In conclusion, we have seen that the *s*RNA nucleotide composition of *Streptomyces fradiae* is very similar to that of other micro-organisms examined, $G + C$ content being nearly 62 per cent.

The constancy of percentage of nucleotide composition in *s*RNA in micro-organisms involves a similar constancy in the related cistron of DNA[5]. This could be explained, following a hypothesis by Silvestri and Hill[6], by assuming that the cistron was only slightly affected by mutations during evolution, because a mutation at any site of this cistron would disturb complementarity and therefore prevent the formation of the helical structure of *s*RNA and hence exact recognition by the activating enzyme. A mutation at the site determining the triplet complement to the codon almost certainly involves lethal alteration in code reading.

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A Role for Inorganic Ions in the Maintenance of Intracellular Solute Concentrations in a Marine Pseudomonad

One of the earliest observations of a physiological nature made by marine microbiologists was that marine bacteria prefer sea water or a solution of sodium chloride to fresh water in the medium for growth[1]. Recent studies have shown that the need of marine bacteria for sea water in chemically defined media represents a requirement for inorganic ions[2] and that inorganic ions play at least two essential parts in the growth and survival of the cells. First, inorganic ions are required for the nutrition and metabolism of marine bacterial cells. Specific requirements for a number of the ions of sea water for growth[3,4], oxidative metabolism[5] and active transport[6] have been demonstrated. Secondly, inorganic ions are required to prevent lysis of marine bacterial cells. Studies with a marine pseudomonad have shown that the requirement for inorganic salts to maintain the integrity of the cells in a suspending medium is not due to the osmotic activity of the salts in solution but to the fact that inorganic ions are intimately involved in maintaining the mucopeptide layer of the cell wall intact[7].

A third role for the ions of sea water in the survival of marine bacteria has now come to light. This is a role in maintaining intracellular solute concentrations in cells of a marine bacterium. Evidence for this role arose in the course of studies of the uptake of α-aminoisobutyric acid-1-^{14}C by cells of marine pseudomonad *B*-16. This compound, which is not metabolized by the cells, can be accumulated intracellularly to a concentration some 3,000 times greater than that prevailing in the medium. The transport mechanism involved in this uptake has been shown to be activated specifically by Na^{+}[6]. When cells of the organism which had been allowed to accumulate the compound labelled with carbon-14 were centrifuged from the medium and resuspended in various salt solutions, it became evident that in some salt solutions the labelled compound was retained by the cells, while in others the compound was released into the medium.

Washed cells of marine pseudomonad *B*-16 (NCMB 19) were allowed to accumulate α-aminoisobutyric acid-1-^{14}C using procedures described previously[6]. The labelled cells were centrifuged from the incubation medium, the supernatant solution was removed, the interior surface of the tube was swabbed dry with a tissue and the cells resuspended in the salt solution to be tested. One-ml. aliquots of the suspensions were filtered through 'Millipore *HA*' filters at appropriate intervals. The cells on the filter were washed three times with 1-ml. portions of the same salt mixture as was used in the incubation medium. The filter and its adhering cells were transferred to a vial, air-dried, a scintillation mixture was added and the radioactivity of the cells was measured using a Packard 'Tricarb' liquid scintillation spectrometer.

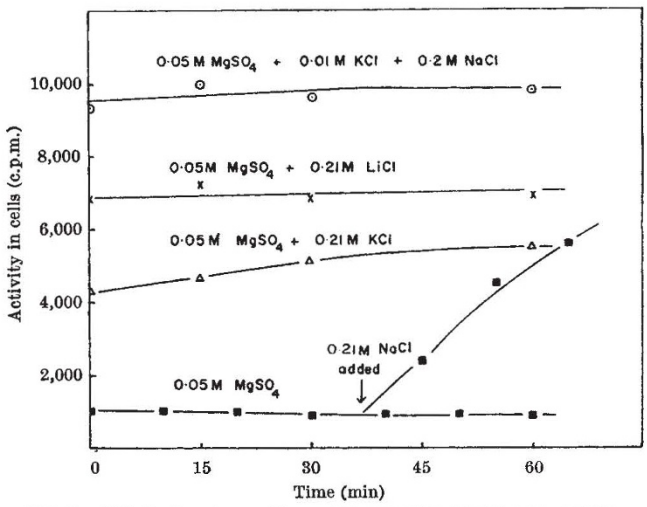

Fig. 1. Effect of various salts on the capacity of cells of a marine pseudomonad to retain ^{14}C-α-aminoisobutyric acid

The results are shown in Fig. 1. When the cells centrifuged from the incubation medium were resuspended in a mixture of sodium chloride, potassium chloride and magnesium sulphate of the same composition as was used in the incubation medium, the level of the labelled compound in the cells was maintained. If the cells were resuspended in magnesium sulphate alone, at a concentration of 0·05 M, the label in the cells was lost, and so rapidly that the rate of loss could not be measured. This loss was not caused by lysis of the cells since magnesium sulphate at this concentration protects the cells of this organism against lysis better than any of the other salts[8]. Furthermore, the addition of sodium chloride to the suspension of cells in magnesium sulphate caused uptake of the labelled compound from the medium again, in line with its function in transport[6]. Lithium chloride and to a lesser extent potassium chloride, though neither can function in the uptake of the labelled compound, were both partially effective in preventing its release. It is thus evident that inorganic ions have a marked capacity to modify the permeability properties of cells of this marine bacterium. This property might well be expected to play an important role in the survival of the cells.

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