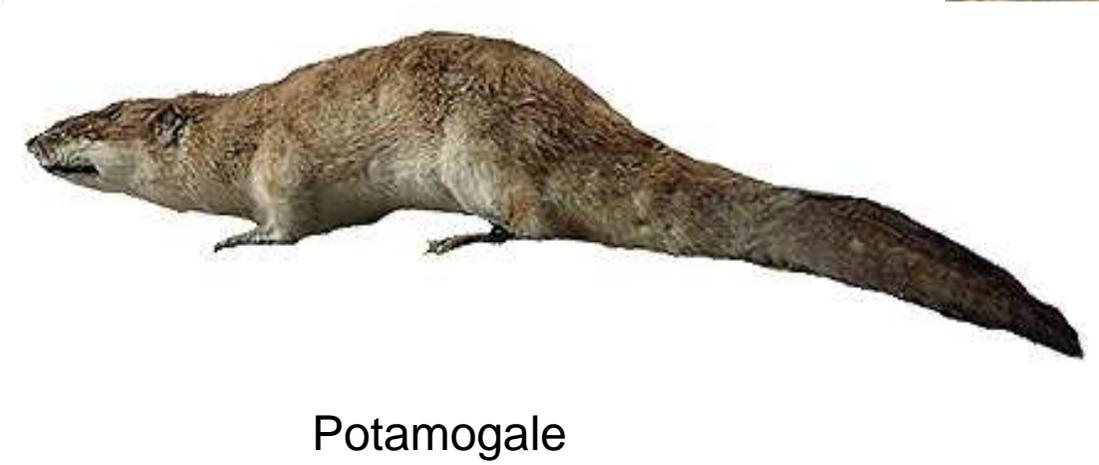




tenrec



*Limnogale mergulus*



Potamogale



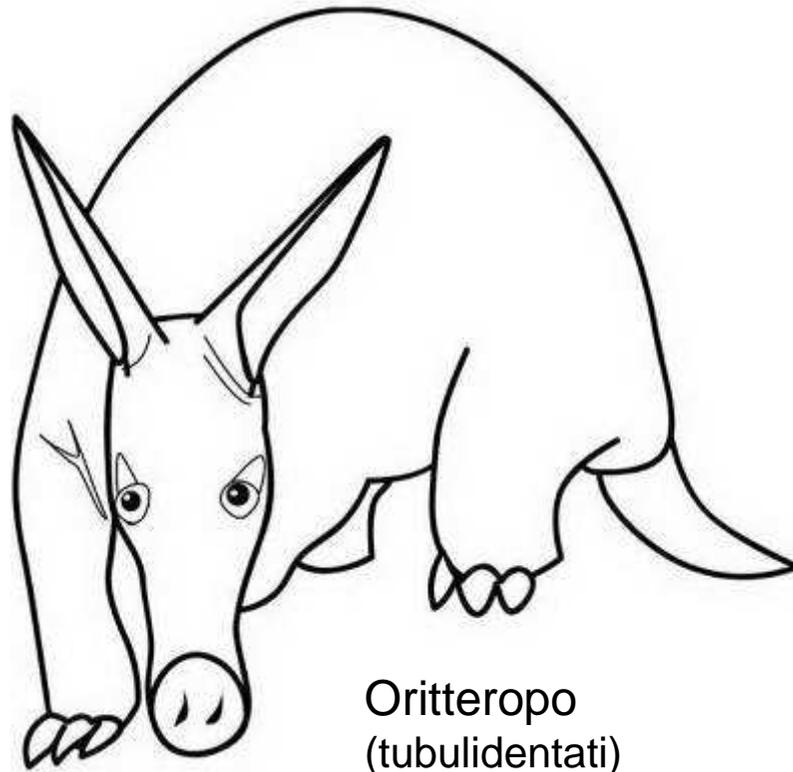
Macroscelidae



*Rhynchocyon*



**Chrysochloridae**



Oritteropo  
(tubulidentati)



Hyracoidea



lamantino



Dugong dugon

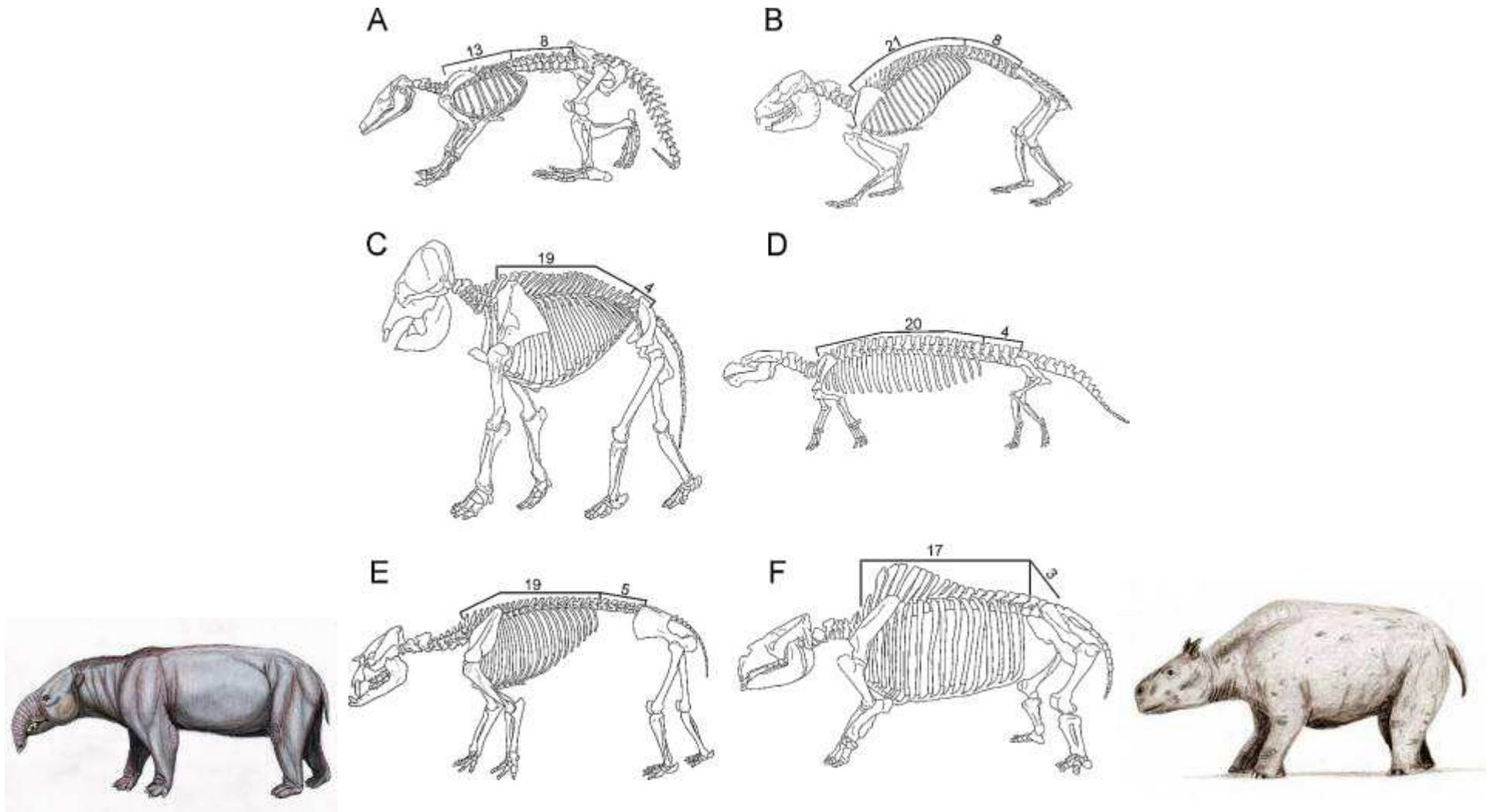
**SIRENIA**

- Amazonian Manatee *Trichechus inunguis*
- West Indian Manatee *Trichechus manatus*
- West African Manatee *Trichechus senegalensis*
- Dugong *Dugong dugon*
- Steller's Sea Cow *Hydrodamalis gigas*

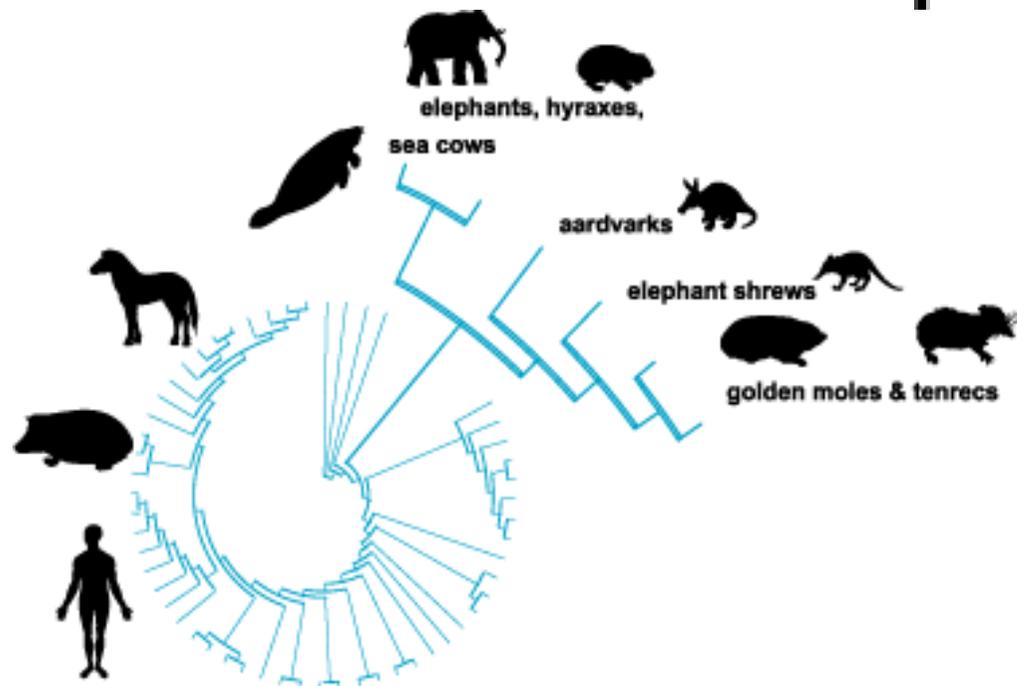
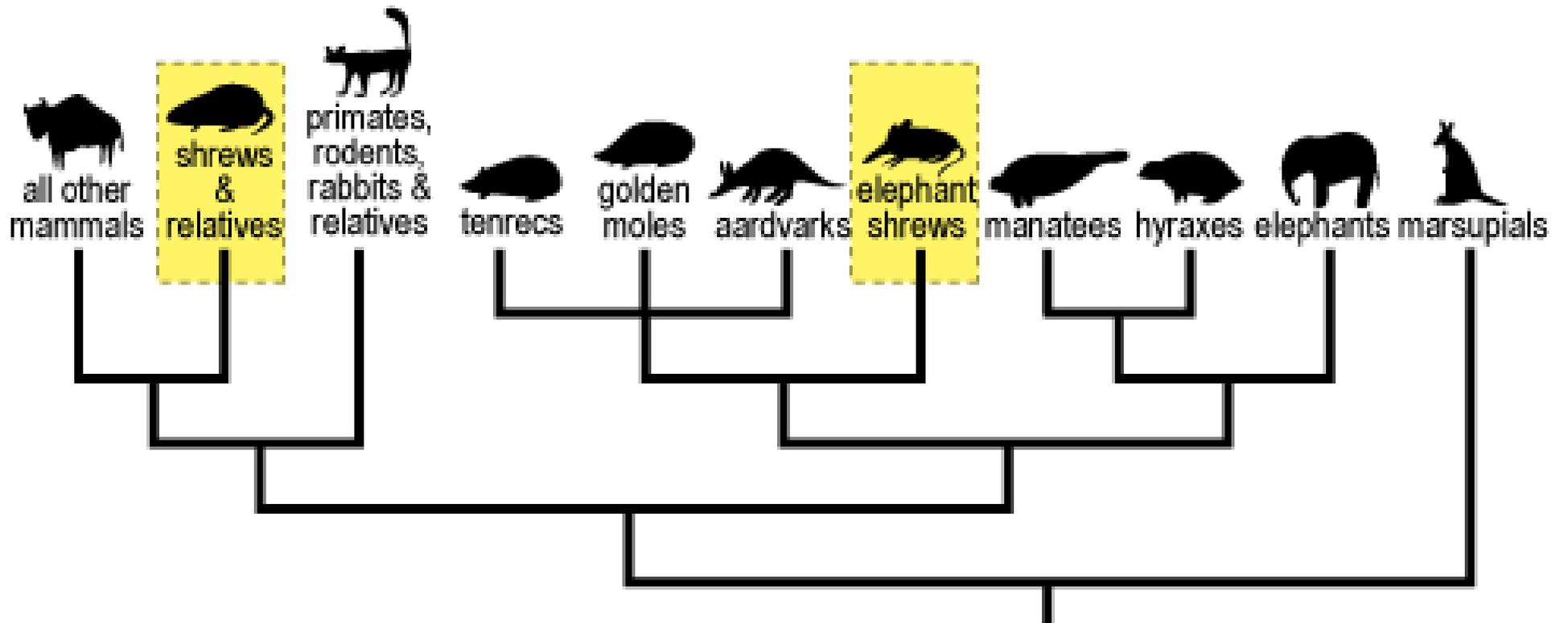
©Pieter Arend Folkens

National Marine Educator's Association 1989 Conference Miami, Florida

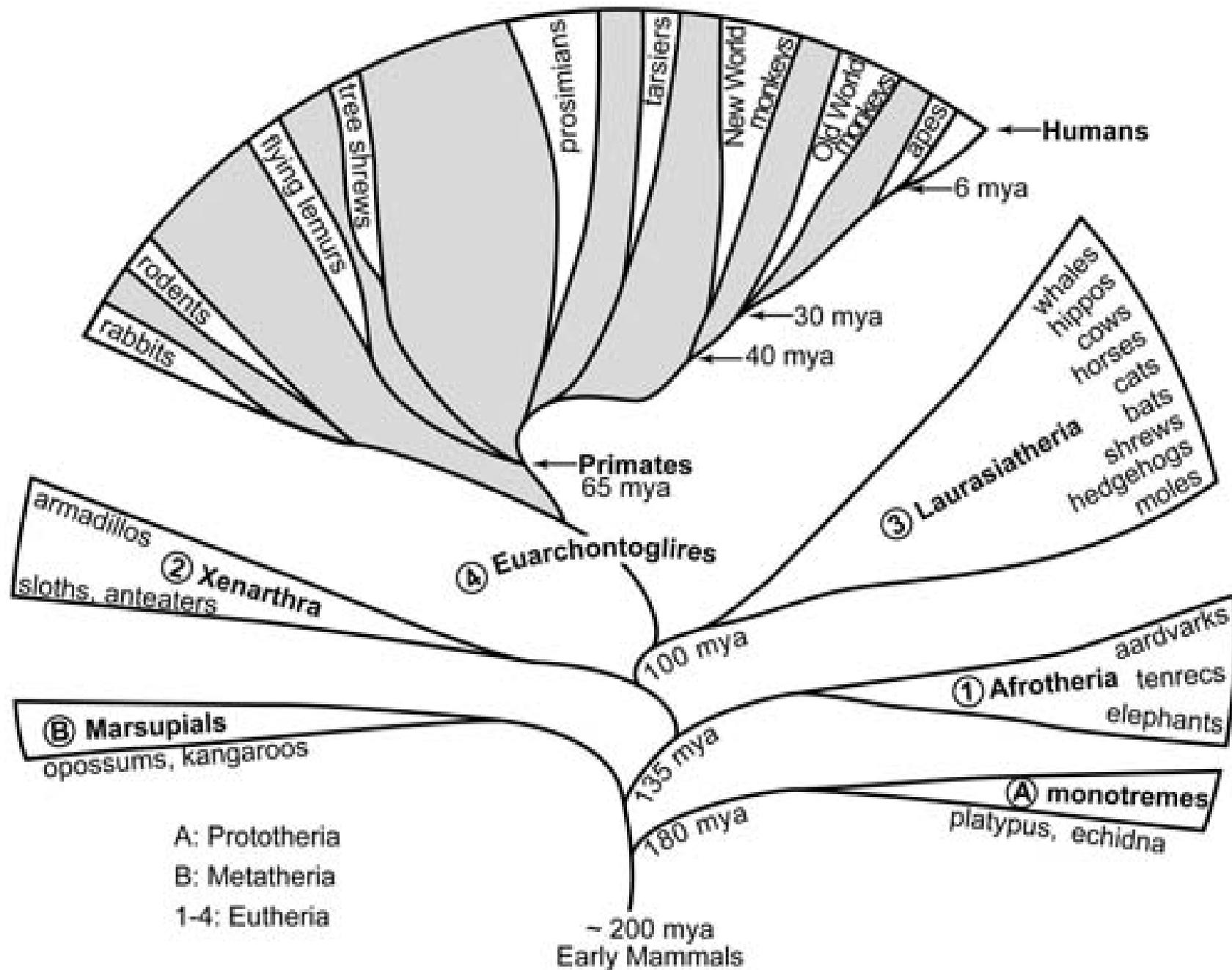


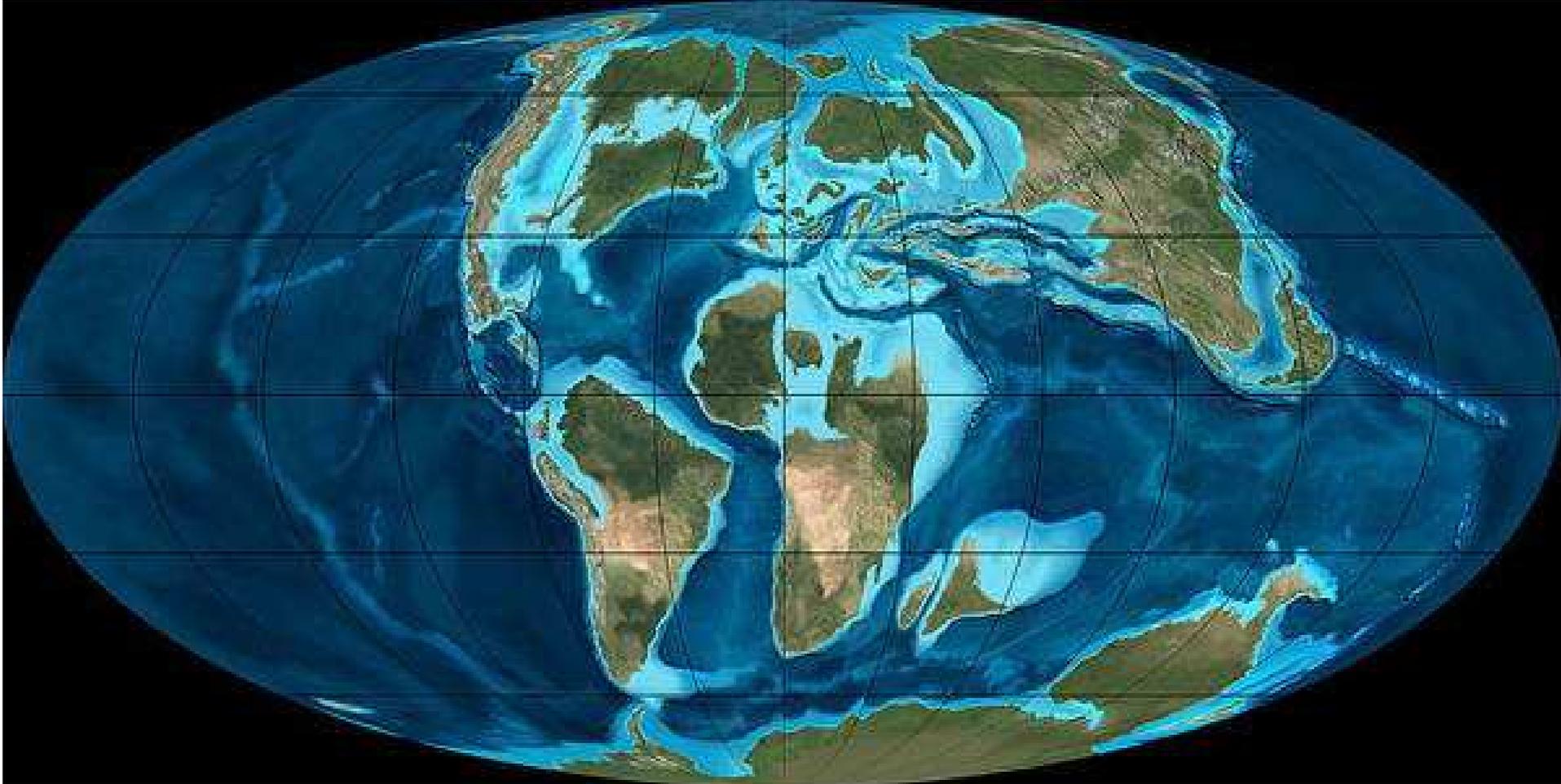


Skeletal reconstructions of selected Afrotherian mammals showing TLV. A, *Orycteropus afer* (Tubulidentata) (MACN-Ma 13.99); B, *Procavia capensis* (Hyracoidea) (MACN-Ma 22.36); C, *Elephas maximus* (Proboscidea) (MACN-Ma 43.49); D, *Pezosiren portelli* (Sirenia) (modified from [Domning, 2001](#)); E, *Astrapotherium magnum* (Astrapotheria) (modified from [Riggs, 1932](#)); F, *Toxodon platensis*

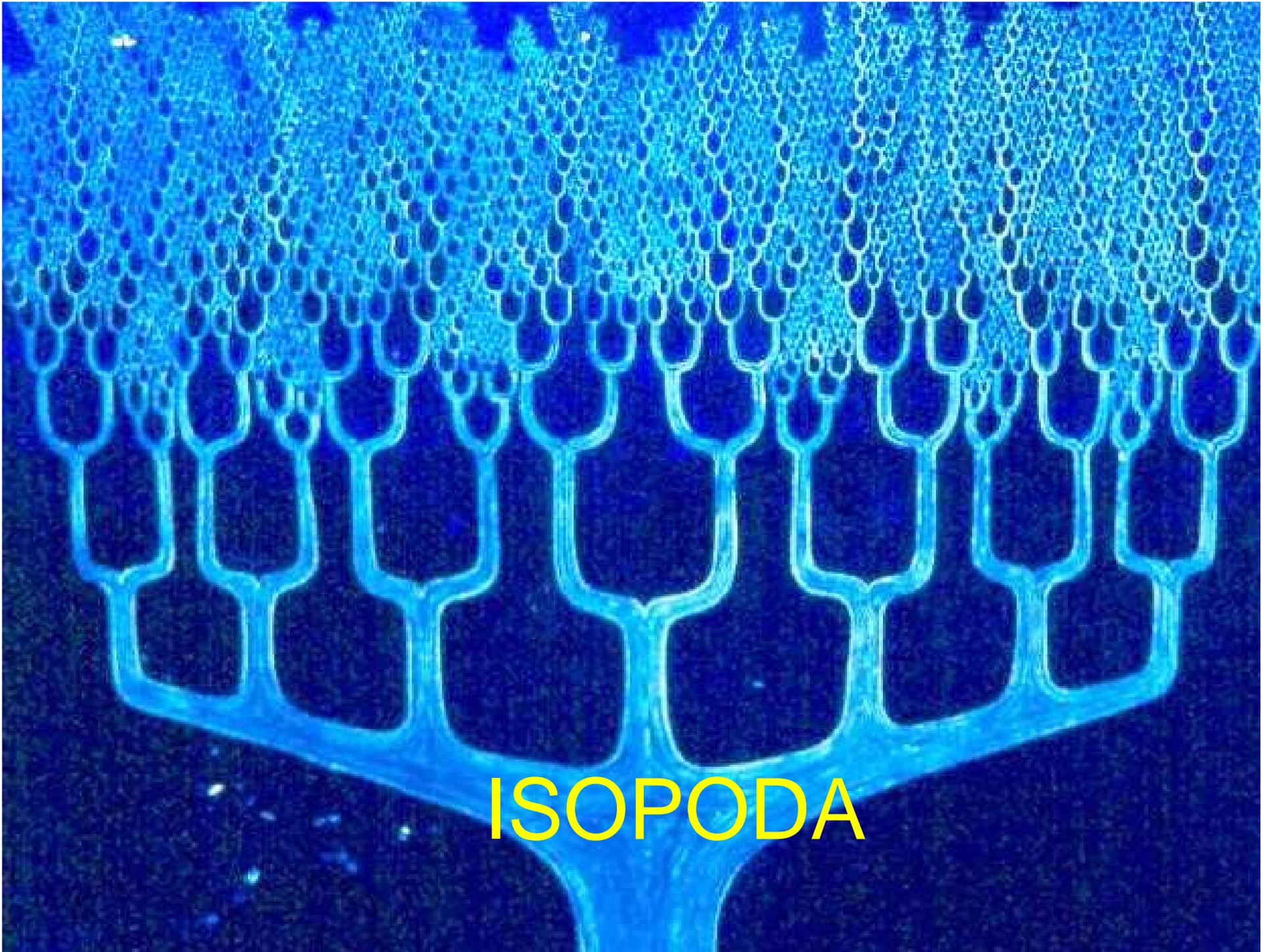


# Phylogeny of Living Mammals





**Late Cretaceous palaeomap - Image: Wikipedia**



**ISOPODA**

# MALACOSTRACI - Isopodi



# Phylum ARTROPODI

## Subphylum CROSTACEI

Classi: Remipedi

**Malacostraci**

Ordini: Decapodi

Stomatopodi

**Isopodi**

Anfipodi

Branchiopodi

Ordini: Anostraci

Notostraci

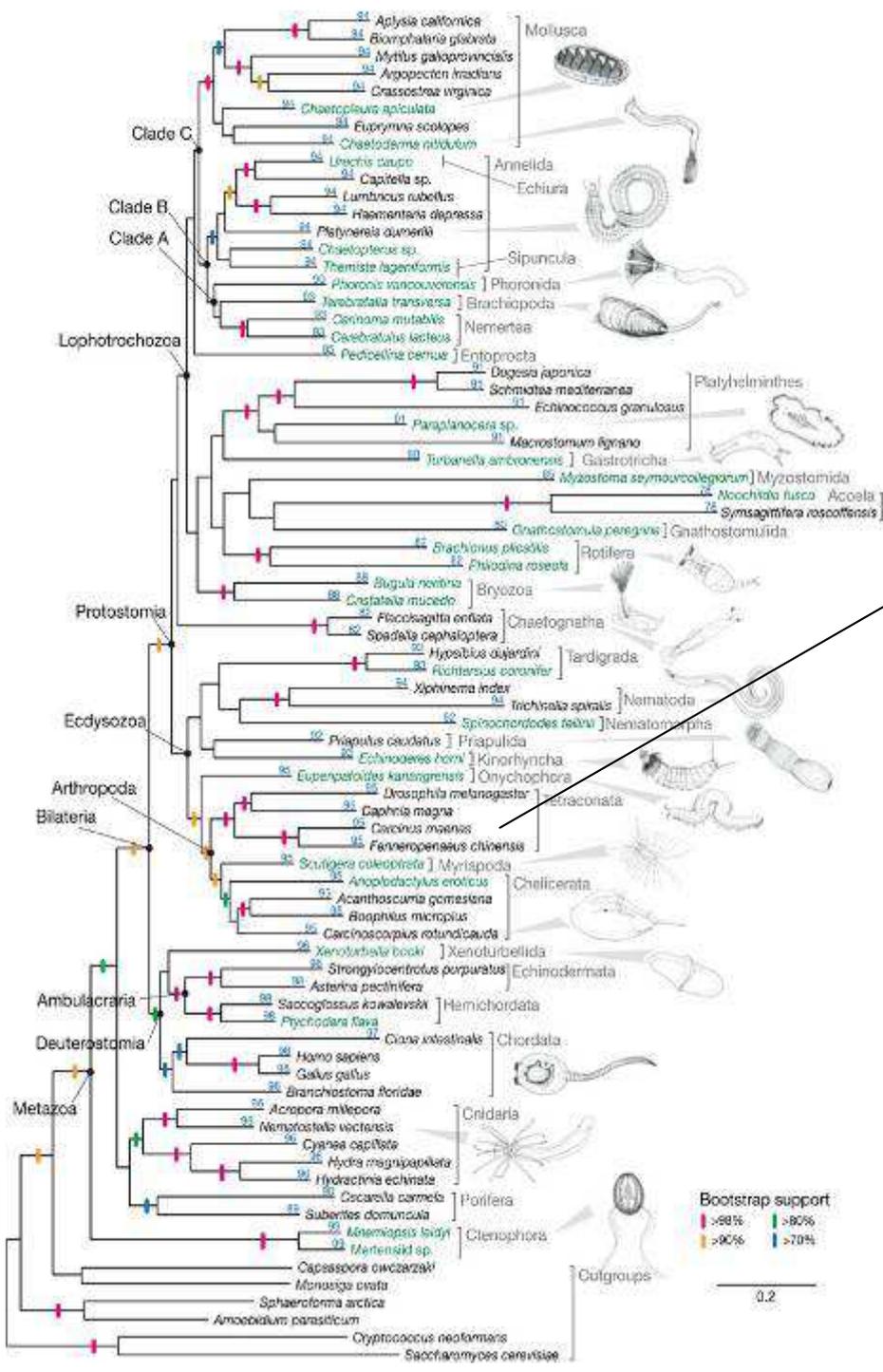
Cladoceri

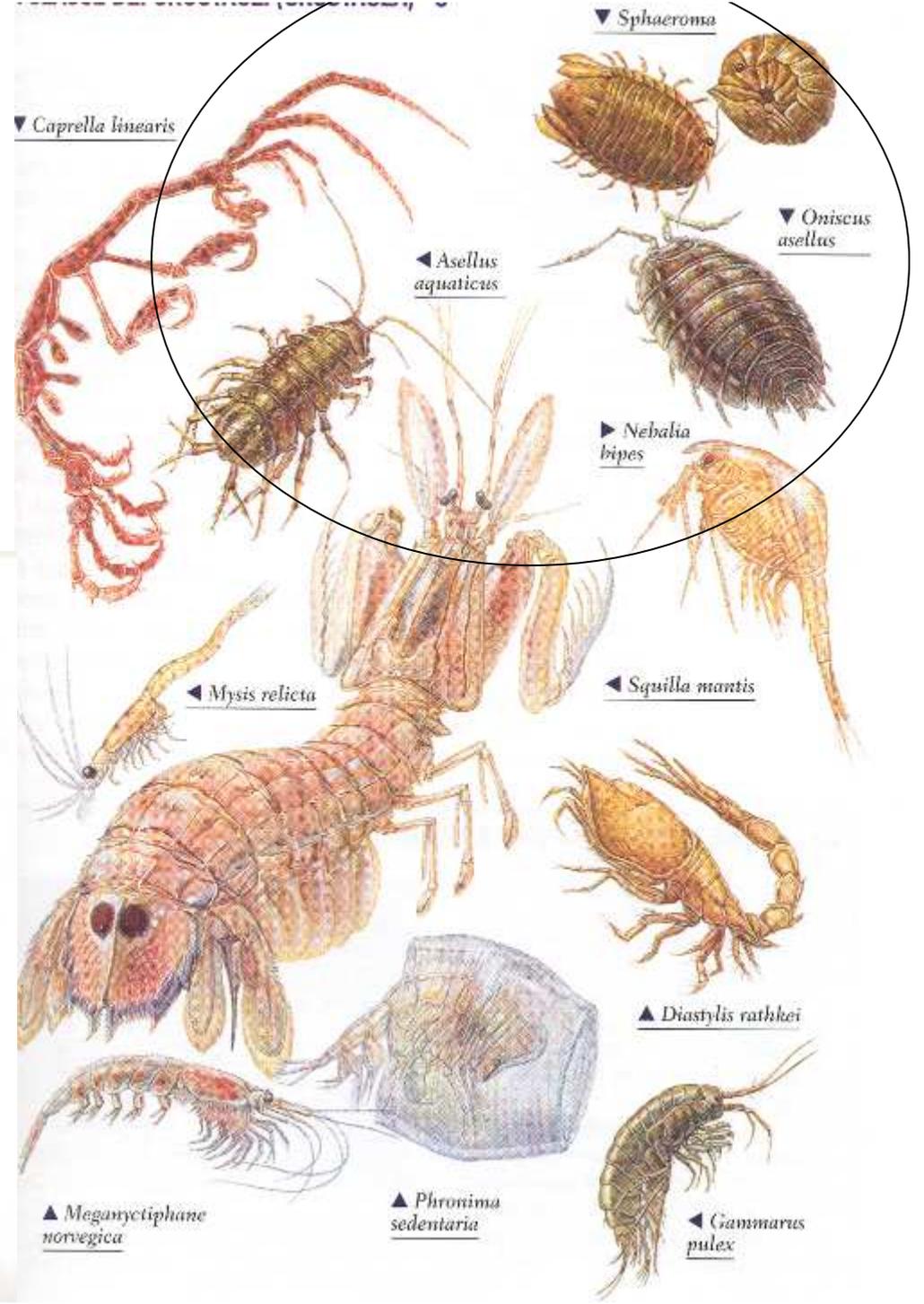
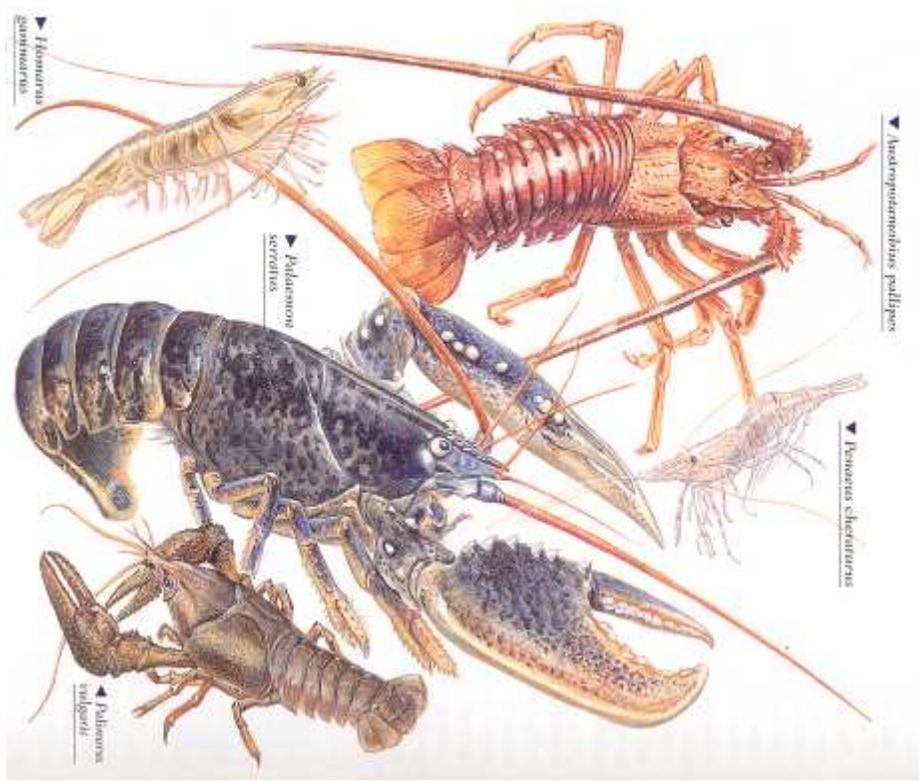
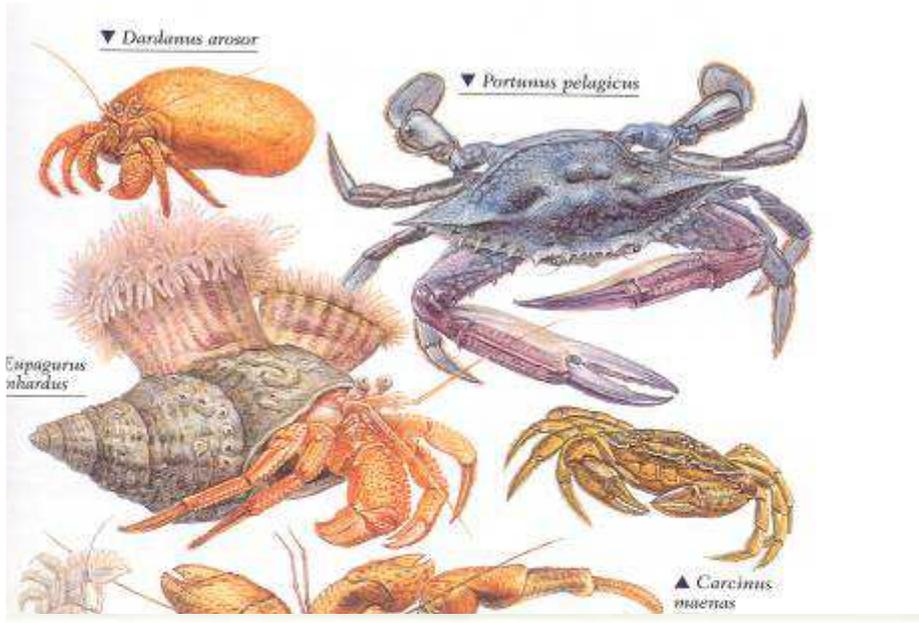
Copepodi

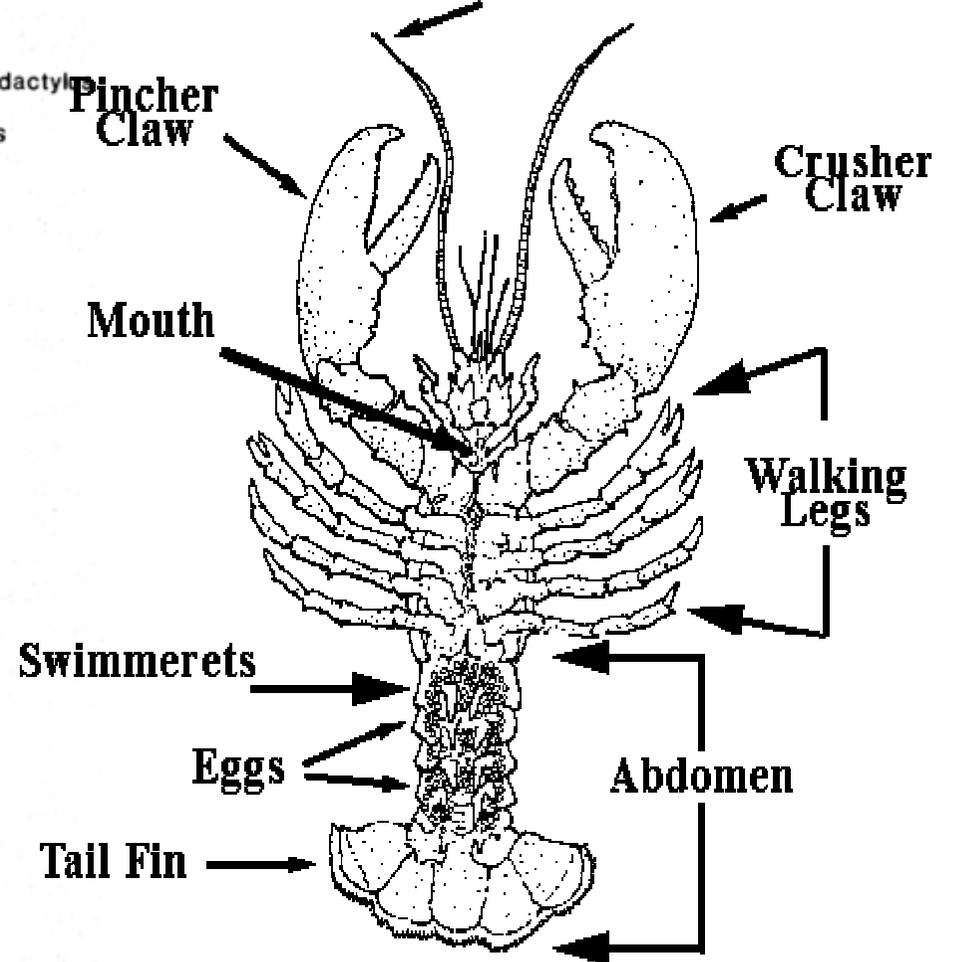
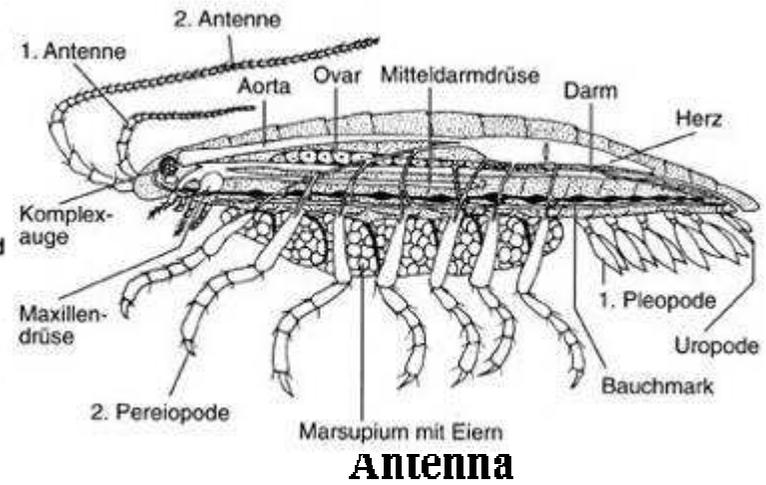
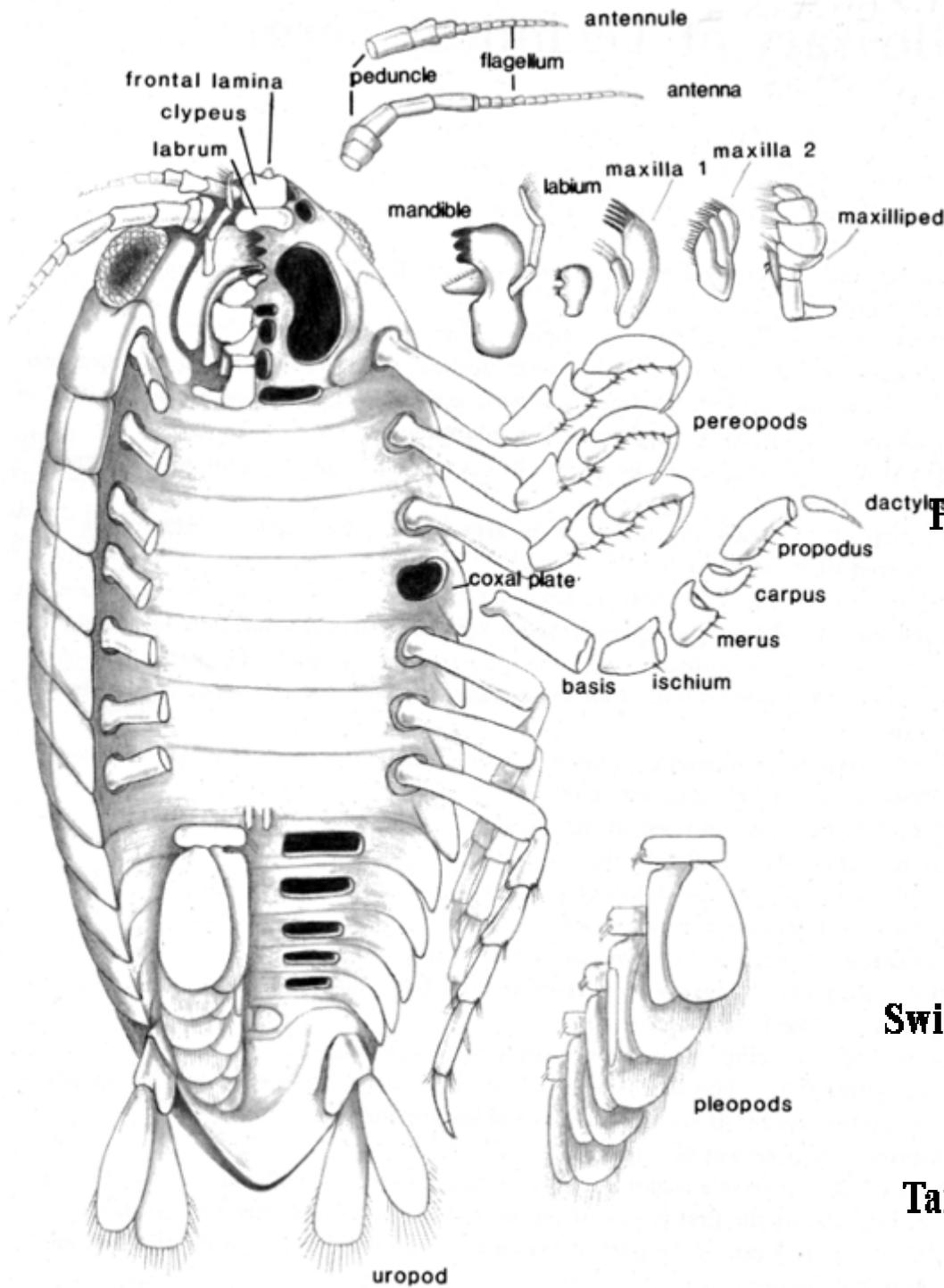
Ostracodi

Branchiuri

Cirripedi

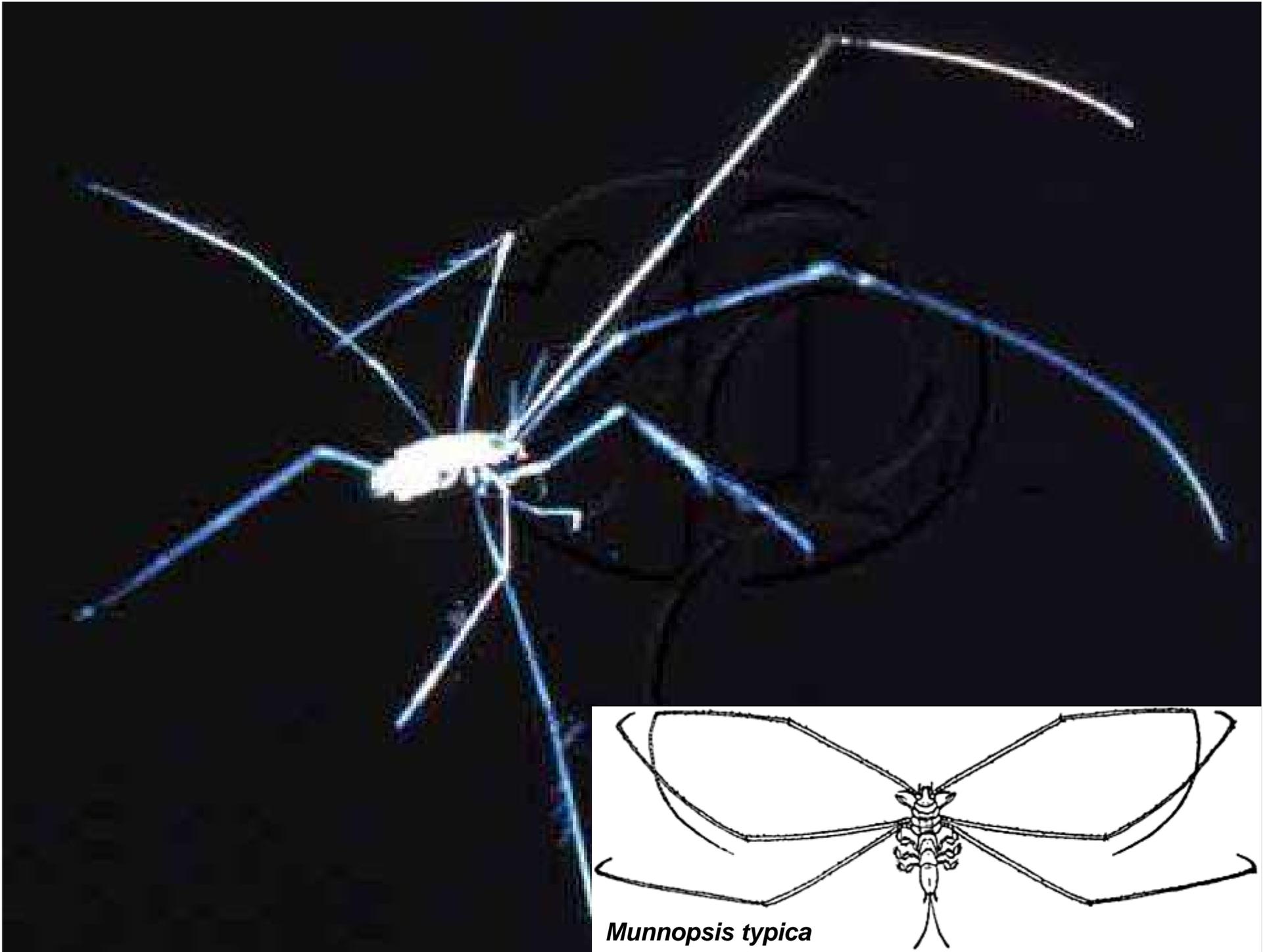




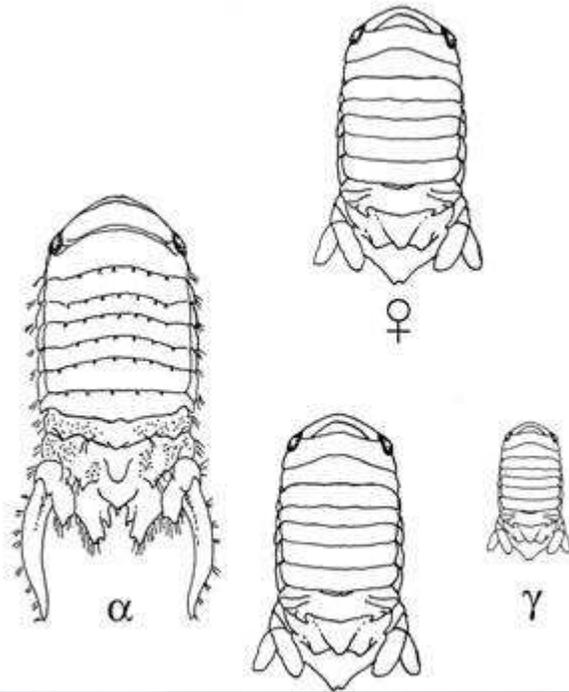








*Munnopsis typica*



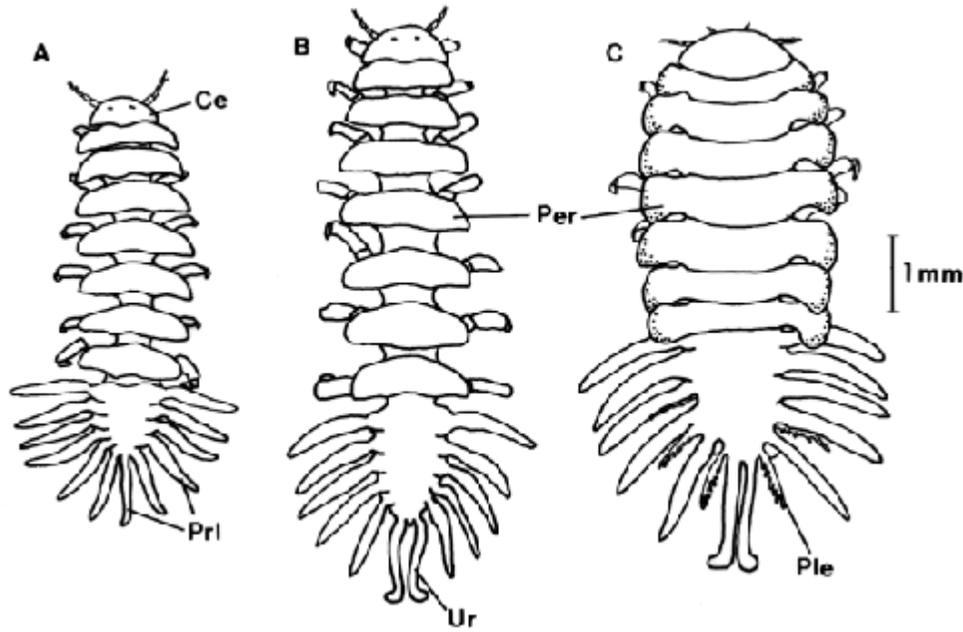
## Sphaeromatidae



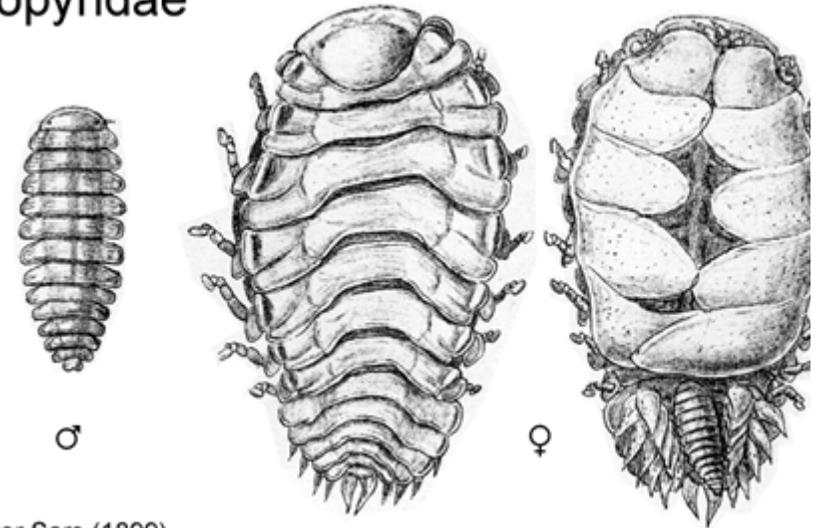
Photo: R. T. Springthorpe © Australian Museum







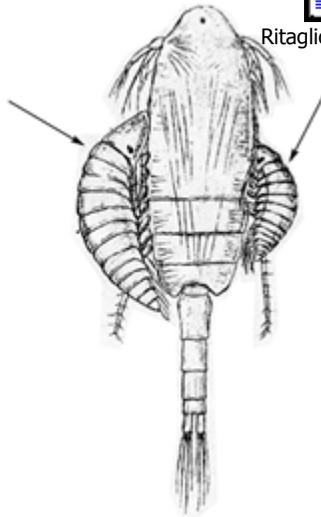
**Bopyridae**



After Sars (1899)

**Bopyridae**

**Microniscus (larval stage)**



Ritaglio (2).shs

After Sars (1899)

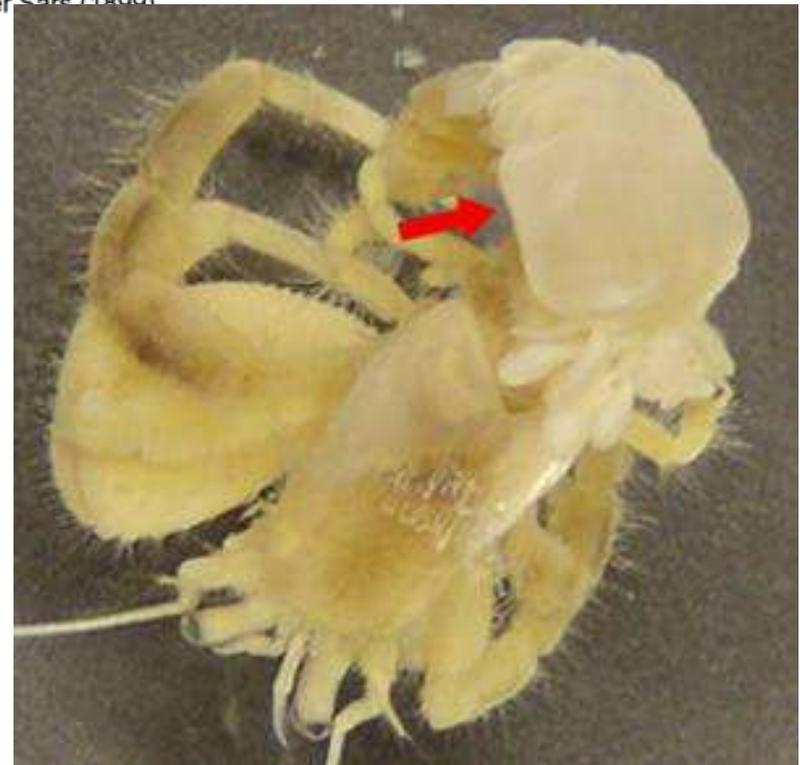
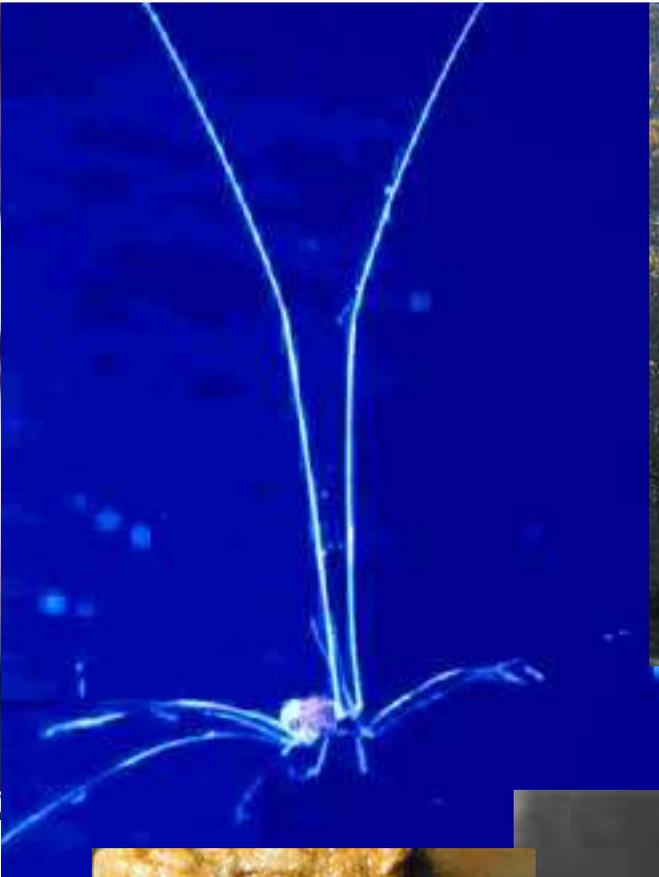




Image © D. & L. Atki



Harriet Richardson





©2007 IGOR SIWANOWICZ











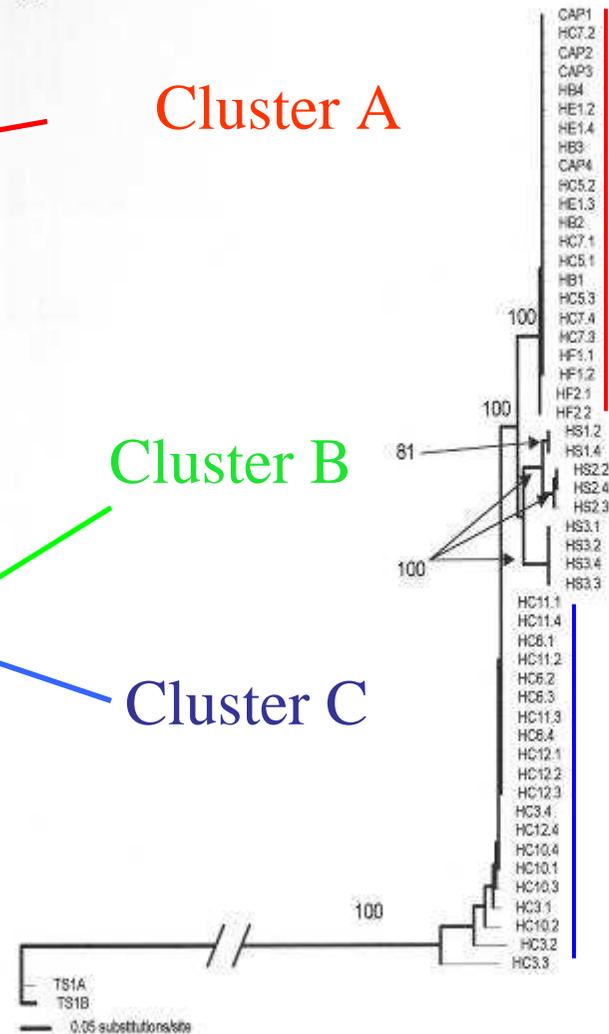


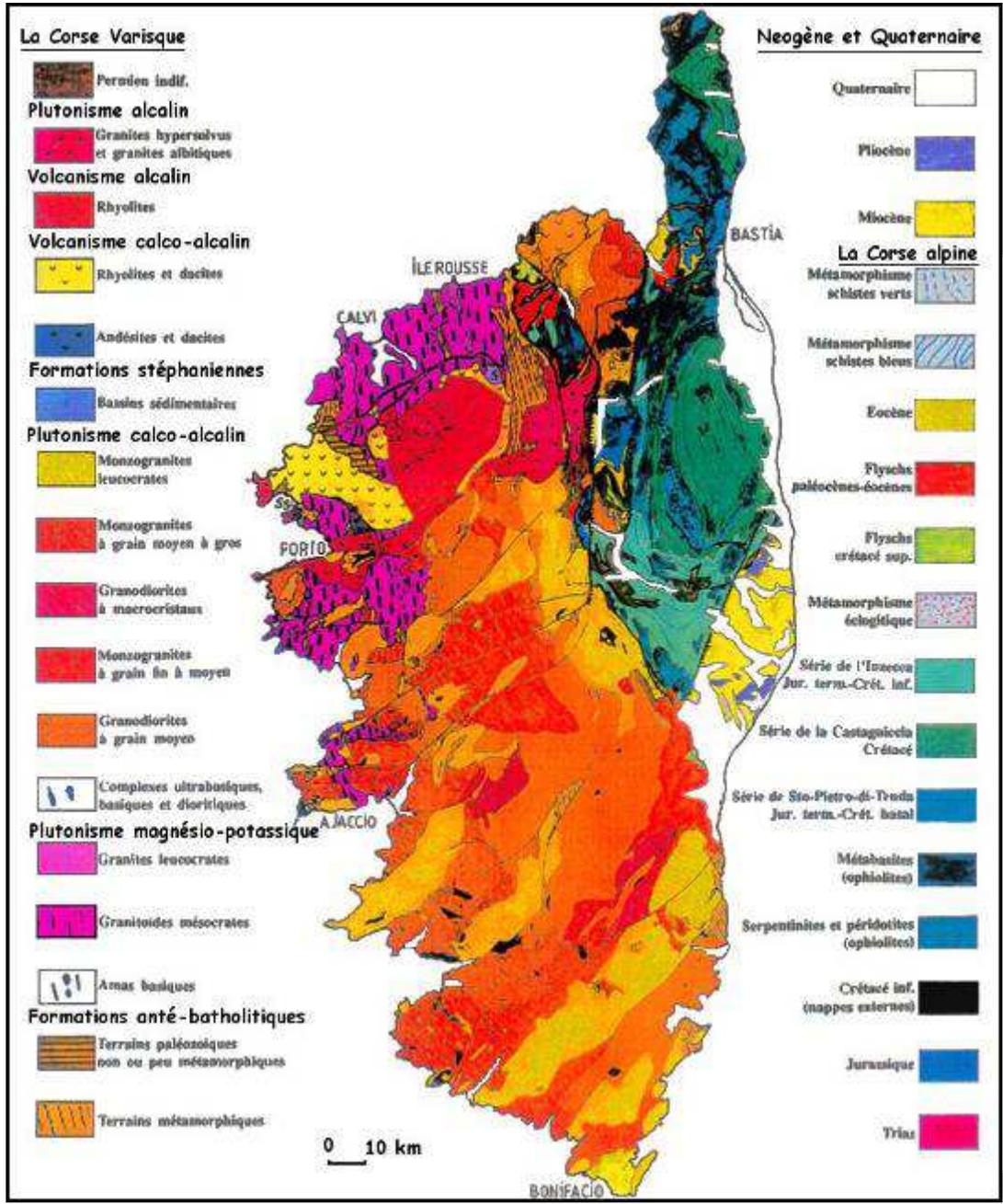
NU

Cluster A

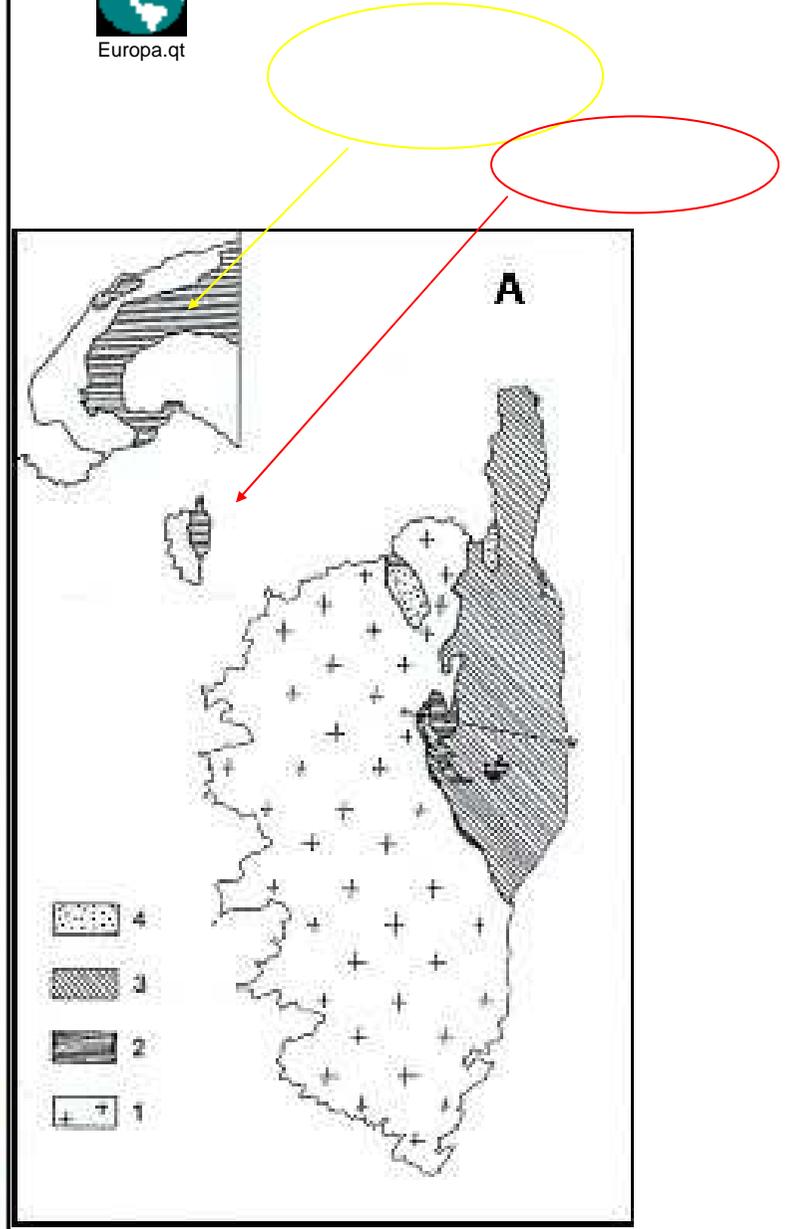
Cluster B

Cluster C



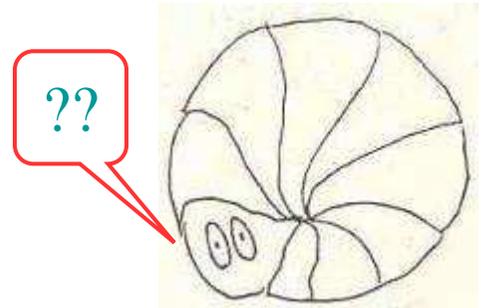


Europa.qt



Who is Hellaeria? Where did it origin?  
Who are its parents?

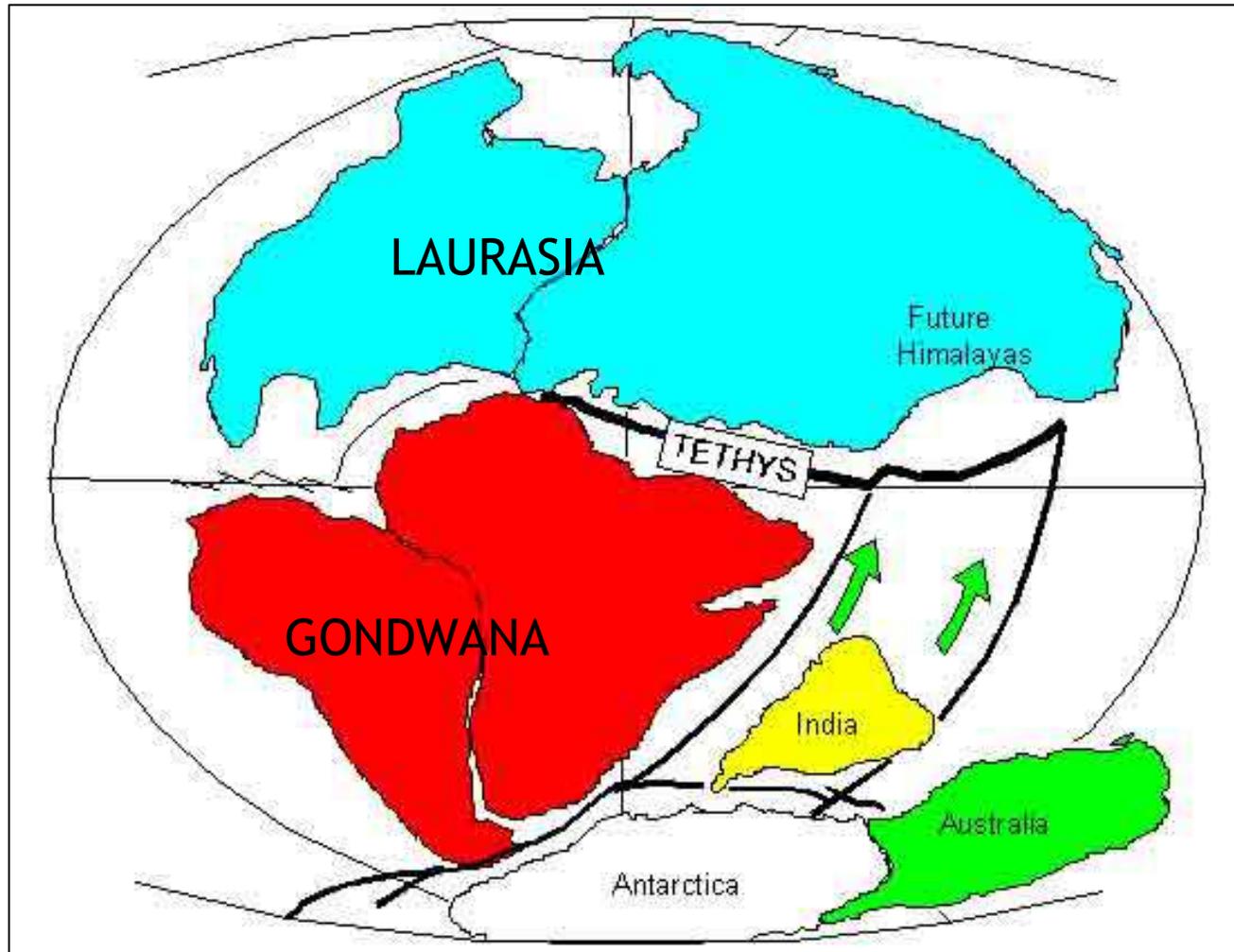
Did it origin from the sea?





# PALEOGEOGRAFIA DEL MEDITERRANEO

FRATTURAZIONE PANGEA (fine era Paleozoica, 200 Ma):  
tra i due super-continenti Gondwana e Laurasia si estende la TETIDE







19. Avendo adunque il Signore Dio formati dalla terra tutti gli animali terrestri e tutti gli uccelli dell'aria, li condusse ad Adamo, perchè ei vedesse il nome da darsi ad essi; e ognun de' nomi che diede Adamo agli animali viventi è il vero nome di essi <sup>8</sup>.





People often come to me with some strange animal they have found.

"What is it?" they ask.

Frequently I can't say—sometimes I get a despairing feeling of never knowing the answers to questions people ask. But at least I knew where to look it up; or I know someone who is an expert on that kind of animal, so I can relay the question to him. And once in a while I know the answer.

"Oh," I say brightly, "that is a swallowtail butterfly, *Papilio cresphontes*."

It is curious how happy people are to have a name for something, for an animal or plant, even though they know nothing about it beyond the name. I wonder

#### 4 : THE STUDY OF LIFE

whether there isn't some lingering element of word magic here, some feeling that knowing the name gives you power over the thing named—the sort of feeling that leads members of some savage tribes to conceal their personal names from all except their intimates. An enemy, learning their name, might be able to use this power for some evil purpose.

But other questions follow, "Where does it live?" and "What does it do?"

I explain that it is a tropical butterfly, common in Florida, which sometimes gets quite far north in the United States. The caterpillar lives on plants of the orange family, and north of Florida the butterfly is usually associated with prickly ash, which is a relative of the orange.

Almost inevitably there will come another question, "What good is it?"

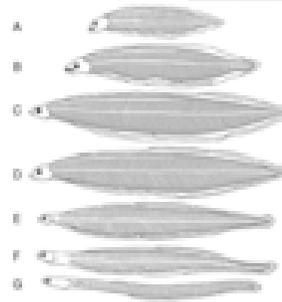
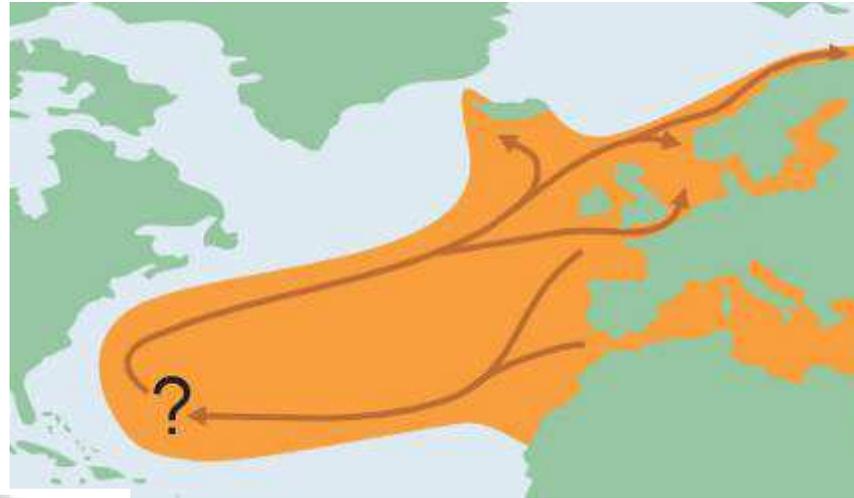
I have never learned how to deal with this question. I am left appalled by the point of view that makes it possible. I don't know where to start explaining the world of nature that the biologist sees, in which "What good is it?" becomes meaningless. The question is left over from the Middle Ages; from a small, cozy universe in which everything had a purpose in relation to man. The question comes down from the days before Copernicus' theories removed the earth from the center of the solar system, before Newton provided a mechanism for the movements of the stars, before Hutton discovered the immensity of past time, before Darwin's ideas put man into perspective with the rest of the living world.

Faced with astronomical space and geological time, faced with the immense diversity of living forms, how can one ask of one particular kind of butterfly, "What good is it?"

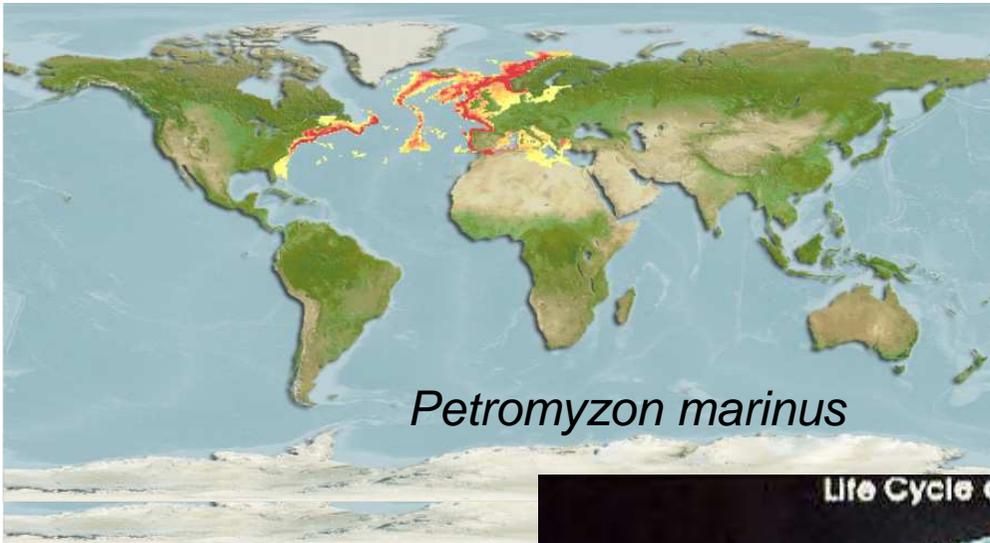
Often my reaction is to ask in turn, "What good are you?"

# Eugenio Montale, *L'anguilla*

L'anguilla, la sirena  
dei mari freddi che lascia il Baltico  
per giungere ai nostri mari,  
ai nostri estuari, ai fiumi  
che risale in profondo, sotto la piena avversa,  
di ramo in ramo e poi  
di capello in capello, assottigliati,  
sempre più addentro, sempre più nel cuore  
del macigno, filtrando  
tra gorielli di melma finché un giorno  
una luce scoccata dai castagni  
ne accende il guizzo in pozze d'acquamorta,  
nei fossi che declinano  
dai balzi d'Appennino alla Romagna;  
l'anguilla, torcia, frusta,  
freccia d'Amore in terra  
che solo i nostri botri o i disseccati  
ruscelli pirenaici riconducono  
a paradisi di fecondazione;  
l'anima verde che cerca  
vita là dove solo  
morde l'arsura e la desolazione,  
la scintilla che dice  
tutto comincia quando tutto pare  
incarbonirsi, bronco seppellito;  
l'iride breve, gemella  
di quella che incastonano i tuoi cigli  
e fai brillare intatta in mezzo ai figli  
dell'uomo, immersi nel tuo fango, puoi tu  
non crederla sorella?



catadromo

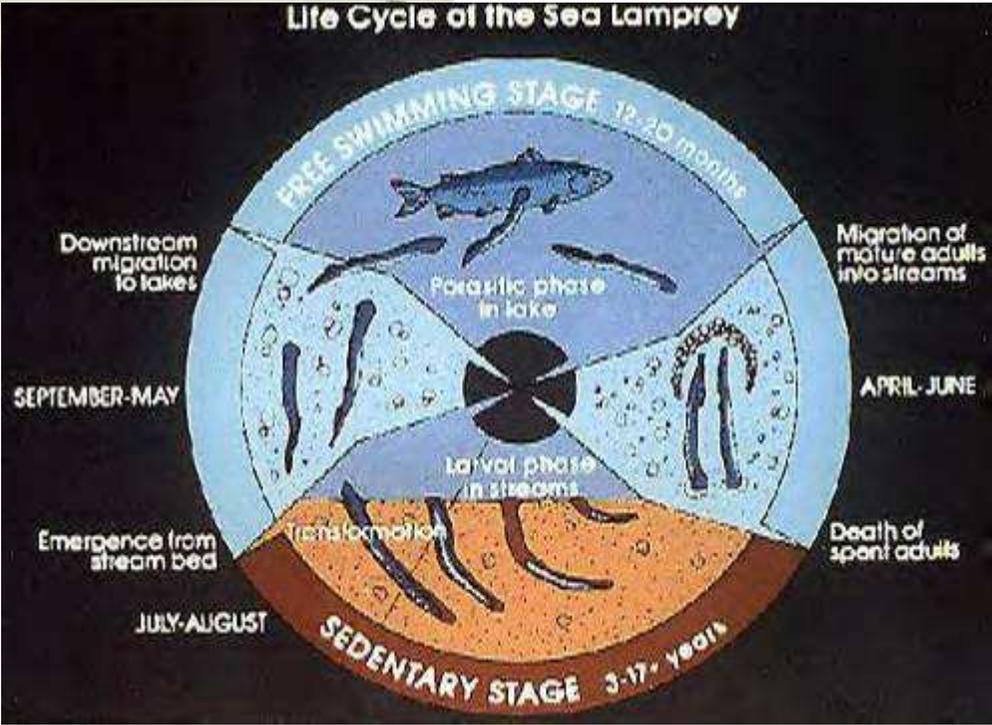


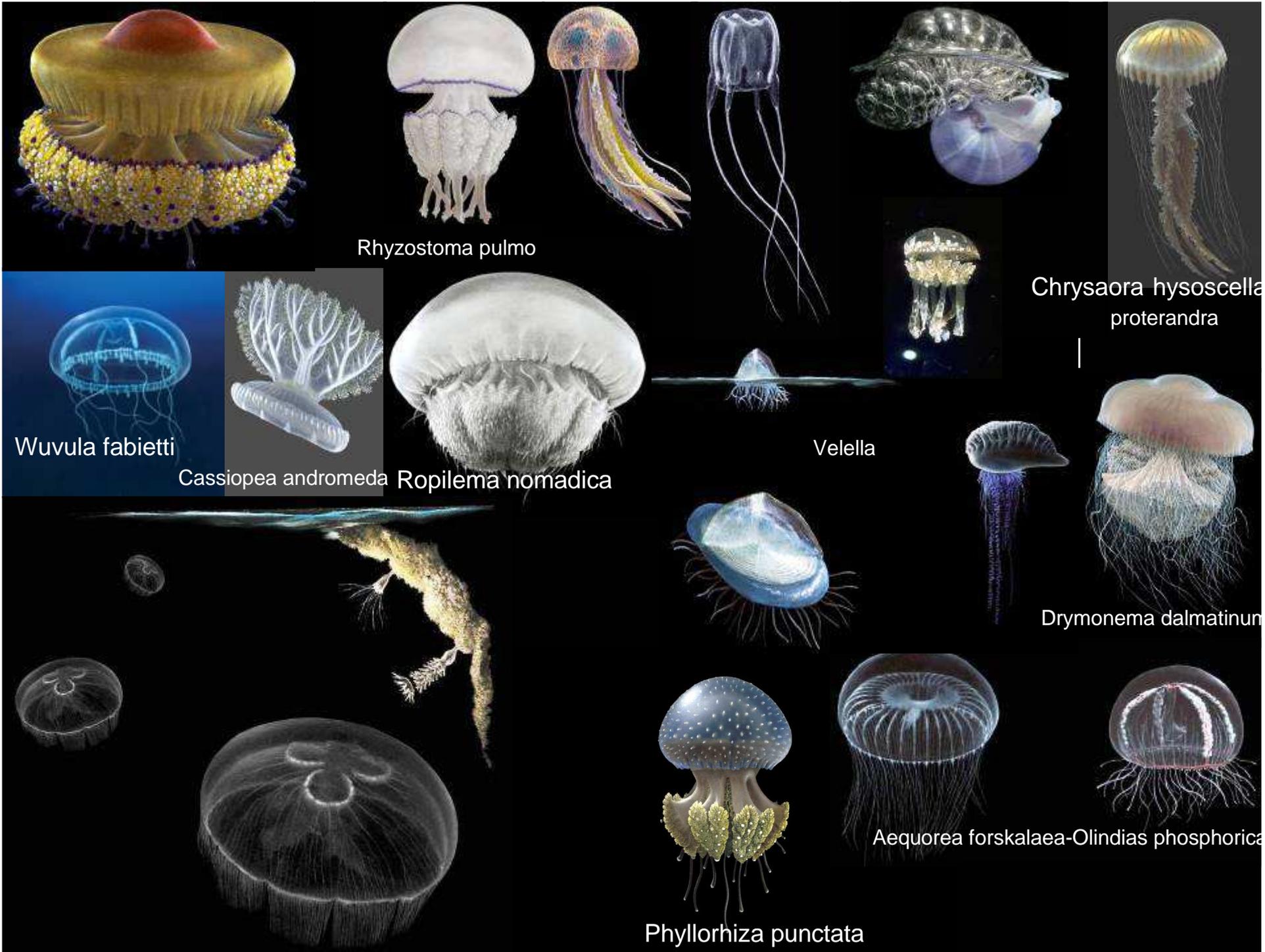
*Petromyzon marinus*



lampreda

anadromo





*Rhyzostoma pulmo*

*Chrysaora hysoscella proterandra*

*Wuvula fabietti*

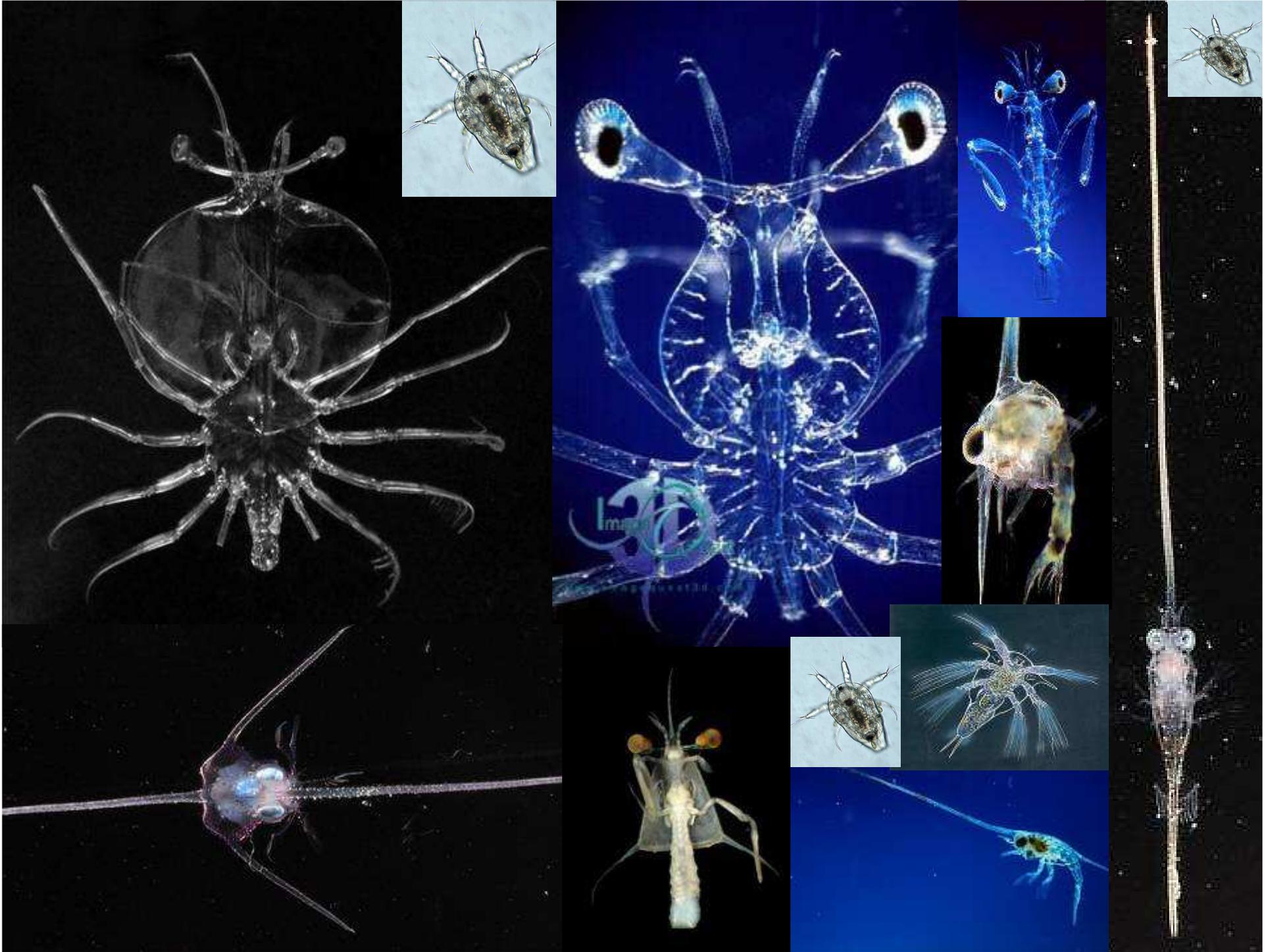
*Cassiopea andromeda* *Ropilema nomadica*

*Verella*

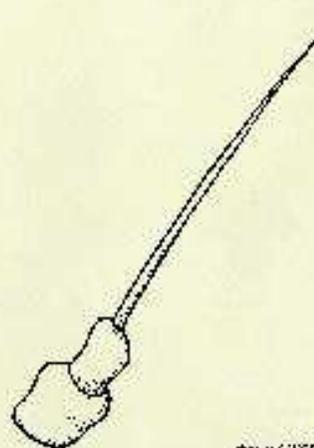
*Drymonema dalmatinum*

*Aequorea forskalaea-Olindias phosphorica*

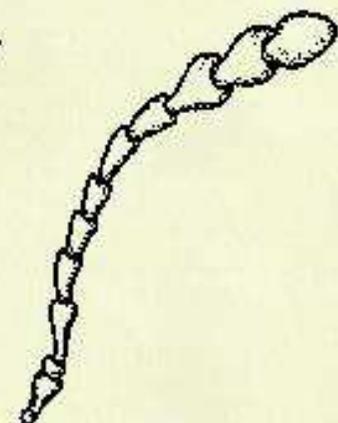
*Phyllorhiza punctata*



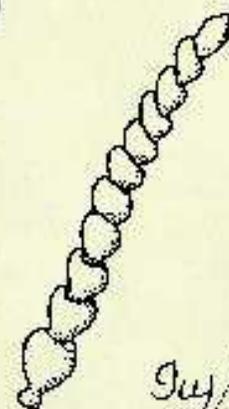
## CAPO - antenne



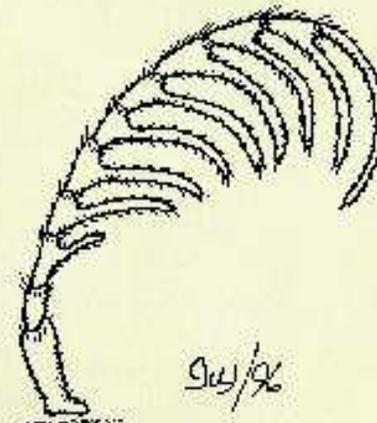
setosa



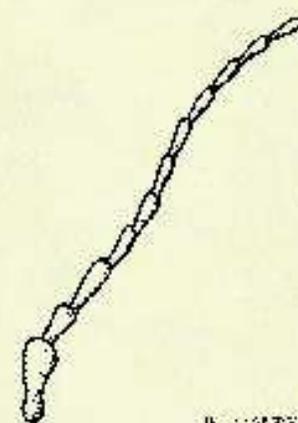
clavata



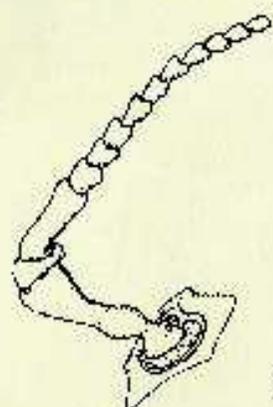
moniliforme



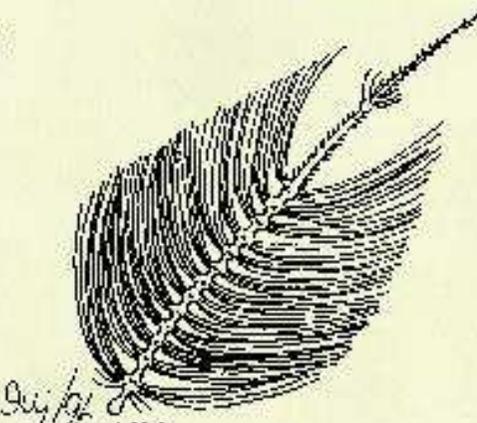
pettinata



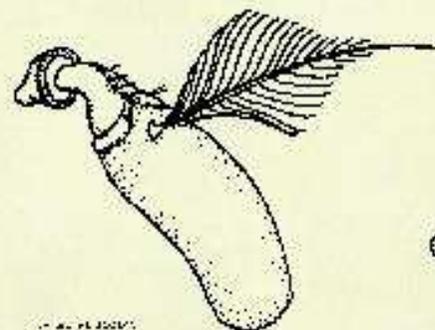
filiforme



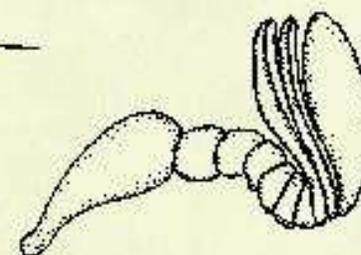
geniculata



piumosa

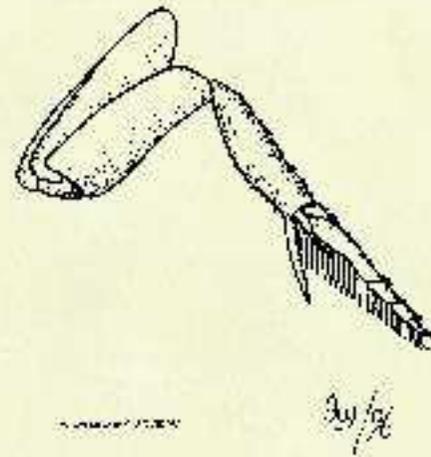
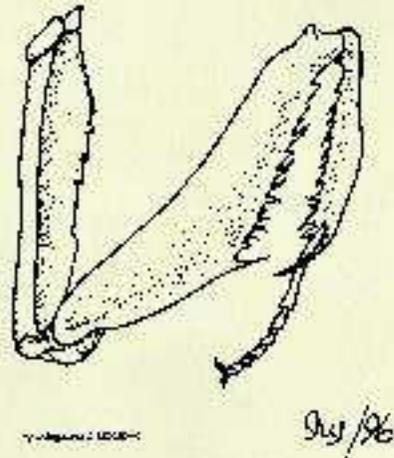
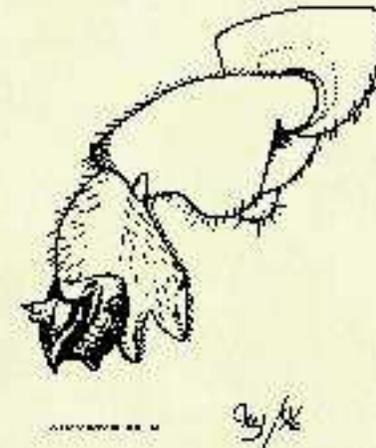
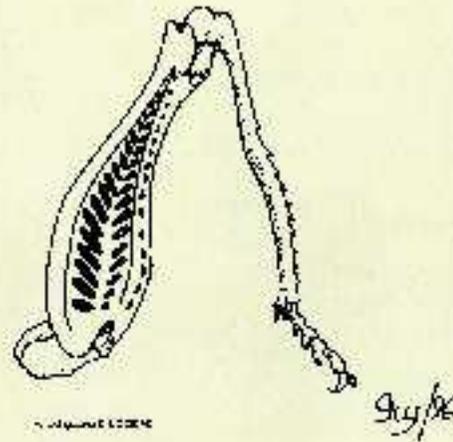


aristata

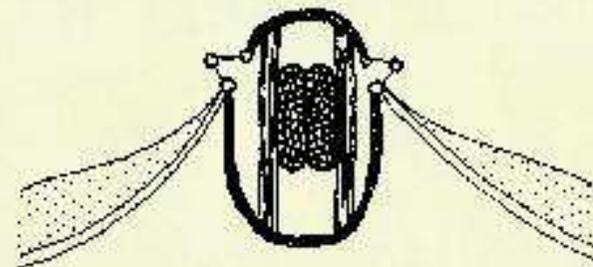
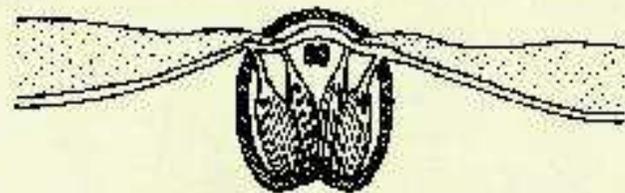
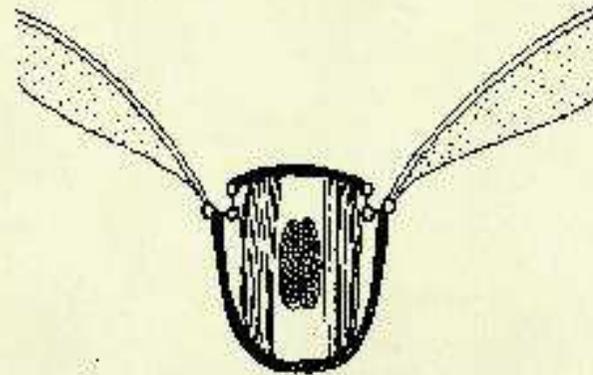
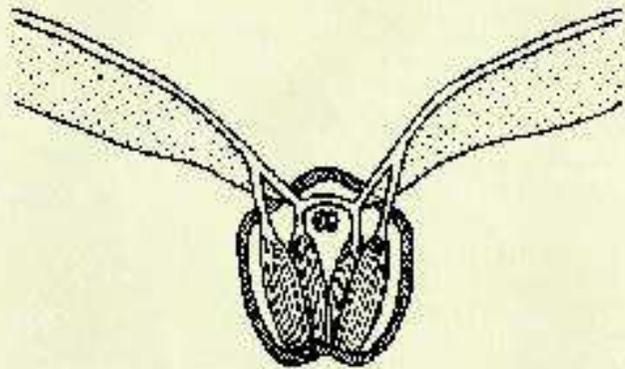


lamellata

# TORACE - zampe



# TORACE - ali

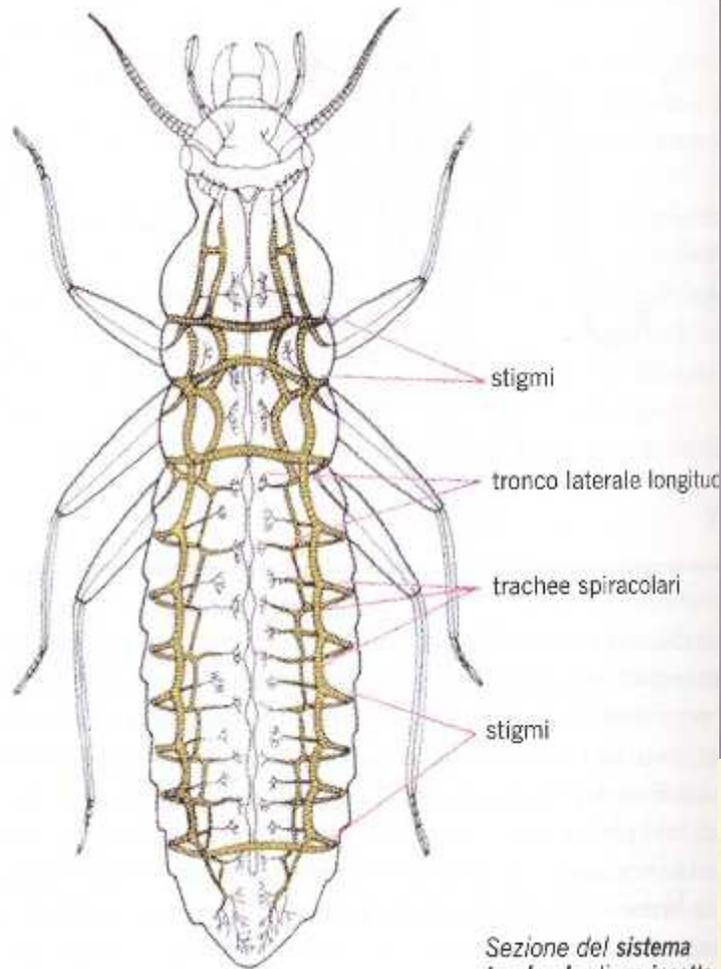


Livingstone, C. BIOIDAC

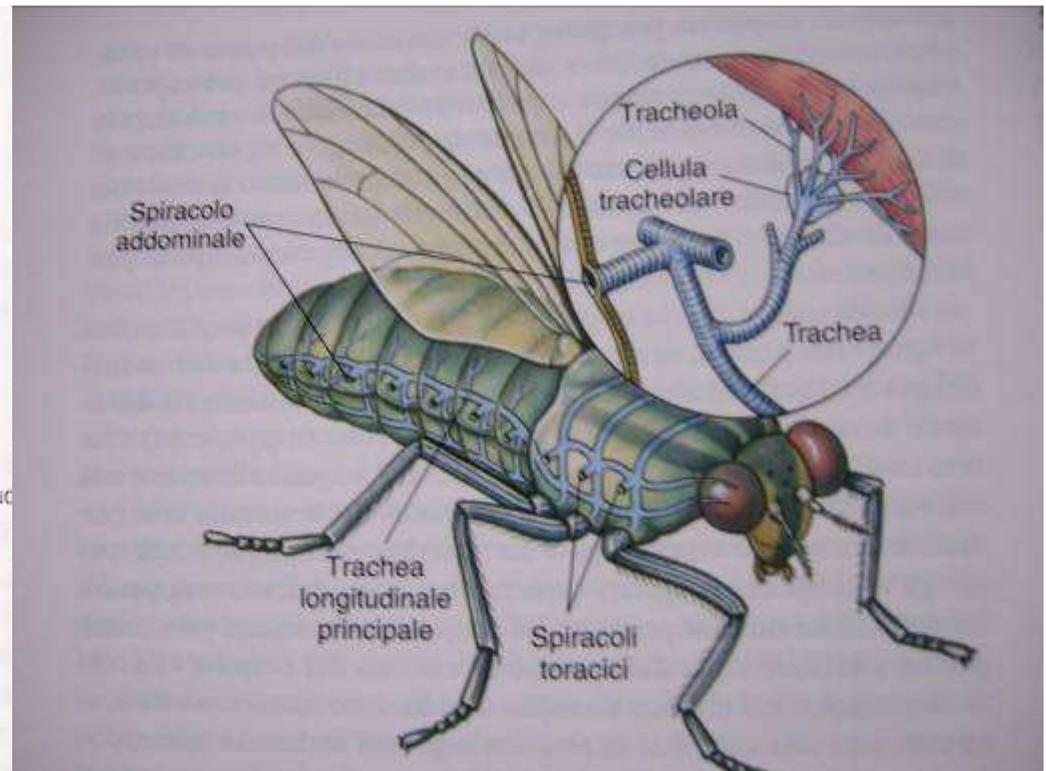
9/4/95

Livingstone, C. BIOIDAC

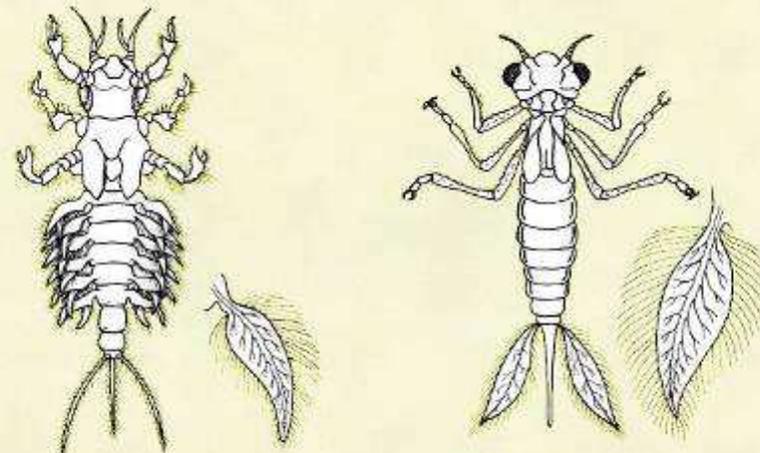
9/4/95



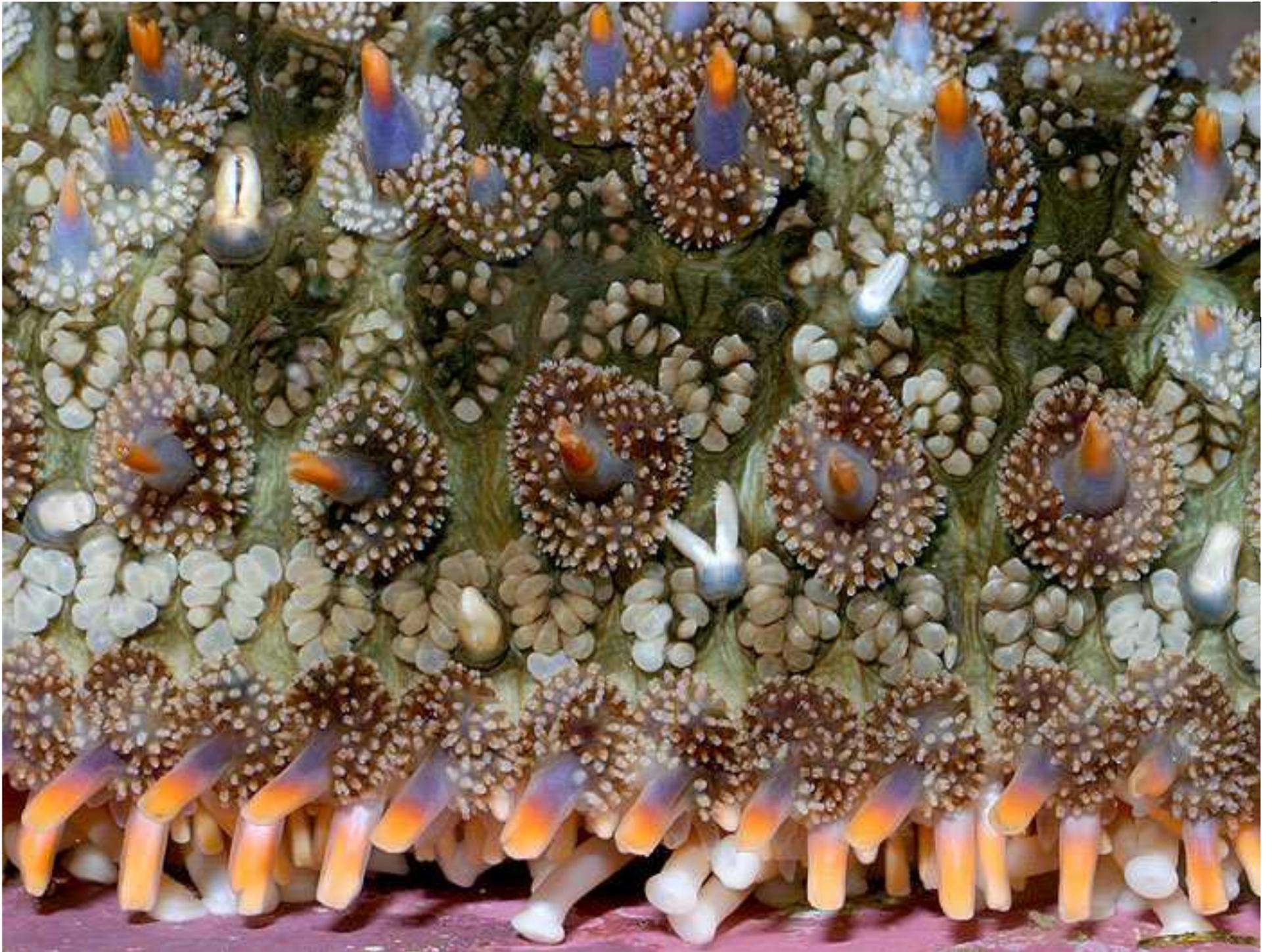
Sezione del sistema tracheale di un insetto.

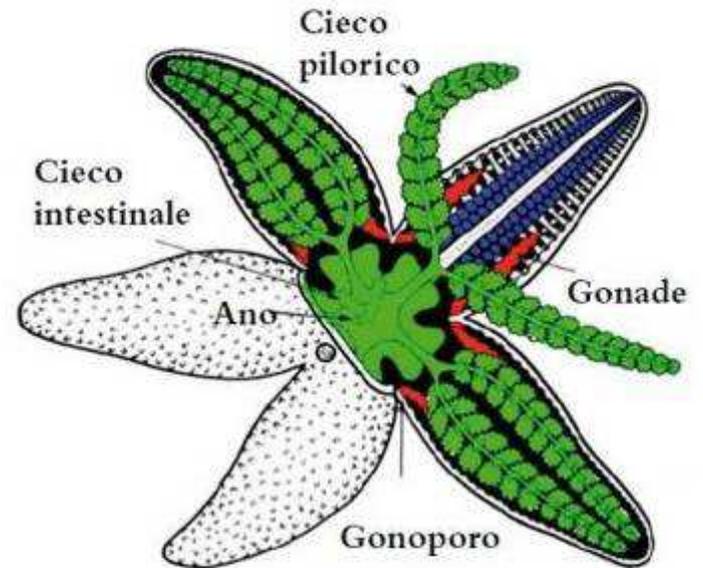
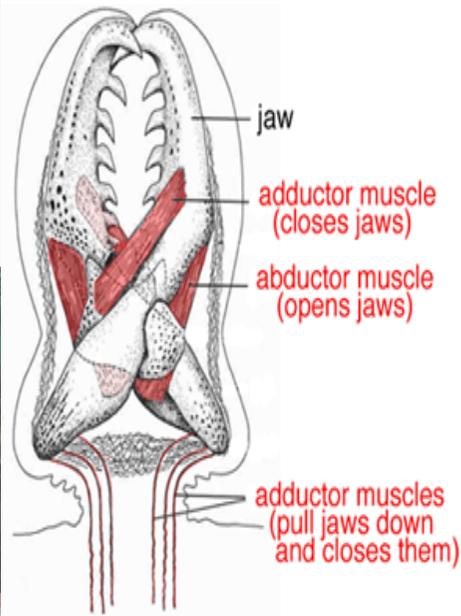
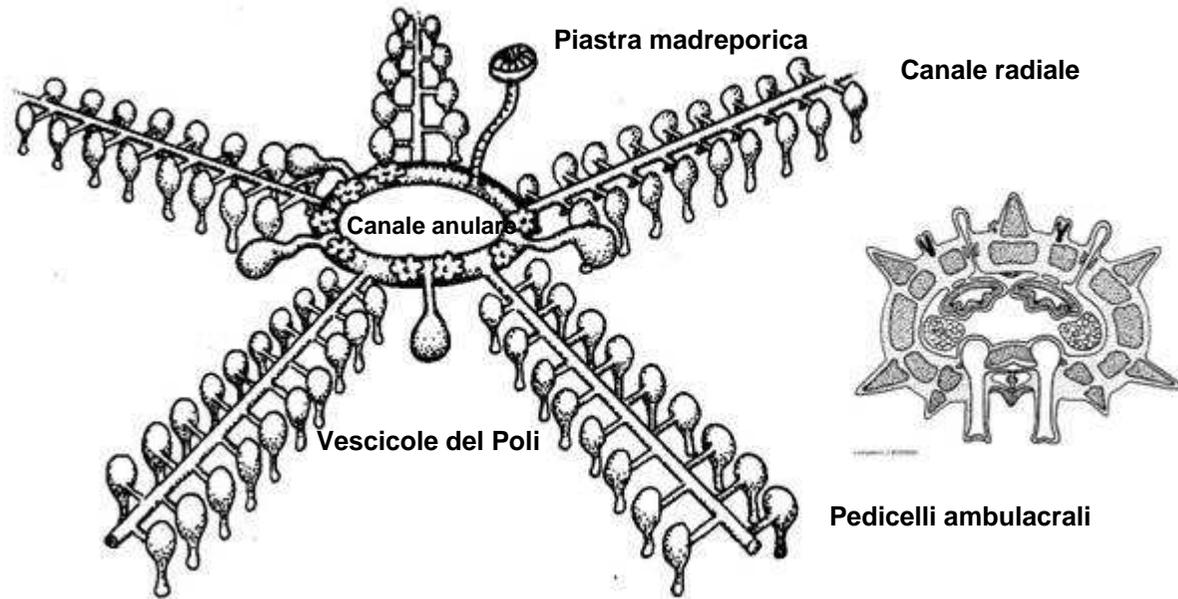


### ADDOME - tracheobranchie e cerci



Quale Entomologia?  
 Medica?  
 Agraria?  
 Veterinaria?  
 Forense?  
 Generale?(evoluzionistica,  
 genetica, ecologica  
 etc.etc.)



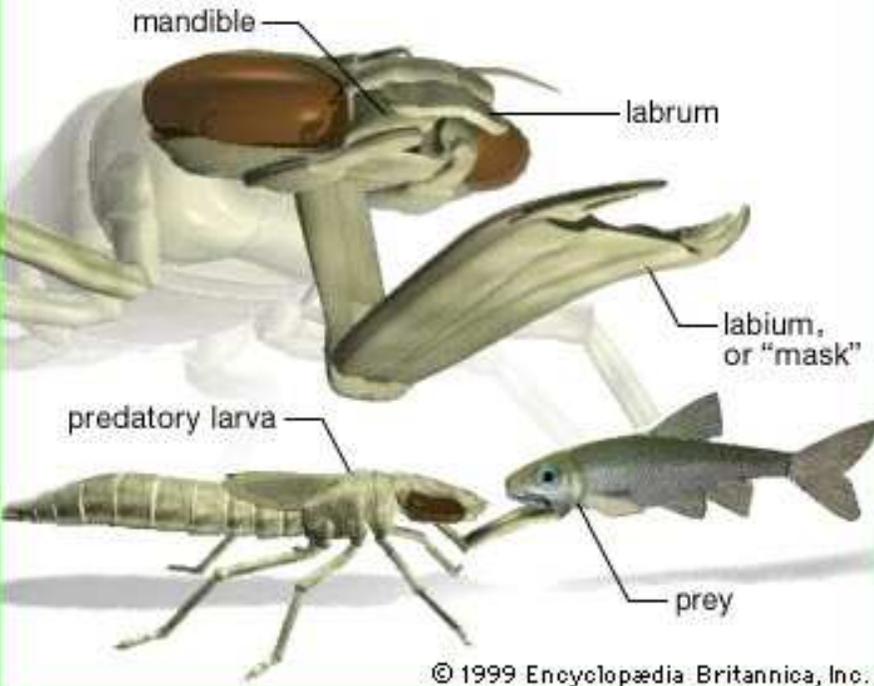


Sistemi digerente e riproduttore

B

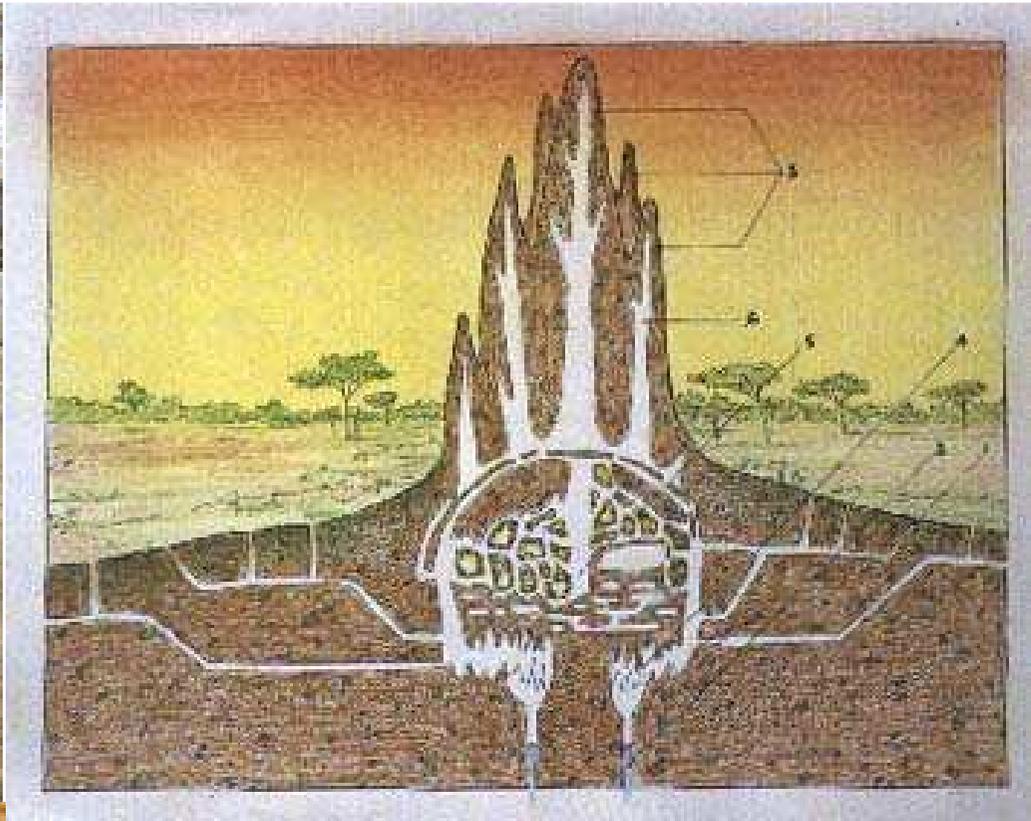


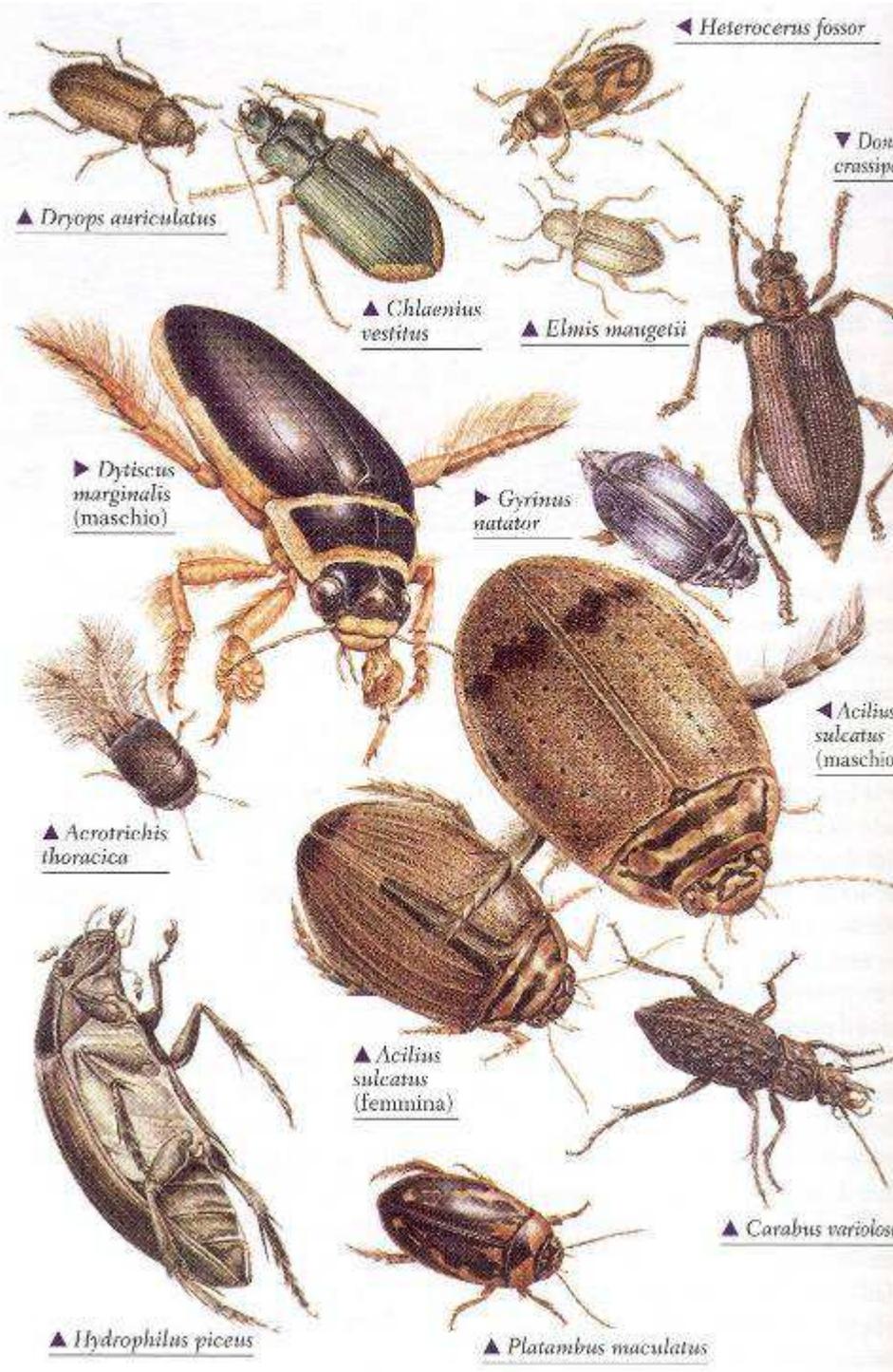
### Odonate mouthparts: the dragonfly larva





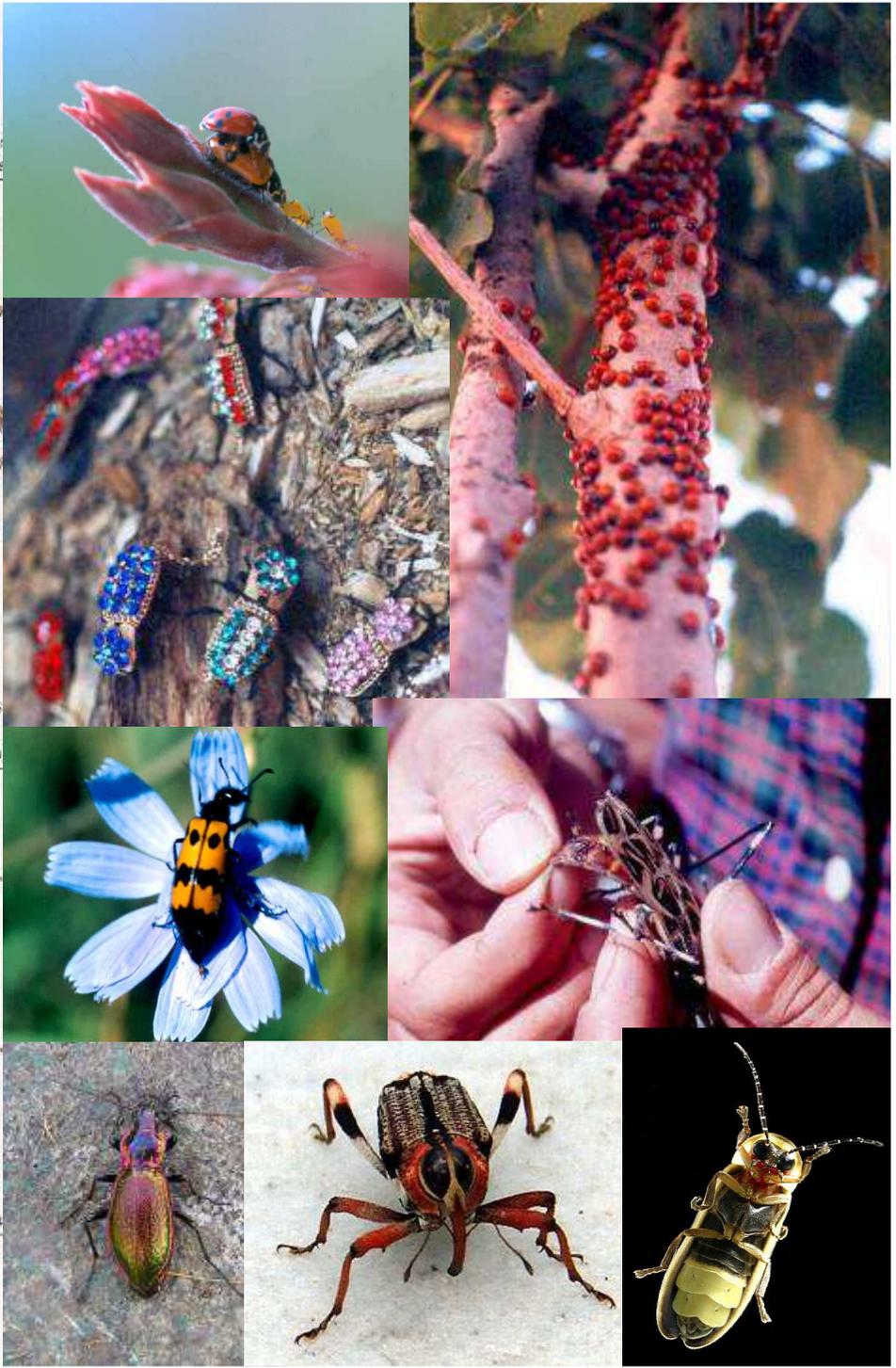


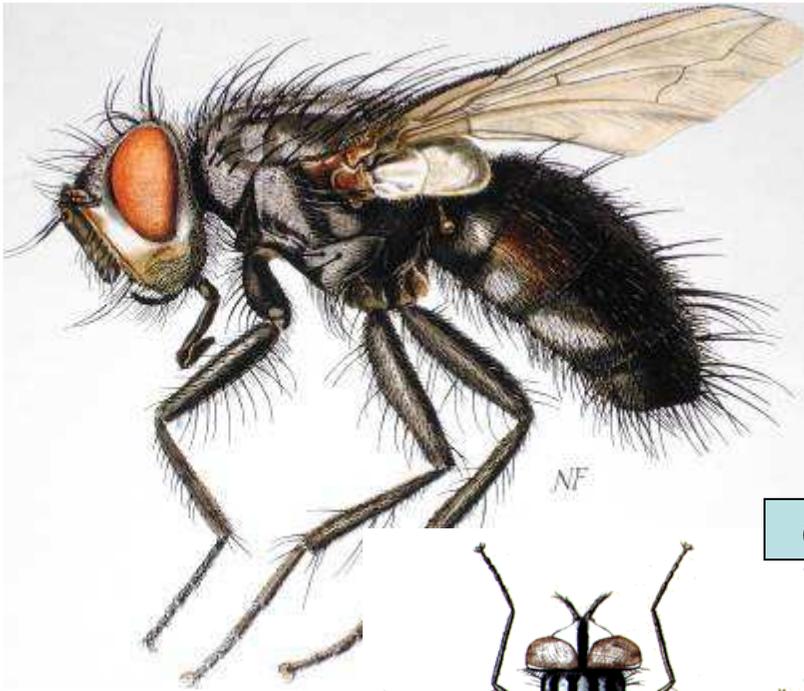




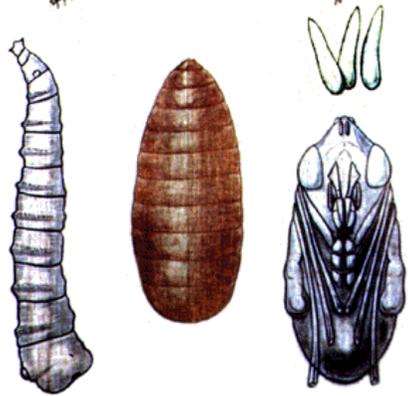
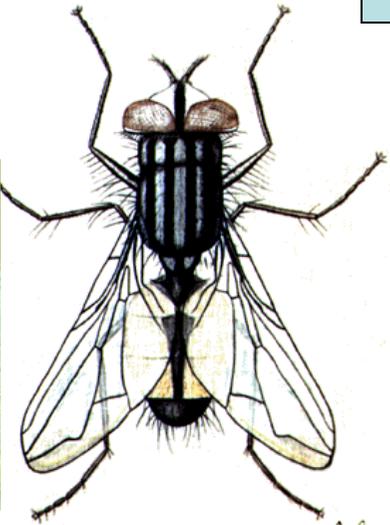
◀ *Heterocerus fossor*

▼ *Dontocrassipes*

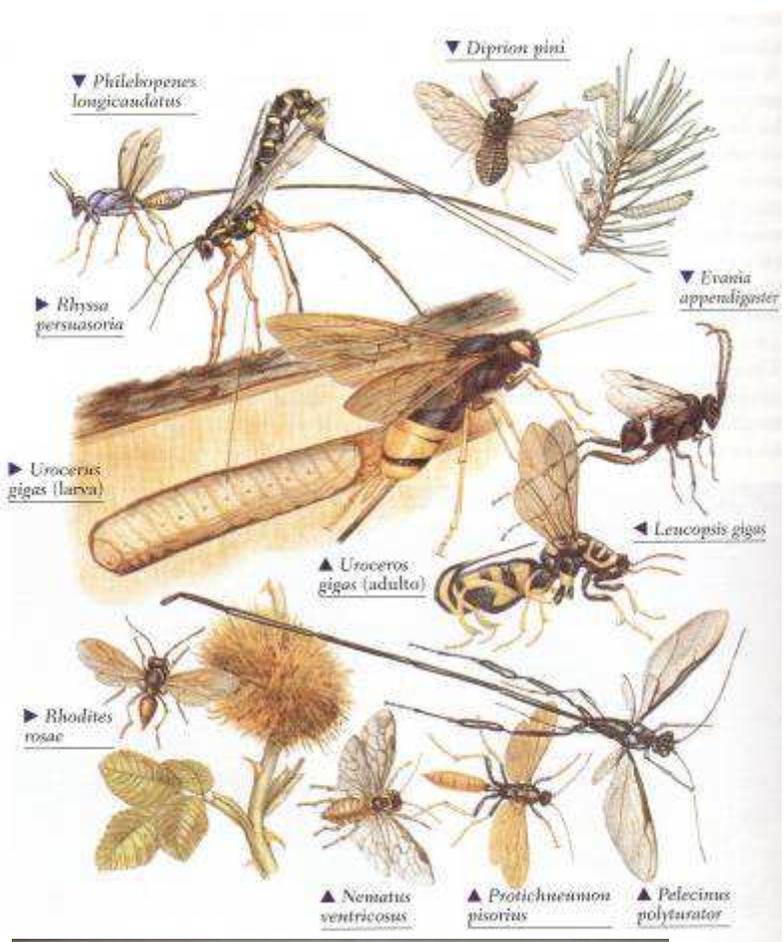
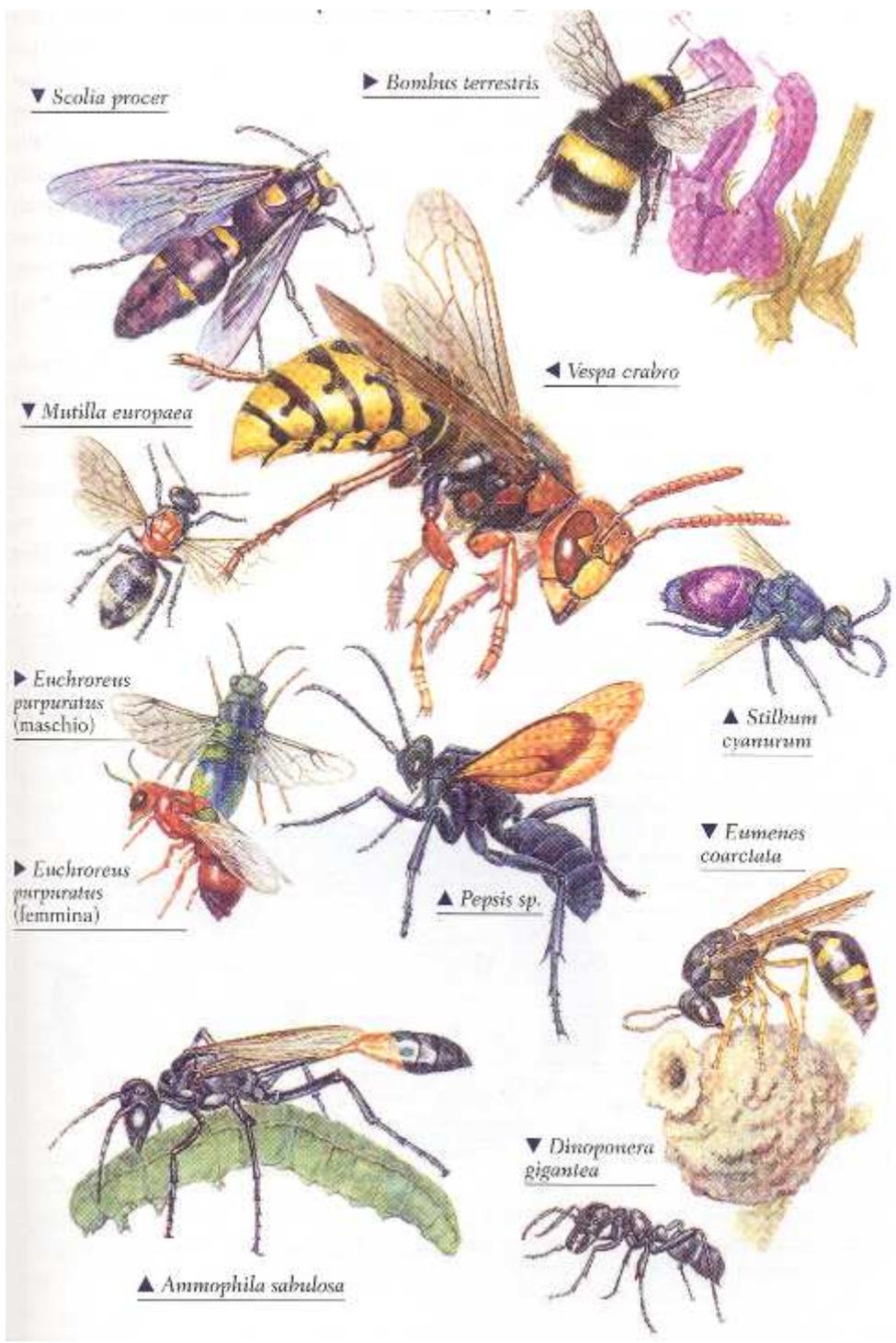


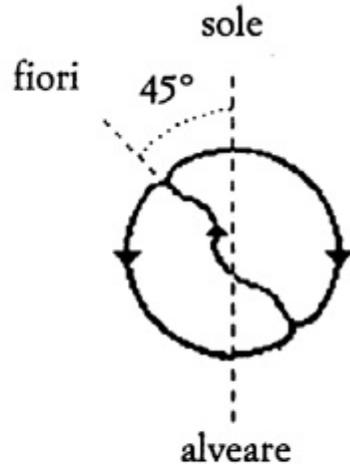
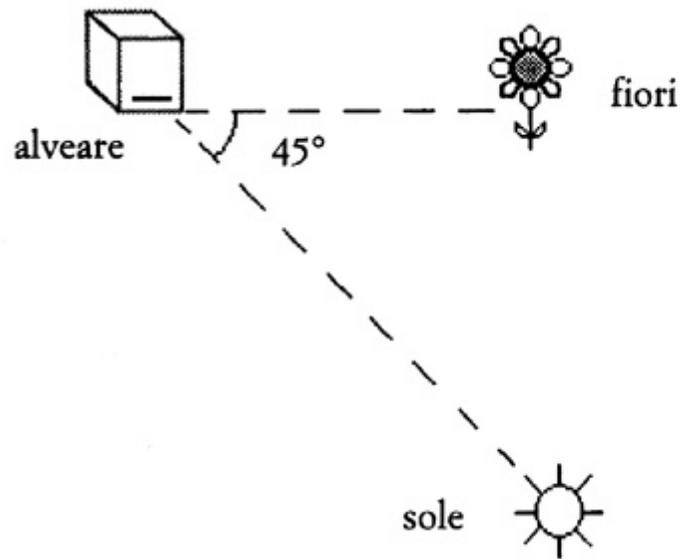


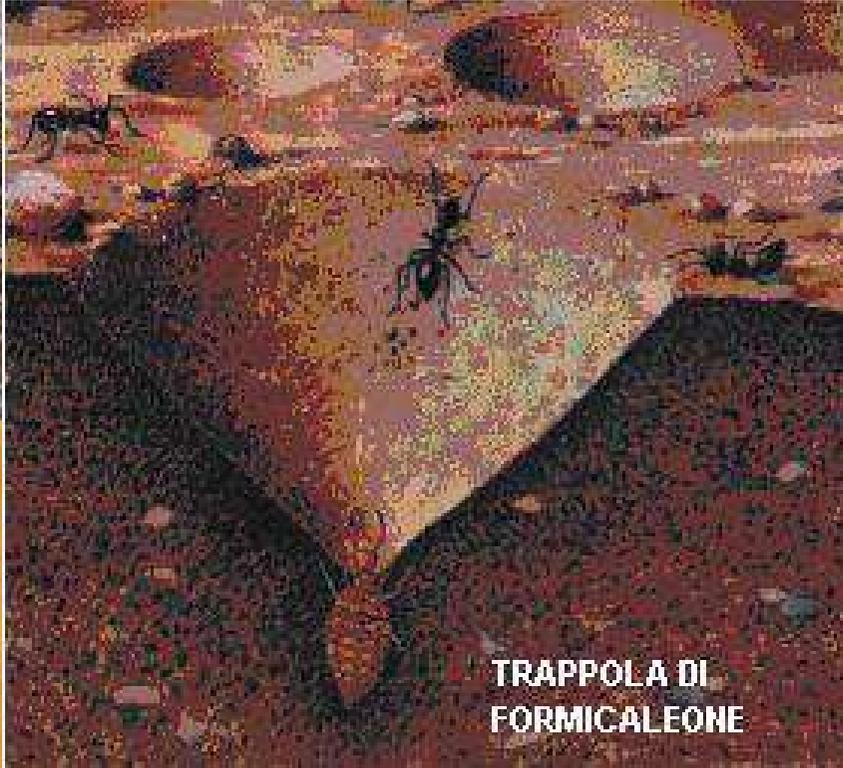
ditteri











## **Ernesto Ragazzoni** 1870-1920



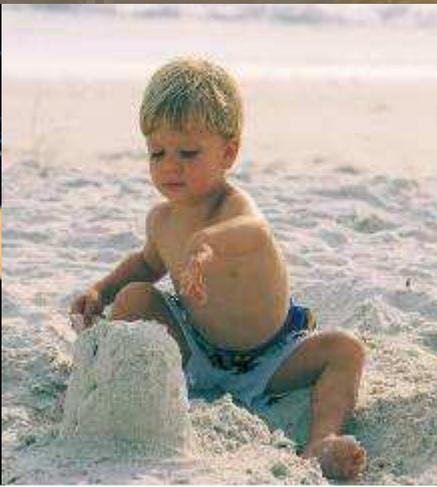
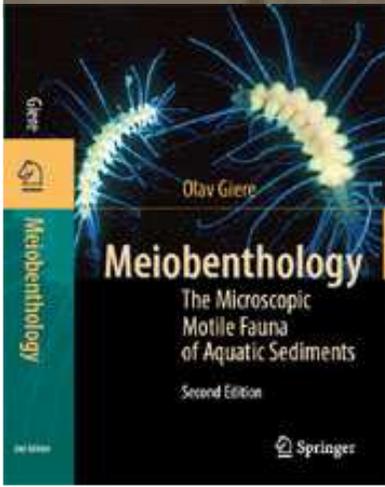
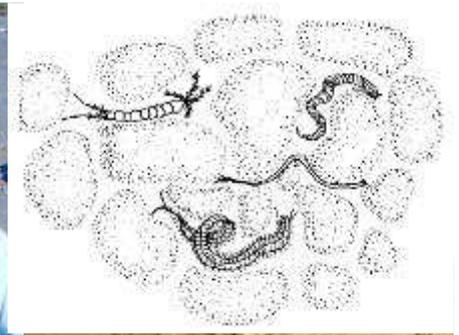
## **Ballata**

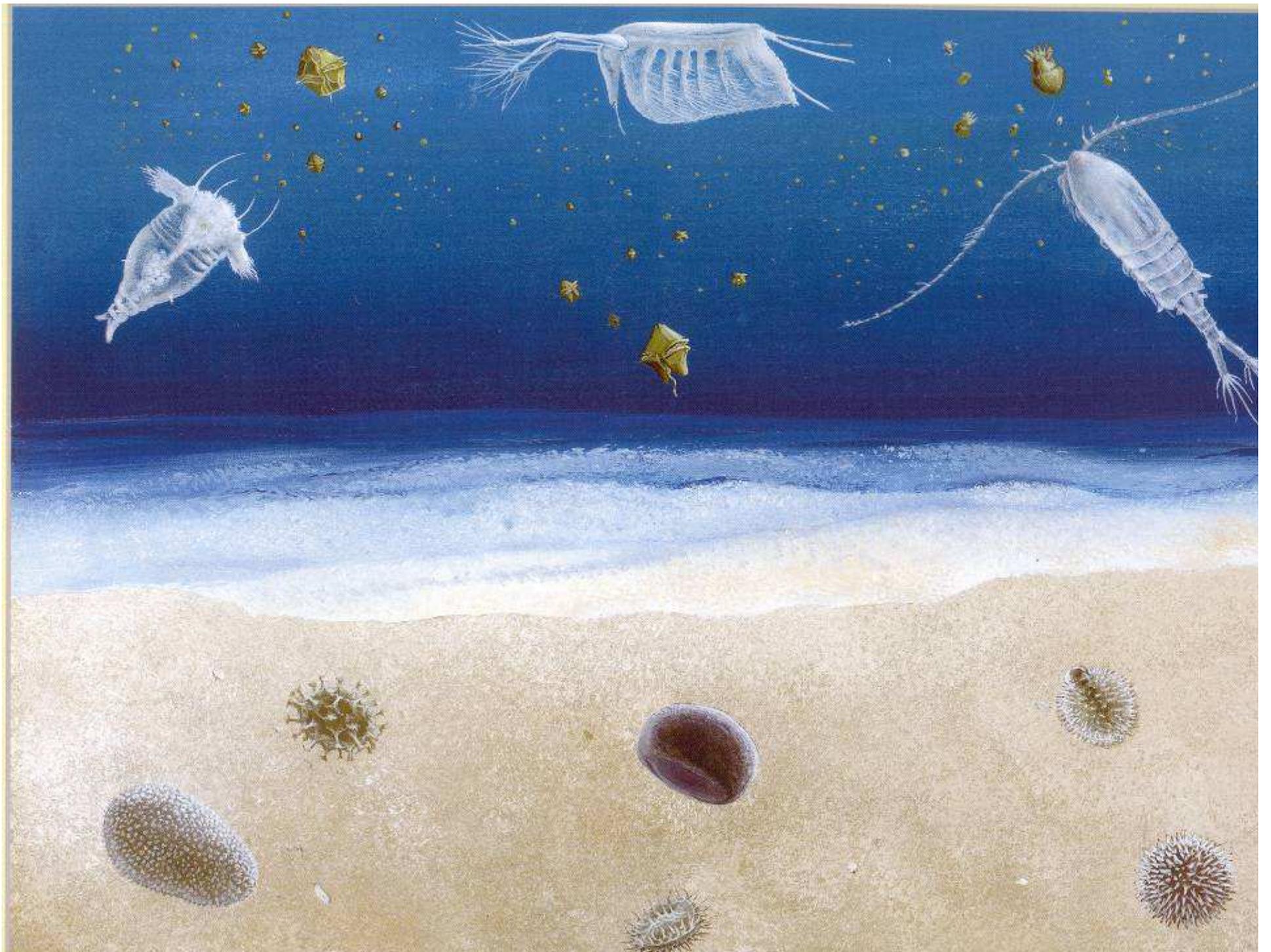
Se ne vedono nel mondo  
che son osti... cavadenti  
boja, eccetera... (o, secondo  
le fortune grand'Orienti).  
C'è chi taglia e cuce brache,  
chi leoni addestra in gabbia,  
chi va in cerca di lumache...  
lo... fo buchi nella sabbia.

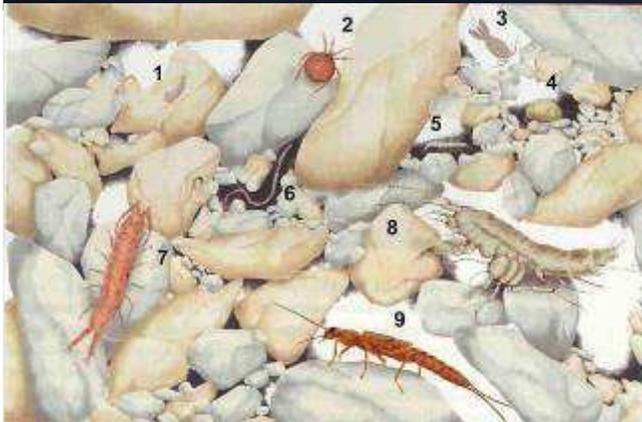
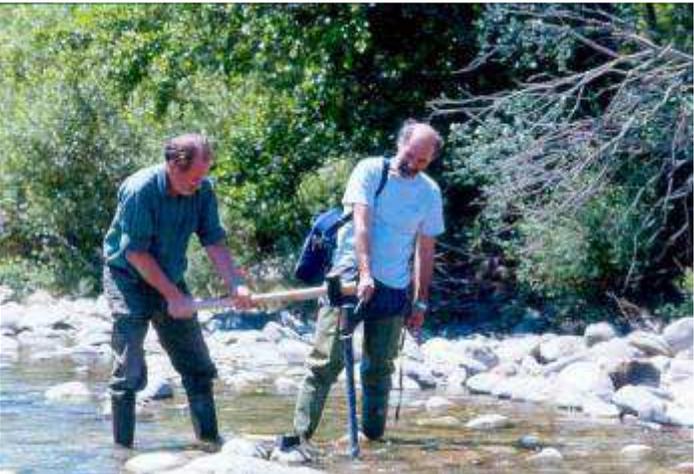
I poeti anime elette,  
riman laudi e piagnistei  
per l'amore di Giuliette  
di cui mai sono i Romei!

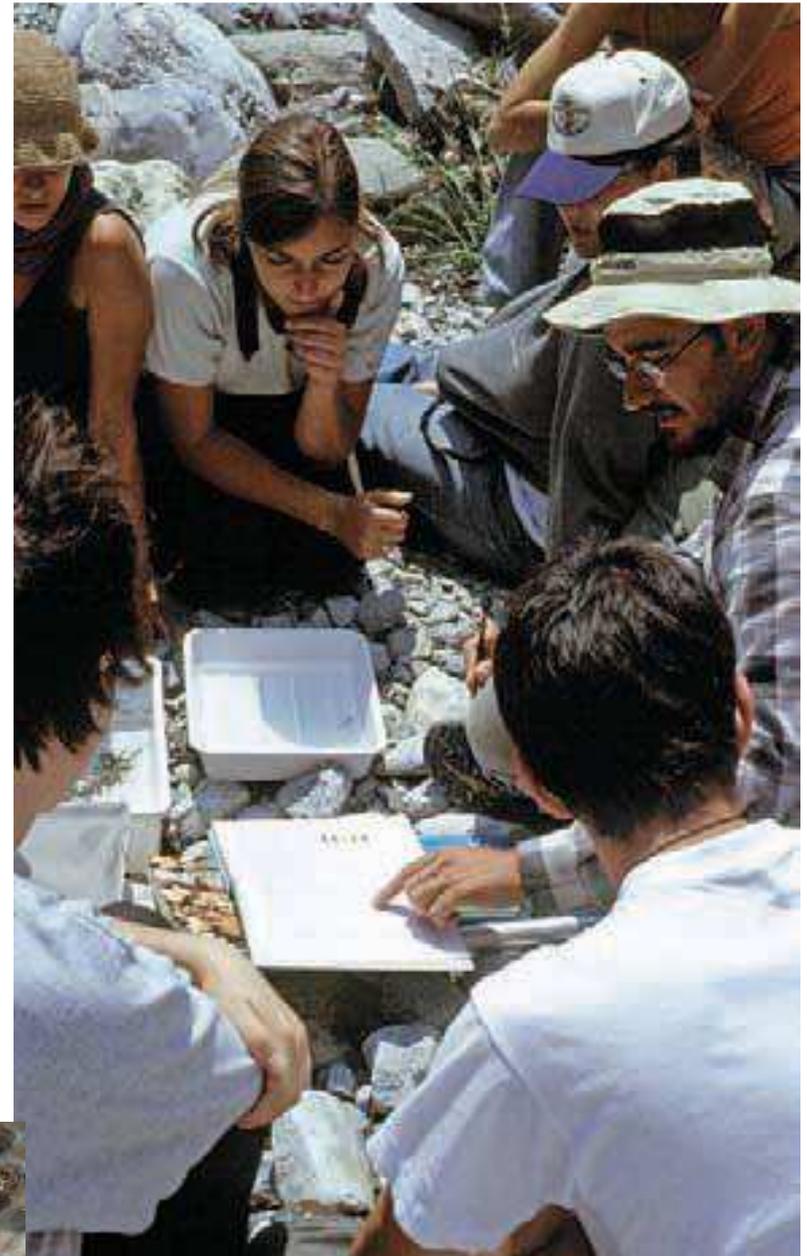
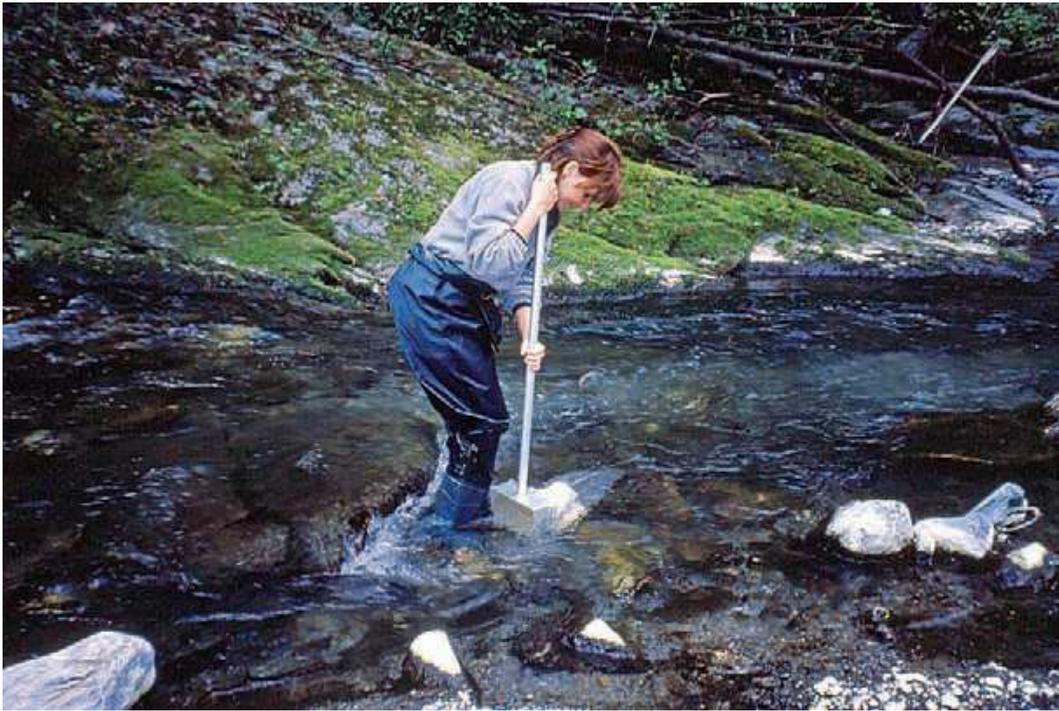
I fedeli questurini  
metton argini alla rabbia  
dei colpevoli assassini...  
lo... fo buchi nella sabbia.  
Sento intorno sussurrarmi  
che ci sono altri mestieri...  
Bravi... A voi! Scolpite marmi,  
combattete il beri-beri,  
allevate ostriche a Chioggia,  
filugelli in Cadenabbia,  
fabbricate parapioggia  
lo... fo buchi nella sabbia.

O cogliate la cicoria  
e gli allori. A voi! Dio v'abbia  
tutti quanti, in pace, e gloria!  
lo... fo buchi nella sabbia.









idropsichidi



filopotamidi



*polycentropodidi*



Gruppi faunistici che determinano con la loro presenza l'ingresso orizzontale in tabella (primo ingresso)		Numero totale delle Unità Sistematiche (U.S.) costituenti la comunità (secondo ingresso)								
		0-1	2-5	6-10	11-15	16-20	21-25	26-30	31-35	36-...
Plecoteri (Leuctra) ■	Più di una U.S.	--	--	8	9	10	11	12	13 ■	14 ■
	Una sola U.S.	--	--	7	8	9	10	11	12	13 ■
Efemeroteri (Baetidae, Caenidae) ■■	Più di una U.S.	--	--	7	8	9	10	11	12	--
	Una sola U.S.	--	--	6	7	8	9	10	11	--
Tricotteri	Più di una U.S.	--	5	6	7	8	9	10	11	--
	Una sola U.S.	--	4	5	6	7	8	9	10	--
Cammaridi, Atidi e Palemonidi	Tutte le U.S. sopra assenti	--	4	5	6	7	8	9	10	--
Asellidi	Tutte le U.S. sopra assenti	--	3	4	5	6	7	8	9	--
Oligocheti o Chironomidi	Tutte le U.S. sopra assenti	1	2	3	4	5	--	--	--	--
Tutti i taxa precedenti assenti	Possono essere presenti organismi a respirazione aerea	0	1	--	--	--	--	--	--	--

CLASSE di QUALITÀ	VALORE di I.B.E.	GIUDIZIO di QUALITÀ	COLORE di RIFERIMENTO della classe di qualità
Classe I	10-11-12-...	Ambiente non inquinato o non alterato in modo sensibile	<i>azzurro</i> 
Classe II	8-9	Ambiente con moderati sintomi di inquinamento o alterazione	<i>verde</i> 
Classe III	6-7	Ambiente inquinato o comunque alterato	<i>giallo</i> 
Classe IV	4-5	Ambiente molto inquinato o molto alterato	<i>arancione</i> 
Classe V	0-1-2-3	Ambiente fortemente inquinato o fortemente alterato	<i>rosso</i> 

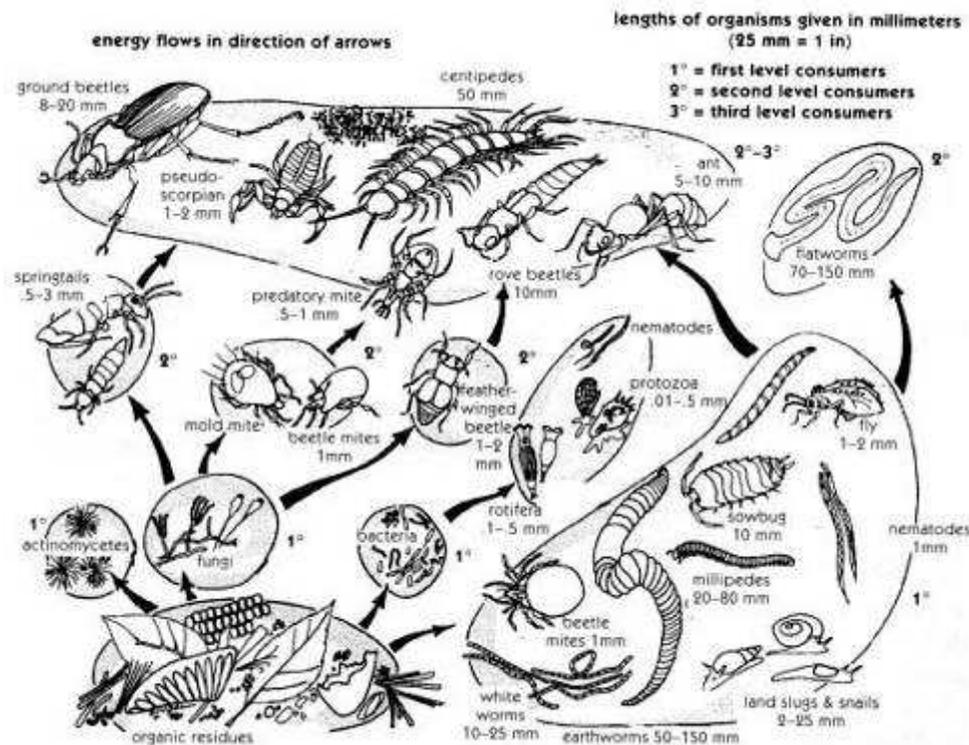


Figure 3.1 Soil organisms and their role in decomposing residues. Modified from D.L.Dindal, 1978.

international  
BARCODE  
OF LIFE



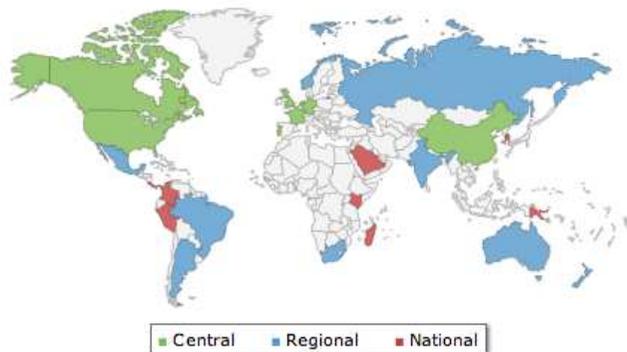
# iBOL

## International Barcode of Life Project

University of Guelph, Canada

Obiettivi:

- Creare di una banca dati contenete tutte le sequenze barcode delle specie viventi (BOLD)
- Sequenziare di 5mln di campioni, rappresentativi di 500mila specie entro il 2015
- Sviluppare un dispositivo portatile DNA-barcoder
- Rivoluzionare le modalità del riconoscimento di specie

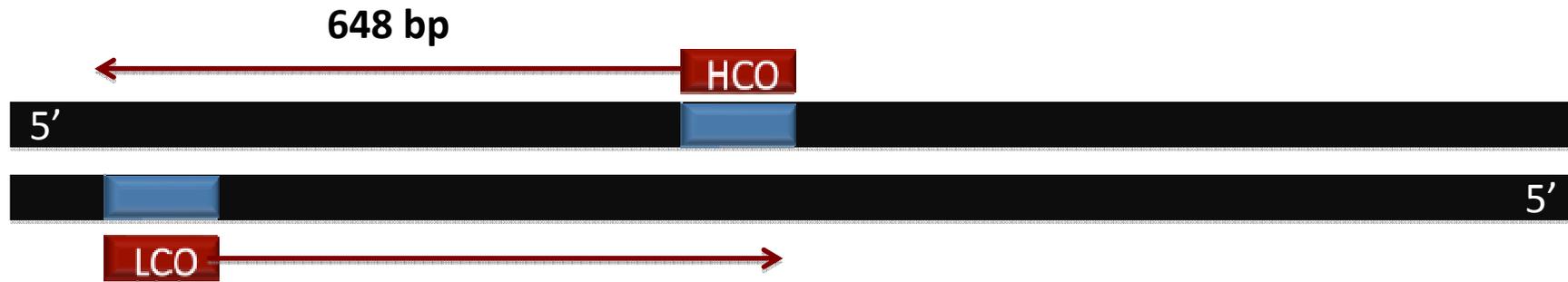


**4 Nodi Centrali:** coordinazione, sequenziamento, analisi dati, BOLD (>C\$25 milioni)

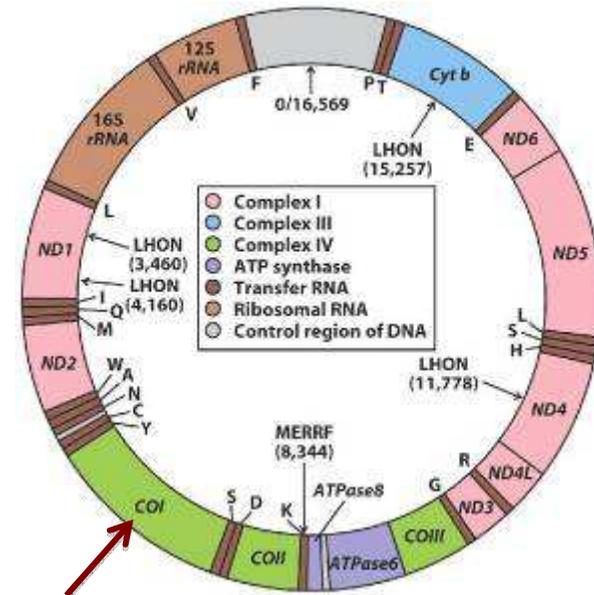
**9 Nodi Regionali:** sequenziamento all'interno dei propri confini (>C\$5 milioni)

**10 Nodi Nazionali:** raccolta e identificazione campioni, analisi dati (>C\$1 milione)

# La COI



- Sequenza ben conservata
- Tasso relativo d'evoluzione sufficientemente alto
- Primer per amplificazione universali
- Molte sequenze già presenti in banca dati



Hebert P.D.N., Ratnasingham S., Waard J.R. (2003b) **Barcoding animal life: cytochrome c oxidase subunit 1 divergences among closely related species.**

Proceedings of the Royal Society B, Biological Sciences (Suppl.), 270, S96–S99.

# L'utilità

- Identificazione di frammenti, di diversi stadi vitali, di specie criptiche



*Pipistrellus pipistrellus*,  
specie comune



*Pipistrellus pygmaeus*

- Controllo degli ecosistemi



*Pisaster ochraceus*,  
specie chiave



*Zoarces viviparus*,  
specie bioindicatrice

- Monitoraggio delle specie invasive e di quelle protette



*Caulerpa taxifolia*  
(alga killer), specie  
tropicale invasiva



*Strombus gigas*,  
specie  
frequentemente  
contrabbandata

Caro Gesù,  
la giraffa la volevi proprio così  
o è stato un incidente?

Patrizia.

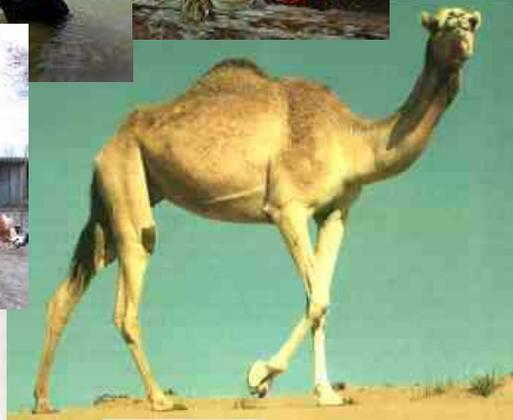


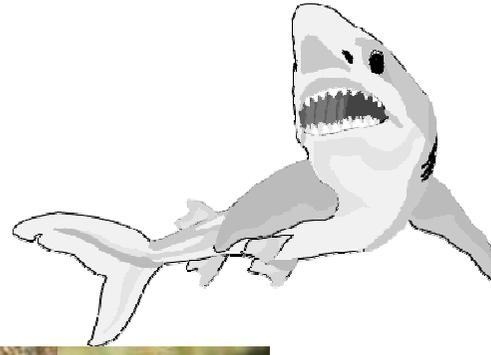
**Tabella 3.1 - Categorie tassonomiche dell'uomo, del leone e della mosca.**

<b>Categoria tassonomica</b>	<b>uomo</b>	<b>leone</b>	<b>mosca</b>
Dominio	Eukarya	Eukarya	Eukarya
Regno	Animalia	Animalia	Animalia
Phylum	Chordata	Chordata	Arthropoda
Subphylum	Craniata	Vertebrata	Pancrustacea
Classe	Mammalia	Mammalia	Insecta
Ordine	Primates	Carnivora	Diptera
Famiglia	Hominidae	Felidae	Muscidae
Genere	<i>Homo</i>	<i>Panthera</i>	<i>Musca</i>
Specie	<i>Homo sapiens</i> Linnaeus, 1758	<i>Panthera leo</i> Linnaeus, 1758	<i>Musca domestica</i> Linnaeus, 1758

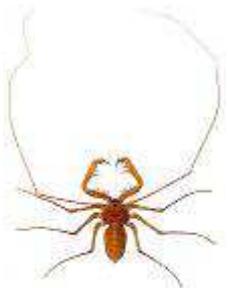
King Playing Cards On a Fine Green Sofa

# ANIMALI BUONI





# ANIMALI PERICOLOSI



# ANIMALI FASTIDIOSI

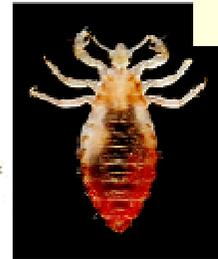
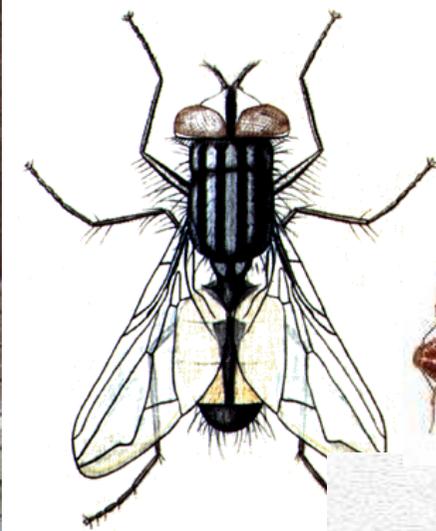
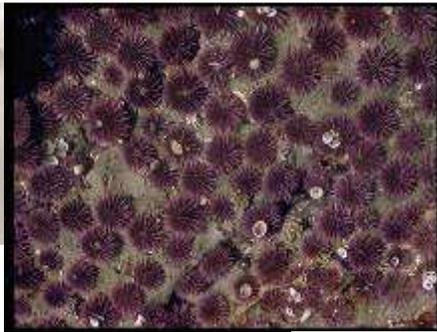


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# ANIMALI INUTILI

