

## Culinary Ingredient per half a gram

(approximately 0.02oz or a pinch)

Such a comprehensive balance of nutrients is found in no other natural food but seaweed. From the primordial ocean to the vegetation and animals which remain our food today, our own bodily composition has its origins in the earliest organisms and the very chemistry of life itself. As life forms became increasingly diverse they adopted more specific diets. To survive on a narrower range of nutrients and protect themselves against toxicity, each evolved different mechanisms of selectivity and defence. That is why we need a wide variety of land based foods, since each has a little of what we need. But nutrient loss in agricultural soils and so much less-than-natural food makes nutritional balance, especially of all the micronutrients, harder to achieve. Almost as old as the ocean, seaweed is an outstanding whole food which complements and fills the gaps in all land food and special diets.

*1g (gram) = 1000mg (milligram) = 1,000,000µg (microgram)*

### **Amino acids**

Alanine 0.68 mg, Arginine 0.60 mg, Aspartic acid 0.84 mg, Cystine and Cysteine\* 0.56 mg, Glutamic acid 1.04 mg,, Glycine 0.64 mg, Histidine 0.56 mg, Isoleucine 0.60 mg, Leucine 0.68 mg, Lysine 0.64 mg, Methionine 0.56 mg, Phenylalanine 0.60 mg, Phosphoserene 2.92 mg, Proline 0.68 mg, Serine 0.64 mg, Threonine 0.64 mg, Tryptophan 0.56 mg, Tyrosine 0.56 mg, Valine 0.64 mg.

*\*Cysteine is a non-essential methionine amino acid derivative formed in collaboration with vitamins B6 and B12 whereas cystine, a compound formed when two amino acids form a disulfide bond, is a more stable semi-essential amino acid. Both are important in protein synthesis, detoxification and metabolism and cystine is a substrate for the cystine-glutamate cell transport by which it is readily broken down to cysteine in the cell. Normal human hair and skin contains 10-14% cystine.*

### **Amino acids are...**

*Simple organic compounds containing both a carboxyl and an amino group which can combine in linear arrays to form proteins in living organisms. There are several important amino acids which have no relation to protein, such as the neurotransmitter aminobutyric acid and betaines. There are 20 common amino acids all of which are present in Seagreens®, which is not the case in any other whole food. The simplest amino acid is glycine, a major inhibitory neurotransmitter in the spinal cord and brainstem of the vertebrate central nervous system.*

### **Antioxidant capacity and principal antioxidant nutrients**

Antioxidant capacity 403.32 µmole/TE ORAC. Alpha-linolenic acid (ALA) 990 µg, Calcium 24,000 µg, Copper 1.16 µg, Magnesium 16,060 µg, Phenolics (gallic acid equivalent) 332,220 µg, Polyphenols 70,132 µg, Potassium 38,100 µg, Selenium 0.08 µg, Superoxide dismutase 127 µg, Tannins 9,000 µg, Vitamin A (carotenoid precursors) 63.40µg, Vitamin C 848.28 µg, Vitamin E (alpha-tocopherol) 103.52 µg, Zinc 48.32 µg.

### **Antioxidants are...**

Nutrients widely present in body fluids and tissues that inhibit or remove potentially damaging products of oxidation or oxidizing agents in a living organism. Antioxidants are either soluble in water or lipids. Water-soluble antioxidants are effective in cells and blood plasma while lipid-soluble antioxidants protect cell membranes from lipid peroxidation. In the presence of sufficient nutrients both can be synthesized in the body or obtained from the diet. Antioxidant capacity of Seagreens® wrack seaweeds is higher than in commonly consumed fruit and vegetables, including green tea which has a similar polyphenol content by weight. Seagreens® antioxidants have been shown to inhibit and therefore prolong carbohydrate and lipid digestion with the potential to favourably influence insulin response and the glycemic index of food. They may be effective against reactive oxygen species (ROS) in the lower intestine. See also Polyphenols below.

### **Betaines**

Glycine Betaine trace, Gamma Amino Butyric Acid Betaine trace, Delta Amino Valeric Acid Betaine trace, TML (Laminine) trace, L-Carnitine trace, Trigonelline trace.

### **Betaines are...**

Compound derivatives of glycine (an amino acid) characterised by high solubility in water which functions as an osmotic agent in plant tissue. 6 betaines have so far been identified in Seagreens®.

### **Carbohydrates**

1,106.40 mg of which total dietary fibre is 1,016.50 mg including non-starch polysaccharides Algin, Fucose, Fucoidan, Mannitol, Methylpentosans, Laminarin, Mannuronic acid and Chlorophyll (antioxidant). Soluble fibre is approximately 18% of total dietary fibre, insoluble 82%.

### **Carbohydrates are...**

Organic compounds occurring in foods and living tissues including sugars, starch and cellulose, containing 2 parts hydrogen to 1 part oxygen, the same ratio as water, which can typically be broken down to release energy more readily than proteins or fats. Simple carbohydrates are sweet-tasting sugars which can be absorbed through the intestine into the bloodstream as monosaccharides (glucose, fructose and galactose) and disaccharides (lactose, sucrose and maltose) can be converted to their two monosaccharide bases in the digestive tract. Complex carbohydrates, on the other hand, are commonly known as starches made up of chains of glucose molecules. Typical high starch foods include most grains (wheat, corn, oats and rice) and potatoes. Starch is also broken down in the digestive tract though more slowly than simple carbohydrate. Compared with most vegetables Seagreens® has a valuable ratio of soluble to insoluble fibre, with soluble fibre up to 20% of total dietary fibre. The wide variety of non-starch polysaccharides is also antioxidant, contributing to Seagreens® outstanding antioxidant capacity.

### **Enzymes**

Protease (pH7.4) 1,347.92 µg, Superoxide dismutase (antioxidant) 127 µg, Carbohydrase (pH8) 143.92 µg, Uronic acid 31.40 µg/g.

### **Enzymes are...**

Biological molecules that catalyse (i.e., increase the rates of) chemical reactions. An important function of enzymes is in the digestive systems of animals. Enzymes such as amylases and proteases break down large molecules (starch or proteins, respectively) into smaller ones, so they can be absorbed by the intestines. Starch molecules, for example, are too large to be absorbed from the intestine, but enzymes hydrolyze the starch chains into smaller molecules such as maltose and eventually glucose, which can

then be absorbed. Other nutrients in Seagreens® have beneficial effects on certain digestive enzymes resulting in prolonged carbohydrate digestion and the steadier release of sugars.

### **Essential fatty acids**

Total EPA and DHA Omega-3 1.56 mg, Omega-3 3.40 mg, Omega-6 10.24 mg, Omega 9 24.92 mg, Oleic acid 5.60 mg, Alpha-linolenic acid (ALA) (antioxidant) 1 mg, Eicosapentenoic acid (EPA) 0.012 mg, Docosapentaenoic (DPA) 0.008 mg, Docosahexaenoic acid (DHA) 0.012 mg, Monounsaturated fatty acids 16.04 mg, Polyunsaturated fatty acids 10.12 mg, Saturated fatty acids 6.32 mg, Trans fatty acids 0.012 mg.

#### **Essential fatty acids are...**

*Fatty acids (EFAs) that humans and other animals must obtain from food because they are essential for good health but our bodies cannot synthesize them, including the vital-to-the-brain PUFAs (polyunsaturated fatty acids). The term "essential fatty acid" refers to fatty acids required for many neural and other biological processes, and not those that solely act as fuel. Seagreens® Pelvetia seaweed (Channeled Wrack) is particularly rich in essential fatty acids and one reason for its inclusion in Seagreens® Food Capsules and Food Granules.*

### **Minerals**

Calcium (antioxidant) 24 mg, Magnesium (antioxidant) 16.06 mg, Nitrogen 18.80 mg, Phosphorus 8.04 mg, Potassium (antioxidant) 38.12 mg, Sodium 66 mg, Sulphur 56.32 mg.

#### **Minerals are...**

*Solid and soluble naturally occurring substances available in edible form ranging from the rare earths in the form of clays, to various sands and salts, animal tissue (flesh and bones) and plants which absorb them from the soil and the ocean as 'colloidal' minerals (in a soluble suspended state). Colloidal minerals are never intrinsically toxic and this is the soluble form in which they present in Seagreens® seaweeds. Trace elements are minerals (metalloids or metallic elements) which represent only the smallest part of a living organism (less than 1mg per litre of internal fluid) yet are essential in its growth, equilibrium and regulatory processes. Quantity is less important than quality and in natural sources the trace elements exist in ideally balanced proportions and forms which allow the body to recognise and utilise them. The human body and Seagreens® contain all the elements of the Periodic Table that are available to it in its environment. Seagreens® provide a natural balance of all the minerals and trace elements known to be present in the human body in colloidal form, of particularly valuable because it is otherwise "necessary that we consume some 20 different vegetables in the proper proportions, and that these vegetables have been grown in soil that is sufficiently rich in nutrients and free from the many different chemical products now in common use" (Muller, Colloidal Minerals and Trace Elements, 2002). Colloidal minerals and trace elements of sea or plant origin can be 98% assimilated. Their absorption is 2.5 times greater than that of chelated minerals and 10 times greater than that of non-organic minerals. 7,000 times smaller than red blood cells, colloidal minerals are readily absorbed because they contain a negative charge, while the intestinal wall holds a positive charge, creating a chemical gradient which concentrates colloidal minerals towards the intestinal mucous and enables their absorption. A chelated mineral is bound or held by amino acid molecules which naturally encircle mineral atoms. Isolated metallic atoms do not naturally exist in the body. In Seagreens®, with its ample amino acid component, minerals are bound to protein ions in the most effective form of chelation which comes closest to achieving a neutral pH, which assists their absorption.*

*Minerals help regulate the body's elimination system and regenerate the blood at a molecular level. Mineral deficiency and imbalance thus puts us at risk of chronic toxicity, endemic in modern societies. Arsenic, for example, is essential for the survival of newborns. Dietary arsenic was eliminated in laboratory tests in rats with the result that their growth rate slowed, they lost their fur, they seldom moved and their red blood cells became inactive. When (colloidal) arsenic was introduced these effects were reversed. In all cases the amount of the element significantly alters its physiological effect. In an ionised form, calcium has coagulant properties, so that a large dose will restore calcium to bone or tissue, whilst very small amounts in colloidal form endows it with regulating properties. All trace elements can be toxic if taken in excess and some, such as aluminium, cadmium, mercury and arsenic are toxic at very low levels and may occur as environmental pollutants. Tolerable levels of arsenic are present in Seagreens® as in other natural foods and due in part to its high content of colloidal minerals, Seagreens® is also a natural binding or chelating agent assisting in the elimination of toxic heavy metals and other toxic substances. Seagreens® has the effect of restoring to the body the most primal natural marine balance of minerals and trace elements still available. Like seawater which has a pH between 7.9 and 8.3, Seagreens® are the most alkalisng of all foods. It should not be at all surprising that its simple addition to the daily diet can so dramatically regulate both an overly acidic gastric and intestinal environment and an overly alkaline cellular environment, but in addition indirectly cure all kinds of disorders and diseases. Due to its electrolytic composition, "seawater (nutrition) fundamentally modifies the mineral content of different tissues by correcting ionic imbalances, which explains the effect it has on allergic diseases. In clinical settings the subjective and objective results were so favourable that it gave the impression of a specific curative effect" (Bensch, Therapeutic Properties of Seawater, Journal of Medicine, 1966).*

## **Polyphenols**

70,135.32 µg (antioxidant).

### **Polyphenols are...**

*Nutrients composed of four main classes – phenolic acids, flavonoids, stilbenes and lignans – principally found in fruits, berries, seeds, cereals and vegetables including onions, cocoa and tea. Lignans are derived from the amino acid phenylalanine. Polyphenols also include phenols and tannins. They are secondary metabolites of plants or the bacteria and fungi associated with them, which help protect the plant against aggressive pathogens and radiation. The sometimes confusing term 'phenolic' refers to phenol compounds within a larger class of organic 'polyphenol' compounds and all typically have valuable antioxidant properties which counter cellular damage and oxidative stress from free radicals (waste or by-products) arising from pollution, smoking and eating rancid or inflammatory foods as well as from the body's normal metabolic processes. Tannins are particular polyphenolic compounds, found particularly in wines, tea, cocoa and many other plants, consisting of gallic acid derivatives, which bind to and precipitate proteins and are strongly antioxidant. Polyphenols are widely indicated in the prevention of human degenerative diseases and are anti-carcinogenic. The level of polyphenols in Seagreens® is directly related to its high antioxidant capacity – see also Antioxidant capacity above.*

## **Proteins**

117.80 mg.

### **Proteins are...**

*Complex organic compounds of high molecular weight, essentially composed of at least 20 different amino acids in peptide linkages containing carbon, hydrogen, oxygen, principally nitrogen and usually sulphur, ubiquitous in plants and animals as the principal constituents of cell protoplasm. Each protein has a unique, genetically defined amino acid sequence which determines its structure and function.*

*Proteins serve in oxygen transport, muscle contraction, electron transport and other activities, especially as structural components of body tissues such as muscle tissue, hair, collagen, and as enzymes, hormones, immunoglobulins and antibodies. Seagreens® is a source of high quality vegetable protein, containing the full balance of amino acids, of particular use for vegetarians and vegans because most other plant proteins are low in one or other essential amino acids. For instance, grains tend to be short of lysine whilst pulses are short of methionine. This does not mean that vegetarians or vegans need go short on essential amino acids. Combining plant proteins, such as a grain with a pulse, leads to a high quality protein which is just as good, and in some cases better, than protein from animal foods. The limiting amino acid tends to be different in different proteins, so when two different foods are combined, the amino acids in one protein can compensate for the one lacking in the other. This is known as protein complementing. Vegetarians and vegans eating a well-balanced diet based on grains, pulses, seeds, nuts and land and sea vegetables will be consuming a mixture of proteins that complement one another naturally without requiring any planning. Beans on toast, cheese or a peanut butter sandwich, muesli with milk (soya or cow's) and rice with peas or beans, are all common examples of protein-complementing. The body retains a short-term store of essential amino acids so as long as deficiencies are replenished within a day or two, a well-balanced vegetarian or vegan diet can supply all the protein needed.*

## **Sugars**

Fructose 4.00 mg, Glucose 4.00 mg, Maltose 4.00 mg, Sucrose 4.00 mg.

### **Sugars are...**

*Simple monosaccharides like fructose, glucose and galactose and compound disaccharides like maltose and sucrose found in the tissues of most plants and are closely related. For example a molecule of lactose is formed by the combination of a molecule of galactose with one of glucose and is broken down in digestion by the enzyme lactase. Some people are deficient in this enzyme and cannot digest lactose, a sugar present in milk. The digestion of sugars releases energy into the bloodstream. Slow and prolonged release is assisted by the enzymatic effects of other Seagreens® nutrients, especially their unusual range of polysaccharides which are both soluble and insoluble carbohydrates some of which have been shown to inhibit carbohydrate digesting enzymes.*

## **Trace elements**

Antimony 0.12 µg, Barium 10.80 µg, Beryllium 0.001 µg, Bismuth 0.001 µg, Boron 183.60 µg, Bromine 1,067.40 µg, Cerium 0.0001 µg, Cesium 0.08 µg, Chromium 0.80 µg, Cobalt 1.24 µg, Copper (antioxidant) 1.16 µg, Dysprosium 0.01 µg, Erbium trace µg, Europium 0.02 µg, Flouride (acid soluble) 11 µg, Gadolinium trace µg, Gallium 0.08 µg, Germanium 0.12 µg, Gold 0.020 µg, Hafnium 0.008 µg, Holmium trace µg, Iodine 435 µg\*, Iridium 0.052 µg, Iron 181.20 µg, Lanthanum trace µg, Lithium 0.68 µg, Lutetium 0.02 µg, Manganese (antioxidant as a component of Superoxide dismutase) 33.92 µg, Molybdenum 1.68 µg, Neodymium 0.0002 µg, Nickel 1.28 µg, Niobium 0.01 µg, Osmium 0.01 µg, Palladium 0.002 µg, Platinum 0.01 µg, Praeseodymium trace µg, Rhenium 0.26 µg, Rubidium 12.56 µg, Ruthenium 0.01 µg, Samarium trace µg, Scandium 0.0002 µg, Selenium (antioxidant) 0.08 µg, Silicon\*\* 460.18 µg, Silver 0.12 µg, Strontium 1244 µg, Tantalum trace µg, Tellurium 0.10 µg, Terbium trace µg, Thallium 0.004 µg, Thorium 0.018 µg, Thulium trace µg, Tin 0.04 µg, Titanium 6.40 µg,

Tungsten 0.02 µg, Uranium 0.02 µg, Vanadium 4.82 µg, Ytterbium trace µg, Yttrium 0.0001 µg, Zinc (antioxidant) 48.32 µg, Zirconium 0.28 µg.

*\*For more iodine information and a comparison of iodine levels in Seagreens products see below 'Iodine levels in Seagreens® nutrition products'.*

*\*\*Silicon and silica are different chemical species, the key difference being that silicon is an element whereas silica is a compound. Higher levels in seaweed may indicate the coincidental collection of sand during harvesting and is indicative of low grade seaweed unlikely to have been produced to standards for human consumption.*

### **Trace elements are...**

*Minerals present but comparatively rare in nature – many are even called 'rare earth minerals'. Yet many are absent or deficient in soils partly because gravity, water and erosion makes minerals leach into the oceans, which is why they are all present for seaweeds to absorb into their own substance. There is no more comprehensive food source of the mineral trace elements. Trace elements are metalloids or metallic elements which represent only the smallest part of a living organism (less than 1mg per litre of internal fluid) yet are essential in its growth, equilibrium and regulatory processes. Quantity is less important than quality and in natural sources the trace elements exist in ideally balanced proportions and forms which allow the body to recognise and utilise them. A single trace element may have different roles in numerous biochemical processes in the body. More than 67 have been found in Seagreens® seaweed species, the 58 presented here being regularly monitored. We continue to work towards the widest possible field of analysis. Like other minerals, trace elements are solid and soluble naturally occurring substances available in edible form ranging from the rare earths in the form of clays, to various sands and salts, animal tissue (flesh and bones) and plants which absorb them from the soil as 'colloidal' minerals (in a soluble suspended state). Colloidal minerals are never toxic and this is the soluble form in which they present in Seagreens® seaweeds. The human body and Seagreens® contain all the elements of the Periodic Table that are available to it in its environment. Seagreens® provide a natural balance of all the minerals and trace elements known to be present in the human body in colloidal form, of particularly valuable because it is otherwise "necessary that we consume some 20 different vegetables in the proper proportions, and that these vegetables have been grown in soil that is sufficiently rich in nutrients and free from the many different chemical products now in common use" (Muller, Colloidal Minerals and Trace Elements, 2002). Colloidal minerals and trace elements of sea or plant origin can be 98% assimilated. Their absorption is 2.5 times greater than that of chelated minerals and 10 times greater than that of non-organic minerals. 7,000 times smaller than red blood cells, colloidal minerals are readily absorbed because they contain a negative charge, while the intestinal wall holds a positive charge, creating a chemical gradient which concentrates colloidal minerals towards the intestinal mucous and enables their absorption. A chelated mineral is bound or held by amino acid molecules which naturally encircle mineral atoms. Isolated metallic atoms do not naturally exist in the body. In Seagreens®, with its ample amino acid component, minerals are bound to protein ions in the most effective form of chelation which comes closest to achieving a neutral pH, which assists their absorption. Minerals help regulate the body's elimination system and regenerate the blood at a molecular level. Mineral deficiency and imbalance thus puts us at risk of chronic toxicity, endemic in modern societies. Arsenic, for example, is essential for the survival of newborns. Dietary arsenic was eliminated in laboratory tests in rats with the result that their growth rate slowed, they lost their fur, they seldom moved and their red blood cells became inactive. When (colloidal) arsenic was introduced these effects were reversed. In all cases the amount of the element significantly alters its physiological effect. In an ionised form, calcium has coagulant properties, so that a large dose will restore calcium to bone or tissue, whilst very small amounts in colloidal form endows it with regulating properties. All trace*

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### **Vitamins**

A (precursor carotenoids, including betaine carotene, fucoxanthin and violaxanthin) (antioxidant) 63.40 µg, B1 (thiamin) 0.76 µg, B2 (riboflavin) 0.42 µg, B3 (niacin or vitamin PP) 12.67 µg, B5 (pantothenic acid and calcium pantothenate) 0.001 µg, B6 (pyridoxine) 0.0002 µg, B9 (folate) 1.80 µg, B12 (cobalamin) 0.003 µg, C (antioxidant) 848.26 µg, E (alpha-tocopherol) (antioxidant) with all the isomers of wheat germ 103.50 µg, H (biotin or vitamin B8) 0.09 µg, K (phytomenadione, K1 phylloquinone, K2 menaquinone 4 and menaquinone 7) 742 µg.

### **Vitamins are...**

Organic fat- or water-soluble substances that are required in small amounts, necessary for numerous special functions and affected by environmental conditions such as light, heat and air. Food storage, processing and cooking can all act to reduce the level of vitamins in food. The fat-soluble vitamins are A, D, E and K which can be stored in the body and so dietary sources are not needed every day. The water-soluble vitamins are C and the B group which includes B1, B2, B3, B6, B12, folic acid, biotin and pantothenic acid. The body is less able to store water-soluble vitamins, with the exception of vitamin B12 which is stored in the liver, and so they are needed daily and are more easily lost during cooking. Vitamin A, C, D2, D3 and E are also antioxidants. Seagreens® contains an exceptional balance of small but significant amounts of all of these vitamins.

## Nutritional values (typical) per 100 g

### Culinary Ingredient

<b>Energy</b>	154 kc / 630 kj
<b>Protein</b>	5.89 g
<b>Carbohydrate</b> (total)	55.32 g
of which Carbohydrate (available)	4.50 g
Sugars	4.28 g
<b>Fat</b>	1.27 g
of which Saturates	0.40 g
Mono-unsaturates (cis)	0.96 g
Mono-unsaturates (trans)	<0.01 g
Polyunsaturates	0.21 g
Polyunsaturates (trans)	<0.01 g
<b>Dietary fibre</b> (AOAC)	50.83 g
of which Insoluble fibre	41.26 g
Soluble fibre	8.89 g
<b>Sodium</b>	3.30 g
<b>Moisture</b>	10.23 g

## Iodine levels in Seagreens® nutrition products

*Uptake of iodine in the body\* has been shown to be approximately 1/3rd of intake. Figures are average iodine levels in micrograms over two decades harvesting Seagreens®. Iodine levels fluctuate according to natural variances in species and individual uptake.*

Product name	Intake (daily use or portion)	*Uptake
Food Capsules x 2 (1g / 0.04oz)	390µg	129µg
Food Granules x 1/2 tsp (1g / 0.04oz)	390µg	129µg
Iodine+ Capsules x 1 (1/2g / 0.02oz)	385µg	127µg
Iodine Lite+ Capsules x 1 (400mg / 0.014oz)	150µg	50µg
Culinary Ingredient (2g / 0.07oz)	1740µg	574µg
The Mineral Salt (2g / 0.007oz)	870µg	287µg
Pelvetia Pieces (2g / 0.07oz)	548µg	181µg
Pet & Equine Granules (1g / 0.04oz)	870µg	287µg

*\* Combet E., et al. Low-level seaweed supplementation improves iodine status in iodine-insufficient women. British Journal of Nutrition, 9:1-9, 2014. A Seaweed Health Foundation study at Glasgow University, Scotland. The British Health Food Manufacturers' Association advises that iodine supplementation should not exceed 500µg per day. In the EU the European Food Safety Authority allows an 'upper tolerable daily intake' of 600µg. In the USA this figure is 1100µg per day.*

***Iodine is...***

*A naturally occurring mineral element, drawn from the ocean into the plant, transformed into soluble iodine (I<sub>2</sub>) and iodide (I<sup>-</sup>), chelated (bound) to protein ions in the seaweed. It contributes to normal thyroid, skin, nervous system and cognitive function, energy-yielding metabolism, and normal growth in children. Iodine levels in different seaweed species have predictable variances and averages which in Seagreens®, are particularly well documented. In Seagreens® Ascophyllum nodosum the average iodine level has changed over 10 years by 150 points from 720 to 870µg/g. In other Seagreens® species the average iodine ranges from 200µg/g in Palmaria (Dulse), to 262µg/g in Pelvetia (Channel Wrack), 425µg/g in Fucus (Bladder Wrack) and 589µg/g in Alaria (Winged Kelp, often wrongly called Wakame) with a wider natural variance than many minerals. The British Health Food Manufacturers' Association (HFMA) advises that iodine supplementation should not exceed 500µg iodine per day. The European Food Safety Authority (EFSA) allows an upper tolerable daily intake of 600µg day (EFSA NDA Panel, 2014) which permits the consumption of larger quantities of seaweed, among other iodine sources (seafood, meat and dairy products). In the USA this figure is 1100 µg per day. Iodine is mainly stored in the thyroid gland, and in a variety of tissues including mammary and salivary glands, eyes, gastric mucosa, and the cervix. Iodine receptors reject excessive iodine, which can be freely excreted in urine. "We found a difference in the amounts of iodine excreted consistent with the generally held view that most of the iodine will be excreted in urine if iodine stores are replete. We found that colonic fermentation is important to free iodine from the seaweed matrix (which) may delay iodine absorption with (the seaweed) iodine being released from the food over a longer period" (Combet). Naturally occurring halogens such as chlorine and bromide, also ubiquitous as industrial pollutants, may compete for iodine receptors and reduce the bioavailability of total dietary iodine. A 2018 review in the international scientific journal Food Chemistry noted that "concerns over iodine toxicity from eating seaweed appear to be unfounded. However, seaweed must be sourced from near-pristine and clean environments where there is no concern for biological and chemical contamination or other environmental pollutants".*