filaments are sparsely branched and the branching often one sided. Rarely branches of the second order are also seen.

The cells are cyclindrical, 4–6 μ broad and upto 6 times as long, markedly constricted at the septa (figure 2). The terminal cells of the branches are rounded. Each cell is uninucleate and a parietal, laminate-perforate chloroplast with a single pyrenoid. The organisation is often obscured in older cells by accumulation of reserved food material. The cell wall is 2 to few layered.

The beaded appearance is so pronounced suggesting a high degree of fragmentation and is probably one of the ways in which the alga propagated. Isolated cells belonging to the peripheral branches (figure 3) or the central portions (figure 4) are frequently seen floating in the medium.

Besides fragmentation, formation of reddish brown thick walled akinetes is also seen. These akinetes develop mostly from the round cells of the central portion by gradual growth and enlargement (figure 15). Fully developed akinetes were 7.5–24 μ broad, 10.5–37.5 μ long, round to ovoid with a very thick lamellated wall and dense granular contents which generally obscure internal organisation but on careful examination showed the features of vegetative cell (figure 15). The akinetes produced a number of small thin walled aplanospores which were released through an apical pore (figures 5, 6, 13, 15).

Swarmer formation is also seen. The round cells of the central portion of the oval basal cells of the peripheral filaments produced 32–64 swarmers by repeated divisions of the contents (figures 7, 8). The protoplasts were extruded through an apical or lateral pore into a vesicle where they developed their characteristic configuration and flagella (figures 9, 10). It looked as though the zoospores were not always liberated into a vesicle. Occasionally direct liberations of zoospore (figure 12) occurred. The liberated zoospores were ovoid to pyriform, 3.4–5 μ broad, 6–9 μ long and biflagellate with a laminate unipyrenoidal chloroplast, a pair of contractile vacuole, and an anterior stigma (figures 11, 14). After swarming for a while they settled down, rounded up, enlarge and grew into new thalli (figures 14, 16–18).

The only previous record of *C. gloeophilum* from this region is that of Skuja[1]. The collections were from the University College Laboratory and made on the 11th December 1936. In the first collection the alga occurred as free-floating circular patches as reported here. The second was apparently grown on the sides of a glass jar. Prior to Skuja's (and the present) record *C. gloeophilum* was known to occur only as an endophyte in the mucilage of various blue-green algae[1]. This appears to be the first record of this interesting alga from India.

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DISTRIBUTION OF pH IN THE CENTRAL ARABIAN SEA BY REDFIELD KETCHUM AND RICHARD'S MODEL

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WE have recently shown[1] that the organic decomposition model of Redfield *et al*[2] can successfully define the linear relationship between total inorganic carbon and apparent oxygen utilization (AOU) (average $\Delta C/\Delta O$ ratio = 0.395, as compared with theoretical value 0.384) in the Central Arabian sea. This model however has not been utilized for computing the distribution of pH in sea water. In this note, we establish equations for computing pH in Central Arabian sea using the above model. For this purpose, 13 stations (lat. 15°–20°N, long. 58–71°E) with 269 observations were worked out from the earlier reported work[3].

Total CO_2 (TCO_2) is computed by equations of Takahashi *et al*[4] as

$$TCO_2 = \left[TA - \frac{T_B - K'_B}{a_H + K'_B}\right]\left[\frac{a_H^2 + a_H K' + K'_1 K'_2}{a_H K'_1 + 2K'_1 K'_2}\right] \quad (1)$$

where TA and T_B are total alkalinity and total boron respectively. T_B is given by $1.21 \times 10^{-5} S$ where S is salinity. K'_1 and K'_2, first and second apparent dissociation constants of carbonic acid and their pressure derivatives are calculated by data of Lyman[5] and the equations of Culberson and Pytkowicz[6]. K'_B is apparent dissociation constant of boric acid.

It has been shown earlier[1] that total CO_2, TCO_2, corrected to salinity, total alkalinity and preformed CO_2(Co) is denoted by TCO''_2 and has linear relation with normalized AOU as

$$TCO''_2 = Co + 0.384\,(AOU). \quad (2)$$

Considering (1) and (2), one can compute the corrected pH (25°) which is expected to show non-linear dependence with AOU. However, the corrected pH (25°) has linear dependence with normalized AOU. The normalised AOU is defined as

$$AOU_{normalized} = \frac{AOU \times 35}{salinity},$$

A new term called "$AOU_{relative}$" can be defined as

$$AOU_{relative} = \frac{(TCO''_2)_{pHi} - (TCO''_2)_{8.2}}{0.384}, \quad (3)$$

where $(TCO''_2)_{pHi}$ is the value of TCO''_2 corresponding to a particular pHi. TCO''_2 was assigned the lowest value at zero $AOU_{relative}$ and at pH 8.2. $(TCO''_2)_{8.2}$ is total corrected CO_2 at pH 8.2. The theoretical pH curve can be calculated by

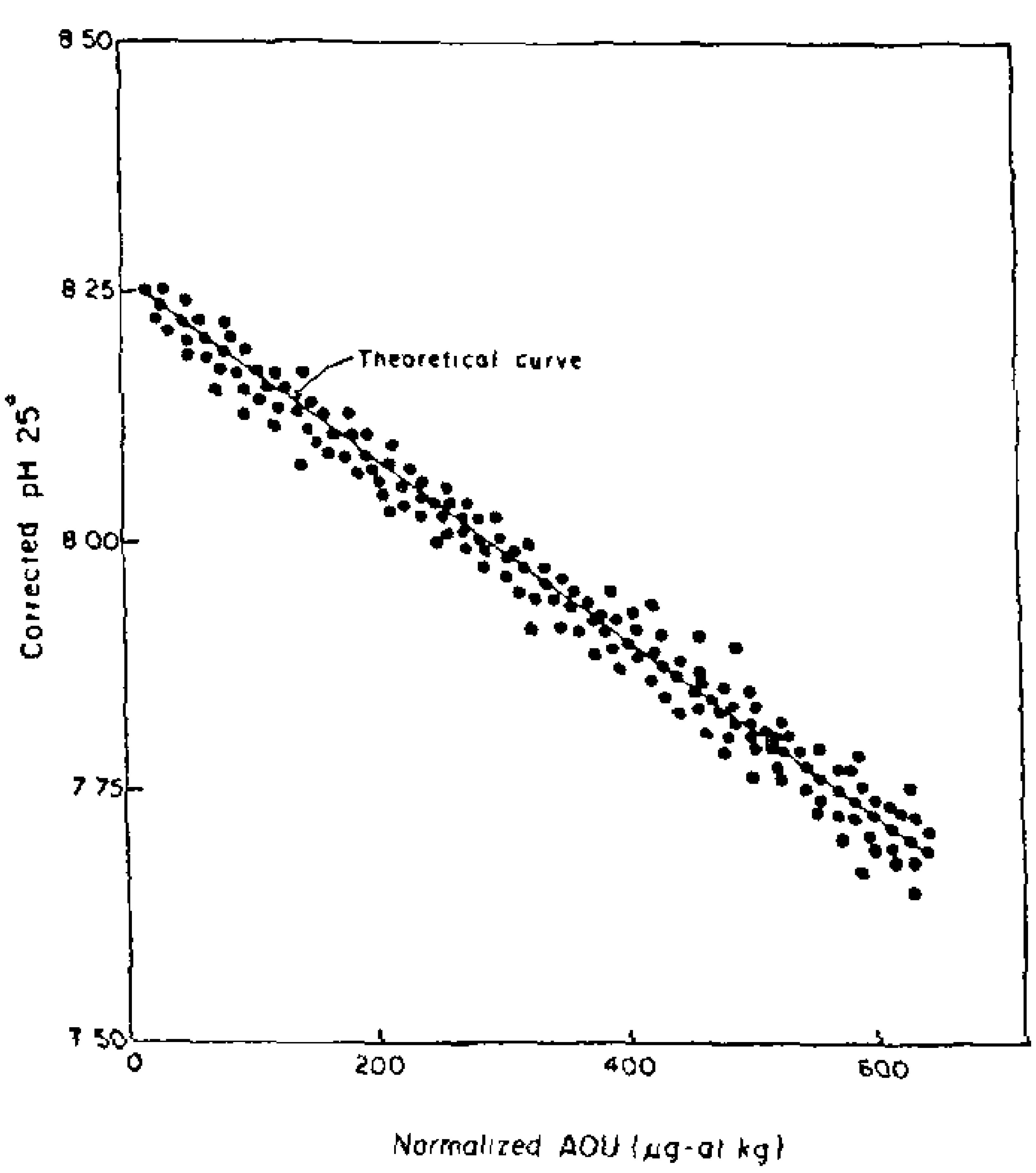

Figure 1. Corrected pH_{25} vs normalised AOU.

$$TCO''_2 = Co + 0.384\,AOU = \left[TA_n - \frac{T_B - K'_B}{a_H + K'_B}\right]\left[\frac{a_H^2 + a_H K'_1 + K'_1 K'_2}{a_H K'_1 + 2K'_1 K'_2}\right]. \quad (4)$$

In (4), TA_n is the normalized value of total alkalinity. In Central Arabian sea, the normalized value of TA_n (total alkalinity normalized to salinity and depth) is 2.771 meq kg^{-1} of sea water as reported elsewhere[2].

$AOU_{relative}$ obtained from (3) was plotted against pH in figure 1. The theoretical curve calculated from (4) was then superimposed over the experimental points in the figure. The points overlapping in the figure are removed for clarity. The theoretical curve was shifted along the x-axis until the best fit was obtained. A computer program developed on Apple II was employed for the purpose.

The standard deviation σ between the observed and the calculated pH values (269 points) was 0.015 unit.

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EFFECT OF STREPTOMYCIN ON THE GROWTH OF RHIZOBIUM

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THE assumption that the antibiotic resistant mutants and their wild types behave similarly is not necessarily justified because streptomycin being a bacteriocidal compound, is likely to create many distortions in the morphology as well as the physiology of a bacterium.