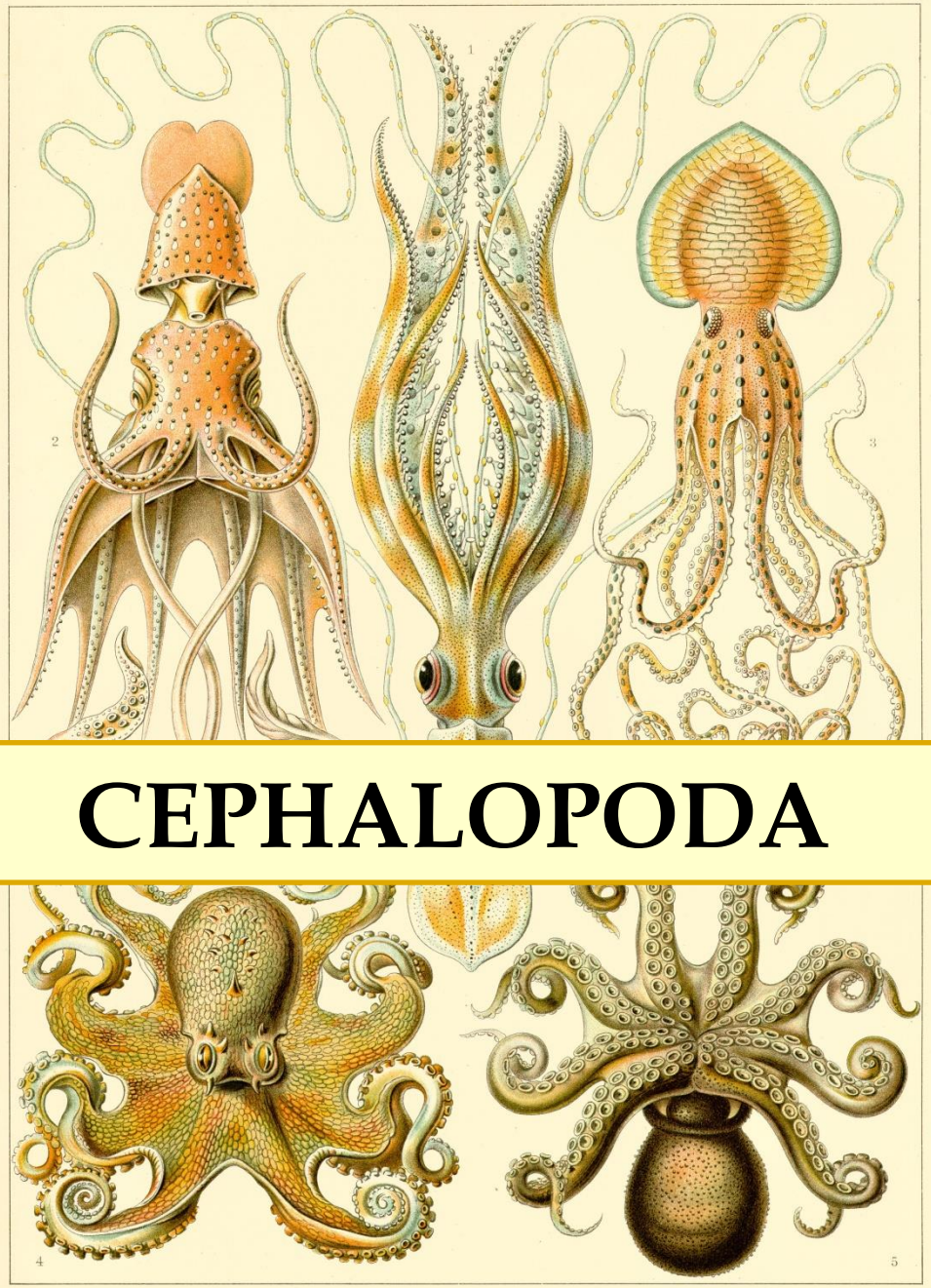
MOLLUSCA (MEKUŠCI)

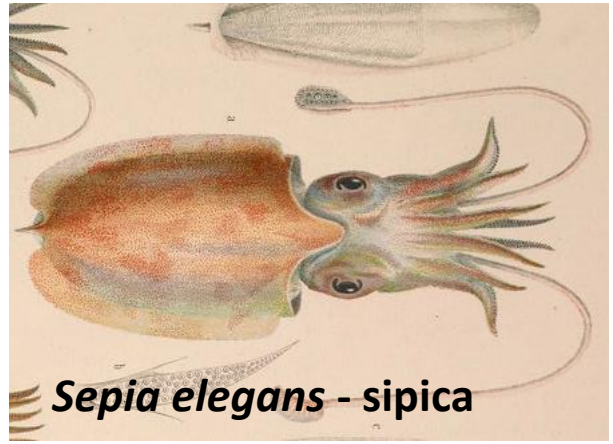




CEPHALOPODA

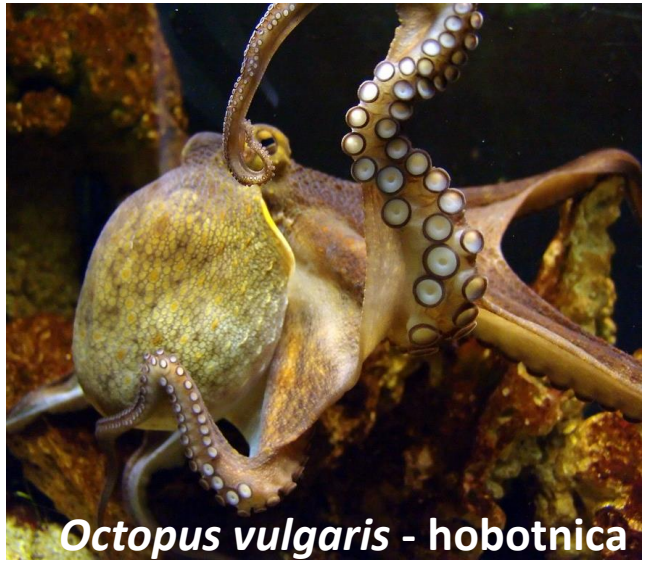
Gamochonia. — Trichterkraken.







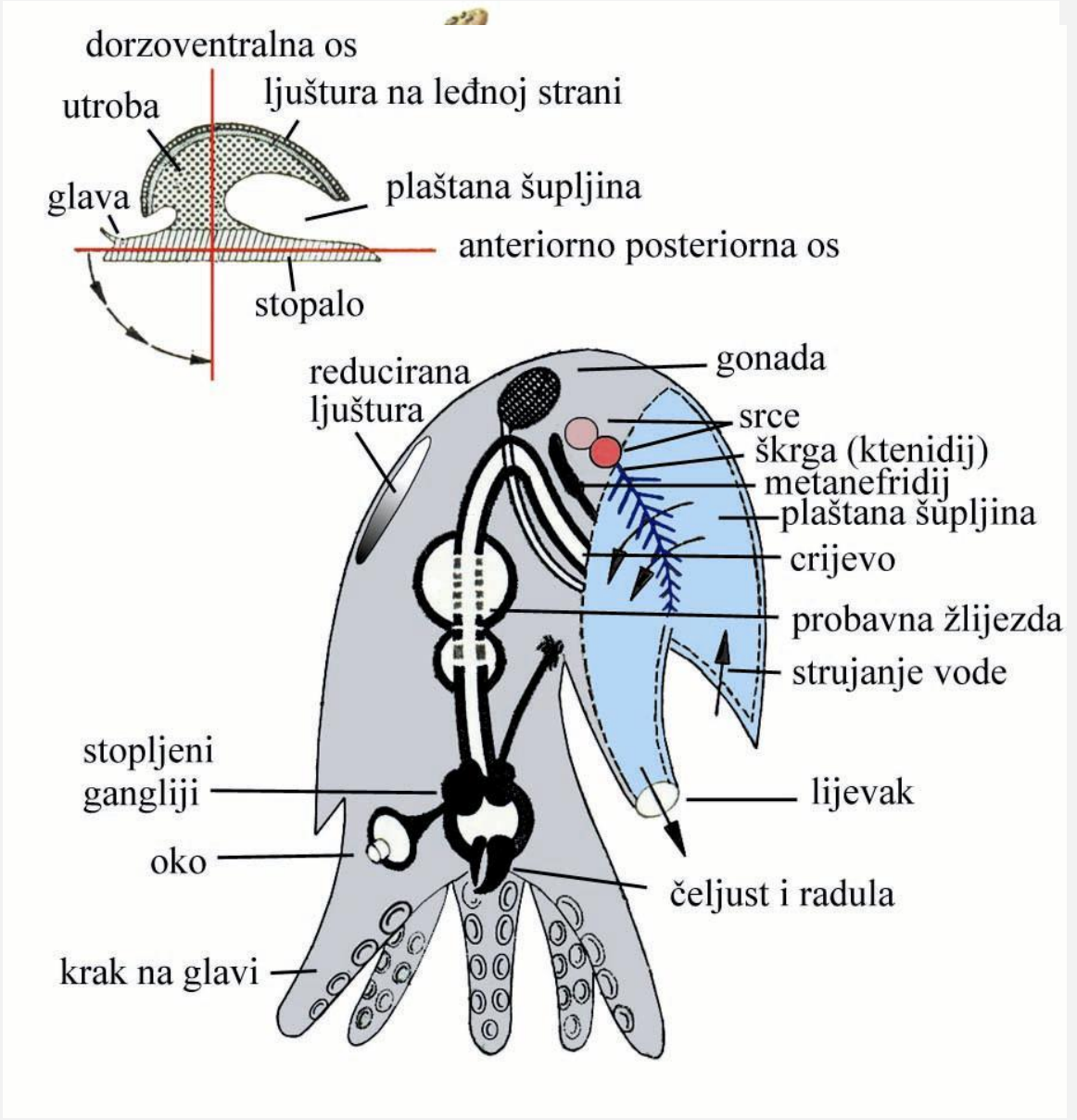

Eledone moschata - muzgavac





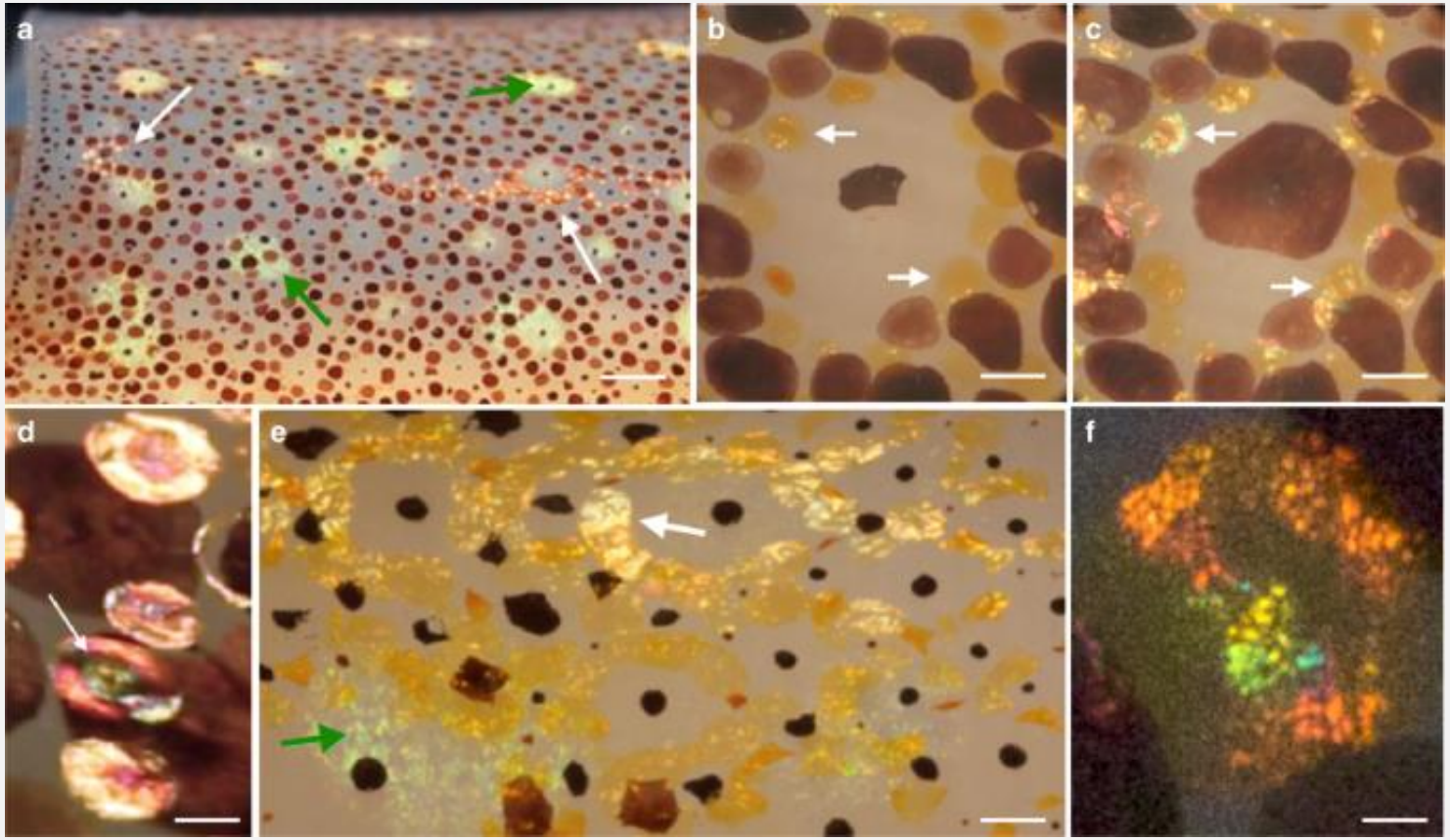
Razred: Cephalopoda (glavonošci)

- reorijentacija glavne osi i reorganizacija građevnog plana
- podjela tijela na:
  - glavu
  - vrat
  - trup
- stopalo preobraženo u krakove (s prianjaljkama) i lijevak (infundibulum)



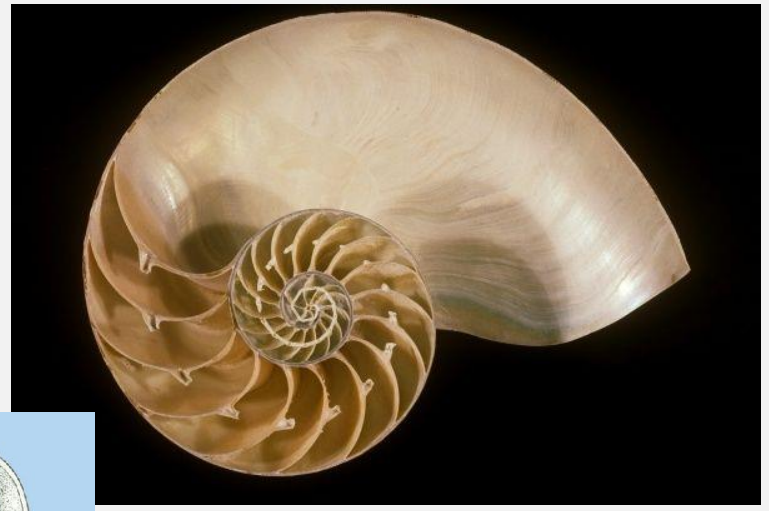
Razred: Cephalopoda (glavonošci)

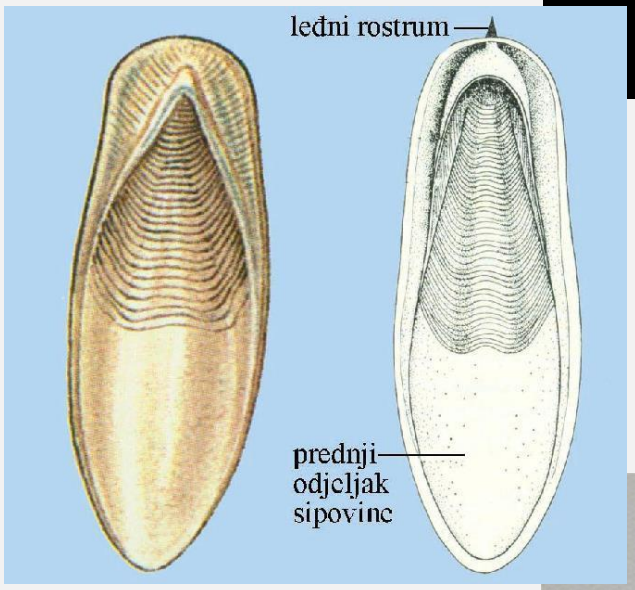
- pokrovni sustav:
  - epiderma – sluzne žlijezde i osjetilne stanice
  - dermis/hipoderma:
    - kromoatofori
    - leukofori
    - iridociti
    - fotofori



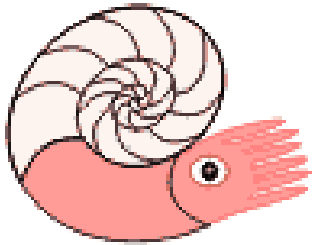
Razred: Cephalopoda

- ljuštura
  - ektokohleatni – vapnenački vanjski skelet
  - endokoleatni – reducirana ljuštura prekrivena plaštom/nema je:
    - sipovina
    - lignjino perce
    - u osmerokračnjaka zakržljala
- hrskavica









Nautilus



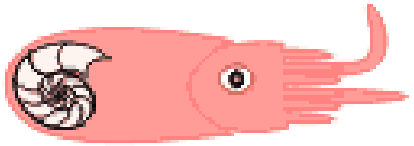
Sipa *Sepia*



Belemniti



Lignja *Loligo*



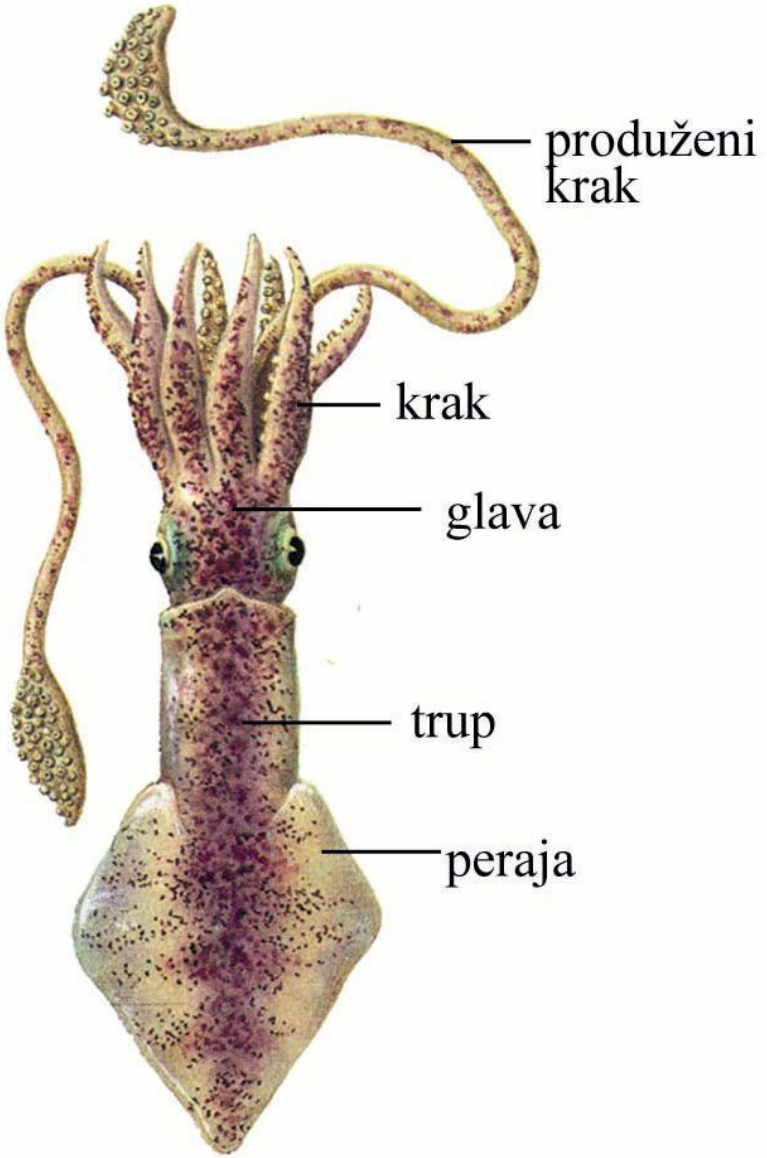
Spirula



Hobotnica *Octopus*

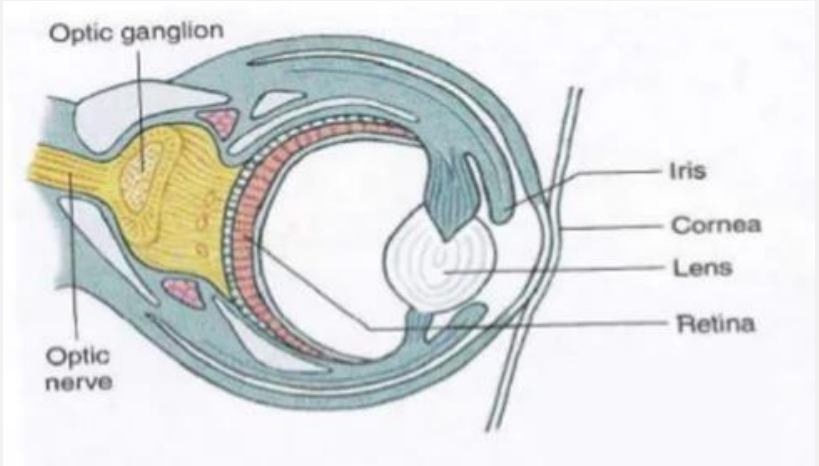


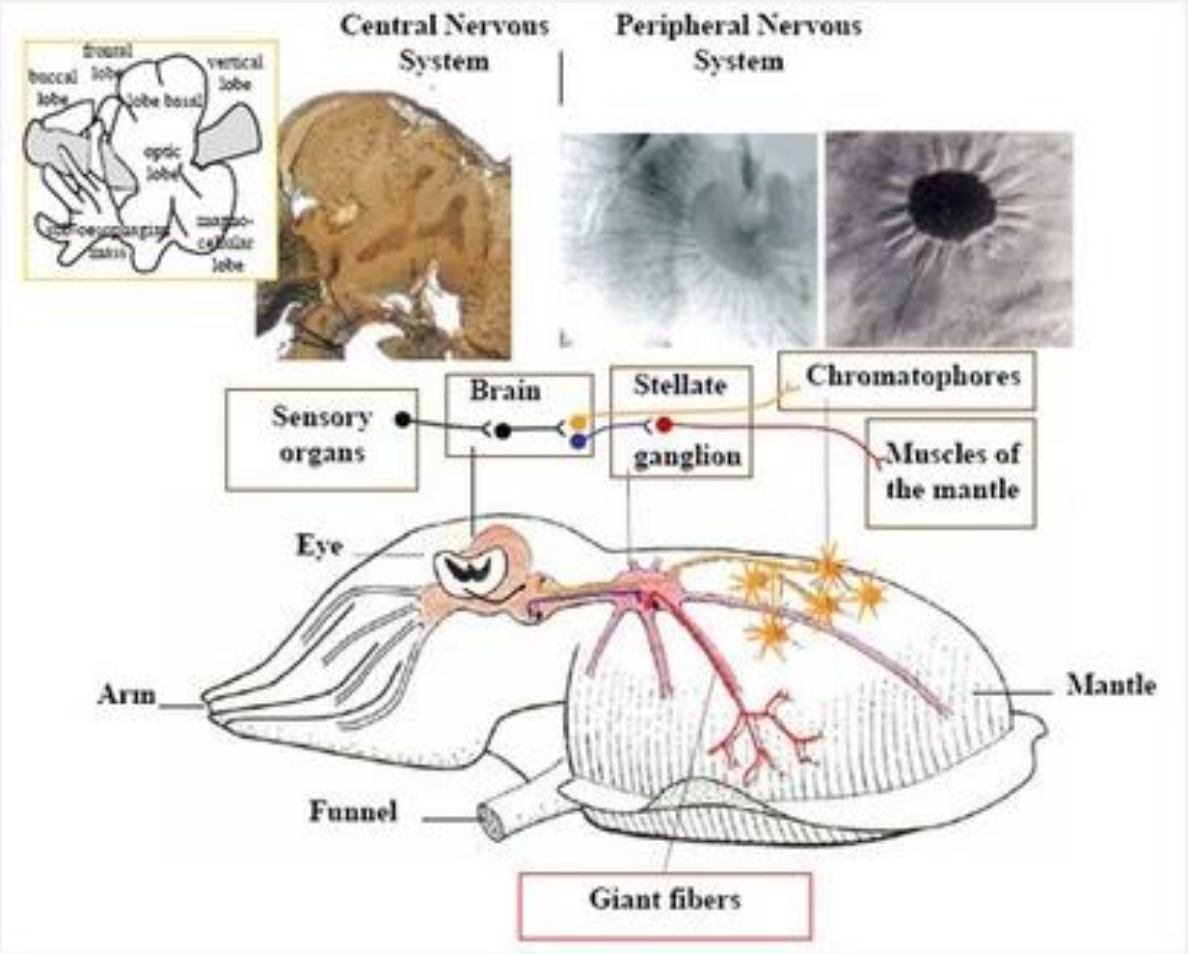




Razred: Cephalopoda

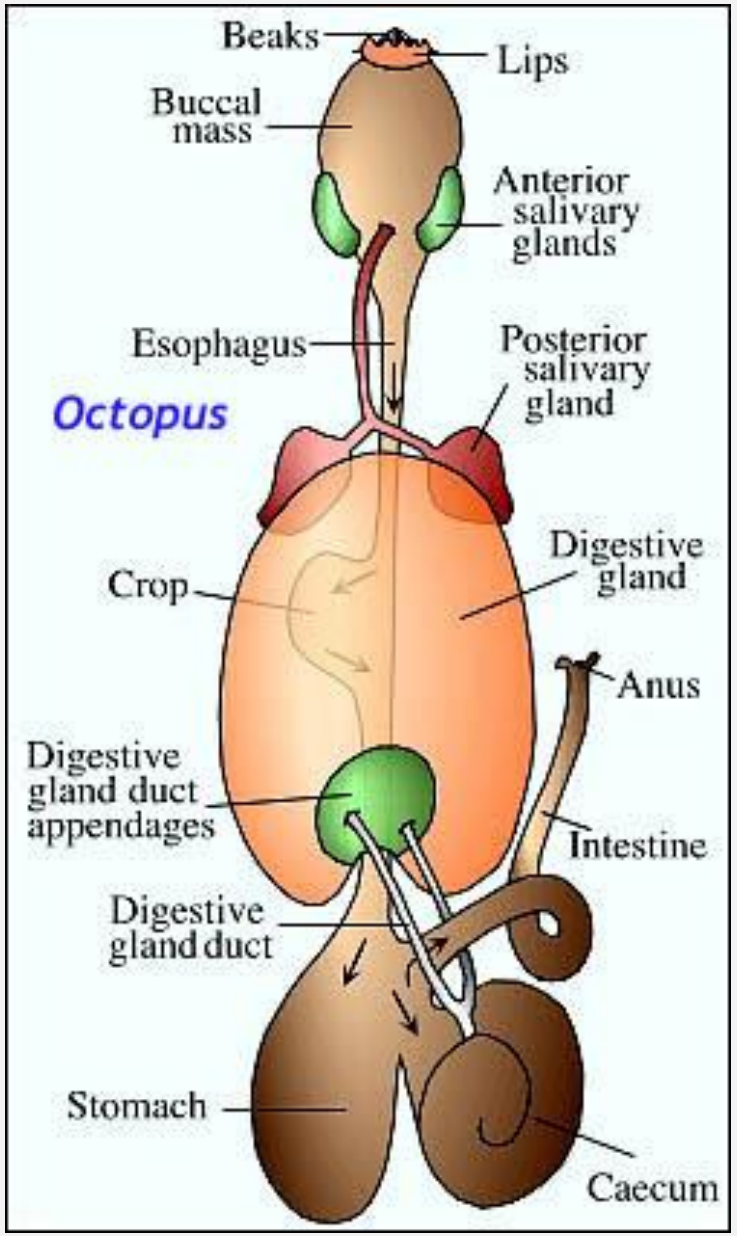
- cefalizacija:
  - koncentracija živčanih stanica u glavi – skraćivanje konektiva i komisura → centralni živčani sustav
    - motorički i osjetilni živci
    - zvjezdasti ganglij – povezan s mišićima plašta
- osjetila:
  - oči
  - statocisti
  - kemoreceptori





Razred: Cephalopoda (glavonošci)

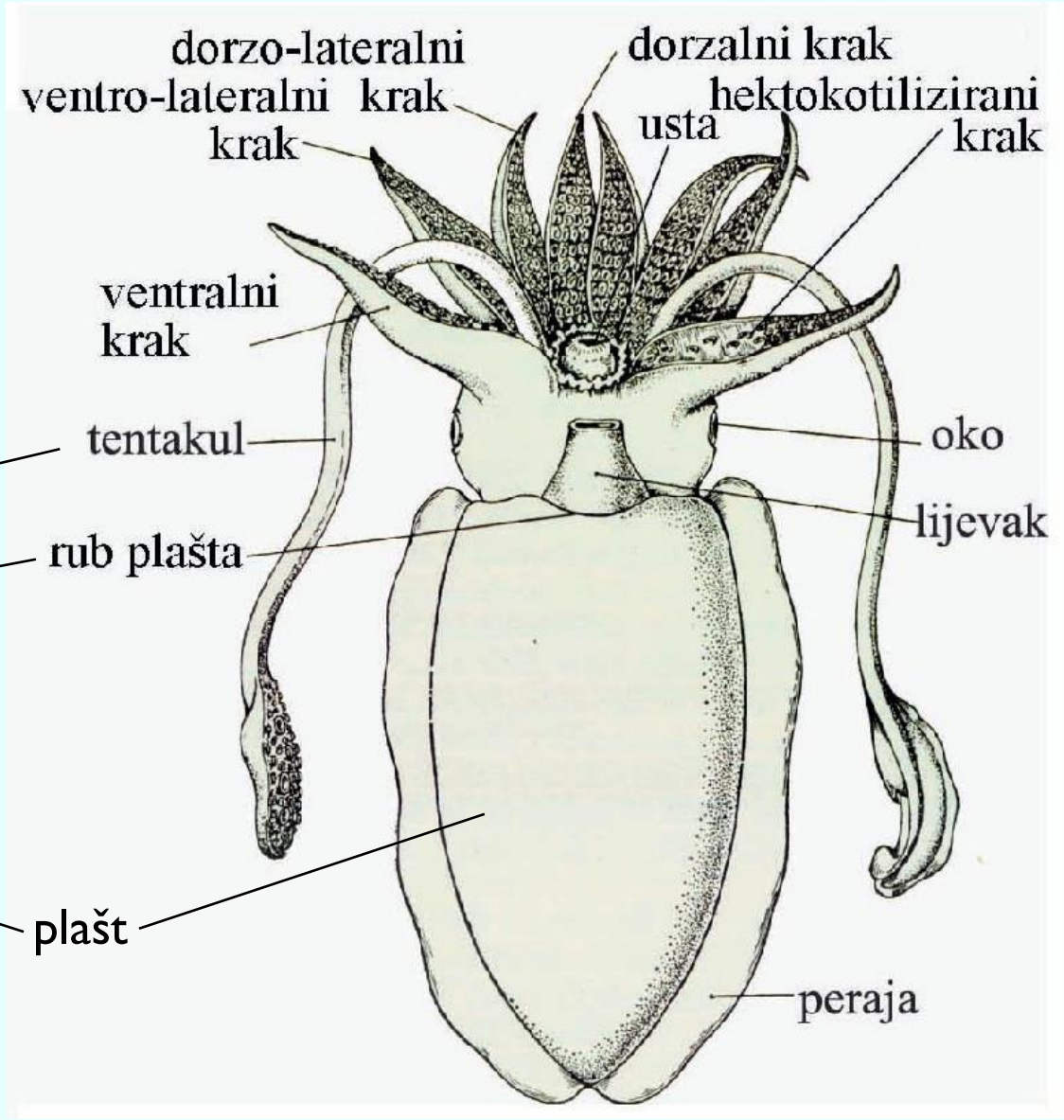
- probavni sustav
  - usna šupljina – čeljust (papigin kljun)
  - ždrijelo – odontofor + radula
    - par slinskih žlijezda
  - hepatopankreas
  - crijevo
    - žlijezda s crnilom
  - ekstracelularna probava



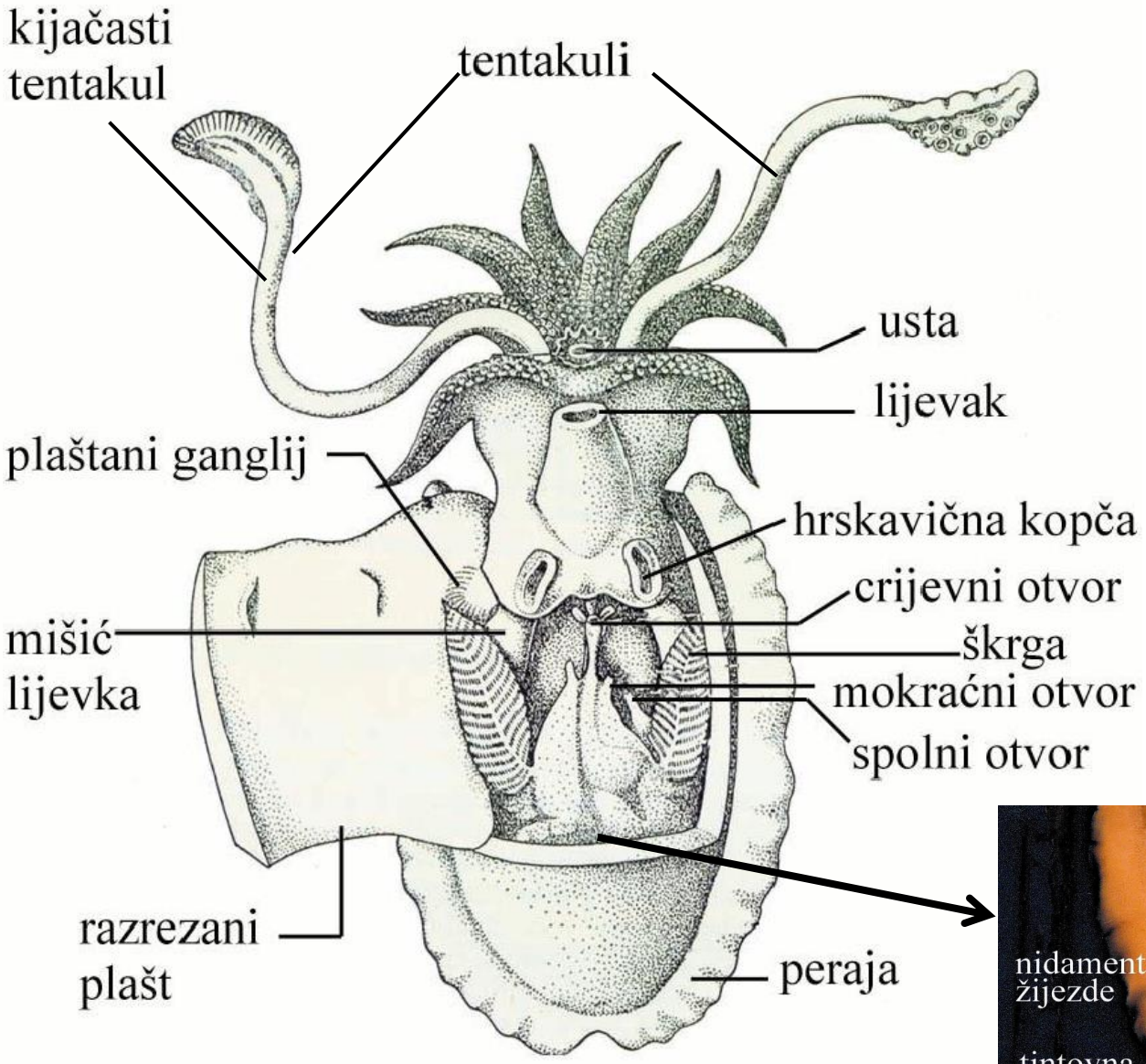
Podrazred: Dibranchiata (dvoškržnjaci)

Sepia officinalis

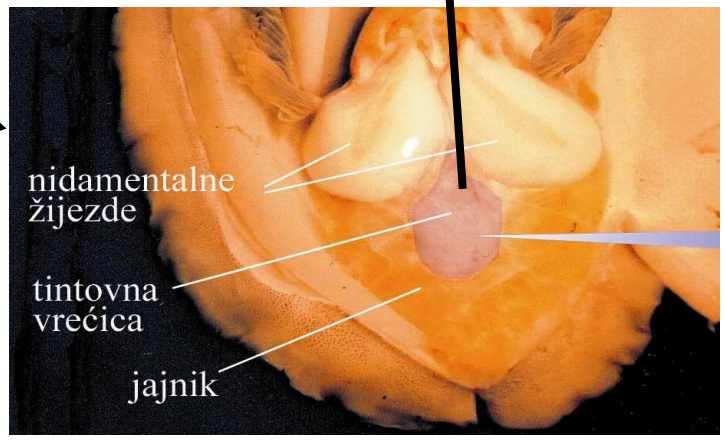




Sepia officinalis - organi plaštane šupljine

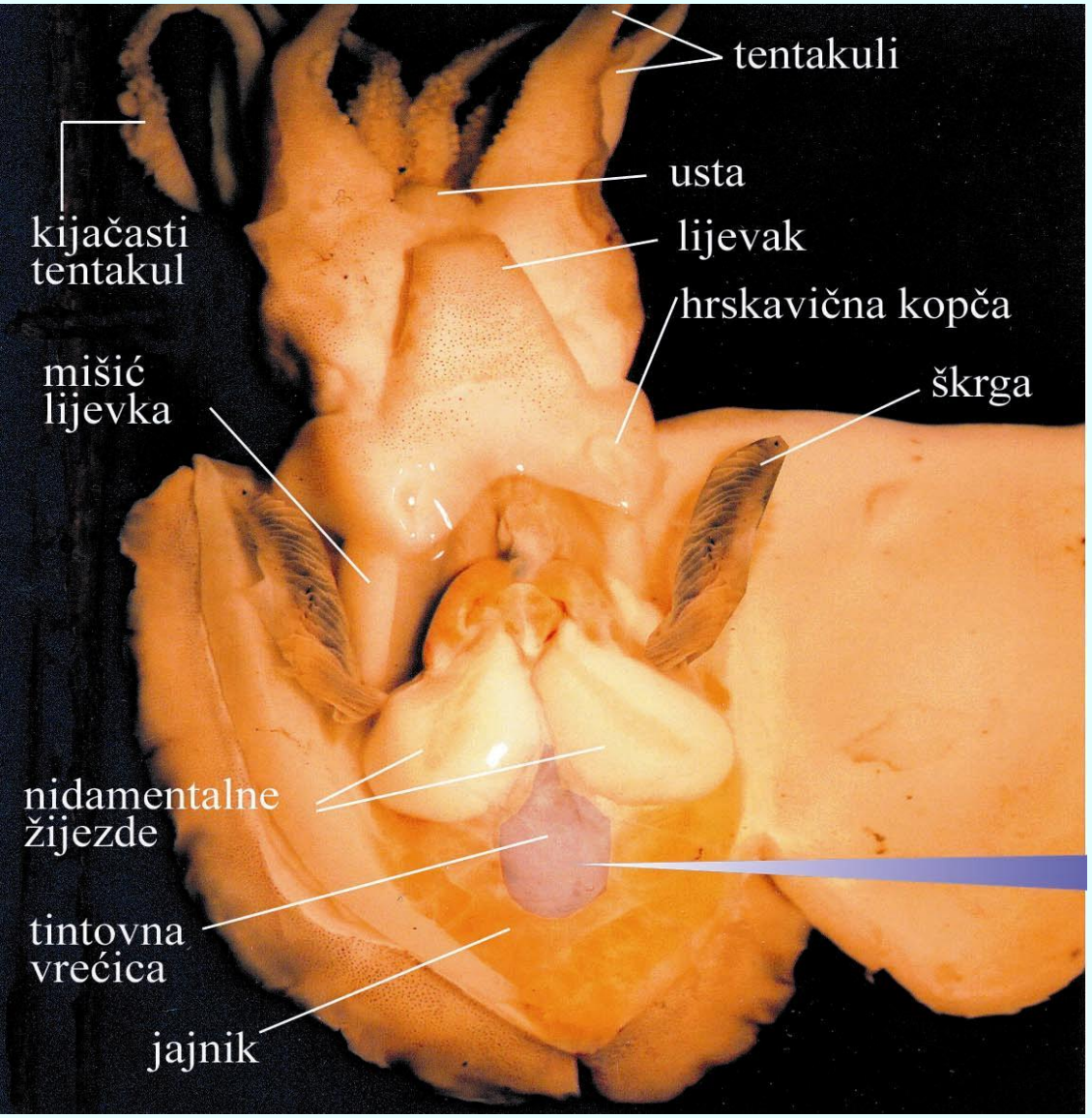


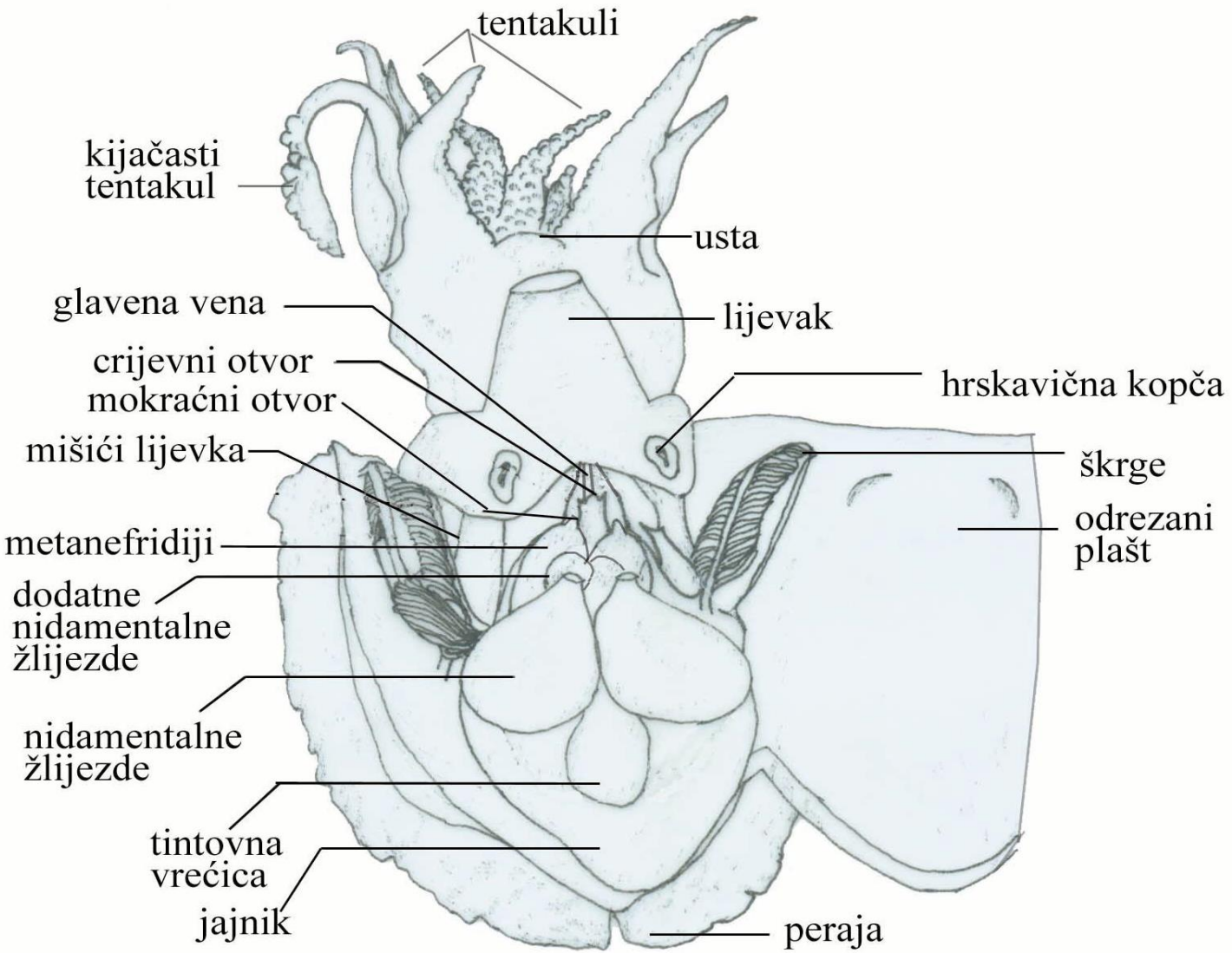




https://www.youtube.com/watch?v=OueQ9kU36i0&t=3s

Sekcija glavonošca (lignje)

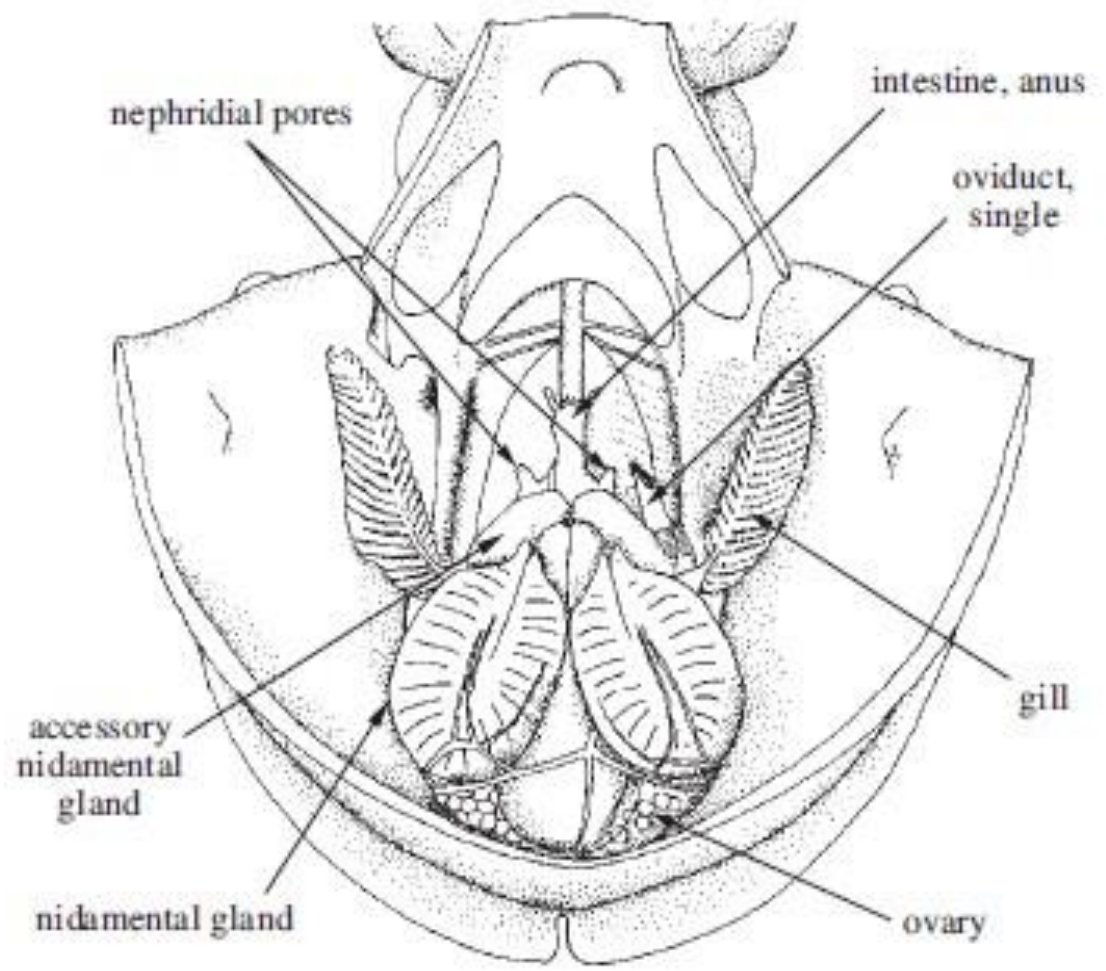

tentakuli
kijačasti tentakul
usta
lijevak
hrskavična kopča
mišić lijevka
škrga
nidamentalne žijezde
tintovna vrećica
jajnik


tentakuli
kijačasti tentakul
usta
glavena vena
lijevak
crijevni otvor
mokraćni otvor
hrskavična kopča
mišići lijevka
škrge
odrezani plašt
metanefridiji
dodatne nidamentalne žlijezde
nidamentalne žlijezde
tintovna vrećica
jajnik
peraja

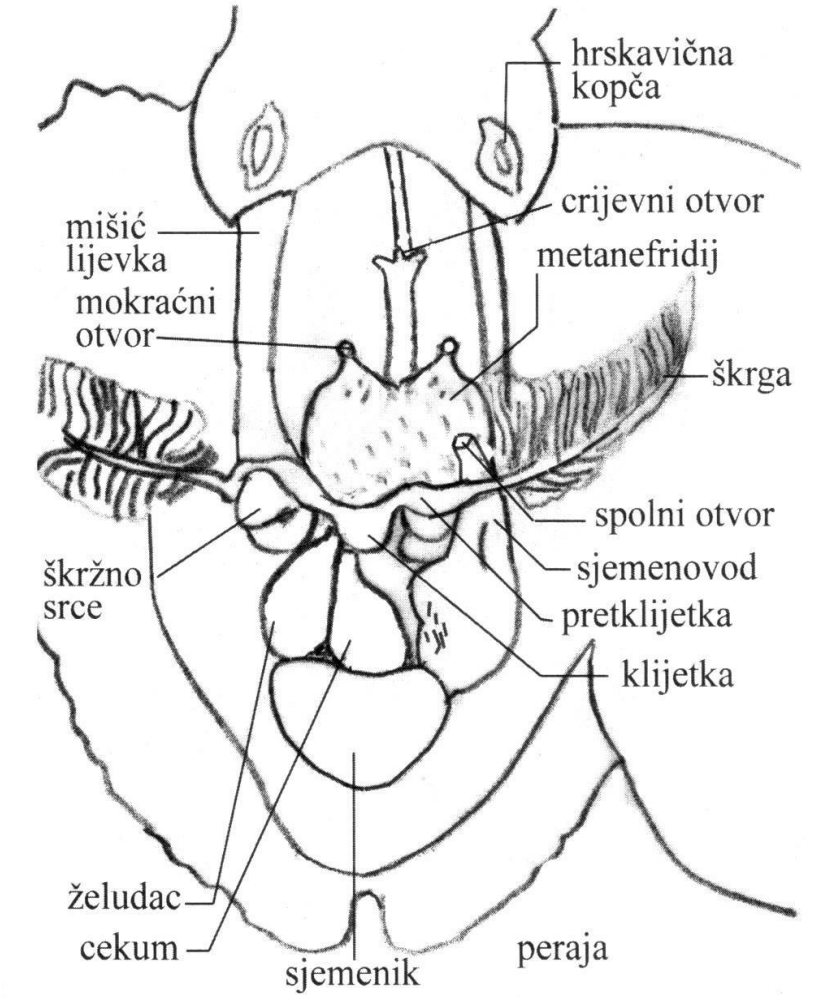
Unutrašnja građa

- nidamentalne žlijezde, dodatne nidamentalne žlijezde, vrećica za crnilo, metanefridij, mokraćni otvor, jajnik, jajovod, škrge, škržno srce, depressus infundibuli (mišić lijevka), plaštani ganglij (nidamentalne žlijezde i dodatne nidamentalne žlijezde imaju samo ženke)

ŽENKA



MUŽJAK



Razred: CEPHALOPODA – glavonošci

***Sepia officinalis* – organi plaštane šupljine:**

- LIJEVAK (INFUNDIBULUM)
- PLAŠTANI ZATVARAČI (HRSKAVIČNE KOPČE)
- PLAŠTANI GANGLIJ
- PLAŠTANA ŠUPLJINA
- MIŠIĆ LIJEVKA (DEPRESSOR INFUNDIBULI)
- ŠKRGE (KTENIDIJE)
- CRIJEVNI OTVOR
- MOKRAĆNI OTVOR (NEFRIDIOPOR)
- (VREĆICA ZA CRNILO)



♀

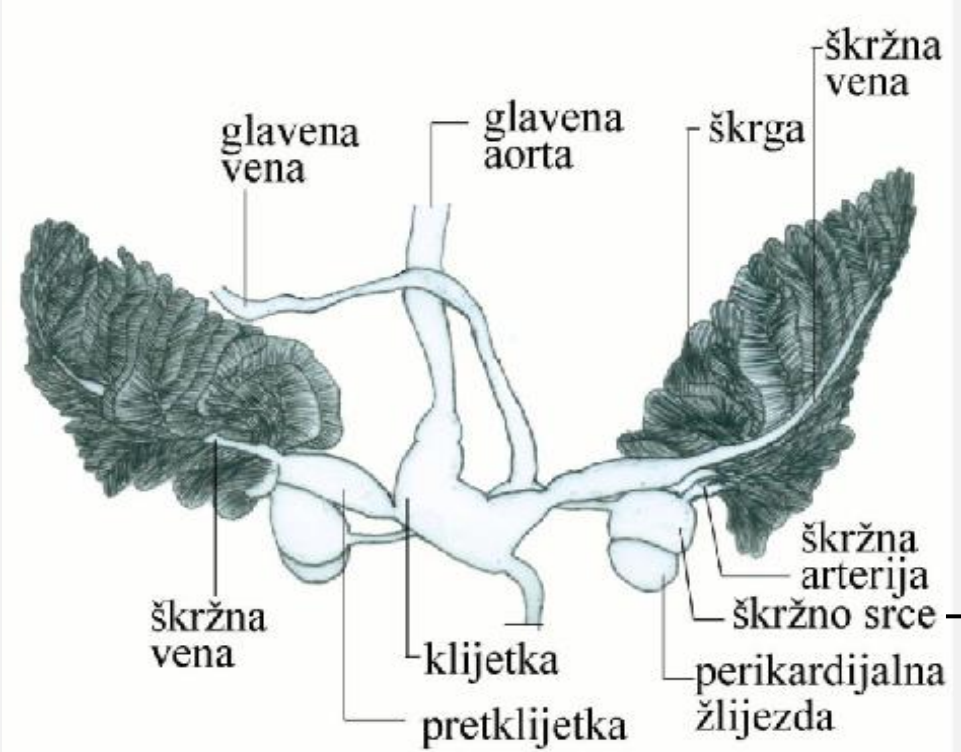
- JAJNIK
- NIDAMENTALNE ŽLIJEZDE (DODATNE NIDAMENTALNE ŽLIJEZDE)

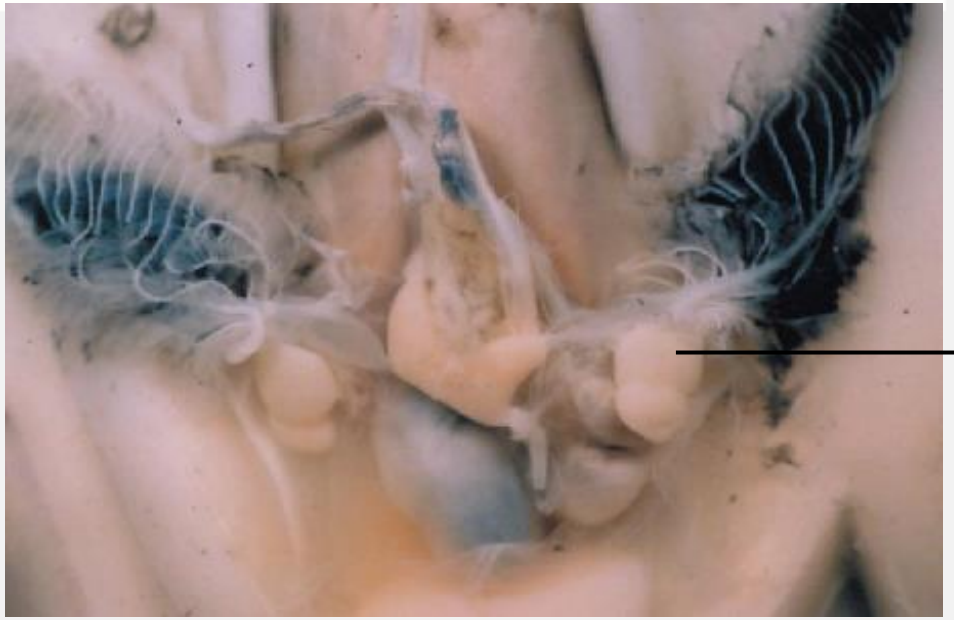
♂

- SJEMENIK
- OTVOR VREĆICE ZA SPERMATOFORE

Razred: Cephalopoda

- disanje
  - par škrga (ktenidija)
- optjecajni sustav
  - zatvoren
  - srce – dvije pretklijetke i klijetka
    - škržna srca
    - perikardijalna šupljina

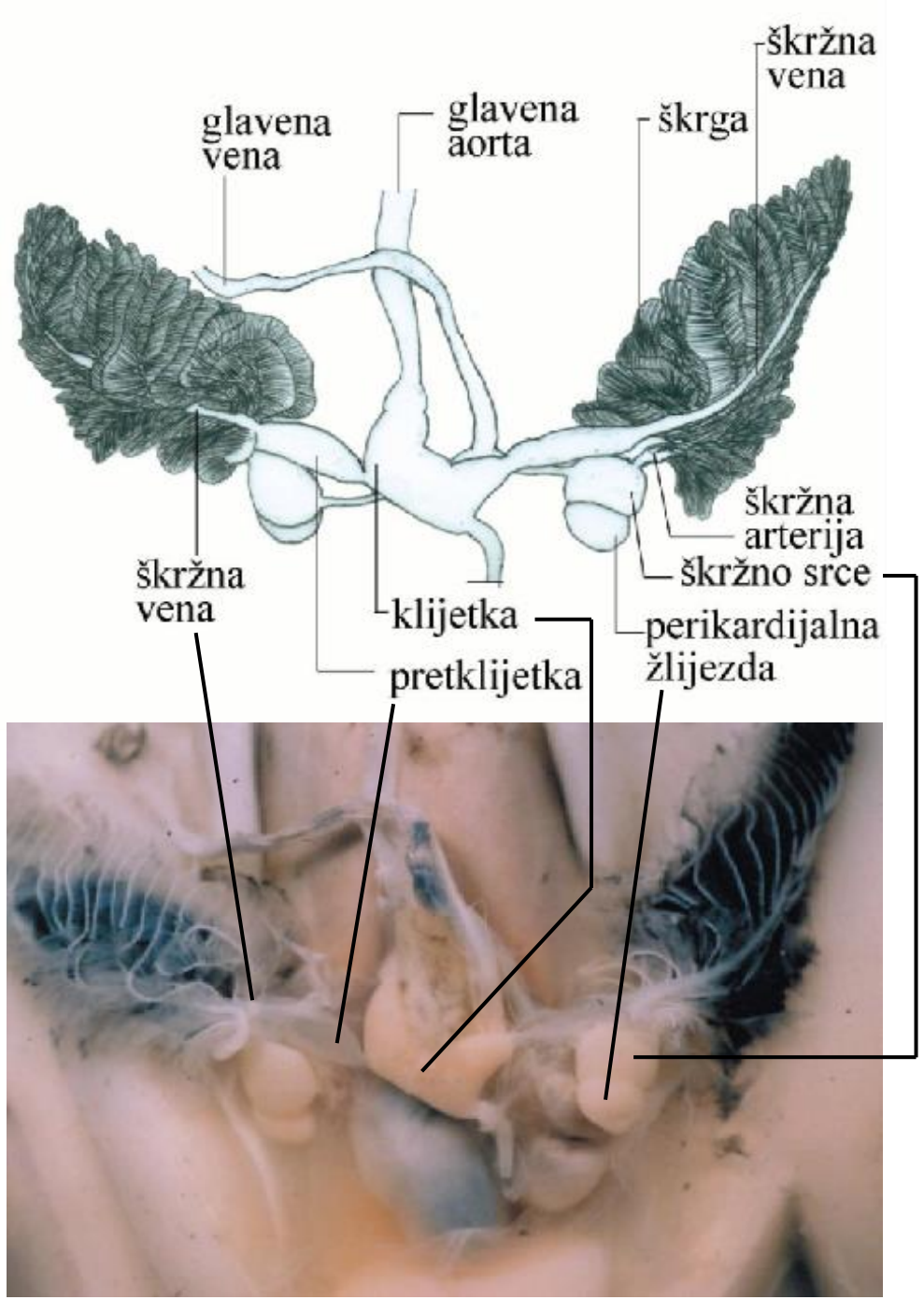




S. officinalis – optjecajni sustav

Smjer hemolimfe:

ktenidije → škržna vena → pretklijetka → klijetka → glavena aorta/stražnja aorta → unutrašnji organi (arterije i kapilare) → glavena vena → škržna srca → škržna arterija →ktenidije



Razred: CEPHALOPODA – glavonošci

***S. officinalis* – unutrašnja građa:**

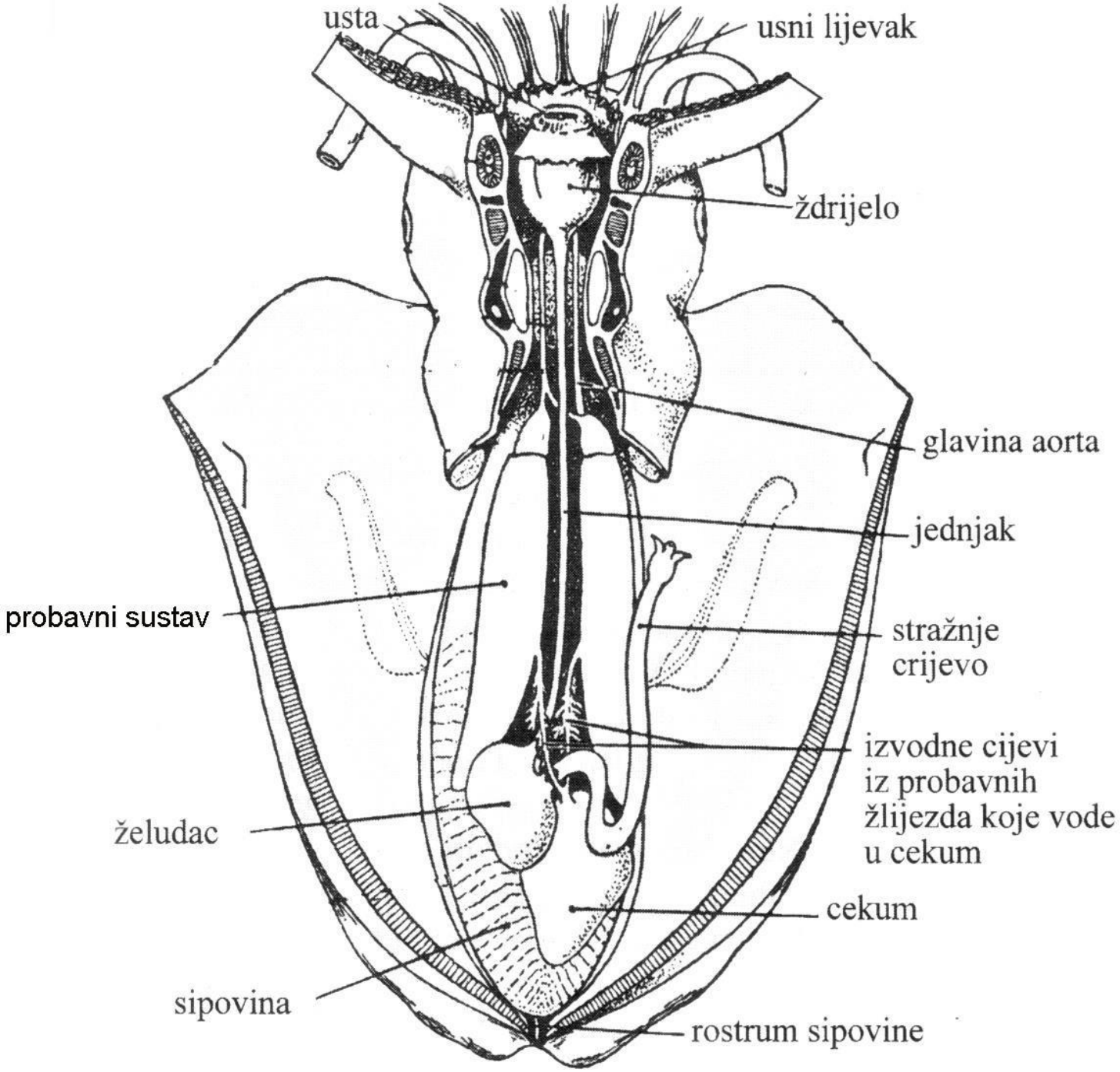
a) optjecajni sustav

- **GLAVENA VENA (1)**
- **ŠKRŽNO SRCE (2)**
- **PERIKARDIJALNA ŽLIJEZDA (2)**
- **ŠKRGA (2)**
- **ŠKRŽNA ARTERIJA (2)**
- **ŠKRŽNA VENA (2)**
- **PRETKLIJETKA (2)**
- **KLIJETKA (1)**
- **GLAVENA AORTA (1)**
- **TRBUŠNA AORTA (1)**

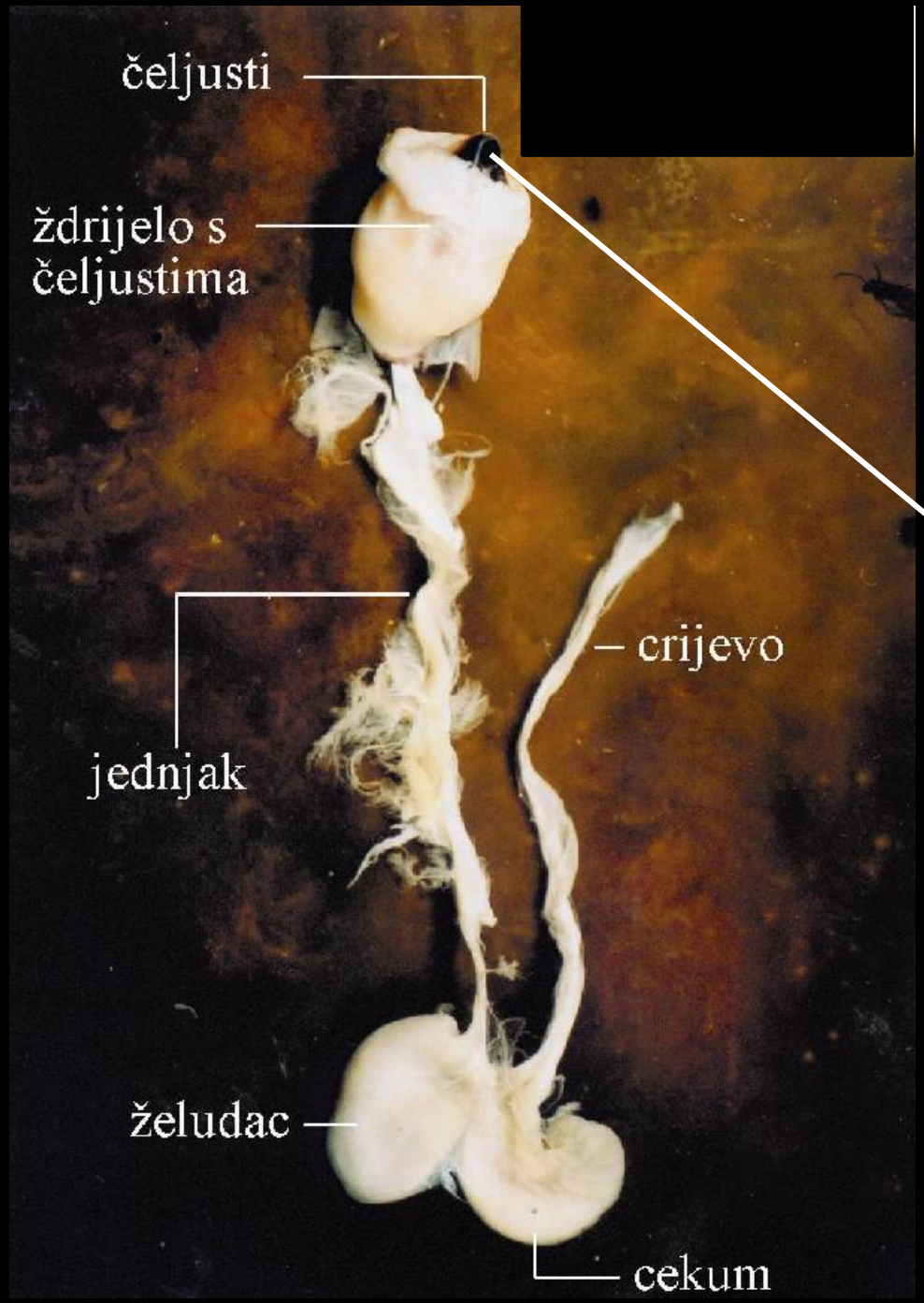


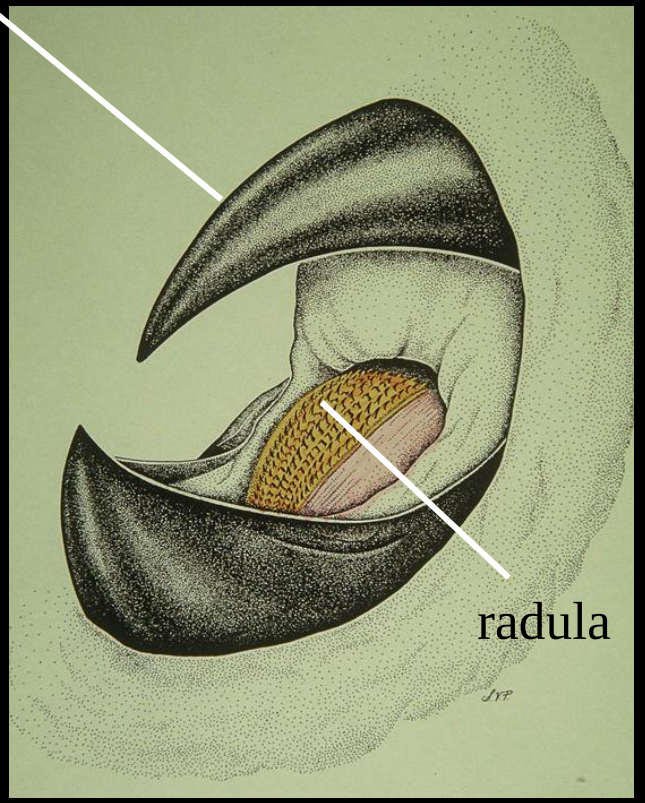
Probavni sustav

- usta, ždrijelo, jednjak, želudac, cekum, crijevo, crijevni otvor, žlijezda srednjeg crijeva, (izvodna cijev žlijezde srednjeg crijeva), vrećica za crnilo



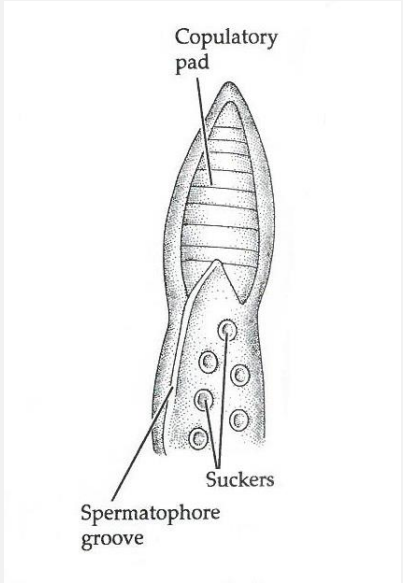
S. officinalis – probavni sustav

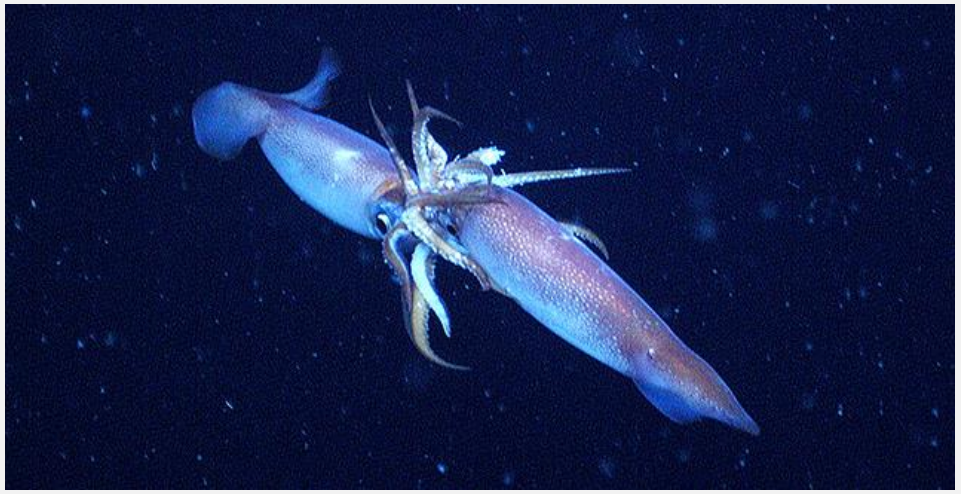




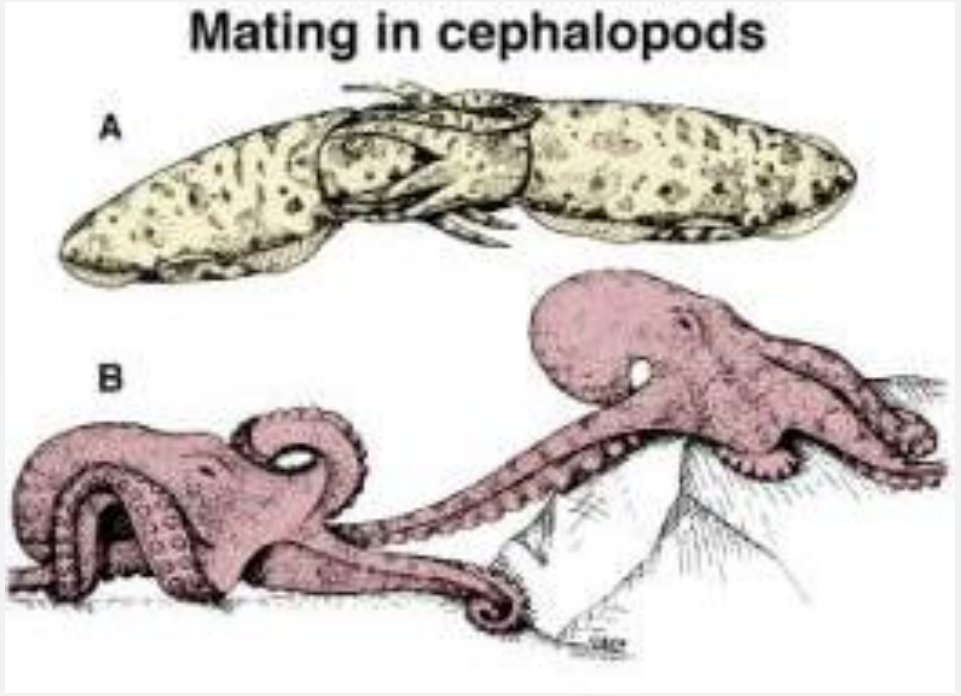
Razred: Cephalopoda (glavonošci)

- spolni sustav
  - gonohristi
  - gonocel
  - spolni dimorfizam
  - vanjska oplodnja
    - direktan razvoj

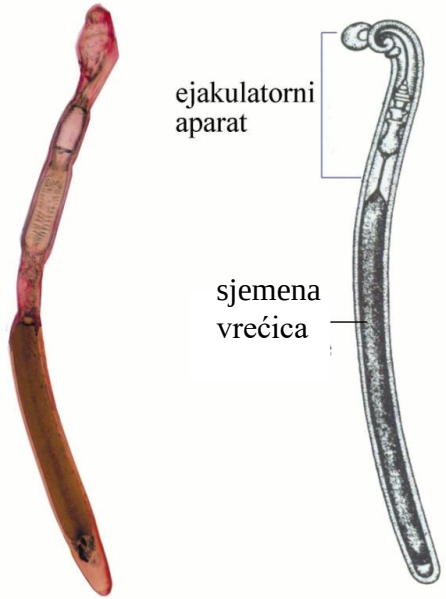




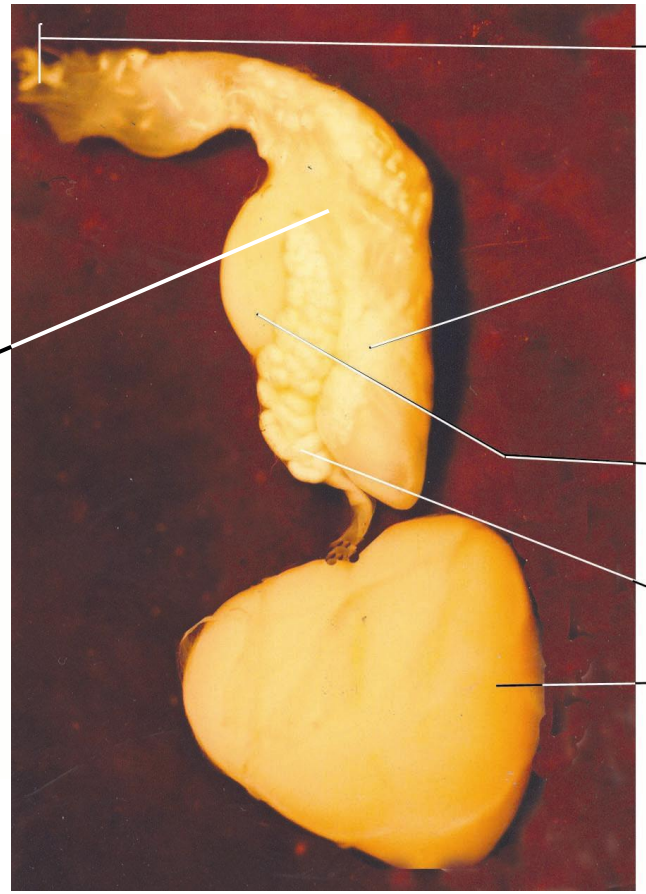




S. officinalis – ♂ spolni sustav + spermatofor



spermatofor



https://www.youtube.com/watch?v=lNi7CtG-heg

Razred: CEPHALOPODA – glavonošci

***S. officinalis* - unutrašnja građa:**

b) probavni sustav

- ČELJUSTI
- USTA
- ŽDRIJELO (+ RADULA)
- JEDNJAK
- ŽELUDAC
- CEKUM
- ŽLIJEZDA SREDNJEG CRIJEVA
- CRIJEVO
- CRIJEVNI OTVOR

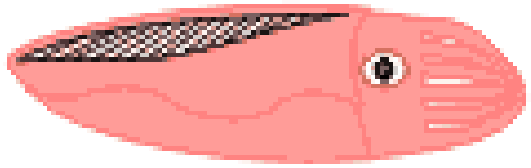


c) građa spermatofora

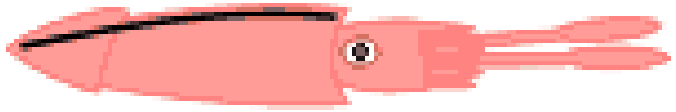
- OVOJ SPERMATOFORA
- EJAKULATORNI APARAT
- SJEMENA VREĆICA

S. officinalis – unutarnji skelet

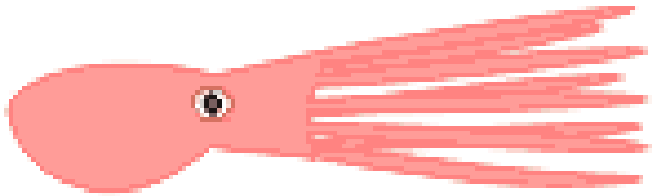
- rostrum, fragmakon, vapnenaste pločice
(prostor ispunjen plinom - uglavnom dušikom)



Sipa *Sepia*

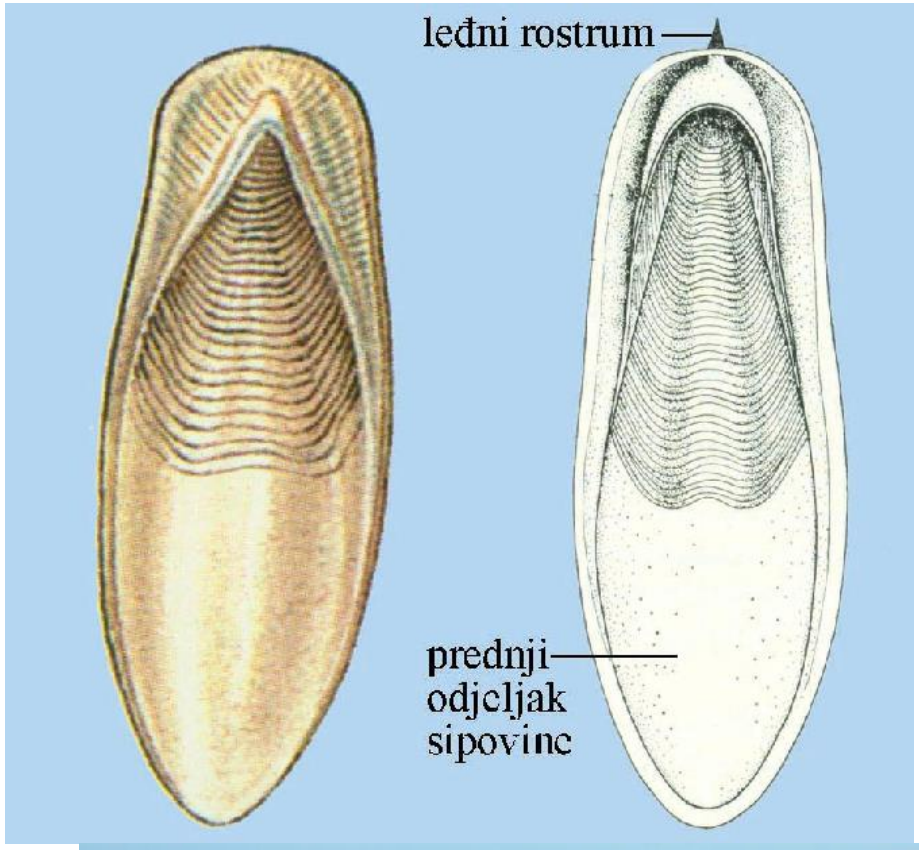


Lignja *Loligo*



Hobotnica *Octopus*

- rostrum
- fragmakon (septalno pregrađeni dio kroz koji prolazi *sifo*)
- proostrakum (produžetak fragmakona u obliku tankog lista s leđne strane)





Razred: CEPHALOPODA - glavonošci

***S. officinalis* – unutarnji skelet (sipovina):**

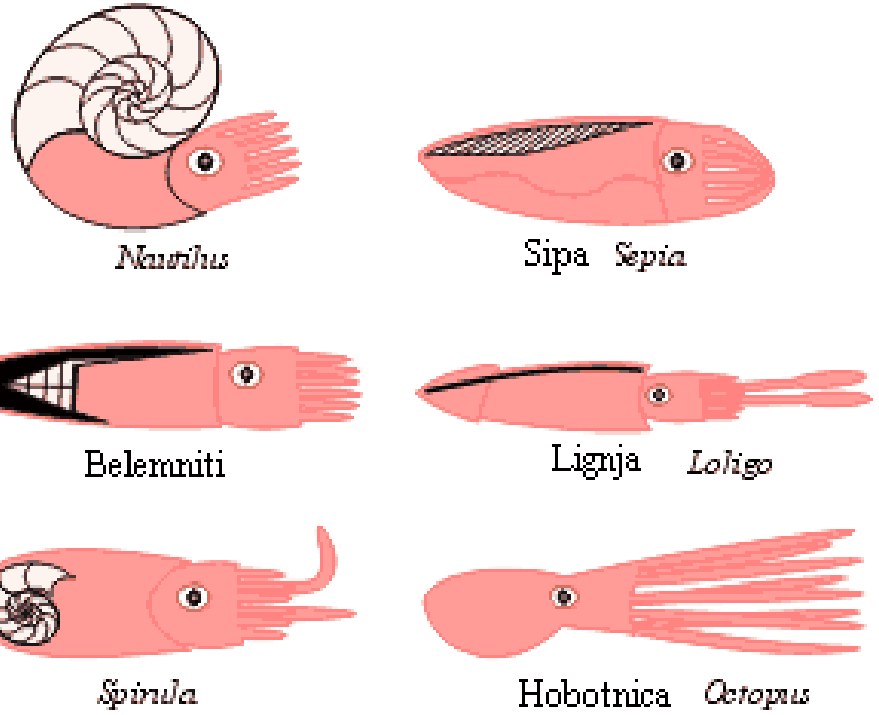
- **ROSTRUM** ($CaCO_3$)
- **FRAGMAKON** ($CaCO_3$)
- **PROOSTRAKUM** (konhiolin)

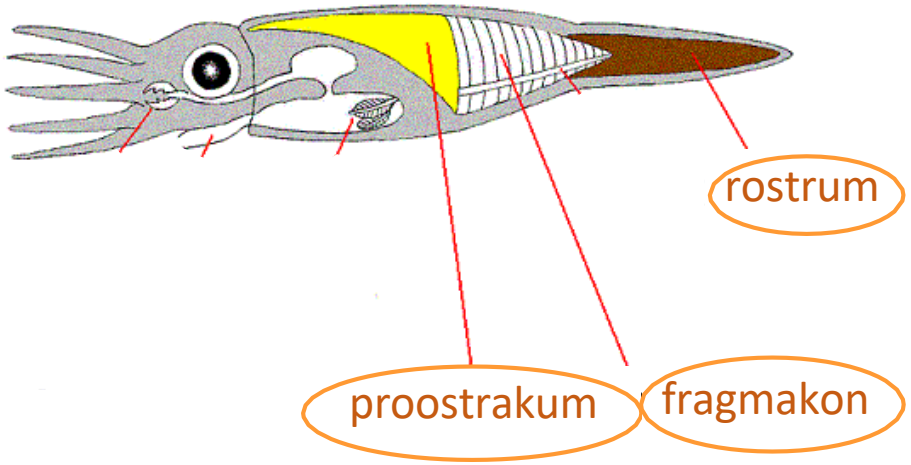


Evolucija unutarnje ljuske kod glavonožaca

- kod recentnih vrsta različiti stupnjevi redukcije

  rostrum
  fragmakon (septalno pregrađeni dio kroz koji prolazi *sifo*)
  proostrakum (produžetak fragmakona u obliku tankog lista s leđne strane)









Kretanje lignje: https://www.youtube.com/watch?v=iMq89roPycI

Sipa hvata plijen s tentakulima:
https://www.youtube.com/watch?v=MUCduZyCHes

Razmnožavanje sipe:
https://www.youtube.com/watch?v=8LD9-jyDjEg