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# **× Economic importance of cyanobacteria**

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# INTRODUCTION

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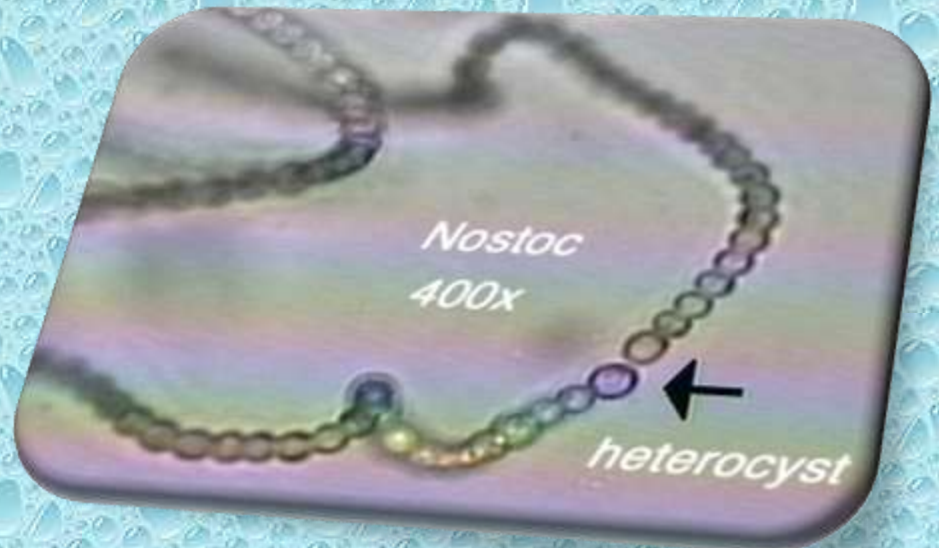
- \*Also known as Blue green algae/Blue green bacteria.
- \*Most successful group of microorganisms on Earth and most genetically diverse.
- \*Stromatolites of fossilized O<sub>2</sub> producing cyanobacteria have been found from 2.8bya. The ability of cyanobacteria to perform oxygenic photosynthesis is thought to have converted the early reducing atmosphere into oxidising one.



# IMPORTANCE

- 1) First organisms to have 2 photosystems and to produce organic material and give off  $O_2$  as a bi-product.
  - 2) Show photosynthetic activity.
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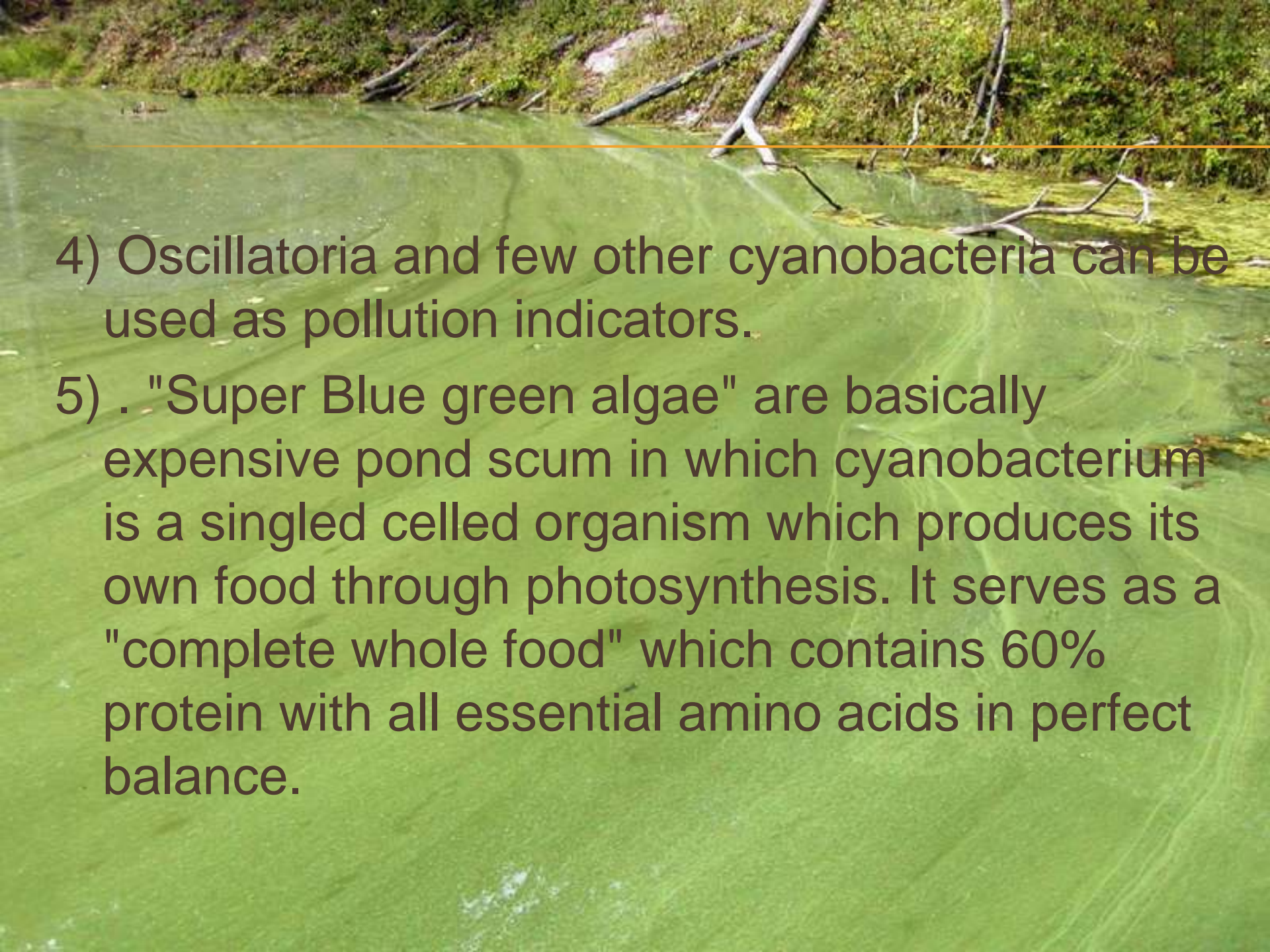
**3) Many** – fix or convert atmospheric nitrogen into usable forms through Nitrogen Fixation when other forms are unavailable.



**IMPORTANT** because atmospheric  $N_2$  is unavailable to most living organisms.

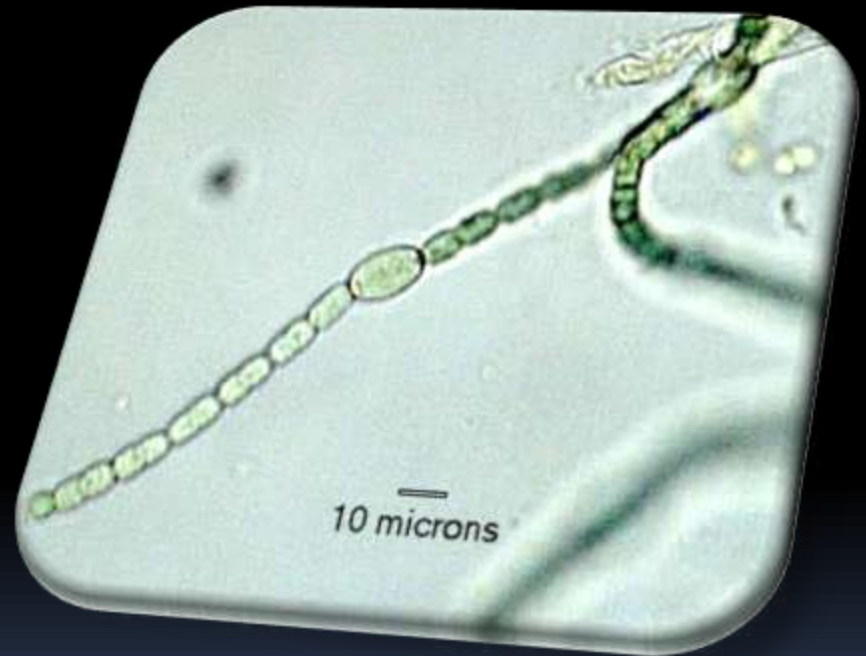
eg., Nostoc




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- 4) Oscillatoria and few other cyanobacteria can be used as pollution indicators.
- 5) . "Super Blue green algae" are basically expensive pond scum in which cyanobacterium is a singled celled organism which produces its own food through photosynthesis. It serves as a "complete whole food" which contains 60% protein with all essential amino acids in perfect balance.

# symbiotic relationships

- They have symbiotic relationship with protozoa, fungi, and nitrogen fixing species form associations with angiosperms. They are photosynthetic partner in most of lichen association. Eg., *Anabaena azollae* colonizes the floating water fern



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- *Apart from this, cyanobacteria also colonizes the roots of higher plants. The corolloid roots of Cycas are good examples of this association.*



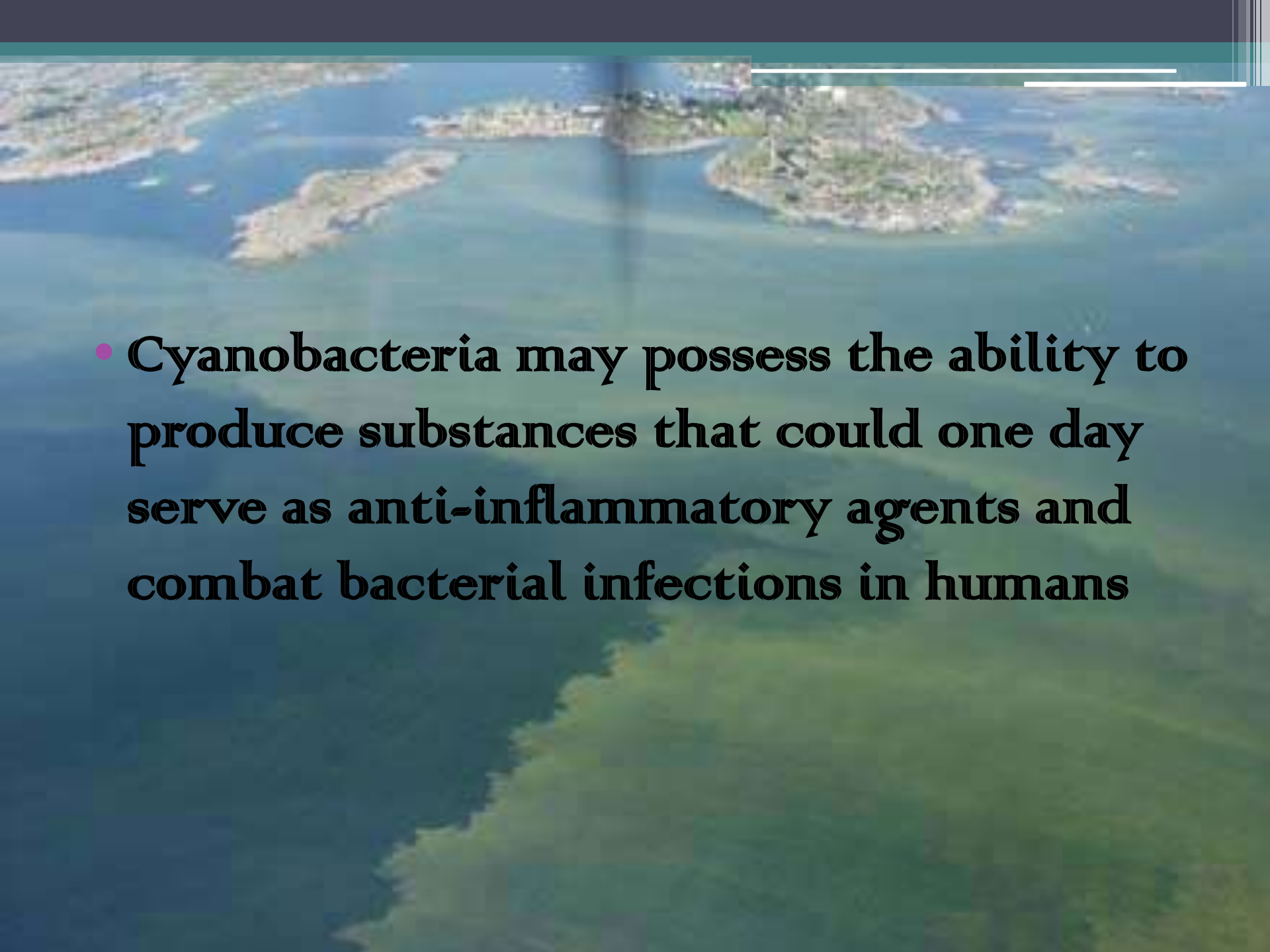
# Its use as food:

- *Spirulina* are sold in market due to their nutritive value.  
*Spirulina* tablets are sold all over the world as “health food”



# ITS APPLICATIONS IN BIOTECHNOLOGY

- **THE UNICELLULAR CYANOBACTERIUM *SYNECHOCYSTIS* SP. PCC 6803 WAS THE THIRD PROKARYOTE AND FIRST PHOTOSYNTHETIC ORGANISM WHOSE GENOME WAS COMPLETELY SEQUENCED. IT CONTINUES TO BE AN IMPORTANT MODEL ORGANISM.**

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- An aerial photograph of a coastal region. In the upper half, there are several small, rocky islands with sparse vegetation. The water around them is a clear, light blue. In the lower half, a large, dense, green algal bloom or cyanobacteria colony spreads across the water, contrasting sharply with the blue water above. The text of the bullet point is overlaid on the blue water area.
- Cyanobacteria may possess the ability to produce substances that could one day serve as anti-inflammatory agents and combat bacterial infections in humans

- *Cyanobacteria are cultured in specific media. Cyanobacteria can be helpful in agriculture as they have the capability to fix atmospheric nitrogen to soil.*

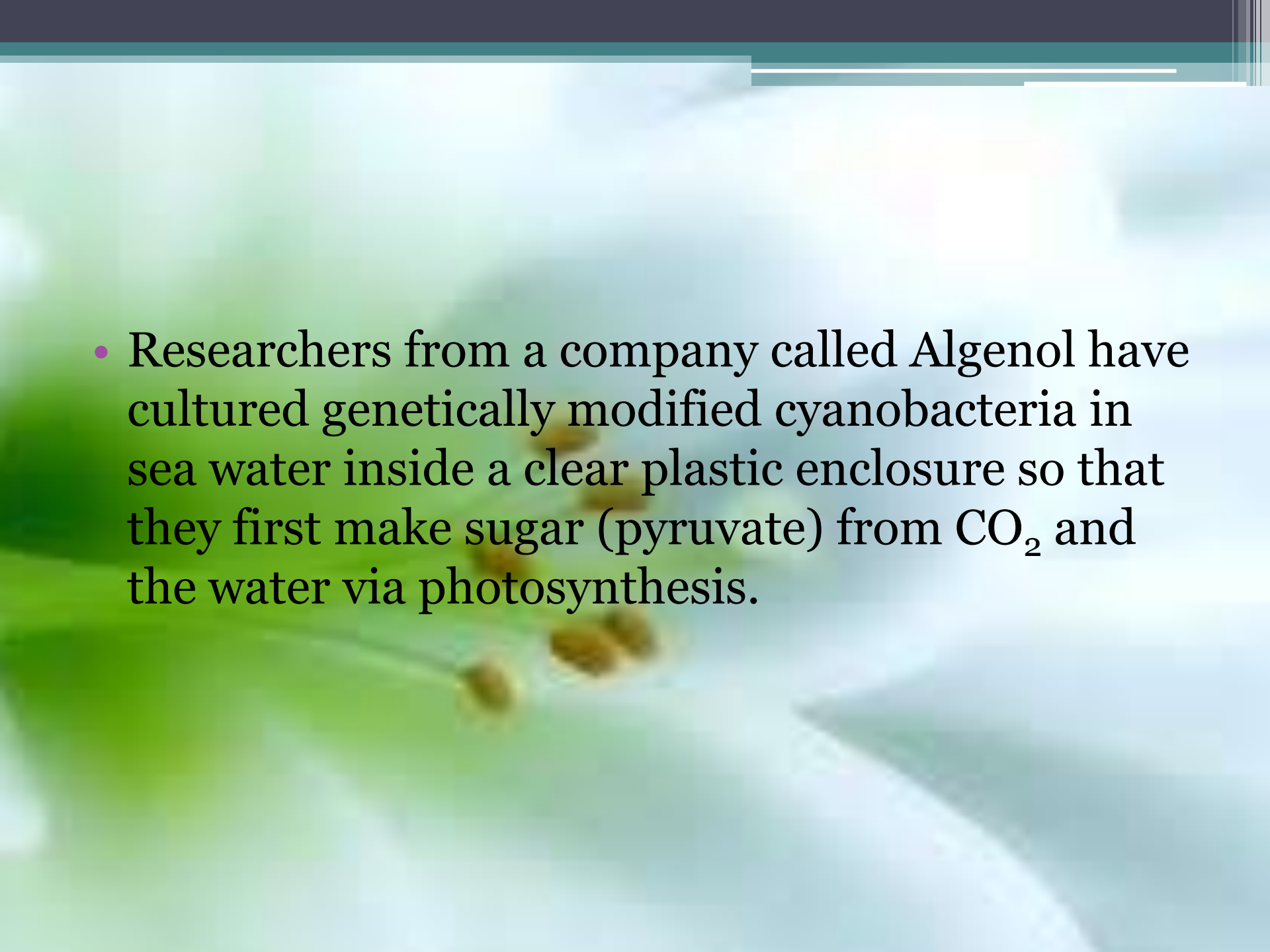




# RECENT RESEARCHES

- Recent research has suggested the potential application of cyanobacteria to the generation of renewable energy via converting sunlight into electricity
- Currently efforts are underway to commercialize algae-based fuels such as diesel, gasoline and jet fuel.



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- Researchers from a company called Algenol have cultured genetically modified cyanobacteria in sea water inside a clear plastic enclosure so that they first make sugar (pyruvate) from CO<sub>2</sub> and the water via photosynthesis.

# HEALTH BENEFITS

- CYANOVIN, a secondary metabolite has been shown to possess anti-HIV activity.
- Consumption of edible blue green algae may also reduce risks of cataracts and age related macular degeneration.
- Sulfate polysaccharides exhibit antitumor, anticoagulant, anti-mutagenic, anti-inflammatory, antimicrobial, and even antiviral activity against HIV, herpes, and hepatitis.

# CONCLUSION

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- Cyanobacteria are arguably the most successful group of microorganisms on earth.
- Cyanobacteria fulfill vital ecological functions in the world's oceans, being important contributors to global carbon and nitrogen budgets.

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***Thank you***

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