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COURSE ON "MEDITERRANEAN SEA(S) CIRCULATION & ECOSYSTEM FUNCTIONING" 2 - 20 November 1998

Trieste, Italy

"Mediterranean Seas Circulation & Ecosystem Function: Introduction"

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MEDITERRANEN SEAS: CIRCULATION AND ECOSYSTEM FUNCTION: AN INTRODUCTION

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Mediterranean seas versus the Med. Sea

Generic term: adjacent to an ocean + surrounded by land + separated by a sill

Examples:

North Polar Sea: North Polar Basin, North American Basin, the European North Sea, and Baffin Sea.

American Mediterranean: Mexico Basin, Yukatan Basin and Carribean Basin.

the European Mediterranean: West Med: (Gibraltar to the Sicilian Ridge) and Eastern Med.

Red Sea, East Indian (Indonesian) Archi
Eastern China Sea, Japan Sea and Sea of Okhotsk.

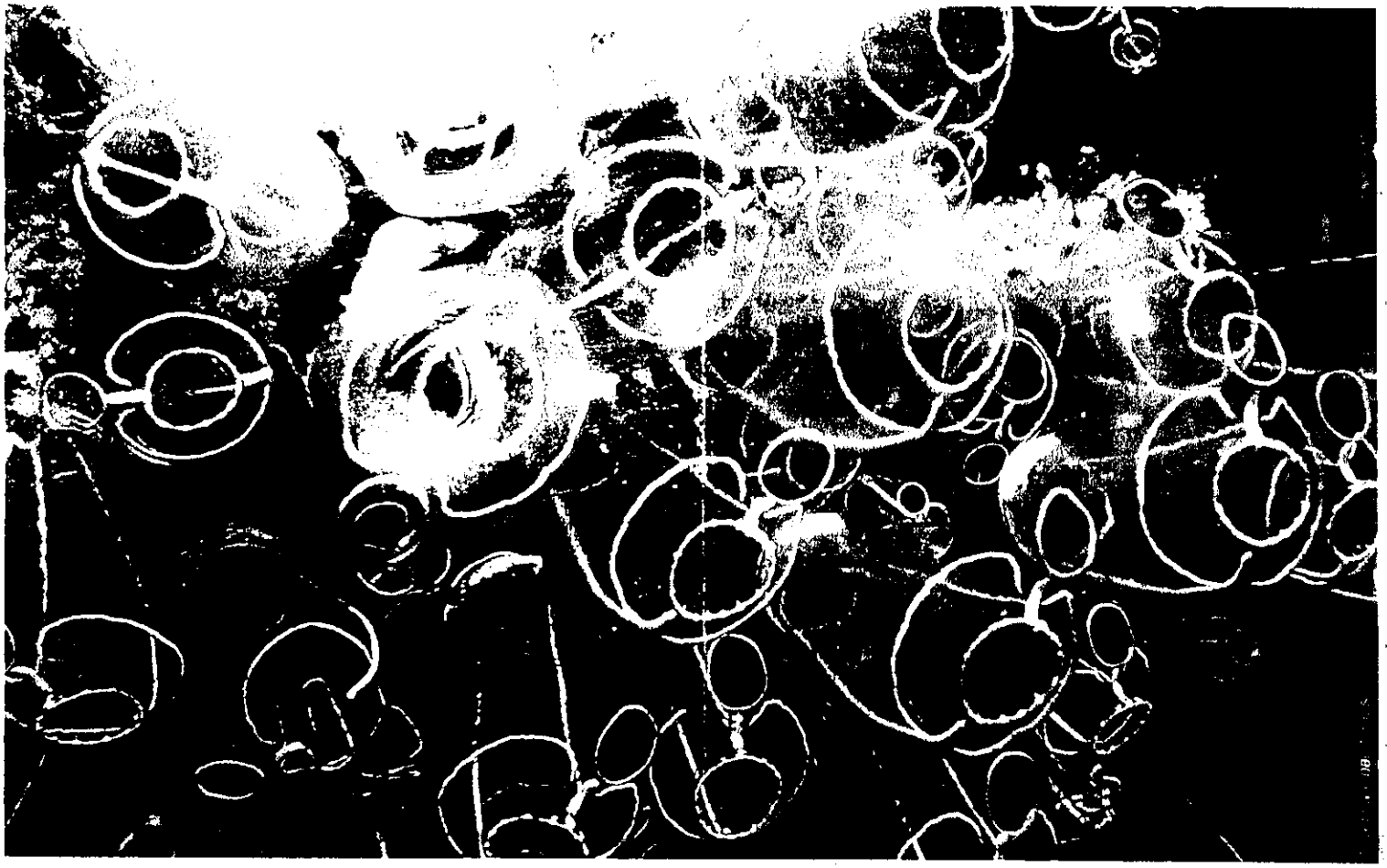
Concerned about mediterranean seas?

Let us consider how have humans been using the seas:

- heavy trafic by large ships and even more by pleasure boats;
- oil and gas exploitation;
- fishing;
- recreation;
- dump site for pollution.

Some negative results on the Med. Sea:

- $0.5 - 1 \cdot 10^6$ tons of oil /y ends up in the sea;
- all comercial fisheries have already crashed;
- this repvesents only 5% of pollution that comes from land-based sources;
- eutrophication and hypoxia on the bottom;
- huge jelly formations on the surface;
- toxicity of sea water;
- Loss of diversity including loss of endemic biological species;
- global change;
- pollution by noise.



GEF/BSEP Cruises 1995:

" From the outside all the fish looked healthy enough. But, ... every liver was infected with parasites. In cases the liver had been all but completely consumed. How had the fish stayed alive? Some fish possessed bloody liver... . None were healthy.

Why to study circulation of seawater?

Water is a carrier of nutrients, trace elements, organisms and affects all objects found in the sea.

Vertical movement is aerating the bottom ⇒ DO ⇒ benthic fauna.

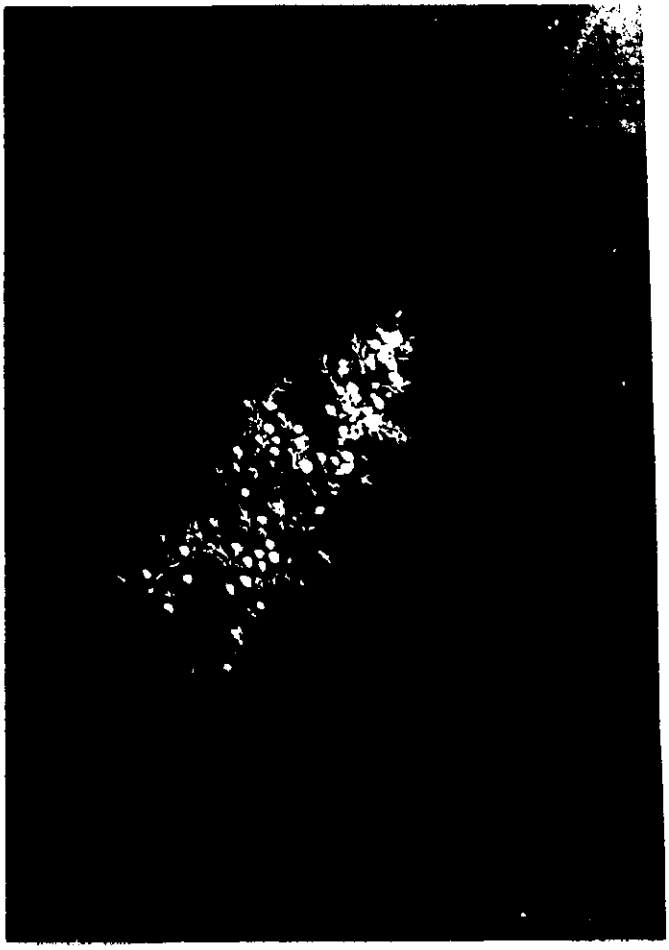
Circulation is induced by: rotation of earth, moon, wind, atm. pressure, fr heating and cooling, oceanic forcing, and affected by batymetry.

Researchers are often forced to go far beyond analytical models.

For description and verification a lots o data are needed.

Data collection - dangerous.] NO alternativ

Marine chemistry



Detection, quantification and distribution of chem. species: nutrient, trace elements, essential biogenic elements and pollutants.

Speciation and transf. rates: Why are given species in certain proportions?

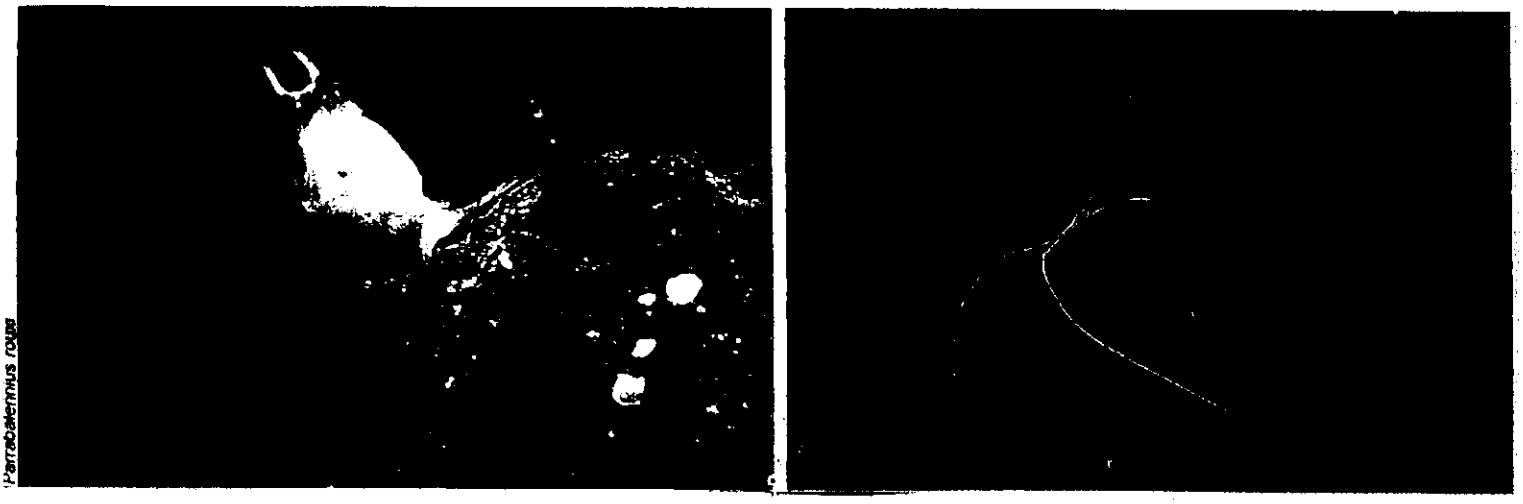
How much do they vary between seas and why?

A part of chemistry can not be understood without physics, biology and geology.

Physics → Chemistry ⇄ Biology

↑

Geology



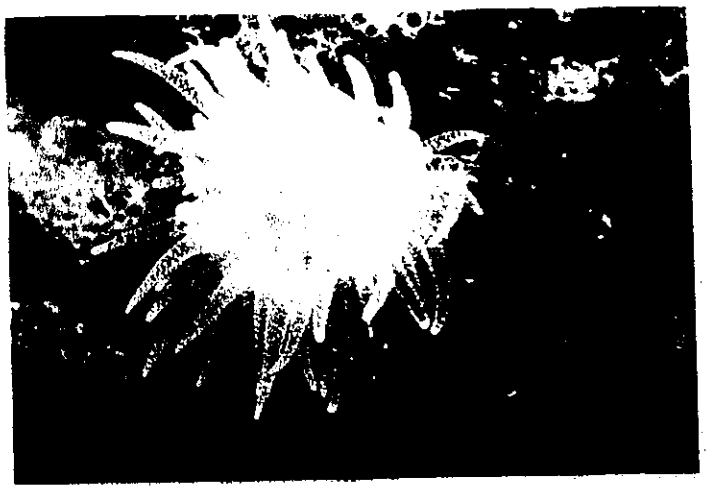
Marine biology

Distribution of living organisms, their growth and death, interactions among themselves and their environment, dynamics of their populations.

Organisms have been grouped according to evolutionary history into taxa.
But they have also been grouped according to what they "eat" (trophic sources): light, organic and inorganic molecules.

inorganic and light: autotrophic:
a) photosynthetic, b) chemosynthetic
organic: heterotrophic.

Bacteria shows more trophic diversity than any other biol. Kingdom on the earth:
They are: photo-, chemo- and heterotrophic.

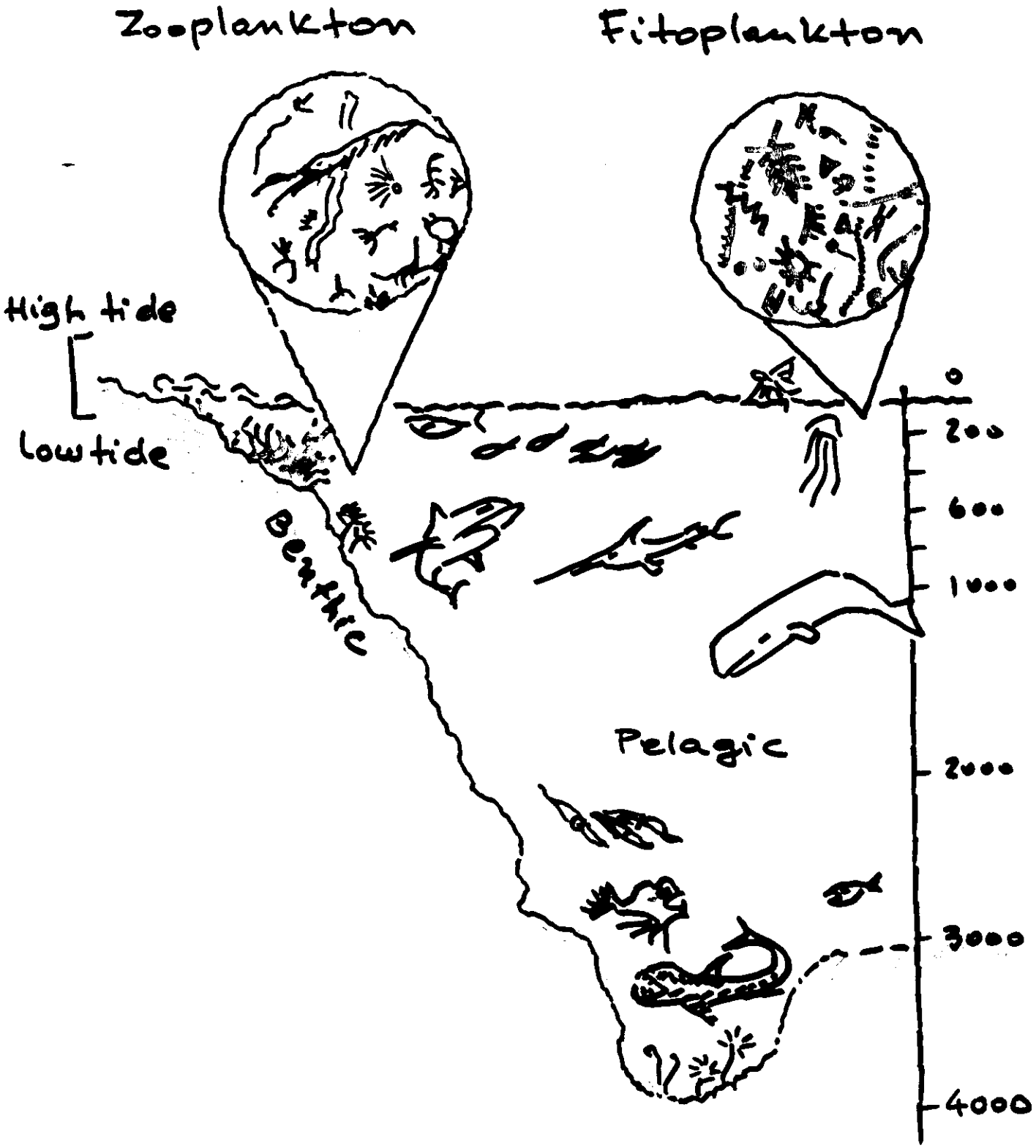


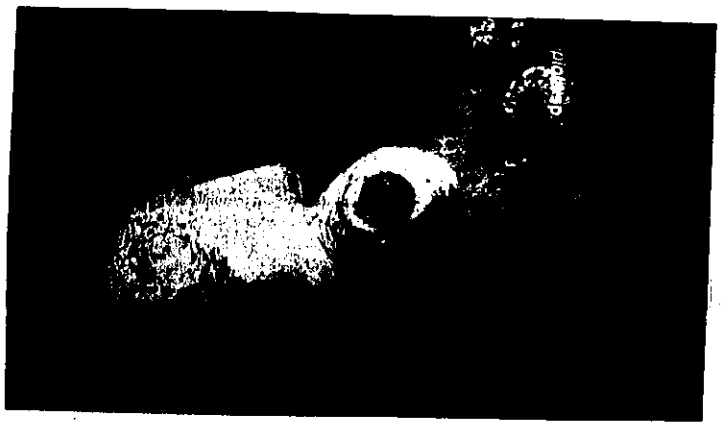
	Heterotrophic	Photosynth.	Chemosynth.
Bacteria	many	many	many
Protists	many	many	
Plants	few	many	
Fungi	many		
Animals	many		

Heterotrophic: herbivorous, carnivorous, detritivorous.

Going from Phys. → Chem → Biol. less and less is known about the subject of study. Why? Diversity increases and interactions become complicated.

⇒ reliable explanatory models are more difficult to construct. ⇒ their predicti power and generality decrease.


Zooplankton
Fitoplankton
High tide
Low tide
Benthic
Pelagic
0
200
600
1000
2000
3000
4000



Biology: pelagic and benthic.

plankton (viruses, bacteria algae, zooplankton)

nekton (mostly fishes)

Endemic species in the Mediterraneam

Some polychetes, 21 decapod crabs, mediterraneam monk seal (Monachus monachus), Octopus macropus, Corralium rubrum.

Northern Adriatic is particularly rich in endemic species!

MODES OF WORK

1. Lectures, 2. Exercises.
3) Discusion groups
4) Reading in the lib.
5) Computer work

Develop good working relations with your colleagues. Although we will provide modes for exchange of info: Your initiative is CRUCIAL.

You have been carefully selected based on your interest and ability to make a difference in the way med. seas are going to be managed in future.

I wish you productive and beneficial workshop.