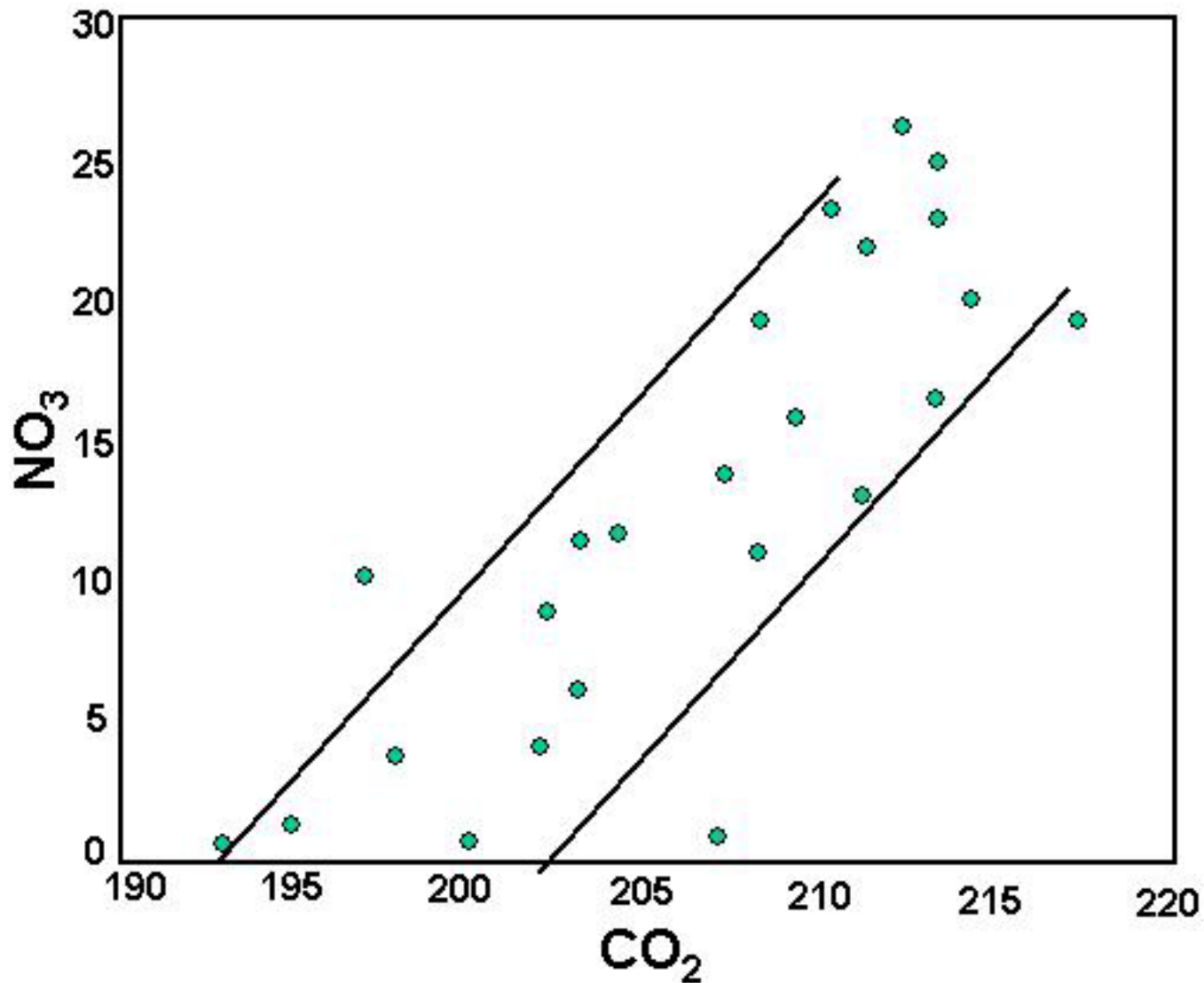


Correlation between the concentration of nitrate and phosphate in waters of the Atlantic, Indian, and Pacific Oceans

Source: Redfield, 1934



$\Delta C : \Delta N$   
7 : 1

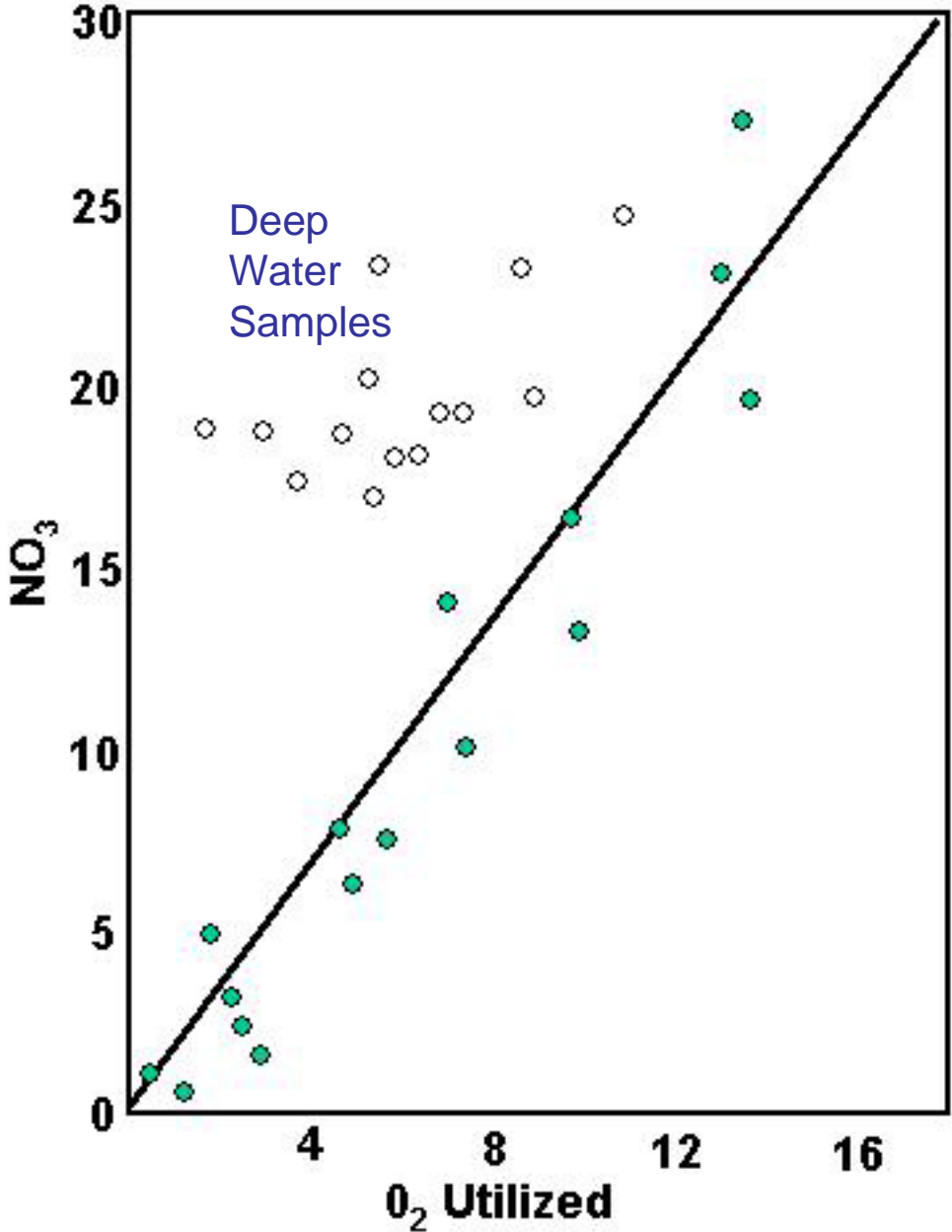
Western Atlantic

Units:

[NO<sub>3</sub>]=10<sup>-3</sup> millimols per liter  
[CO<sub>3</sub>]=10<sup>-2</sup> millimols per liter

Source: Redfield, 1934

# Western Atlantic



$$\Delta O_2 : \Delta N$$
$$6 : 1$$

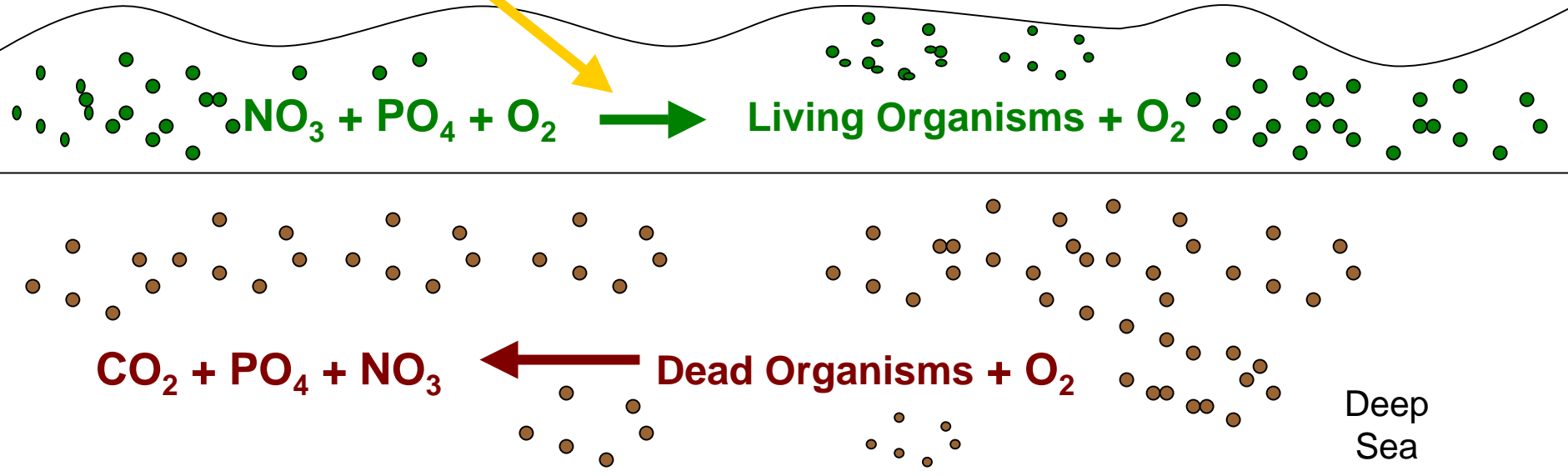
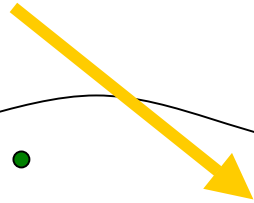
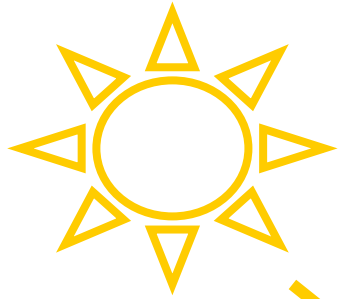
Units:

[NO<sub>3</sub>]=10<sup>-3</sup> millimols per liter

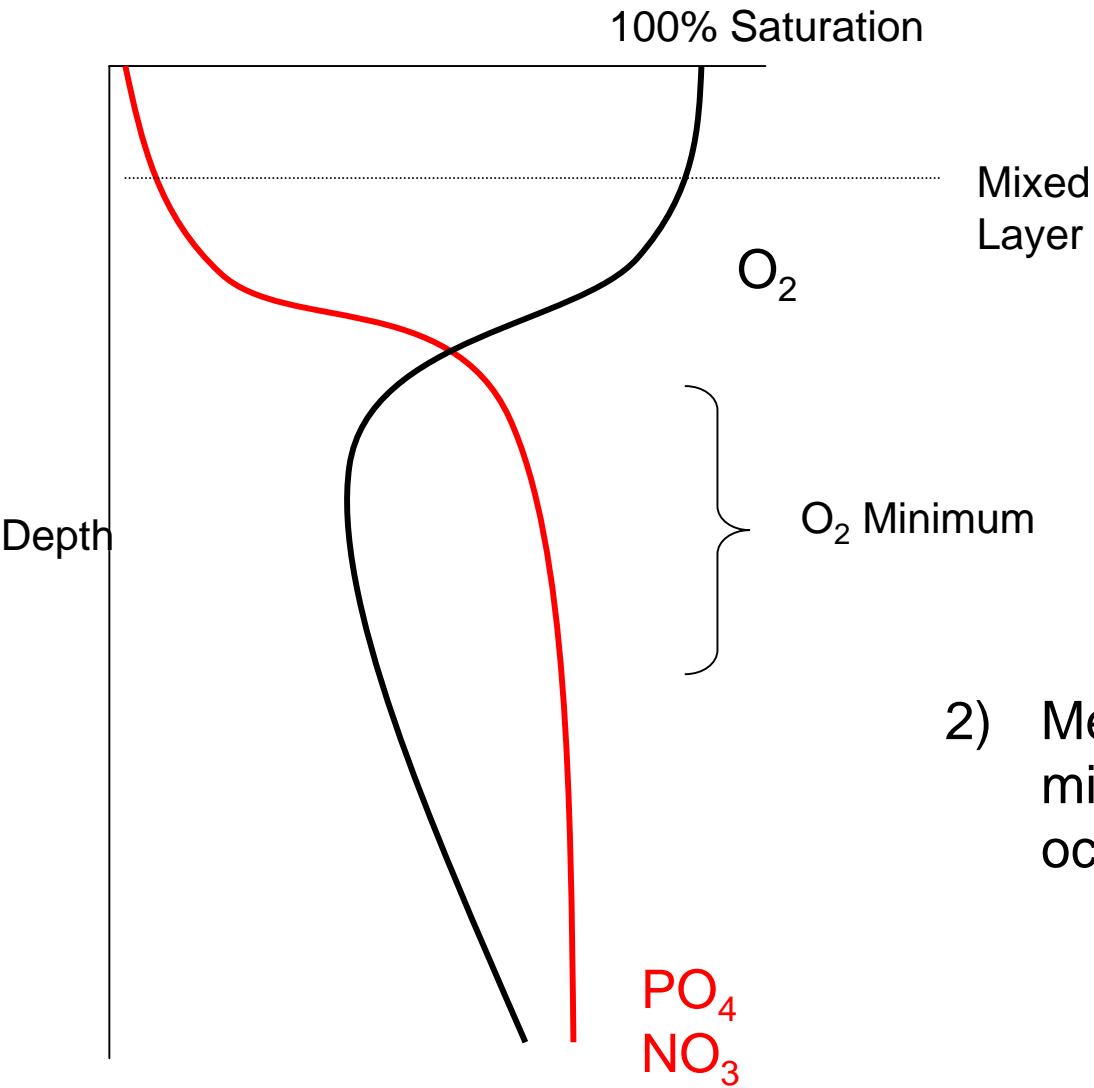
Source: Redfield, 1934

## REDFIELD HYPOTHESIZED:

The proportions of elements in the atmosphere and the sea are controlled by the biogeochemical cycle

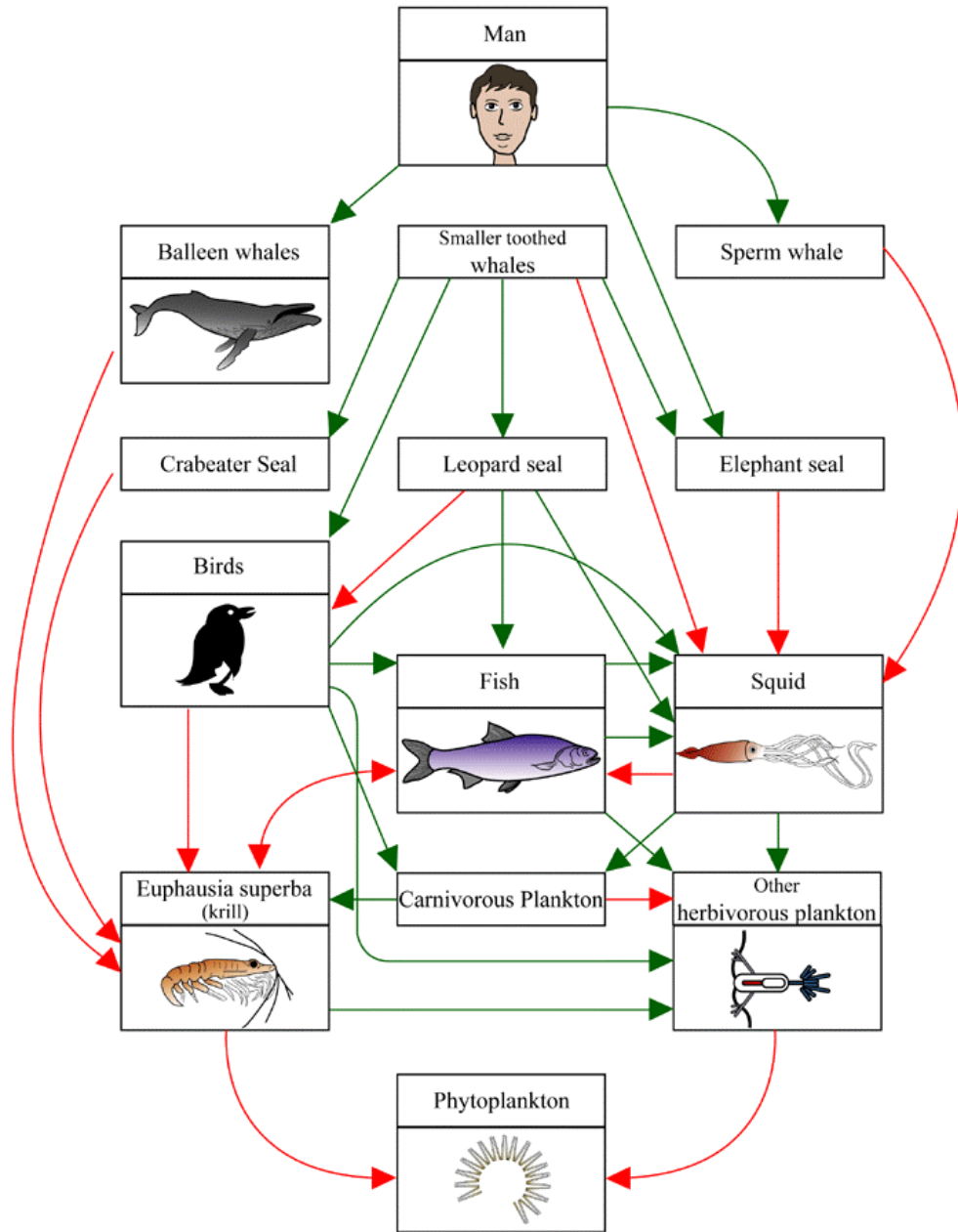


If the elemental composition of the deep ocean water is dictated by the composition of the plant material, the elements should vary in constant proportion from place to place.



1)  $\Delta O_2$  between surface and minimum is  $\approx$  the amount used to oxidize the organic compounds as they settle out of the euphotic zone

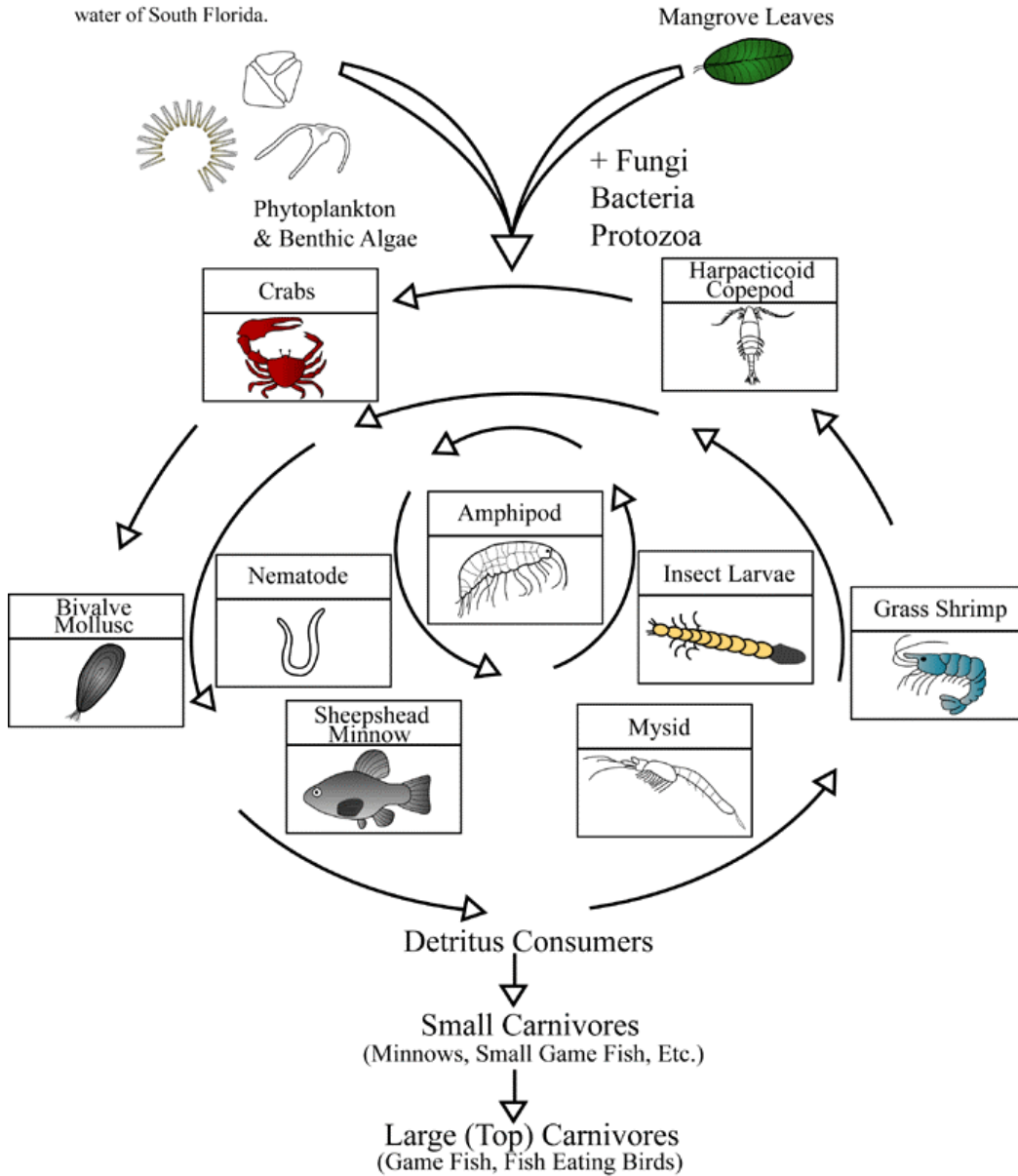
2) Measured N:P:C ratios in mid-ocean, surface and deep ocean at various times



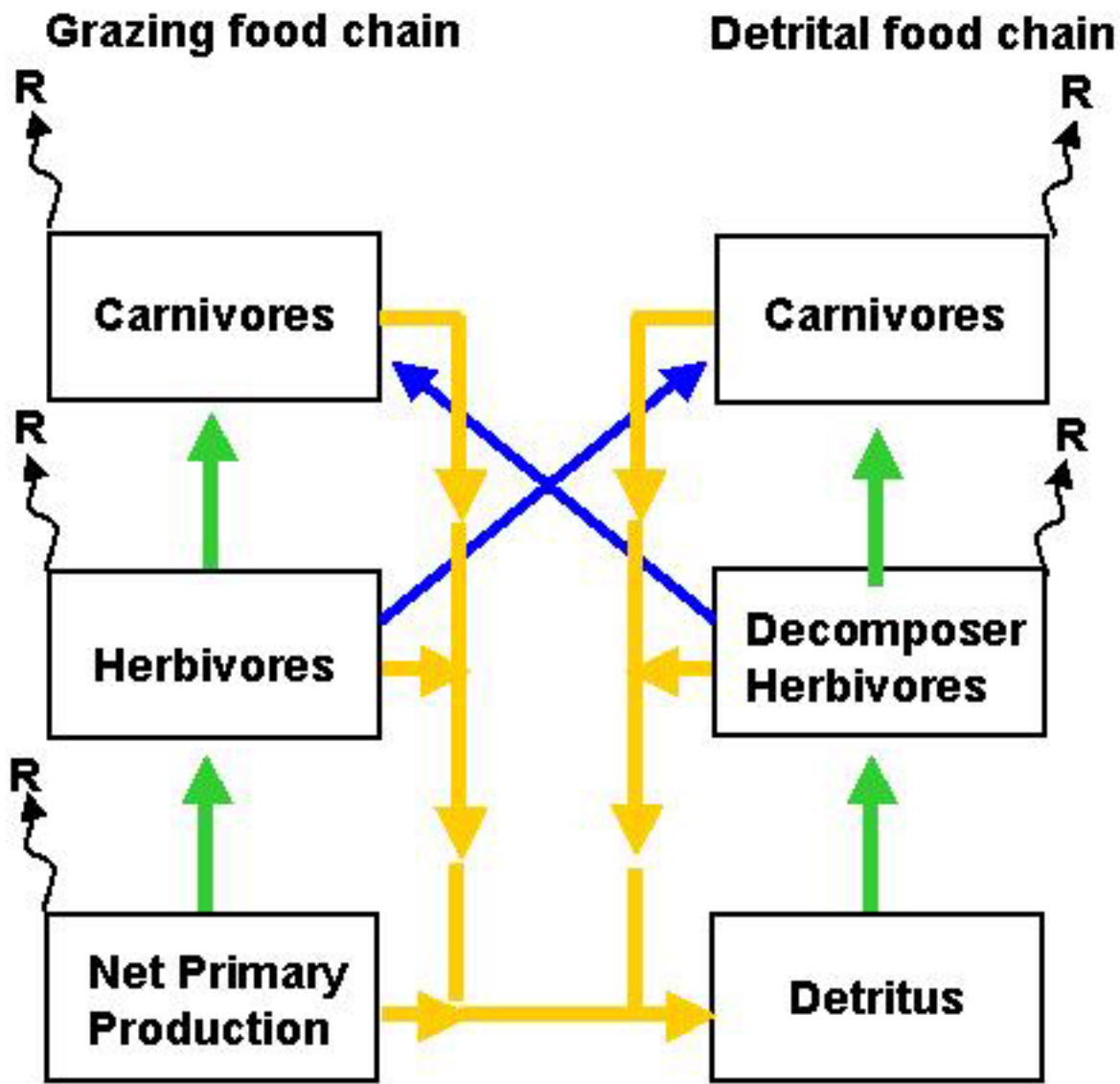
Adapted from  
Krebs Fig. 23.3

# Decomposer Food Web

Detritus food chain based on mangrove leaves which fall into shallow estuarine water of South Florida.



Adapted from: Odum (1972)



**Grazing and detrital food chains**  
**R = respiration**

From Smith  
 and Smith  
 2001

## Assimilation Efficiencies (A/I) for different types of organisms

	Herbivore	Carnivore	Microbivore	Saprotroph
Invertebrates	40%	80%	30%	20%
Vertebrates	50%	80%	--	--

*From Heal and Mac Lean, 1975*

The more similar you are to your food, the more efficient you are at assimilating it

Microbivore = an organism that feeds on microorganisms

Saprotroph = a fungus that feeds on detritus

# Production Efficiency of Various Animal Groups

(ranked in order of increasing efficiency)

<b>Group</b>	<b>P / A %</b>
1 Insectivores	0.86
2 Birds	1.29
3 Small Mammal Communities	1.51
4 Other Mammals	3.14
5 Fish and social insects	9.77
6 Non-insect invertebrates	25.0
7 Non-social insects	40.7
<i>Non-insect invertebrates</i>	
8 Herbivores	20.8
9 Carnivores	27.6
10 Detritivores	36.2
<i>Non-social insects</i>	
11 Herbivores	38.8
12 Detritivores	47.0
13 Carnivores	55.6