

Phormidium Persicinum

Related Ingredient: PHORMISKIN BIOPROTECH

Phormidium persicinum is a primitive microorganism related to the Cyanophyceae family, still called the blue-green micro algae.

Cyanophyceae appeared approximately 3.8 billion years ago and belong to the species that contributed to the build up of molecular oxygen in the Earth's atmosphere allowing the development of life on Earth.

Synonyms: *Pseudanabaena persicina* (Reinke ex Gomont) *Anagnostidis*



BOTANICAL

Botanical Family: Cyanophyceae

Phormidium persicinum is a thin, filamentous marine cyanophyceae, with partly diffuent or completely dissolved sheaths, which cause filaments to stick together in layers.

This micro-alga is organized in mucilage-producing colonies that have generated over many billions of years the geological formations called stromatoliths, (from the Greek stroma, carpet and lithos, stone): these are rock domes in the shape of “cushions” or “columns”, which have helped de-acidify the oceans.



Source: <http://fmp.conncoll.edu>

BIOTOPE

Phormidium Persicinum lives in saltwater, and can grow in a large number of biotopes: it is tropical in origin, but is adapted to extreme climatic conditions, such as very low temperatures in the Antarctic and the Arctic (Canadian high Arctic) - temperatures below 5°C. It is capable of surviving several freezing / thawing cycles, growing in spite of persistent low temperatures, withstanding exposure to very strong sunlight and placing itself in a prolonged state of dormancy. In plants, dormancy is equivalent to hibernation in some animals.

Conversely, *Phormidium persicinum* can also adapt to very high temperatures and is therefore thermophilic. In this way, it was detected in the hot springs water in Yellowstone National Park.

This micro-alga is also halophilic: it withstands very high salt concentrations. Indeed, it grows for example in the highly saline water in Lake Sivash (Crimea).

At last, it is resistant to drying; it can bear dehydration and live for several days in dry form, without water.

HISTORICAL AND GEOGRAPHICAL DISTRIBUTION

The discovery: one of the great names in algal culture stumbles across a microscopic grain...

Luigi Provasoli was 45 years old when he discovered, quite by chance, a new species of cyanobacteria: *Phormidium persicinum*. It was not his first attempt, but he had come a long way before he came across this marine speck.

Whilst the Provasoli family had been excelling itself for several generations in the Italian Textile industry, Luigi decided to follow his passion for biology. First he concentrated on the study of insects, which he found to be so rich and fascinating that he published 17 articles on the subject during his thesis. It was his time spent at the Pasteur Institute in Paris in the 1940's that lead him to concentrate on the culture conditions of algae and protozoa. After the war, he travelled to New York where he embarked



upon 25 years of successful collaboration with Seymour Hutner and Caryl Haskins in one of the biggest private institutes in the United States: Woods Hole Oceanographic Institute.

While he was working on the culture of algae and protozoa, he discovered microscopic algae whose morphological characteristics were reminiscent of bacteria, a primitive alga. Thus was born *Phormidium persicinum*, an intermediate between bacteria and algae, belonging to the Cyanophyceae family, which are still known as the blue algae.

The Cyanophyceae, just like algae, produce oxygen through photosynthesis, and are responsible for enriching the earth's atmosphere with oxygen, which enabled the development of life on Earth. They are also responsible for the appearance of the protective ozone layer, and of the first big carbon reserve that decreased the greenhouse effect as the sun's temperature increased.

The first building block of an empire...

Provasoli did not just discover an ancestral microalga, what he discovered was the greatest witness account ever left on earth by a microorganism.

Over billions of years, *Phormidium persicinum* formed colonies that generated geological formations known as stromatoliths, rocky domes in the form of "cushions" or "columns".

Only the keen eye of a scientist such as Luigi Provasoli could differentiate fossilized stromatoliths from the last living stromatoliths that can today be found strewn over Shark Bay in Western Australia.

He therefore needed to combine scientific curiosity with a passion for nature to winkle out this microscopic blue alga, which, well-sheltered in its casing, has been working since time immemorial to transform life on Earth into a miracle of nature.

The improbable discovery of *Phormidium persicinum* is on a part with the career of the scientist who subsequently gave his name to the Provasoli-Guillard National Centre for Culture of Marine Phytoplankton and to the Luigi Provasoli Award awarded each year by the Journal of Phytology of which he was editor from 1965 to 1974.

Nowadays, *Phormidium persicinum* can be found in several areas: Europe (Britain, Ireland), North America (Florida) or Pacific Islands (French Polynesia).

OUR GROWING AREAS

To prevent using natural resources, and to extract *Phormidium persicinum* from its medium without harming its remarkable properties, our laboratory has been the first one to develop cutting-edge biotechnological tools to cultivate it in bioreactors. This is a cultivation method developed to strengthen our management program of natural resources, which consists in the cultivation of plankton microorganisms, micro algae or macro algae in bioreactor under controlled conditions (temperature, culture medium, light...). The resulting extracts are totally natural, enriched in interesting molecules and totally respectful of environment.



Culture of Phormidium Persicinum