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THE PHYTAL FAUNA OF *SARGASSUM* OFF VISAKHAPATNAM COAST*

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ABSTRACT

In the foreshore region of Visakhapatnam Coast, the phytal animals of *Sargassum* (*S. turneri*?) were studied during the period January, 1967 to December, 1968. The standing crop of the alga ranged between 1.80 and 4.60 kg/m² of rock surface. The maximum growth was observed during November in both the years and minimum in March-May period. The total non-sessile faunal density ranged from 894.2 to 22255.0/100 g of alga with the maximum numbers in February-March period and the minima in January, 1967 and November, 1968. The fauna of *Sargassum* was not dominated by any single group throughout the year. The maximum total faunal density occurred when the algal thalli were declining and degenerating and the ambient hydrographical conditions (like salinity and temperature) were steady. Bivalves, gastropods and halacarines were abundant when the alga was prolific and while withering, foraminiferans, nematodes, polychaetes, chironomids, copepods and amphipods were high in numbers. The phytal faunal density of the present area compares favourably with those from other areas.

INTRODUCTION

THOUGH the faunal wealth and ecological significance of sea-weeds have been studied since the beginning of this century, quantitative studies of the phytal animals are very few. Important quantitative investigations dealing with the intertidal phytal fauna associated with algae are those of Colman (1940) ; Wieser (1952, 1959) ; Chapman (1955) ; Glynn (1965) ; Jansson (1966, 1967, 1969, 1970) ; Zavodnik (1967 a. b) and Nagle (1968). The works of Dahl (1948) ; Ohm (1964) ; Hagerman (1966) and Mukai (1971) are the principal references pertaining to the sublittoral phytal faunal communities.

The zoology of the algal belts of Indian Seas is vastly an unexplored field. Quantitative studies of the phytal fauna have not so far been made from Indian waters except for the recent investigation by Sarma and Ganapati (1970). The present paper dealing with the results of the investigation on the phytal animals of *Sargassum* thalli, forms a part of the more comprehensive studies of qualitative composition and quantitative distribution of the fauna of 13 species of common local littoral algae. The object of the present studies is to assess the productivity of the littoral phytal region and to compare the findings with those of the temperate phytal.

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ENVIRONMENT

Topography : The present investigation was carried out in the foreshore *Sargassum-Gracilaria* region of Visakhapatnam Coast (17° 40′ 30″ and 17° 45′ N and the longitudes 83° 16′ 25″ and 83° 21′ 30″ E) on the east coast of India. The coast is mostly rocky comprising chiefly of Precambrian Khondalites and Leptynites. Collections were made at five selected stations (Fig. 1) representing different physical conditions of the rocks. They were separated from one another by wide stretches of sand and all of them are subjected to direct wave action and insolation.

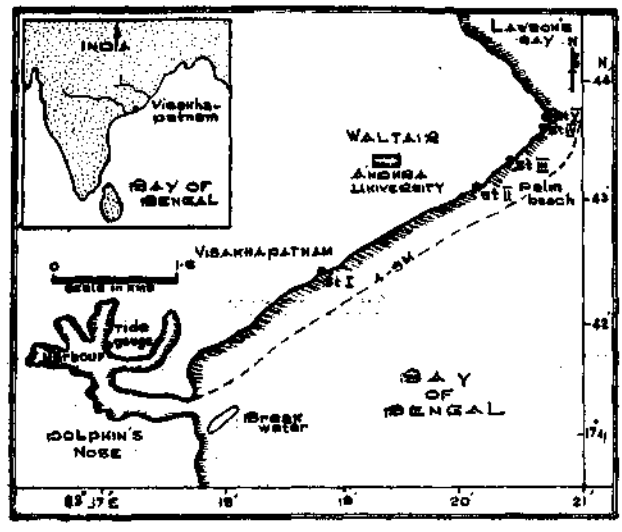

Fig. 1. Location and coast line of Visakhapatnam showing collection stations.

Monthly observations and qualitative collections were made at all stations throughout the period of investigation. Station III (Palm Beach) was selected for detailed quantitative studies of the phytal fauna through seasons in view of the fact that it offered a wide range of habitats. The diagramatic representation of zonation of the flora and fauna at Palm Beach is shown in Fig. 2.

Sand level changes on the beach : Changes in the sand levels affect the area and vertical heights of the substrata available for plant and animal colonisation to a great extent. It was observed in general that the sand ' cut ' of the beach commenced from October to April and filling up of the beach from May to September (Umamaheswara Rao and Sreeramulu, 1964).

Hydrographical conditions : Observations were made on the seasonal fluctuations of surface water temperature and salinity by taking water samples at weekly intervals at Station III (Palm Beach) in the intertidal region (0.5 m depth).

The surface water temperatures were recorded with a centigrade thermometer of 0.2°C sensitivity. The temperatures were recorded between 1300 hrs and 1400 hrs IST.

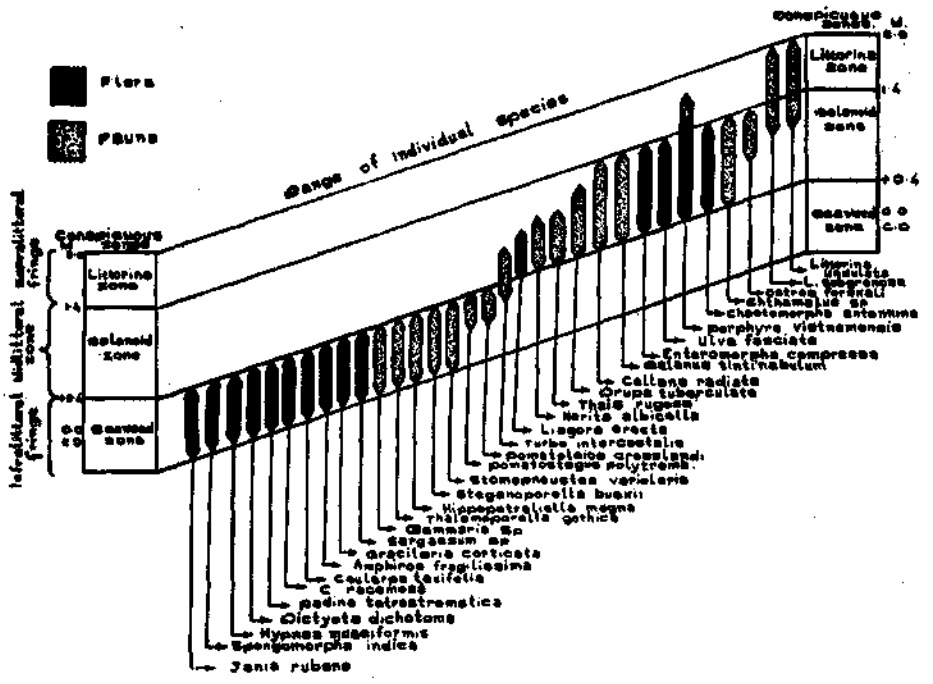

Fig. 2. Diagramatic representation of zonation at Palm Beach.

The chlorinity of the seawater was determined by Knudsen's method as given by Barnes (1959).

Surface temperature : The monthly averages of surface temperature of seawater ranged from 24.6°C to 29.3°C in January and October respectively during 1967 and 26.4°C to 29.4°C in January and October respectively during 1968. The difference between the maximum and minimum surface temperature was 4.8°C during the entire period of investigation. High values are recorded during the months May and October in both the years and there is a slight decrease in temperature during August (Fig. 3a).

Salinity : The salinity conditions are high and steady during the months March to September in both years ranging from 31.84 to 34.50‰ during 1967 and 30.78 to 34.50‰ during 1968. The salinity reaches a minimum value of 24.40‰ in October, 1967 and 24.67‰, in November 1968 (Fig. 3b). From November there is a gradual rise in salinity reaching the peak in May of 1967 and July of 1968.

Tides : The tides on the Visakhapatnam Coast are semidiurnal. The maximum range of spring tides observed during 1967 and 1968 was about 2.04 m. The different mean tidal levels varied from month to month as there are marked changes in the mean sea level (Prasada Rao and La Fond, 1954). Data (supplied by the authorities

of the Geodetic and Research branch, Survey of India, Dehradun) presented in Fig. 4 indicate the yearly and monthly variations in the mean tidal levels for the period of study. In 1967 the mean sea level in different months ranged from 0.59 m in April to 0.93 m in October and in 1968 from 0.60 m in March to 1.05 m in October. Since the mean tide levels vary monthly, the different tidal heights from which the algal samples were collected, are expressed in metres above or below the zero level of the tide (chart datum) instead of using the terminology of the mean tide levels such as mean high water of springs (MHWS) or mean low water of neaps (MLWN) which may not indicate the exact position of the algae in the intertidal region.

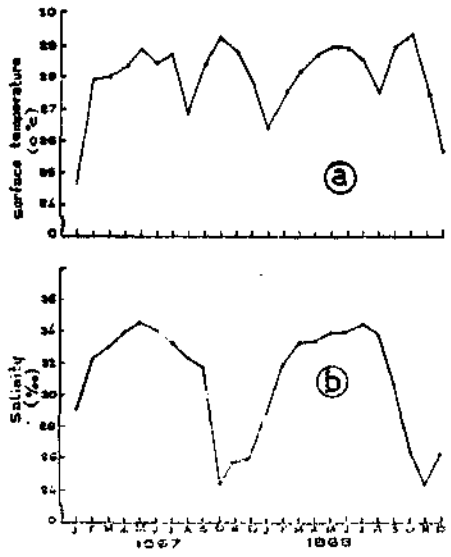

Fig. 3. Monthly fluctuations in the surface water temperature (a) and salinity (b).

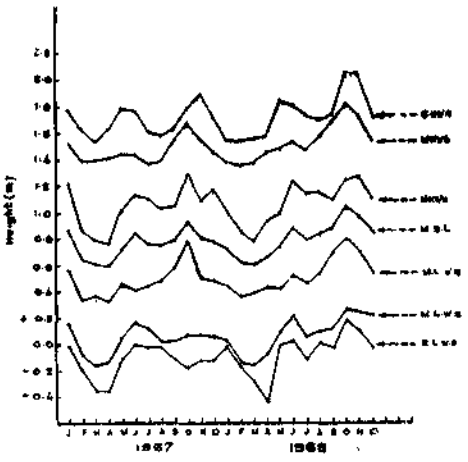

Fig. 4. Seasonal fluctuations in the mean tide levels.

Material and Methods

A total of 23 quantitative quadrate samples were collected from 0.30 m CD during the period January, 1967 to December, 1968 to determine the composition and structure of the faunal associations, supplimented with qualitative collection and field observations. To minimise the effect of possible patchy distribution, two or three samples of each alga were collected, pooled and then analysed. The area covered by each of the quadrate samples was 100 cm^2. The details of the analysis of the samples were given in an earlier paper (Sarma and Ganapati, 1970).

The quantitative data is expressed in terms of numbers of animals per unit weight (100 g) of algae. The standing crop of the alga in terms of wet weight was estimated by 5 samples of 100 cm^2 quadrate, for every month. The seasonal abundance of different faunules are graphically represented. Broken lines in the graphs denote period for which data are not available. The average number of animals of various taxonomic groups per 100 g for the weed was arrived at by pooling the counts of all samples and calculating the average numbers. The average percentage composition of animals of various taxanomic groups in each alga was calculated from the average numbers of animals/100 g of alga.

PROFILE OF THE *SARGASSUM* REGION

Sargassum plants are bushy and 40-50 cms long with lanceolate fronds and spherical vesicles, attached to the rock surface by a discoid holdfast. *Sargassum, Gracilaria corticata* and *Amphiroa fragilissima* are the most striking and band forming perennials of the infralittoral fringe. The limits of this zone extend from about 0.4 m to —0.2 or —0.4 m CD (Umamaheswara Rao and Sreeramulu, 1964). A conspicuous break in the distribution of the intertidal organisms appears near the upper limits of these algae. The upper limit of these algae marks the lower limit of the

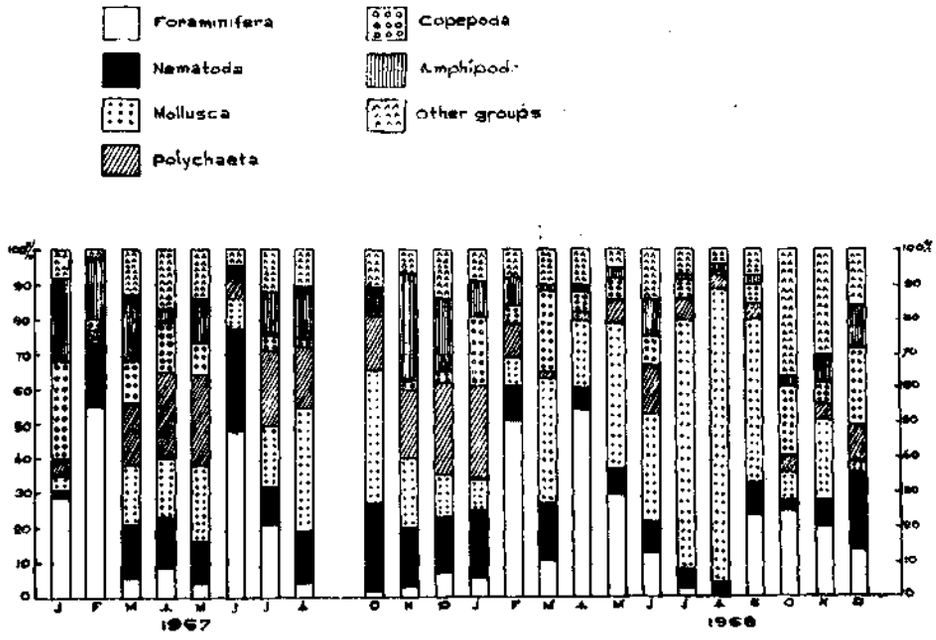

Fig. 5. Seasonal variation of percentage composition of the fauna present on *Sargassum*.

balanoid zone. In certain areas *Caulerpa taxifolia, C. racemosa, Padina tetrastromatica* appear as regular bands in this zone. In areas where bands are not formed, many algae occur either as scattered patches or in the form of mixed algal turf. *Sargassum* forms regular bands on exposed rocky surfaces and species of *Caulerpa, Padina tetrastromatica, Amphiroa fragilissima, Gracilaria corticata* in sheltered areas. *Pomatostegus polytrema, Gemmaria* sp. and *Stomopneustes variolaries* are the most important animals of the infralittoral fringe on this coast.

STANDING CROP AND GROWTH OF *SARGASSUM*

The standing crop ranged from 1.80 to 4.60 kg/m^2 of rock surface during the period of investigation. The maximum growth was observed during November in both the years and the minimum in March-May period (Fig. 6a). The alga was prolific during October to December and started to decline and decay from January to

April. Regeneration and increase in alga was observed from May to September. The epiphytic algal flora comprised of the algae *Sphacelaria furcigera*, *Aglaothamnion cordatum*, *Ceramium* sp., *Ulva fasciata* and in addition many species of diatoms (*viz.*, *Cyclotella meneghiniana*, *Coscinodiscus lineatus*, *C. marginatus*, *Biddulphia mobiliensis*, *Tabellaria floculosa*, *Licmophora abbreviata*, *Climacosphenia moniligera*, *Cocconeis littoralis* and *Pleurosigma elongatum*). Epiphytation was maximum on the fully grown thalli from November to March.

Sediment factor : The sediment (detritus) accumulated on the thalli is distinguished between four categories following Dahl (1948). The accumulation of sediment on the thalli generally corresponded to sediment categories 'O' and 'I'. From July to August in both the years the sediment category was 'O'. During the rest of the period the sediment category was 'I'.

FAUNA

The average population density was 6192 non-sessile animals/100 g of which the foraminiferans (1622), bivalves (1547), nematodes (740), copepods (671), polychaetes (456), amphipods (397), insect larvae (336), and acarines (222) formed the bulk of the fauna in the order of their density. The list of identified species along with their qualitative abundance is given in appendix.

Sessile fauna : The sessile fauna comprised of sponges, hydrozoans, serpulid polychaetes, cirripedians and bryozoans. The sponges were rarely represented by the two species, *Chalina subermigera* and *Halichondria panicea*. A prolific growth of hydrozoans mostly represented by two species of hydrozoans *Sertularia* sp. and *Dynamena quadridentata* was observed. The serpulid polychaetes were represented by *Pomatostegus polytrema* and *Pomatoleios crosslandi*. The cirriped *Chthamalus* sp. was occasionally encountered. The bryozoan *Electra pilosa* was observed in a few samples.

Non-sessile fauna : The total faunal density ranged from 894.2 to 22255.0/100 g during the two years under study. The maximum numbers occurred in the February-March period and the minima in January 1967 and November 1968 (Fig. 6b). The faunal density was high during the decaying phase of the alga except in January 1967 when their numbers were low. The low faunal density corresponded with periods of prolific growth of the alga.

The percentage composition of non-sessible fauna was found to vary seasonally (Fig. 5). Foraminiferans, formed 1.2% to 55.6% during the two years under study with minimum in August-September and maximum in February-April period. The percentage composition of nematodes ranged from 1.9 to 29.3%. The minima occurred in January 1967 and August 1968 and maxima during June 1967 and December 1968. The molluscs varied from 0.3% to 84.8% with minimum values in December-February and maxima during August-October periods. The polychaetes varied from 1.9% to 27.1% with minimum values during February-March and maxima in December-January periods. The copepods contributed 0.8% to 28.2% with minima during June-August and maxima in January-March periods. The amphipods varied from 0.4% to 30.9% with their minima during June-July and maxima in November-December. The remaining groups ranged from 1.6 to 35.6%. They were conspicuous during March-June and October-December in both the years.

Foraminifera (Fig. 7b)

Numerical range : 31.2 to 8695.6.

Seasonal distribution : Minima in August-October period and maxima during February in both the years.

Species composition : The common species were *Textularia agglutinans, Quinqueloculina lamarckiana, Q. vulgaris, Entzia tetrastomella, Trochammina inflata, Lagena* sp., *Elphidium craticulatum, E. crispum, Discorbis vesicularis, Ammonia dentata, Rotalia calcar* and *Cibicides lobatulus.*

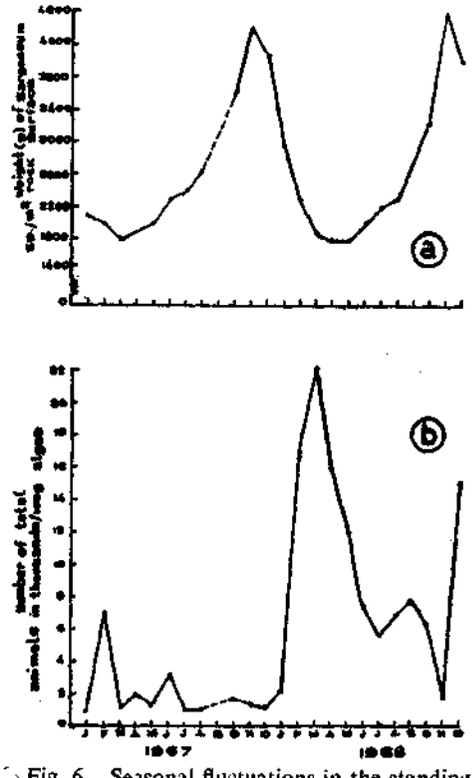

Fig. 6. Seasonal fluctuations in the standing crop of *Sargassum* per m^2 of rock surface (a) and number of total animals/100 g alga (b).

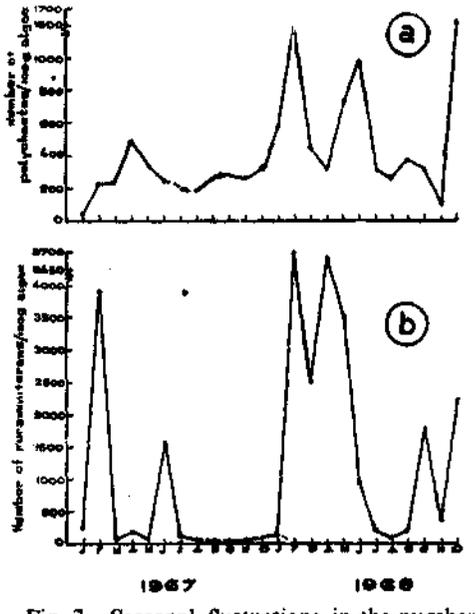

Fig. 7. Seasonal fluctuations in the number of polychaetes (a) and foraminiferans per 100 g alga (b).

Remarks : The maximum abundance occurred during the decaying period of the alga. Mukai (1971) found that foraminiferans ranged between 100-4090/100 g on *Sargassum serratifolium.* The foraminiferans in the present species is almost double that on *S. serratifolium.*

Nematoda (Fig. 8a)

Numerical range : 17.2 to 3500.0.

Seasonal distribution : Maxima in February-March and minima in January 1967 and November 1968.

Remarks : Mukai (1971) observed the largest number of nematodes (206/g) when the alga was luxuriant. In the present observation the numbers (35/g) were fewer than in *Sargassum serratifolium* and the maximum numbers were present when the alga was on the decline. The sheltered sublittoral location of *S. serratifollium* may explain the larger abundance of nematodes in the above alga in contrast to the present species which is exposed.

Polychaeta (Fig. 7a)

Numerical range : 43.1 to 1632.6.

Seasonal distribution : Maxima in April 1967 and December 1968 and minima during January 1967 and November 1968.

Species composition : Mostly dominated by members of the families Nereidae and Syllidae. Polynoidae, Eunicidae, Phyllodocidae, Terebellidae and Sabellidae were represented in smaller numbers, although they occurred frequently.

Remarks : The density was relatively higher when the alga was declining except in January 1967 when the numbers were low. During the peak periods of abundance larval and juvenile forms comprised the bulk of the population.

Insect larvae (Fig. 8b)

Numerical range : 34.3 to 1590.0.

Seasonal distribution : Maxima in March-April period and minima in October 1967 and July 1968.

Remarks : The maximum numbers corresponded with periods of decline of the alga.

Copepoda (Fig. 9a)

Numerical range : 19.2 to 5000.0

Seasonal distribution : Maxima in March-April period and minima during November 1967 and August 1968. Copepods were generally very abundant from January to May in both the years. In October and December 1968 they were fairly high in numbers.

Species composition : The common species were *Longipedia coronata, Porcellidium fimbriatum, P. clavigerum, Harpacticus clausi, H. littoralis, Tisbe furcata, Scutellidium plumosum, Parastenhelia littoralis, Amphiascopsis cinctus, Laophonte* (*Laophonte*) *cornuta, L.* (*L.*) *hirsuta, Orthopsyllus linearis* and *Enhydrosoma* sp.

Remarks : Mukai (1971) observed Copepoda the most important constituent of the non-sessile phytal animals for they formed more than 50% of the total population throughout the year. In the present area the copepods ranged between 0.8 and 28.2% of the total population.

Amphipoda (Fig. 9b)

Numerical range : 25.8 to 1795.6

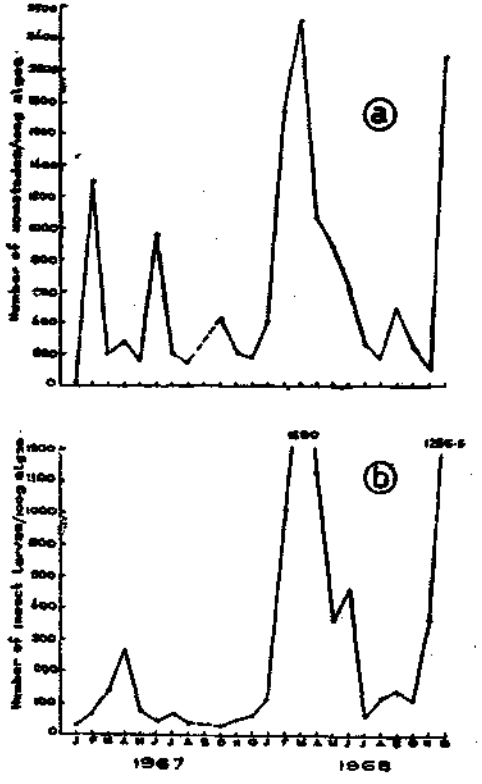

Fig. 8. Seasonal fluctuations in the number of nematodes (a) and insect larvae per 100 g alga (b).

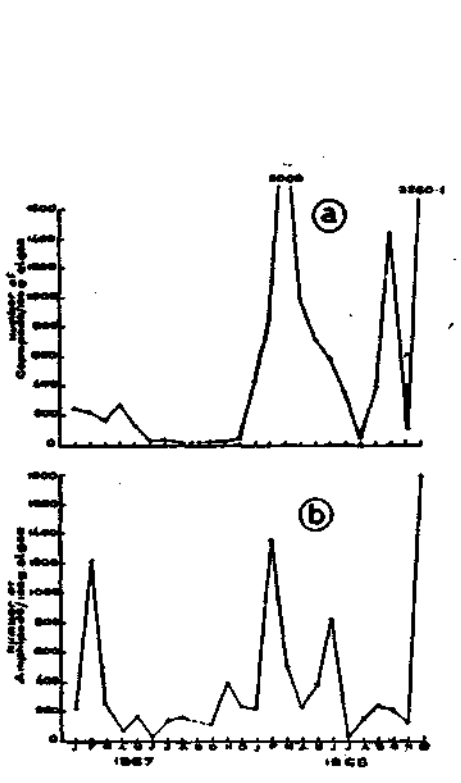

Fig. 9. Seasonal fluctuations in the number of copepods (a) and Amphipoda per 100 g alga (b).

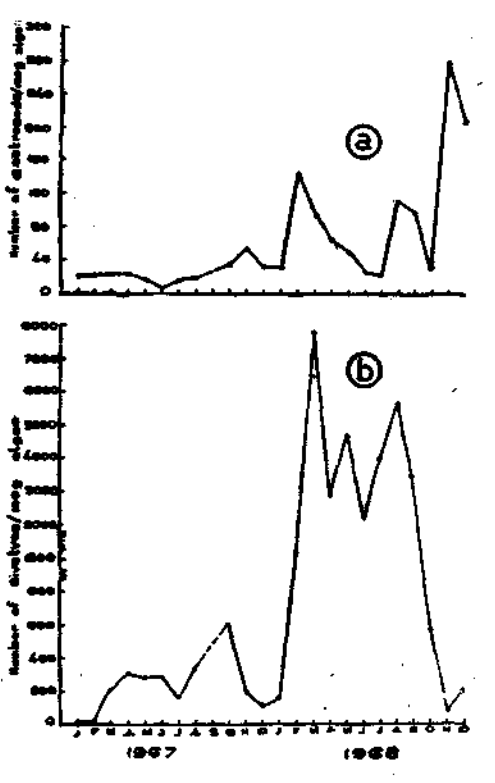

Fig. 10. Seasonal fluctuations in the number of gastropods (a) and bivalves per 100 g alga (b).

Seasonal distribution : Minima during June-July and maxima in December-February period.

Species composition : Hyale honoluluensis, H. diploidactyla and *Elasmopus pectinicrus* were the important species.

Remarks : Amphipod fauna was next to Copepoda in abundance among crustaceans. They were high in numbers when the alga was declining.

Gastropoda (Fig. 10a)

Numerical range : 4.3 to 282.7

Seasonal distribution : Minima during June-July and maxima in November in both the years.

Species composition : Pyrene zebra, Rissoina clathrata and *Cingula* sp. were the common forms.

Remarks : The numbers were high when the alga was prolific. Both mature and recently metamorphosed juvenile specimens were present. During August-September period and November-December months deposits of egg masses were observed on the leaf blades.

Bivalves (Fig. 10b)

Numerical range : 10.2 to 7825.0

Seasonal distribution : Maxima during October 1967 and March 1968 and the minima in February and November respectively. The bivalves were generally high in numbers from March to October. From November to February they were low in density in both the years.

Species composition : Musculus strigatus was the only abundant form. Very rarely *Septifer bilocularis* and *Arca avellana* were present.

Remarks : The bivalves formed 83.2% of the total number of animals during August 1968. During the seasons of peak abundance a major portion was constituted by the juvenile and just metamorphosed forms. They get attached on to the thalli by byssus in the axils of the leaf bases and near the discodial holdfasts.

The rest of the faunules were sporadic in their occurrence and do not contribute much to the bulk of the fauna (Table 1). Their maximum densities/100 gm are as follows : Anthozoa (102.9), Turbellaria and Nemertini (205.0), Sipuncula (4.3), Amphineura (176.4), Pycnogonida (4.3), Halacaridae (2380.9), Ostracoda (150.0), Tanaidacea (204.3), Isopoda (112), Decapoda (70) and Echinodermata (8.6).

TABLE 1. *Seasonal abundance of individual numbers of Anthozoa, Turbellaria and Nemertini, Sipuncula, Ostracoda, Isopoda, Tanaidacea, Decapoda, Halacaridae, Pycnogonida, Amphineura and Echinodermata per 100 g of weed*

Months		Anthozoa	Turbellaria & Nemertini	Sipuncula	Ostracoda	Isopoda	Tanaidacea	Decapoda	Halacaridae	Pycnogonida	Amphineura	Echinodermata
1967												
January	..	..	..	..	..	8.6	10.3	10.3	6.8	1.7	..	..
February	..	..	..	2.0	..	28.5	..	2.0	22.4	4.0	..	..
March	..	8.6	..	..	..	..	21.7	..	..	4.3	..	..
April	..	10.8	8.6	..	..	6.5	..	17.3	32.6	..	8.6	..
May	..	102.9	..	..	14.7	..	..	2.9	..	..	..	..
June	..	30.4	4.3	..	13.0	8.6	..	2.1	43.4	..	..	..
July	..	16.6	..	..	..	28.5	..	..	..	..	..	..
August	..	9.7	4.4	..	..	62.5	..	9.7	..	..	1.3	..
October	..	14.0	57.7	..	..	46.8	6.2	17.1	..	..	..	7.8
November	..	7.6	23.0	..	..	9.6	..	3.8	9.6	..	..	..
December	..	16.3	..	..	..	79.5	..	6.1	..	2.0	..	..
1968												
January	..	15.3	..	..	..	5.7	7.6	34.6	..	..	..	..
February	..	30.4	..	..	..	..	204.3	69.5	..	..	26.0	8.6
March	..	50.0	205.0	..	150.0	..	20.0	70.0	300.0	..	..	..
April	..	73.3	66.6	..	..	..	..	43.3	366.6	..	13.3	6.6
May	..	..	..	..	..	5.8	..	23.5	294.1	..	176.4	..
June	..	15.4	38.0	2.3	..	8.3	4.7	9.5	476.1	2.3	4.7	3.5
July	..	58.6	72.4	..	..	55.1	141.3	10.3	..	..	..	3.4
August	..	..	..	..	..	112.0	6.8	8.6	18.9	1.7	3.4	5.1
September	..	..	..	..	..	92.1	65.7	15.7	210.5	..	5.2	5.2
October	..	19.0	41.6	..	17.8	10.7	3.5	3.5	2380.9	3.5	3.5	..
November	..	6.8	6.8	..	..	17.2	6.8	20.6	68.9	..	..	..
December	..	17.3	8.6	4.3	..	100.0	95.6	17.3	869.5	..	..	..

Discussion

During the present investigation, a maximum of 7046.3 (February, 1967) and 22255.0 (March, 1968), and a minimum of 894.2 (January, 1967) and 1623.1 (November, 1968) mobile phytal organisms were found per 100 g of algae. When expressed in terms of numbers per m^2 of rocky surface covered with algae, these figures are equivalent to 140926.0 ; 422845.0 ; 18778.2 and 74662.6 respectively.

The increase in the faunal density from February to April coincides with the breeding season of many of the phytal invertebrates which is evinced by the presence of larval forms, the young and subadult forms. This was also the period during which steady ambient hydrographical conditions (like temperature and salinity) ; and sand 'cut' phenomenon prevailed. The sand 'cut' uncovers the covered rocks and helps in providing more substratum for the thalli to colonise and hence to the phytal organisms. Further the peak abundances of animal density corroborates with the degeneration of the thalli of *Sargassum*. The degenerating and decaying plant contributes to the detritus that gets deposited on the thalli which attracts a number of deposit and detritus feeders. The importance of the detritus factor in the bioeconomy of the algal forests need not be overemphasised in view of the work of Peterson (1918), Dahl (1948), Wieser (1952, 1959), Hagerman (1966) and Mukai (1971) who have pointed out the importance of the sediment factor in determining the relative faunal composition and abundance. The relatively low density values obtained from May to November may be attributed to the young developmental state of the thalli and filling up of the beach with sand during May to September and the rough sea conditions resulting in severe wave action. The steep fall in faunal density in November in both the years synchronises with the adverse ambient low salinity and relatively high temperature conditions.

The changes in the faunal composition, however, appears to have a close relationship with the breeding of the phytal animals, which in turn, depends upon a rise in water temperature and increase in sediment or detritus resulting from the decline, decay and degeneration of *Sargassum*. More interestingly the nematodes, syllid polychaetes and harpacticoid copepods increased in numbers with increase in detritus and epiphytation.

The low faunal density values of *Sargassum* (422845/m^2) on the local coast may be the result of the intertidal distribution of the plant unlike what Mukai (1971) observed in the Inland Sea of Japan on *S. serratifolium* (1600000/m^2-maximum density value).

There are differences in the amount of standing crop of algae/m^2 of bottom. In the present studies a maximum of 4.5 kg wet weight of *Sargassum*/m^2 rocky surface was observed. For *S. serratifolium*, Mukai (1971) recorded a wet weight of 4.93 kg/m^2 bottom. This difference in the weight may be due to differences in the species of algae.

A comparison with the non-sessile animal population densities of the phytal reported by Colman (1940), Chapman (1955), Hagerman (1966) and Zavodnik (1967 a, b) suggests that the tropical *Sargassum* weed fauna is very rich. The density of the phytal animals/g algae seems to be governed by differences in the shapes of algae and 'specific surface' area per gram algae (the latter is influenced by shape, height consistency and degree of branching) (Wieser, 1951, 1952). The degree of

sedimentation which influences the faunal density (Dahl, 1948) appears to be governed by other factors such as water conditions, current, secretion of mucus matter from the thalli and the planktonic organisms (Mukai, 1971).

The fauna of *Sargassum* in the present area was not dominated by any single group throughout the year whereas Mukai (1971) found benthic copepods as the principal constituent of the phytal fauna of *S. serratifolium* forming more than 50% of the total population throughout the year. Mukai (1971) reported that the seasonal fluctuations of the individual number of animals generally corresponded with those of the standing crop of *Sargassum*. In the present area the maximum numbers of animals occurred when the thalli were declining and degenerating.

Bivalves, gastropods and halacarids were abundant when the alga was prolific and while decaying foraminiferans, nematodes, polychaetes, chironomids, copepods and amphipods were high in numbers.

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APPENDIX

List of identified species and their qualitative abundance

Key to symbols

R = Rare (1-10 individuals)
C = Common (11-20 individuals)
A = Abundant (21-100 individuals)
AA = Very abundant (over 101 individuals)

Foraminifera	
Marsipella sp.	R
Textularia agglutinans d'Orbigny	A
Quinqueloculina lamarckiana d'Orbigny	A
Q. vulgaris d'Orbigny	A
Quinqueloculina sp.	C
Trochammina inflata Montague	A
Entzia tetrastomella Daday	A
Nodosaria japonica Cushman	A
Elphidium craticulatum Hofker	A
E. crispum (Linne) Cushman and Grant	AA
Discorbis vesicularis Lamarck	A
Rotalia calcar Hofkerr	A
Ammonia dentata (Parker and Jones)	AA
Cibicides lobatulus Walker	A
Porifera	
Chalina subermigera (Ridley)	R
Halichondria panicea (Pallas)	R
Hydrozoa	
Syncoryne sp.	R
Obelia bicuspidata Clarke	A
Clytia noliformis (McCrady)	A
Orthopyxis intermedia Stechow	A
Sertularia sp.	AA
Dynamena quadridentata (Ellis & Solander)	AA
Anthozoa	
Undetermined species	A
Turbellaria	
Pseudoceros sp.	R
Thysanozoan sp.	R
Eurylepta sp.	C
Nemertini	
Undetermined species	A
Nematoda	
Undetermined species	AA
Polychaeta	
Lepidonotus tenuisetosus (Gravier)	C
L. cristatus Grube	C
L. dictyolepis Haswell	R
Harmathoe imbricata (Linn)	R
Euphrosyne myrtosa Savigny	R
Phyllodoce tenuissima (Grube)	C
P. (Anaitides) madeirensis Langerhans	R
Eulalia viridis (Muller)	R
Syllis (Typosyllis) prolifera Krohn	AA
Syllis (Typosyllis) krohnii Ehlers	A
Syllis (Ehlersia) cornuta (Rathke)	A
Odontosyllis gravelyi Fauvel	C
Exogone gemmifera Pagenstecher	R
Perinereis cultrifera Grube	A
Pseudonereis anomala Gravier	A
Platynereis dumerilii (Aud & M. Edwards)	AA
Eunice tubifex Crossland	C
Marphysa mossambica Reters	R
Marphysa sanguinea Montagu	R

Lumbriconereis impatiens Claparede	C
Loima medusa (Savigny)	R
Lanice socialis (Willey)	R
Thelepus plagiostoma Schmarda	C
Streblosoma persica (Fauvel)	C
Terebella sp.	R
Terebellides sp.	R
Dasychone cingulata Grube	R
Pomatoleios crosslandi Pixell	C
Pomatostegus polytrema Philippi	C
Sipuncula	
Phascolosoma dentigerum	R
Pycnogonida	
Anaplodactylus sp.	R
Ammothea sp.	R
Halacaridas	
Undetermined species	AA
Chironomidae	
Undetermined species	AA
Ostracoda	
Undetermined species	A
Copepoda	
Longipedia coronata Claus	A
Macrosetella gracilis Dana	R
Peltidium maldivanum Sewell	R
Syngastes indicus Sewell	R
Porcellidium fimbriatum Claus	AA
P. clavigerum Pesta	AA
Harpacticus clausi A. Scott	C
H. littoralis Sars	C
Tisbe furcata (Baird)	C
Scutellidium plumosum (Brady)	C
Parastenhelia littoralis (Sars)	C
Eudactylopus striatus Sewell	C
Diosaccus truncatus Gurney	C
Amphiascopsis cinctus (Claus)	C
A. hirsutus (Thompson and Scott)	C
Phyllopodopsyllus minor (Thompson & Scott)	R
Laophonte (*Laophonte*) *cornuta* Phil.	A
L. (*L.*) *hirsuta* (Thompson & Scott)	C
L. (*L.*) *meinerti* Brady	C
Orthopsyllus linearis Claus	C
Enhydrosoma sp.	R
Cirripedia	
Chthamalus sp.	R
Tanaidacea	
Leptochelia filum (Stimpson)	AA
Isopoda	
Paranthura sp.	C
Elaphognathia insolita (Stebbing)	R
Exosphaeroma sp.	A
Dynamenella sp.	R
Eurydice inermis Hansen	R
Synidotea variegata Collinge	A
Amphipoda	
Elasmopus pectinicrus (Bate)	AA
Maera quadrimana (Dana)	C
Hyale diplodactyla Stebbing	A
H. honoluluensis Schellenberg	AA
Gammaropsis zeylanicus Walker	R
Photis digitata Barnard	R
Decapoda	
Alpheus strenuus Dana	R
Letopocten sordidulum Kemp	R
Pachygrapsus minutus A. M. Edwards	R
Ptychognathus barbatus A. M. Edwards	R
Pilumnus laevis Dana	C
Menaethius monoceros M. Edwards	C
Hyastenus diacanthus Dettaan	C
Bryozoa	
Electra pilosa (L.)	R
Amphineura	
Acanthochitona mahensis Winckworth	A
Bivalvia	
Arca avellana Lamarck	R
Modiolus metcalfei (Hanley)	R
M. tulipa (Lamarck)	R
Septifer bilocularis (Linne)	R
Musculus strigatus (Hanley)	AA
M. cumingianus (Dunker)	R
M. nanus (Dunker)	R
Isognomon nucleus (Lamarck)	R
I. legumen (Gmelin)	R
Venerupis macrophylla Deshayes	R
Irus exoticus (Lamarck)	R
Gastropoda	
Cellana radiata (Born)	R
Gibbula blanfordiana Nevill	R
Clanculus clanguloides (Wood)	R
Turbo intercostalis Menke	R
Phenacolepas asperulata	R
Rissoina clathrata A. Adams	A
Cingula sp.	A
Triphora concinna Hinds	R
T. violacea (Quoy & Gaimard)	R
Pyrene zebra (Gray)	A
Acteocina townsendi (Melvill)	R
Echinodermata	
Stomopneustes variolaris (Lamarck)	R
Stichopus chloronotus Brandt	R
Palmipes sarasini de Loriol	R
Ophiothrix fragilis (Abildgaard)	R