

# **SEAWEEEDS**

## **Curse or Blessing?**

***Carsten Christophersen***

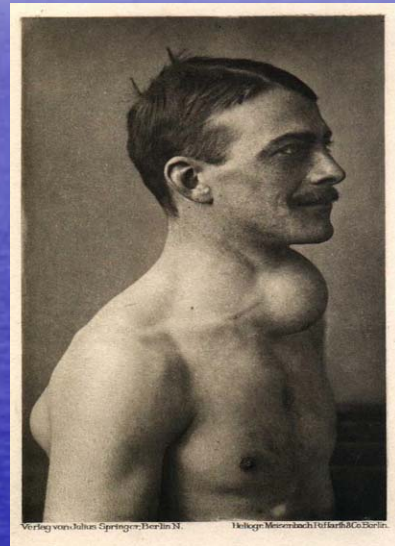
**Department of Chemistry**  
**University of Copenhagen**

## SEAWEEDS

### Chemical investigations so far

	Papers	Structures	Invest.
Red algae	1431	1548	~9%
Green algae	465	315	~4%
Chromophyta	1934	1473	~1%

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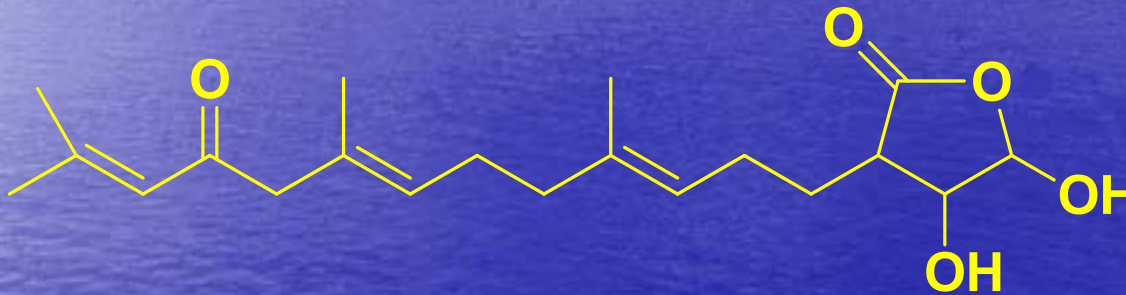
Struma is caused by lack of iodine. Seaweeds may function as a source of the missing element

# Nutritional Aspects

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- Phorphyranase from lateral gene transfer
- [*Nature* 8 April 2010]
  
- 75% reduction in uptake of fat – obesity
- [BBSRC – Bioscience for the future, 22 March 2010]
  
- Satiety effects – viscosity better than protein
- [*Apetite* 2010, 6 February]

*Bifurcaria bifurcata*



Roscoff France

Piriac France

Oualidia Morocco

Hougaard, L. Anthoni, U., Nielsen, P. H. and Christophersen C., *Phytochemistry* 30 (1991) 3049-3051.  
Eleganolone Derived Diterterpenes from the Brown Alge *Bifurcaria bifurcata*.

Hougaard, L., Anthoni, U., Christophersen, C. and Nielsen, P. H., *Tetrahedron Letters* 32 (1991) 3577-3578.  
Two new Diterpenoid Dihydroxy-butyrolactones from *Bifurcaria bifurcata* (Cystoseiraceae).

# Sarganin

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- Sarganin complex was isolated from brown, red and green algae (~ 1960)
- Active against G<sup>+</sup>, G<sup>-</sup> bacteria and fungi
- Structure completely unknown

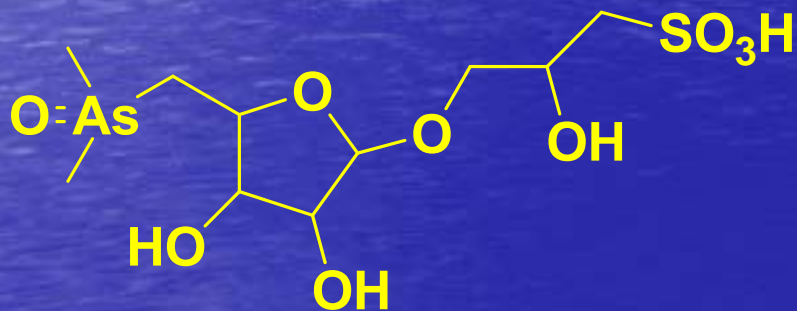
# Sargalin

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- Sargalin was isolated from *Sargassum confusum* (1949)
- Reduces blood sugar level (anti-diabetic?)
- Structure  $C_{26}H_{24}O_8N_4K$  - free radical?

# Sulfuric Acid and Arsenicals

- *Desmarestia* – H<sub>2</sub>SO<sub>4</sub>?
- *Sargassum fusiforme* - Hijiki (~ 100 mg/kg)





# Caulerpicin adverse effects (1966)

- Numbness of tongue
- Cold sensation in feet and hands
- Dizziness
- Difficult breathing
- Loss of balance

# Caulerpicin



$n = 16, 18, 20, 22, 24$

Sphinganine ceramides

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Northern Zealand lake

## SEaweEDS



*Chara globularis*

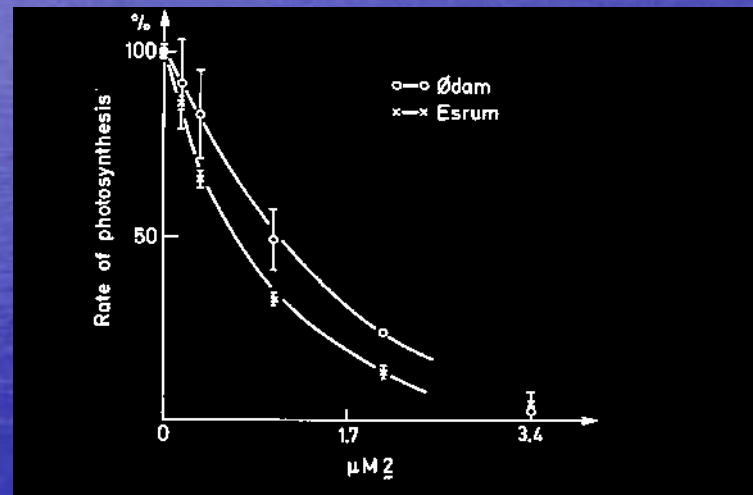
## SEaweeds



# Charatoxin 1 & 2



## Charatoxin 2



Wium-Andersen, S., Anthoni, U., Christophersen, C., and Houen, G., *Oikos*, 39 (1982) 187-190. Allelopathic Effect on Phytoplankton by Substances Isolated from the Aquatic Macrophytes (Charales).

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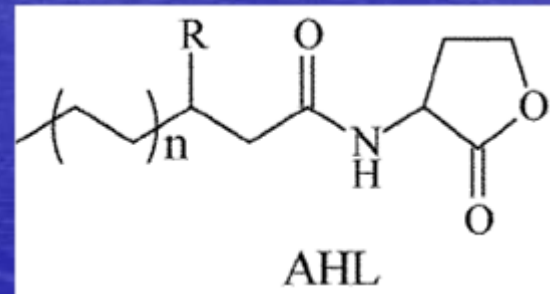
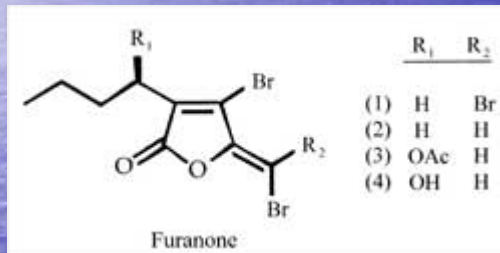


**Charamin**

Anthoni, U., Nielsen, P. H., Smith-Hansen, L., Wium--Andersen, S., and Christophersen, C., *J. Org. Chem.*, 52 (1987) 694-695. Charamin, A Quarternary Ammonium Ion Antibiotic from the Green Alga *Chara globularis*.



Biofilms

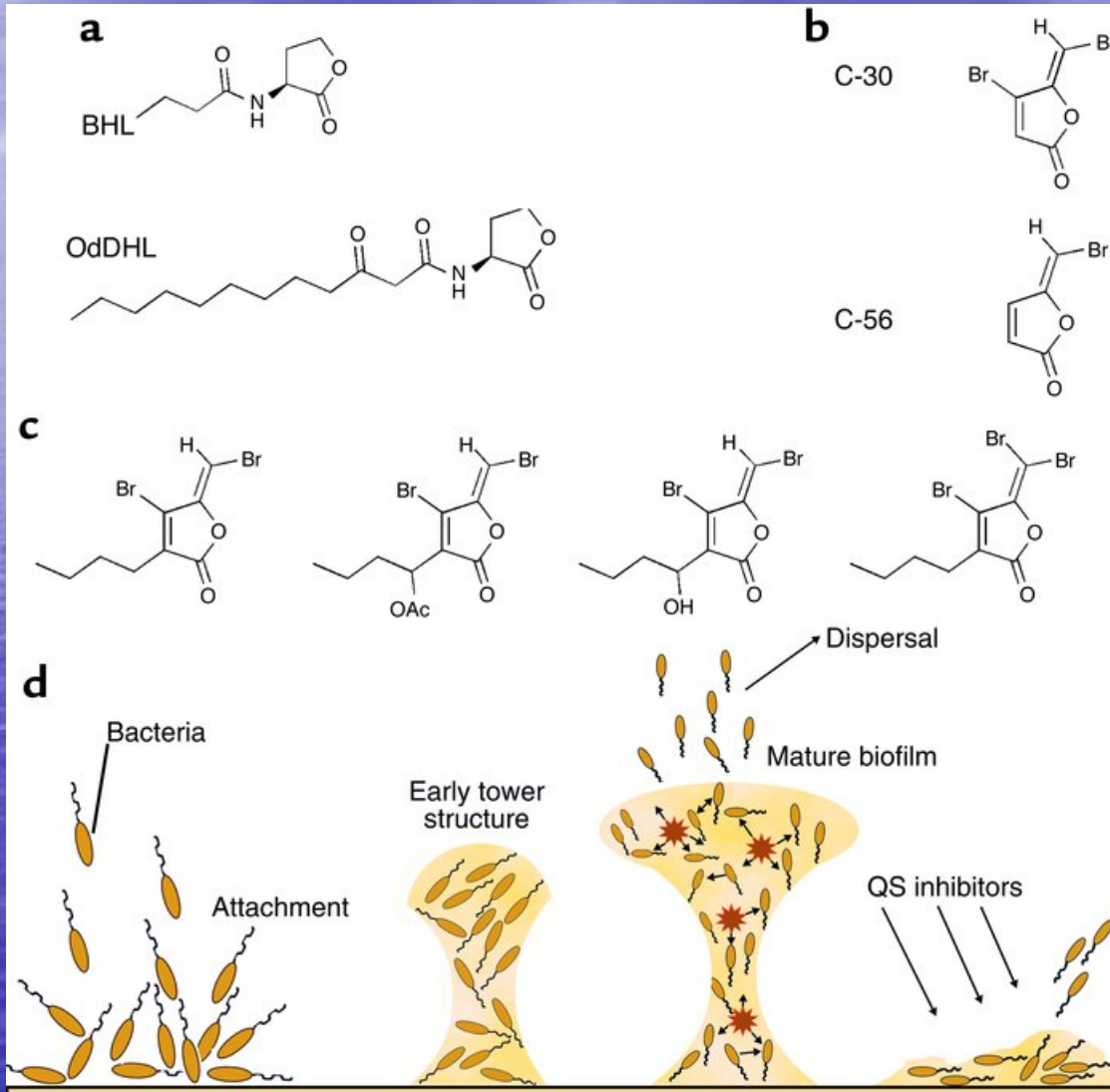


Acylated homoserine lactone

Rasmussen, T. B., Manefield, M., Andersen, J. B., Eberl, L., Anthoni, U., Christophersen, C., Steinberg, P., Kjelleberg, S. and Givskov, M. *Microbiology* 146 (2000) 3237-3244 . How *Delisea pulchra* furanones affect quorum-sensing and swarming motility in *Serratia liquefaciens* MG1.

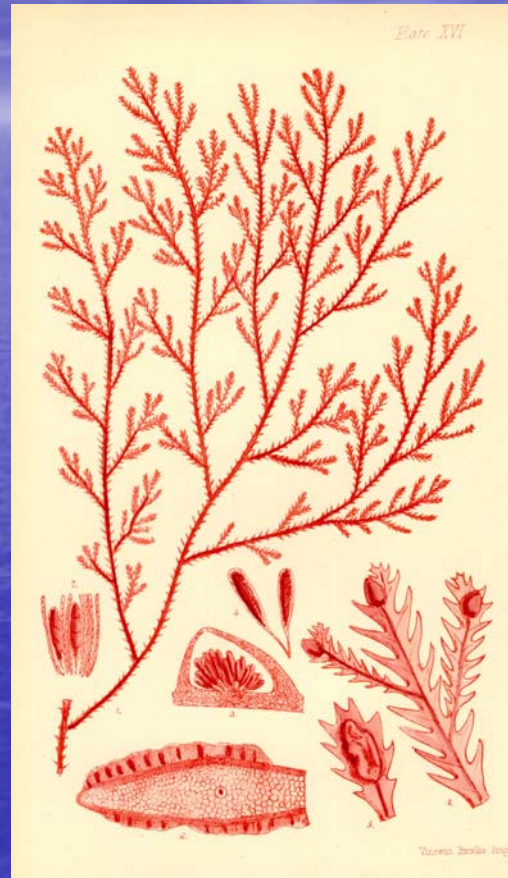
# Biofilms

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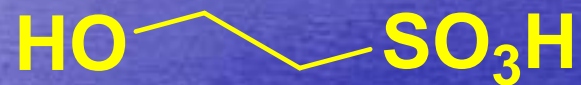
## Biofilms

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# Biofilms



**Isethionic acid**

Holst P. B., Nielsen, S. E., Anthoni, U., Bisht, K. S., Christophersen, C., Gupta, S., Parmar, V. S., Nielsen, P. H., Sahoo, D. B. and Singh, A. *J. Appl. Phycology* 6 (1994) 443-446. Isethionate in Certain Red Algae.

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# Fouling



Marine fouling is a major problem

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### Fouling



Fouling is a major problem for ships and marine installations and for medicine

# SEAWEEDS



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