

# The history of algae

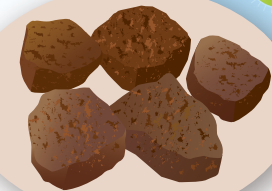
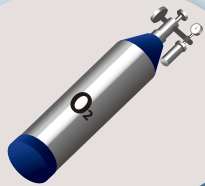
We live on earth that has 21% oxygen in its atmosphere and is teeming with life. This incredible biodiversity and environment are the gift from algae. Let's travel back in time and see how algae have played such an important role for life on earth.

## “Past”

### Oxygen:

3 billion years ago

Oxygen produced by photosynthesis of the blue green algae (cyanobacteria) changed the atmosphere to oxygenic.



### Iron deposit:

2.5–1.8 billion years ago

Vast amount of ionic iron in seawater became insoluble iron oxide by combining with oxygen, which fell to the seabed and formed iron ore deposit.



### Petroleum:

200–100 million years ago

Dead organisms including algae on the sea bed became trapped in the crust and were denatured by high pressure and geothermal heat to form petroleum.

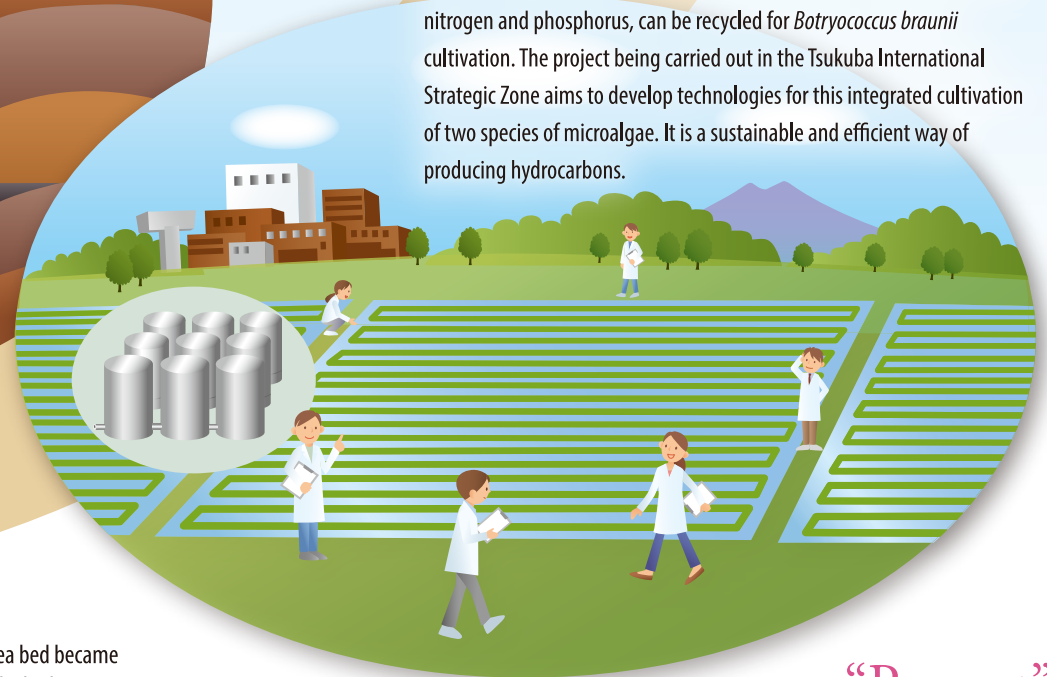
## “Future”

Transformation from consuming natural resources to producing our own resources



### Integration of Photosynthetic Alga *Botryococcus braunii* and Heterotrophic Alga *Aurantiocytrium*

*Botryococcus braunii* is cultured in the large-scale outdoor plant, while *Aurantiocytrium* is cultured in tanks. After going through all the process of culturing, harvesting, and oil extraction, organic effluent and residues will appear. The mixture of solubilized algal residue and organic effluent is a good source of organic nutrition for *Aurantiocytrium*. In addition, effluent of *Aurantiocytrium* cultivation, which contains mineral nutrients such as nitrogen and phosphorus, can be recycled for *Botryococcus braunii* cultivation. The project being carried out in the Tsukuba International Strategic Zone aims to develop technologies for this integrated cultivation of two species of microalgae. It is a sustainable and efficient way of producing hydrocarbons.



## “Present”

Tsukuba International Strategic Zone