

# **The usage of the extraction of the Dunaliella seaweed in cosmetic products of Beauty of Life**

## **The Dunaliella seaweed and its spread**

The Dunaliella is unicellular green seaweed. Its length is 8-25 microns and its width is 5-15 microns. It motions in water with the help of two flagellums, positioned in the upper part of the cell. The Dunaliella cell contains chloroplast, nucleus, mitochondria, small vacuoles and Golgi apparatus. These are the mutual organs that the Dunaliella shares with other green seaweed cells. It is different of all other green seaweed cells because it lacks a cell wall and is wrapped with an extremely thin elastic membrane. The lack of cell walls allows the cell to change its volume with every change in the atmospheric pressure that surrounds it.

The Dunaliella seaweed can be found in different places on the face of the earth. It grows in deep salt-water in areas with sever climate conditions (high temperature and intense sunlight) like The Dead Sea, where it was first discovered in 1941. In order to habitat in these difficult conditions, the Dunaliella synthesizes special substances in a very high concentration. Its resistance against high salt concentrations (35%) is linked to its ability to synthesize and accumulate glycerol in different concentrations of up to 10% of its dry weight. Due to this trait, it maintains its shape and functions in high atmospheric pressures. In order to grow in an environment of high temperature and intense sunlight, the seaweed's cell synthesizes beta-carotene in high concentration (about 6% if it's dry weight). Studies show that the function of Beta-carotene is to protect the seaweed's cell from damages caused by intense radiation.

The high concentrations of glycerol, beta-carotene and other substances which the Dunaliella produces have made the seaweed a prime source of natural substances with high economical value. Indeed, the seaweed is now commercially grown in several places in the world as a source of natural glycerol and beta-carotene.

## **The composition of the Dunaliella cells and its importance in the cosmetic industry**

The Dunaliella cells are composed of proteins, carbohydrates, lipids, water, vitamins and minerals.

### Proteins

Proteins assemble 60% of the dry cell weight. The seaweed's protein contains almost every amino acids exist in nature (18 amino acids). Proteins and amino acids are important ingredients in cosmetic preparations. They are used in order to create a contaminating layer on the skin surface while nourishing the skin cells. A mixture of proteins and polysaccharides is patented(2).

### Carbohydrates

The carbohydrates include mono-sugars (glucose, galactose, mannose, xylose, ribose, rhamnose), di-sugars and 1,4 polysaccharides - glucosen and starch. The sugars, especially the poly-sugars are used as stabilizers. They thicken and give the product a smooth and gentle texture. They absorb large quantities of water and grant the product with moisturizing traits. Attached to the negative electrical charge of the poly-sugars are electrolytes, released in a controlled way to the skin cells. The presence of polysaccharides in the cosmetic product allows this controlled release of the active substances in

the product and offers an efficient treatment of skin diseases without using substances which risk the user in side-effects.

### Lipids and Fatty Acids

Lipids assemble 6-18% of the dry cell weight (depends in the habitat). Of all the lipids, the most concentrated one is beta-carotene which can assemble up to 6% of the cell's dry weight.

The fatty acids include palmitic acid, 3 - trance acid hexadecanoic, linoleic acid and arachidic acid which is a product of the linoleic acid. The fatty acids are the main component of the phospholipids and the lipoproteins of the cell's membrane. Lack of these essential acids can cause scaly dermatitis and skin dehydration.

Dermatitis in the scalp was found in people nourished in a fatty acids free diet, during a long period of time(3).

### Glycerol

Glycerol assembles up to 10% of the dry cell weight. Glycerol includes monogalacto glycerol, digalacto glycerol and diacyl glycerol. The glycerol maintains a high level of humidity in extreme conditions.

### Vitamins

In addition to high level of beta-carotene, the Dunaliella contains thiamine, pyridoxine, riboflavin, nicotinic acid, biotin and tocopherol (vitamin E). The beta-carotene, produced from the Dunaliella is composed of two isomers: all trans and cis-9. This differs the Dunaliella from the beta-carotene produced from carrots and from synthetic beta-carotene.

Beta-carotene usually used in the body as a source of vitamin A. Lack of the vitamin can cause skin dehydration and creation of a cornea layer. Lately, importance was attribute to vitamin A as the source of retinoid which derivative, retinoic acid, encourages growth of the epithelia and as a result, the cornea skin layer is reduced. A mixture of retinoic acid and antibiotics is used today as an acne treatment.

The retinoid prevents the formation of aggregates of cornea cells, which act as a source of germ sittings and skin infections. In addition to being the source of Vitamin A, beta-carotene is being used as an antioxidant. It ties free radicals in the body cells and prevents skin damages cause by oxidation of the cell components like the nucleus acids(4). Studies show that Ultra Violet radiation type A and B causes a decrease in the beta-carotene capacity in the skin cells and increase in the skin sensitivity to radiation damages. Treatment with products which contain beta-carotene allows the skin with protection against radiation damages.

Lack of riboflavin (vitamin B2) causes scaly dermatitis around the nose, eyes and ears.

Lack of Nicotinic acid causes pellagra, which symptoms are diarrhea, amnesia and skin diseases. The skin turn red with scaly dermatitis, especially in areas exposed to pressure, heat and sun light.

Mixture of the vitamins B, A, E, C and biotin together with essential, unsaturated fatty acids and proteins from wheat sprout is widely used in cosmetics as skin synthesize encourager.

### **Dunaliella extraction product**

The Dunaliella extraction was prepared in our laboratories by fracturing the cell and extracting all of the components in the seaweed's cell. The outcome was a unique mixture of beneficial natural

substances. The combination of these components in one mixture in the cosmetic products improves the skin's metabolic activity, benefits the skin with essential and healthy natural substances, keeps the humidity level in difficult conditions, prevents environment damages (heat and radiation) and slows down the skin aging process.