A Database of Oxygenic Photosynthetic Gene Clusters form Prokaryotes

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Global warming is one of the most important concerns world-wide. Emission of CO2 is primary cause of global warming; hence efforts are being made to reduce the emission of this gas. In addition to checking emission, another alternative is to reduce CO2 to Carbon and Oxygen. Photosynthesis is one such process that reduces CO2 to organic Carbon and releases Oxygen. Both bacteria and plants are capable of carrying out photosynthesis. Using bacteria for utilizing CO2 has advantages of (i) efficient in terms of space (ii) scalable (iii) genetically modifiable. However useful, major limitation is that only few species are characterized to have photosynthetic capabilities. In order to expand the applicability of this method of reducing CO2 levels, we need to identify photosynthesis capabilities in bacterial species. Availability of sequenced bacterial genomes provided an excellent opportunity to screen for photosynthesis components.

From genomic and plasmid DNA sequences of 1471 bacterial strains, genes encoding for photosynthesis components were found in 952 strains. We found a total of 8,564 genes encoding for photosynthesis components which is far more than any of the reported number of genes encoding for photosynthesis components. Interestingly we found one or more genes encoding for photosynthesis components in almost every second bacterial strain. It is likely that some components are universal where as some are specific. It will further be interesting to see it these specific components are introduced into a strain containing universal components and induce photosynthetic activity

Keywords: Global Warming, Prokaryotic Photosynthesis, Genomic Data Mining