

Universidade Federal do Rio Grande  
Programa de Pós-graduação em Oceanografia  
Física, Química e Geológica

Dinâmica de Ecossistemas Marinhos

Biologia das Plataformas Continentais

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Roteiro:

Introdução

Ambiente Planctônico

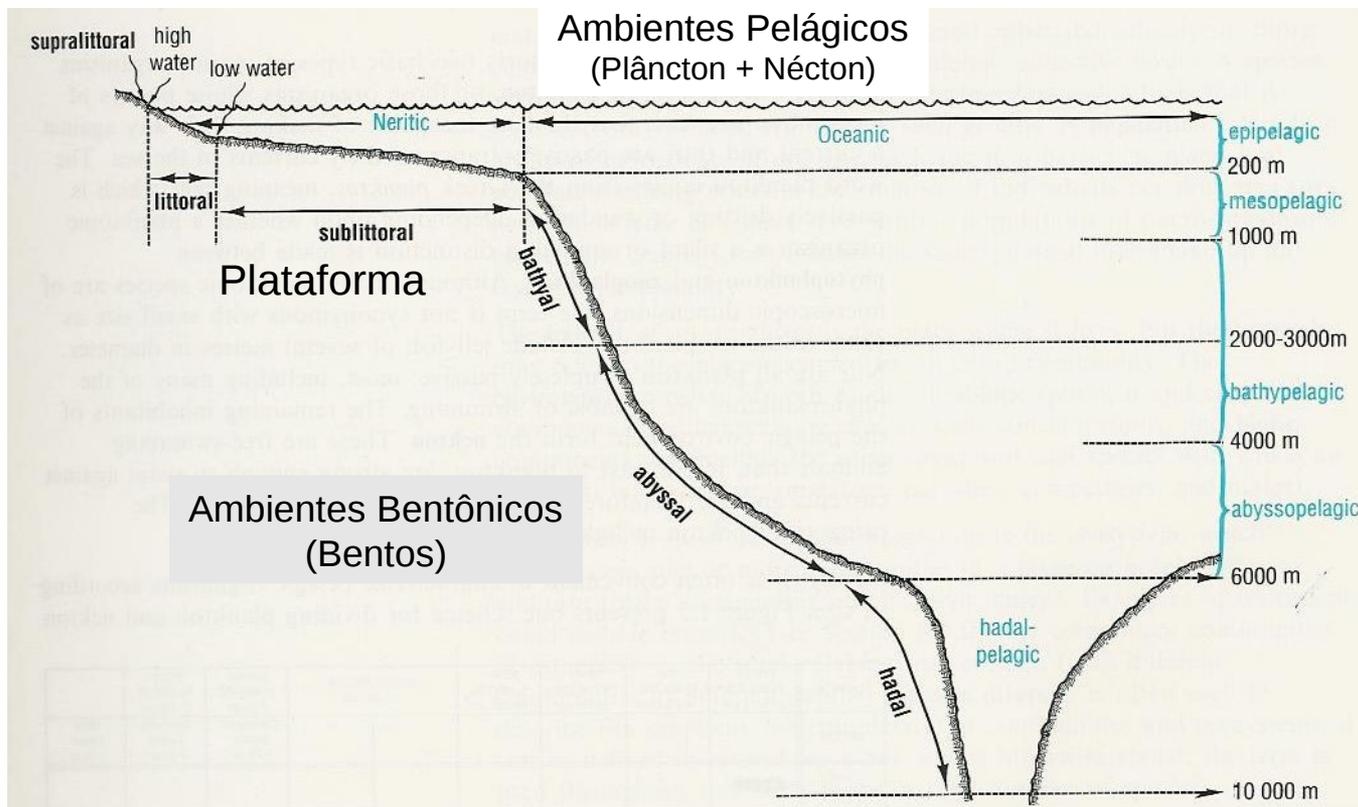
Ambiente Nectônico

Ambiente Bentônico

Relações Ecológicas

# Introdução

- Plataforma continental: compreende o sublitoral e a região nerítica, e se estende da marca de maré-baixa até 200 m.
- 7 a 8 % da área dos oceanos
- Produtividade entre 100 e 160  $\text{gCm}^{-2}\text{a}^{-1}$
- Importantes pescarias, geralmente de fundo (bacalhau, merluza, linguados)



# Ambiente Planctônico

Plâncton: organismos que vivem ao sabor das marés

Fitoplâncton: organismos vegetais

Zooplâncton: organismos animais

Diverso taxonomicamente e também em tamanho.

PLANKTON	FEMTO- PLANKTON 0.02-0.2 $\mu\text{m}$	PICO- PLANKTON 0.2-2.0 $\mu\text{m}$	NANO- PLANKTON 2.0-20 $\mu\text{m}$	MICRO- PLANKTON 20-200 $\mu\text{m}$	MESOPLANKTON 0.2-20 mm	MACRO- PLANKTON 2-20 cm	MEGA- PLANKTON 20-200 cm	
NEKTON						Centimetre Nekton 2-20 cm	Decimetre Nekton 2-20 dm	Metre Nekton 2-20 m
VIRIO- PLANKTON	■							
BACTERIO- PLANKTON		■						
MYCO- PLANKTON			■					
PHYTO- PLANKTON			■	■				
PROTOZOO- PLANKTON			■	■				
METAZOO- PLANKTON					■	■		
NEKTON							■	

Figure 1.2 A grade scale for the size classification of pelagic organisms.

# Ambiente Planctônico

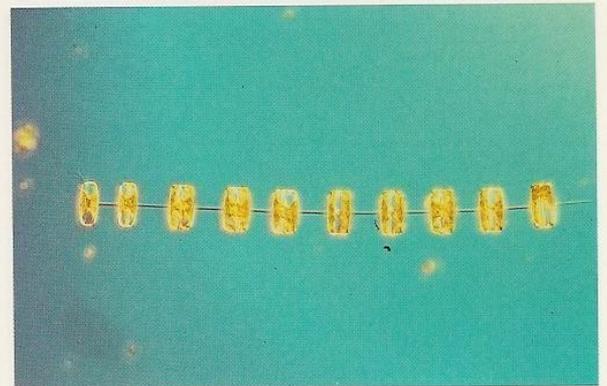
## Fitoplâncton:

- Diatomáceas, dominantes no fito, entre 2 e 1000  $\mu\text{m}$ , compostas de carapaça de sílica, formam cadeias. Penadas e Cêntricas.
- Dinoflagelados: possuem 2 flagelos, algumas podem ser heterotróficas, florações intensas (marés-vermelhas)
- Cocolitoforídeos: unicelulares e pequenos ( $< 20 \mu\text{m}$ ), concha externa calcárea
- Silicoflagelados: uniflagelados e pequenos, com espículas de sílica
- Cianobactérias: podem ser pequenas ou grandes, também conhecidas com algas azuis-verdes. *Oscillatoria* pode fixar  $\text{N}_2$

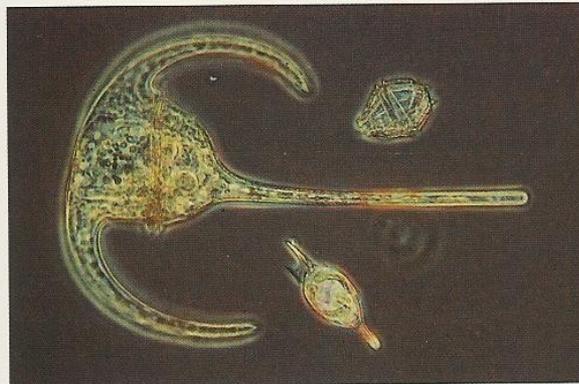
## Alguns organismos do fitoplâncton



1



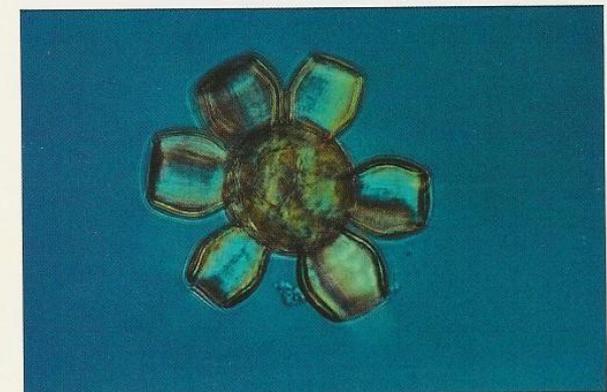
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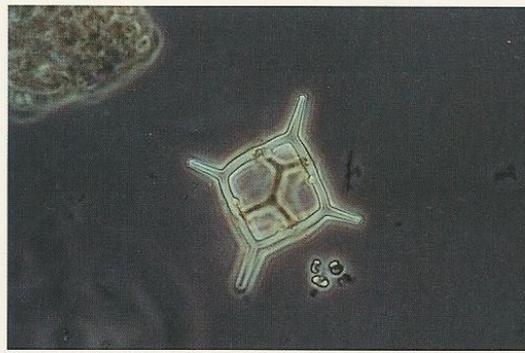
1. Diatomáceas
2. Cadeia de diatomáceas
3. Dinoflagelado
4. Maré vermelha
5. Cocolitoforídeo

# Ambiente Planctônico

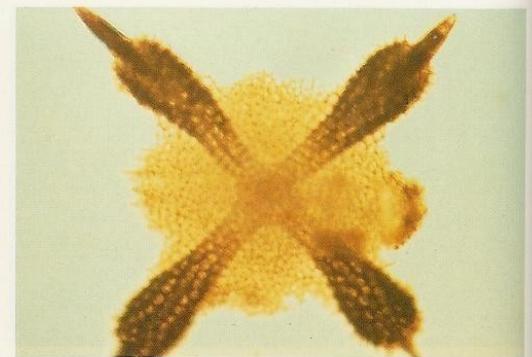
## Zooplâncton:

- Holoplâncton: Todo ciclo de vida no plâncton, cerca de 3700 espécies, de vários grupos taxonômicos.
- Meroplâncton: parte do ciclo de vida no ambiente planctônico. Vários representantes de espécies comercialmente importantes, como peixes, crustáceos e moluscos.

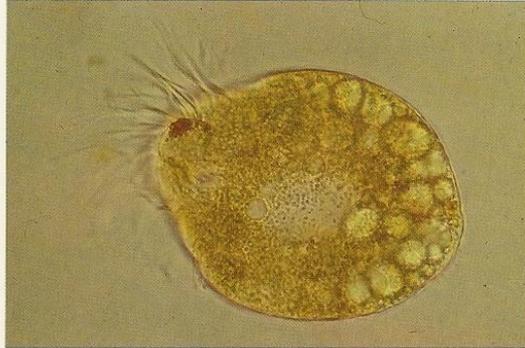
Fitoplâncton  
6. Silicoflagelado  
fotossintético



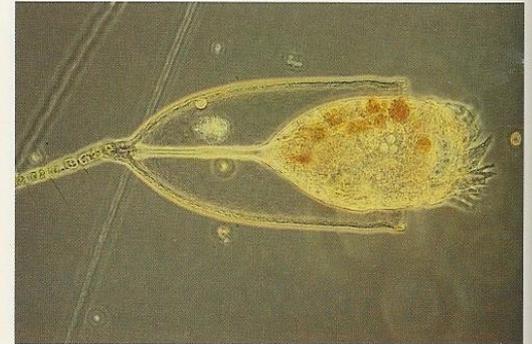
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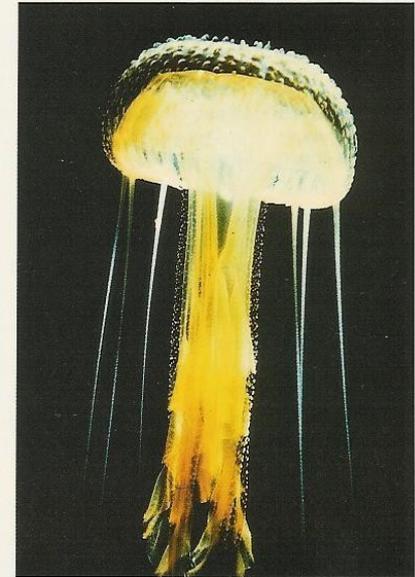
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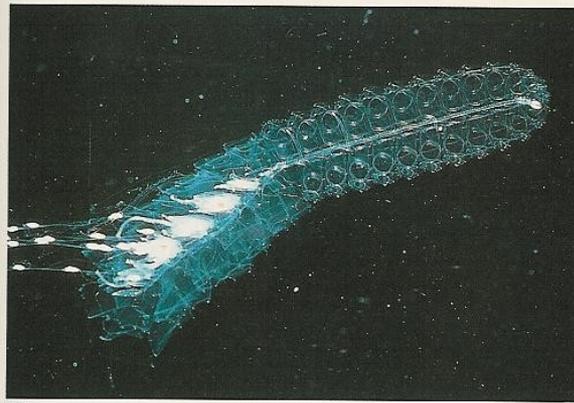
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Organismos do  
Zooplâncton

- 7. Radiolária
- 8. Ciliado
- 9. Tintinídeo
- 10. Medusa



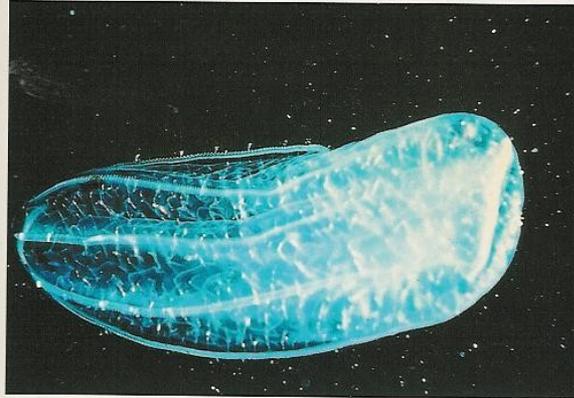
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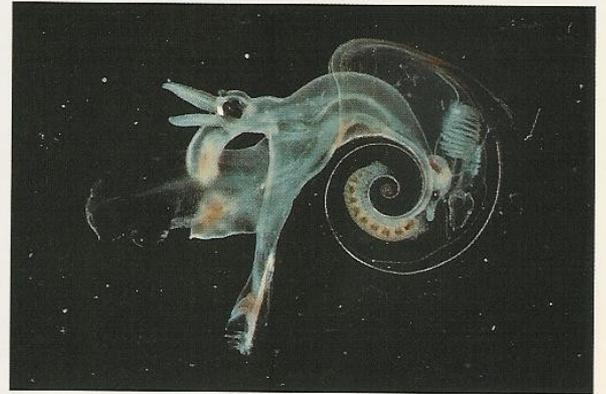
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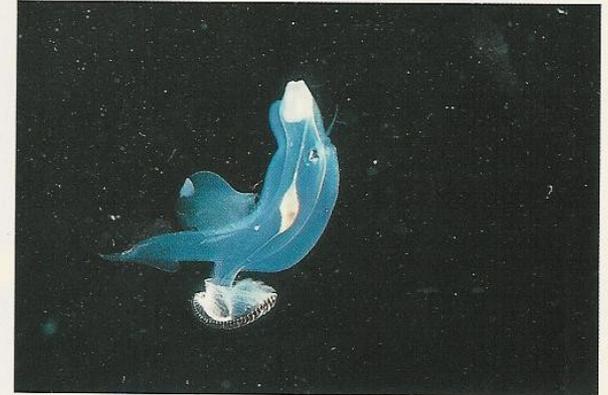
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Organismos do  
Zooplâncton

- 11. Colônia de Sifonóforos
- 12. Ctenóforo
- 13. Ctenóforo
- 14. Heterópodo
- 15. Heterópodo



15

# Organismos do Zooplâncton

- 16. Pterópodo tecostomado
- 17. Pterópodo tecostomado
- 18. Molusco pseudotecostomado



16

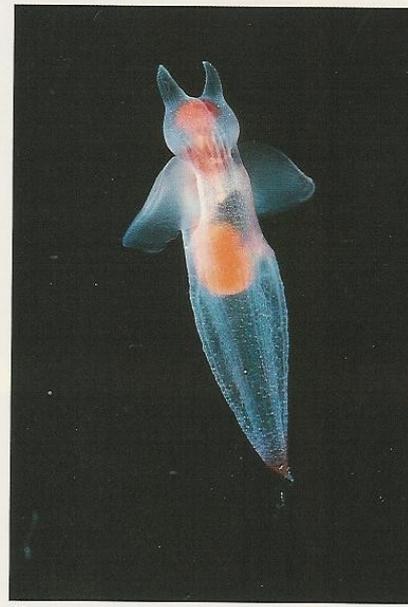


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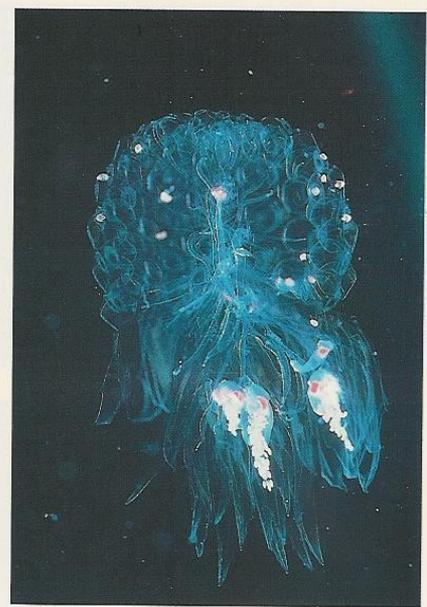


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# Organismos do Zooplâncton



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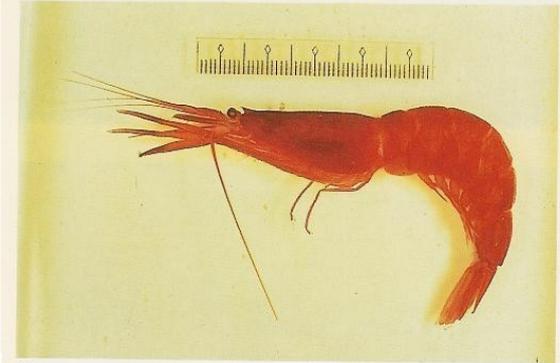
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19. Molusco gimnosoma

20. Sifonóforo

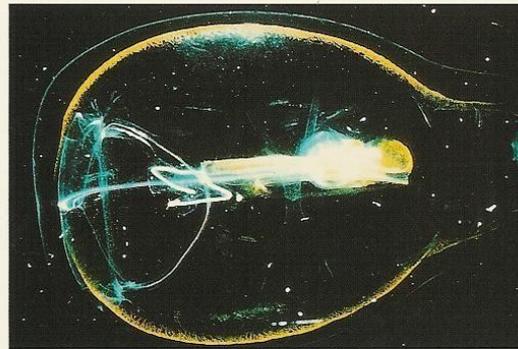
21. Camarão de mar profundo

22. Apendicularia larvacea

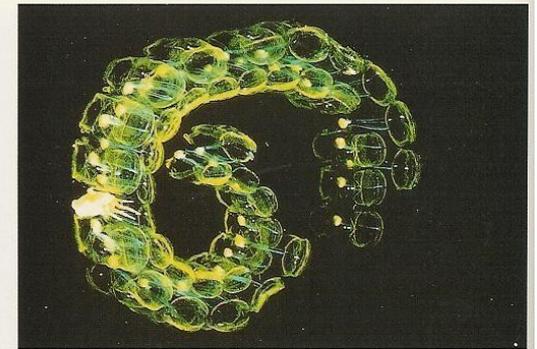


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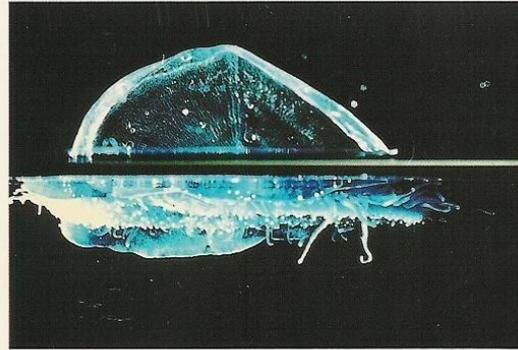




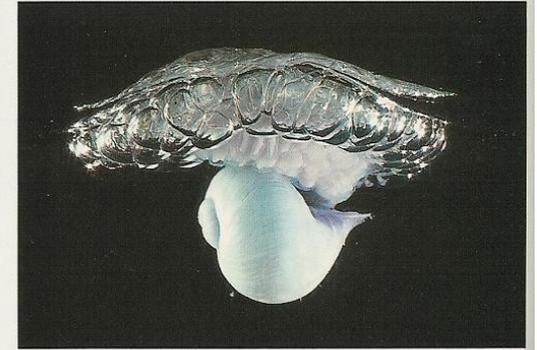
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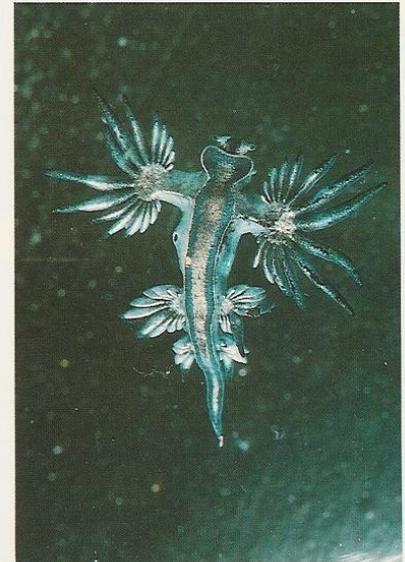
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## Organismos do Zooplâncton

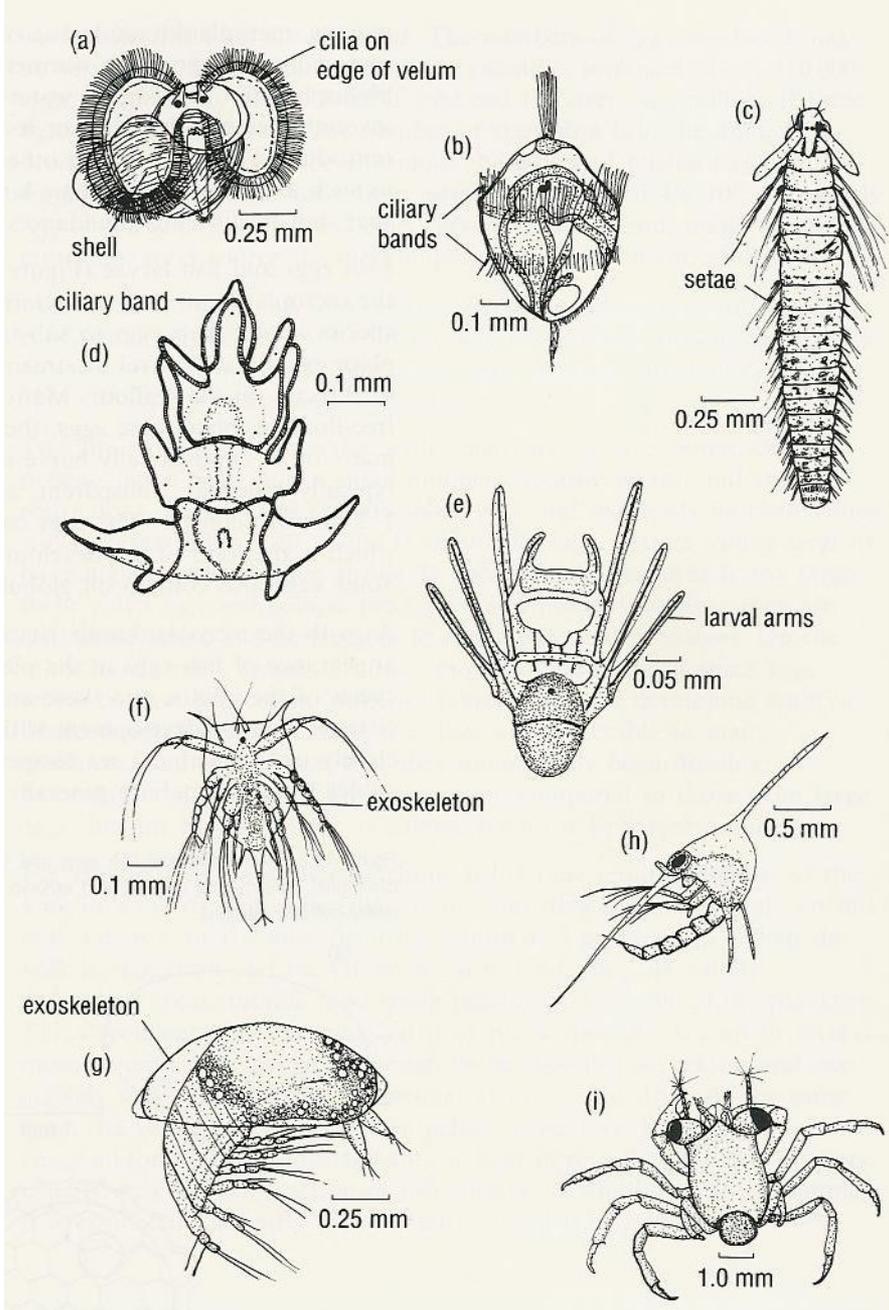
- 23. Salpa solitária
- 24. Salpa colonial
- 25. Cnidário neustônico
- 26. Molusco neustônico
- 27. Molusco nudibrânquio neustônico



27

# Meroplâncton

- a) Véliger de molusco
- b) Trocófora de poliqueta
- c) Larva avançada de poliqueta
- d) Bipinária de estrela-do-mar
- e) Equinopluteus de ouriço
- f) Nauplius de craca
- g) Cipris de craca
- h) Zoea de siri
- i) Megalopa de siri



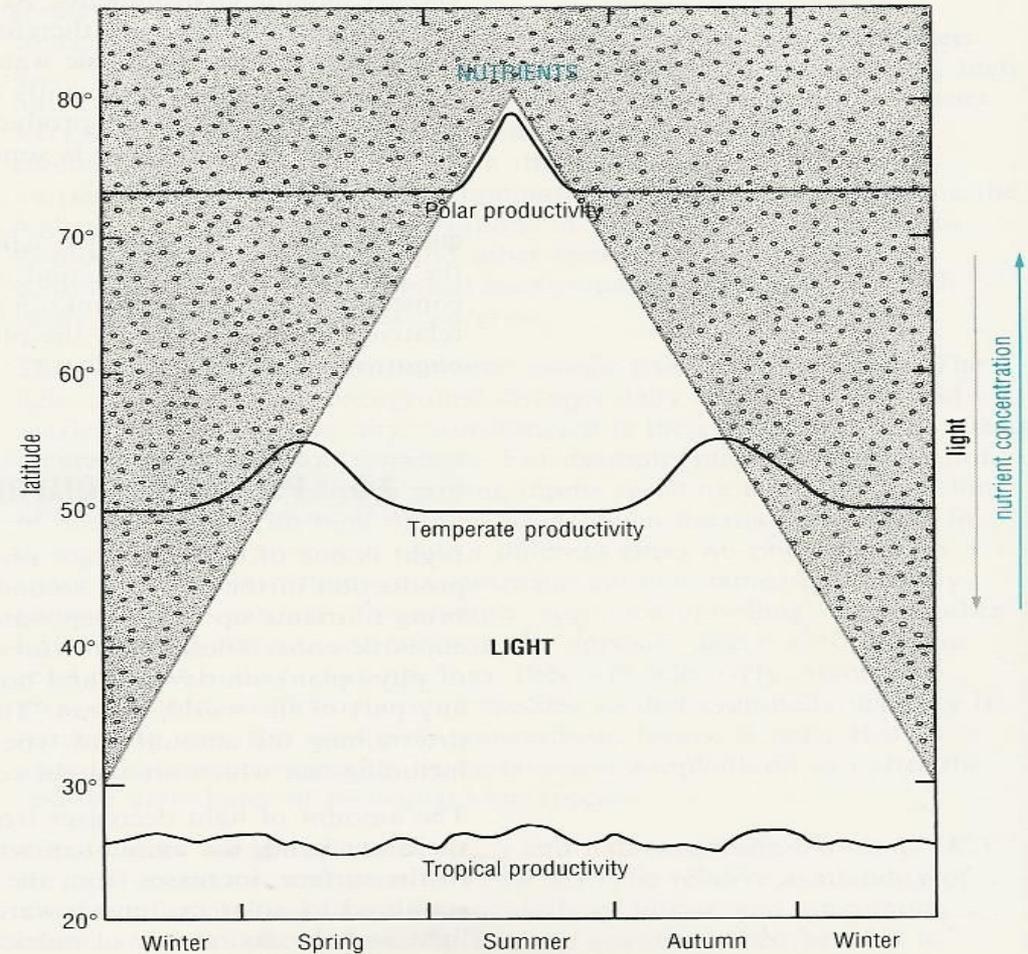
# Ambiente Planctônico

Produção biológica:

## Fatores Limitantes

- Intensidade luminosa
- Disponibilidade de nutrientes

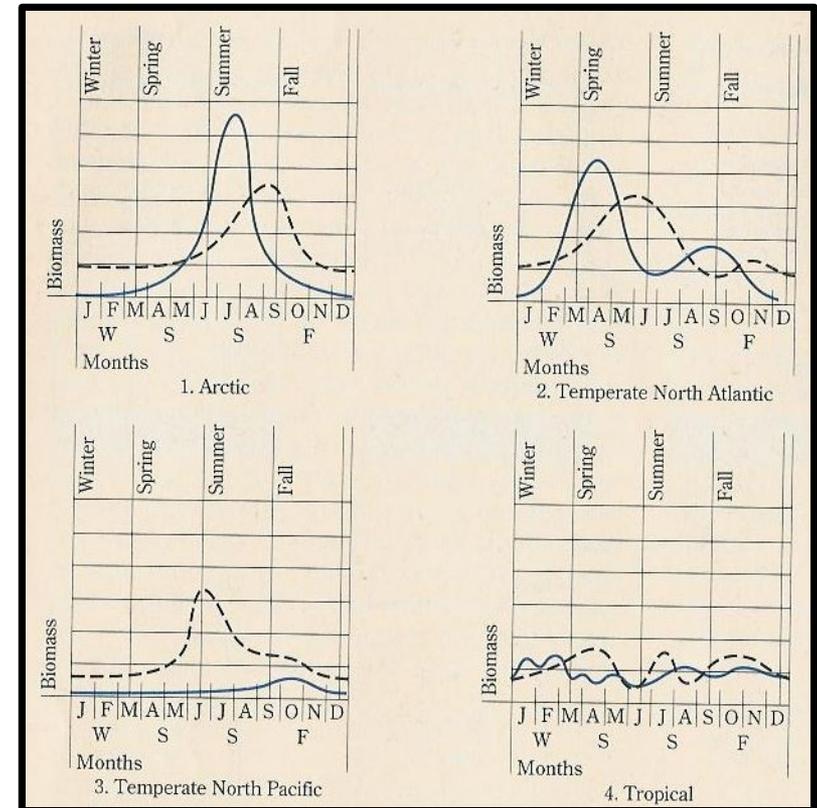
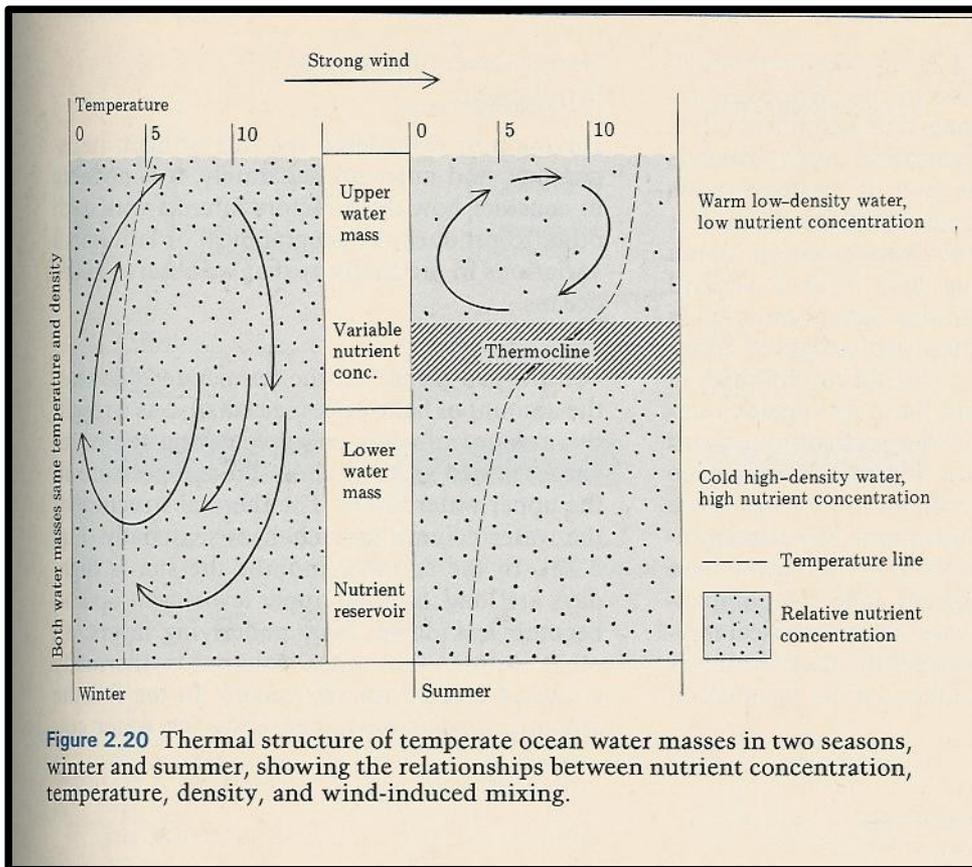
Figure 3.9 The relative abundance of light (unshaded area) and nutrients (shaded area) at the sea surface and the relative seasonal change in primary productivity at three different latitudes. (Productivity expressed in arbitrary vertical scales.)



# Ambiente Planctônico

## Produção biológica: Variação Sazonal

- Intensidade luminosa
- Disponibilidade de nutrientes de acordo com intensificação dos ventos



# Ambiente Planctônico

## Distribuição vertical do zooplâncton

### Migrações sazonais

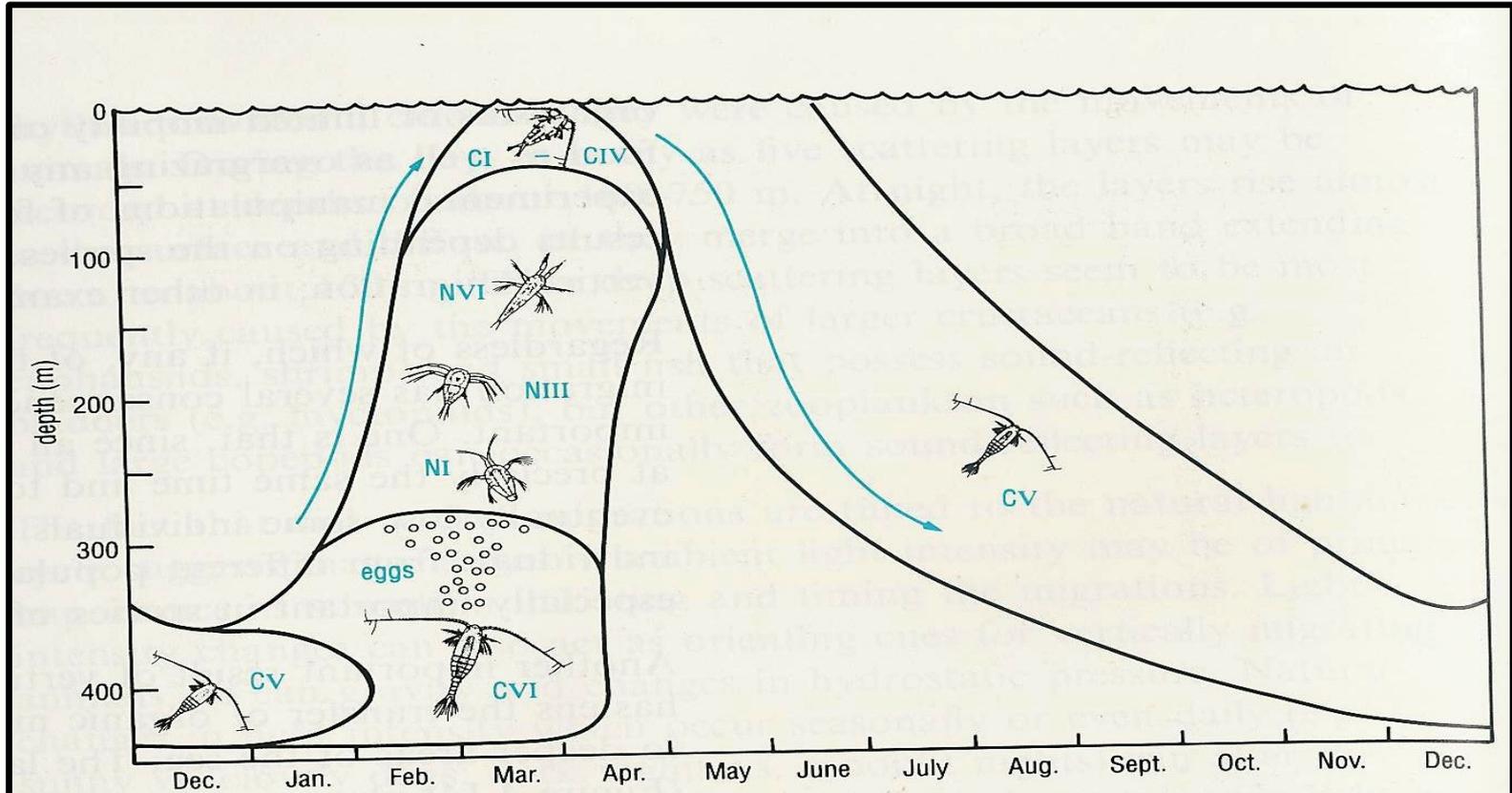
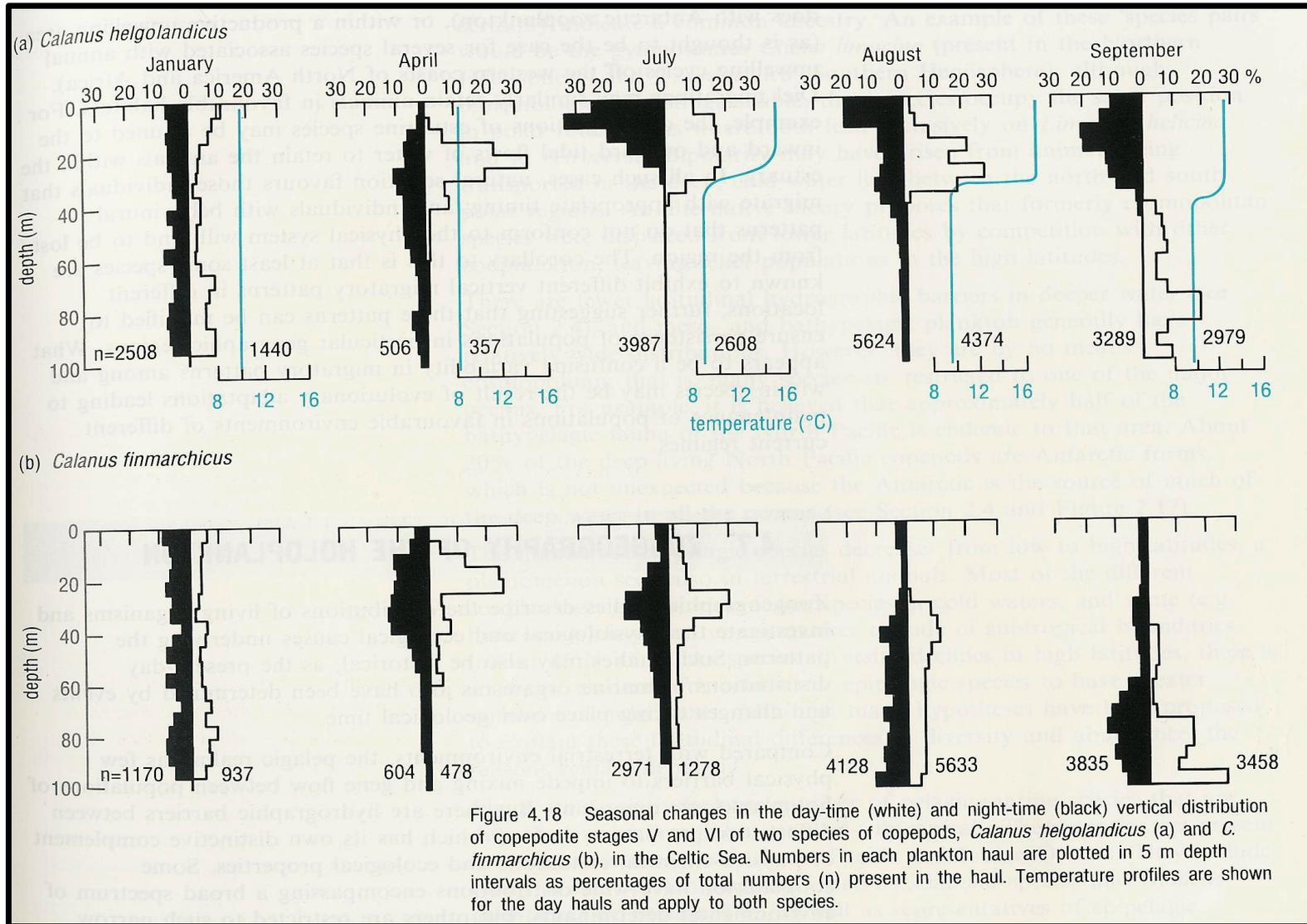


Figure 4.17 A schematic diagram of the life cycle of the copepod *Calanus plumchrus* in coastal waters off British Columbia, Canada. The depth distributions of the eggs, larvae (nauplii I–VI and copepodites I–V) and adults (copepodite VI) are shown over the course of one year. C, copepodite; N, nauplius.

# Ambiente Planctônico

## Distribuição vertical do zooplâncton

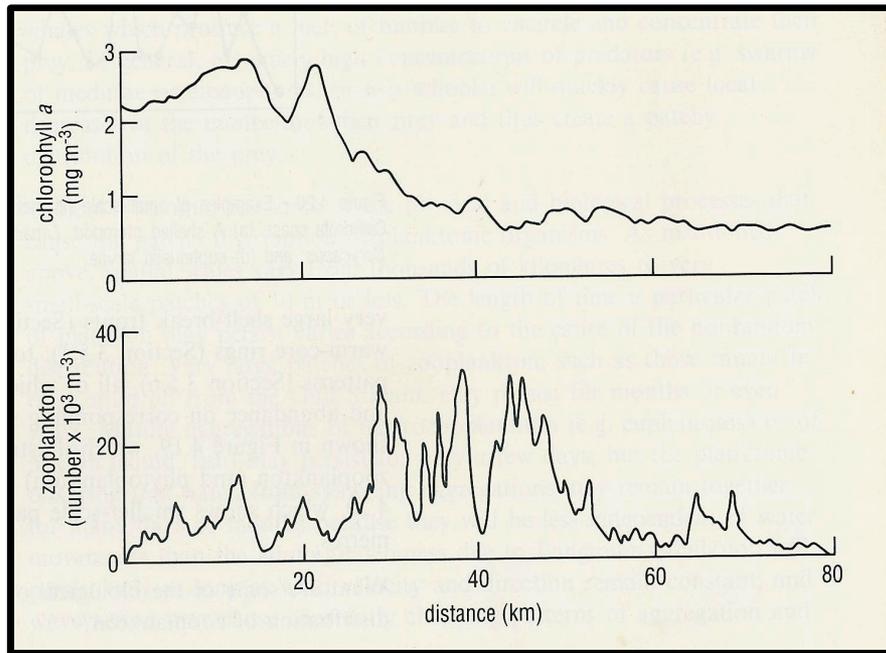
### Migrações sazonais e diárias



# Ambiente Planctônico

Distribuição agrupada em manchas (“patches”)

Grande escala



Pequena escala

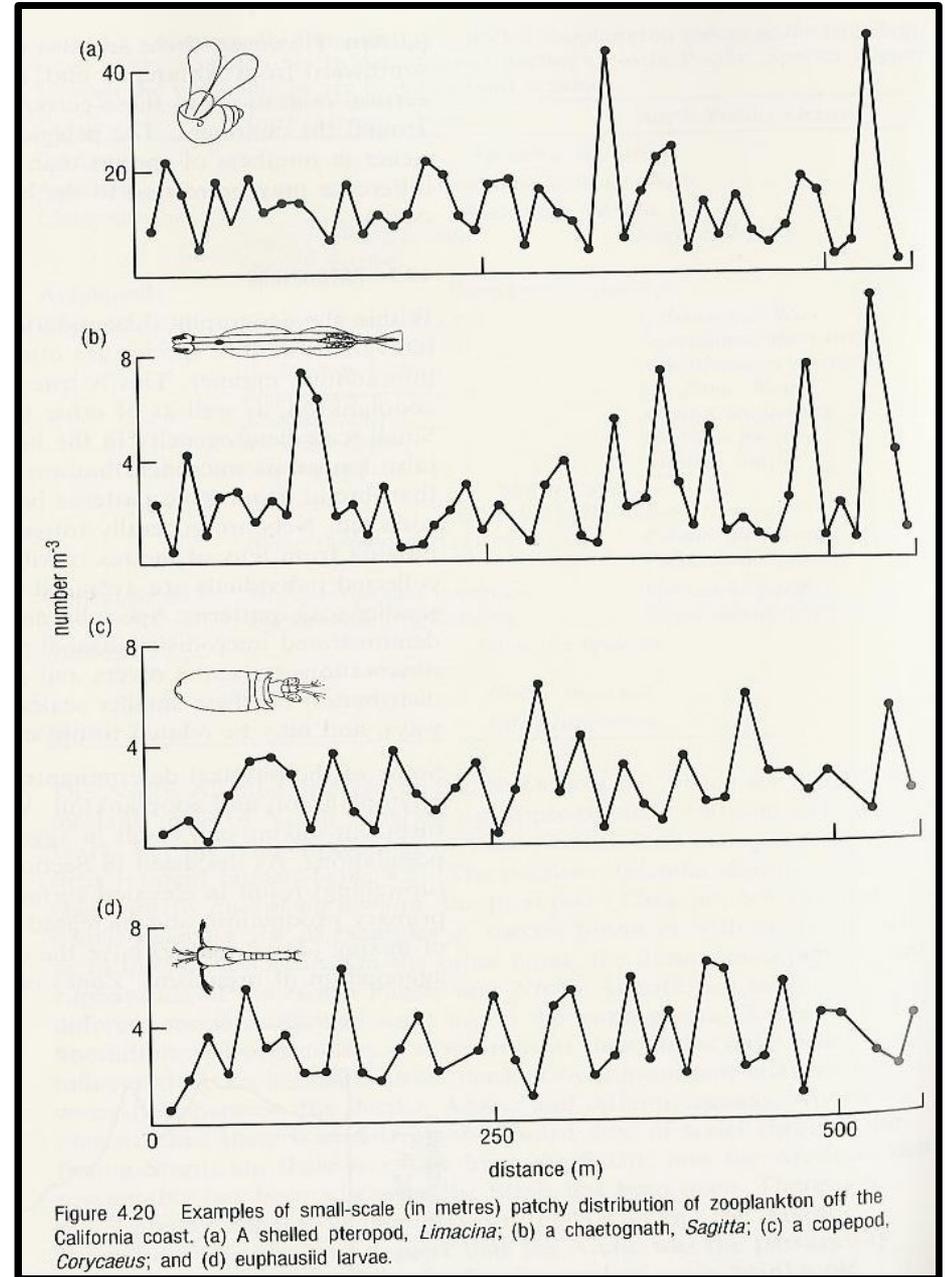


Figure 4.20 Examples of small-scale (in metres) patchy distribution of zooplankton off the California coast. (a) A shelled pteropod, *Limacina*; (b) a chaetognath, *Sagitta*; (c) a copepod, *Corycaeus*; and (d) euphausiid larvae.

## Ambiente Nectônico

São os organismos que tem o poder de locomover-se e não estão sujeitos a ação do movimento das águas

Invertebrados:

Crustáceos: krill



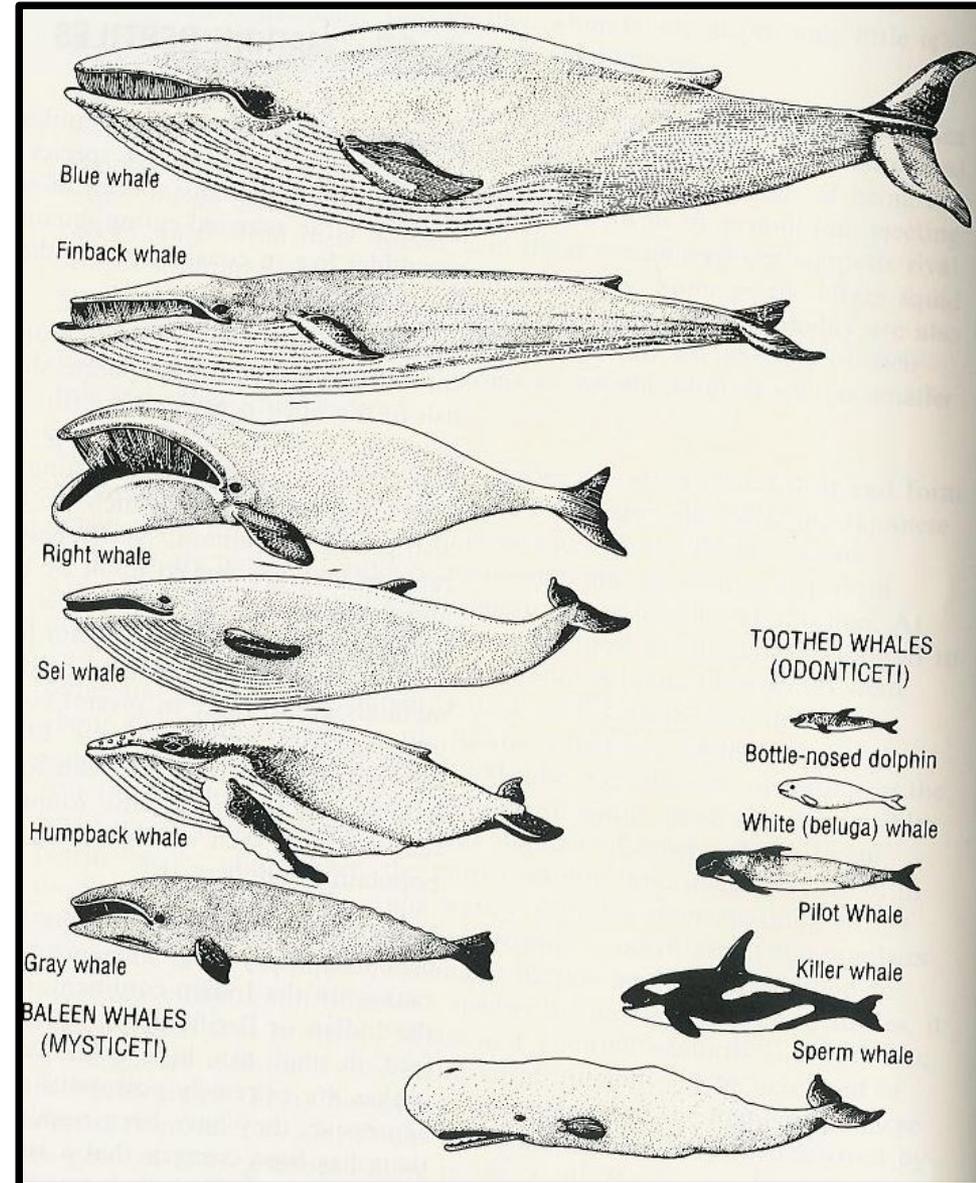
## Cefalópodes: lulas



# Ambiente Nectônico

Vertebrados:

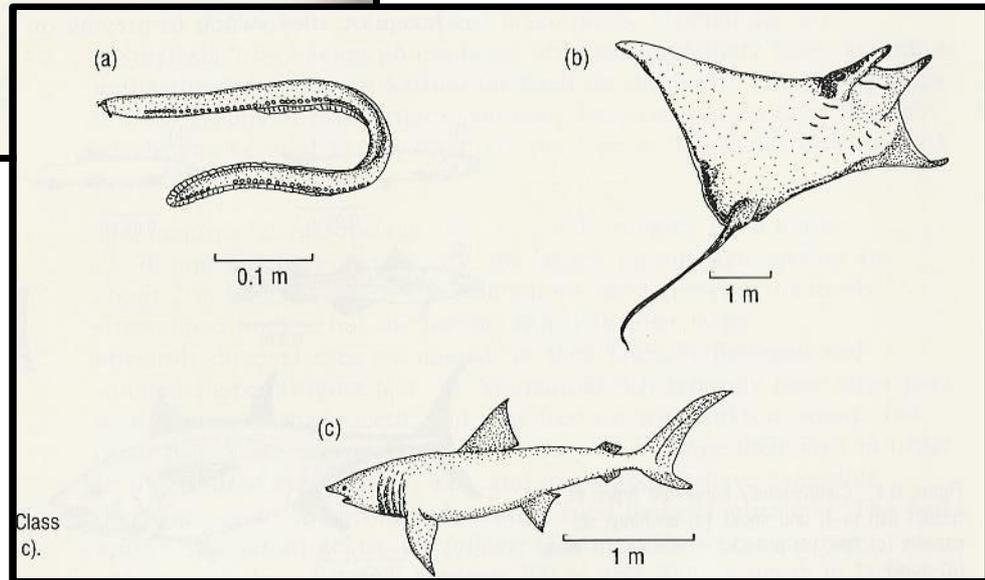
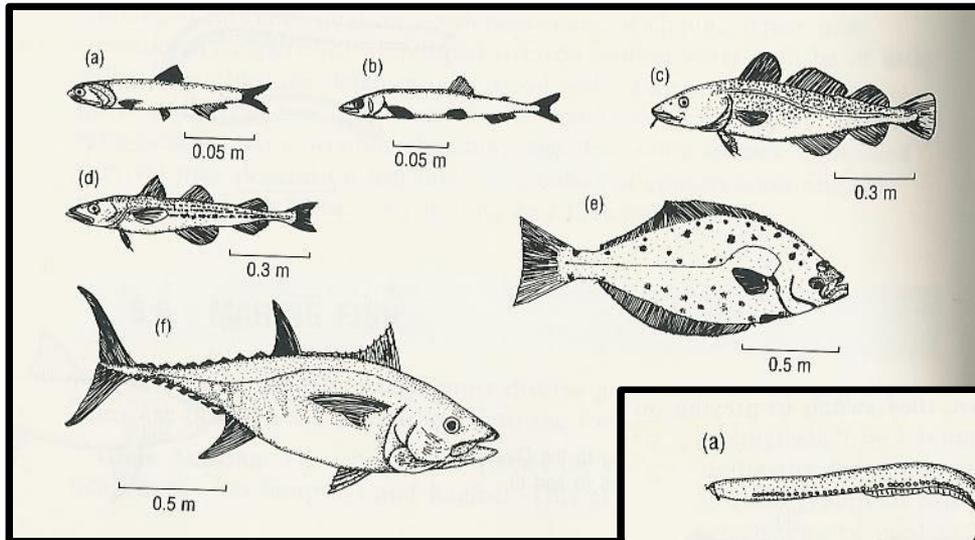
- Répteis: alguns crocodilos e iguanas, tartarugas
- Mamíferos: cetáceos (baleias e golfinhos) e pinípedes (focas, lobos e leões-marinhos)



# Ambiente Nectônico

Vertebrados:

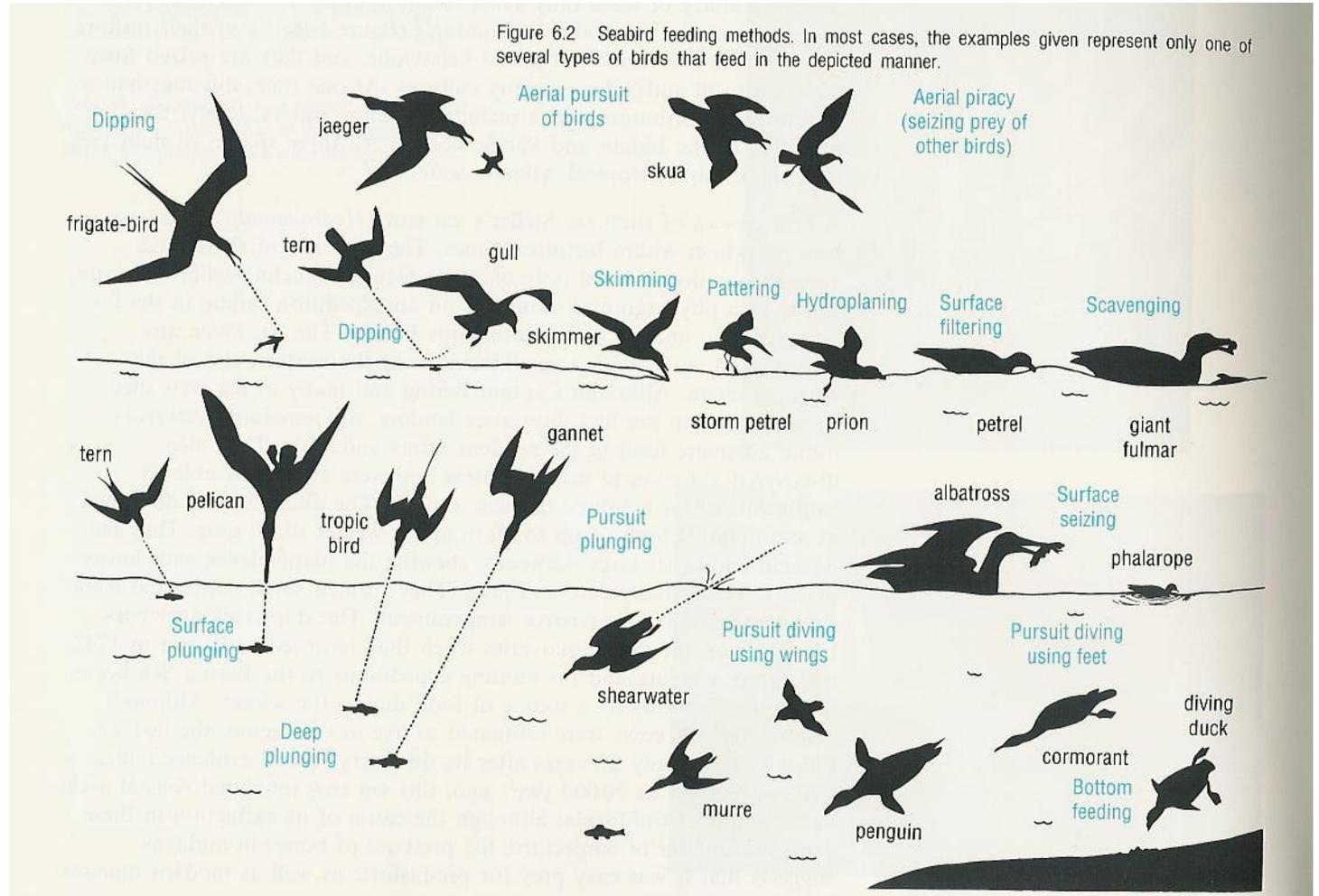
-Peixes: ósseos e cartilagosos (tubarões e raias)



# Ambiente Nectônico

Vertebrados:

- Aves



# Ambiente Nectônico

## Adaptações Flutuabilidade

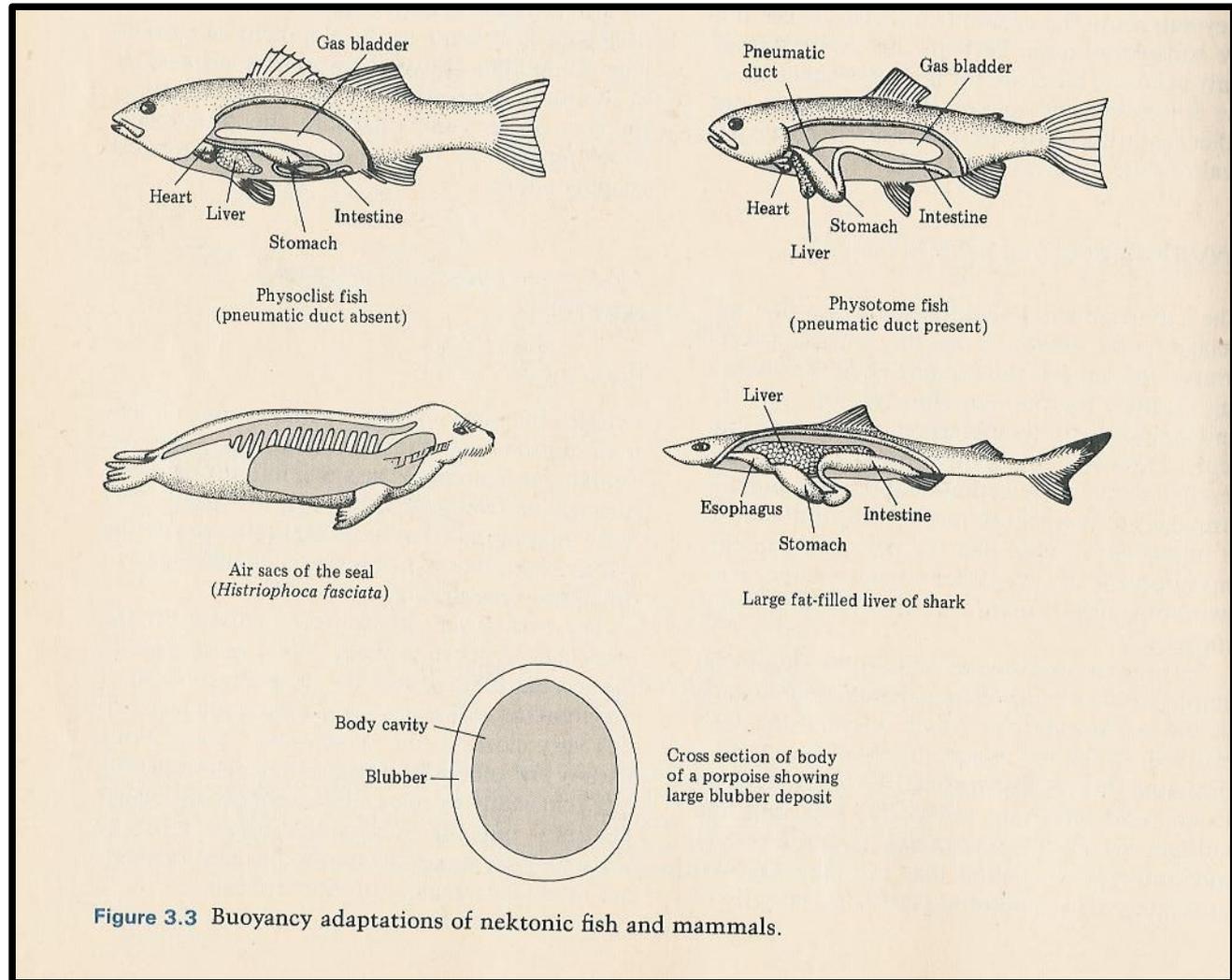


Figure 3.3 Buoyancy adaptations of nektonic fish and mammals.

# Ambiente Nectônico

## Adaptações - Locomoção

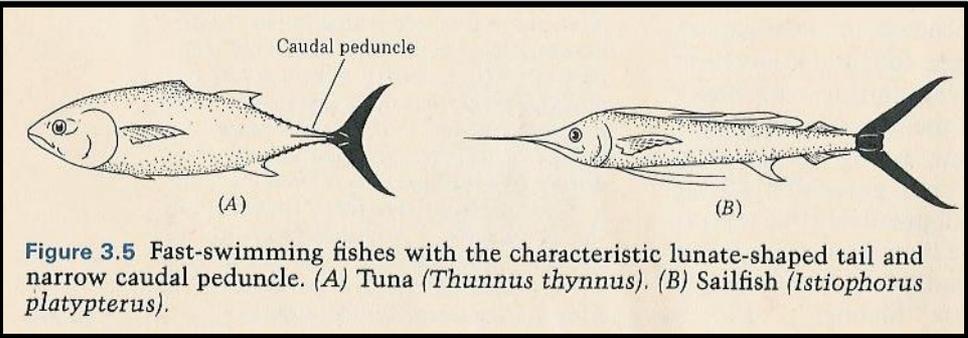


Figure 3.5 Fast-swimming fishes with the characteristic lunate-shaped tail and narrow caudal peduncle. (A) Tuna (*Thunnus thynnus*). (B) Sailfish (*Istiophorus platypterus*).

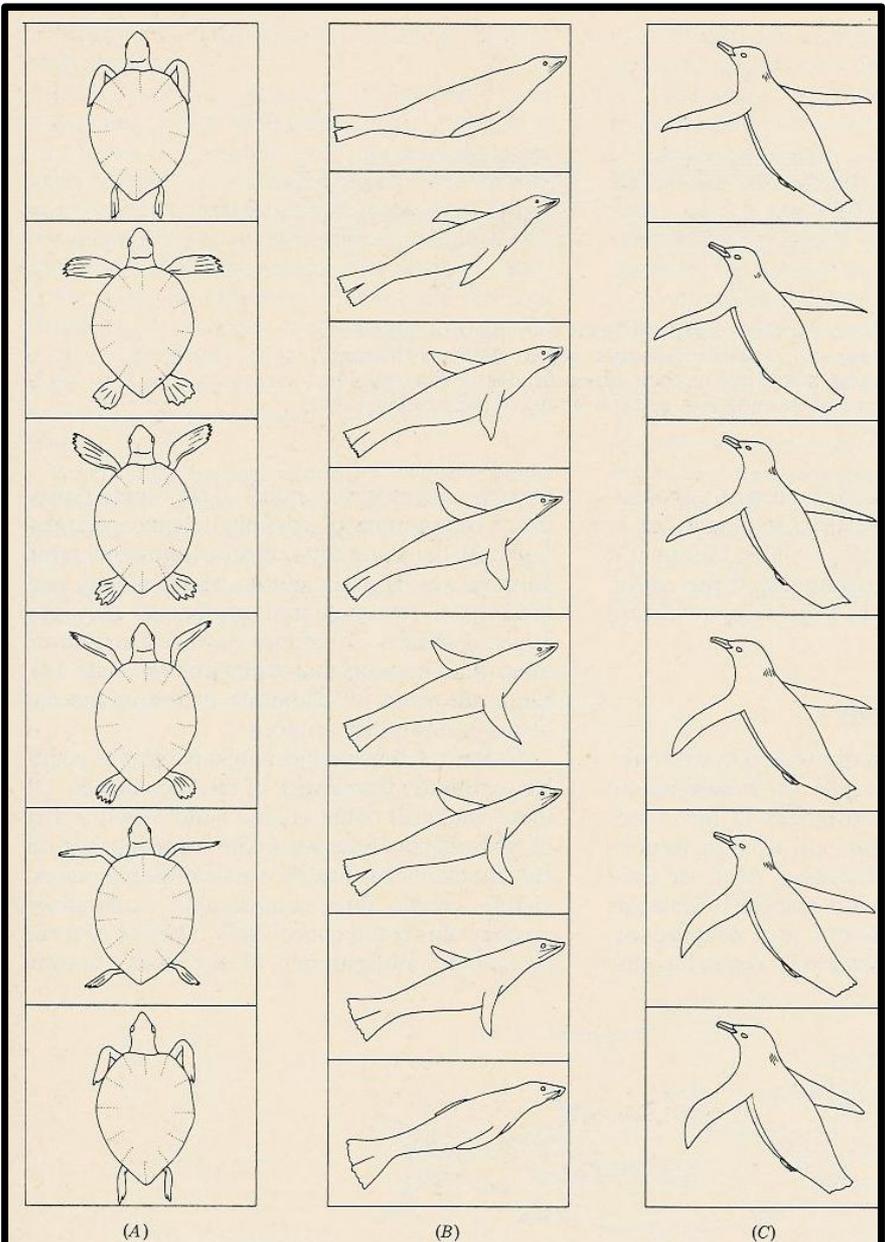
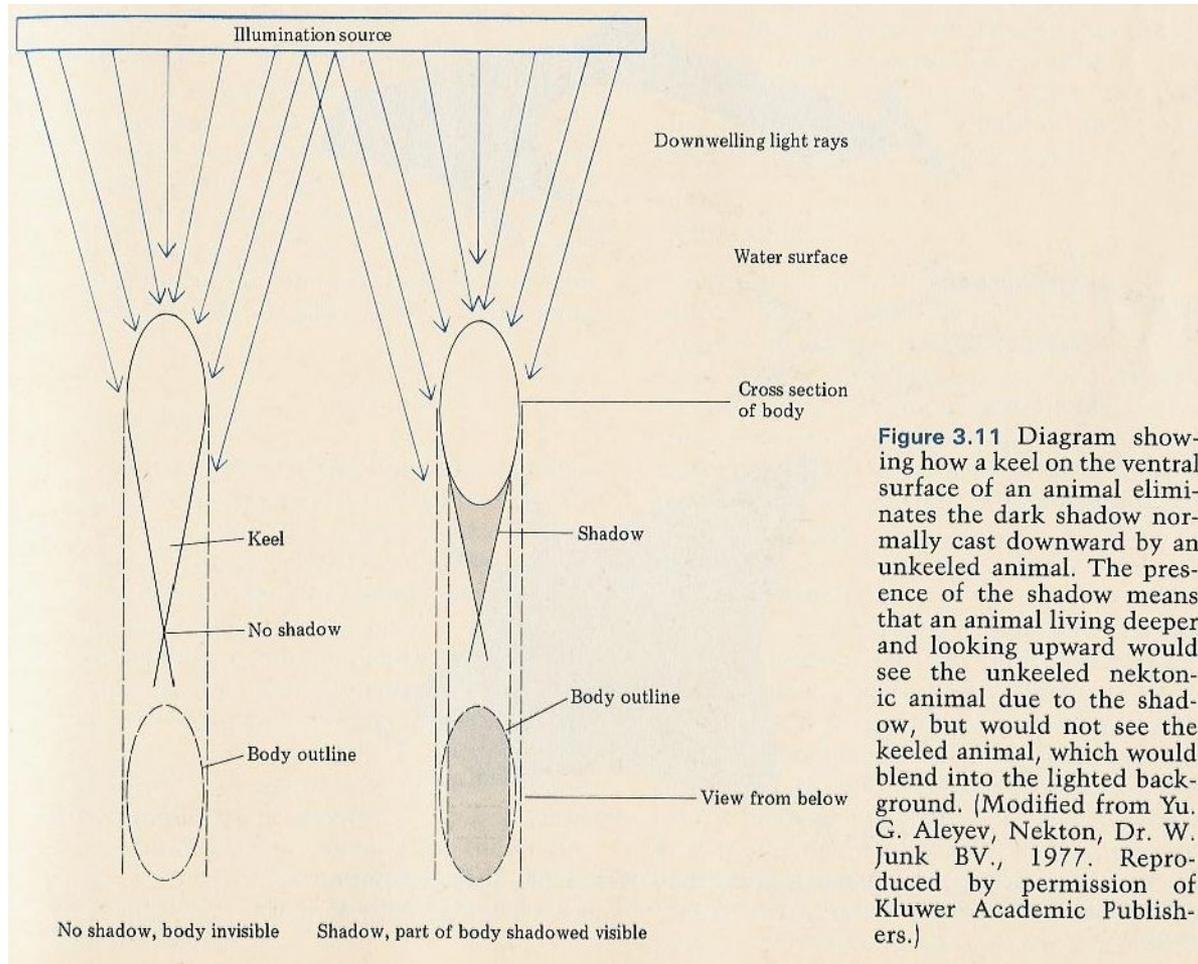


Figure 3.8 Swimming by paddle motions in three classes of marine vertebrates. (A) The green turtle (*Chelonia mydas*). (B) The sea lion (*Arctocephalus pusillus*). (C) The penguin (*Pygoscelis papua*). (Redrawn from Yu. G. Aleyev, Nekton, Dr. W. Junk BV., 1977. Reproduced by permission of Dr. W. Junk BV.)

# Ambiente Nectônico

## Adaptações

### - Defesa e Camuflagem



**Figure 3.11** Diagram showing how a keel on the ventral surface of an animal eliminates the dark shadow normally cast downward by an unkeeled animal. The presence of the shadow means that an animal living deeper and looking upward would see the unkeeled nektonic animal due to the shadow, but would not see the keeled animal, which would blend into the lighted background. (Modified from Yu. G. Aleyev, *Nekton*, Dr. W. Junk BV., 1977. Reproduced by permission of Kluwer Academic Publishers.)

# Ambiente Bentônico

## Diversidade de habitats:

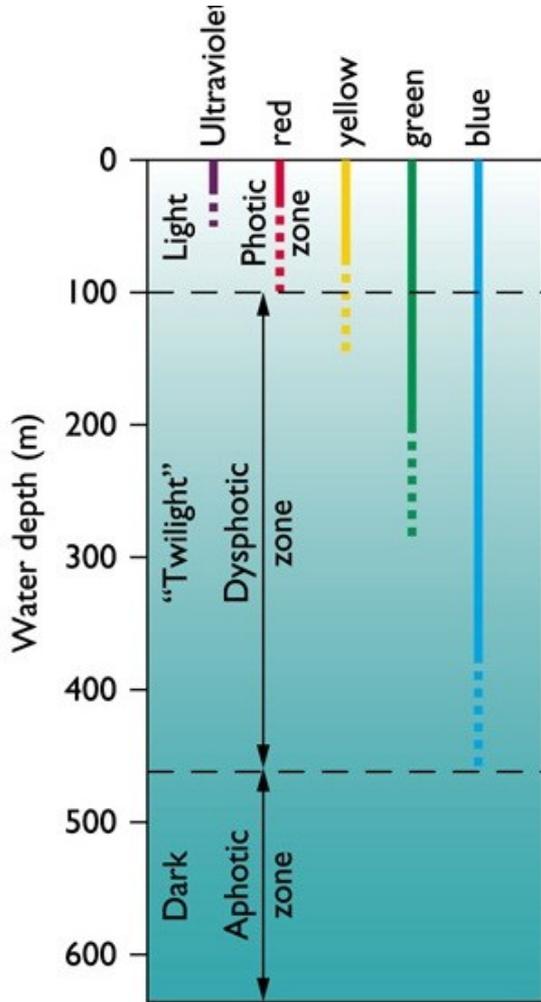
- variedade de ambientes em função da pressão, temperatura, luz e tipo de substrato

## Características ambientais:

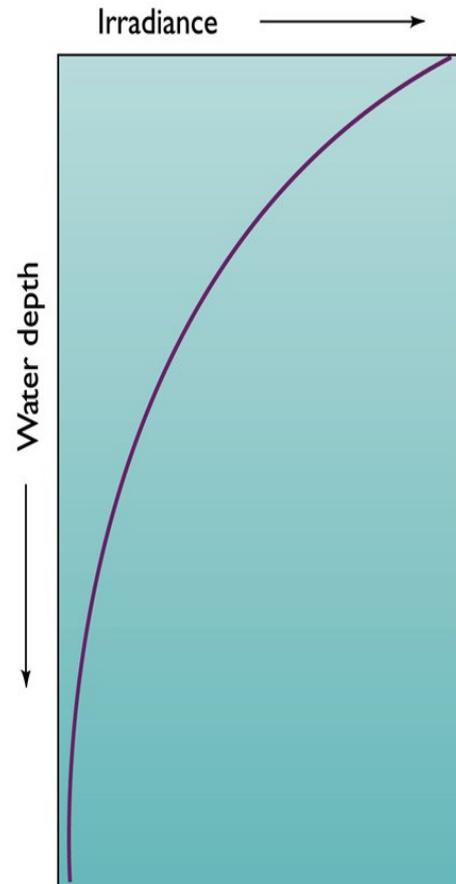
- Luz: varia de acordo com a profundidade
- Pressão: talvez o fator com maior variabilidade (1 atm por 10m)
- Salinidade: praticamente constante abaixo da haloclina
- Temperatura: praticamente constante abaixo da termoclina
- Oxigênio: baixas concentrações, porém não impede existência de vida
- Alimento: diversas fontes de matéria

# Ambiente Bentônico

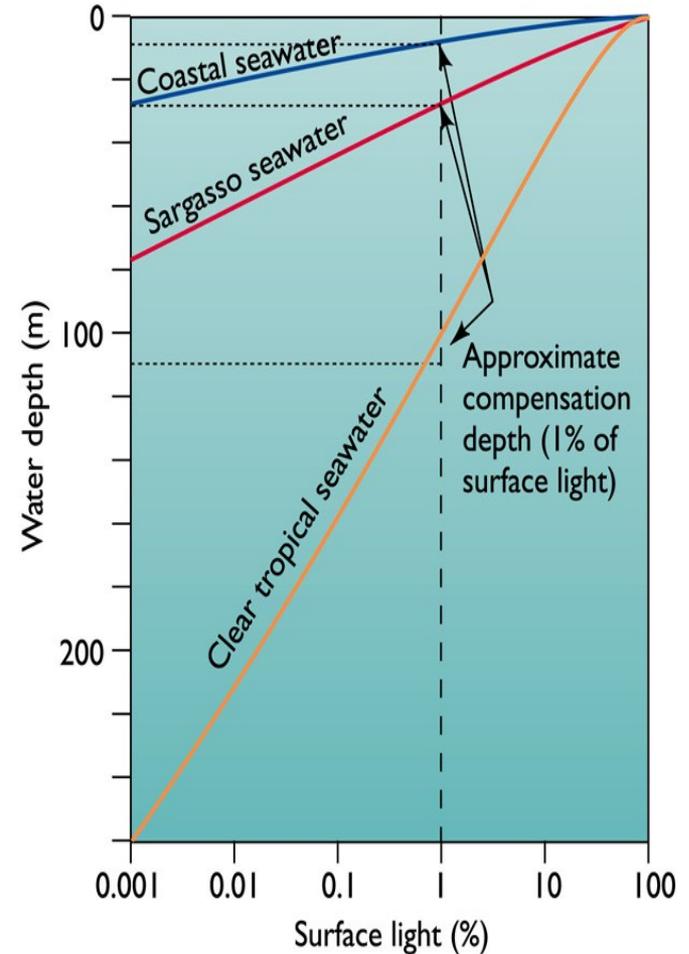
## Características ambientais:



(b) LIGHT ZONES



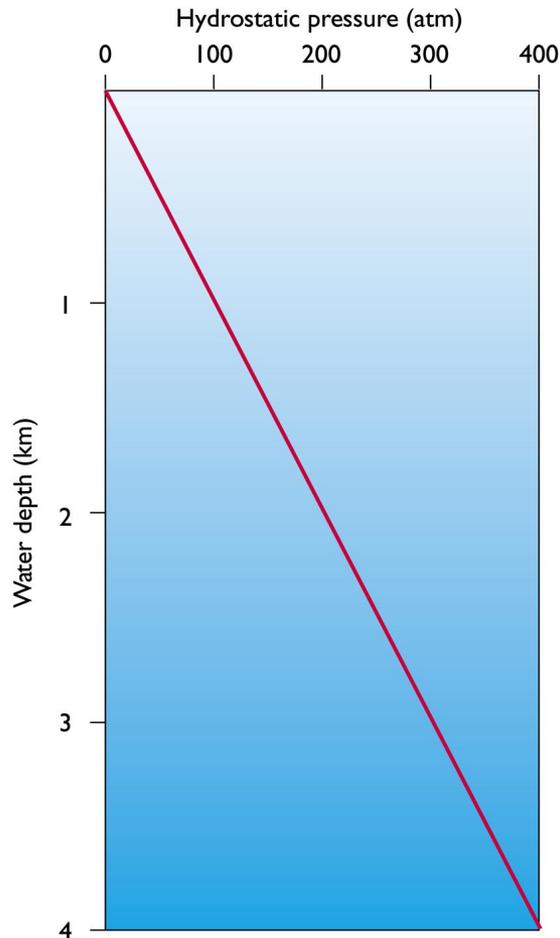
(a) LIGHT LEVELS



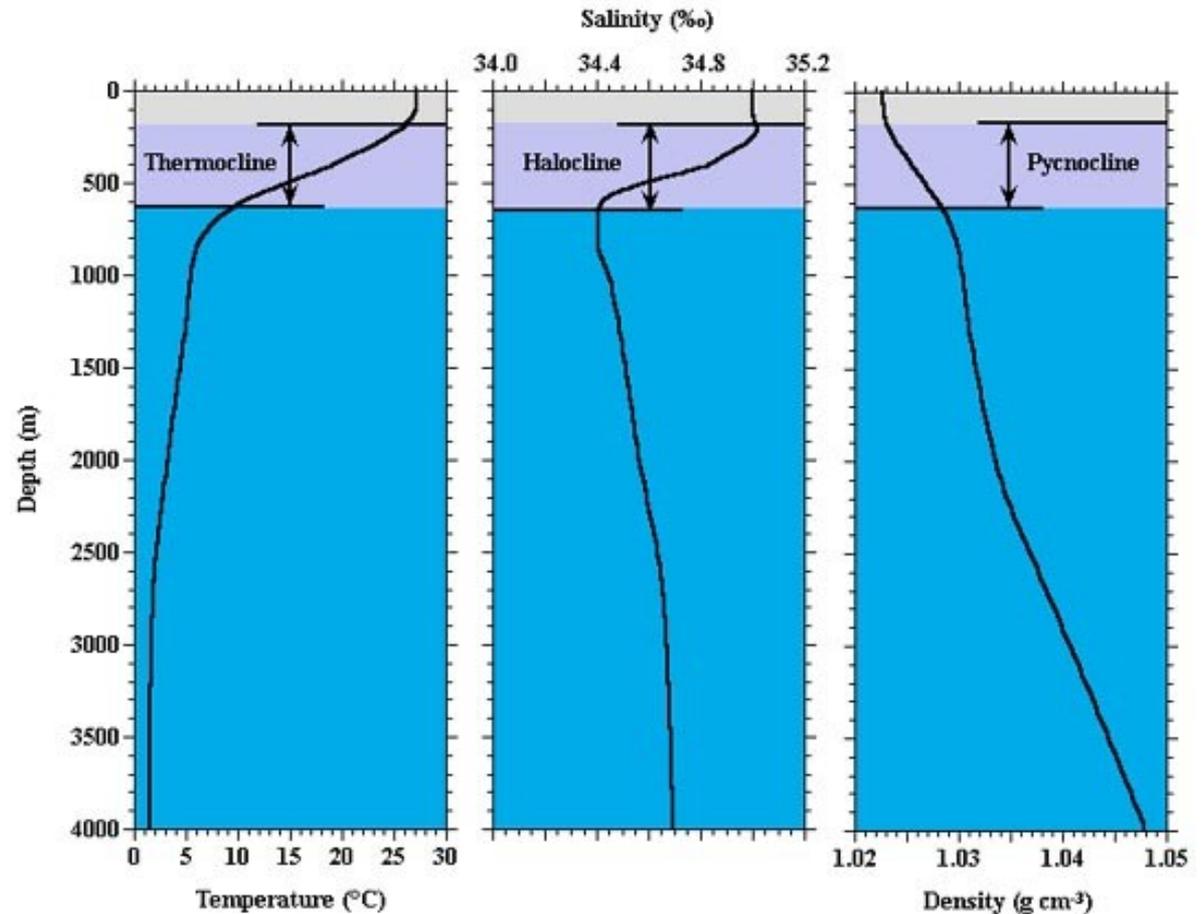
(b) COMPENSATION DEPTH

# Ambiente Bentônico

## Características ambientais:

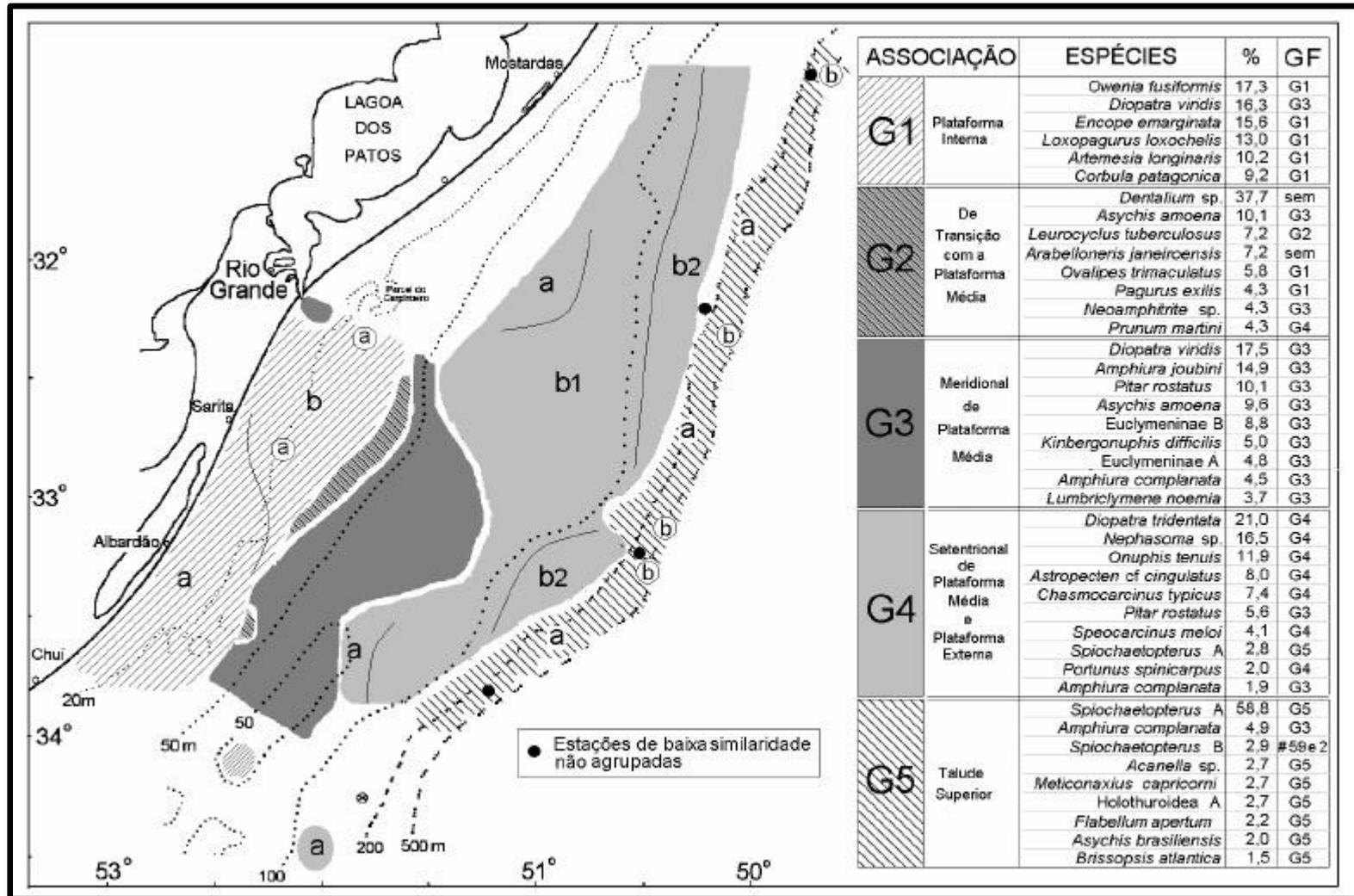


(a) WATER PRESSURE



# Ambiente Bentônico

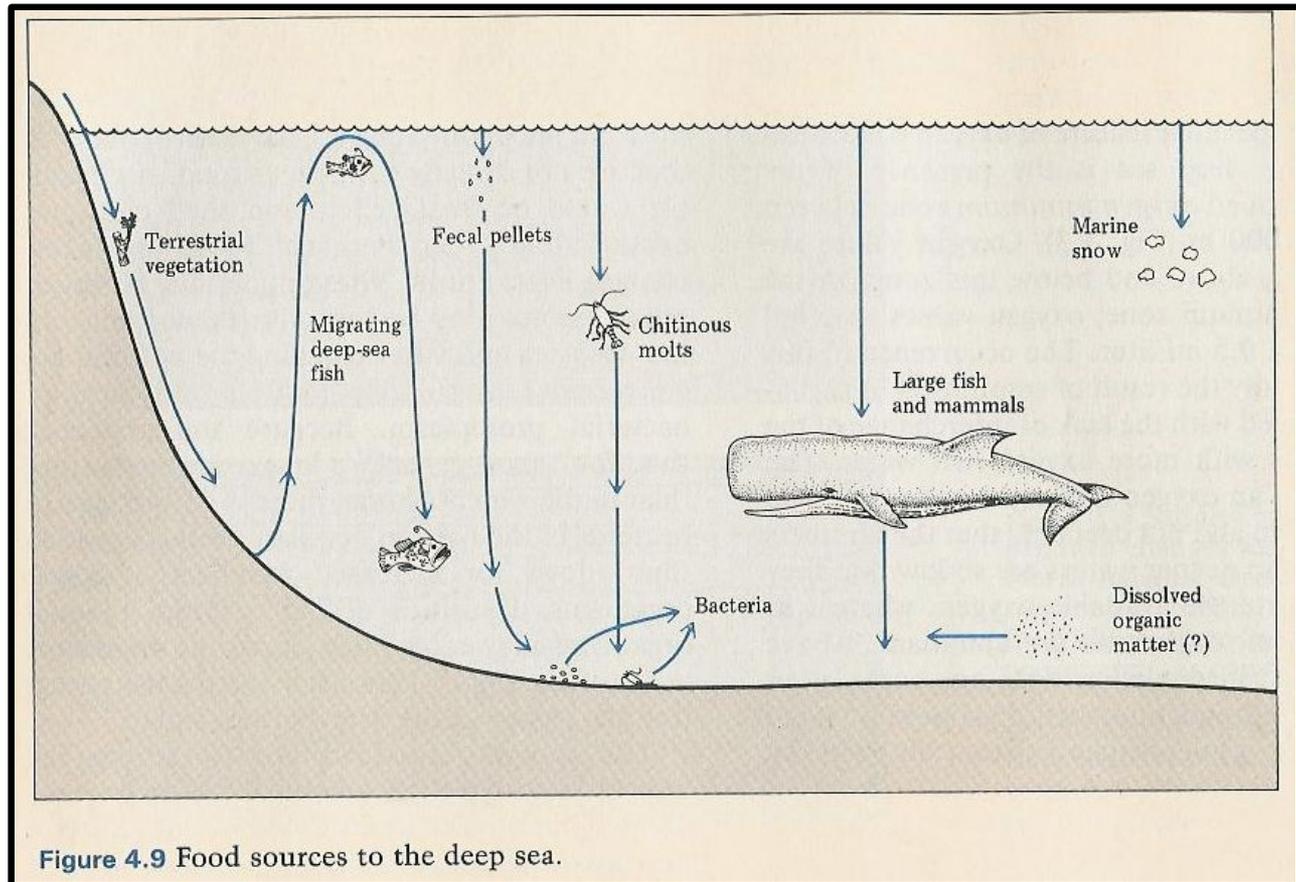
## Diversidade de habitats: Sedimentos



# Ambiente Bentônico

Características ambientais:

-Alimento: diversas fontes de matéria



# Ambiente Bentônico

Plantas: principalmente macrofitas



# Ambiente Bentônico

## Animais

- Grande diversidade taxonômica de invertebrados

## Categorias

- Infauna: organismos que vivem dentro do sedimento
- Epifauna: organismos que vivem sobre o sedimento

## Classificação por tamanho:

- Macrofauna:  $> 1$  mm
- Meiofauna: 0,1 a 1 mm
- Microfauna:  $< 0,1$  mm

# Infauna

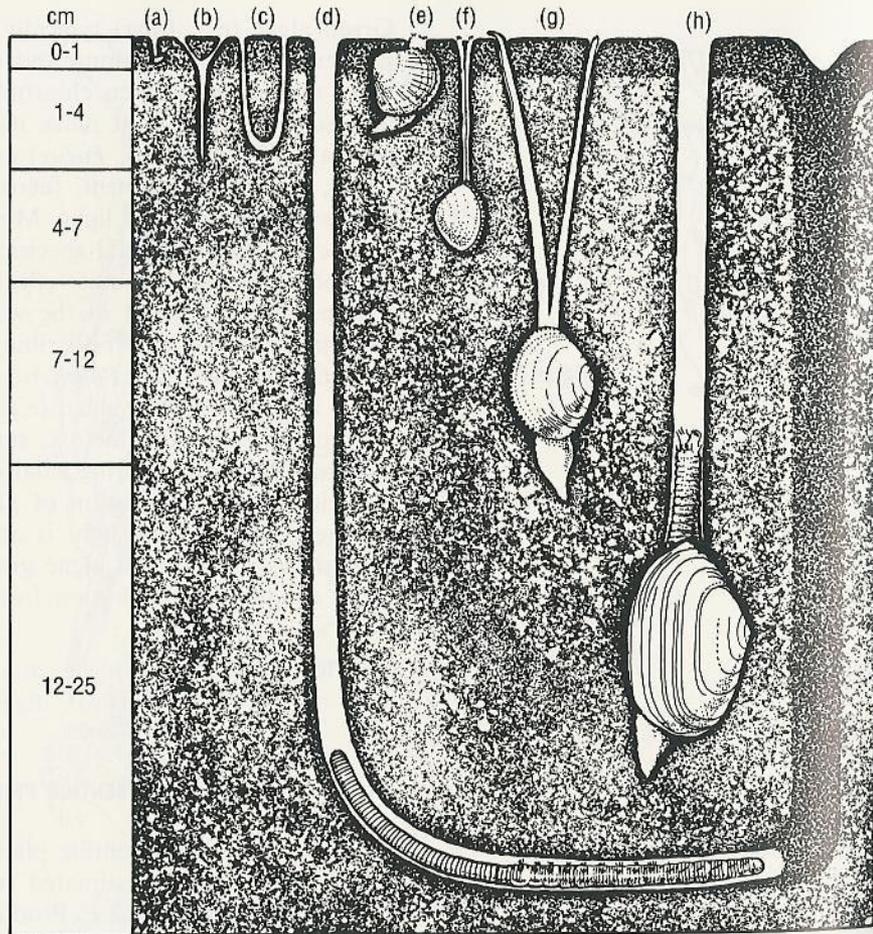


Figure 7.2 Representative infauna, showing their burrows and living positions. (a) *Hydrobia*, a snail; (b) burrow of *Pygospio*, a polychaete; (c) burrow of *Corophium*, an amphipod; (d) *Arenicola*, a polychaete; and the clams (e) *Cardium*, (f) *Macoma*, (g) *Scrobicularia*, and (h) *Mya*.

# Epifauna

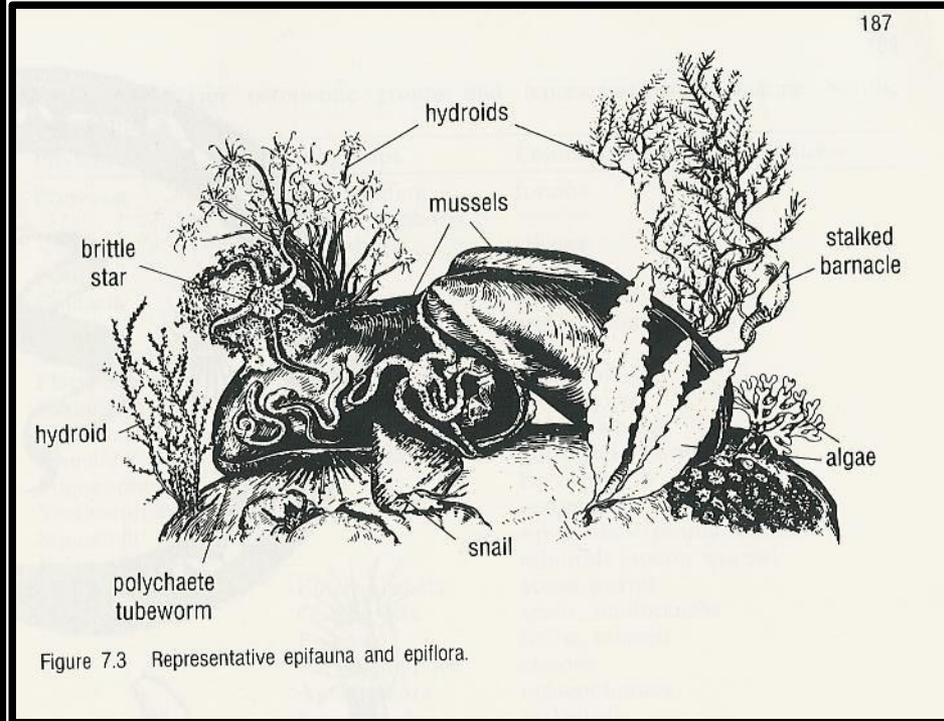


Figure 7.3 Representative epifauna and epiflora.

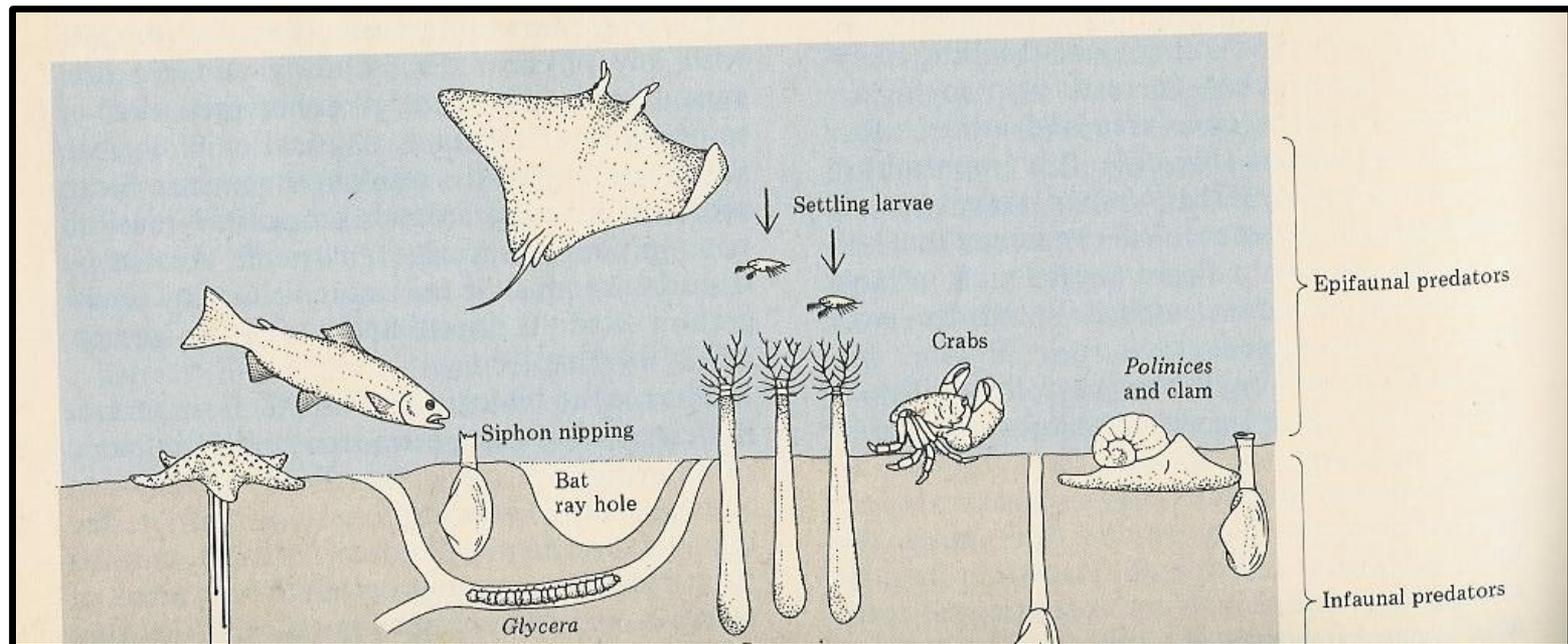
# Ambiente Bentônico

## Tipos de Ambientes

### 1) Fundos moles sem vegetação

São os mais abundantes.

Principais organismos: poliquetas, crustáceos, moluscos e equinodermatas

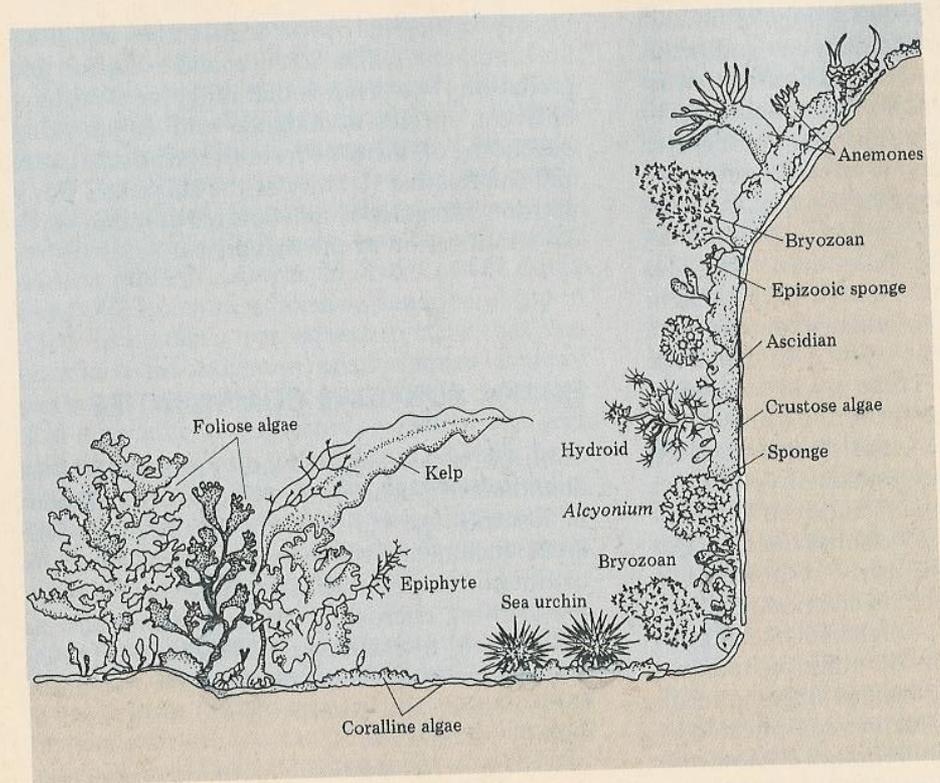


# Ambiente Bentônico

## Tipos de Ambientes

### 2) Fundos rochosos

Caracterizado por animais incrustantes.



**Figure 5.12** A diagrammatic representation of the characteristic flora and fauna inhabiting the vertical and horizontal surfaces of the Massachusetts subtidal rocks. Horizontal surfaces are dominated by a canopy of foliose algae and other, epiphytic species, unless the surfaces are being actively grazed by sea urchins, in which case coralline algae predominate. Vertical surfaces support diverse assemblages of invertebrates and algae that compete for space; some of these species are seasonal, such as the erect bryozoans and hydroids that form a canopy layer during the warm months. (Modified from K. Sebens, *The ecology of the rocky subtidal zone*, Amer. Sci. 73:548–557, 1985.)

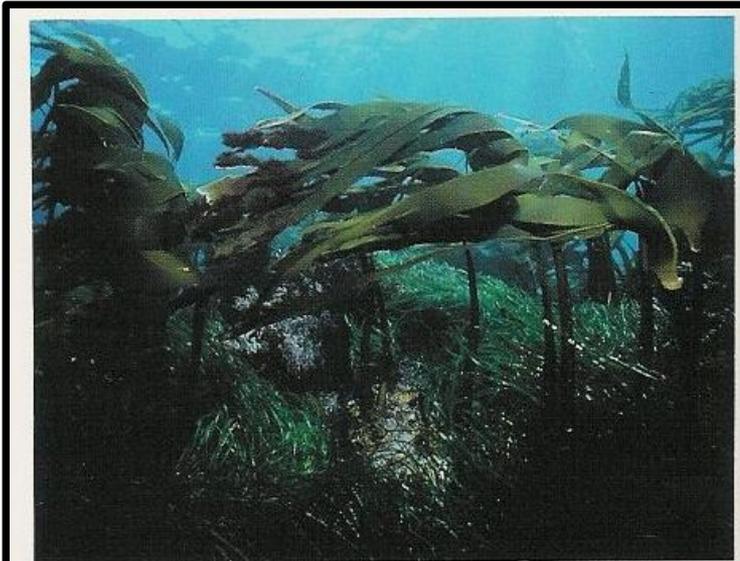
# Ambiente Bentônico

## Tipos de Ambientes

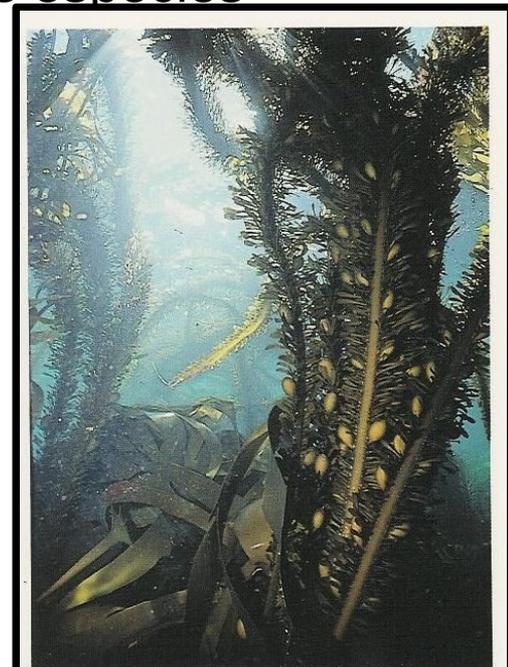
### 3) Florestas ou campos de algas

Presença de algas gigantes que podem aflorar a superfície (florestas) ou não (campos)

Possibilitam diversidade de habitats para várias espécies



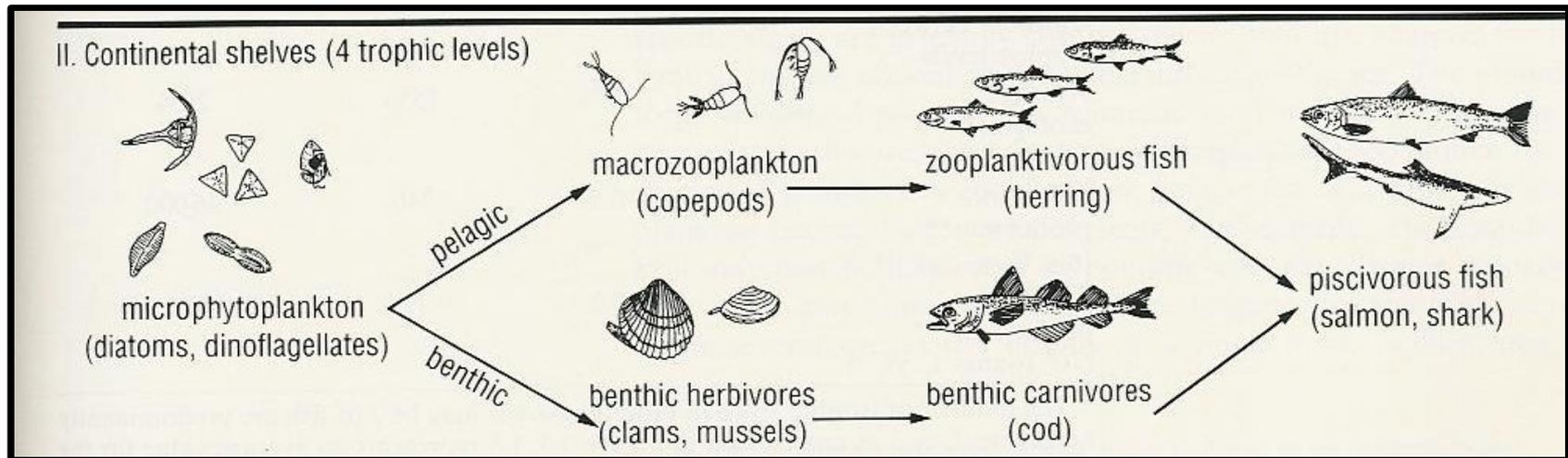
**Plate 38** A kelp bed composed of an overstory of *Laminaria dentigera* and an understory of the surfgrass *Phyllospadix*. (Photo courtesy of Drs. Lovell and Libby Langstroth.)



**Plate 37** A view inside a giant kelp forest, dominated by the kelp genus *Macrocystis*, on the California coast. (Photo courtesy of Drs. Lovell and Libby Langstroth.)

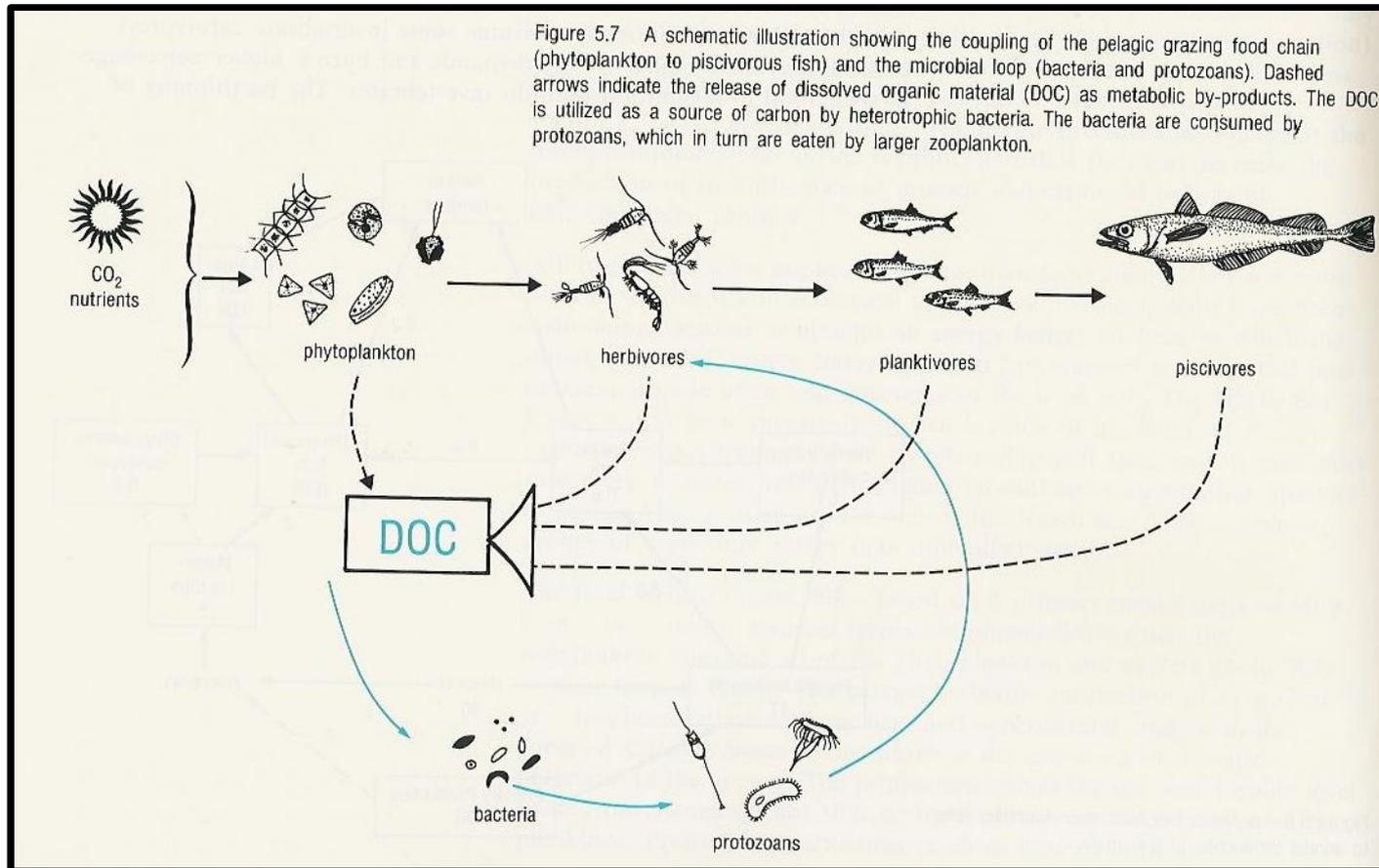
# Relações Ecológicas

## Cadeia Trófica



# Relações Ecológicas

## Alça microbiana



## Literatura

Lalli, C.M. e T.R. Parsons. 1993. Biological Oceanography: An Introduction. Pergamon Press. 301 pp.

Mann, K.H. e J.R.N. Lazier. 1991. Dynamics of marine ecosystems: biological-physical interactions in the oceans. Blackwell Scientific Publications. 466 pp.

Nybakken, J.W. 1993. Marine Biology: An ecological approach. Harper Collins College Publishers. 3a. edição. 462 pp.

Livros disponíveis na Biblioteca Setorial de Oceanografia

Material didático disponível em [www.lei.furg.br](http://www.lei.furg.br)