The importance of the addition of electrolytes like, KCl, NH₄Cl and KNO₃ has already been shown. The gel strength can be increased by 5 to 15% with the addition of KCl (Table 1) which not only enhances gel strength but also controls gelation temperature (Table 1), as indicated earlier.

From the present study, it seems that Hypnea, Gracilaria, Gelididia and their mixtures can be used as a source of agar. However, to get the desired gel strength, KCl should be added before filtering the hot extract. But the addition of an electrolyte to increase the gel strength of the final product may not be desirable when agar is to be used for bacteriological investigations.

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References

A Model for the Prediction of Zooplankton Abundance in an Estuary

M. Madhupratap, T. S. S. Rao & H. Krishna Iyer
National Institute of Oceanography, Regional Centre Cochin 682018

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Regression model for the prediction of zooplankton abundance correlating total numbers of zooplankton with salinity, temperature and oxygen from Cochin to Alleppey during 1972 and monthly collections at 2 stations, viz. Barmouth (Cochin) and Aroor (about 14 km south of mouth) from Nov. 1971 to Oct. 1972. Zooplankton collections and measurements of the environmental parameters (salinity, temperature and oxygen) were made as reported earlier.

Correlation coefficients were calculated between total numbers of zooplankton, salinity, temperature and oxygen. All the correlation coefficients being found significant, they were connected by a multiple regression model. The regression model fitted to the data was $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3$, where $Y$ stands for total numbers, $X_1$ for salinity, $X_2$ for temperature and $X_3$ for oxygen. The regression was fitted by the method of least squares and the normal equations were solved using matrix inversion.

Significance of the regression coefficients was tested by analysis of variance and the relative importance of environmental parameters was estimated using the formula: $b_1 = \frac{\sum X_1Y}{\sum X_1^2}$ (ref. 3).

The equation derived for the whole estuary (series 1) was $\hat{Y} = -17.4733 - 0.0201X_1 + 0.8118X_2 + 1.2685X_3$. It was $\hat{Y} = 4.1574 + 0.0643X_1 - 0.0438X_2 - 0.2801X_3$ at Aroor and $\hat{Y} = 5.4335 + 0.0559X_1 - 0.1532X_2 - 0.2877X_3$ at Barmouth.

The test of significance for regression coefficients (Table 1) showed that in series 1 and at Aroor, the fitted regressions were highly significant ($P<0.001$) while at Barmouth it was significant at a lesser level ($P<0.05$). The variability explained by the fitted regression was 73.5% in series 1, 88.7% at Aroor and 52.2% at Barmouth.

Proximity to the mouth results in an early recovery of salinity after the monsoon season enhancing a longer duration of typical estuarine conditions at Aroor. During the monsoon period salinity and zooplankton population are very low at this station. Hence the parameters considered accounted a higher percentage of variability at Aroor. But Barmouth is subjected to greater turbulence even during premonsoon period resulting in greater variations in environmental parameters and fauna. During the monsoon period also the salinity values ranged from near zero values during low tide to 35.5% at the bottom during high tide. This indicates that other factors such as turbidity, currents and tidal dispersion, food, extent of pollution, etc. may have to be considered to explain the total variability occurring in the environment. Organisation of communities is influenced by multiple environmental stresses and organisms increase or decrease in response to these.

Relative importance of the 3 parameters in the equation are given in Table 2. In all cases salinity is the most prominent factor controlling zooplankton abundance followed by oxygen and temperature. Being a tropical estuary, fluctuations in temperature are of low magnitude to affect the organisms drastically. But sharp variations in salinity occur in the estuary and zooplankton population is very low.
during the low saline monsoon period. The abundance of copepods in the estuary has been found to be significantly correlated with salinity. Similar results have been obtained for zooplankton by Pillai et al.

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References


Bioaccumulation of Iron in Anadara rhombea (Born) (Bivalvia: Arcidae)

GEORGE JOHN
C.A.S. in Marine Biology, Parangipettai 608502

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Iron content of the mantle, ctenidia, adductor muscle, digestive gland and foot of A. rhombea, collected from 2 localities with different sedimentary iron concentrations was estimated. Iron content of tissues was found to be an indicator of the environmental iron concentration. During starvation iron content in all the body organs decreased, and steep decline was noted in digestive gland and ctenidia, the chief organs associated with digestion and feeding which normally show higher concentration of iron.

AMONG bivalves, members of the family Arcidae contain haemoglobin (iron compound) in their blood. Many workers have reported trace elements uptake, their effect on the animals and the concentration factor between the organism and the environment. Previous studies show that in estuarine systems concentration of these trace elements is higher in sediments, especially muddy sediments. In shallow estuaries, the large amount of suspended particles present are filtered by the bivalves, the feeding of which chiefly depends on the particle size of the food material present. Silt and other light sediment particles form most of the suspended matter in the overlying waters of muddy subtidal areas. The trace elements present in the sediments thus find their way into the bivalve body. An attempt has been made to study the flux of iron from the sediment to various body organs of the mud living estuarine arid bivalve Anadara rhombea (Born), from 2 localities. Concentration of exchangeable or biologically reactive fraction of iron in the sediment and the effect of starvation on the bioaccumulated iron have also been studied.

Specimens of A. rhombea (Born) were collected from 2 localities, the mudflat which extends from the Pitchavaram mangrove up to the seaward outlet of Kilaii backwaters at Chinnavaikkal (11°26'N; 79°48'E) and the muddy area in the tidal zone of Vellar estuary (11°29'N; 79°46'E). The specimens, ranging from 4 to 5 cm in length, were all with gonads in the spent stage. Animals were kept in filtered seawater for one day, to clear the digestive tract. Mantle, ctenidia, adductor muscle, digestive gland and foot (including the gonad and the body wall) were isolated, washed with distilled water and dried at 70°C in an oven. Tissues were always kept out of contact with iron instruments or particles. These tissues were digested with perchloric acid and the iron content was estimated following the method described by Stickland and Parsons.

Another sample of animals from the estuary was kept in filtered seawater for 6 days before tissues were analysed for iron content. Surface sediments (5 cm depth) were taken from different areas of mangrove mudflat and the estuary, dried and the iron was extracted with 0.1N HCl and estimated following the procedures of Cross et al. Iron thus estimated in the sediment provided a gross measure of the fraction of iron available for exchange between sediment and biota.

Biologically reactive iron at the 2 localities differed markedly. In the mangrove sediment the values were higher ranging from 3151-78 to 3330-22 µg/g while in the estuarine sediment it ranged from 1635-47 to 1663-05 µg/g.

Amount of iron in the body of the clams varied significantly in both the biotopes (Fig. 1). Maximum iron content with respect to dry weight was in foot followed by adductor muscle, mantle ctenidia and digestive gland. Values were higher in all the...