in the stagnant water of paddy fields may lead to harmful effects. The age of the wells varied from 5 to 38 months and the water has been flowing continuously during these periods. There seems to be no correlation between the age of the wells and the total microbial population of the water. Perhaps the microbial populations of the underground water vary from place to place.

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VERTICAL ZONATION AND SEASONAL VARIATION IN THE GROWTH OF PORPHYRA ON VISAKHAPATNAM COAST

Based on some dried specimens in Prof. Iyenger's collection from the Madras Harbour, Boergesen first reported the occurrence of Porphyra in India. Subsequently Sreeramulu found this alga growing in the littoral region on Waltair coast. Porphyra was not observed on any part of the Visakhapatnam coast before 1950. A few plants were found for the first time on this coast in 1951 and during the next three years it gradually established itself on boulders in the intertidal region. The present communication deals with the vertical distribution and seasonal variation in the growth of Porphyra observed in the year 1961 on this coastline.

Porphyra occurs on smooth as well as Chthamalus encrusted boulders in the midlittoral zone (of Stephenson's scheme) which are daily covered and uncovered by the tides. In the early stages of its annual growth it begins to appear here and there on the shells of Cellana and Chthamalus and it grows gradually without mixing with the other algae and forms distinct dark mahogany-red coloured bands on the surfaces of boulders exposed to wave action. The range of vertical distribution of these bands in the intertidal region is worked out following the method described by Evans. The height of Porphyra band during the period of its maximum development in 1961 is found to be about one metre with well-marked upper and lower limits (Fig. 1), extending approximately from 0.4 to 1.4 metres above the zero level of the tide.

FIG. 1. Photographs of a boulder on Visakhapatnam Coast showing the Porphyra band. A. entire band; B. close-up of a portion of the band with the scale of height (in metres) above the zero level of the tide.

Data on the seasonal variation in the quantity of Porphyra growth have been obtained by marking five quadrats (each with a side of 25 cm.) at different vertical heights in the midlittoral zone on the surfaces of some selected boulders in February, the beginning of its annual growth period in 1961. The area covered by the alga in each quadrat is measured at fifteen-day intervals. The average values of percentage cover per quadrat estimated from the actual results are plotted in Fig. 2 to show the
seasonal variation in the quantity of the algal mass observed from the beginning till the end of its growth period in 1961. Although Porphyra disappeared from all the quadrats in the month of June, a few plants were observed in the vicinity till the end of August. After the disappearance of the thalli produced in the growing season in 1961, no traces of Porphyra are found on these boulders till the alga reappeared in the next year on the shells of Cellana and Chthamalus. Drew and Richards have reported that Porphyra exists in the Conchocelis-phase in certain barnacles and suggested that these infested barnacles provide a perpetual reserve from which fresh thalli develop year after year. The possibility of its perennial in the Conchocelis-phase during its unfavourable periods on Visakhapatnam coast is suggested by its appearance on Cellana and Chthamalus in the early stages of its annual growth.

On this coastline the growth period of Porphyra in 1961 extended from March to May. Sreeamulu reported May to August as the growth period of this alga in the year 1952. In 1962 we have observed the growth period extending from January to April. The year to year variations observed on the same coastline are probably due to the variations in the environmental factors operating in the intertidal region in different years.

The seasonal growth period in which Porphyra flourishes luxuriantly on this coast is found to be the period when most of the other algal forms growing in the intertidal region are in a degenerating condition. An examination of the daily tidal records of this coast for this part of the year revealed the occurrence of lowest tides in the year. As such this part of the intertidal region is exposed to air for a comparatively longer time during this period than in the rest of the year. Highest air temperatures are also recorded during these months. The luxuriant growth of Porphyra during this period indicates its capacity to resist conditions of desiccation better than other algae growing at this height. In the vertical distribution also it has been reported that Porphyra displays considerable variation in different regions showing its tolerance to factors associated with submergence and emergence.

Results reported here are collected as part of a scheme work which was financed by the Council of Scientific and Industrial Research, New Delhi, to whom we express our thanks.

Botany Department. M. UMAMAHESWARA RAO Andhra University, T. SREEAMULU. Waltair, September 15, 1962.

Added in proof: Prof. George F. Papenfuss has now identified this species as Porphyra vietnamensis Tanaka et Ho.


ASSOCIATION OF A NEW SPECIES OF PHOMA WITH PLEOSPORA HERBARUM (PERS.) RAHB,

The plants of Citrus maxima growing around Allahabad manifested severe leaf-spotting of dark-gray colour in August 1957. Isolation of the black fructifying bodies from the diseased regions yielded the perithecia of Pleospora herbarum as well as pycnidia of Phoma sp. The herbarium specimen as well as the culture of the latter organism were sent to C.M.I., Kew, but it could not be attributed to any of the existing species of Phoma. Due to abnormally elongated size (vide Fig. 1) of the conidia it is being described as a new species, viz., Phoma nainiense sp. n.

Morphological character of the isolate

Hyphae very closely septate, light brown 5·2-7·6 μ wide; pycnidia black, 215-340 × 131-