Blue-green algae are scientifically known as Cyanobacteria. The color of the species recognized first of all was blue-green which led to their naming. Algae of many other colors were identified later on. These range from olive-green to red. Cyanobacteria can be found everywhere as every habitat suits their reproduction and growth. They can be found from oceans to fresh water to bare rock to soil. Cyanobacteria form in shallow, warm, slow-moving or still water. They are made up of cells, which can house poisons called cyanobacterial toxins. A mass of cyanobacteria in a body of water is called a bloom. When this mass rises to the surface of the water, it is known as surface scum or a surface water bloom.

Cyanobacteria include unicellular, colonial, and filamentous forms. Some filamentous colonies can be differentiated into three different cell types: vegetative cells are the normal photosynthetic cells that are formed under favorable growing conditions; akinetes are the climate-resistant spores that may form when environmental conditions become harsh; and thick-walled heterocysts that contain the enzyme nitrogenase, vital for nitrogen fixation, that may also form under the appropriate environmental conditions (anoxic) wherever nitrogen is necessary.

Heterocyst-forming species are specialized for nitrogen fixation. As plants cannot use nitrogen, Heterocysts fix nitrogen into ammonia (NH_3), nitrites (NO_2^-) or nitrates (NO_3^-), which can be absorbed by plants and converted to protein and nucleic acids.

Each individual cell typically has a thick, gelatinous cell wall, which stains gram-negative. They don't have moving organs flagella. But they may move about by gliding along surfaces. Some of them float in water column due to the ability to form gas vesicles.

Cyanobacteria are mostly found in fresh water, while others are marine, occur in damp soil, or even temporarily moistened rocks in deserts. A few are endosymbionts in lichens, plants, various protists, or sponges and provide energy for the host. Some live in the fur of sloths, providing a form of camouflage.

For photosynthesis, Cyanobacteria have an elaborate and highly organized system of internal membranes. Photosynthesis in cyanobacteria generally uses water as an electron donor and produces oxygen as a by-product. However, some may also use hydrogen sulfide as occurs among other photosynthetic bacteria. Carbohydrates are formed from carbon dioxide via the Calvin cycle. In most forms the photosynthetic machinery is embedded into folds of the cell membrane, called thylakoids. The activities of ancient cyanobacteria are considered to be responsible for the creation of the large amounts of oxygen in the atmosphere in the early times. They are often found as symbionts with a number of other groups of organisms such as fungi (lichens), corals, pteridophytes (Azolla), angiosperms (Gunnera) etc. due to their ability to fix nitrogen in aerobic conditions.

Classification

The cyanobacteria were traditionally classified by morphology into five sections referred to by the numerals I-V. The first three - Chroococcales, Pleurocapsales, and Oscillatoriales - are not supported by phylogenetic studies. However, the latter two, Nostocales and Stigonematales - are monophyletic, and make up the heterocystous cyanobacteria. The members of Chroococales are unicellular and usually aggregated in colonies. The classic taxonomic criterion has been the cell morphology and the plane of cell division. In Pleurocapsales, the cells have the ability to form internal spores (baeocytes). The rest of the sections include filamentous species.

In Oscillatorialles, the cells are uniseriately arranged and do not form specialized cells (akinets and heterocysts). In Nostocalles and Stigonematalles the cells have the ability to develop heterocysts in certain conditions. Stigonematales, unlike Nostocalles include species with truly branched trichome.

Some species of cyanobacteria produce neurotoxins, hepatotoxins, cytotoxins, and endotoxins, making them dangerous to animals and humans. Some are known to attack the liver (hepatotoxins) or the nervous system (neurotoxins); others simply irritate the skin. These toxins are usually released into water when the cells rupture or die. If a person ingests water, fish or blue-green algal products containing elevated levels of

toxins, he may experience headaches, fever, diarrhea, abdominal pain, nausea and vomiting. While swimming in contaminated water, a person may get itchy and irritated eyes and skin, as well as other hay fever-like allergic reactions. If a person comes into contact with cyanobacterial toxins and is experiencing any of these symptoms, he should rinse any scum off his body and consult his physician immediately.

Cyanobacteria toxins are even more harmful to animals. The animal could become extremely ill and even die.

Some cyanobacteria are very beneficial and are sold as food, notably Aphanizomenon flos-aquae (E3live) and Arthrospira platensis (Spirulina). It has been suggested that they could be a much more substantial part of human food supplies, as a kind of super food. Along with algae, some hydrogen producing cyanobacteria are being considered as an alternative energy source.