The purpose of this manual is to assist in the training and education of each associate on OUR product containing Marine Phytoplankton.

Algae is not new to our industry, however Marine Phytoplankton and the unique blend (**Alpha-3 CMP™**) produced by the Sea Farm and found in UMAC-CORE™is the first of its kind. We have a unique opportunity to be the first to market with a unique discovery, a proprietary product that works and one that can be consumed by everyone. This truly is an exciting time for us to represent what has been touted as being the "cornerstone of nutrition" for all living creatures - a complete "super food" from the Sea!

Let's get started!

Alpha-3 CMP™ - *Nutrition from the Sea!*

Alpha – The first, beginning. It has long been known by the scientific community that approximately 3.5 billion years ago our earth's nutritional origin began in the Sea. Along with supplying oxygen to our earth's atmosphere, plankton was the source providing nutrients to our soils and is the primary producer in oceanic food webs. All living creatures are inherently linked to the preservation and sustainability of these microscopic organisms!

3 – Mind, Body and Spirit; A unique symbiotic relationship. Health is related to our body as a whole, not just a single component.

CMP – Concentrated Marine Phytoplankton is a unique nutrient-rich blend of marine phytoplankton species. CMP is harvested naturally by the Sea Farm from the pristine temperate coastal waters of the northeast Pacific Ocean. It contains a unique blend of phytonutrients and naturally balanced composition of sea minerals. These phytonutrients are essential plant-based chemicals that promote proper metabolic functions. Many of which exhibit potentially promising effects in human physiology: General nutrition, Cardiovascular, Cholesterol, Blood Sugar, Sleep, Skin, Neurological, Vision, Liver and Energy.

UMAC- CORE™ - Restores, Strengthens & Balances Your Cellular System

UMAC - *Unique Marine Algae Concentrate,* our brand which contains the proprietary ingredient **Alpha-3 CMP™**.
CORE: Defined as the central, innermost or most essential part of anything. Our unique blend of Marine Phytoplankton contains a nutrient dense, complete whole food with essential nutrients with significant health benefits in a deliverable form.

THE DISCOVERY OF A *UNIQUE* NATURAL RESOURCE

THE SEARCH FOR *UNIQUE* MARINE PHYTOPLANKTON

In the mid 1990's, Unique Sea Farms, a research facility located along the Georgia Straight in Nanaimo B.C., Canada, operated one of the largest shellfish seed hatcheries in North America. Its owner and founder, Tom Harper, spent much of his time looking for alternative ways to improve the algae food source for shellfish seeds. His research in the general algae market offered nothing compared to the wild algae (Marine Phytoplankton) found in the ocean surrounding his shellfish farm, which contains several hundred different species of nutrient-rich microscopic marine phytoplankton species.

His energy shifted from seeking outside sources to provide nutrients for his shellfish seeds to utilizing the resources unique to his geographical location. One major issue stood in the way, no one had previously been able to recreate the "Spring Bloom" conditions necessary for micro algae to grow and sustain life. Mr. Harper discovered a way to harvest small amounts of marine phytoplankton directly from the ocean and multiply them by the billions in tanks year round. He created a highly potent and abundant source of Concentrated Marine Phytoplankton (CMP). He began feeding the CMP to his shellfish seed and the results were astounding. The shellfish seed being fed the CMP were growing 5-10 times larger than the seed on the industry-standard algae diet, a huge breakthrough in Aquaculture technology. This process was over 8 years in the making.

NOT WITHOUT A *UNIQUE* CHALLENGE

As his business continued to grow and prosper, Mr. Harper's health began to deteriorate. Having suffered with the health complications associated with Diabetes for over 20 years, he knew his new symptoms were very serious. He was diagnosed with a rare form of lung cancer. He was given only months to live and advised by his doctor to get his affairs in order. This was a very trying time in Mr. Harper's life. He was faced with the challenge of losing his life, leaving behind his family and losing his life long efforts associated with the Sea Farm.

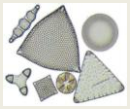
One day while passing his tanks of CMP, he thought about the amazing health benefits realized by his shellfish seed. He thought of all the plants in the world and knew several of them had medicinal properties. Something intuitively told him to begin eating the nutritious marine phytoplankton paste. Within weeks he started to feel less pain in his chest and his energy returned. November 2004, he was scheduled for surgery to have a medical grade talc injected into the plural lining of his lungs. To their amazement, his surgeons discovered the disease had stopped spreading. Mr. Harper remains free of this disease today. Was it a coincidence Mr. Harper began eating CMP or was there a possibility that these microscopic marine phytoplankton were ready to be presented to the world as a unique untapped source of nutrition from the sea?

***UNIQUE* MARINE ALGAE CONCENTRATE (UMAC)** Word about his recovery rapidly spread and people clamored for his "CMP paste." As he shared his CMP paste, soon others began experiencing positive shifts in different areas of their health as well. His efforts shifted from producing food for his shellfish seed to finding a way to deliver the CMP paste to a rapidly growing number of people interested in improving their health. He embarked on a journey to share his unique discovery with the world.

Marine Phytoplankton is the original food source sustaining life in the ocean for millions of years. This patent-pending CMP (Alpha-3 CMP™) contains a unique combination of rich nutrients, amino acids, rare trace elements, vitamins and minerals. It is a renewable and sustainable blend which provides nutrients to our cells in order to restore strengthen and balance our systems.

One last obstacle stood in the way of being able to offer this Alpha-3 CMP paste to people in a useable form. He collaborated with a facility called Canadian Phytopharmaceuticals Corporation which specializes in research, innovation, development and manufacturing of top quality functional foods, nutraceutical and natural health products. They are a fully certified Good Manufacturing Practices (cGMP) facility by Health Canada. Health Canada has some of the strictest regulations in the world. There they developed the 2 forms of product (capsule and liquid) which contain Alpha-3 CMP™ currently being offered to the world.

UMAC-CORE was launched March 15, 2005. Now this unique super food is available in a form ready for human consumption!



A CLOSER LOOK

Scientists at NASA theorize approximately 3.5 billion years ago, tiny microorganisms with the ability to convert energy, or light from the Sun, water and minerals into essential nutrients (amino acids, carbohydrates, vitamins, etc) marked the beginning of life on Earth.

The upper layers of our oceans are adrift with microscopic, single-celled organisms which use energy from the sun and nutrients extracted from surrounding water to make their own carbohydrates through a set of chemical reactions called photosynthesis. These organisms are collectively referred to as phytoplankton (Greek; *phytos* = plant, *planktos* = wanderer). Because our blend is harvested from the marine ecosystem it is referred to as marine phytoplankton. Marine Phytoplankton is comprised of a vast, diverse array of organisms which are united by their microscopic size and drifting life mode, rather than by genetic relatedness. These miraculous protists provide oxygen, energy and essential nutrients to sustain all life.

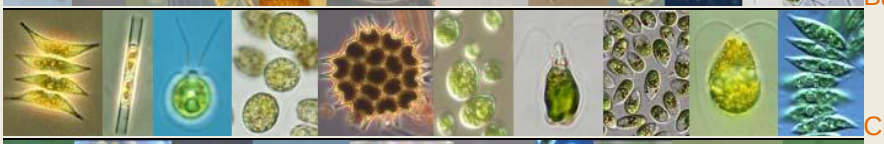
PHYTOPLANKTON FACTS

Marine Phytoplankton, also known as marine microalgae, comprise thousands of species of photosynthetic, unicellular organisms belonging to the Kingdom Protista. Temperate coastal waters, such as those along British Columbia (BC), experience high levels of productivity and support a diverse array of microalgal species from numerous groups called classes.

Classes of phytoplankton (brief description)
Bacillariophyceae (diatoms) – 100,000 species in 250 genera, passive floating, silicon cell walls, chain-forming
Chlorophyceae (green algae) – 2,500 species in 350 genera, self-propelled, green pigmentation
Chrysophyceae (chrysomonads) – 1,000 species in 120 genera, self-propelled, golden-brown pigmentation
Cryptophyceae (cryptomonads) – 60 species in 20 genera, self-propelled, tear drop shape
Cyanophyceae (blue-green algae) – predominantly tropical, either filamentous or coccoid, photosynthetic bacteria
Dictyophyceae (silicoflagellates) – only a few species, self-propelled, silicon skeleton
Dinophyceae (dinoflagellates) – 4,000 species in 550 genera, self-propelled, some species form “red tides”
Euglenophyceae (euglenoids) – 800 species in 43 genera, self-propelled, pliable, green pigmentation
Eustigmatophyceae (yellow-green algae) – very small, self-propelled, large “eyespot”, high pigment concentration
Prasinophyceae (prasinomonads) – 120 species in 13 genera, self-propelled, heart shape
Prymnesiophyceae (prymnesiomonads) – 500 species in 50 genera, self-propelled, calcium carbonate scales
Raphidophyceae (chloromonads) – < 20 species, self-propelled, yellow-brown pigmentation
Rhodophyceae (red algae) – few microalgal species, usually benthic, red pigmentation
Xanthophyceae (yellow-green algae) – 600 species in 90 genera, most are fresh-water or terrestrial

Take an even closer look……..

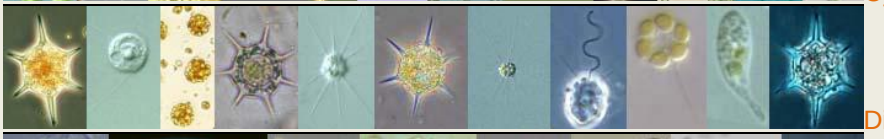

Bacillariophyceae (Diatoms)

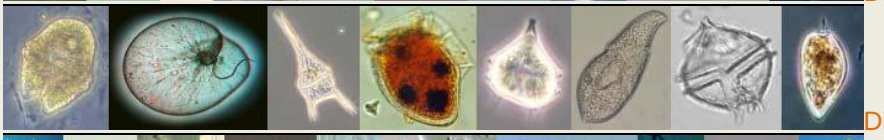

Chlorophyceae (Green Algae)


Chrysophyceae (Chrysomonads)


Cryptophyceae (Chryptomonads)


Cyanophyceae (Blue-Green Algae)

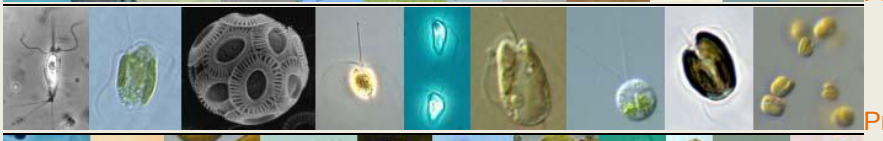

Dictyophyceae (Silicoflagellates)

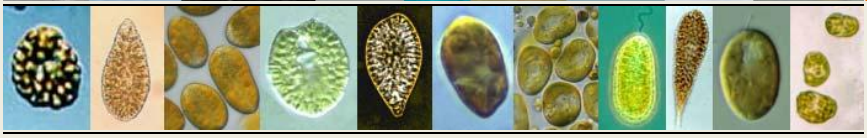

Dinophyceae (Dinoflagellates)


Euglenophyceae (Euglenoids)


Eustigmatophyceae (Yellow-Green Algae)


Prasinophyceae(Prasinomonads)


Prymnesiophyceae (Prymnesiomonads)


Raphidophyceae (Chloromonads)

Every spring, when conditions of light, nutrients, and mixing are optimal for growth, diatoms grow rapidly in the euphotic or "good light" zone (upper 20 m). This event is known as the "spring bloom". During this period, many species take advantage of the enhanced conditions, but generally three diatom genera prevail – *Skeletomema, Thalassiosira, and Chaetoceros*. In summer, warm temperatures and freshwater runoff from melting snow stratify the upper euphotic zone, and the thermocline (large temperature gradient) occurs at 20-30 meters. While these physical conditions prevail, massive primary production depletes nutrients above the thermocline, and the diatoms eventually form resting cysts and sink to deeper regions. Summer stratified waters allow vertically migrating protists like dinoflagellates to predominate because they can migrate between the nutrient-rich waters at depth and the high light environment near the surface. In autumn, winds increase the vertical mixing and break down the stratified layer. This renewal of mixing and nutrients causes the "autumn bloom" which is generally characterized by a greater diversity of diatom species than that of the spring bloom. In winter, when solar irradiance is low and vertical mixing of the water column is high, primary production remains minimal due to light limitation.

Microalgae

The word "microalgae" is a very broad term for all microscopic, photosynthetic protists. (Technically, algae are not plants because they lack a vascular system.) Microalgae that float or swim in the will-lit regions of the oceans, lakes and other water bodies are termed "phytoplankton". Microalgae that live on surfaces like the sea floor, wharf pilings, or river bottoms are termed "benthic microalgae". Simply put, all phytoplankton are microalgae, but not all microalgae occur in the plankton.

Most of the world's current production of microalgae for human consumption centers on the genera – Chlorella (Chlorophyceae), Dunaliella (Chlorophyceae), and Spirulina (Cyanophyceae). These organisms generally require extreme conditions to grow, conditions which facilitate easy cultivation due to low risk of contamination (by fungus and bacteria, or by other microalgae). For instance, Dunaliella salina requires very high salanites while cyanobacteria like Spirulina platensis need highly alkaline conditions. Most microalgae species, however, grow best in conditions that are optimal for hundreds of other species. This is primarily why so much research is directed to scaling up photobioreactors – enclosed growth chambers where all aspects of the environment are controlled and contamination is minimized.

Phytoplankton taxonomy relies heavily on cell morphology (shape), surface ornamentation, color, and food reserves. Most often identification is through a compound or inverted microscope at 250-400x magnification. For some species, correct identification requires observation through an electron microscope.

IMPORTANT BIOLOGICAL TERMS & INFORMATION

Jacques Cousteau once said, "The future of nutrition is found in the oceans." What did he mean? We have been reaping the benefits from these microscopic algae for years. Plankton is directly responsible for oxygen production forming our earth's atmosphere, transferring nutrients to our soils and converting solar energy to a useable form of energy for higher complex organisms. All living creatures are dependent upon plankton in one way or another.

In order to gain a deeper appreciation for what is meant by "the future of nutrition is found in the ocean", we have to familiarize ourselves with some terminology and background information.

Biological view and classifications

Sun: The Sun is the source of most of the energy on Earth--the power source for plants, the cause of flows of atmosphere and of water, the source of the warmth which makes life possible. None would exist without it.

Earth: The Earth is the third planet from the Sun and the fifth largest. 71 Percent of the Earth's surface is covered with water and the remaining 29 percent is land mass. The earth is further subdivided into biomes.

Biome: A biome is a major group of distinctive plant and animal communities. A biome is made up of ecosystems. There are two fundamental classifications of biomes:

1. *Terrestrial (land) biomes* – Rainforest, Tundra, Tiaga, Temperate, Desert, Grasslands
2. *Aquatic (water) biomes* – Marine and Freshwater **Alpha-3 CMP is part of this biome.*

Ecosystem: An ecosystem is a naturally occurring collection of all living organisms in a biome; every plant, insect, aquatic animal, bird, or land species forming a complex web of interdependency. Survival depends on the ability to transfer the energy of the sun to a useable form for all living creatures to sustain life. Within an ecosystem an action taken at any level in the food web has a potential domino effect on every other occupant of that system.

Food Chain: A food chain is a linear pathway depicting the flow of energy from one organism to the next. There is one organism per level. They usually start with a primary producer and end with a top predator. There cannot be too many links in a single food chain because the animals at the end of the chain would not get enough food (and hence energy) to stay alive. Most animals are part of more than one food chain and eat more than one kind of food in order to meet their food and energy requirements. Here is an example of a food chain:
Marine phytoplankton → copepod → fish → squid → seal → orca This "chain" can be described as follows: Orca (also known as "killer whales") feed upon seals, which feed upon squid, which eat small fish, which feed on copepods, which feed on phytoplankton. In this example, marine phytoplankton—autotrophs by virtue of their ability to photosynthesize—are the base of the food chain. It is always the case that numbers and mass decrease from the base of the chain to the top. In other words, the number and mass of marine phytoplankton cells are much greater than the number and mass of copepods being supported by the phytoplankton. Viewed another way, to support one orca requires many seals, large numbers of squid, huge numbers of fish, and so on down the chain. This is because, with each transfer, some of the energy is lost to the environment.
Photosynthesis: Photosynthesis *(photo=light, synthesis=putting together)*, generally, is the creation of sugar from light, carbon dioxide and water, with oxygen as a waste product. It is arguably the most important process known; nearly all life depends on it. It is an extremely complex process, comprising many coordinated biochemical reactions. It occurs in higher plants, algae, some bacteria, and many protists, all of which are collectively referred to as photoautotrophs *(photo=light, auto=self, trophe=nutrition)*.
Primary Producers: All life on earth is directly or indirectly reliant on primary production. Primary production is the production of organic compounds from atmospheric or aquatic carbon dioxide, principally through the process of photosynthesis. The organisms responsible for primary production are known as primary producers or autotrophs *(auto=self, trophe=nutrition)*, and form the base of the food chain. In terrestrial biomes, these organisms are mainly plants, while in aquatic biomes phytoplankton are primarily responsible.

Consumer: A consumer is an organism that is incapable of making its own food from light or inorganic compounds, and feeds on organisms or the remains of other organisms to get its energy forsurvival. A consumer is known as a **heterotroph** *(heterone = (an) other and trophe = nutrition)* in the food chain. All animals as well as humans are consumers (heterotrophic) and therefore must obtain their nutrition from another consumer (heterotroph) or a producer (autotroph).

SUMMARY

With these definitions in hand, we can now begin to understand why the ocean can provide a new and rich source of nutrients; but first, let's review how nutrients are created (by producers / autotrophs) and consumed (by consumers / heterotrophs). Our planet contains different biomes. Each of these biomes contains a variety of ecosystems with multiple food chains. Each food chain contains primary producers (autotrophs) with multiple layers of consumers (heterotrophs). Through the process called photosynthesis, primary producers (photoautotrophs) take light, carbon dioxide and water and create energy. This energy is then consumed by a larger consumer (heterotroph) capable of digesting the primary producer to receive its nutrients and energy.

The ability to digest a producer or consumer is a key element in a food chain. Not all digestive systems are alike and not all organisms can digest a primary producer or consumer. This is especially true for humans at the top of the food chain. Many primary producers have cellular walls that are made of cellulose and difficult for us to digest. Although the primary producer may be full of rich and beneficial nutrients we are not able to digest the cellular wall and provide those nutrients to our bodies. They simply pass right through.

As humans we sit at the top of many food chains and are completely dependent on the quality of the primary producers and consumers. Unfortunately most of our food is either overly processed or nutrient-poor. Many of our food staples are manipulated through man-made processes. This manipulation has greatly affected the quality and nutritive values of our food. Since we are several layers away from the primary producers we must consume a large variety of food in substantial quantities to fuel our bodies. Remember that in a food chain number and mass are important as you move down the chain since generally only 10% of one levels energy is passed up to the next level. Therefore, the closer we are able to consume at the primary production level the less we need to efficiently and effectively fuel our bodies. Many ask the question "why don't we just then consume primary producers and shorten the food chain?" The answer is quite simple – access and digestibility.

AQUATIC BIOME

Next, we move our discussion to the aquatic biome and more specifically the aquatic primary producers which form the base of most marine food chains. Remember that all life on earth is directly or indirectly reliant on primary production. The predominant organisms responsible for primary production in aquatic ecosystems are phytoplankton. These miraculous microscopic organisms not only form the base of life in our oceans, but also produce up to 90% of the oxygen in our atmosphere.

Notice we did not use the term "plankton" or "algae". This is where an interchanging of terms usually creates confusion among many consumers. "Algae" is one of the most misused terms in the consumer markets partly because in science, the term "algae" can refer to any plant in a wet environment without true roots or leaves. With such a broad definition as "wet environment" distinctions between marine, freshwater or even land based algal growths are often misrepresented. Often the terms "microalgae" and "macroalgae" are used in an attempt to distinguish between microscopic organisms such as phytoplankton and larger organisms such as seaweed or kelp. Although these terms have helped, much confusion still exists.

A good rule of thumb states that all phytoplankton are classified as microalgae, but not all microalgae occur in phytoplankton. As you will read below, there are roughly a dozen different classes of phytoplankton. Just as “algae” has a broad definition, so does phytoplankton. Among the various classes of phytoplankton you find marine, freshwater and terrestrial based species. So, just because someone labels a product microalgae or phytoplankton the reality of what they are using is usually different.

To help add clarity to the second part of our discussion, we have again provided some key definitions.

Definition of essential terms:

Plankton: The name **plankton** is derived from the Greek word “planktos”, meaning “wanderer” or “drifter”. While many forms of plankton are capable of independent movement and can swim up to several hundred meters in a single day, their position is primarily determined by currents in the body of water they inhabit. By definition, organisms classified as "plankton" are unable to resist ocean currents. Plankton is primarily divided into broad functional groups:

1. Phytoplankton
2. Zooplankton

This scheme divides the plankton community into broad producer and consumer groups.

Phytoplankton: The name comes from the Greek terms, *phyton* or "plant" and *planktos*, meaning "wanderer" or "drifter". Phytoplankton is microscopic plants that live in the ocean, freshwater and other terrestrial based water systems. There are many species of phytoplankton, each of which has a characteristic shape, size and function. Marine species of phytoplankton grow abundantly in oceans around the world and are the foundation of the marine food chain. Marine Phytoplankton is the producing (autotrophic) component in the ocean.

Algae: **Algae** (singular *alga*) comprise the majority of aquatic organisms capable of photosynthesis. Algae range from single-cell organisms to multicellular organisms, some with fairly complex form and (if marine) called seaweeds. All lack leaves, roots, flowers, seeds and other organ structures that characterize higher land based plants. The US Algal Collection is represented by almost 300,000 specimens. Most common forms of algae are known as:

Green Algae: Only about 10% of green algae are marine species, most live in freshwater. Green algae are more closely related to the green land plants than any other group of algae. They have the same photosynthetic system as land based plants. There are more species of green algae found in warm tropical oceans than in cooler temperate seas. The structure of green algae ranges from single-celled forms to multi-cellular sheets. The most common green alga is *Chlorella*.

Red Algae: The red algae are a large group, about 5000 - 6000 species of mostly multicellular, marine algae, including many notable commercial types of seaweed.

Blue-Green Algae: **Cyanobacteria** (Greek: *kyanós* = blue + bacterium) is a division of Bacteria that obtain their energy through photosynthesis. They are often still referred to as blue-green algae, although they are in fact more like bacteria. The most common commercial blue-green alga is *Spirulina*.

Yellow-Green Algae: Yellow-green algae generally live in freshwater, but some are found in marine and soil habitats. They vary from single-celled organisms to simple colonial forms. Unlike other algae,

their chloroplasts do not contain fucoxanthin, which accounts for their lighter color. Several species have shown to provide a very poor food source for immediate consumers because they were readily ingested but were very poorly digested.

Brown Algae: Brown algae are a large group of mostly marine multicellular algae, including many seaweeds of colder Northern Hemisphere waters. They play an important role in marine environments both as food, and for the habitats they can form. Worldwide there are about 1500 - 2000 brown seaweed species. Most brown algae contain the pigment fucoxanthin, which is responsible for the distinctive greenish-brown color that gives them their name.

Sea Vegetables: Sea vegetables are marine macroalgae, more commonly known as seaweeds. Macroalgae differ from microalgae primarily by their larger size, which is chiefly a function of a more complex cellular organization. These algae comprise three Classes – Brown (Phaeophyta), Red (Rhodophyta), and Green (Chlorophyta) based on their pigment composition. The general public is probably most familiar with kelps and other brown seaweeds that can form extensive forests along the coastline.

SUMMARY

The first part of our discussion focused on the earth's ecosystems and the many food chains within each one. The concept of eating closer to the level of primary production the more energy and nutrient transfer you get was introduced. Now we can focus on the oceanic ecosystem and gaining access to the primary producer in this ecosystem – marine phytoplankton. As we learned in our definitions, there are at least fourteen classes of phytoplankton. Some of the classes are commonly found in marine environments while others are freshwater based or terrestrial based. We also learned that a general classification of microalgae does not necessarily mean the same as phytoplankton; while all phytoplankton are microalgae, not all microalgae occur in phytoplankton.

The base of most marine food chains is marine phytoplankton. Diatoms are especially important, as they are estimated to contribute up to 45% of the total oceanic primary production (Mann, D.G. 1999, The species concept in diatoms, *Phycologia* **38**, 437-495). . In coastal communities, diatoms form the predominant biomass. Oceanic systems are poorer in nutrients and are usually dominated by nanoflagellates. There is no one class that predominates here. Often coccolithophorids (class Prymnesiophyceae) form massive blooms seen by NOAA's satellites. Coccolithophorids have scales made of calcium carbonate and help regulate the ocean's carbon budget. But that's another long story. Generally, coastal upwelling zones are where most of the primary production occurs and this is more often than not dominated by diatoms. Many of the over 100,000 diatom species flourish in temperate ocean conditions, but generally three diatoms prevail – *Skeletonema*, *Thalassiosira*, and *Chaetoceros*. These prevailing diatoms utilize the nutrient-rich ocean water and in conjunction with photosynthesis their microscopic cells contain high concentrations of essential nutrients.

Access to these highly concentrated nutrients has been through the natural progression of the food chain. However, for humans a direct link to these nutrients is difficult because of several factors

1.Growing: Many species can grow in artificial seawater, though their growth is not usually optimal because some micro-nutrient is missing or even too abundant. Natural seawater, on the other hand, contains a complete suite of buffered elements in suitable proportions forming the best possible base for growing marine phytoplankton. It is common practice in research laboratories to use artificial seawater for experiments. Scientists do this to control the environment when they want to measure the effects of specific parameters they might be studying (e.g., effects of light levels on growth). Controlling the growth environment using photobioreactors (enclosed growth chambers) provides limitations of expense and large scale production.

2.Harvesting:
In order to shorten the food chain and allow humans direct access to the base oceanic nutrients found in marine phytoplankton, you need to extract microscopic organisms. Most commercial facilities and research laboratories harvest phytoplankton using centrifugation. Other extraction processes are sometimes used but are not as cost-effective

3.Digesting:
Many scientific studies have focused on the ability of consumers to not only ingest but digest primary producers. Most marine and freshwater phytoplankton has either a siliceous or cellulose outer membrane. While many products may be ingestible, many microalgae products simply can not be digested by humans. The ability to breakdown cellulose is not possessed by mammals. Typically, this ability is possessed only by certain bacteria which are often the flora on the gut walls of cows and sheep, or by fungi, which in nature are responsible for cycling of nutrients.

> The groups of phytoplankton known as the diatoms create their cell walls from silicic acid. Relative to the cellulose cell walls produced by other groups, silica cell walls require less energy to generate (approximately 8%), a major saving of overall cell energy (Raven, J. A. (1983). *Biol. Rev.* 58, 179-207), and an explanation for higher growth rates in diatoms (Furnas, M. J. (1990). *J. Plankton Res.* **12**, 1117-1151). This difference in cellular membrane structure from all other alga forms enhances the importance of the diatom class of marine phytoplankton.

So what does this all mean for the ability to consume at the base of the marine food chain? First, we must realize that because of the over processed state of our foods, the closer we can eat to the primary producers the higher the quality of the nutrients we will receive. Access and digestibility of these tiny microorganisms are key factors in actually providing our systems with these highly potent and effective nutrients.

Second we must understand that “algae” and “phytoplankton” are broadly defined terms encompassing numerous species. Remember, all phytoplankton are classified as microalgae, but not all microalgae are found in phytoplankton. The richest source of primary production in the marine food chain is the marine phytoplankton class known as diatoms. These microscopic organisms account for 45% of the primary production in our oceans.

Third, in order for humans to gain access to the highly effective and potent nutrients, the issue of digestibility is crucial. If we can ingest but not digest, it does not matter how nutritious or how much we consume or systems will be left empty. Algae and phytoplankton with cellulose walls are not digestible by our systems. Unlike most algae and phytoplankton species, diatoms contain a silica cell wall which allows this specie to conserve its energy during growth preserving nutrients for its consumers.

Finally, there is a difference in the growth of any algae or phytoplankton in its natural ocean state verses a freshwater or manmade state. Freshwater and artificial seawater simply do not contain the amount or breadth of nutrients that are found in our oceans. Additionally, strains of algae cultured over many generations potentially suffer from mutations. Contamination in a natural environment can be controlled without robbing consumer of vital natural nutrients and growth patterns. The marine food chain has thrived for millions of years without bioreactors and manipulated growing processes.

COMPARISON OF PHYTOPLANKTON AND ALGAE PRODUCTS

The most important thing to remember when dealing with algae is that not all algae are phytoplankton. However, all phytoplankton are algae. In addition, not all phytoplankton are marine algae. The primary difference between our product UMAC-CORE™ and others on the market is that we provide a natural blend of indigenous species with a suite of nutrients.

***Alpha 3 CMP**™ - is a unique nutrient-rich blend of marine phytoplankton harvested from the pristine temperate coastal waters of the northeast Pacific Ocean. It is classified as brown algae and is a blend of several species of marine phytoplankton. What makes these temperate waters an exceptional cauldron of life is the way in which ocean tides interact with fresh water, creating turbulence that draws even more deep water nutrients and supporting a diverse array of marine phytoplankton species. National Geographic, (Aug. 2006). The proprietary patented process harvests natural seawater, capturing the marine phytoplankton in million-liter tanks. This is the only known product to take natural marine phytoplankton communities containing a complete suite of marine trace elements in proportion to those found naturally in human tissue. Throughout this unique growing and harvesting process, quality control and testing is employed to ensure the highest quality products, providing assurance that no pathogens, toxins, heavy metals or contamination has occurred to the natural marine phytoplankton. The concentrated paste contains hundreds of species (primarily from the larger, nutrient-rich *Bacillariophyceae* classification commonly known as diatoms). Through the harvesting process the Company's proprietary technology breaks down the cellular walls, separating the silicate walls and releasing the nutrients that are otherwise encapsulated. This process, unlike any other known to man today, makes the nutrients immediately bioavailable. The raw paste at this point contains approximately 85% water. It next goes to a state-of-the-art phyto pharmaceutical production facility, licensed and certified GMP (Good Manufacturing Processes) by Health Canada, where it is further concentrated, passing through the highest standard quality assurance procedures (sanitized and stabilized) to certify Alpha 3 CMP™ is safe for human consumption.

UMAC-CORE™ (Unique Marine Algae Concentrate) uses Alpha 3 CMP™* as the base of their products. UMAC-CORE™ has developed and formulated two licensed products for human consumption. The capsule product contains organic maltodextrin as a delivery system. The concentrated liquid product is in a base of organic glycerin. Even though both products come from the same core ingredient, they have been designed to provide different functional benefits for the consumer. The products utilize the micro nutrients found only in the ocean. Each provides a wide spectrum of nutrients including vitamins, amino acids (protein), rare trace elements, minerals and cellular materials needed to achieve and maintain a healthy and energetic lifestyle.

Spirulina is blue-green algae and therefore is actually classified as Cyanobacteria. It is a simple, one-celled form of algae that grows in warm freshwater environments. Even though *Spirulina* is distantly related to the kelp algae, it is not a sea plant. The freshwater ponds and lakes it favors are notably more alkaline than ordinary lakes and cannot sustain any other forms of microorganisms. Spirulina is a prokaryotic organism, meaning that it does not have nuclear envelope. Its genetic material (DNA) floats around in its protoplasm. Eukaryotic organisms, essentially most everything other than bacteria, have a nucleus that contains the genetic code.
http://en.wikipedia.org/wiki/Prokaryote

Chlorella is a form of unicellular green algae found in still, freshwater; soil, or bark of trees. Chlorella has a strong cell wall that prevents its native form from being adequately broken down and absorbed by the human digestive system and so special processing is required to break its cell wall.

Kelp are large macroalgae (seaweeds), belonging to the brown algae. Despite their appearance they are not grouped with the normal aquatic or land plants. Kelp grows in underwater forests (kelp forests) in clear, shallow, oceans, requiring water below about 20 °C; it offers a protection to some sea creatures, or food for others. Of the more common algae products currently on the market Kelp is correctly classified as a marine algae.

Enerex Super Phytoplankton™ claims to contain marine phytoplankton. It is suspected that the specific strain of alga used in this product is *Nannochloropsis, (*also commonly known as "green tide algae" or "yellow-green algae"). This alga is extensively used in the fish hatchery industry for growing small fin and shell fish larvae.

This product is actually laboratory-created, combining synthetic nutrients and minerals with fresh sterilized water, ultimately creating a highly human manipulated algae manmade strain of algae, not a natural marine phytoplankton. The algae are grown in a highly manipulated environment. This alga is then processed inland in a large centrifuge that, according to their literature, protects the cellular structure of their product. Science has shown that the majority of the nutritional benefit is found in the interior of the cell and, unless the cellular structure is broken down, the nutrients aren't bioavailable and will not be assimilated effectively they simply pass through the human system. After being centrifuged, the algae remains are then sent to a GMP certified drying facility where it is turned into a powdered state for mixing. The product is then mixed in 9:1 kelp: microalgae ratio to produce the final product.

Gesundheit (Worfuhlun) Marine Phytoplankton is a single specie of microalgae called *Nannochloropsis, (*also commonly known as "green tide algae" or "yellow-green algae"). (MOST OTHER PHYTOPLANKTON COMPANIES PRIVATE LABEL THIS PRODUCT ie: Oceans Alive etc…)It is considered to be one of the least nutrient-based species of algae with high pigmentation. It is very small, self-propelled, with a high pigment concentration. Studies indicate this green tide species provides a very poor food source and is poorly digested in the clam and oyster industry. The industry uses this small species to feed to rotifers which are then fed to shellfish. Probably the only reason clams and oysters cannot utilize this species directly is due to its small size. Can you imagine humans trying to survive on mosquitoes? Mosquitoes may have nutritive value, but humans are not equipped to eat such small prey. This alga was believed to have been responsible for the collapse of the once prosperous oyster and clam industry in the Northern Atlantic (Journal of Phycologia (2006), 42, 963-974). It is commonly known in the aquaculture industry that this alga is used as a cheap food for fish larvae and shrimp. This is a cultured product created in a closed laboratory environment using artificial sea water, resulting in less than optimal growth because micro-nutrients are either missing or over abundant. Their manufacturing process of this alga leaves the cellular walls intact, making it difficult for the human body to absorb any benefit. This product is being offered to the public without sterilization or stabilization and, like any natural product without preservatives, is easily contaminated once opened. We are unable to verify any licensing or product development for human consumption of this product.

FrequenSea™ by Forever Green™ is a super food, exclusively employing the nutrient benefits found in Alpha 3 CMP™* for the network marketing industry. Combining the whole-food nutrition from both land and sea, FrequenSea™ utilizes organic ingredients known to re-awaken the body's natural healing power.



GIVING BACK TO MOTHER NATURE

At Unique Sea Farms, we not only take pride in growing and harvesting the worlds most unique blend of Marine Phytoplankton; Alpha-3™ CMP, our facility also offers rare contributions BACK TO "Mother Earth" few industrial facilities can match.

As you know, Marine phytoplankton forms the essential and vital base of the food chain for most life forms in our oceans. It is imperative that any process used to extract these specific, extraordinary combinations of natural marine phytoplankton are done so without disrupting the fragile eco-system.

We are using 8 one million liter land based tanks in which to grow the Alpha-3™ CMP blend of wild marine phytoplankton. Great care is taken to ensure our processing mimics Mother Nature in all ways possible. A specific amount of sea water containing a diverse blend of marine phytoplankton is gravity fed into our tanks. There our technology is used to recreate the "Spring Bloom" on land and they multiply by the billions until the water is dense with these potent, nutrient rich marine phytoplankton. Once the bloom has reached its full mass, as many of the marine phytoplankton as possible are then harvested and moved through the next stage or our patent pending process. As was just mentioned, Marine Phytoplankton are invisible to the human eye, therefore approximately 5% of the wild nutrient rich phytoplankton bloom remain in the tanks after harvesting. When we empty the tanks after the harvest, the remaining 5% of Phytoplankton returns back out to the ocean. This has created a significant positive impact on the ecosystem surrounding our Sea Farm.

According to NASA Phytoplankton are responsible for up to 90% of the oxygen in the earths' atmosphere through photosynthesis. **These large one million liter tanks filled with the rich, dense phytoplankton blooms are in themselves emitting oxygen back out into the atmosphere. In addition, it is estimated that our growing process can utilize up to 60 metric tons of carbon per day.**

For years, large industrial facilities such as this have struggled with the fine balance of manufacturing products without creating damage to our environment. Unique Sea Farms is not only providing the newest "Super Food" to mankind, we are proudly providing a food source back out to the ocean, consuming carbon and emitting oxygen into our atmosphere. This is another positive reason to use the ingredient Alpha-3 CMP™.

In other words, our process allows for more phytoplankton to be returned to the ocean than what was originally brought in. We take in a large amount of sea water containing a low concentration of marine phytoplankton, grow it until it reaches a high concentration and a specific density, allow sea water along with non harvested marine phytoplankton to return to the sea, use our patent pending process to turn the remaining marine phytoplankton to Alpha-3 CMP™, then the ingredient Alpha-3 CMP™ is used in products such as UMAC-CORE.

WHAT ARE THE EXPERTS SAYING?

WHY IS MARINE PHYTOPLANKTON IMPORTANT TO US?

Dr. Hugo Rodier, MD states, “The micronutrients and electrolytes in marine phytoplankton are exactly what human cell membranes need to carry out their metabolism. Not surprisingly, the composition of human plasma, or fluid surrounding cell membranes, is similar to that of sea water. Relying solely on land-based food sources may lead to deficiencies in these micronutrients and electrolytes. While transient sub-optimal nutrition may be forgiven, a constant diet lacking in these micronutrients will adversely affect every function, structure, and detoxification functions of the human cell. Our metabolism will suffer, leading to practically all diseases.

Good nutrition will enhance the structure and function of all organs in our bodies. Our brains, muscles, heart, arteries, joints, bones, skin, hair, hormones, immune system, vision, digestion, kidneys, liver will carry out their jobs much better. Metabolically, our lipids, and sugars can be optimized, thus providing more overall energy, minimize weight problems, and improve sleep. These nutrients improve mental function, and memory. They reduce depression, harmful effects of stress, and mood swings.

The high density of nutrients found in marine phytoplankton is extremely important for many reasons. Perhaps the most important (as noted above) is that these nutrients maintain human cell membranes in structure and function. This is vital for cell detoxification, and for the overall metabolism of human cells. In fact, the causes of diseases have been simplified to very specific mechanisms, all of which center on cell membrane function and structure. Inflammation, Oxidation, Toxicity, and Mitochondrial dysfunction keep cell membranes from doing their job effectively.

Marine Phytoplankton contains high levels of antioxidants, and anti-inflammatory micronutrients to fuel metabolism and detoxification. Also, they stoke the fires of the Mitochondria, where cells make energy required to carry out their function. Of course, photosynthesis is the mechanism whereby plants in general and marine phytoplankton in particular, harness life-sustaining solar energy.

So, it is not surprising to find very good evidence that marine phytoplankton is highly beneficial. In my opinion, the enrichment of our cell membrane function, through nutrients, and the pre-biotic function of marine phytoplankton are the most important contributions to our health from these microorganisms.”

Dr. Jerry Tennant, MD states: “There are very few products that provide all, or even most, of the raw material to make new cells and sustain the existing ones. The problem is that we need ALL of them at the same time for things to work.

One of the rare products that contains almost everything you need for life (and the rebuilding of a healthy life) is marine phytoplankton. It contains the nine amino acids that the body cannot make and must be consumed in our diet (essential amino acids). Vitamins A (betacarotene), B1 (thiamine), B2 (riboflavin), B3 (niacin), B5 (pantothenic acid), B6 (pyridoxine), B12 (cobalamin), C, and D (tocopherol) and major trace minerals are all present in phytoplankton.

In short, it contains almost everything one needs to sustain life. Therefore, it contains almost everything one needs to restore health by providing the raw materials to make new cells that function normally. This is particularly true if one stops putting toxic materials such as artificial sweeteners and trans fats (particularly hydrogenated fats) into our body. It is exciting to find something that seems to

contain most of the things necessary to get well and stay well. It is likely that marine phytoplankton will change the way we think about health.

Marine Life Sciences, LLC

RESEARCH ADVISORY BOARD & MLS ASSISTANTSHIP AT THE UNIVERSITY OF UTAH

Dr. Glenn Richardson – Ph.D. is professor, director of graduate studies, and director of the integrative health program in the Department of Health Promotion and Education, in the College of Health at the University of Utah. His research interests are in resilience and healthy lifestyles.

Beverly G. Bradshaw – Ph.D., is an assistant professor in the Division of Foods and Nutrition in the College of Health at the University of Utah. Dr. Bradshaw has research interests in intuitive eating and in lifestyle management for people with Type II Diabetes.

David Derezotes – LCSW, Ph.D., Dr. Derezotes is currently Professor, Chair of the Mental Health Domain, and coordinator of the honors program at the School of Social Work at the University of Utah. His interests are in advanced generalist practice with individuals, couples, families, and groups. He also does research in child and family welfare.

Richard Burgess – Ph.D., is a professor in the Department of Physiology at the University of Utah. He is editor of the American Journal of Chinese Medicine. His expertise is in neuroscience with particular interest in the measurement of human energy.

Hugo Rodier – M.D., is the Medical Director of the Pioneer Clinic which is an integrative health practice. Dr. Rodier is also an adjunct professor in the Department of Health Promotion and Education, the Division of Foods and Nutrition, and the Department of Family and Preventive Medicine at the University of Utah.

Alan Davis - MD, PhD - is an assistant professor at the University of Utah School of Medicine Division of Physical Medicine and Rehabilitation in Salt Lake City, and the medical director for Quinney Rehabilitation Institute at Salt Lake Regional Medical Center. His medical practice focuses on inpatient medical rehabilitation. He completed his physical medicine and rehabilitation residency at the University of Medicine and Dentistry of New Jersey in Newark.

Doctoral Students:

Richard Interdenado, M.S. is a doctoral student in the Department of Health Promotion and Education in the College of Health at the University of Utah. His M.S. Degree is in Exercise Physiology and is a professional computer programmer.

Diane Legett, MSN, RN, is an associate professor at the Dr. Ezekiel R. Dumke College of Health Professions at Weber State University.