

Seaweed Resources of the world











温暖化により資源海藻の養殖が開始
(オゴノリ)

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チリでのオゴノリの収穫



砂袋にてオゴノリの養殖
(現在はロープ方式) (チリ)



Laminaria cultivationcultivation

ロングライン方式のオゴノリ養殖 開始(中国)

**Expanding production with larger long line
cultivation since 2000s**

Production of 18,000 ton(wet) in 2000

Production of 1,116,108 ton(wet) in 2014

乾燥重量で約10万トン

(FAO data)



中国・福建省のオゴノリ養殖



若いオゴノリ種苗がロープに固着

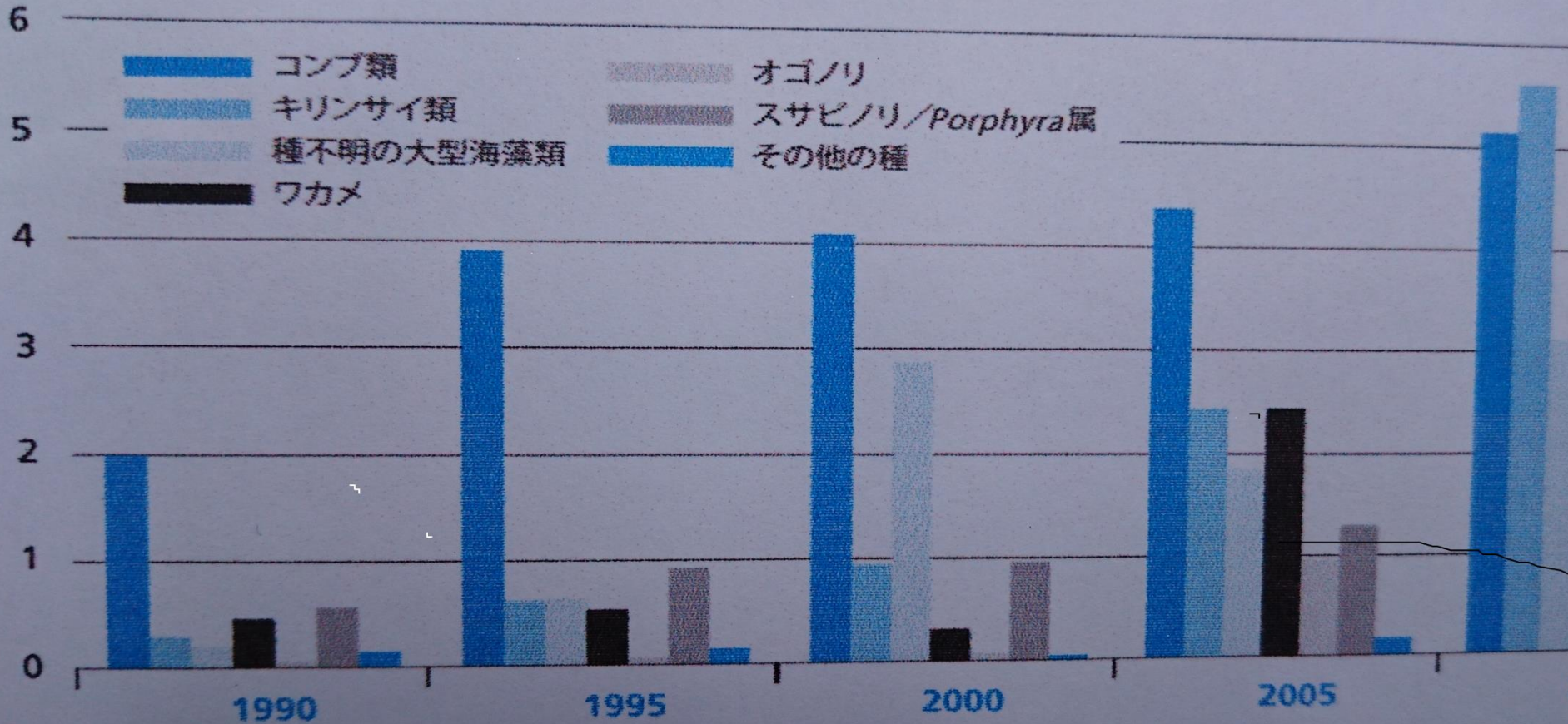


ベトナムのキリンサイ養殖 (カラギナン)

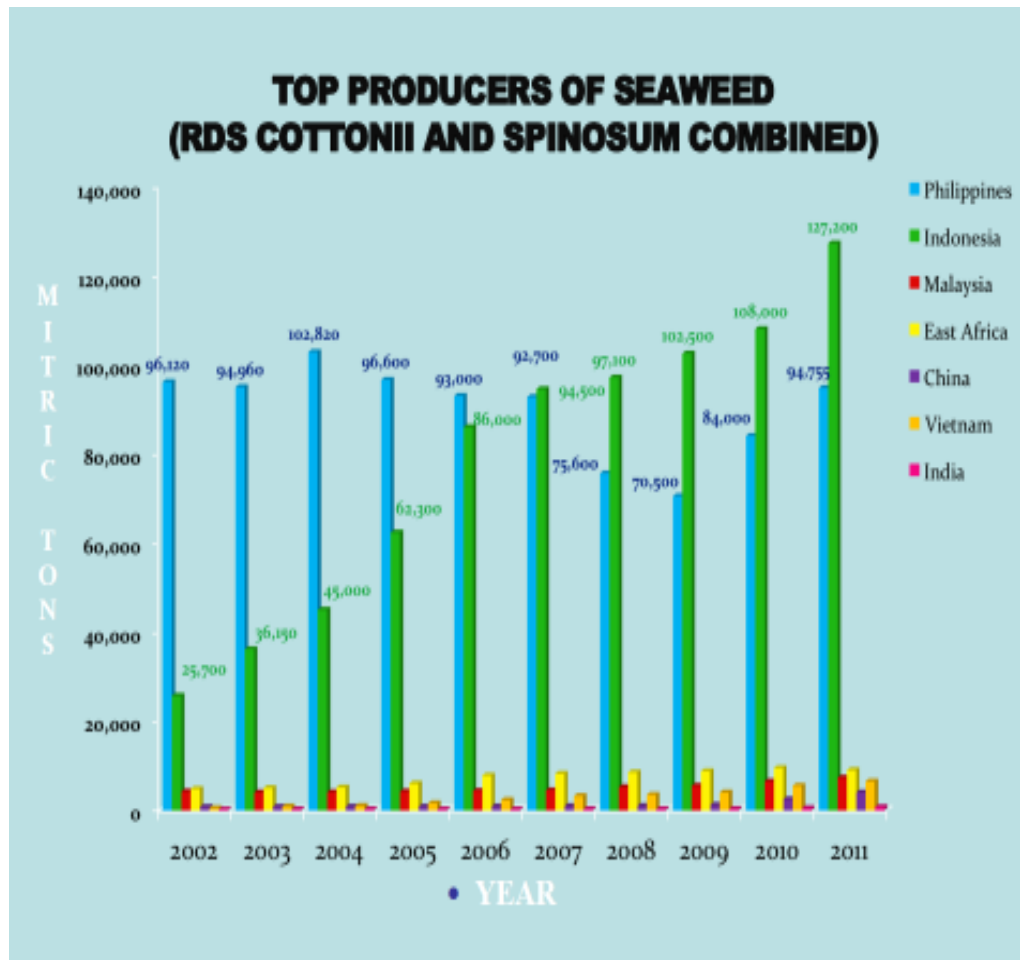


中国の広大なコンブ養殖場（増産）
アルギン酸原料と食用

100万トン

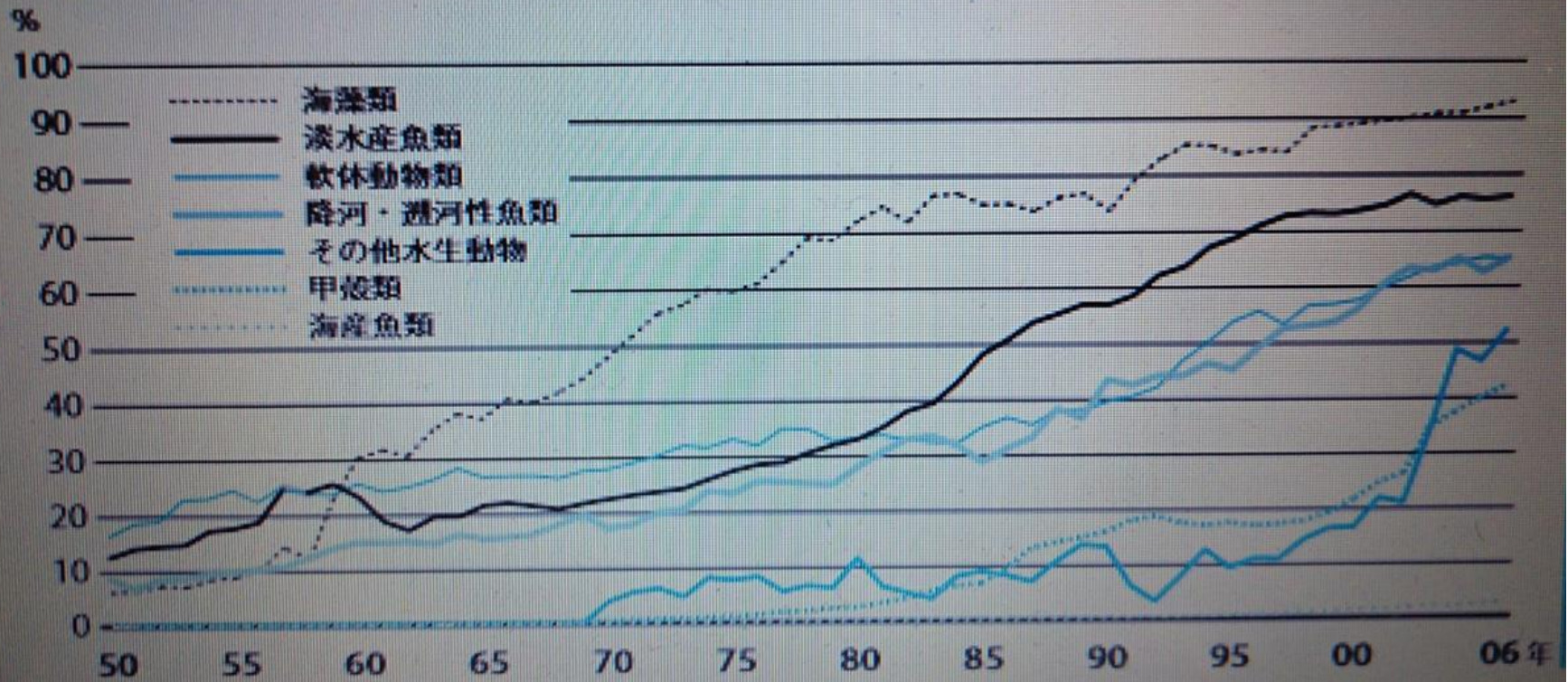


世界の養殖海藻資源の変動(FAO資料)
温暖化でコンブ、オゴノリ、キリンサイの生産は増加



カラギナン原料キリンサイ生産量の推移

世界の総漁業生産量に占める養殖生産量の割合：主要養殖対象種グループ別



Production of the cultivated seaweeds of the World

- 1. *Kappaphycus* and *Eucheama* (Tropical seaweeds)
Phycocoroid (Carrageenan) **83 milion ton (wet)****
- 2. *Lminaria* (China, Japan and Korea)
(Edible seaweed, alginate) **57 milion ton (wet)****
- 3. *Gracilaria* (Chile, Asian countries)
Phycocoroid (Agar) **28 milion ton (wet)****
- 4. *Undaria* (China, Japan and Korea)
(Edible seaweed) **22 milion ton (wet)****
- 5. Nori (*Porphyra* (Japan, China, Korea)
(Edible seaweeds) **18 milion ton (wet)****
- 6. Other seaweeds **28 milion ton (wet)****

(FAO data, 2015)

<2017年>

順位	国名	単位:トン	注
1	中国	17,737,080	
2	インドネシア	9,793,019	1
3	韓国	1,769,396	
4	フィリピン	1,415,673	
5	北朝鮮	553,000	1
6	日本	476,300	
7	イビス	1	
999	世界計	32,921,890	

AGAR INDUSTRY



- Agar–Agar consists mainly of high molecular weight polysaccharides extracted from Tengusa (*Gelidium spp.*) and Ogo Nori (*Gracilaria spp.*), which are also well known as edible seaweeds with Sashimi (*raw fish*).
- Agar–Agar is a food material developed in Japan 350 years ago , and are now manufactured and consumed all over the world.
- Agar–Agar contains more dietary fibers than any other food products , that is including 80–grams dietary fibers in 100–grams of Agar–Agar.
- Agar–Agar is also a good medicine for constipation and diarrhea, which is in accordance with Japanese Pharmacopoeia.

- There are three types , a strip type , a square type and powder type.
- Agar–Agar is chiefly used for the gelatinous foods, such as Tokoroten (*pure Agar–Agar*) , jelly , Mitsumame (Stabilizing jelly ,boiled beans and other mixtures with treacle) , jelly beans.
- It is essentially used for Japanese style confectionary, such as sweet bean jelly, soft adzuki–been jelly and Chinese style almond jelly.
- Nowadays it is frequently used for a hard type yogurt and functional drinking Jelly.
- It is uniquely used for bio–technological products such as culture medium for inspection of bacteria , gel for DNA analysis(*agarose*), and cell culture of the orchid .



**Traditional agar production
washing *Gelidium* fronds**







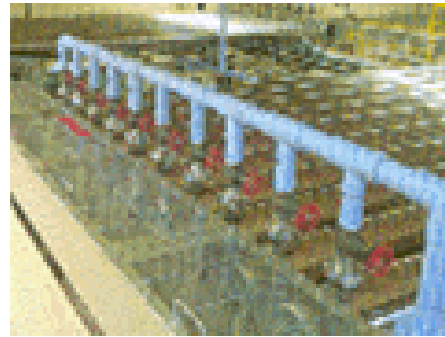
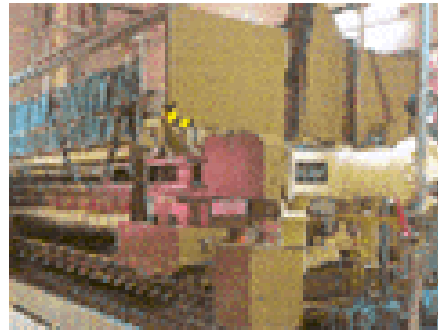
**Agar gel cutting in winter season
for natural freezing (-2°C-10°C at the night)**



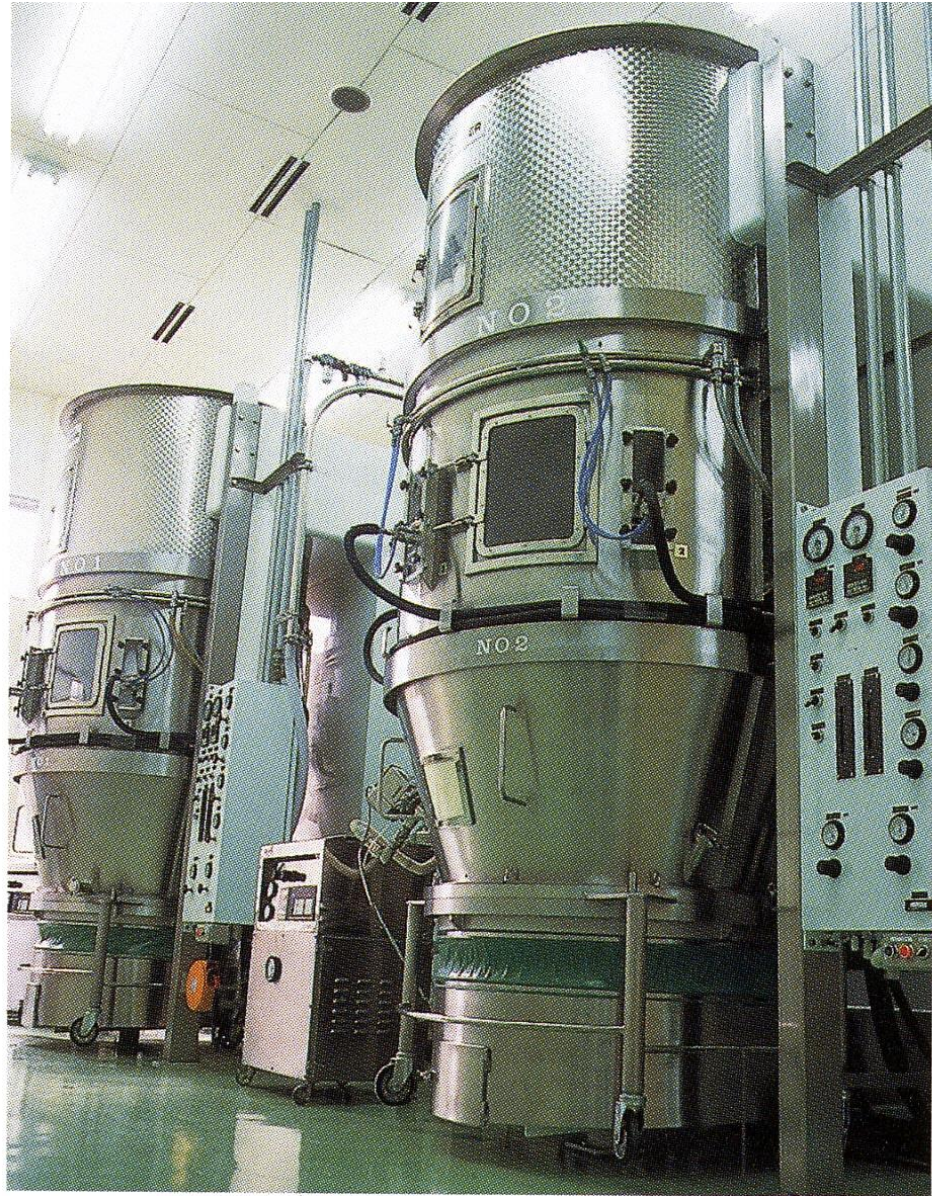
**Natural agar production by drying in day time
and freezing at night**



Natural agar (ito-kanten) for Japanese cakes



**Modern agar production
at Ina food industry Co., Ltd.**





Japanese cakes
with natural agar



soup



cake



Modern application of Agar dishes

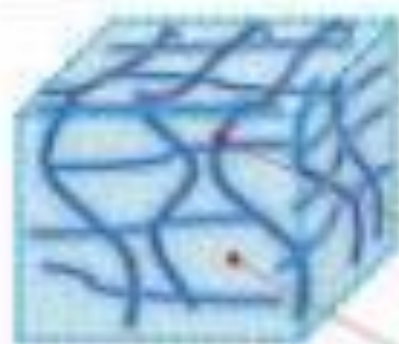
jam



noodle







高分子ゲル

→ 高分子が骨格となり、
その周囲に溶媒が分散

高分子

溶媒

寒天、ゼラチン



化学ゲル



化学結合

化学結合

↑ 強固

└ 不可逆反応

物理ゲル



結晶部位

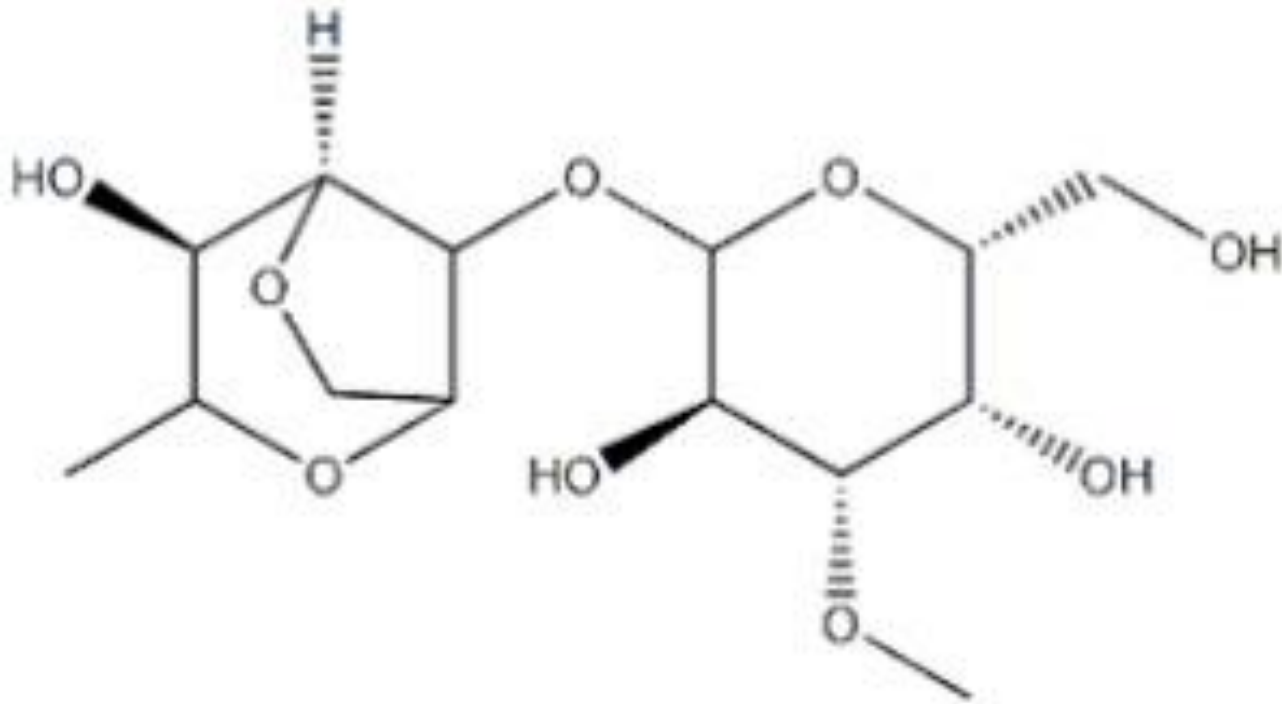
結晶・水素結合

↑ 脆弱

└ 可逆反応

〈ゾルーゲル〉

Chemical structure of Agar



Powder



Powder



Tablet

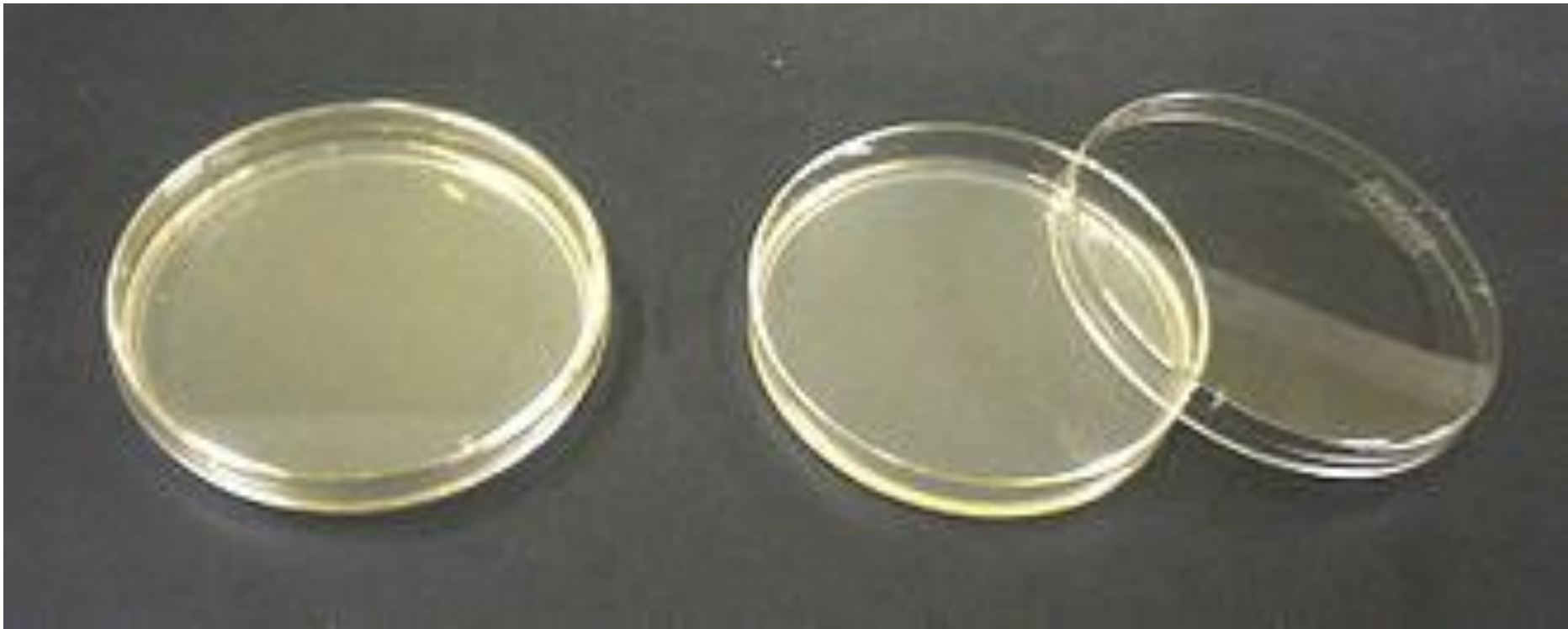


Flake

Agar products

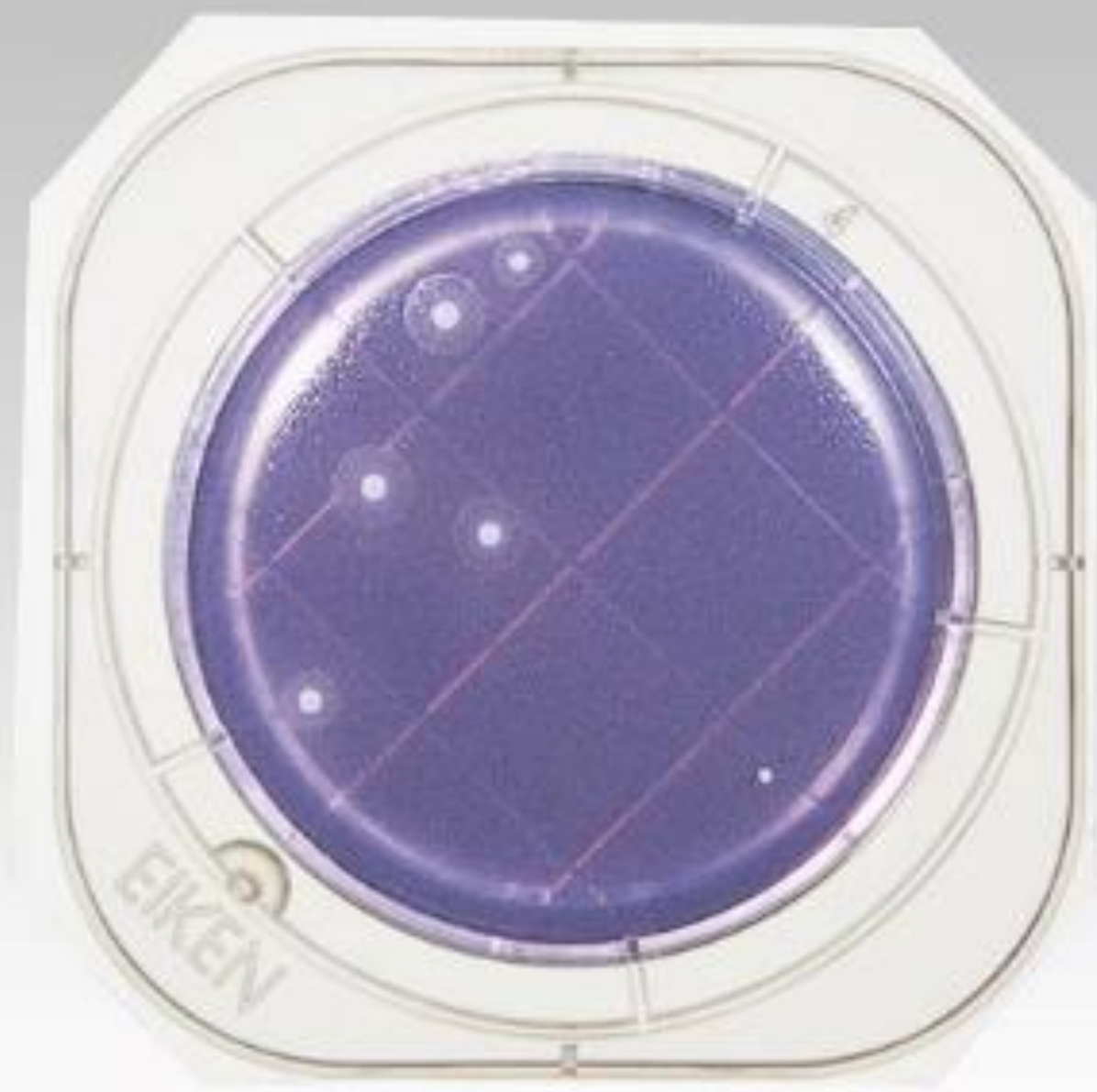
Chemical Agar



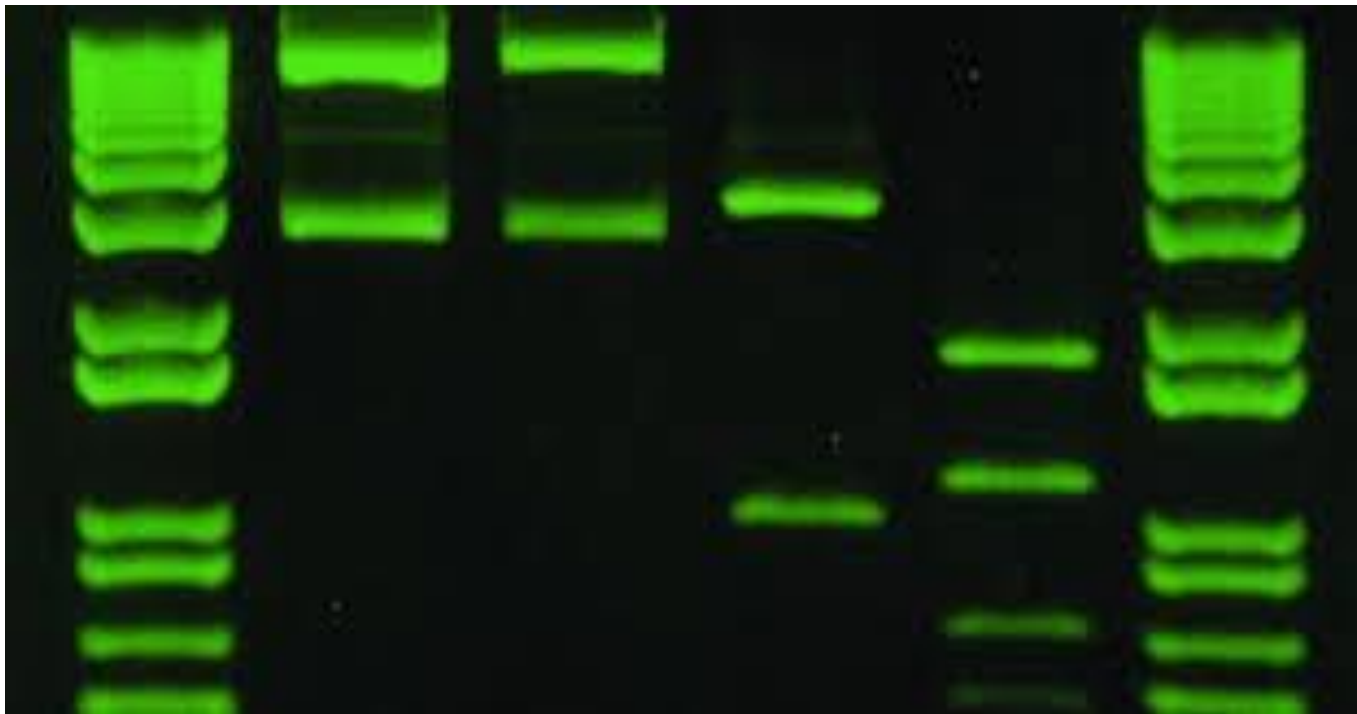








Agalose gel and DNA analysis



Carrageenan

- Carrageenan is the general term of hydrocolloid contained in the red algae (*Rhodopyhta*). Carrageenan is roughly divided has three types as Kappa, Iota and Lambda.
- Kappa type carrageenan has ability of solidify of water into jelly with hardness or elastic gel which is influenced by water soluble proteins, minerals and gums. The gel hardness and elasticity is able to adjustment freely by minerals and gums.
- Iota type carrageenan has the thixotropic viscosity which has fluidity of gel with fluidity, the influence of the Iota type on minerals is not so remarkable as a Kappa type, but the viscosity and soft texture is increase.
- Lambda type carrageenan has stable viscosity on the different temperature, and Lambda Carrageenan is not influenced by any protein and minerals.

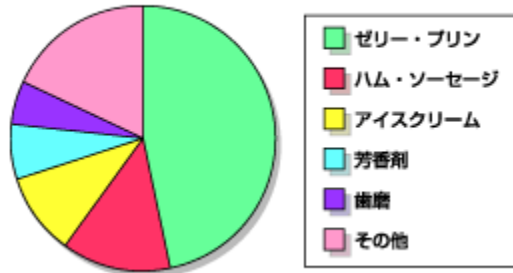


CAGEENAN INDUSTRY





カラギーナンの用途



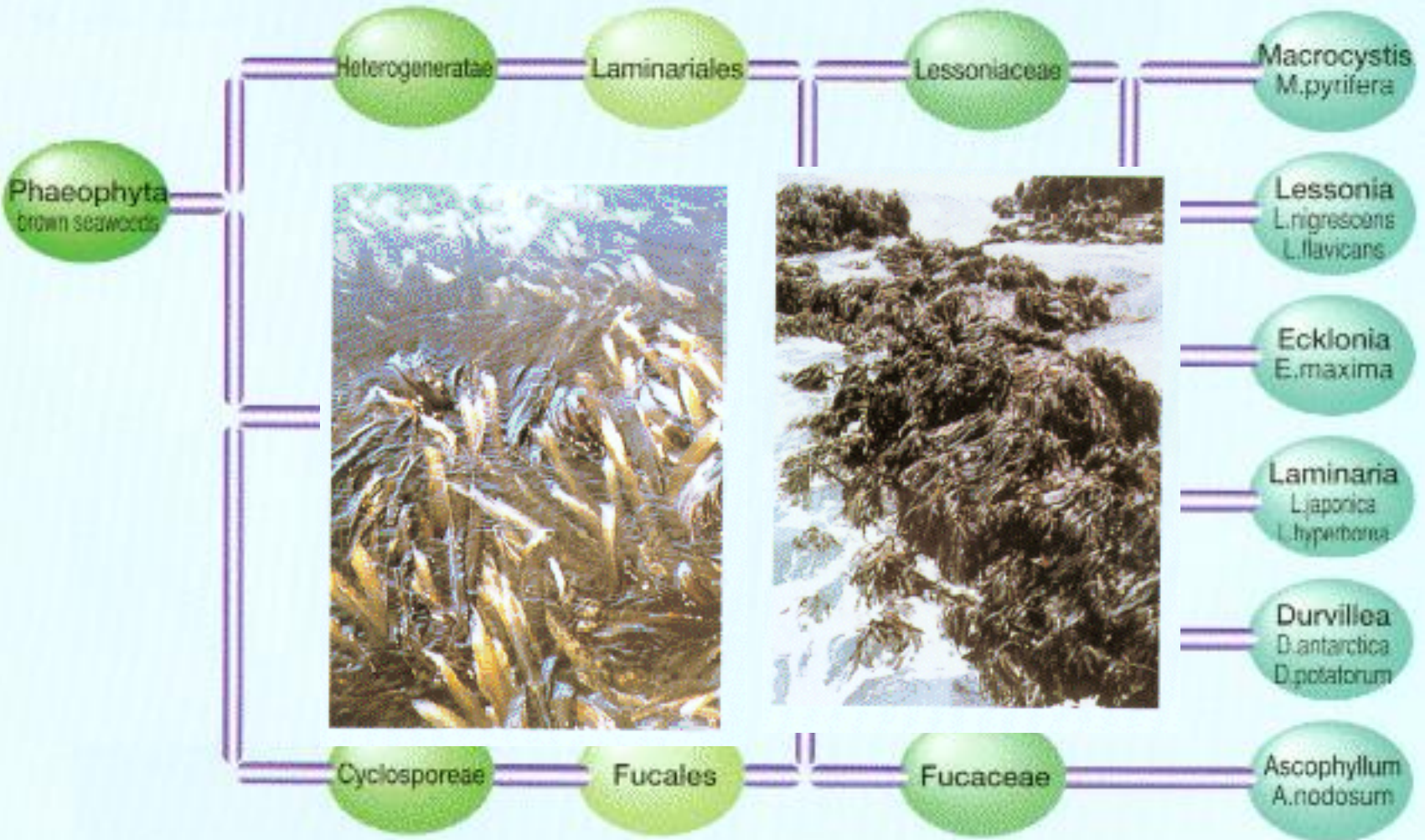
ALGINATE INDUSTRY



- Alginate is a natural polysaccharide that comprises from 30 to 60% of brown algae
- (on dry weight basis). Alginate has dietary fibre properties.
- Alginic acid usually accumulates in seaweeds as “jelly bodies” after combining
- with minerals from seawater. These jelly bodies fill the seaweed cells. The litheness
- of seaweeds growing in the ocean is a result of the flexibility that these jelly bodies, i.e.
- alginates, provide to the seaweed structure.
- Alginic acid was first isolated and named by a Scottish scientist, Dr. E.C.C. Stanford, in 1883. Since then, Alginic acid and its derivatives has been utilized as a hydro-
- colloid in a variety of applications such as food additives, pharmaceuti-cals, cosmetics and textile ,manufacturing.



Botanical classification of the brown seaweeds; raw materials for Alginates



Product Selection Guide 2

KIMICA ALGIN (SODIUM ALGINATE)

- **FOOD**
 - Thickening, Stabilizing, Gelling (Ice cream, Filling, Topping, Fruit jelly, Onion ring, Artificial fish egg)
- **PHARMACEUTICAL**
 - Dental Impression
 - X'ray Imager Stabilizer
 - Time Release Agent
- **ANIMAL FEED**
 - Pet Foods
 - Fish Feed
- **COSMETICS**
- **INDUSTRIAL**
 - Textile Printings
 - Welding Rods
 - Water Treatment Coagulant
 - Paper Sizing
 - Micro-encapsulation
 - Liquid Fertilizer

KIMICA ACID (ALGINIC ACID)

- **FOOD**
 - Texture Improver
 - Nutritious Food
- **PHARMACEUTICAL**
 - Disintegrant

KIMILOID (PROPYLENE GLYCOL ALGINATE)

- **FOOD**
 - Emulsifying and Stabilizing
 - Stabilizer in Acid system
 - Low Reactivity to Calcium (Ice cream, Sherbet, Beverages,



- Alginic acid
- Sodium alginate
- Calcium alginate
- Potassium alginate
- Ammonium algina



Commercial name: Soluble agar for drinking





New products with water-soluble diet fibers of seaweed

Diet fiber	Brown seaweeds
Fucoidan	<i>Laminaria</i>
	<i>Undaria</i>
Sodium alginate	<i>Cladosiphon</i>
	<i>Lessonia</i>
Agar-oligosaccharide	<i>Gelidium</i>
	<i>Gracilaria</i>
Polypeptide	<i>Porphyra</i>









海藻でお腹応援



海藻

+ **フコイダン**

食物繊維
オリゴ糖

新発売

海の野菜パワーで爽快気分