THE ORGANISM AND ITS POTENTIAL

Cyanobacteria have been present on the surface of the earth since the early Precambrian times, about $3.6 \times 10^4$ years ago (Stewart, 1977). Reports on the use of certain species of cyanobacteria as a source of food were made by Spanish crusaders in Mexico as early as the sixteenth century. It is now known that the species which had been used as a source of food, both in Mexico and Africa, is none other than Spirulina platensis, an obligate, photoautotrophic organism.

In 1968*, at a conference in Stockholm (June 13-15, 1968) on "Preparing nutritional protein from Spirulina", the following statement was made at the conclusion:

'Every attempt must be made to inform the scientific community of the increasing interest, as a potential source of food, in blue green algae in general, and the genus Spirulina in particular. Determination of the potential of algal protein in animal and human nutrition will require the examination of many strains, cultural conditions and processing techniques. In view of the meagre knowledge of the fine structure and physiological functions in blue green algae the fundamental knowledge of these organisms must be increased'.

Since then, much work has been done on the Spirulina species. Most of the studies have dealt with growth requirements, technological possibilities of using Spirulina for human nutrition, methods to increase digestibility, nutritional value, possible culinary products, protein content and more recently, on the morphology and ultrastructure

*Quoted from Eykelenburg, C.V.1980.
of *Spirulina platensis* (Eykelenburg, 1980). However, as yet, there is very little published information on the basic physiology and functioning of this organism, a major reason for choosing this system on which to commence studies related to nitrogen metabolism.

We have chosen *Spirulina platensis* a free living filamentous cyanobacterium as the system for the present studies for the following reasons:-

(i) Very scanty reports are available on nitrogen assimilation in non-nitrogen fixating cyanobacteria (non-Azotroph). The very fact that *Spirulina* does not fix nitrogen could imply a different mechanism of regulation for nitrogen assimilation in this cyanobacterium.

(ii) It can be grown photoautotrophically, on a minimal basal inorganic medium; is easy to handle, and can be grown axenically with relative ease at pH 8-9, the condition being not amiable for the growth of most other cyanobacteria.

(iii) *Spirulina platensis* is a well documented source for synthesis of single cell protein (SCP) and upto 80 per cent of the dry weight of this cyanobacterium consists of protein. It would be interesting to understand why and how this procaryote has evolved in such a way and whether, its nitrogen metabolism differs from other systems.

(iv) Cyanobacteria also contain a unique photosynthetic accessory pigment phycocyanin, which has been implicated as a source of reserve nitrogen under conditions of nitrogen starvation. In what ways are the dynamics of this protein, which constitutes 40 per cent of the
total protein, controlled and how is it connected to nitrogen metabolism?

In order to understand these basic questions, it was essential to identify and characterize glutamine synthetase, the enzyme which has been implicated with a major role in regulating nitrogen assimilation. Once the basic mechanism is clear, it may be possible to elucidate the functioning of various other aspects linked to the nitrogen metabolism in this cyanobacterium.