

# **NATURAL** « **ASTAXANTHIN**

THE NATURAL QUALITY YOU ARE LOOKING FOR  
SAFE, CLEAN, SUSTAINABLE

# Astaxanthin

from *Haematococcus pluvialis* microalgae



## Health and Energy from a safe, natural and miraculous nutrient



Astaxanthin is a powerful antioxidant found in microalgae that gives salmon, crabs, shrimp, and flamingos their reddish color. From microalgae phytoplankton, through crustaceans and zooplankton, this wonderful molecule has been in the human and animal food chain for millennia.

Mother Nature and life evolution have devised Astaxanthin and its supporting carotenoids to be present in the natural food cycle to give us all its health benefits.

A notable example is a salmon that, having accumulated Astaxanthin in their muscles cells, posses the extraordinary capacity of recovering from oxidation in their strenuous upstream swimming race.



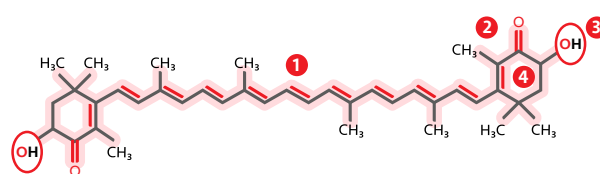
## Most powerful antioxidant with anti-aging and anti-inflammatory action

The unique molecular structure made up of 13 conjugated double bonds<sup>①</sup>, with keto<sup>②</sup> and hydroxyl<sup>③</sup> moieties on each ionone ring<sup>④</sup>, confer it a very strong antioxidant and anti-inflammatory capacity. Its main feature is having many available electrons to donate that can neutralize multiple free radicals at one time.

- ✓ Known as the “The king of the carotenoids,” it is nature’s most powerful antioxidant.
- ✓ Unlike other carotenoids, it never becomes a pro-oxidant.
- ✓ It absorbs UV rays reducing skin damage from sun exposure.
- ✓ Most available antioxidants cannot cross endothelial cells, astaxanthin does cross the blood-brain and blood-retinal barriers to help preserve neurons and eye health.
- ✓ Having both hydrophilic<sup>③</sup> and lipophilic<sup>①</sup> sites, the Astaxanthin molecule stretches through the phospholipid bilayer of cell membranes creating a shield that protects mitochondria, ribosomes and nuclear DNA against oxidative damage.
- ✓ Supports healthy inflammatory response blocking COX 2 pathway, it also suppresses serum levels of nitric oxide, interleukin 1B, prostaglandin E2, C Reactive Protein, and tumor necrosis factor-alpha.

### Astaxanthin

3 S, 3’S stereoisomer of Astaxanthin from *Haematococcus pluvialis*



### Clinically proven benefits

**Microalgae produce astaxanthin to protect themselves from stressful environmental conditions. This attribute is transmitted to humans by ingestion as food or supplements.**

Antioxidant and anti-inflammatory properties of natural Astaxanthin from *Haematococcus pluvialis* microalgae have led more than a thousand clinical and pre-clinical studies that show benefits in brain health, cardiovascular support, eye health, skin health, antiaging, and athletic performance.

### Potent

Free radicals are unstable and highly reactive molecules due to unpaired valence electrons in atomic orbitals. They degrade biological cell membranes as they obtain electrons from them. Antioxidants act quenching and scavenging free radicals.

### Astaxanthin power compared with other antioxidants

Singlet oxygen quenching		Free radicals scavenging	
800	times stronger than CoQ10	65	times stronger than vitamin C
550	times stronger than vitamin E	14	times stronger than vitamin E
11	times stronger than beta carotene	54	times stronger than beta carotene
		21	times stronger than synthetic astaxanthin



## Discover the origin of NatAxtin™

# Harvesting the sun

Cost effective, maximizing Astaxanthin



## The perfect place on Earth

To commercially produce natural Astaxanthin from *Haematococcus pluvialis*, two factors are strictly needed: an exceptionally clean environment so the microalgae can grow strong without contamination or biological competition, and an intense light source to enable carotenogenesis of Astaxanthin. Both conditions can be created and forced using human technology but, what if there is a perfect place on Earth where you can access both naturally? There is such a place, and it is the Atacama Desert in the North of Chile.

Atacama is a remarkably clean environment as it is away from urban zones (polycyclic aromatic hydrocarbons), agricultural zones (pesticides), rainy areas (acid rain) and regions with fauna presence (salmonella, feces). Proof of this are the many astronomical observatories that chose the location due to the exceptionally clear, pristine skies. This desert has the highest solar irradiation in the world which, combined with the environmental cleanliness, provides vibrant **year-round sunlight that strongly stimulates *Haematococcus pluvialis* to produce the most potent natural Astaxanthin.**

## Clear skies, pure product

CHOSEN BY NASA FOR  
IT'S IDEAL STAR GAZING  
CONDITIONS, SELECTED  
BY US AS THE BEST SPOT  
FOR *HAEMATOCOCCUS  
PLUVIALIS* CULTIVATION

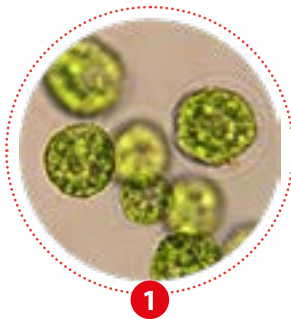
# Most powerful Astaxanthin complex because it is made as nature intended

NatAxtin™ is astaxanthin created by the freshwater, non-GMO microalgae *Haematococcus pluvialis* which live as green stage macrozooids<sup>1</sup> in shallow water bodies.

When ponds are drying and the cell is

exposed to severe adverse conditions such as high temperature, solar irradiation or salt concentration, these macrozooids have the ability to transform themselves into palmella and cyst stages. As the green vegetative cells are hit by the strong sun radiation

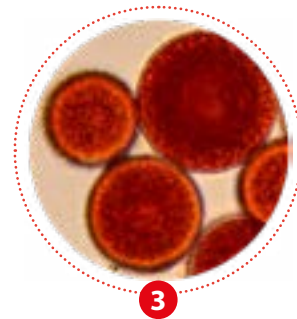
of the Atacama desert, they start the natural biological transformation and hyper accumulate astaxanthin and supporting carotenoids to protect their cell membranes and preserve mitochondria and DNA from UV and dehydration damage.



1 Macrozooid green phase



2 Intermediate palmella stage\*



3 Red hematocyst

\*Adaptation of Transmission electron micrograph showing transformation, chloroplast in green color, pyrenoids grey, nucleus blue and astaxanthin starting to appear in red. Figure reproduced from Watyama et al.(2013) distributed under the terms of the Creative Commons Attribution License.

In its transformation, this algae becomes an intermediate cell called palmella<sup>2</sup> and finally a cyst, resembling a dry egg with a thick shell. It accumulates energy in the form of lipids that are protected from peroxidation by a synergistic collection of carotenoids, mainly astaxanthin, created by the stimulus of the extreme sun irradiation. This form of hibernation keeps the now red-colored cell alive up to 40 years awaiting for favorable environmental

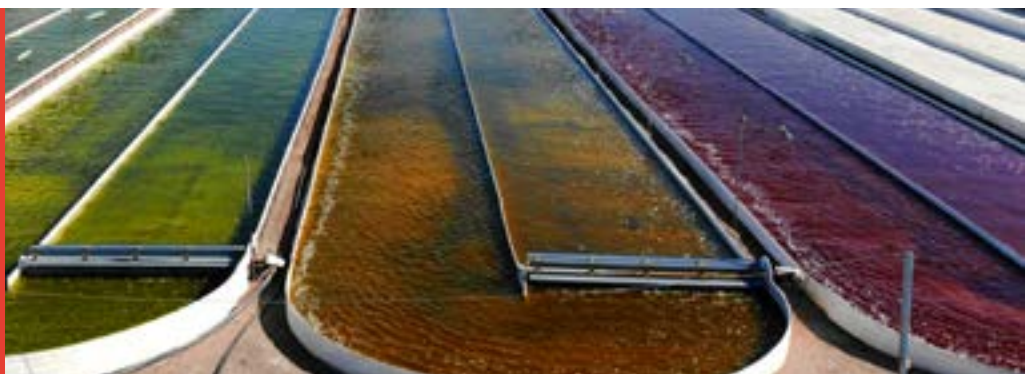
conditions to germinate and initiate a new green vegetative growth cycle. The result is a hematocyst cell<sup>3</sup> of red color filled with oils with the potent mix of antioxidants.

## NatAxtin™ as made by Atacama Bio Natural Products

After billions of years of research and development, mother nature has selected this natural process to produce astaxanthin from *Haematococcus*

*pluvialis*. An ecological, sustainable process done in ponds that self regulate their temperature by evaporation, low energy consumption process that uses the sun as the light source, and low carbon footprint that uses the atmosphere to exchange gases, obtaining CO<sub>2</sub> and releasing oxygen. **The observation of this natural process was the inspiration for Atacama Bio's process development that keeps the sustainable world as it already exists.**

The visual transformation in the pond varies from green, yellow, brown, and finally, red color. These stages correspond to macrozooid, palmella, and cyst stages.



# Biomimetic, ecological and sustainable production of NatAxtin™

## Biomimicry, the ecological way

How to live in this world without creating an environmental impact that destroys nature and creates sustainability problems for the future? New generations simply do not accept industrial processes that consume high amounts of energy and leave a high carbon footprint.

Biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. The core idea is that nature has already solved many of the problems we are grappling with and that technology can imitate the functioning of the ecosystems.

The use of solar energy, closing the cycle for materials and low carbon footprint are on the basis of biomimetic processes.

## The most natural production of astaxanthin possible A closer-to-natural, sustainable, cost-efficient proprietary process

Since 2003, the work of our experienced team on engineering, biology, and technology has allowed us to develop a biomimetic production process that takes advantage of the privileged geographical and climatological conditions in the Atacama Desert.

Atacama Bio Natural Products uses a production system based on raceway photobioreactors which is sustainable, low energy consuming and closely resembles the way that nature intended for *Haematococcus pluvialis* to grow. Ponds that self-regulate their temperature and energy from the sun results in low overall energy consumption. The algae create its biomass from carbon dioxide obtained

directly from the atmosphere where it exchanges the oxygen produced by photosynthesis, thus contributing to a lesser carbon footprint, and reducing the impact on world climate change. The facilities have access to pure underground water coming directly from the peaks of the Andes Mountain Range. Together, all these factors, plus being located in a non-fertile, low-cost marginal land, have a significant impact on the production's costs, a benefit transferred to our customers.

Nowadays, consumers value the way products are manufactured. They want ingredients to come from superb natural sources. The proprietary technology of Atacama Bio Natural Products imitates the original living conditions of *Haematococcus pluvialis*, culturing the algae in pond-like raceways, gently moved by paddles, and exposed to the vibrant sun.

**In this biomimetic process, we do not need to force the cultivation conditions as in tubes and tanks technologies**

No need for tubes

No need for fermentation closed tanks

No need for artificial CO2 injection

No need for artificial cooling

No need for chemical cleaning for tube fouling

No need for artificial light

No need for oxygen separators

No need to subject microalgae to high shear forces on pumping

**Results in low energy, low carbon footprint, sustainable technology**

## LOW ENERGY & LOW CARBON EMISSION

**The building blocks of our natural astaxanthin production**



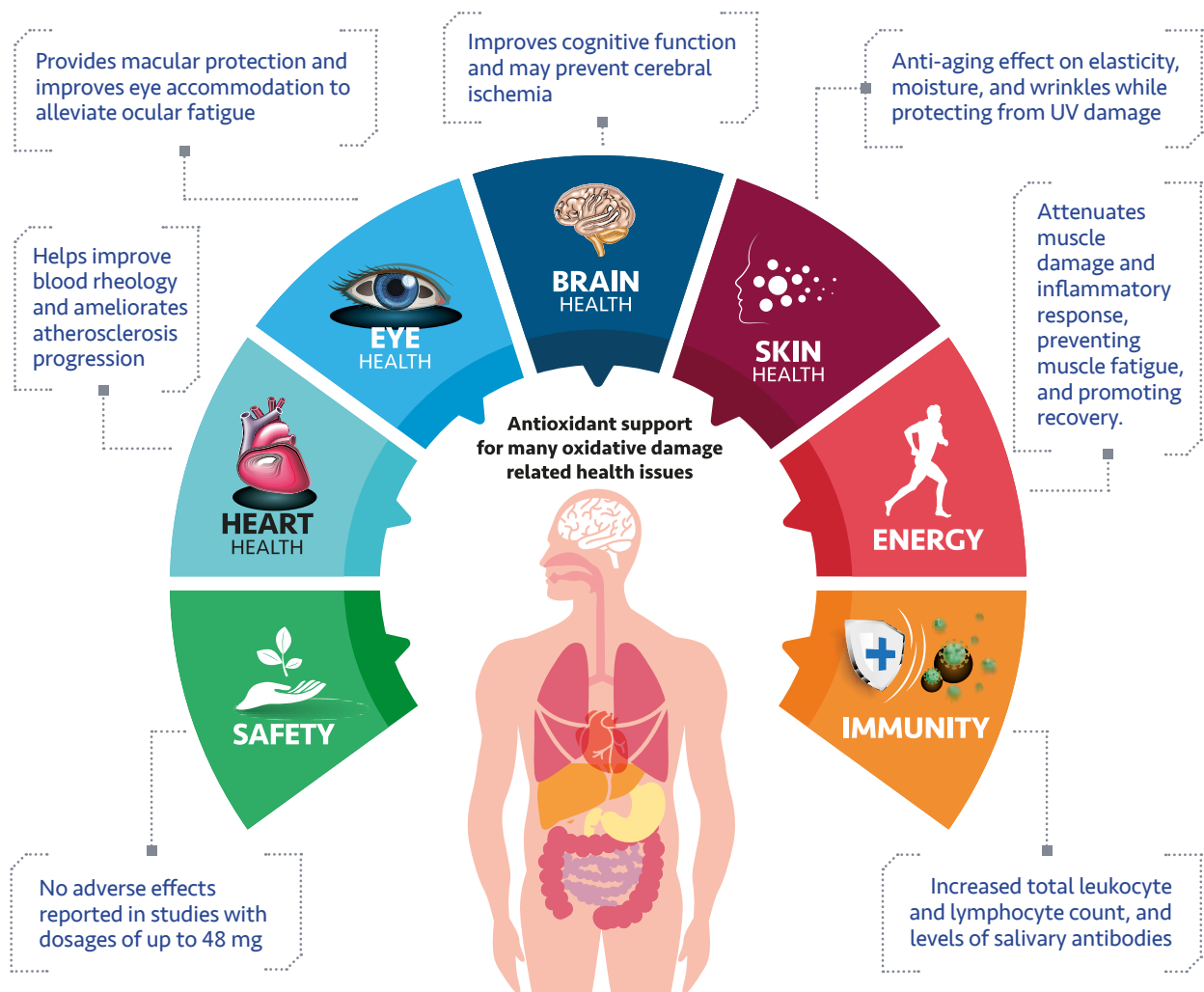
**One step ahead  
Lowest carbon footprint**



## Well studied healthy uses, Clinically proven benefits

### Clinically proven benefits of *Haematococcus pluvialis* astaxanthin

*Haematococcus pluvialis* natural Astaxanthin applications has been documented by extensive research and it is based on a solid scientific evidence. More than a thousand *in vitro*, clinical and pre-clinical studies has been published and support the health benefits of this Astaxanthin isomer.



Ask our specialists for further information about *in vitro*, pre-clinical and clinical studies peer-reviewed papers published in leading research journals.

**Note:** The claims made are for ingredients only. Marketers of finished products containing the ingredient are responsible for determining whether the claims made for such products are accountable. Physiological activity in published studies done on Astaxanthin are not necessarily sponsored or done with our *Haematococcus pluvialis* Astaxanthin.





# The company and its people

## What drives us

**We believe in improving people's health while doing it the right way for our planet.**

Our goals are to develop, produce and deliver high quality natural products for human nutrition from algae. To be a well-known, reliable and preferred supplier of beneficial products for human health in long term business relationship with clients.

To be a company in which the staff feels that it is their own and are committed to the goals of excellence, consumer service, permanent innovation and respect for the environment and community.

## What do we offer?

A long term win-win commercial relationship.

### ● Sustainability

Low carbon footprint process

### Reliable Supply

- High stock in a refrigerated warehouse ready to supply all the product that is needed
- Existent large production capacity
- Production can be increased many times, as market needs

### Very competitive prices, now and in the long run due to

- High solar radiation, low energy consuming technology
- Low cost non fertile marginal land
- Water reuse
- Country with competitive cost of inputs, energy and personnel
- Permanent high investment in R+D to optimize the technology

### NatAxtin® Product range

Formats that meet your needs

- **PureMass 3/4%**  
Cracked and dried H.pluvialis biomass
- **PureMass ME 1.5%**  
Microencapsulated H.pluvialis biomass
- **Oil 5/10%**  
Astaxanthin-rich Oleoresin
- **ME 2.5%**  
Microencapsulated Powder
- **Powder CWD 2.5%**  
Cold Water Dispersible Powder
- **Liquid CWD 1%**  
Cold Water Dispersible Emulsion
- **VSG 4/8mg**  
Vegan softgel capsules

