
Marine hydrothermal vents and antimicrobial activity

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- Background
 - Marine invertebrates
 - Hydrothermal vents in Eyjafjörður
- Project layout
 - Objectives
 - Methods
- Results
- Conclusion and future work

Marine invertebrates - examples



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- Nudibranch



"Sea squirt." Online Photograph. Encyclopædia Britannica Online.
8 Aug. 2007 <<http://www.britannica.com/eb/art-7325>>.

- Ascidians (tunicates)



<http://www.calacademy.org/research>

- Bryozoans



"Tealia." Online Photograph. Encyclopædia Britannica Online.
8 Aug. 2007 <<http://www.britannica.com/eb/art-7307>>.

- Sea anemone

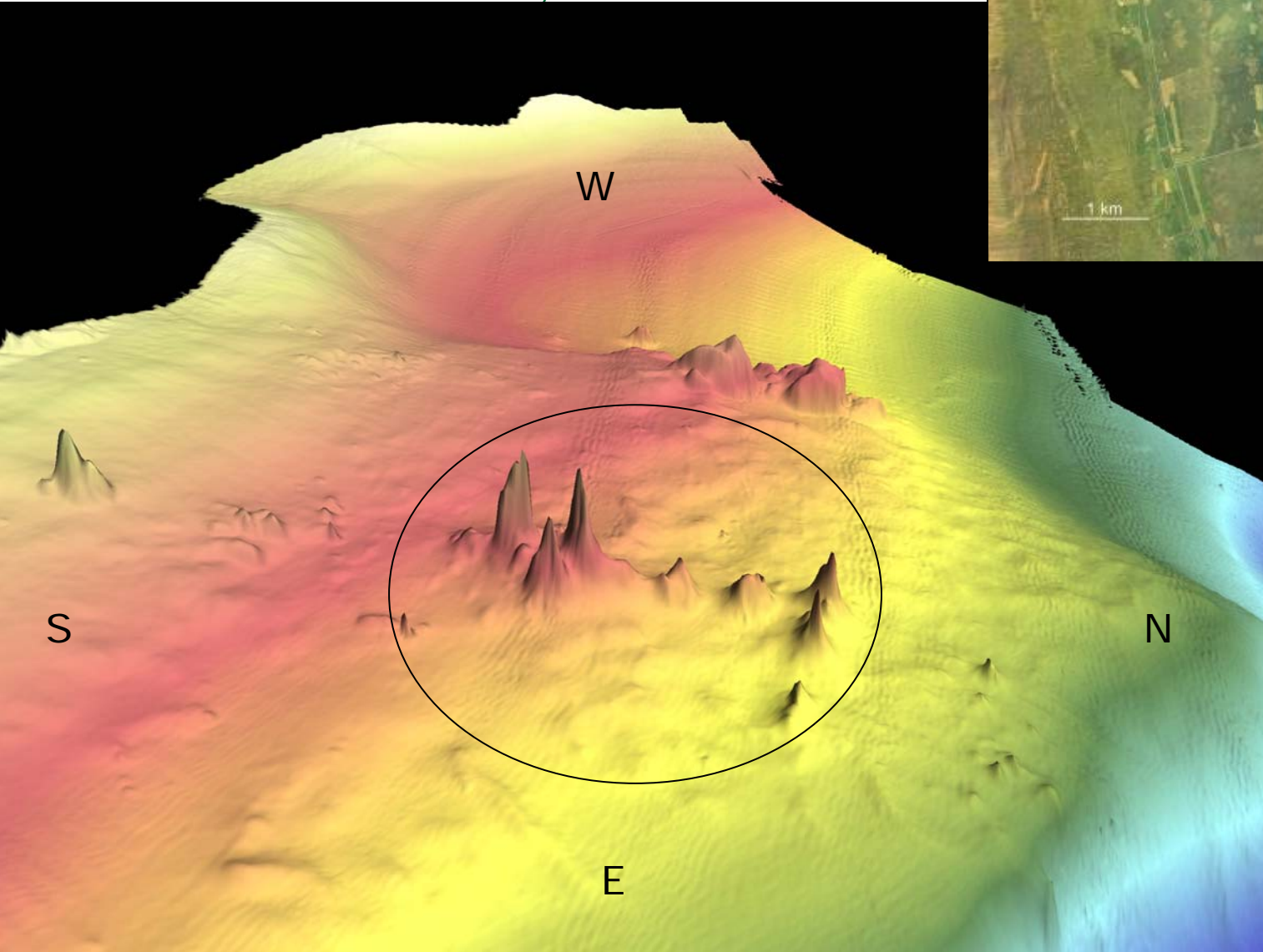


http://commons.wikimedia.org/wiki/Commons:GNU_Free_Documentation_License

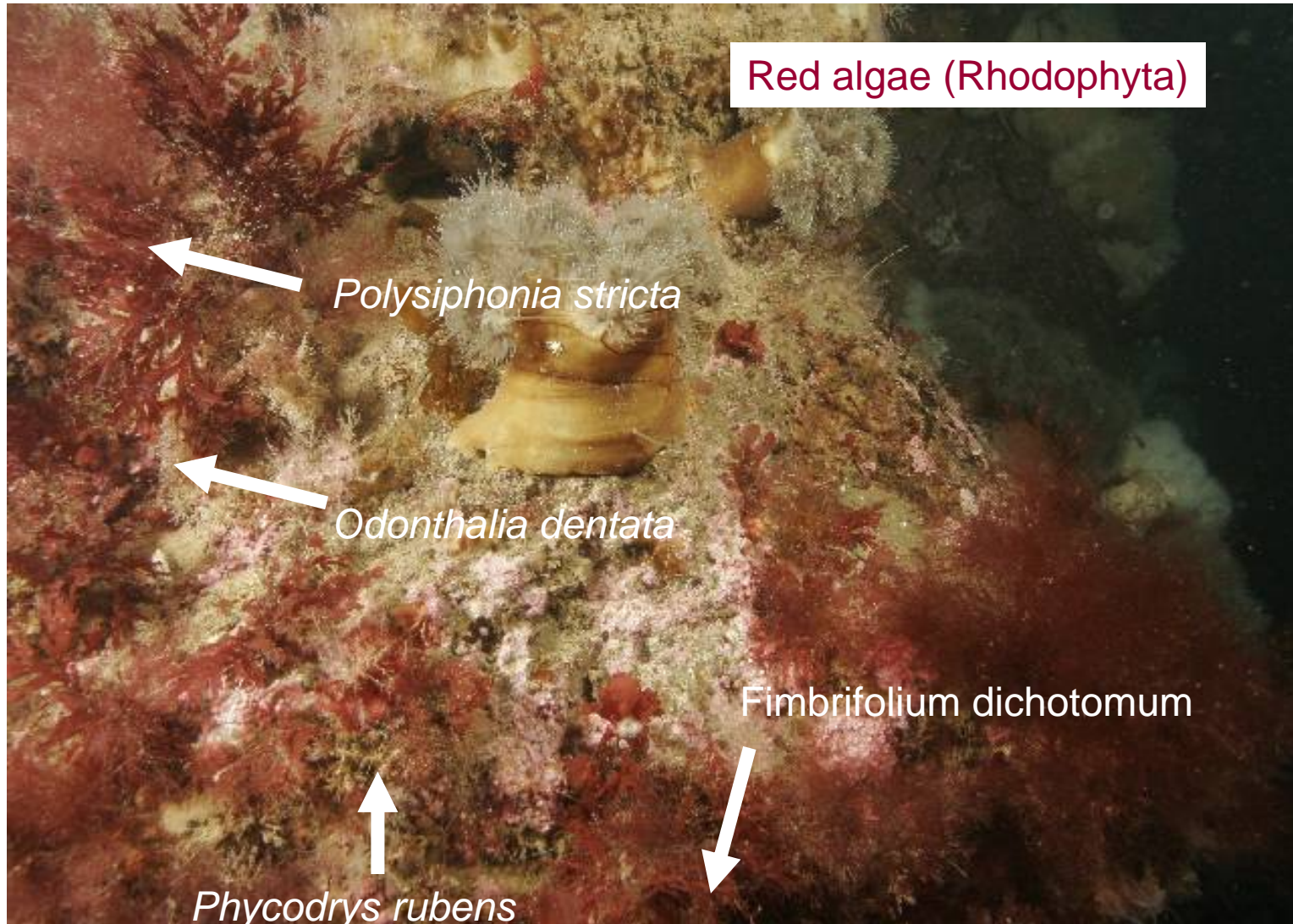
- Sponges



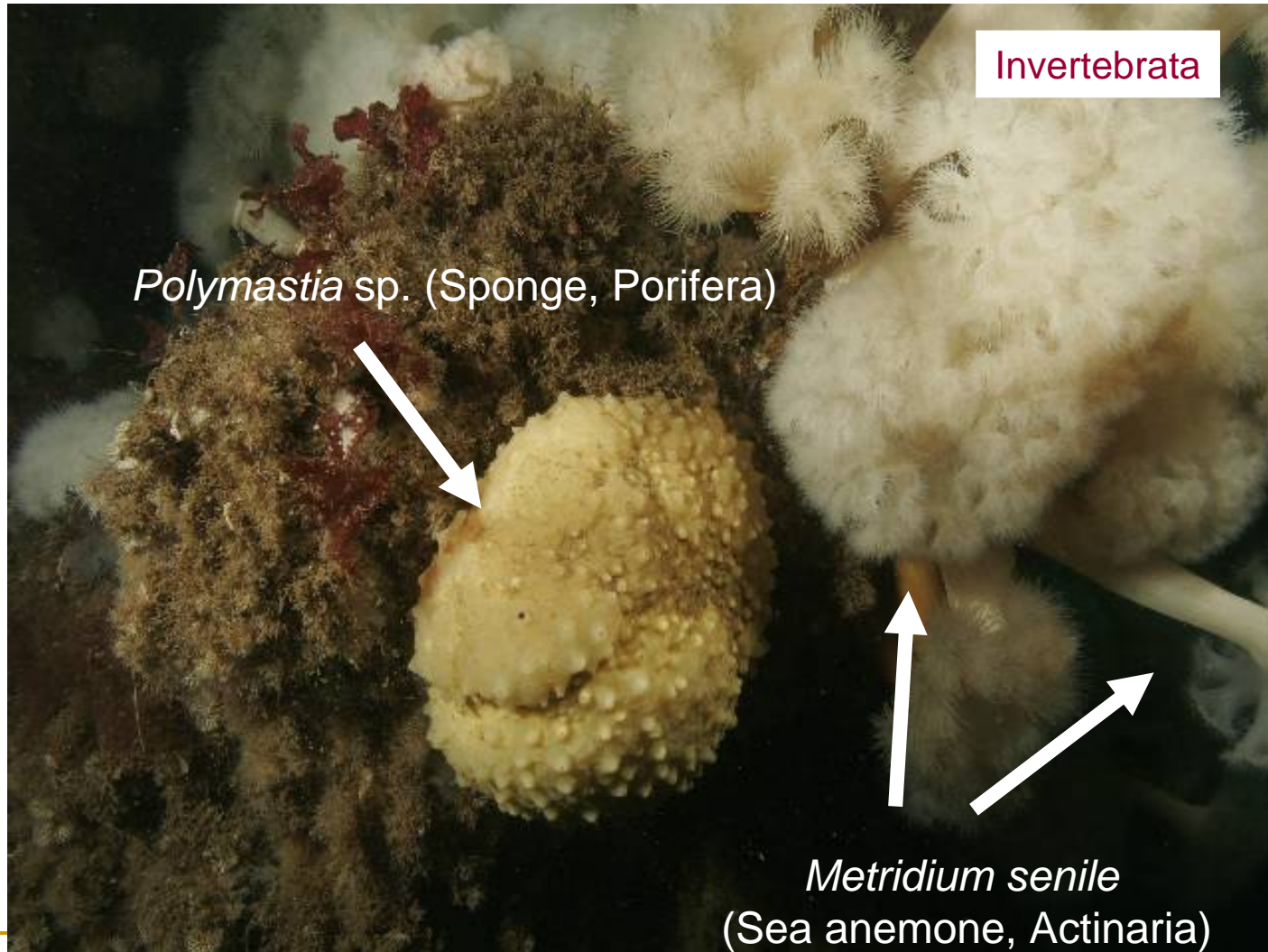
The hydrothermal vents – Arnarnesstrýtur



The biosphere



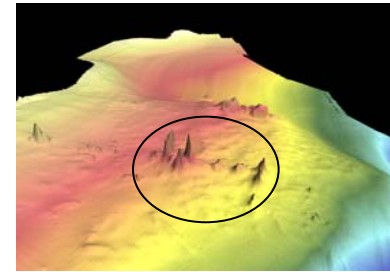
The biosphere



The hydrothermal vents

– Arnarnesstrýtur

- Cone structures at 25 – 40 m depth
- Fresh water seeping from the top
 - Hot - 65 – 75°C (max 77°C)
 - Alkaline - pH ca 10
- Invertebrates and algae inhabit the cones
 - apparently a rich biosphere, in terms of density and diversity
 - interesting for bioprospecting



Aim of the study

- Main objective:
To isolate bacteria with antimicrobial activity from the hydrothermal vent site
- Final goal:
To isolate antimicrobial compounds which could be of commercial use in cosmetic products or foods

Framework of methods

- Collection of invertebrates
- Main focus on sponges
- Main focus on actinomycetes bacteria

Sampling → Culture and isolation → Test for antimicrobial activity



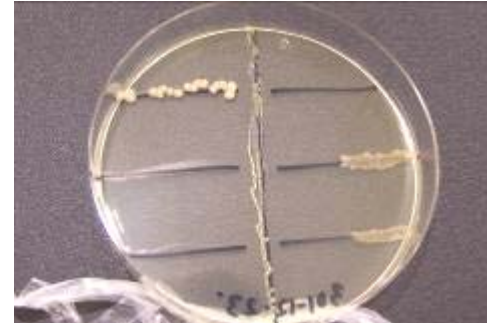
- Total bacterial isolates: 1866
- Origin (approx.):
 - Sponges 58%
 - Algae 11%
 - Sea anemones 10%
 - Ascidians 6%
 - Nudibranches 4%
 - Other (misc.) 11%
- Screening for antimicrobial activity performed on 1533 isolates in total

Antimicrobial activity

Agar diffusion assay

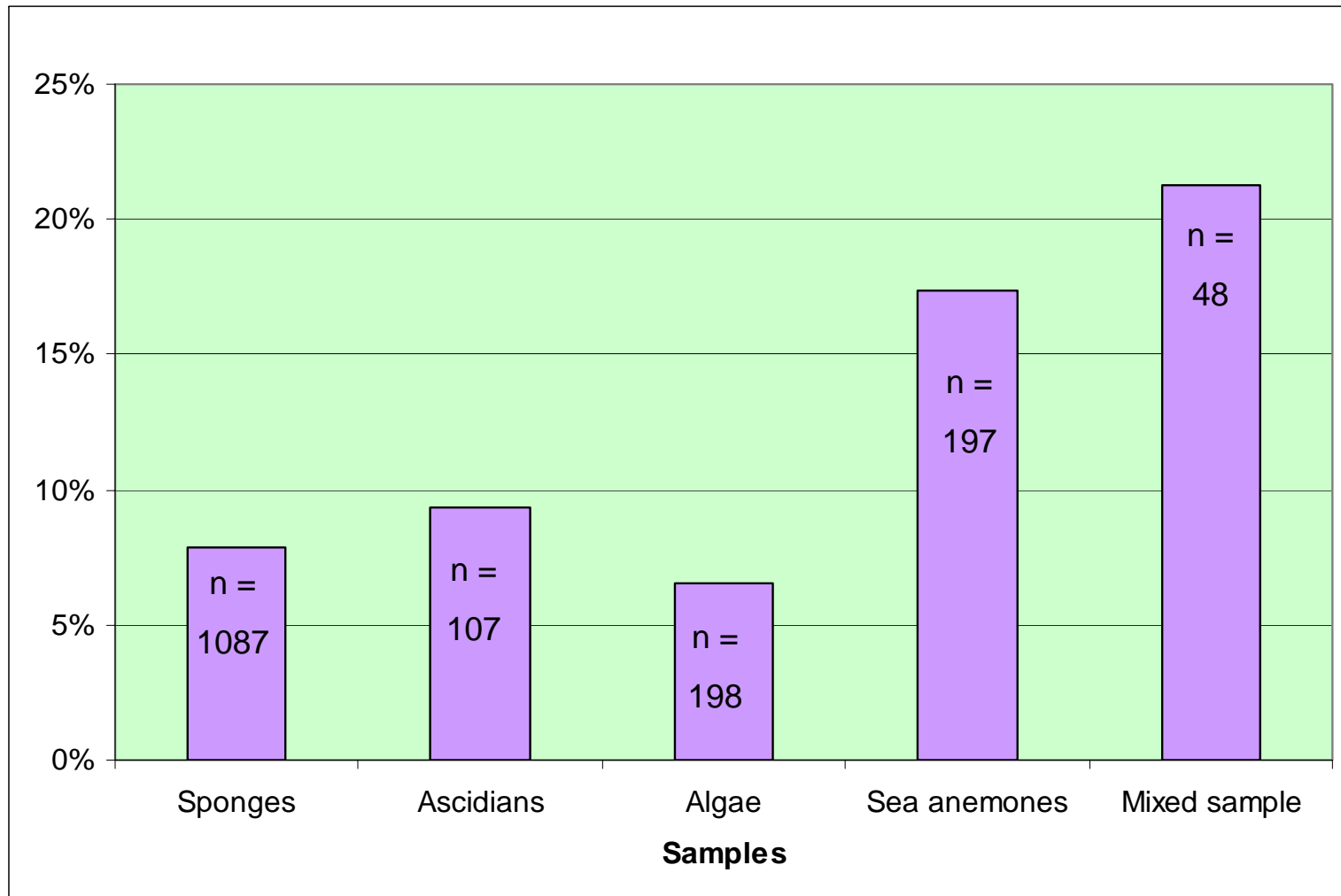


Direct streaking

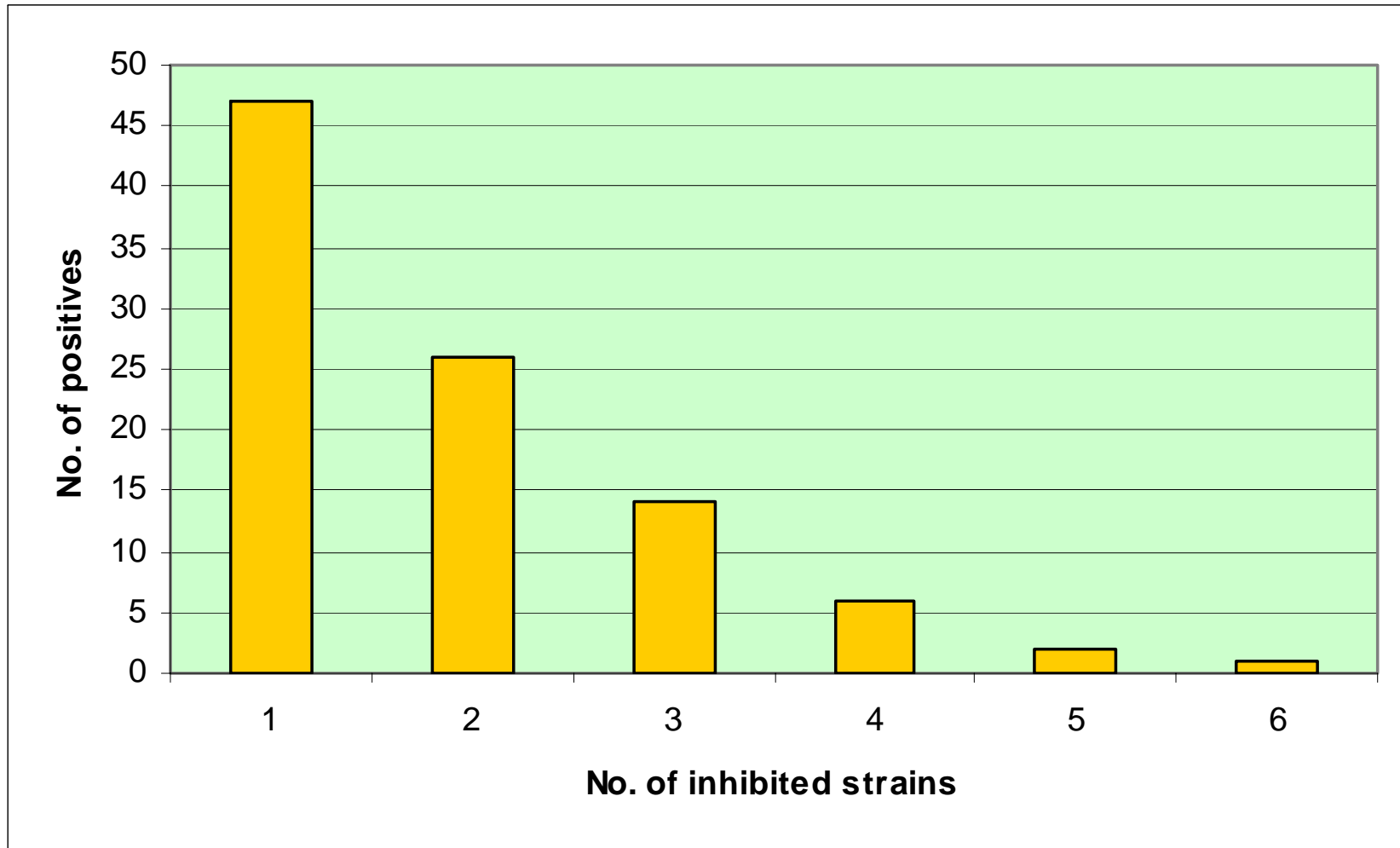


- ❑ 96 isolates exhibited activity
 - against Gram positives, Gram negatives and yeast in different combinations

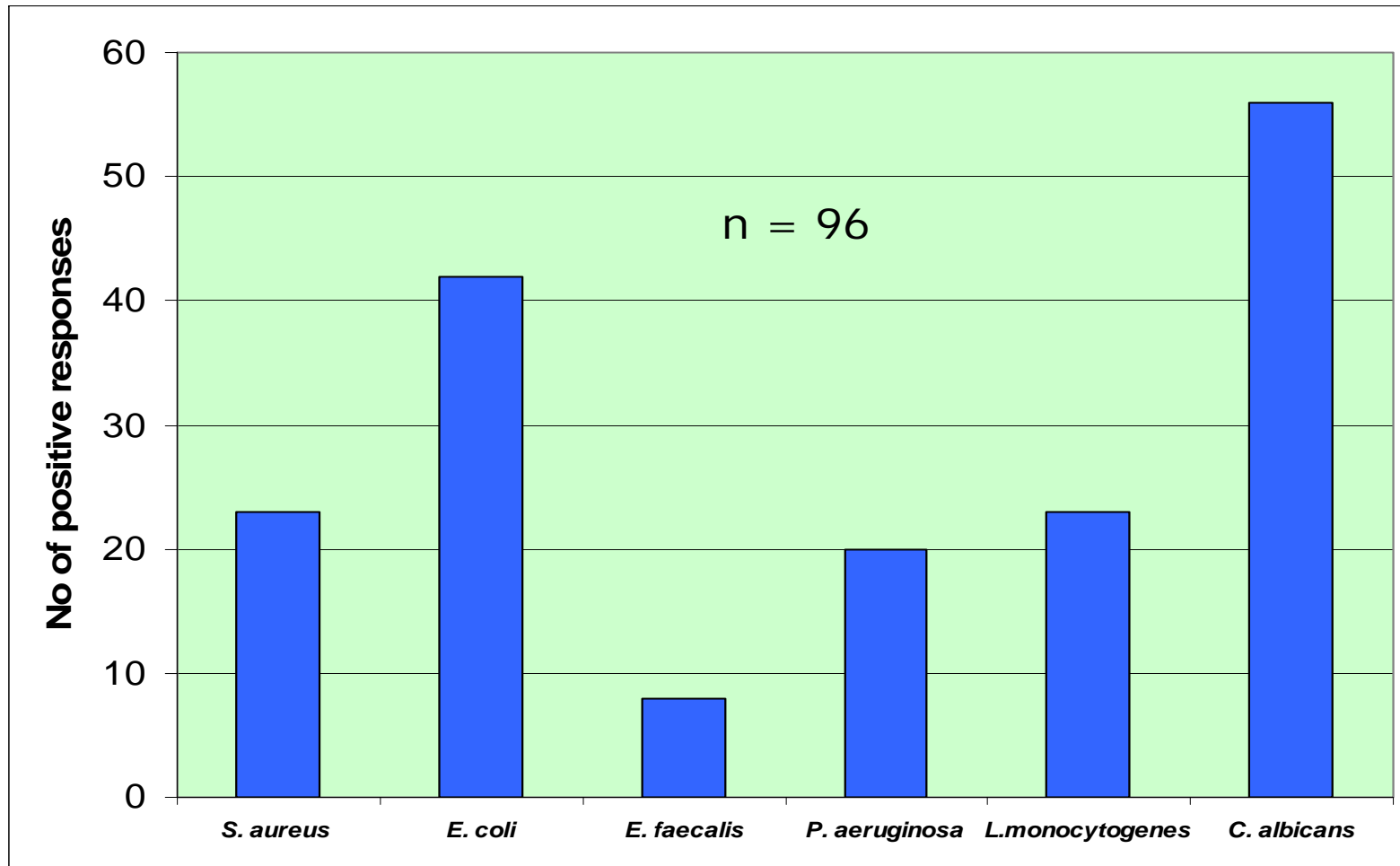
Proportion of active isolates per type of sample organism



Inhibition of test strains

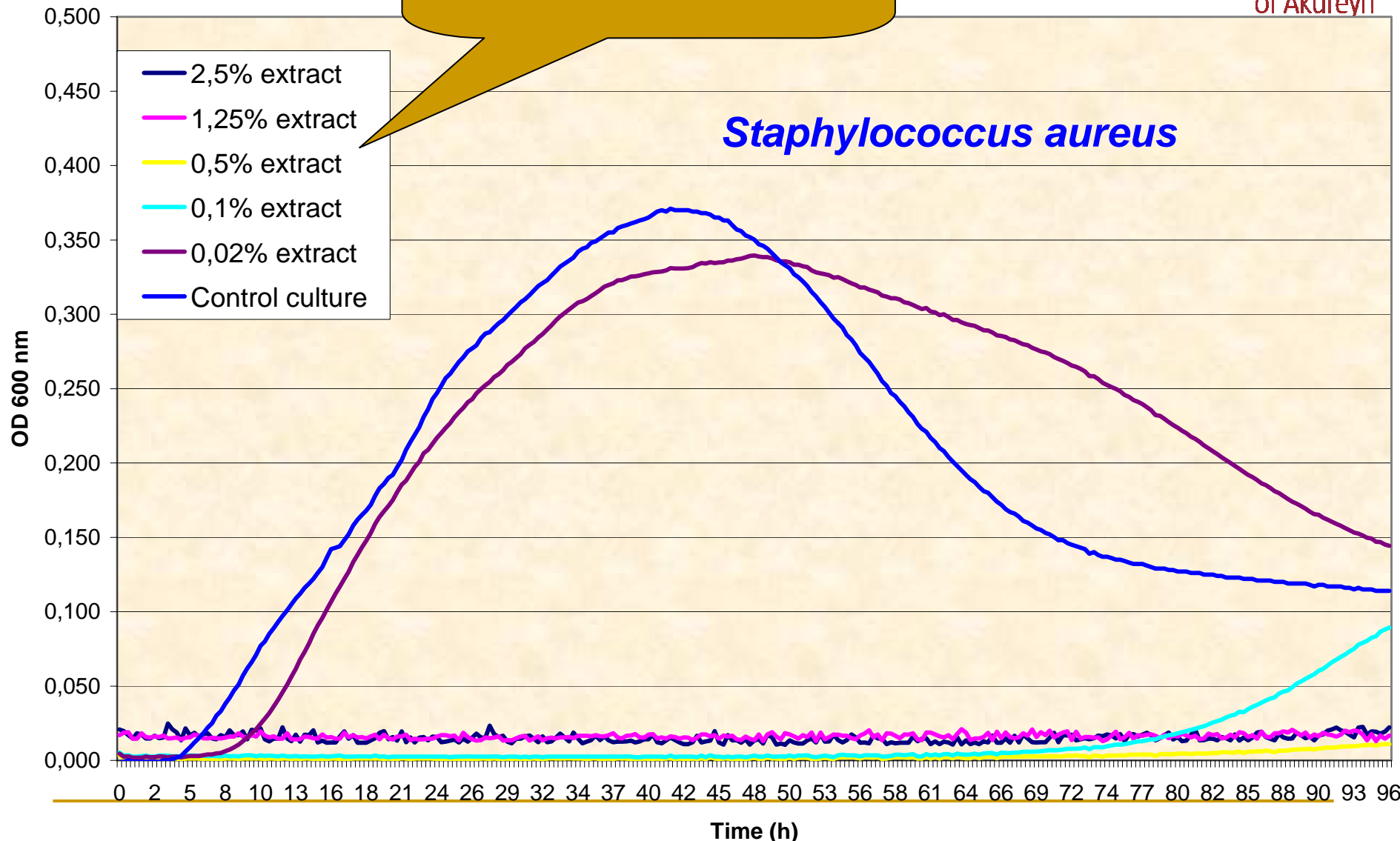


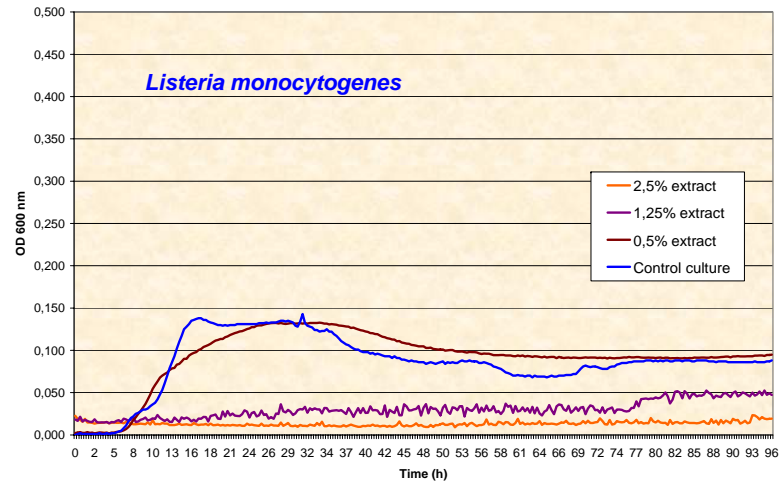
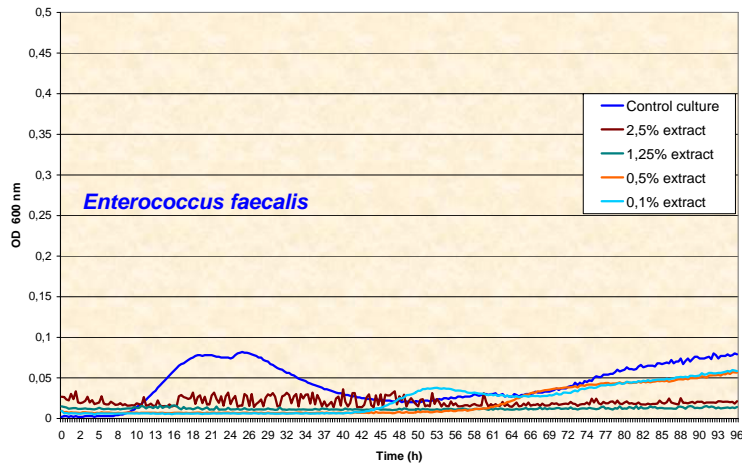
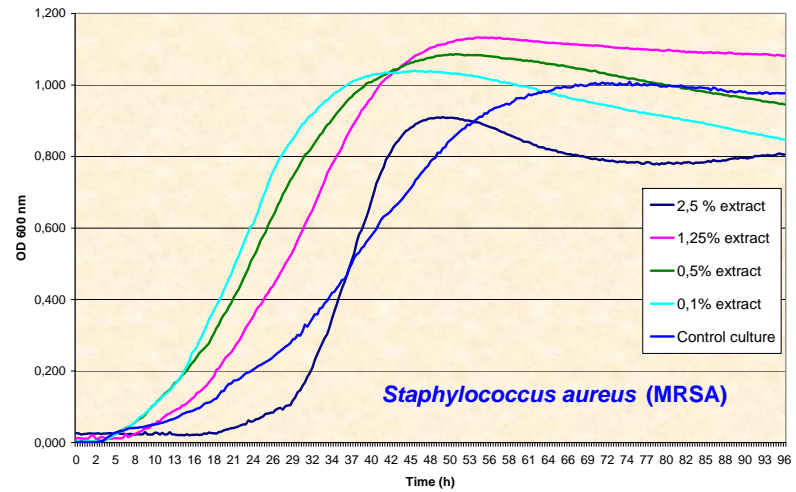
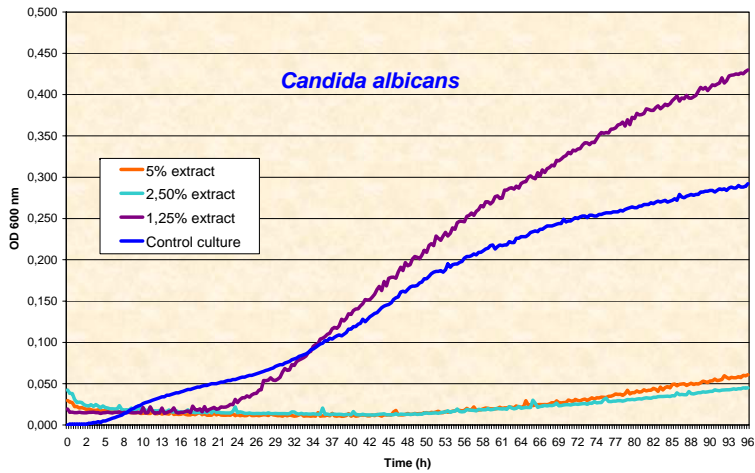
Susceptibility by each test strain



- One isolate chosen for further work (E-1)
 - more information on the nature of inhibition
- Five test strains
 - Growth studies in presence of an extract containing the inhibiting compound
 - Quantitative information using different extract concentrations
- Follow the bacterial growth by frequent optical density measurements

Culture extracts
from isolate E-1





Concluding remarks

- The vent site biosphere is hosting various organisms that produce antimicrobial compounds
- Several cultivable bacteria show activity in different patterns indicating different compounds
- The frequent inhibition against *Candida albicans* is of interest as well as isolates inhibiting *Pseudomonas aeruginosa*