the pellets prepared from finely-powdered polymer sample at a pressure of 7.03×10^6 kg/m^2, were measured at 30°C at a frequency of 1 MHz.

The d.c. and a.c. conductivity of the parent ligand, 1,4-dihydroxyanthraquinone is 7.23×10^{-13} Ω^{-1} cm^{-1} and 8.06×10^{-8} Ω^{-1} cm^{-1} respectively but this value has been found to increase dramatically in the case of polychelates of Co(II) and Ni(II) to 6.60×10^{-7} Ω^{-1} cm^{-1} and 2.20×10^{-7} Ω^{-1} cm^{-1} ($\sigma_{d.c.}$) and 1.26×10^{-4} Ω^{-1} cm^{-1} and 5.14×10^{-6} Ω^{-1} cm^{-1} ($\sigma_{a.c.}$) respectively. Further, the dielectric constant of Co(II) and Ni(II) polychelates is 112 and 21 respectively against 2.29 of 1,4-dihydroxyanthraquinone. The a.c. conductivity at 1 MHz is higher than d.c. conductivity in case of 1,4-dihydroxyanthraquinone and its Co(II) and Ni(II) complexes.

This suggests that the mechanism of conduction is "hopping" though a metal is also present in the latter cases. The short range motion of electron under applied a.c. field seems to give rise to a higher a.c. conductivity. This has also been observed in many low mobility amorphous and crystalline materials[5].

The dielectric constant of Co(II) and Ni(II)-polychelate is higher than that of 1,4-dihydroxy-anthraquinone. The increase in dielectric constant in polychelates can be attributed to the increase in the percentage ionic character of the bond as a result of coordination. The relative motion of the ions in applied a.c. field gives rise to a larger ionic polarization which accounts for an increase in the dielectric constant. However, a dielectric constant of 21 and 112 appears to be too high to arise from ionic polarization alone. Since both the metal ions belong to *3d* series these might be existing in more than one valency state in the polychelates under study. Hopping of the electrons from one valency state to the other will effectively provide a bipotential model and dipolar polarization. This explains the observed higher dielectric constant of the metal chelates under study.

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ROLE OF *AZOTOBACTER* IN NITROGEN FIXATION IN THE PRESENCE OF OIL CAKES AND DICALCIUM PHOSPHATE

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THE presence of *Azotobacter* in soils and its participation in asymbiotic nitrogen fixation are highly relevant to nitrogen fixation in soils[1]. The present report relates to the effect of ground nut oil cake (GOC) and mustard oil cake (MOC) alone and also in combination with a phosphorus fertilizer, dicalcium phosphate (DCP), and KCl on nitrogen fixation and the growth of *Azotobacter* in the medium black soil.

These soils amended with cakes (GOC or MOC) and also with cakes and DCP and cakes, DCP and KCl were regularly exposed to sunlight for 8 hr every day for 180 days. Similar sets were kept in the dark for the same period to study the effect of light on nitrogen fixation and the growth of *Azotobacter*. The soil samples were analyzed at intervals of 90 days for total carbon[2] and total nitrogen[3]. The *Azotobacter* population in soil was determined by serial dilution technique[4] on nitrogen-free medium. The data obtained on *Azotobacter* count were subjected to 'Q test'[5] to reject any statistically suspect value. Standard deviations were also calculated to indicate the precision.

It was observed that the *Azotobacter* count and nitrogen fixation increased in the presence of oil cakes. The increase was enhanced further when DCP and DCP and KCl were also present along with GOC or MOC. The results are presented in figure 1 which show significant enhancement in the amount of nitrogen fixed in 180 days with an increase in the *Azotobacter* population. The *Azotobacter* count was somewhat larger in the dark than in light, but nitrogen fixation was always more in light than in dark. These results find support from a recent study on the role of *Azotobacter* in nitrogen fixation[6].

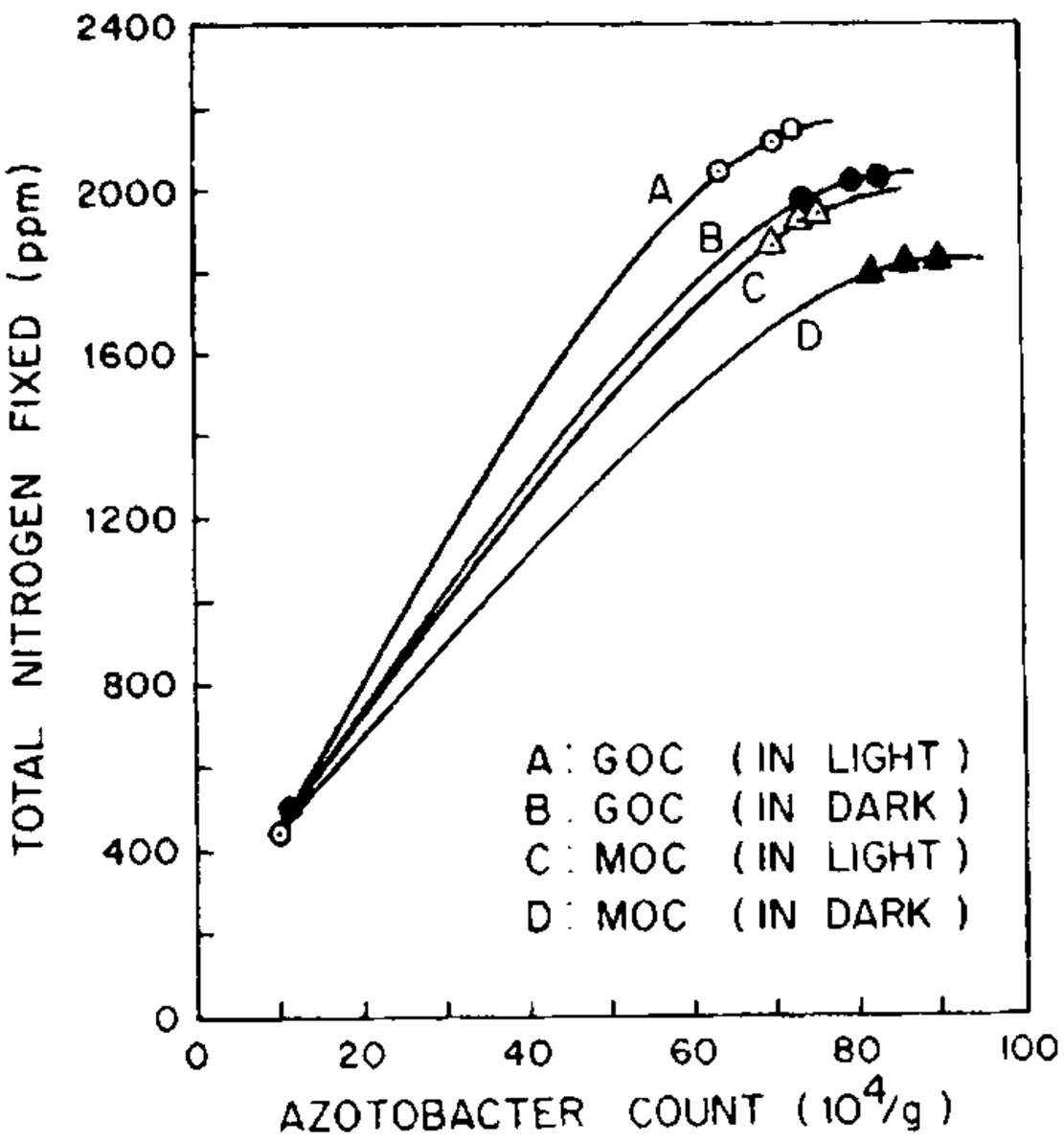

Figure 1. Increase in total nitrogen fixed with increase in *Azotobacter* count in the presence of oil cakes and mixed fertilizers in 180 days.

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EFFECT OF PYRIDINE DERIVATIVES ON ENCYSTMENT OF *ACANTHAMOEBA CULBERTSONI*

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MANY different physiological and environmental conditions trigger differentiation in amoebae[1,2]. Amino acids have been characterized as excystment agents for many species of amoebae but no unique and universal agent is known to promote encystment of different amoebae[1]. A medium containing magnesium chloride and taurine promoted very good encystment of *A. culbertsoni*; cyclic AMP and biogenic amines were also highly effective[3–5]. Srivastava and Shukla[6,7] observed that a purely inorganic medium containing sodium sulphate and magnesium sulphate, as well as several other organic effectors promoted very good encystment of this amoeba, while sugars, amino acids and organic acids exerted catabolite repression of encystation[8]. Several aliphatic and aromatic amines as well as pyridine failed to promote encystment; these compounds also caused lysis of amoebae[7]. The present communication reports the ability of certain hydroxypyridines and pyridine carboxylic acids to promote excellent excystment of *A. culbertsoni*.

An axenic culture of *A. culbertsoni* [(strain A-1) kindly provided by Dr B. N. Singh of this Institute] was maintained in the peptone medium of Kaushal and Shukla[9] containing 2% peptone, 0.5% sodium chloride, 1 mg/100 ml thiamine and 0.5 μg/100 ml cyanocobalamine (pH 7.0). The basal medium for testing the effect of encystment agents contained 0.086 M sodium chloride and 0.015 M magnesium chloride. The growth medium and the basal encystment medium (NM) of the above composition were sterilized at 15 lb/in^2 of steam for 20 min. Aqueous solutions of pyridine derivatives were adjusted to pH 7.0, sterilized separately and added to the medium to the desired concentration; volatile compounds were sterilized by filtration through Swinex filters containing 0.22 μm millipore filters. The cells of *A. culbertsoni* were grown with shaking (Rotary shaker, Emenvee Engineers, Poona) at 37 ± 1°C for 4 days, harvested by centrifugation (1000 g × 10 min) and washed with 150 mM sodium chloride. Freshly harvested amoebae (0.5 ml) of desired cell density were added to 4.5 ml of basal encystment medium supplemented with different compounds. The tubes were incubated with shaking at 28 ± 2°C, and examined periodically for cyst forma-