

A Rare Plant With Unique Medicinal Properties

A hundred years ago, during the reign of medicinal herbs and natural remedies, this simple blue-green alga, **Aphanizomenon flos-aquae** (pronounced "A-fan-e-zom'-anon floss aqua"), might have been a household name had it been known. It would have acquired its reputation for being a food that, when consumed in small quantities, gave one added energy and mental clarity, boosted the immune system, and had a remarkable restorative effect.



Aphanizomenon Flos-Aquae

Today, **Aphanizomenon flos-aquae**, (**AFA**), enjoys a growing popularity among hundreds of thousands of people who report a wide range of benefits. It was discovered over two decades ago growing in wild abundance in a naturally super-productive ecosystem in Oregon. It has come to the attention of medical researchers who are now conducting studies on this unique food to uncover its secrets. Some call it nature's most complete food. Some scoff at its reported benefits. I invite you to read its remarkable story and decide for yourself.

The History of Medicine - Rethinking Health

Medicine has never been so sophisticated, with so many medications available for the treatment of so many diseases, and yet health is declining at a threatening rate. Our nation's spending for health is now second only to that for defense. How did we get there?

The history of the development of modern medicine is certainly fascinating. Many people assume that the current mainstream view is the culmination of centuries of experimentation and knowledge, yielding the best possible understanding of health. Unfortunately, it is not so. Historically, medicine has been the story of opposition between conflicting views regarding health and disease. The path medicine has taken has been determined too often by events and circumstances.

One such event that drastically shaped today's medicine was the acceptance of Pasteur's work over that of Bernard, one of the pioneers in the theory that the whole body, or the terrain, is the determining factor in health. Bernard held that if the terrain is well maintained by proper nutrition and strong immunity, disease will not develop. On the other hand, Pasteur--who provided the evidence of a ubiquitous bacterial world--suggested that the root cause of all disease is the introduction of bacteria into the body, regardless of the terrain.

The discovery of antibiotics, which virtually eliminated tuberculosis and many other epidemics of infectious diseases, consecrated the supremacy of Pasteur's "bacteria" approach over Bernard's more realistic but less popular "terrain" approach. While antibiotics have been a good solution to numerous threatening diseases, experience has shown that they are far from the answer to all problems. The antibacterial model has skewed our vision of health by making us think in terms of eliminating disease rather than regaining and maintaining health. It has generated an "anti" medicine culture that thinks exclusively of health in terms of antibiotic, anti-inflammatory, anti-depressive, antiviral, anticarcinogenic, and other anti- solutions.

Toward Specialization *Forgetting the Whole*

The development of this "anti" medicine paradigm also led to the development of medical specialties, ignoring the demonstrated fact that lasting health can be achieved only by seeking the health of the whole.

Integrative medicine, the science of assisting the body in its natural healing process, has demonstrated that long-lasting, radiant health can be maintained only by looking at the body as a whole. For example, many degenerative diseases that are considered non-treatable by conventional medicine have been shown to be reversible when using methods that address the body as a whole. A case in point: Some forms of autoimmune diseases have been associated with a disturbance of the immune system, secondary to problems of the digestive system. Specialized medical scientists who limit their considerations to inflammatory or immunological processes alone are unable to treat such conditions effectively. However, such problems have been alleviated through holistic measures-when the knowledge of nutrition, immune system strengthening, and digestive system processes are applied.

Furthermore, it is well known today that the emotional state of an individual affects the ability to resist various infections. The field of psychoneuroimmunology has demonstrated that what one thinks has an enormous effect on one's nervous and immune systems, that health can often be regained simply by changing one's attitude in life. The work of Dr. Dean Ornish is a good example of how changing one's mind, attitude, and nutrition can be the best treatment for cardiovascular problems, above and beyond any conventional drug therapy.

Beyond Today's Alternative Medicine **Integrative Medicine -- A Whole Body Approach**

Unfortunately, alternative medicine is often really nothing more than the replacement of drugs with natural ingredients and vitamins. Natural antibiotic herbs or natural substances replace antibiotics, (Ohta et al., 1995; Bork et al., 1996). Garlic extract is used instead of conventional drugs to lower blood pressure, (Brandle et al., 1997; Srivastava, 1984). Ginger extract is a substitute for anti-inflammatory drugs such as cortisone (Srivastava, 1984; Srivastava and Mustafa, 1992), and so on.

It is certainly better for the human body to be exposed to natural substances that are easier to metabolize, than to drugs that are often difficult to eliminate and toxic to the body. However, a more refined approach is integrative medicine, which is the true honoring of nature and the natural healing process, rather than the condensing of nature through the mold of our intellectual constructs and limitations.



A good example of the superiority of integrative over alternative medicine is the case of beta-carotene. Numerous scientific studies have established that foods containing beta-carotene are effective at preventing certain forms of cancer. In order to determine if beta carotene truly prevents cancer, scientists researched the effects of isolated beta-carotene in the prevention of cancer. After the completion of a 12-year study, the scientists concluded that beta-carotene

alone did not offer any protection against cancer, (Hennekens et al., 1996). However, what that study really demonstrated is that beta-carotene, administered without the numerous other carotenoids present in foods containing beta-carotene, is not effective at preventing cancer. It became clear that to prevent cancer, beta-carotene must be accompanied by the other carotenoids found with it in nature. It demonstrated that the effectiveness of certain vitamins and minerals is dependent the synergy of all the ingredients present in the whole food. And it is evident that nature's mix cannot be duplicated in a laboratory.

The concept of synergy is one that is difficult and very expensive to study, although its prevalence and importance in nutrition and health are evident. Two substances are synergistic when action or benefit of both substances taken together is greater or different than when they are separately. We now know that to be effective, beta-carotene must be accompanied by other carotenoids. Likewise, we know that calcium is better absorbed in the presence of magnesium. We know that coenzyme Q-10 is more easily absorbed when emulsified with oils such as flaxseed oil. But there is a danger in believing we know all there is to know about synergy.

There is much evidence indicating that the best synergy is achieved when we eat natural . Natural, wild-crafted foods provide the optimum synergy, although it is beyond our ability to fully understand this phenomenon with the limitations of our current knowledge. Such foods do not contain enough vitamins and minerals from a pure quantitative point of to meet currently accepted Recommended Daily Allowances (RDAs), and yet these foods have a pronounced and significant effect on health which cannot be accounted for solely by their of vitamins and minerals alone. They have a unique ability to modulate the functioning of our bodies and lead to greater overall health.

Science is beginning to notice these herbs and wild-crafted foods, which are called Biomodulators. Biomodulators have a physiological rather than a pharmacological action in the body. Instead of one molecule acting on one receptor or having one effect on the body, like nicotine, caffeine or insulin, there is a more complex reaction involving physiological systems that cannot be attributed to a single molecule in the classical pharmacological model.

In the true holistic vision of health, the body is the true healer. The medical doctor is but the humble, though revered servant of the natural healing process present in everyone. For this reason, Biomodulators are of great interest and are an extremely valuable tool for holistic practitioners. One such natural, wild-crafted food with astonishing Biomodulating effects is the naturally occurring blue-green alga, *Aphanizomenon flos-aquae*, found in Upper Klamath Lake, Oregon.

The Amazing *Aphanizomenon flos-aquae* ***"Harvesting for Food and Medicinal Use"***



For thousands of years, algae have been used as a food source or as a remedy for various various physical ailments all over the world (Hoppe, 1979; Richmond, 1990). In coastal regions of the Far East notably in Japan, there is evidence that algae were used as a food source around 6000 BC, and there are records of many species of seaweed used as food around 900 AD (cannell, 1990).

Many reports during the time of the Spanish conquest reveal that the natives of Lake Texcoco, near the city of Tenochtitlan (Mexico City today), collected blue-green algae from the waters of

the lake to make stun-dried cakes called tecuitlatl (Farrar, 1966; Ciferri, 1983). Prescott reported in his book *Conquest of Mexico* that a "slime" was gathered from the lake by the inhabitants of Tenochtitlan and eaten as a cake. In brief, they collected a substance that floated on the water of the lake, dried it in the sun, and preserved it. They made use of it as a cheese, which it resembled in flavor and taste. They gave this substance the name tecuitlatl, or excrement of stone, as they believed this substance came from stones (Farrar, 1966).

Even today, local African tribes harvest blue-green algae growing in Lake Chad. it is used to make hard cakes called Dihe; (Ciferre 1983). Like the inhabitants of Tenochtitlan, these natives collect patches of floating micro algae and sun-dry them in shallow holes dug in the sand along the shores of the lake. The sand is then cleaned from the dried algal cakes, which are broken in pieces, ready to be eaten or sold at local markets.

For the past seventeen years, a naturally occurring blue-green algae growing in Upper Klamath Lake, Oregon has also been harvested and sold as a high protein, nutritional source. This micro algae is *Aphanizomenon flos-aquae*. Although *Aphanizomenon flos-aquae* grows in many other areas of the world, the biomass that accumulates every year in Upper Klamath Lake is unique in its quantity. While other lakes may reach 5mg/l, in density at peak time, Upper Klamath Lake may have up to 100mg/l during the summer months.

High-quality *Aphanizomenon flos-aquae* is- currently harvested from an aqueduct stemming from the southern end of Upper Klamath lake. The algae is collected and cooled within minutes of harvesting. it is then flash frozen in a few seconds, a process that has been documented to preserve the integrity of chlorophyll as well as other micronutrients present in the algae. Using this process clearly protects against degradation of chlorophyll. 'When harvested algae is not processed carefully and properly, chlorophyll rapidly degrades into secondary metabolites (pheophytins) and sometimes tertiary metabolites (pheophorbides) which are known to be toxic. When the harvested algae is rapidly cooled and treated by a high-quality process, no pheophorbides are produced, and most of the chlorophyll remains intact.

Ecology of Klamath Lake

Upper Klamath Lake is the largest freshwater lake (324 km²) in Oregon with a watershed drainage of 9800 km² annually. This shallow lake is flanked by the Cascade Mountains to the west and the Great Basin to the east. The lake has two major tributaries, the Williamson and Wood Rivers, as well as many smaller springs and stream inflows, providing Klamath Lake with waters of exceptional quality.

Algae is usually found in bodies of water that are stagnant or deteriorating. However, Upper Klamath Lake is an exception. It has always been and still is extremely robust and productive. It supports not only a tremendous biomass of algae but also fish, waterfowl, and predatory bird species. 'When ice was first collected from the lake in 1906) it was reported to be green with algae, (Bortleson and Fretwell, 1993).

Lake sucker fish were so common that people used pitchforks to harvest them. Ospreys were reported in densities of up to 10 nests per square mile. Today, the Klamath Basin is still home to the largest wintering congregation of bald eagles in the lower 48 states and is the largest stop off for waterfowl in the Pacific flyway.



Health Benefits

Over the years, testimonies and empirical observations have suggested that Aphanizomenon flos-aquae may be effective at improving conditions such as diabetes, hypoglycemia, poor memory, Attention Deficit Disorder, chronic fatigue, high cholesterol, high blood pressure, poor immunity, skin problems, allergies, asthma, rheumatoid diseases and depression. Cases have also been reported of significant improvements in conditions such as epilepsy, multiple sclerosis, myasthenia, and cancer.



In Nandime, Nicaragua, over 3500 children have been consuming Aphanizomenon flos-aquae for more than five years. Improvements in the children's health conditions have been reported in a thesis published by the Department of Nutrition of the Universidad Centroamericana. In brief, providing these children with 500 mg of Aphanizomenon flos-

aquae daily for one year was shown to significantly improve overall health conditions.

Eating Aphanizomenon flos-aquae also significantly improved academic performance and school attendance. In the group of children eating Aphanizomenon flos-aquae, 32% of the children significantly increased their academic grades and 14% moved from the 0-89 percentile to the 90-100 percentile compared to a reverse movement of 9% from 70-100 to 0-69 in the control group. The school's overall academic average increased from 65% to 82%, ranking the school number one in Nicaragua after years of poor standings. According to the teachers, besides showing increased attendance, children eating Aphanizomenon flos-aquae also showed a much greater level of participation and enthusiasm.

A comprehensive research program is now underway to further study the effects of Aphanizomenon flos-aquae on health. To date, the research has revealed significant stimulatory effects of Aphanizomenon flos-aquae on the immune and nervous systems. In brief, the consumption of Aphanizomenon flos-aquae was shown to trigger, within two hours of consumption, the migration of natural killer cells from the blood to the tissues, as well as a significant increase in the number of adhesion molecules on the surface of natural killer cells, (Manoukian et al., 1998).

In addition, using a digital electroencephalogram, (dEEG), it was shown that the consumption of Aphanizomenon flos-aquae for 30 to 90 days normalized EEG modulation in participants exhibiting subclinical abnormal brain function or lack of integration of neural input (Valencia and Walker 1999). In some cases, EEG normalization could be seen within minutes of ingestion of Aphanizomenon flos-aquae. Further, consumption of Aphanizomenon flos-aquae was also shown to significantly improve performance in two tests involving EEG, objectively measuring the ability of the brain to process information.

Other studies have also demonstrated that Aphanizomenon flos-aquae from Upper Klamath Lake has a significant hypocholesterolemic action (decreases cholesterol) and contains a significant amount of linolenic acid (omega-3 fatty acid) which, when taken as Aphanizomenon flos-aquae, has a high degree of bioavailability, (Kushak et al., 1999).

Currently, the growing market for Aphanizomenon flos-aquae as a health food supplement is exceeding \$ 100 million in annual sales with annual production exceeding 1,000 metric tons.

The Biochemistry Of *Aphanizomenon flos-aquae*

Aphanizomenon flos-aquae pharmacopoeia

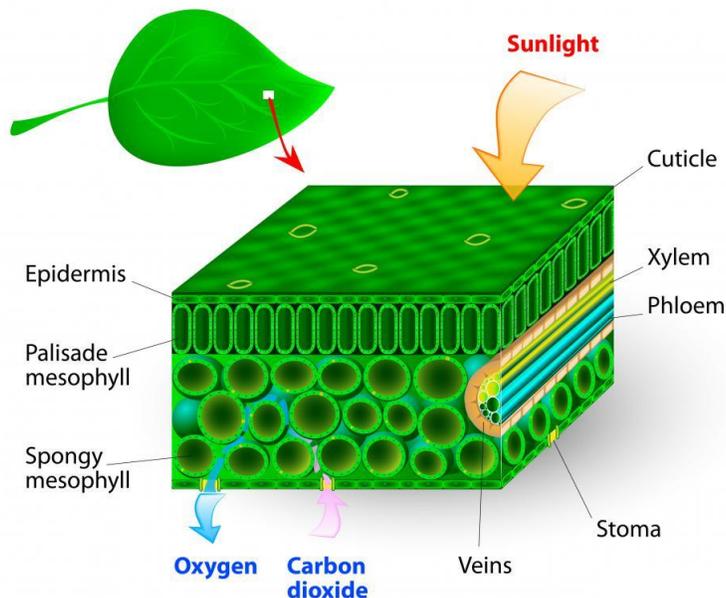
Besides the extensive research currently being conducted on ***Aphanizomenon flos-aquae*** and the data its health-promoting effects, ***Aphanizomenon flos-aquae*** contains numerous micronutrients that may explain its Biomodulating effects. These factors could account for the wide-ranging benefits reported by the hundreds of thousands of people consuming it every day.

Chlorophyll

A green pigment found in plants, chlorophyll is responsible for the transformation of light energy into chemical energy. Although chlorophyll is present in all green vegetables, it is exceptionally abundant in ***Aphanizomenon flos-aquae***, (one to two percent of dry weight). Structurally, chlorophyll is almost identical to heme; (also called hematin) which is the core of hemoglobin, the molecule responsible for carrying oxygen in the blood.

Scientific research as well as popular medicine has produced evidence of the healing and anticancer properties of chlorophyll. For example, recent studies have reported that chlorophyllin, a water-soluble form of chlorophyll, protects against certain forms of liver cancer at a concentration similar to that found in green leafy vegetables, (Breinholt, 1995; Negishi, 1997; Hernaez, 1997; Park 1996). This finding may have important implications in intervention and dietary management of cancer risks in humans.

Data also suggests that eating foods containing a high chlorophyll content composed of the same heme molecule present in hemoglobin, could stimulate the synthesis of hemoglobin in the body, (Hugues, 1936). Topical application as well as oral intake of chlorophyll was shown to prevent and help eliminate infections, (Goldberg, 1943; Grud", 1940). Finally, topical application of chlorophyll was noted to promote healing of the skin as well as stomach ulcers, (Gahan, 1943).



Beta-Carotene and Other Carotenoids



Blue Green Algae is such an exceptional source of carotenoids, nearly 240 retinol equivalents per gram, that it has been used for years as a poultry feed supplement to promote skin color and healthy-looking egg yolks.

Beta-carotene as well as other carotenoids have been shown to be powerful antioxidants, helpful in the prevention of cardiovascular diseases, (Gaziano, 1993; Street, 1994). For example, damage by oxidation of low density lipoproteins, (LDLs) is believed to be of central importance in the development of atherosclerosis. Epidemiological studies suggest that high dietary intake of naturally occurring beta-carotene decreases the risk for atherosclerotic vascular disease by protecting LDLs from oxidation, (Shaish, 1995). Blood levels of carotenoids were measured in 1,899 men and their cardiovascular health was followed for 13 years. During

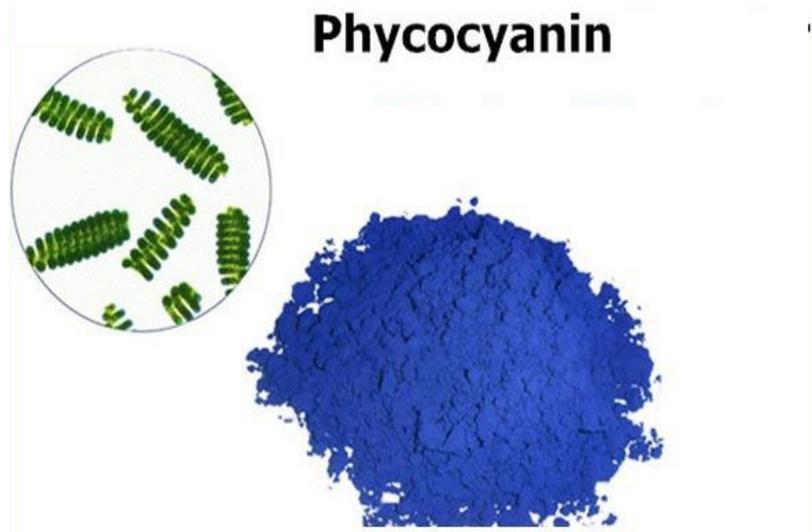
this time, the men with the highest blood levels of carotenoids had 36% fewer heart attacks and deaths than those with the lowest levels of carotenoids, (Morris, 1994).

Beta-carotene was also proven to stimulate the immune system (Kazi 1997; Moriguchi, 1996; Murata 1994) and prevent skin, (Santamaria , 1996), oral, (Garewal , 1995; Schwartz, 1987, 1989), and breast cancer, (Nagasawa, 1989; Shklar, 1988). Besides being a rich source of beta-carotene, *Aphanizomenon flos-aquae* also contains lutein and tycopene, two carotenoids that are known to protect against certain forms of cancer, (Franceschi, 1994; Di Mascio, 1991).

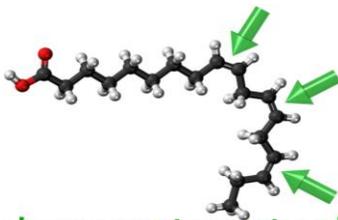
Phycocyanin

Phycocyanin is the blue pigment present in all blue-green algae. In the living algal cell, phycocyanin serves as a protein storage unit and as an antioxidant protecting the cell from certain wavelengths. Phycocyanin accounts for nearly 15% of *Aphanizomenon flos-aquae*'s dry weight.

Phycocyanin has been proven to have significant anticancer properties. As an example, when Phycocyanin was fed orally to mice injected with liver tumor cells, it significantly increased lymphocyte activity and survival rate, (Dainippon, 1983). In addition, daily ingestion of a small dose of Phycocyanin was shown to maintain or accelerate normal cell activities to prevent malignancies such as cancer or to inhibit their growth or recurrence, (Dainippon, 1983). Phycocyanin was also confirmed to have strong antioxidant and anti-inflammatory properties, (Romay 1998) and to protect the liver against toxic substances, (vadiraja et al., 1998). Recently, Phycocyanin was shown to prevent colitis in an animal model, (Gonzalez et al., 1999). This may explain the numerous reports of improvement following consumption of *Aphanizomenon flos-aquae* in conditions such as Crohn's disease and other bowel inflammatory diseases.



Polyunsaturated Fatty Acids; (PUFA)



Dietary polyunsaturated fatty acids (PUFA), especially omega-3 fatty acids, have been shown to be beneficial to the immune, cardiovascular, and nervous systems. It is interesting to note that nearly 50% of the lipid content of dried *Aphanizomenon flos-aquae* is composed of omega-3 fatty acids (mostly linolenic acid).

Polyunsaturated

The average North American diet is known to be lacking in omega-3 fatty acids, (Allison et al., 1999). Deficiency is increasingly linked to cardiovascular diseases, (Simopoulos, 1989, 1991; Spielman et al., 1989; Kromhout, 1989; Renaud et al., 1989; Wood et al., 1987), immunosuppression, (DeWille et al., 1979), arthritis, (Kremer et al., 1989), mental disorders, (Hibbeln and Salem, 1995; Stevens et al., Galli 1995, 1989; Bierve, 1989), and skin problems, (Wright and Burton, 1982).

In addition, omega-3 fatty acids were demonstrated to prevent platelet aggregation, (Nordoy, 1987; Lagarde, 1980; Siess, 1980) and lower cholesterol, (Spielman, 1989; Sugano, 1986). Consumption of PUFA, mostly omega-3, was also shown to inhibit many forms of cancer, namely

breast, prostate, pancreatic, and colon cancer, (Karmali, 1989; Wargovich, 1997). There is also evidence that omega-3 fatty acids may help in neuropathic conditions associated with diabetes, (Jamal, 1986; Houtsmuller, 1981).

Significant interest has been raised by the relationship between PUFA and nervous system functions. Epidemiological studies in various countries and in the United States suggest that decreased omega-3 fatty acid consumption correlates with increasing rates of depression, (Hibblen and Salem, 1995). Consumption of foods containing omega-3 fatty acids may constitute an alternative treatment for depression. Furthermore, decreased concentrations of certain PUFA in plasma have been found in children diagnosed with Attention-Deficit Hyperactivity Disorder, (ADHD), (Stevens, 1995). Though the cause of ADHD is believed to be multifactorial, eating foods containing PUFA may be helpful. Based on various unpublished studies, consumption of *Aphanizomenon flos-aquae* was demonstrated to be beneficial in the treatment of ADHD.



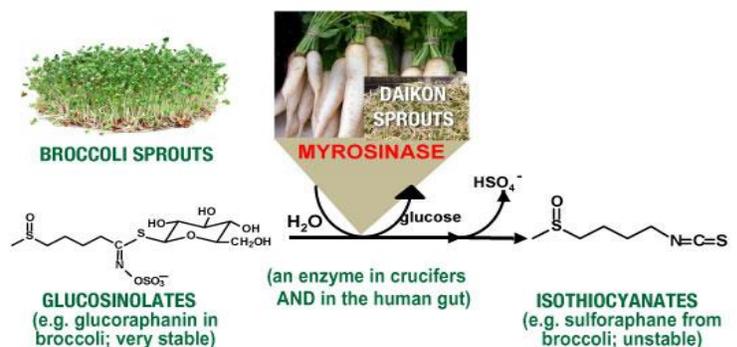
Most interesting is the research data on eicosapentaenoic acid, (EPA), one of the main omega-3 acids, which has drawn special attention in the past few years. EPA was shown to stabilize the membrane of nervous tissues. For example, EPA has been shown to prevent arrhythmia and ventricular fibrillation, (Kinoshita et al, 1994; Leaf and Kang, 1997; Leaf, 1995; Billman et al., 1994) and to protect myocardial cells against hypoxia-reoxygenation-induced injury following ischemic heart disease, (Hiashi et al., 1995). EPA was also shown to prevent epileptic seizures in a rat model of epileptogenesis (Voskuyl et al., 1998; vreugdenhil et al., 1996). This may explain the reports of improvement of epileptic conditions after consumption of *Aphanizomenon flos-aquae*.

Finally, more than 60 years ago, it was discovered that linoleic acid, an omega-6 fatty acid, prevented epidermal water loss and that dry skin was one of the main symptoms of deficiency in PUFA, (Burr, 1929; Burr, 1930; Hansen, 1989). PUFA are necessary for healthy and resistant skin, as well as for the health of mucus tissues such as the intestinal wall. Deficiency in PUFA has been associated with scleroderma, (Strong et al., 1985) and Raynaud's syndrome, (Belch et al, 1985).

Chemoprotection

A substance is "Chemoprotective" when it protects against the toxic effects of chemicals or compounds present in our food or environment. Heavy metals and pesticides are examples of such compounds extremely deleterious to health. Various species of microalgae were demonstrated to absorb heavy metals, and their consumption may promote the elimination of heavy metals, (Holan, 1993; Vymazal, 1984; Volesky, 1995).

Scientific studies have shown that blue-green algae offer a significant protection against heavy metal toxicity to the kidneys, (Fuikno, 1989). A sugar present on the cell membrane of microalgae was also confirmed to bind and eliminate pesticides from the intestine, (Pore, 1984). Phycocyanin, the blue pigment present in blue-green algae and abundant in *Aphanizomenon flos-aquae*, was also shown to have chemoprotective properties, (Vadiraja, 1998). There are many unpublished cases of children suffering from multiple chemical sensitivities who significantly improved after eating *Aphanizomenon flos-aquae*.



Pioneer Research in the Nutraceutical Industry in order to scientifically verify the validity and accuracy of the reported benefits of eating *Aphanizomenon flos-aquae*, many research projects have investigated its effects on the immune, nervous, endocrine and digestive systems. In order to research the effects of eating *Aphanizomenon flos-aquae* on health rather than disease, the first approach consisted of working with healthy subjects. In most studies, human subjects ate 1.5 to 3.0 grams of *Aphanizomenon flos-aquae* per day for a period of three months, while various physiological parameters were monitored. The research performed on *Aphanizomenon flos-aquae* and the whole experimental design constitute a model in the field of nutraceutical research.

Polyunsaturated Fatty Acids (PUFA)...

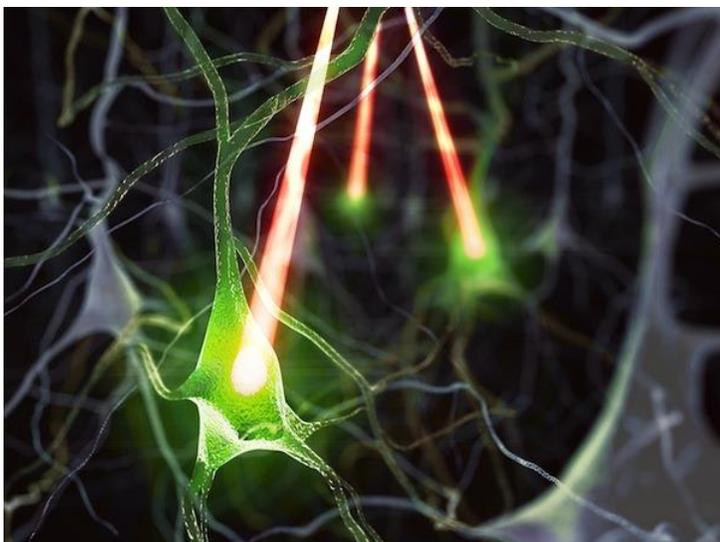
***Aphanizomenon flos-aquae*... An Exceptional Source of Omega-3 Fatty Acid**

A recent study revealed that *Aphanizomenon flos-aquae* was many times more effective than soybean oil in providing dietary polyunsaturated fatty acids, (PUFAs), (Kusakh et al., 1999). In brief, rats fed a PUFA deficient diet, (coconut oil) supplemented with *Aphanizomenon flos-aquae*, (containing mostly linolenic acid) showed blood levels of linolenic acid, (18:3n-3) and docosahexaenoic acid, (DHA; 22:6n-3) comparable to levels found in rats fed the control diet containing soybean oil. Furthermore, rats fed *Aphanizomenon flos-aquae* had higher levels of eicosapentaenoic acid, (EPA, 20:5n-3), than control animals.

In the same study, eating *Aphanizomenon flos-aquae* was shown to significantly decrease blood cholesterol levels. Other blue-green algae were also shown to affect cholesterol levels, (de Caire, 1995). This effect could be due, at least in part, to *Aphanizomenon flos-aquae*'s content of linolenic acid which has been shown to decrease cholesterol, (Sugano, 1986; Ramesha et al. 1980; Chan et al., 1991). This effect could also have been mediated by chlorophyll which was shown to assist liver function and help decrease cholesterol (Vlad et al., 1995)

Effects of *Aphanizomenon flos aquae* on the Nervous System

A Unique Brain Modulator...



One of the most common experiences of people consuming *Aphanizomenon flos-aquae* is the feeling of greater energy and the experience of an increased ability to focus. For example, many children suffering from Attention Deficit Disorder, with or without hyperactivity, experience significant improvement in their condition, often to the point of being able to discontinue the use of psychoactive drugs such as Ritalin. This could be explained by *Aphanizomenon flos-aquae*'s PUFA content and the ability of *Aphanizomenon flos-aquae* to 'increase blood DHA. As described previously, a deficiency in DHA has been associated with Attention Deficit Disorder, (Stevens, 1995).

In order to study the effect of *Aphanizomenon flos-aquae* on the nervous system, 90 individuals were fed either *Aphanizomenon flos-aquae* or a placebo for a period of 90 days, and their electroencephalograms were monitored regularly. In addition, a brainstem auditory evoked response, (BAER) test and a P300 test were performed to measure the ability of the brain to process information.

'When the BAER test is administered, a sound is sent into the left ear. An EEG measures brain activity as the signal travels through various areas of the brain and across the corpus callosum. Taking Aphanizomenon flos-aquae for nearly one month significantly improved central nervous signaling as measured with this BAER test.

In a P300 test, participants must discriminate between sounds at different frequencies that are heard through a headset. When the participant reports hearing a sound of a different frequency, the trace obtained is a reflection of the number of neurons involved in the task and the coordination or simultaneity of the neurons recruitment. A greater ability of the central nervous system to perform this task is indicated by a faster response. Consuming Aphanizomenon flos-aquae for one month significantly increased cognitive functions.

Using a digital electroencephalogram, (dEEG), Aphanizomenon flos-aquae was also shown to normalize EEG modulation in participants who exhibited subclinical abnormal modulations, or lack of central nervous integration. Abnormal modulations or lack of integration between the various regions of the brain may be associated with lack of attention, poor memory, irritability, sleep disorders, depression, and other impairments and disorders. Participants in this study reported an overall improvement in their health condition, which was verified using numerous health-related quality-of-life questionnaires.

This scientific information may have far-reaching implications. Much research in the field of psychoneuroimmunology has established the intricate relationship between the nervous and immune systems. A more optimal nervous system will necessarily lead to better immune functions, and in turn, better immune functions will increase the ability of the body to handle conditions like cancer, autoimmune diseases, infections of various kinds, allergies, inflammatory diseases, etc. The fact that Aphanizomenon flos-aquae positively modulates brain activity and improves cognitive functions may be one of the underlying explanations behind many of the different benefits reported by algae eaters.

Conclusion

It has been conclusively proven that the Biomodulating effects of Aphanizomenon flos-aquae have a beneficial impact on overall health. Although we may not fully understand how this simple blue-green algae has such a positive and pervasive effect on so many systems and physiological functions of the body, the advantageous consequences of consuming it have been verified.

Further research is currently being carried out to study the ability of Aphanizomenon flos-aquae to actually prevent cancer and viral infection, lower cholesterol in people with elevated cholesterol, and prevent cardiovascular diseases. In a hundred years, in the age of whole-body medicine, Aphanizomenon flos-aquae may very well become today's vitamin C.

Doctors' Expertise

Letter from Dr. C.H. Hassell

As a student in a traditional medical school in the 70s in Dublin, Ireland, I took a great interest in complementary medicine. I took every opportunity to travel for the purpose of studying healing methods then in use in Britain, Germany, Switzerland and Holland. When I began my Family Practice in a community just north of Toronto, Canada, I began to use what I had learned, always trying to find what would be of greatest benefit and the least harm.

One condition, which seemed unresponsive to natural therapies was hypertension. After trying diet acupuncture, exercise, garlic, omega 3 and 6 fatty acids and a number of homeopathic and

herbal remedies, many high blood pressure patients still needed medication.

In 1985, I was introduced to Super Blue Green Algae. As I began to explore its use with my patients, I noted that problems in many organ systems responded well to this algae. I decided to try it with hypertension.

Bernie, then a new hypertension patient, had been previously treated with Reserpine and withdrawn because it caused him to be depressed. He was then successfully treated with a diuretic, hydrochlorothiazide and Corgard, a beta-blocker. He complained to me that the treatment had caused him to lose his libido. His energy was poor. He felt generally unwell and wanted to find a way to deal with his hypertension without drugs.

I suggested starting Super Blue Green Algae, which he did. 'Within three months, he began feeling better and slowly was weaned off his medications. After five months completely off meds, but on Super Blue Green Algae, his blood pressure was normal. He remained on the algae for four years with diastolic pressure below 90mm.Hg. His energy remained good. He felt well. His libido was good.

In late 1991, seeking a less expensive alternative, Bernie went off Super Blue Green Algae to try other algae and green products. By 1992, we noted his blood pressure was consistently up; and he tried more exercise, increased garlic and a very vigilant diet as well as large mounts of other green products to no avail. I then prescribed Zestril (an ACE inhibitor), which controlled his pressure well but left him feeling tired.

In late 1995, fed up with not feeling well, he returned to Super Blue Green Algae and within several months he was able to gradually discontinue the Zestril. Feeling wonderful again for the last three years, with diastolic pressures again below 90mm.Hg., he tells me that he is on Super Blue Green Algae for life.

I have many other patients who have successfully eliminated their hypertension using Super Blue Green Algae.

So what is it about this algae, which makes Bernie better and which works in so many different conditions for my other patients, e.g. eczema, asthma, chronic fatigue, irritable bowel syndrome, allergies, depression, attention, learning and behavior problems in children and adults and more, and also works for me and my family?

It seems that Super Blue Green Algae is so full of life that it has the power to give us the nutrients our bodies crave in order to begin to do necessary repair work, and to give us the energy to begin to transform our lives, change our diets, begin to exercise and improve our personal relationships.

For athletes, Super Blue Green Algae provides an edge of sustained endurance for better training and reduced healing time for injuries. Long distance runners in my practice have noted that their immune systems, normally stressed by this extreme activity and prone to infections, have become stronger. They have fewer health problems when they are eating Super Blue Green Algae. For the rest of us, there are also fewer infections and flu-like illnesses throughout the year. Children do better in school and have fewer absences due to illness.

Eating Super Blue Green Algae has given me the opportunity to work better and longer and to stay more emotionally balanced. I am so grateful to have this powerful tool to share with my patients and my family.

Yours sincerely;
C H Hassell, MB CCFP

Letter from Jeffrey D. Millman, M.D.

Chronic Fatigue

My experience with Aphanizomenon flos-aquae began five years ago in an attempt to help my wife with a debilitating illness. Her success prompted selected use of Aphanizomenon flos-aquae with patients of mine who had Chronic Fatigue Syndrome. My clinical observations in those with Chronic Epstein-Barr Virus, Chronic Fatigue Immune Dysfunction Syndrome, Candidiasis and Fibromyalgia include the following: greatly improved energy-physical and mental, improved memory and concentration, fewer and milder cold-flu symptoms and headaches, improved quality of sleep, reduced musculoskeletal discomfort and an overall sense of well-being and renewed vitality. The degree of improvement was variable, it often took many months to see the full benefits, and cleansing/detoxification was significant necessitating slowly increasing the amount of Aphanizomenon flos-aquae ingested. No single treatment I have tried over the last twelve years for these conditions has had a more profound positive effect than Aphanizomenon flos-aquae.

Since Chronic Fatigue Syndrome usually is a reflection of a dysfunctional immune system, I began to explore using Aphanizomenon flos-aquae to enhance other illnesses resulting from an imbalance in the immune system. Diseases are all a reflection of either an under-reacting, (infections and cancers) or overreacting, (allergies and auto-immune illnesses), immune system. My experience as a family practitioner is predominately with infections and allergies. Clinically with the use of Aphanizomenon flos-aquae, I observed significant improvement in allergy symptoms with reduced medication usage and decreased frequency and severity of upper respiratory infections.

Disorders of sugar metabolism include Diabetes Mellitus, hypoglycemia, sugar cravings and alcoholism. Individuals with these conditions do not handle sugar or simple carbohydrates well, whereas protein has a positive effect on controlling blood sugar fluctuations. The very high content of small-chain, easily assimilated protein in blue-green algae is contributing to better controlled blood sugars with fewer highs and lows, decreased cravings for sugar, sweets, and alcohol, and a weight loss of several pounds.

I observe that Aphanizomenon flos-aquae has a tonic-like effect of cleansing the digestive tract. This facilitates absorption of nutrients and excretion of toxins and poisons. Aphanizomenon flos-aquae in varying amounts resolves constipation. Patients with sensitive GI tracts need to increase their intake of Aphanizomenon flos-aquae more gradually. The use of probiotics and digestive enzymes dramatically improves digestive functioning.

Serotonin is one of many neurotransmitters that promotes communication within our nervous system. Aphanizomenon flos-aquae exposed to sound waves disrupts the cell membrane and in some fashion has an observed predilection for enhancing mental functioning and promoting emotional calmness and stability. Children and adults with ADD or ADHD experience improved focus and concentration, improved school and /or work performance, and more appropriate social behavior. I also have observed improvement of such other serotonin related disorders as depression and panic disorder.

Almost everyone experiences symptoms of cleansing and detoxification, with more ill individuals having a more pronounced experience necessitating a more conservative intake of Aphanizomenon flos-aquae. For most people, cleansing is a minor inconvenience reflecting a positive health-enhancing removal of harmful toxins acquired from the food, water and air we take into our body.

Aphanizomenon flos-aquae...

has benefited approximately 80% of my patients to varying degrees, sometimes subtly and often dramatically. *Aphanizomenon flos-aquae* is the healthiest food I know of to recommend as a nutritional supplement to assist healing of our individual health challenges and for maintaining optimal well-being. I hope that this finds you in good health.

Sincerely yours,
Jeffrey D Millman M.D.

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