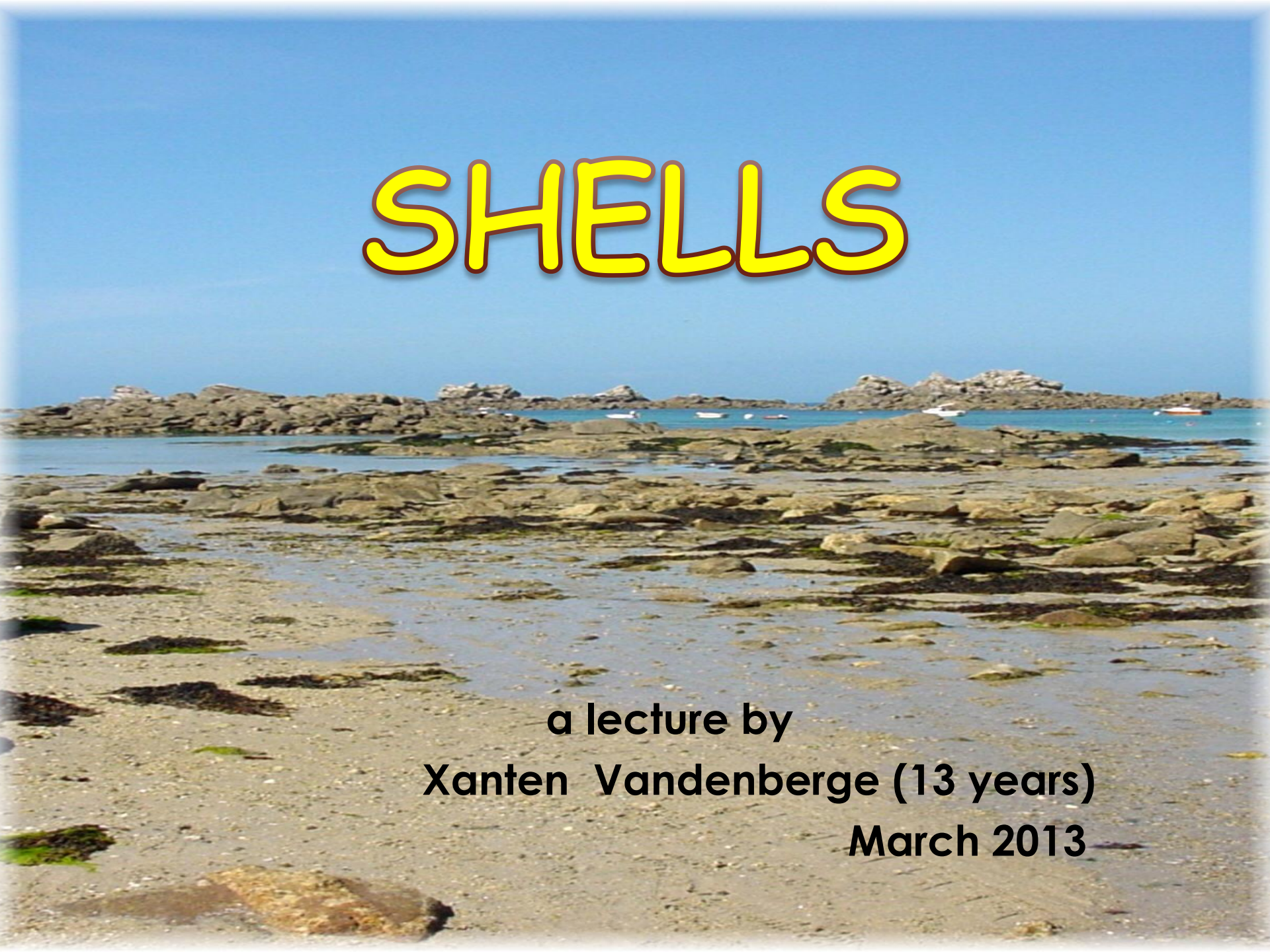
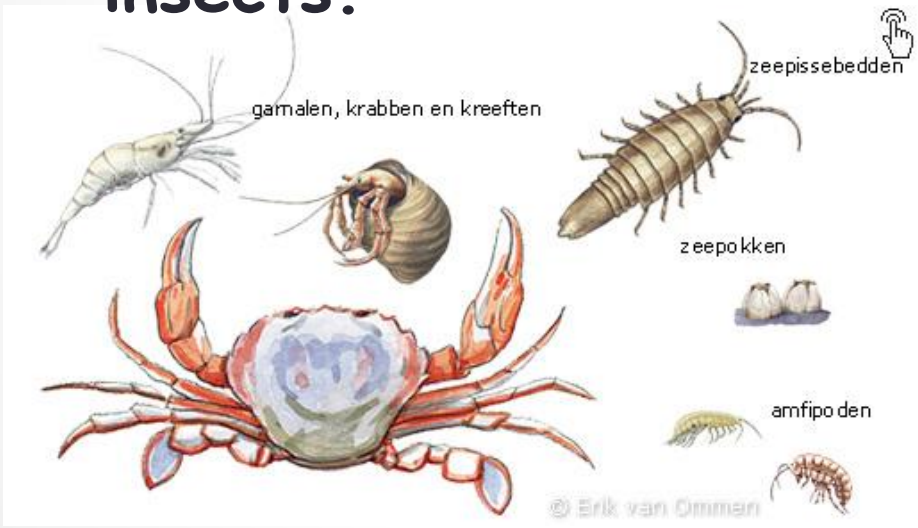

SHELLS
a lecture by
Xanten Vandenberge (13 years)
March 2013

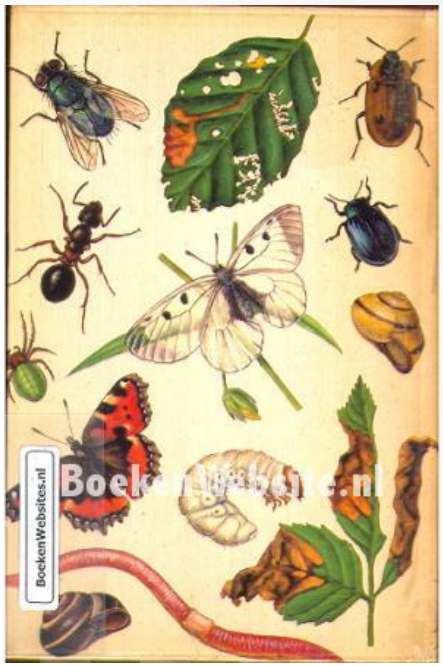
Introduction

The group of molluscs

- Wicked animals without spine, but with a calcareous 'snail house' = molluscs;
- Next to the insects, the largest animal group with 80,000 different species;
- The name is derived from the Latin 'mollis' = soft;
- The animal kingdom includes two large groups: the vertebrates and the invertebrates;

- The invertebrates include the molluscs, but also the sponges, the worms, the starfishes, the lobsters and the insects.

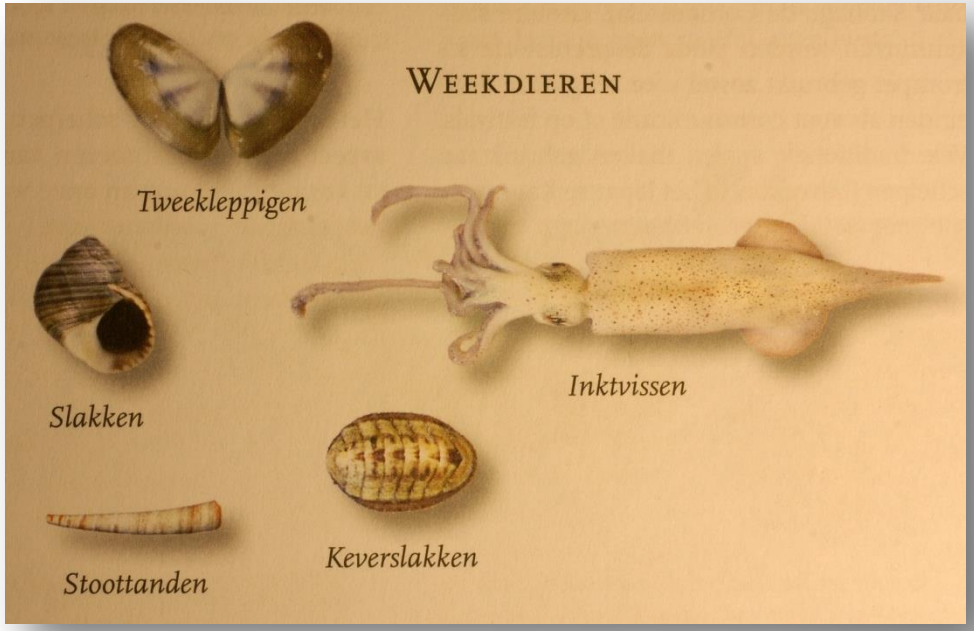




trilobite (fossil)

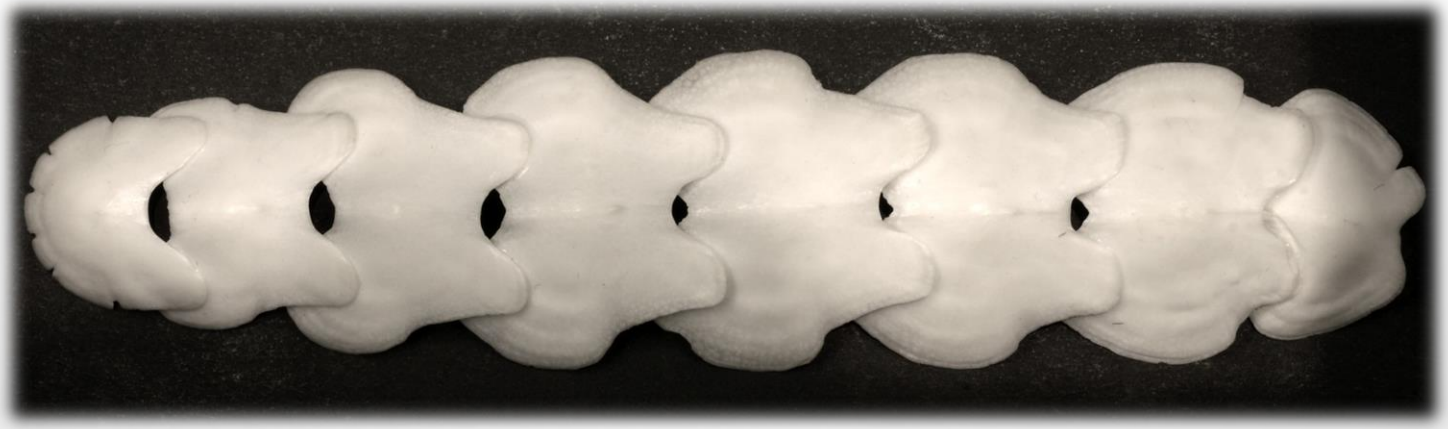
Classification of the molluscs

- The chitons: 8 calcareous plates;
- The gastropods, such as the whelks and the periwinkles, with a twisted house;
- The scaphopoda or tusks: the shell is like a hollow tube;
- The bivalves:
  the shell exists
  of two valves;
- The cephalopods,
  such as the squids.

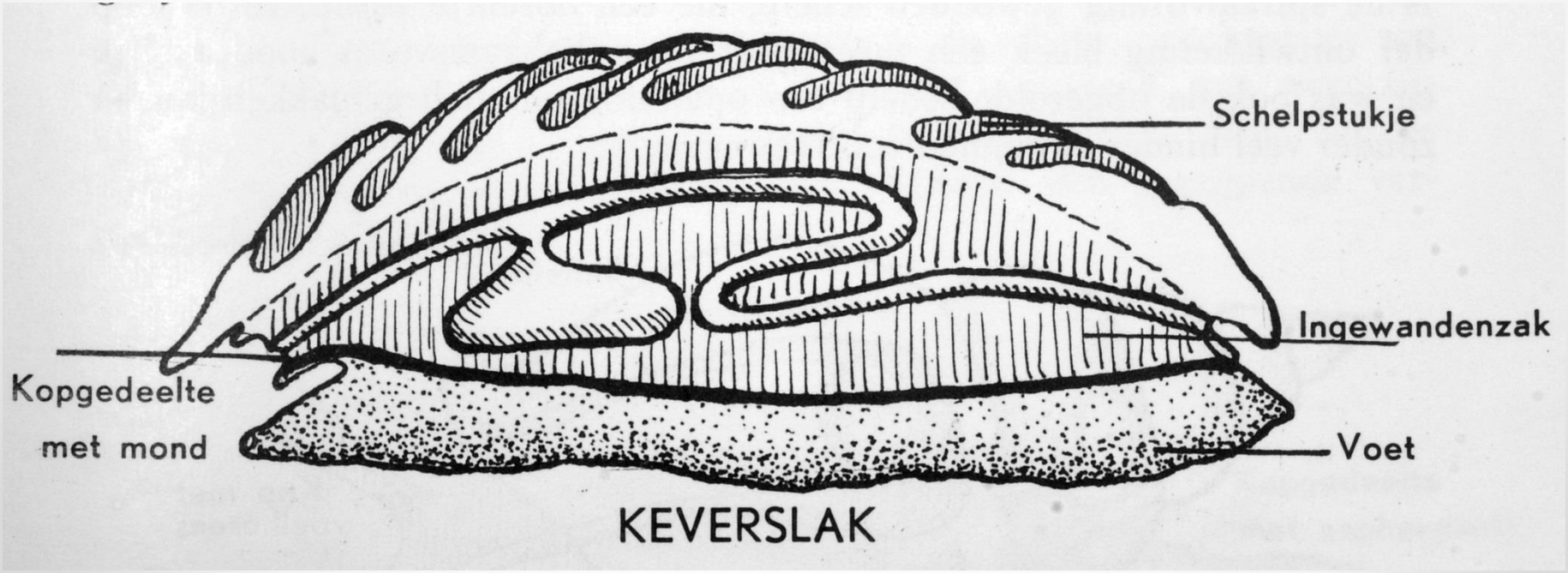


The chitons

- Oval, spherical shape;
- Slow animals;
- 8 shells arranged like tiles over each other;

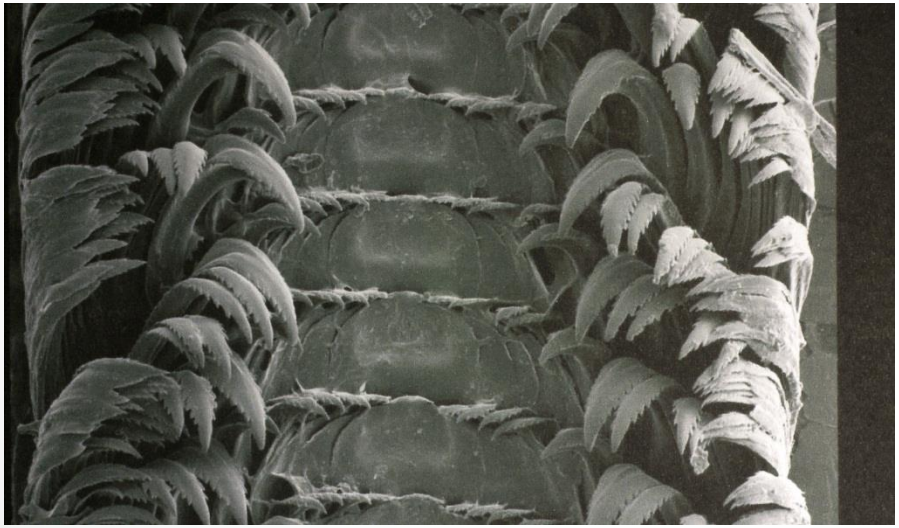


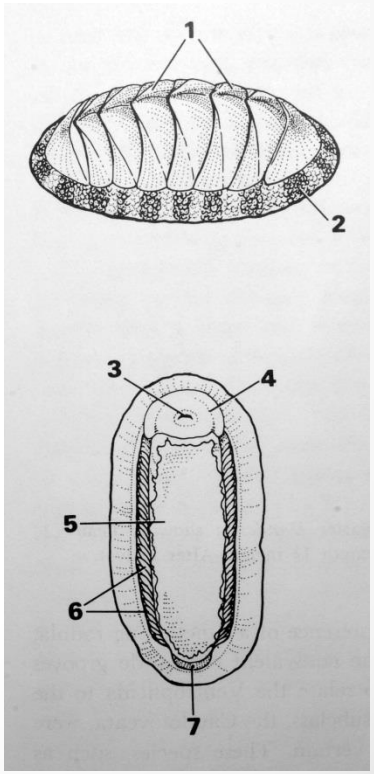
- Usually a chiton has a corrugated surface with equal numbers of holes containing sensors and eyes



- Broad, muscular foot;

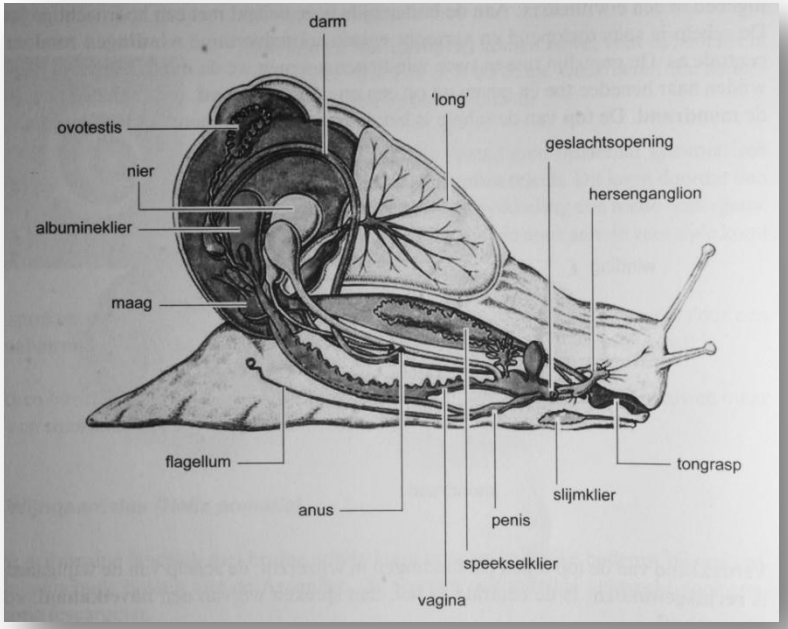
- An unconspinuous head with a mouth and therein a rasptongue or 'radula'.



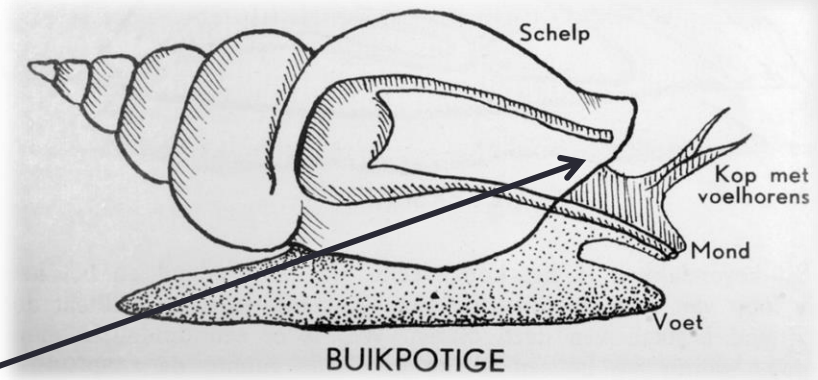


The gastropods

- Largest group with about 40,000 different species;
- Due to the wide, muscular foot it seems like that they are crawling on their stomach;
- Live in all biotopes: in the sea, ditches, lakes, rivers and on land;

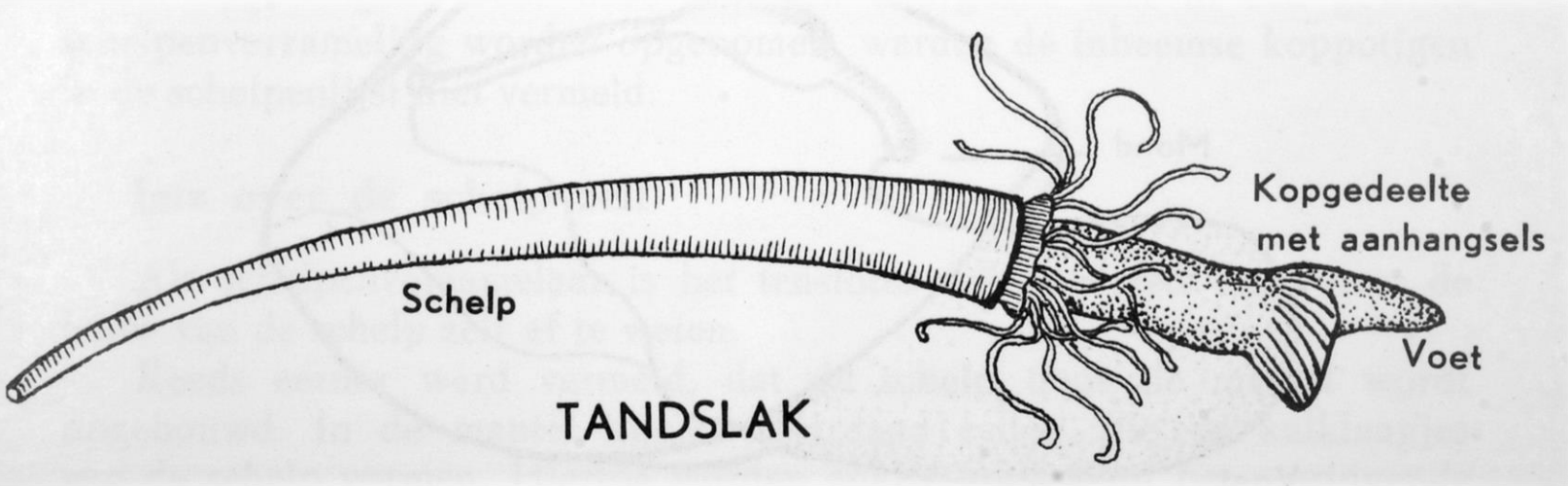


- Usually a twisted shell;
- Head with eyes and touch senses;
- All organs are turned over 180°: end of anal opening is above the head;
- Often a kind of door or 'operculum' at the foot.

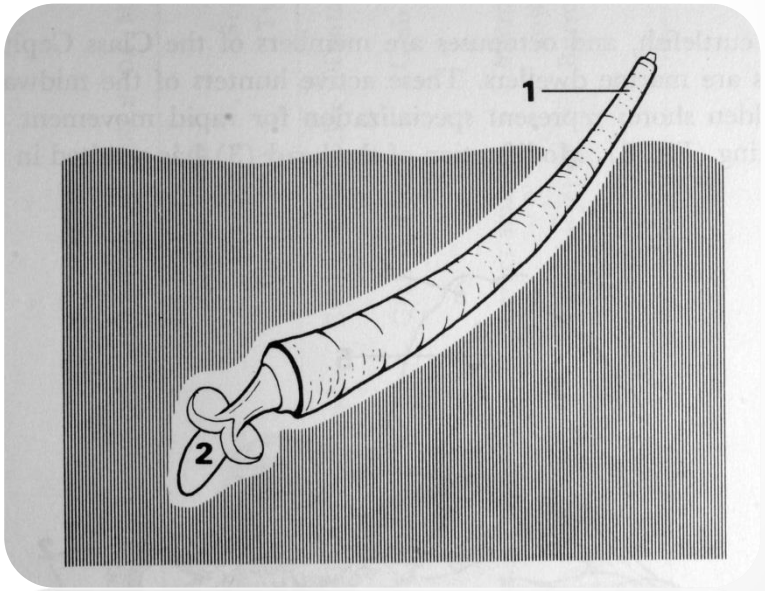


The scaphopods

- A small group with only a few hundred species;
- The shell has the shape of an elephant tooth: bent with two small apertures at both ends;

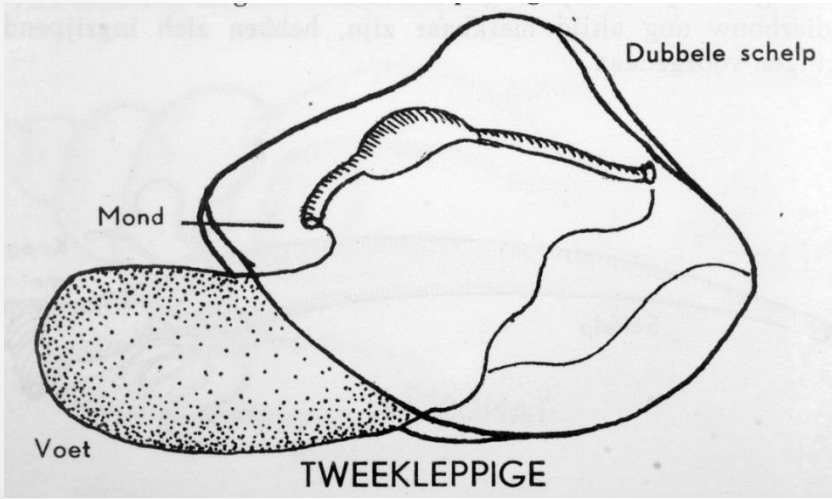


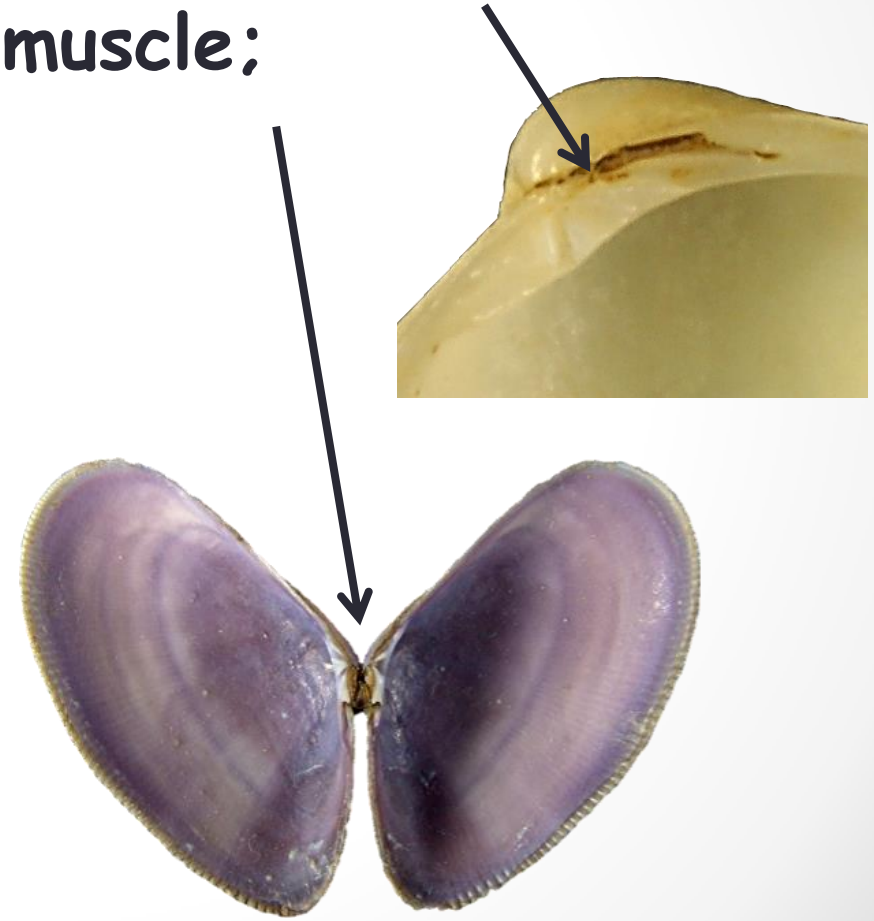
- A very small head with thread-like attachments;
- The foot is a digging instrument;
- They live buried in the sand.



The bivalves

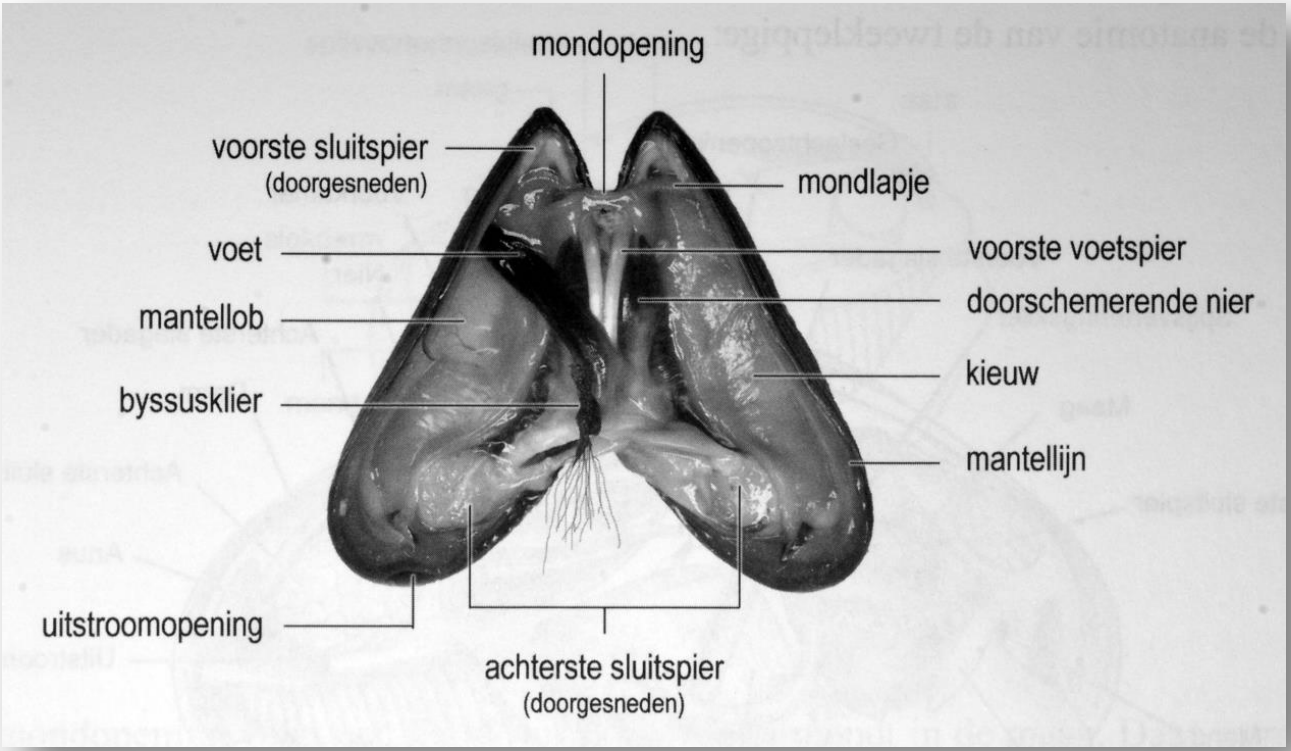
- The shell consists of two equal parts, which rotate in a kind of hinge or otherwise are held together by a muscle;



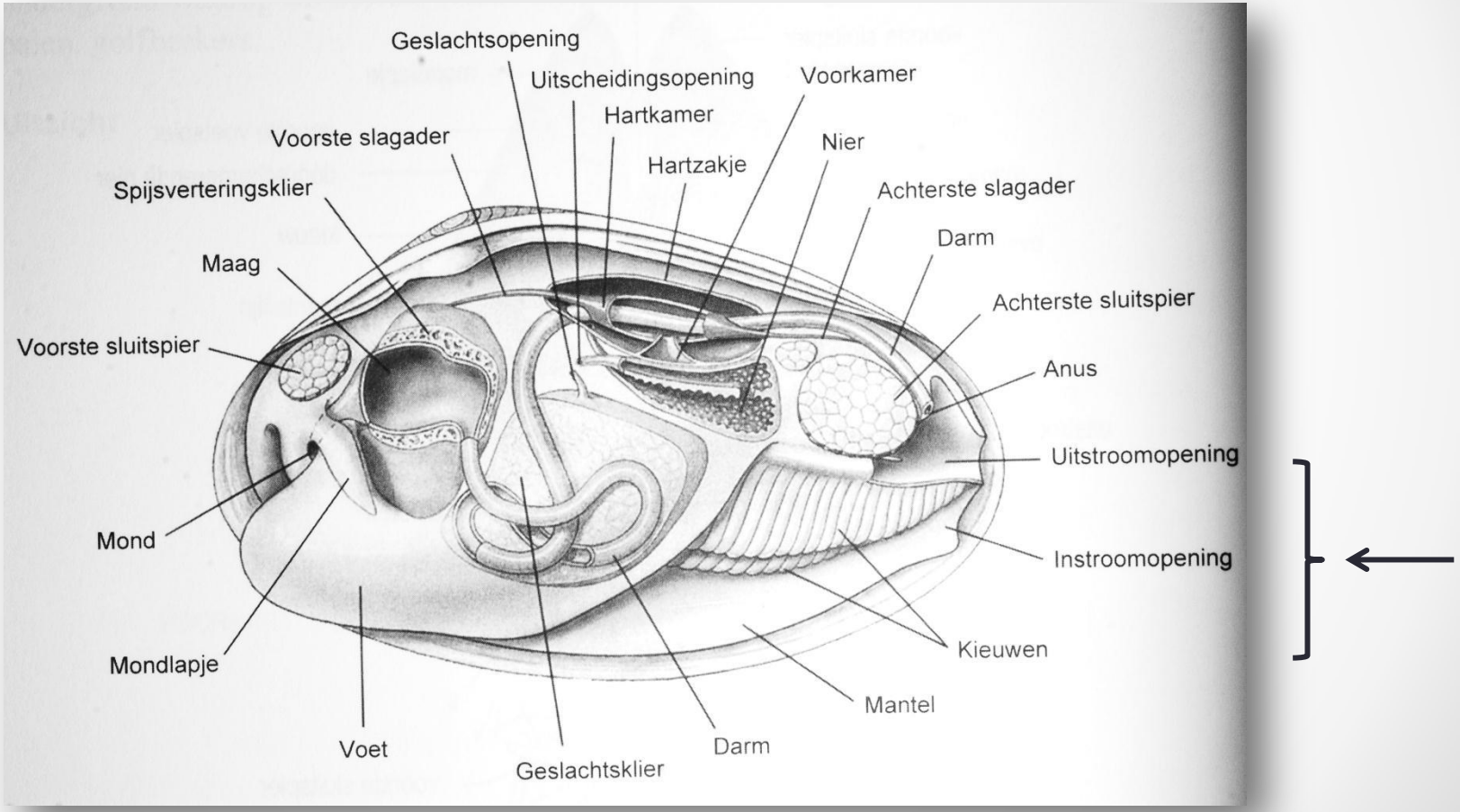


- The foot is sometimes a powerful arm;

- **The valves can be closed with two powerful muscles;**

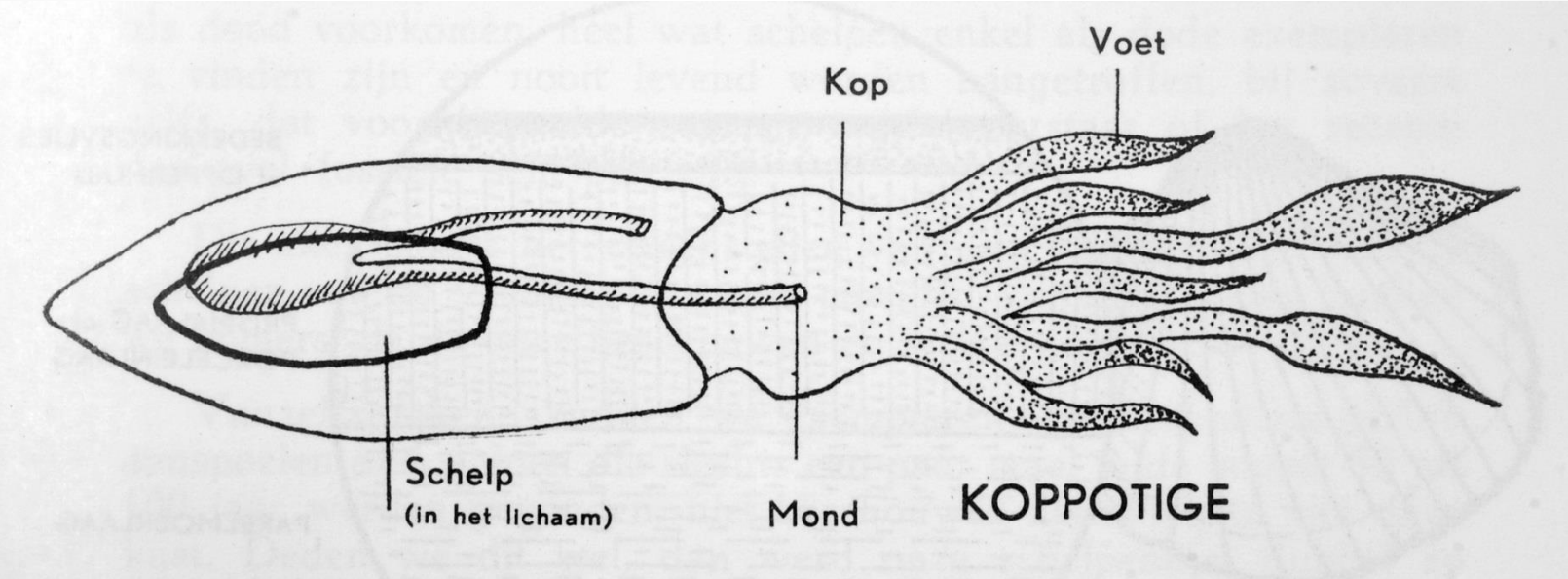


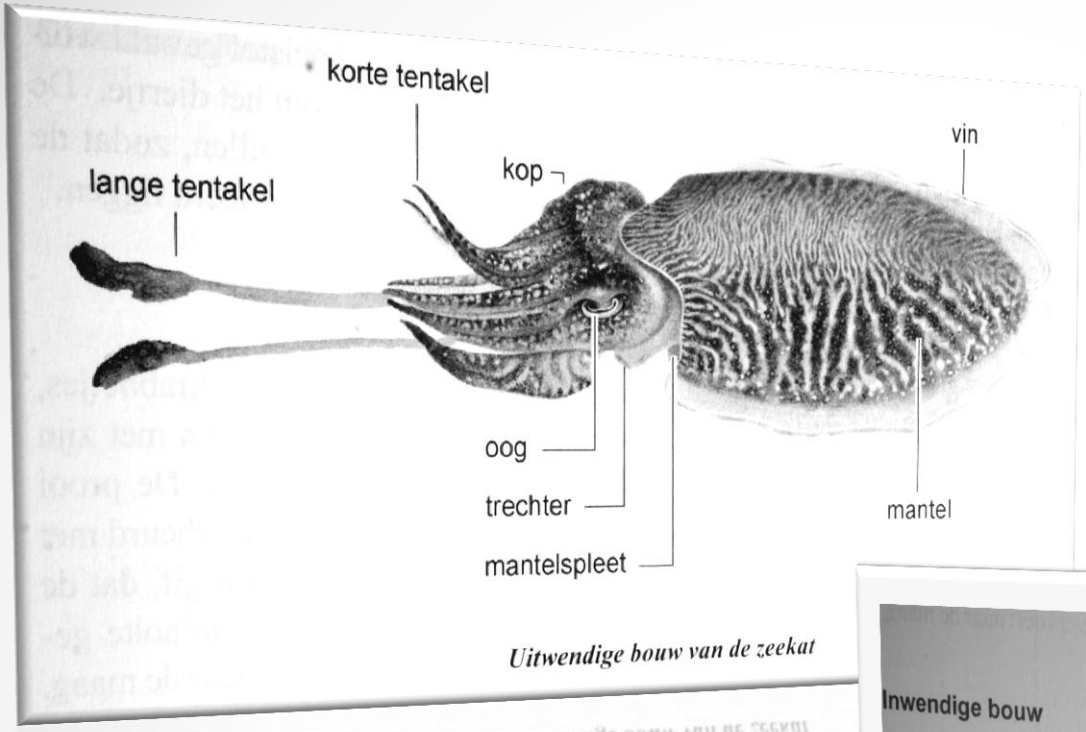
- **Inside the mantle there are gills and two inlets;**



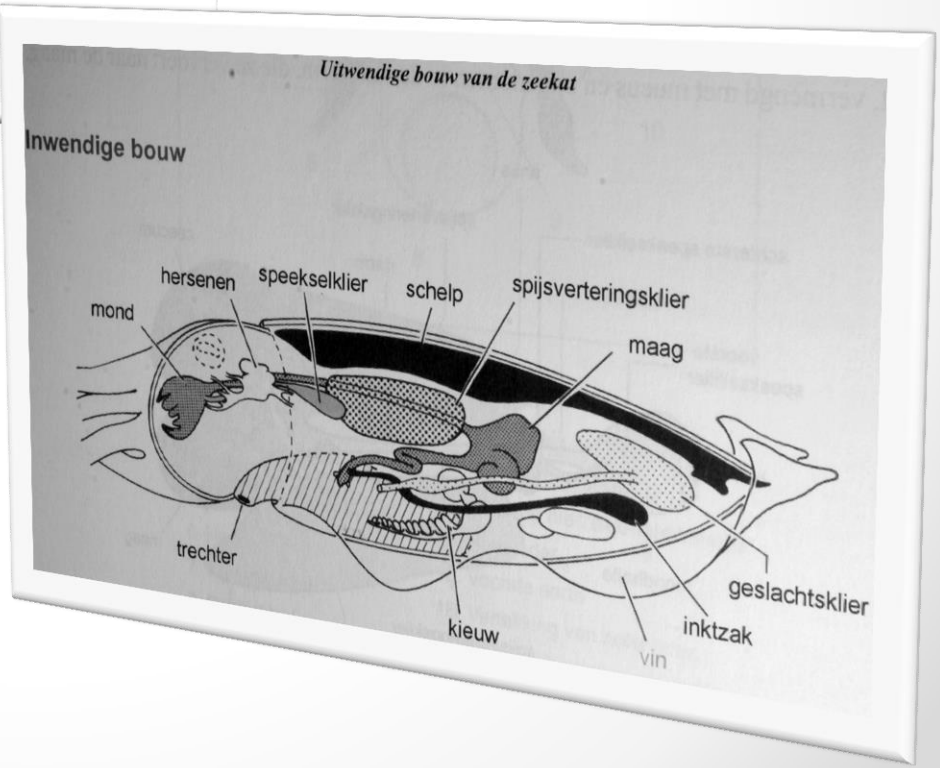
The cephalopods

- The most highly developed molluscs;
- The foot is next to the head like a bunch of appendices;





Uitwendige bouw van de zeekat

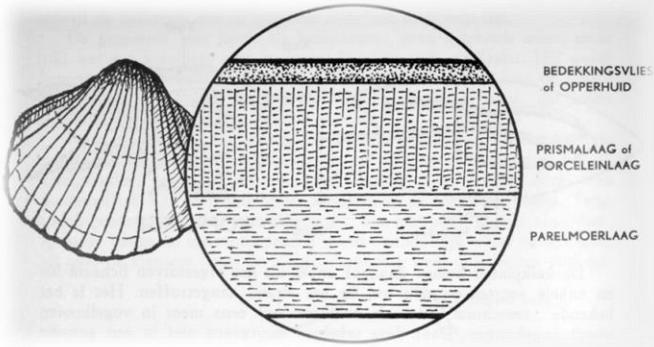


- Most species do not have any shell: it is reduced to a calcareous plate in the body, better known as 'sea foam' washed ashore after a heavy storm = lime source for birds.

Aangespoelde sepiaschelp (zeeschuim)

Something about the shell itself

- A shell is built up by the cells in the mantle: soluble invisible calcium salts are converted to insoluble lime;



- Solid protection;

- Different layers:
  - outer layer = soft epidermis (no lime);
  - thick and solid middle layer = porcelaneous layer: consists of calcareous crystals perpendicular to shell surface;
  - lower layer or pearl layer = horizontal calcareous plates.

The importance of shells for humans

- In the whole history of humankind: a considerable role in daily life;

  * as a source of food:

* as utensils;
* in jewelry;
* as decoration;

* as collecting object, especially 'exotic' shells;
* as study object: detection of new species;
* as exchange or payment method, eg the cowry shells;
* in religious life,
  eg the scallop shell;

Cypraea moneta

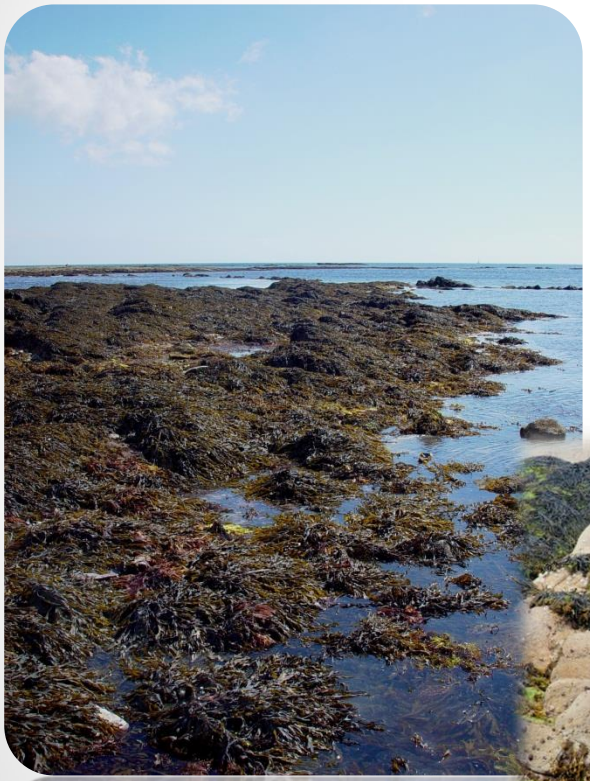
Santiago en Shell

De sint-jakobsschelp dankt zijn naam aan Jakobus de Meerdere die vereerd wordt in Santiago de Compostela. Santiago betekent sint-jakob. Op weg naar het bedevaartsoord dragen pelgrims nog altijd dit symbool. Vroeger gaf het bescherming tegen struikrovers die de dragers vanuit een erecode met rust lieten. In die tijd was het weekdier bijna uitsluitend voor de kust van die regio te vinden. De schelp is ook het beeldmerk van de oliemaatschappij Shell. Die toont het slot naar beneden, de pelgrims dragen het slot naar boven.

How and where do we search for shells?

- Search for yourself:
  * fascinating and educational;
  * time consuming and sometimes expensive (traveling to distant countries);
  *Belgian coast: sand with few species, except after storm and during sand suppletions;

* Normandy and Brittany (France): not so far and very interesting; Mediterranean coasts: no tides and therefore only interesting for divers;



* Shell grit research by using a microscope;

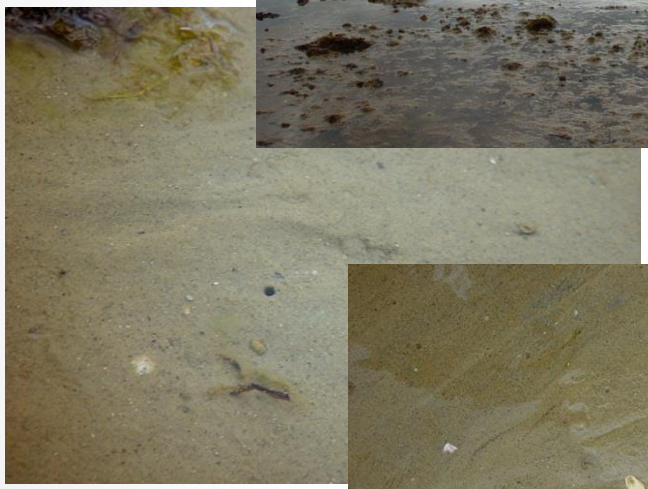
- Rocky shores: especially gastropods, preferably at very low tide;

- Requirements:

  - field bag with:
    - a filling-knife and oyster knife to remove mollusks on or beneath stones;
    - plastic jars: empty and/or filled with alcohol
    - plastic bags;
    - labels;
    - a pair of tweezers;
    - magnifying glass;
    - a rake;
    - eventually a landing net;
    - a raincoat;
    - a pair of boots;
    - a camera (do not forget the memory card!)


SILSTAR


zout



- In open sea:
  - * snorkeling:
    - ° the equipment is cheap;
    - ° depth limited to 10 m;
  - * diving with bottles:
    - ° relatively expensive;
    - ° only for adults;
    - ° experienced divers: up to 40-60 m;
    - ° the best method on coral reefs in tropical waters;
  - * sea fishing:
    - ° molluscs are edible: major by catch of the fish industry;
    - ° fish markets in southern Europe, Asia and Africa;
    - ° directly from fishing nets in harbours


EMILIE
EMILIE

- Exchanging or buying shells:
    * shells from Belgian and French coasts are sent to foreign collectors abroad;
    * spare specimens of corresponding friends from different countries (South Africa, New Zealand, Florida, ...) are exchanged with other collectors;
    * lists of addresses are obtained through societies;
    * acquisition via:
        ° shops;
        ° shell shows;
        ° clubs;
        ° internet (eg eBay)

Preparing shells

- Shells occupied with barnacles, seaweed and sand or mud:
    * wash with water and soap + toothbrush;
    * clean with a steel brush or knife, eventually with a mini drilling tool (eg 'Dremel');
- Prepare living molluscs as soon as possible:
    * in a freezer compartment during a couple of days;
    * cook for ten minutes (except glossy shells!);
    * remove animals with a hook or tweezers;
    * put cotton wool in the aperture of gastropods and glue the operculum;
    * very small shells: keep them in alcohol and let them dry later on.

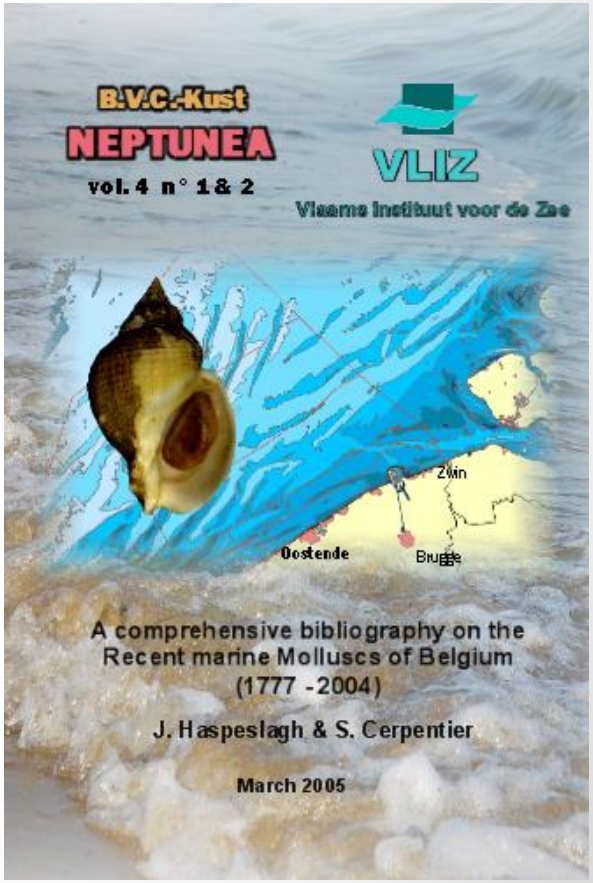

TIMER
STOP+GO
AEG


Vitafluor
STANLEY

Creating a collection: determination and arrangement

- Record all information about the location:

  * exact location, date, depth and type of habitat (sand, mud, kind of weeds, etc.);
  * a register with list, file cards or database on PC of all shells in the collection;
  * identification: proper name for each type: use of books, magazines or websites.




SEASHELLS of the WORLD
SHELLS
COMPENDIUM OF SEASHELLS
MOLLUSCA
A. W. B. Powell
SHELLS OF QUEENSLAND AND THE GREAT BARRIER REEF
Shells of the Philippines
SHELLS OF THE WESTERN PACIFIC IN COLOR
Indonesian Cibells
Seashells of the Egyptian Red Sea
Seashells of Oman
GUIDE TO SHELLS OF PAPUA NEW GUINEA Alan Hinton
GUIDE TO AUSTRALIAN SHELLS Alan Hinton
INDONESIAN SHELLS II
INDIAN SEASHELLS (Part - 1)
Polyplacophora and Gastropoda
MOLLUSCOS AUSTRALES
MARINE SHELLS OF NORTHEAST FLORIDA
Marine Gastropods
Coquillages et escargots de Guyane
CARIBBEAN SEASHELLS
SEA SHELLS
A FIELD GUIDE to SHELLS
Sea Shells of Tropical West America
AMERICAN SEASHELLS
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Encyclopedia of Texas Seashells
BIVALVE SEASHELLS OF WESTERN NORTH AMERICA
coquillages de polynésie
Rare Shells of Taiwan in color T.C.LAN
AUSTRALIAN SHELLS
PHILIPPINE MARINE MOLLUSKS
PHILIPPINE MARINE MOLLUSKS
PHILIPPINE MARINE MOLLUSKS
PHILIPPINE MARINE MOLLUSKS
THE SEA SHELLS
AUSTRALIA'S MARINE SHELLS
SEASHELLS OF CHINA
CHINA OCEAN PRESS
SHELLS OF VIETNAM
SEASHELLS OF EASTERN ARABIA
BOSCH • DANCE • MOOLENBEEK • OLIVER

Familienaam .....

Latijnse naam .....

Nederlandse naam .....

Vindplaats .....

Datum .....

Verzameld door .....

Geschenk van .....

Gevist door .....

Milieu ..... Diepte .....

Levend - met vleesresten - leeg .....

Aankoopprijs ..... Handelswaarde ..... Gekocht van .....

Afgevoerd uit de collectie ..... Reden .....

Bijzonderheden: .....

.....

No.	
Foss.	Recent
Inl.	N. Inl.

Fig. 2. Model van een systeemkaart

Naming of shells

- Any organism has a scientific name derived from Latin or Greek.

- This name consists of two parts: the first (with uppercase letter) refers to the genus (compare it with a family name), the second (lowercase) refers to the species or species (cf. the first name of a person)

Example: *Homo sapiens* ('the wise human')

Mytilus edulis ('the edible mussel')

Clavatula xanteni Nolf & Verstraeten, 2006

Genus species authors date

Types of collections

- Reference collection:
  shells of a certain family (eg cowry shells, mussels, whelks, ...) or a collection of shells from one specific area, eg European shells, shells from India, New Zealand or South Africa.

- Aesthetic collection: shells outstanding by their shape, pattern or colour arranged in display cabinets;

- A scientific collection with priority on accurate and detailed information:
    * specimens in boxes (cardboard or plastic) in cabinets with drawers;
    * labels, file cards or a database file on PC


MITRIDAE
COSTELLARIIDAE
VOLUTOMITRIDAE
OLIVIDAE
OLIVIDAE
OLIVIDAE
OLIVIDAE
OLIVELLIDAE
OLIVELLIDAE
TEREBRIDAE
MURICIDAE
MURICIDAE
MURICIDAE
MARGINELLIDAE
TEREBRIDAE
MITRIDAE
CLAVATULIDAE
DRILLIDAE
TURRIDAE


CALYPTRAEIDAE
OVULIDAE
FICIDAE

- **Conclusion:**

  - A fantastic hobby;
  - An important educational dimension;
  - Travelling a lot;
  - Social contacts: you get to know a lot of people at home and abroad (learning languages!);
  - Disadvantages:
    * can become an (healthy) addiction;
    * a collection can take a lot of space;
    * pay attention to dust, light, moisture and especially mold.

Collection F. Nolf

Frequently asked questions

- How can you determine the age of this shell?

- Can you just bring living molluscs at home and kill them?

- What is the scientific and commercial value of shells?

Quiz

1. What is an 'operculum'?
2. Give an another word for 'radula'.
3. How many plates do the chitons contain?
4. What does the Latin word "mollis" mean?
5. Which symbol is used by the company 'Shell'?
6. Why is it so hard to find shells along the shores of the Mediterranean Sea?
7. Why can't we cook glossy shells?
8. What does '*Mytilus edulis*' mean?
9. Why does we use Latin or Greek for the names of living organisms?
10. In how many ways can you collect shells?