

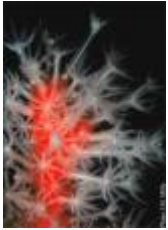
Cnidaria - žarnjaci



➤ **primarna zrakasta (radijalna) simetrija ⇨ RADIATA**



1. Anthozoa - koralji



2. Scyphozoa - režnjaci



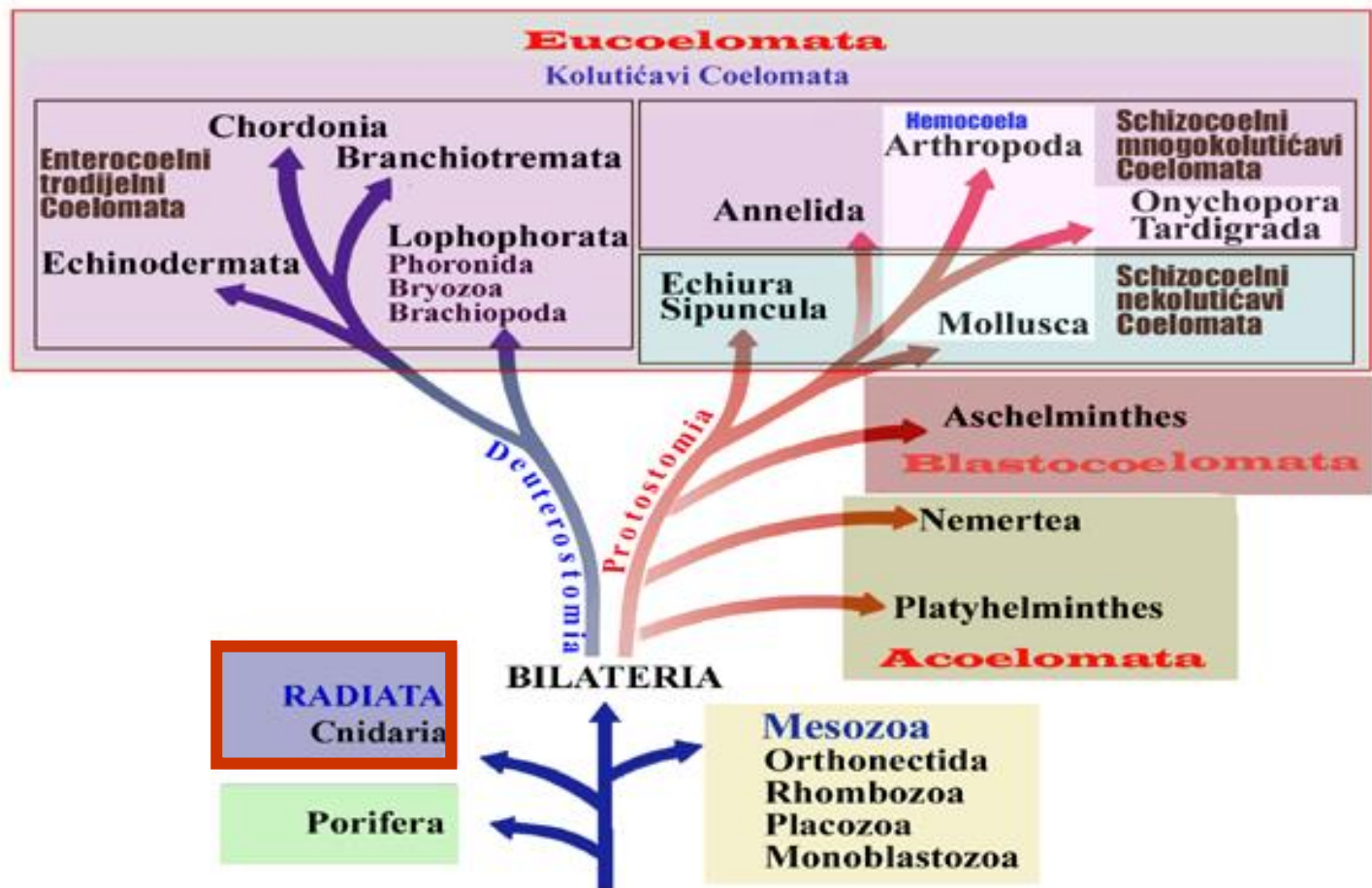
3. Cubozoa - kubomeduze



4. Hydrozoa - obrubnjaci

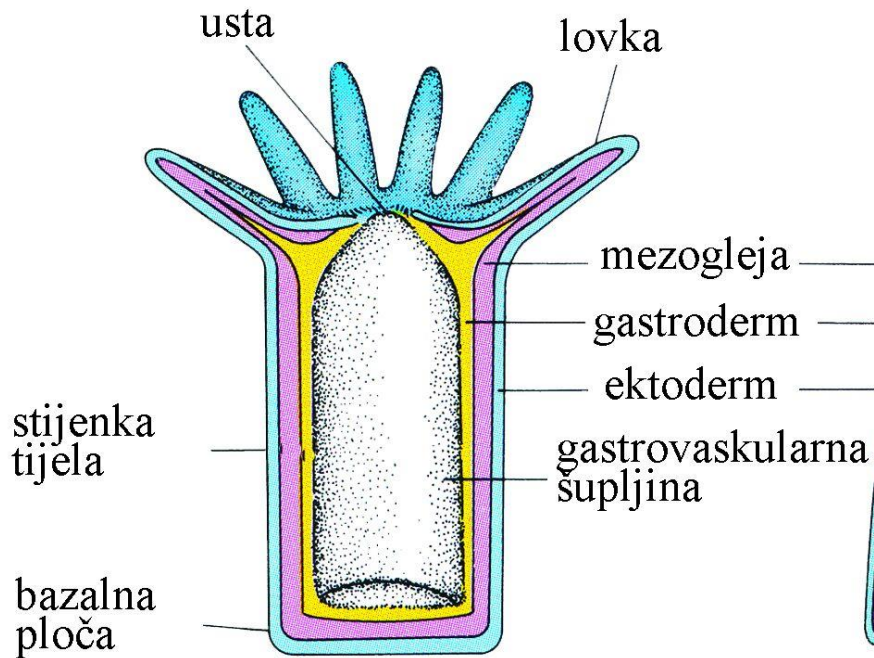


Položaj žarnjaka (Cnidaria) u rodoslovnom stablu

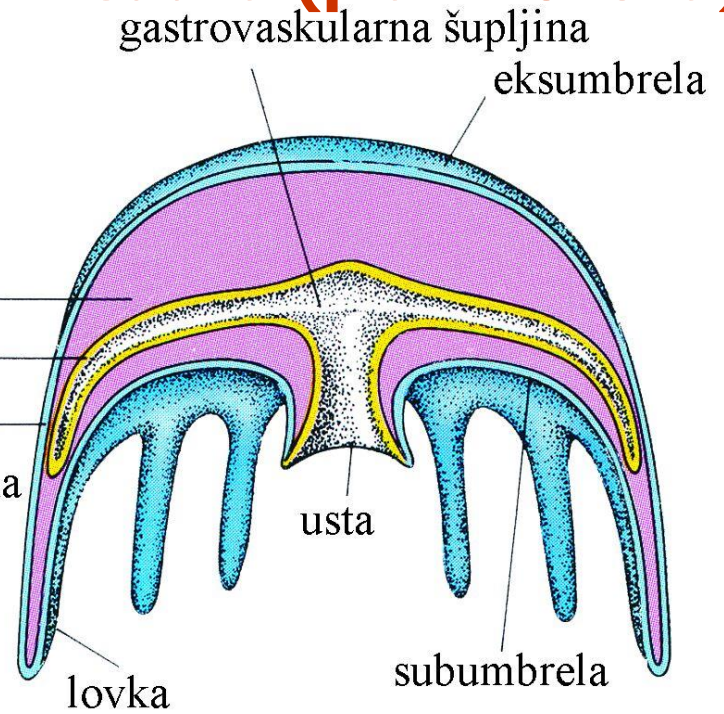


Strukturalni oblici žarnjaka

Polip (sesilan)



Meduza (planktonska)

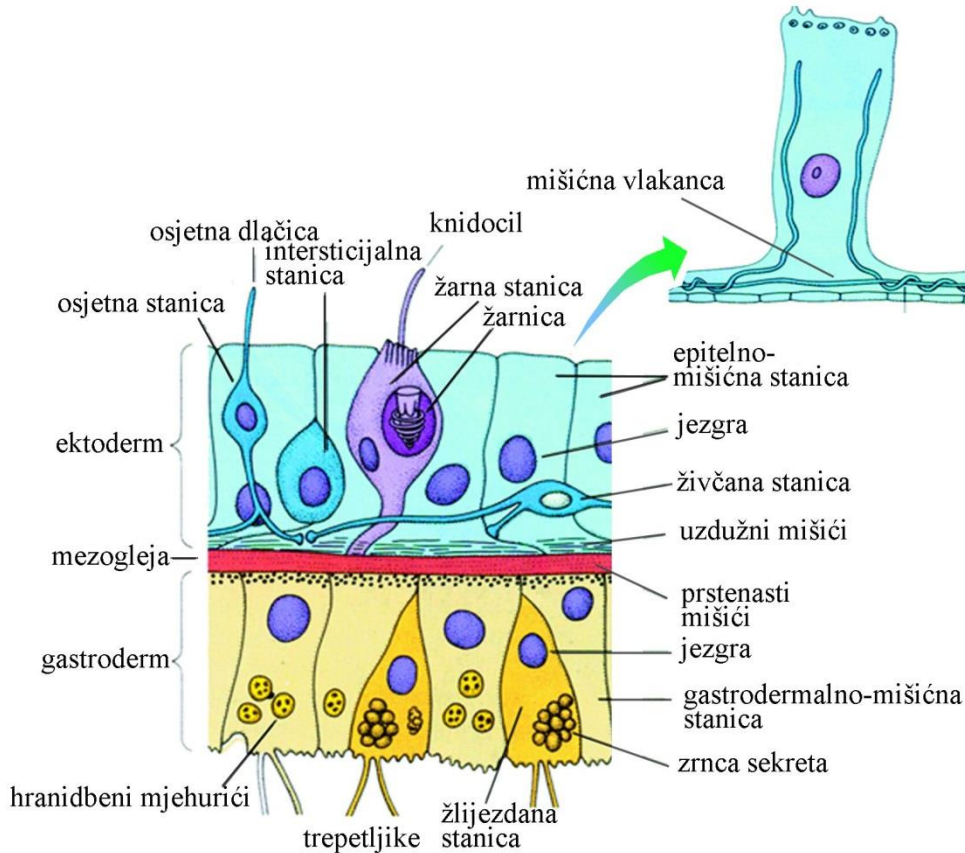


Osnovna strukturalna obilježja Cnidaria

1. **Radijalna simetrija**
2. **gastrovaskularna šupljina:** cjelovita ili podijeljena pregradama (septama) na gastralne odjeljke
3. **troslojna stijenka tijela:** epiderma, mezogleja (ECM) i gastroderma
4. **žarne stanice** (knidocyte, knidoblasti, nematocyte) sadrže eksplozivne bodljikave ili ljepljive žarnice (knide, nematociste) koje služe za hvatanje pljena
5. **difuzni živčani sustav**
6. **nemaju sustave:** za disanje, optjecanje i izlučivanje
7. **razmnožavaju se** **nespolno** i **spolno** – gonade su samo nakupine gameta u razvoju, bez gonodukata;
8. **vanjska oplodnja** ⇒ slobodno plivajuća trepetljikava ličinka **planula**; česta je **metageneza**

Shematski prikaz građe stijenke tijela

Histološka građa:

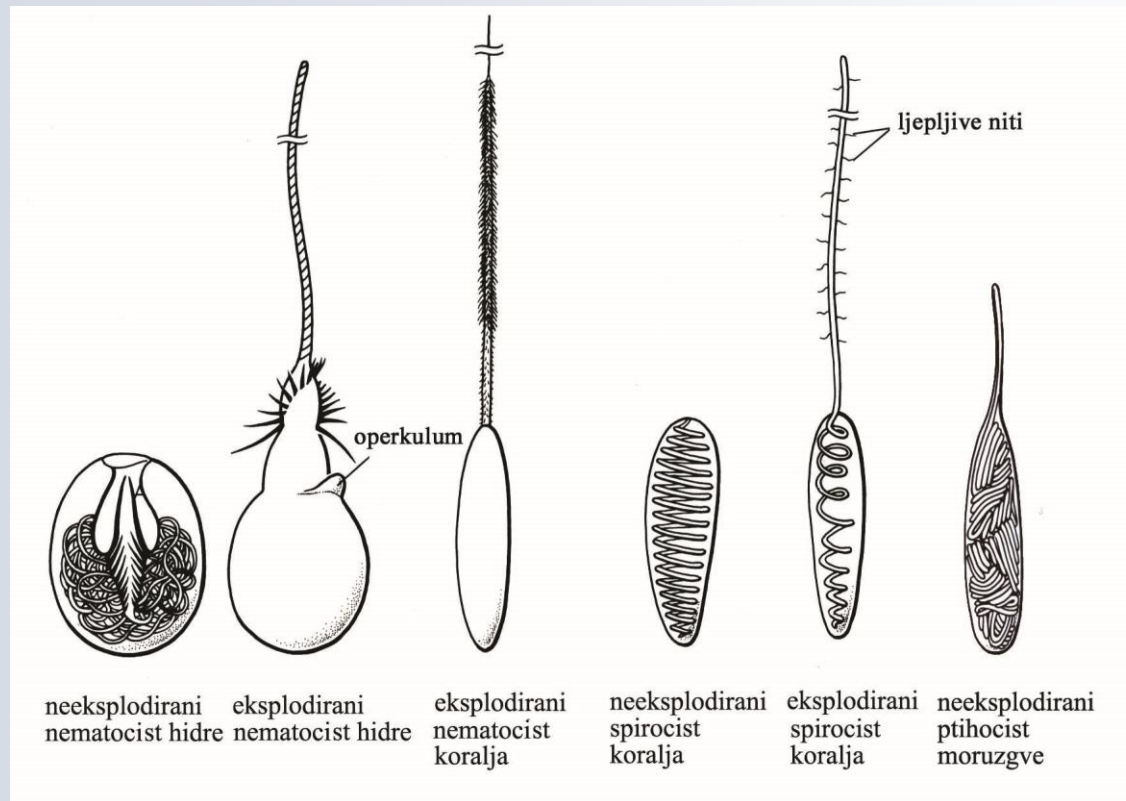


- Epiderm i gastroderm (+ mezogleja)
- epitelno-mišićne stanice
- intersticijske stanice
- živčane stanice
- žarne stanice
- gastrodermalno-mišićne stanice
- žljezdane stanice
- uzdužni mišići
- prstenasti mišići

- **Žarna stanica, knidoblast ili knidocit** (grč. *knide*, ožariti + *blastos*, klica) – okrugla ili jajolika intersticijalna stanica u žarnjaka (Cnidaria) unutar koje se stvara knida
- **knida, knidocista** (grč. *knide*, ožariti + *kystis*, mjehur) ili žarnica – izbaciv organel u žarnjaka (Cnidaria) koji se nalazi u knidociti

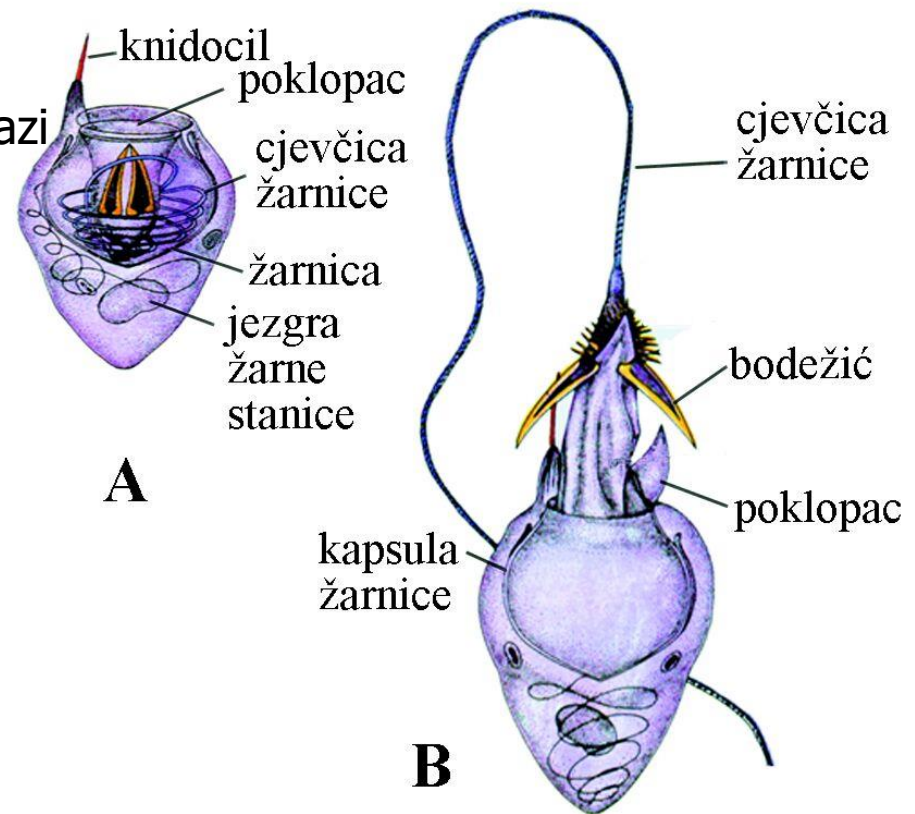
Tri osnovna tipa **žarnica**:

1. **Nematociste** – 30 razl. tipova, većinom s otrovom
 2. spirociste
 3. ptihociste
- } imaju ljepljive cjevčice za pričvršćivanje – kod koralja (Anthozoa)



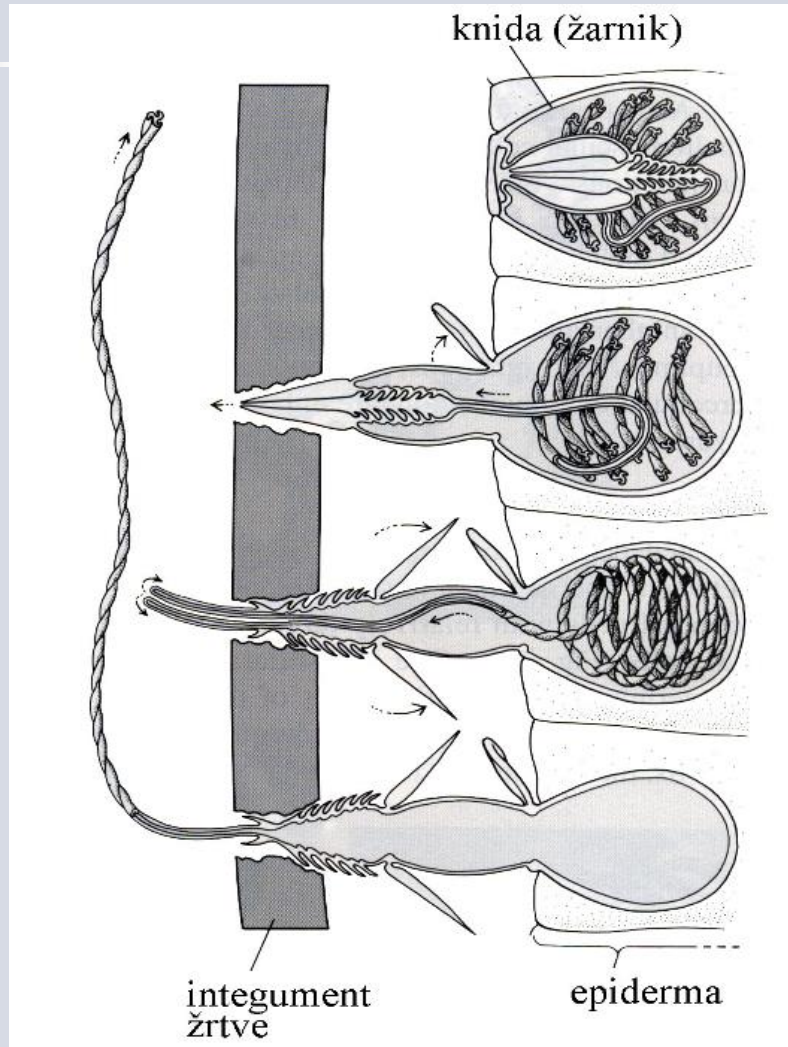
Nematocyte

knidocil (grč. *knide*, ožariti + lat. *cilium*, trepavica) – kratka i ukočena trepetljika, poput četine, koja se nalazi na knidociti.

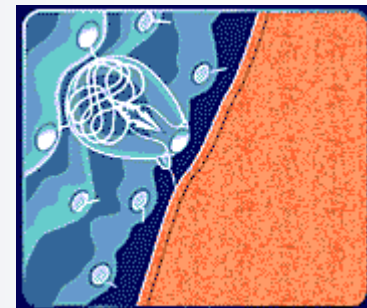


“eksplodirana” žarnica

Funkcioniranje žarnih stanica

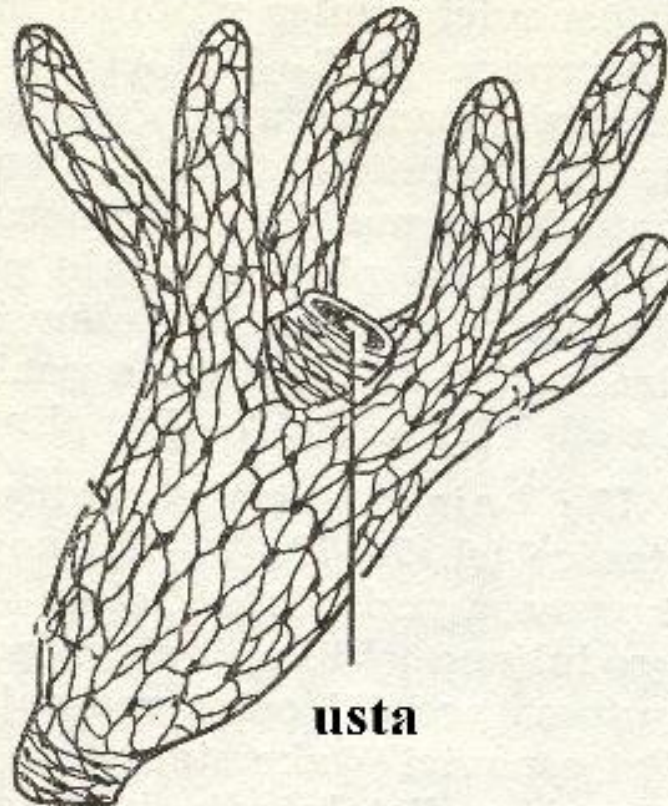


intrakapsularni tlak može narasti do 140 atmosfera pa se cjevčica izvrne za manje od 2 msec



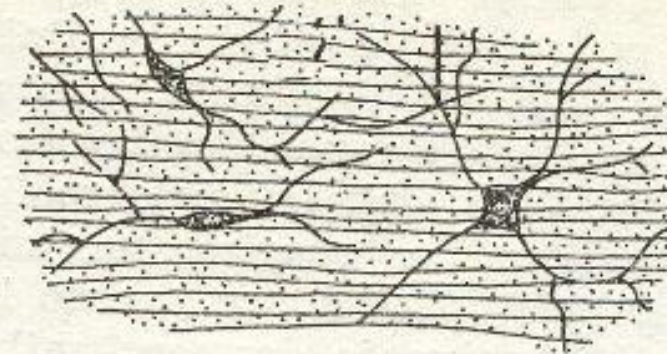
Unutrašnja građa: difuzni živčani sustav

živčana mreža žarnjaka

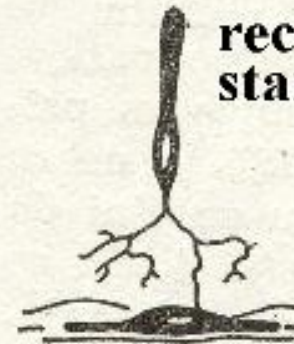


usta

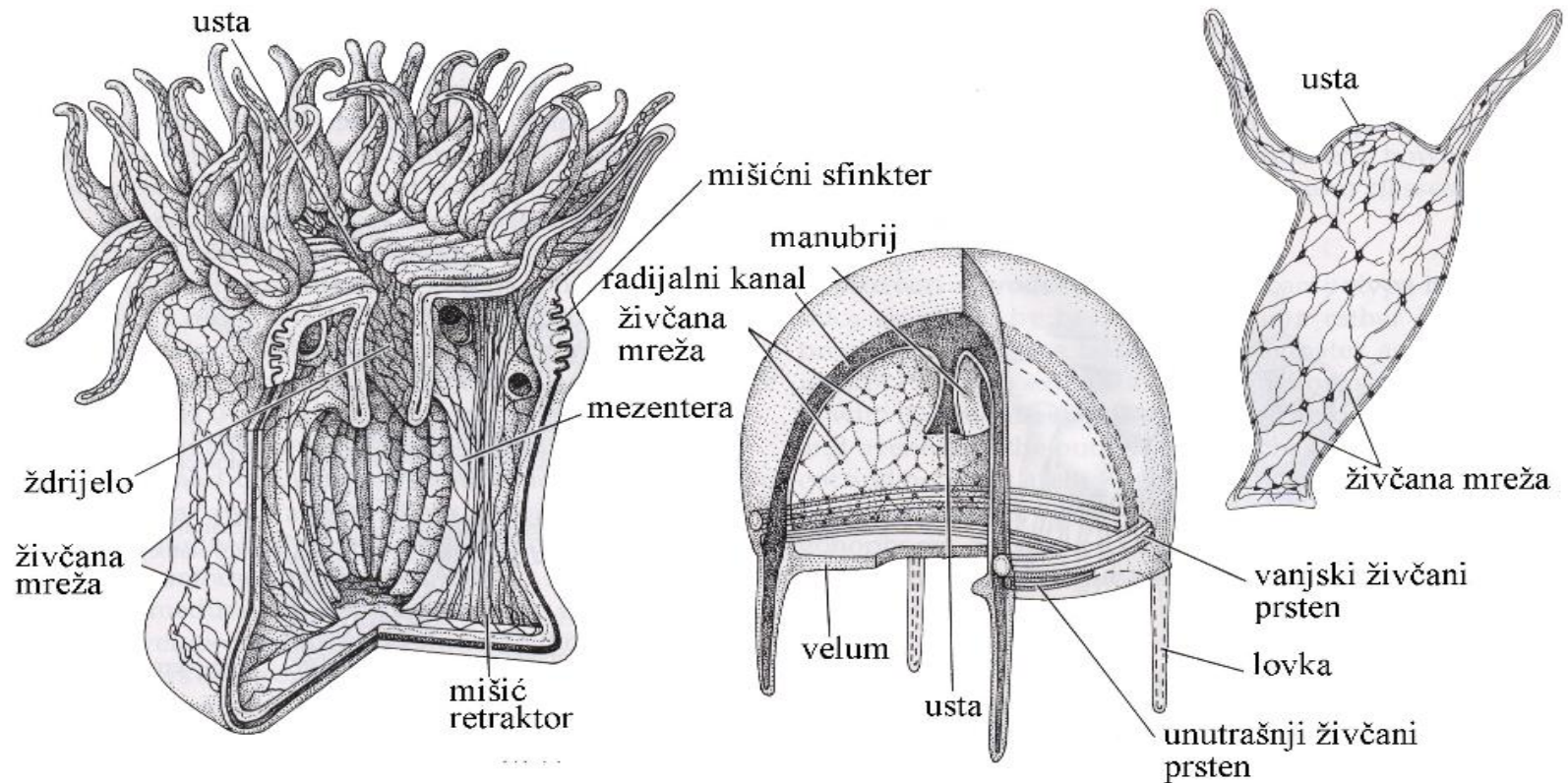
multipolarne živčane stanice
u živčanoj mreži



receptorska
stanica

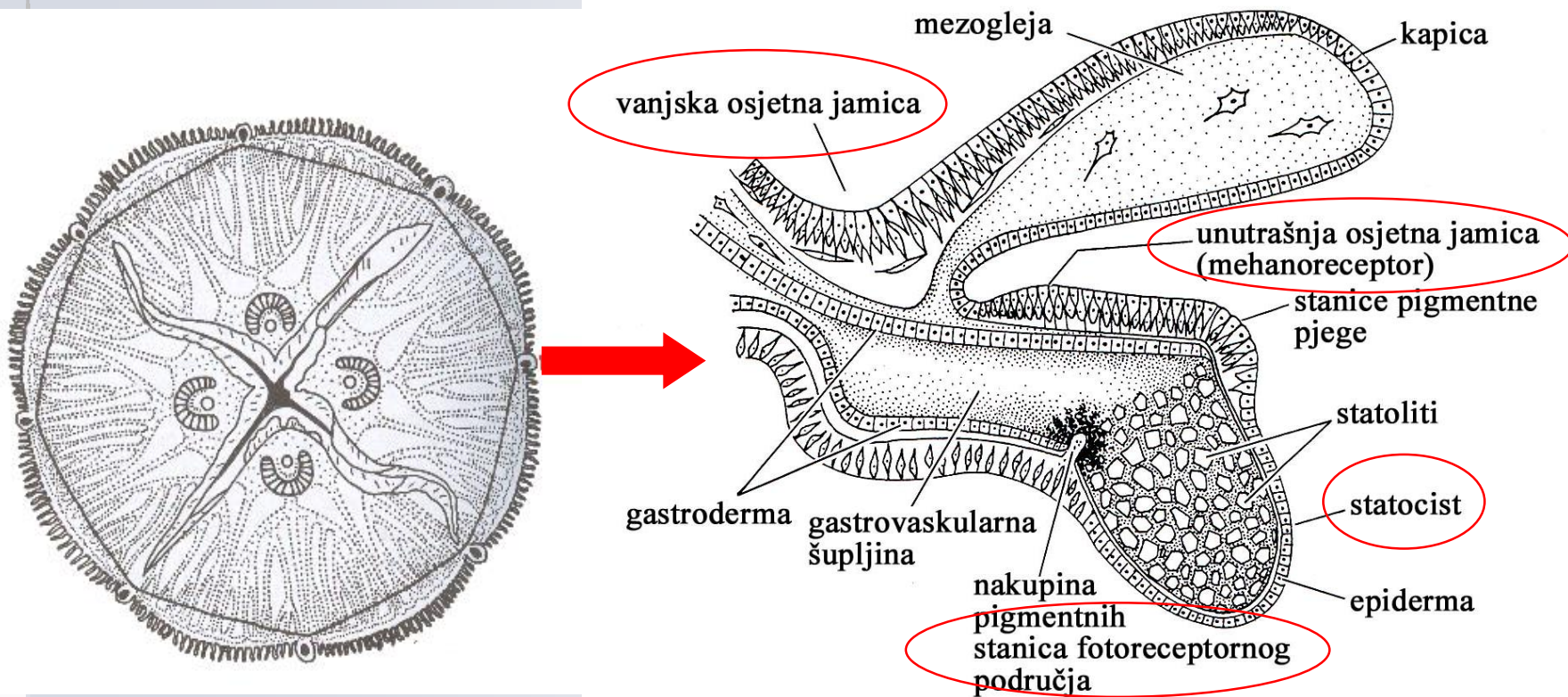


Unutrašnja građa: živčani sustav II

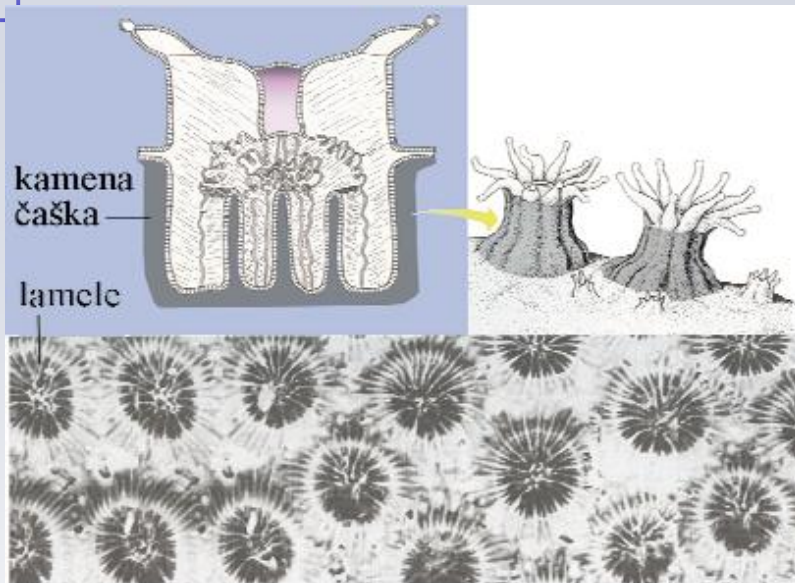


Unutrašnja građa: živčani sustav II

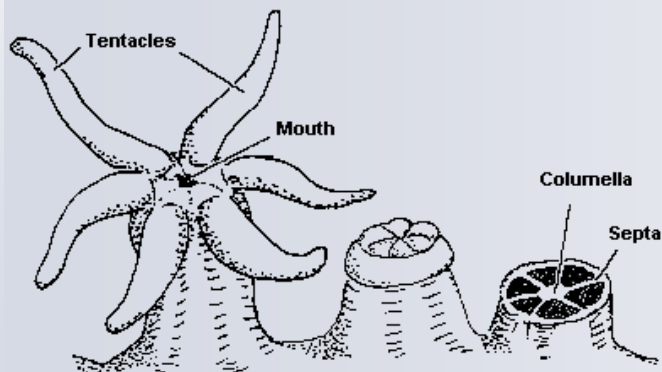
Građa ropalija



Unutrašnja građa: skeletni sustav



Hexacorals



a) coral polyp with expanded arms b) withdrawn polyp c) empty coral cup

Žarnjaci izgrađuju **vanjske i unutrašnje skelete** sastavljene od anorganskih i organskih tvari.

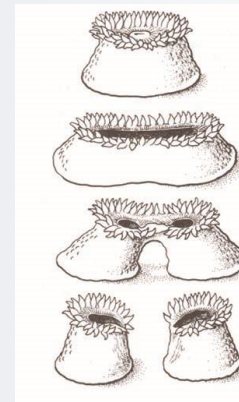
Vanjske skelete luči epiderma.

U izgradnji unutrašnjih skeleta sudjeluju **skleroblasti** koji se nalaze u mezogleji. Oni stvaraju vapnena tjelešca, **sklerodermite** (sklerite).



Razmnožavanje žarnjaka

- **Nespolno razmnožavanje**
pupanje – evaginacija sva tri sloja tijela
dijeljenje - uzdužno i poprečno,
pedalna laceracija - podnožna ploča se raspada i iz svakog djelića se razvija nova jedinka)
- **Spolno razmnožavanje**
gonade su samo nakupine gameta u razvoju, bez gonodukata;
vanjska oplodnja ⇒ slobodno plivajuća trepetljikava ličinka **planula**;
- česta je **metageneza**



Razmnožavanje žarnjaka

Odnos polipoidne i meduzoidne generacije u tri razreda žarnjaka

Koralji

Oplođeno → planula → polip (spolan) → sjeme i jaja
jaje meduzoidnog stanja nema

Režnjaci

oplođeno jaje → planula → skifostom (nespolan) →
meduza (spolna) → sjeme i jaja - *Aurelia aurita*

oplođeno jaje → planula → polipu slična meduza
sjeme i jaja - *Stauromedusae*

oplođeno jaje → meduza (spolna) → sjeme i jaja
odsustvo polipa - *Pelagia noctiluca*

Hydrozoa

oplođeno jaje → planula → polip (nespolan) →
meduza spolna - *Obelia sp.*

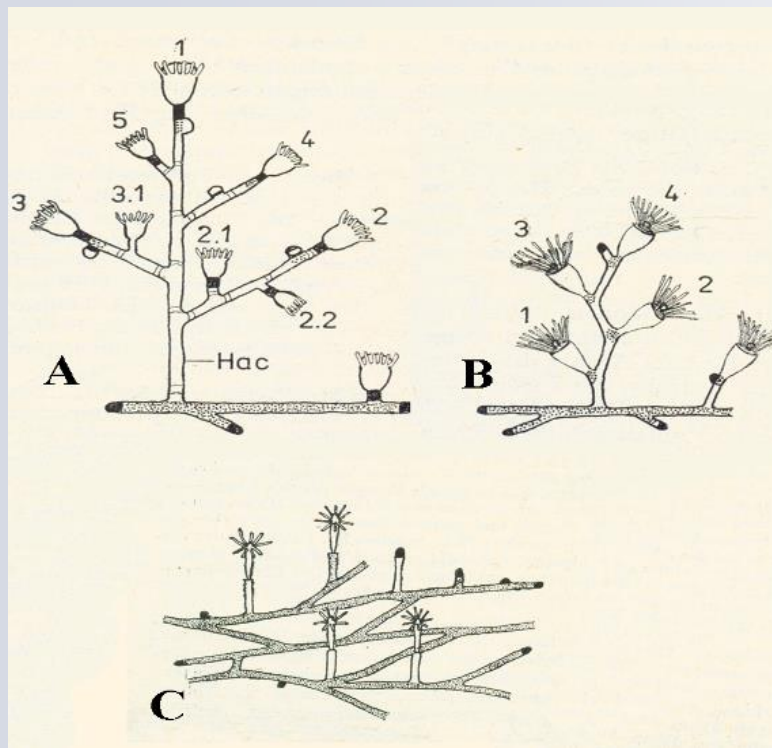
oplođeno jaje → polip s gonoforama (spolan) →
sjeme i jaja - *Tubulariida*

oplođeno jaje → polip (spolan) →
sjeme i jaja - *Hydra sp.*

oplođeno jaje → planula → meduza (spolna) →
sjeme i jaja - *Trachylina*

Razmnožavanje je obično nesporno u polipa, a spolno u meduza. U životni ciklus mnogih žarnjaka uključena je generacija polipa i generacija meduze. Izmjena spolne i nespolne generacije u žarnjaka naziva se **metageneza**.

Zadruga žarnjaka



- **Mnogi žarnjaci izgrađuju vrlo složene zadruga:**
- **A: monopodijalne**
- **B: simpodijalne**
- **C: hidrorizalne**

Rasprostranjenje žarnjaka

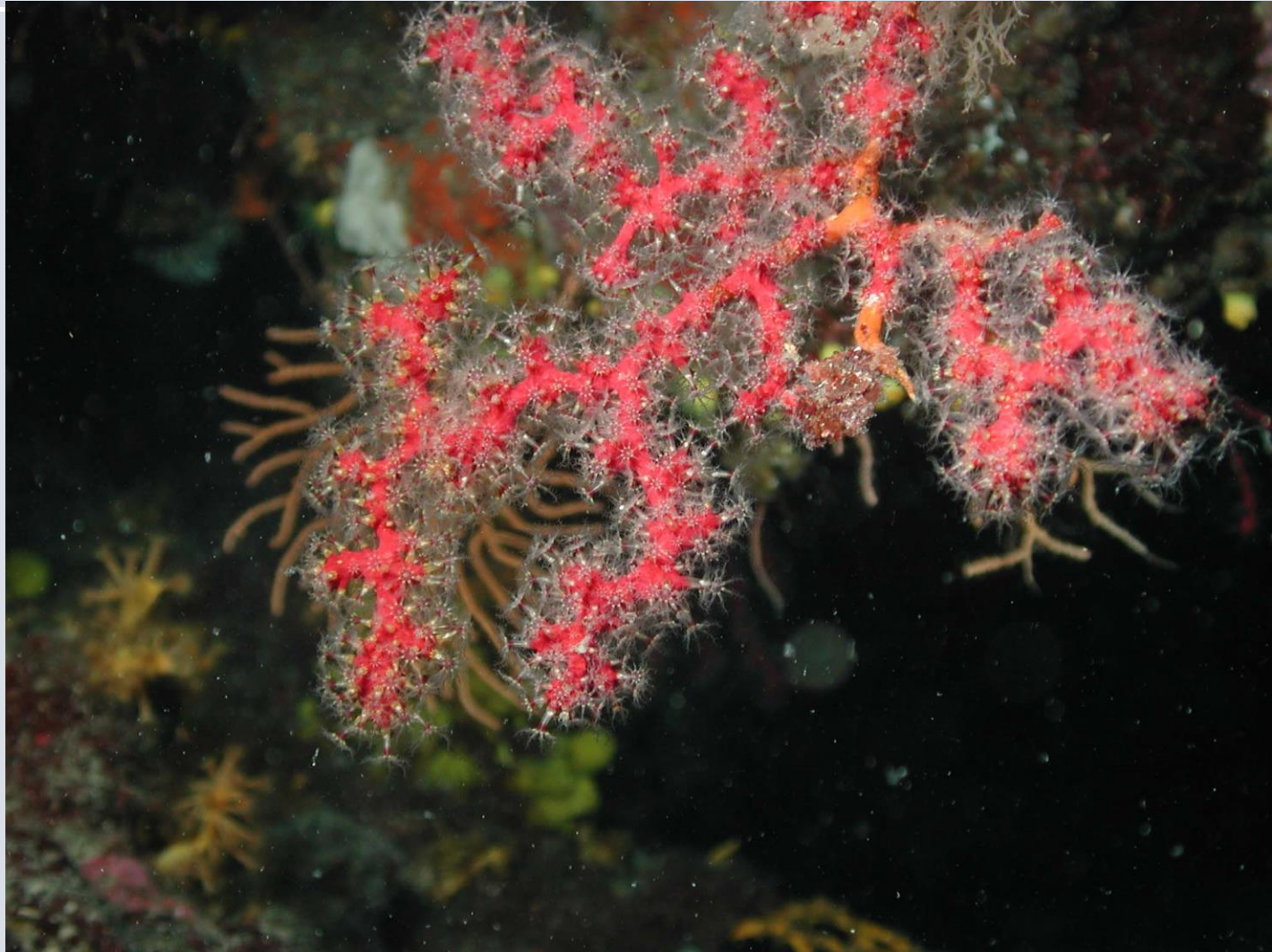
Žive u moru, a samo manji broj vrsta u slatkim vodama.

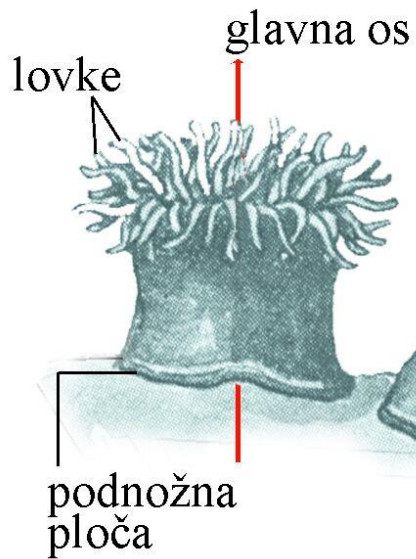
Do danas je opisano oko 10 000 žarnjaka koji su prema svojim strukturalnim i funkcionalnim obilježjima podijeljeni u četiri razreda:

- 1. koralji (Anthozoa),**
- 2. režnjaci (Scyphozoa),**
- 3. kubomeduze (Cubozoa),**
- 4. obrubnjaci (Hydrozoa).**

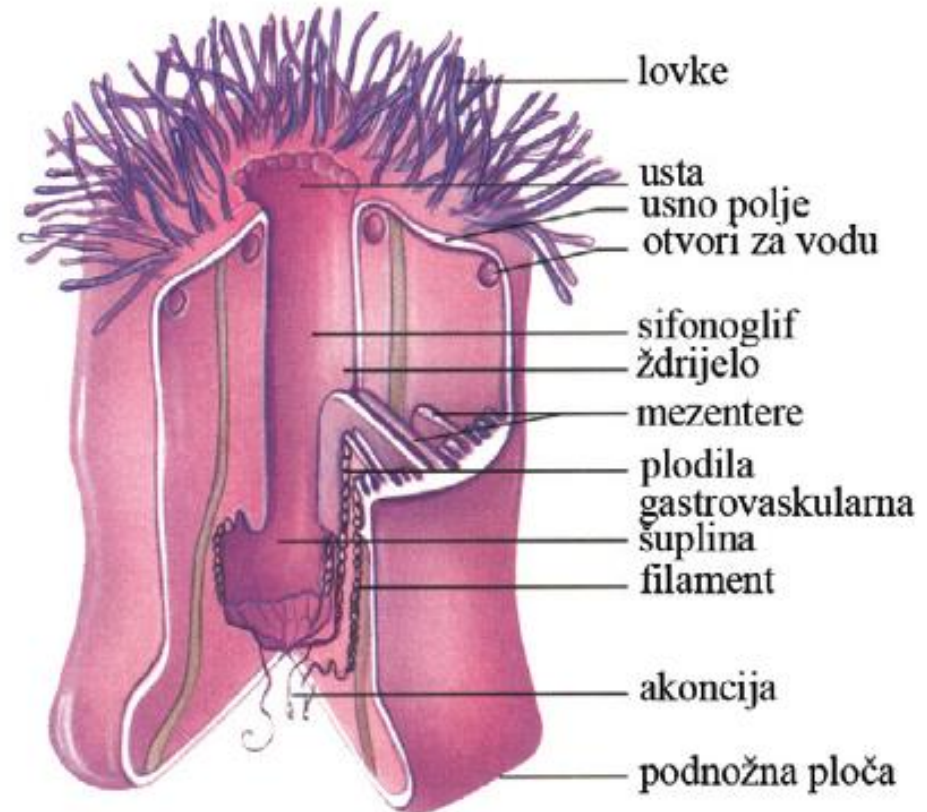
Razred: Anthozoa - koralji

- **Alcyonaria (Octocorallia)**
- **Zoanthiniaria (Hexacorallia)**

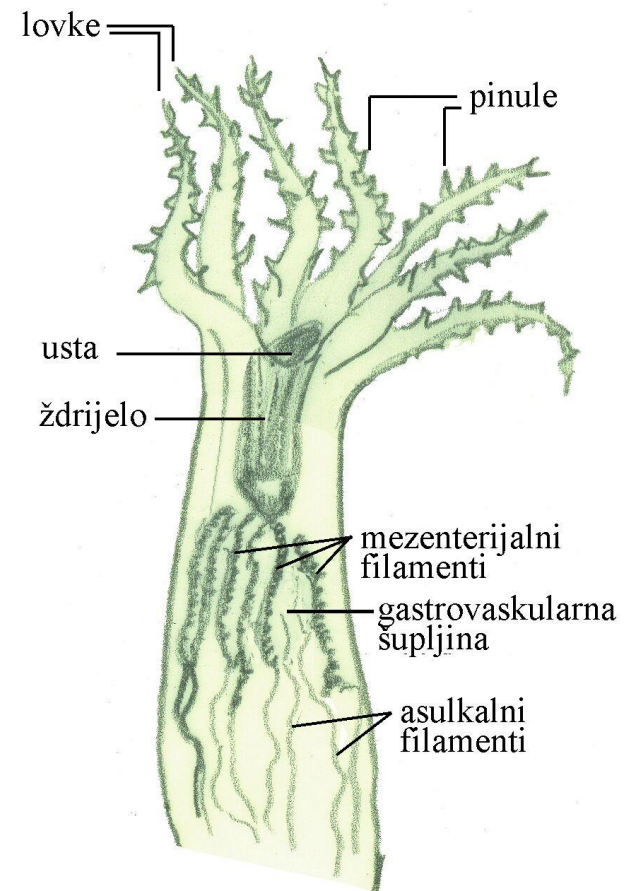
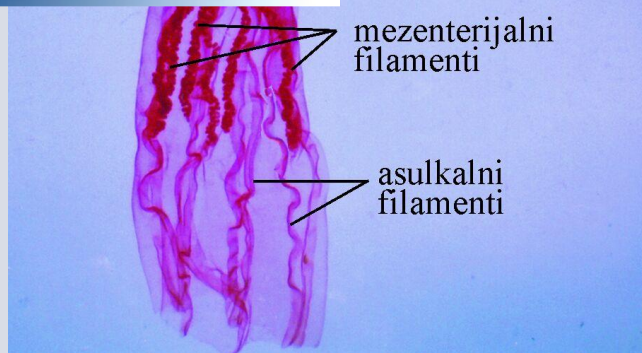
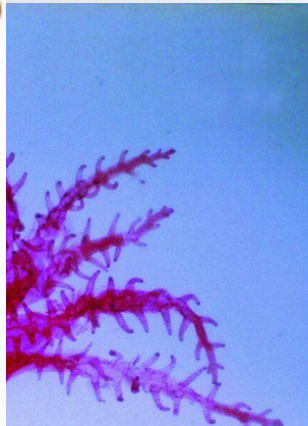


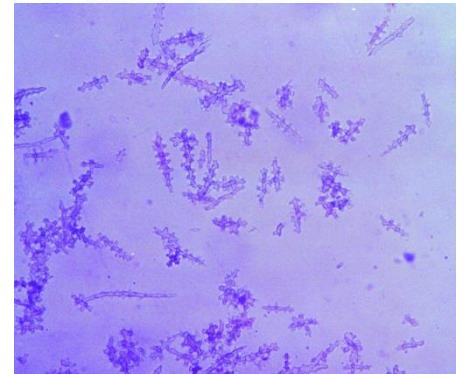
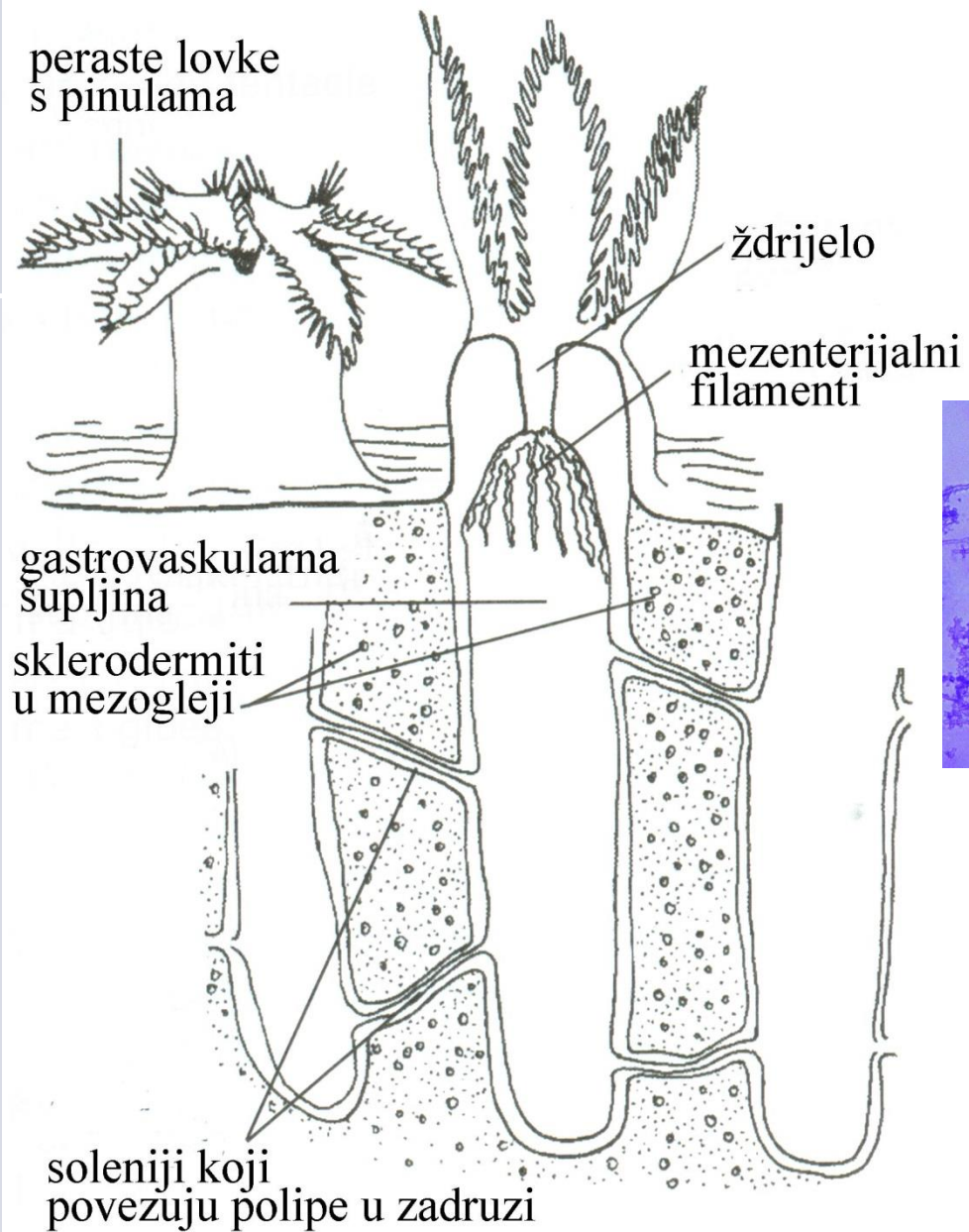


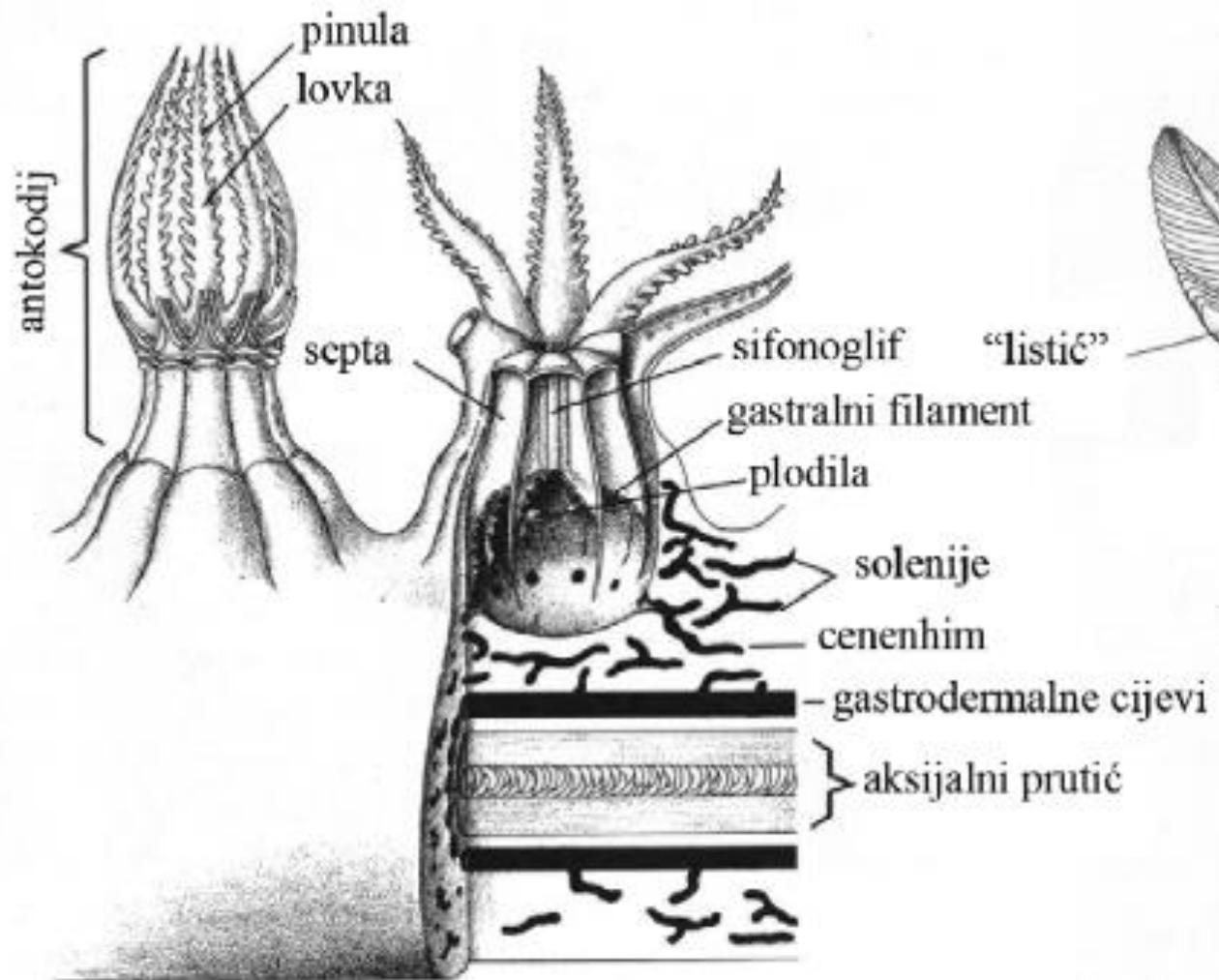
- samo generacija polipa
- isključivo morski
- solitarni ili zadružni

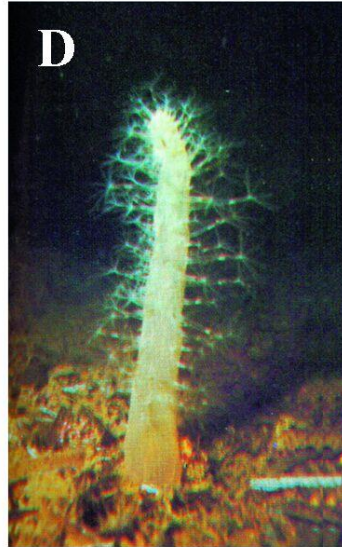
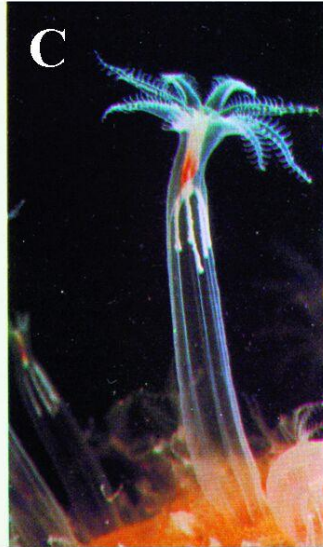


➤ Alcyonaria (Octocorallia)

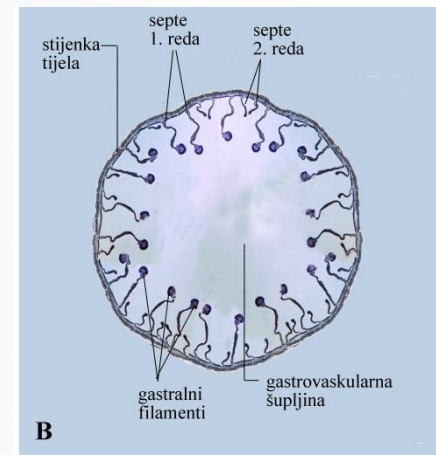
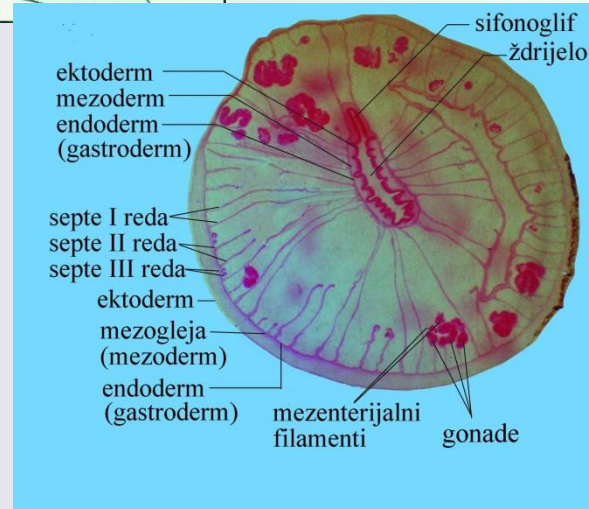
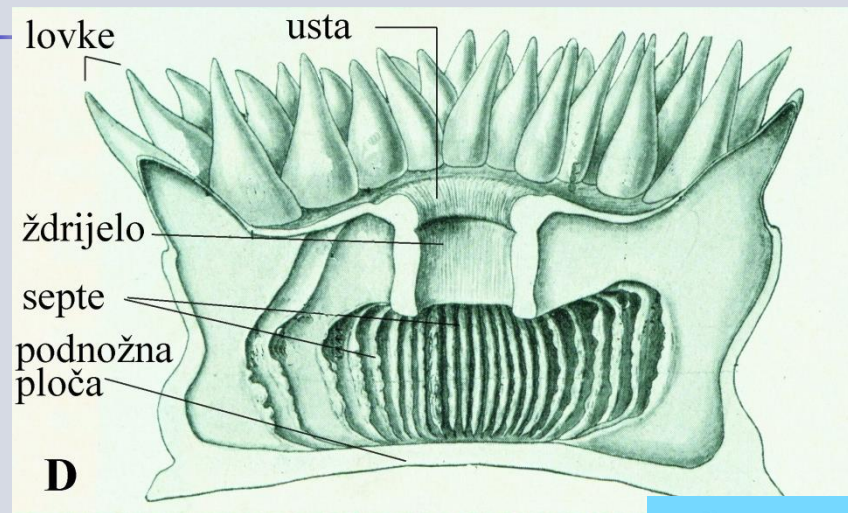


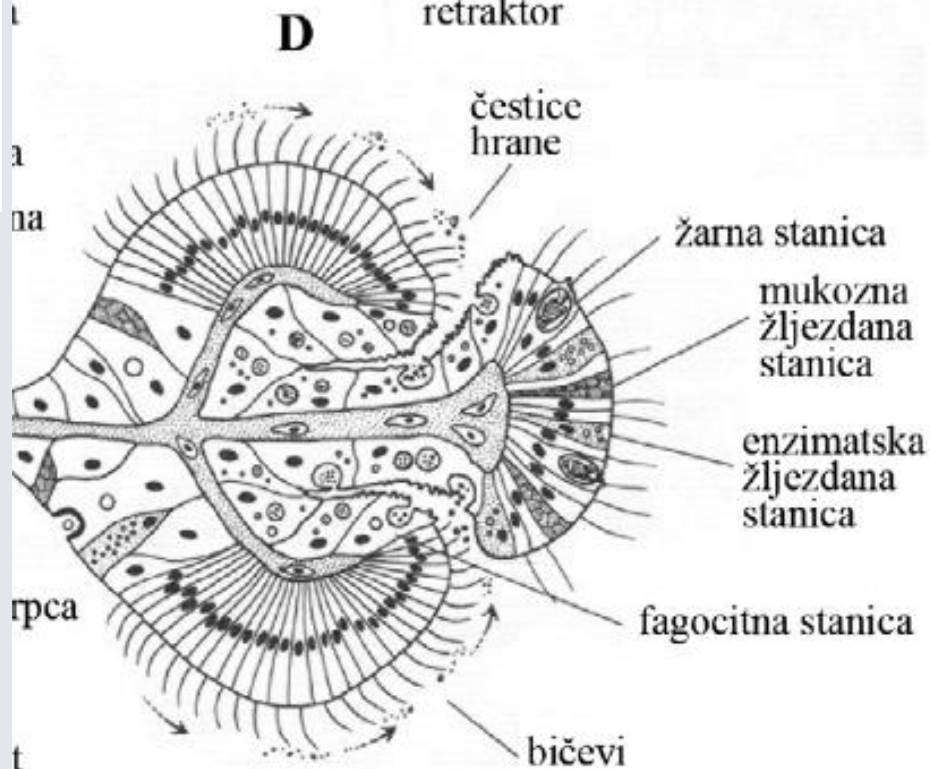
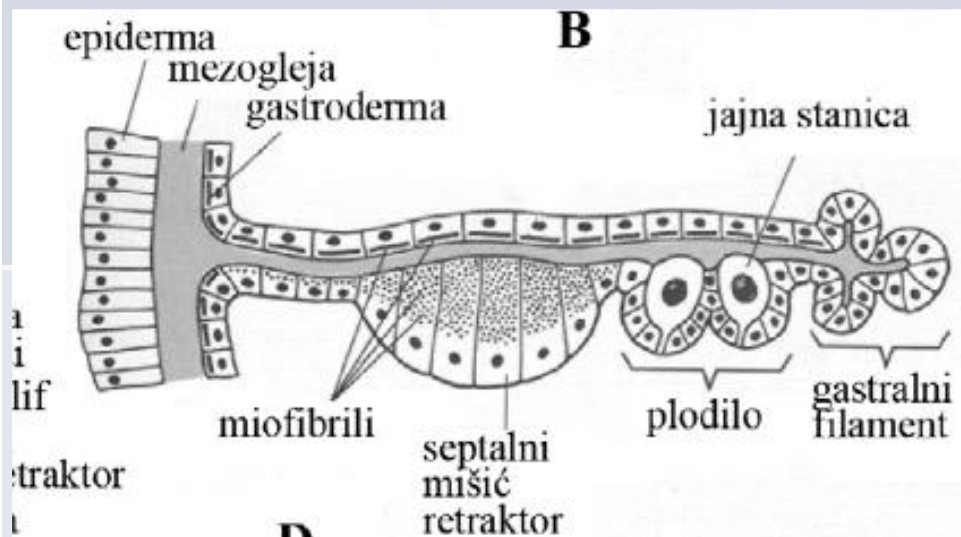
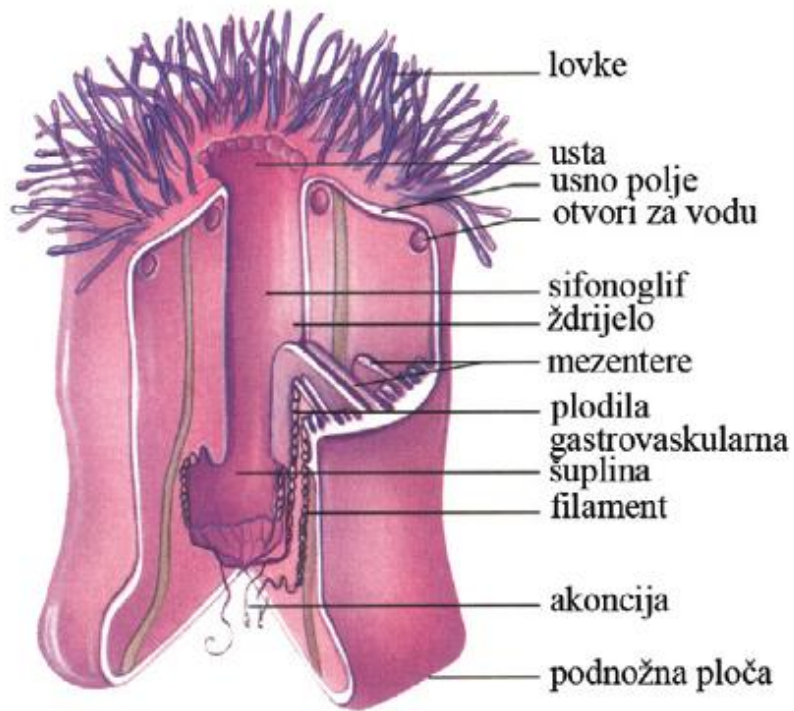


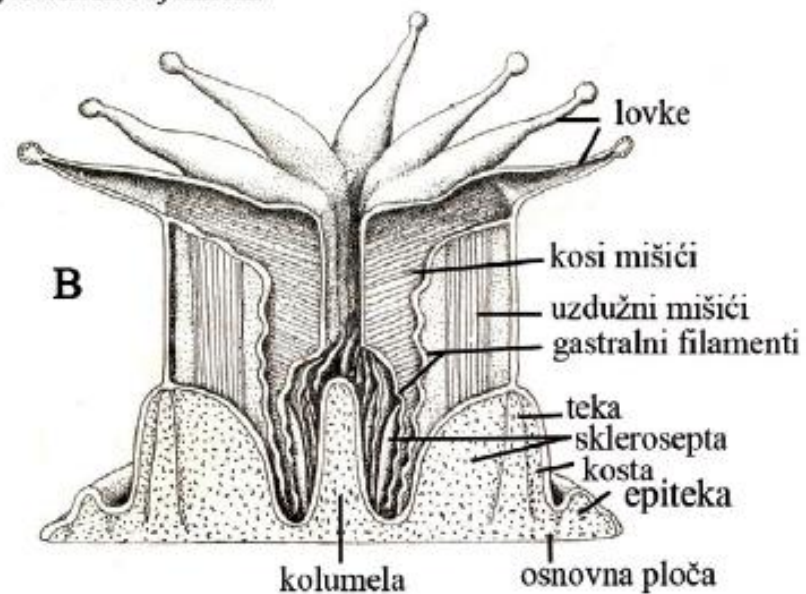
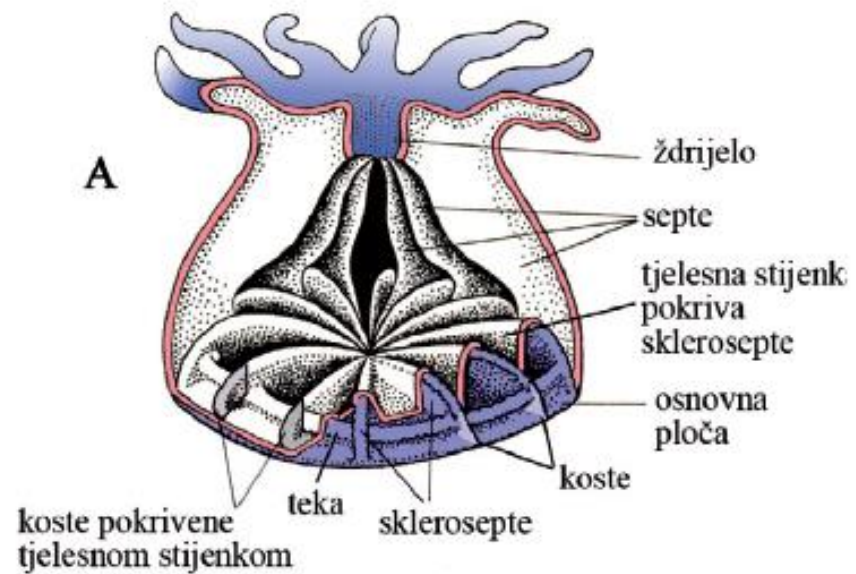
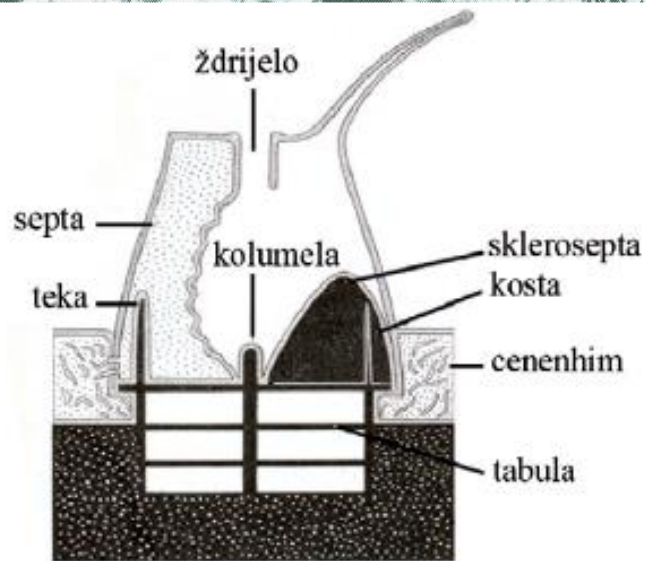
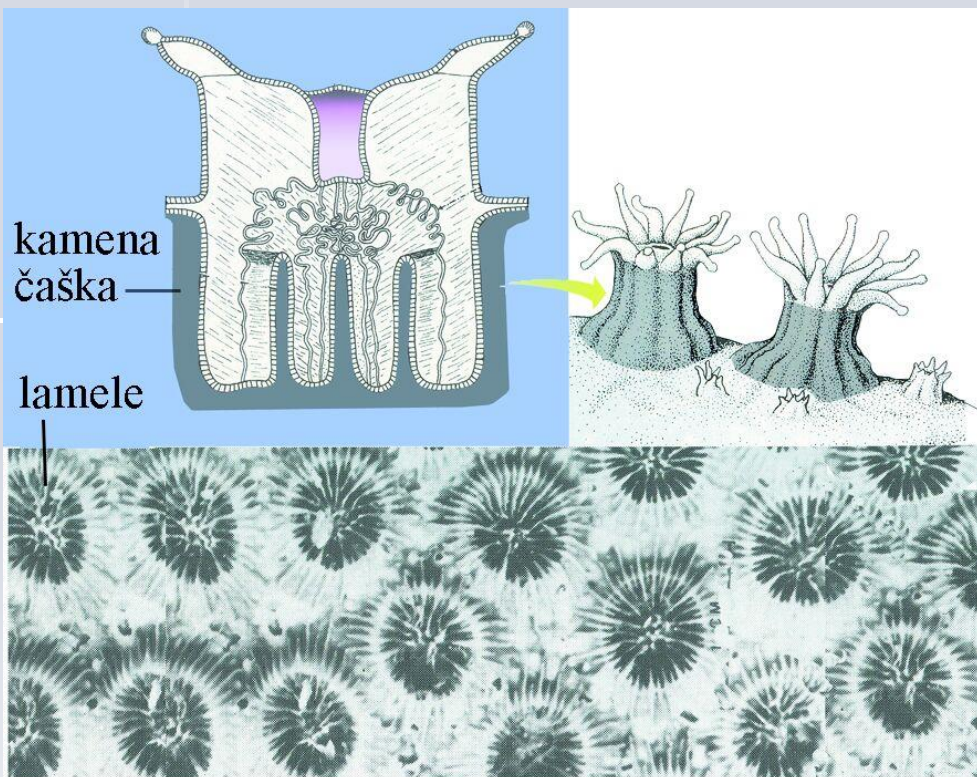




➤ Zoanthiniaria (Hexacorallia)







Biološka raznolikost koralja (Anthozoa)

■ Octocorallia

- *Alcyonium palmatum*
- blijeda ručica
- *Corallium rubrum* -
crveni koralj
- *Eunicella cavolinii*
- *Veretillum
cynomorium*

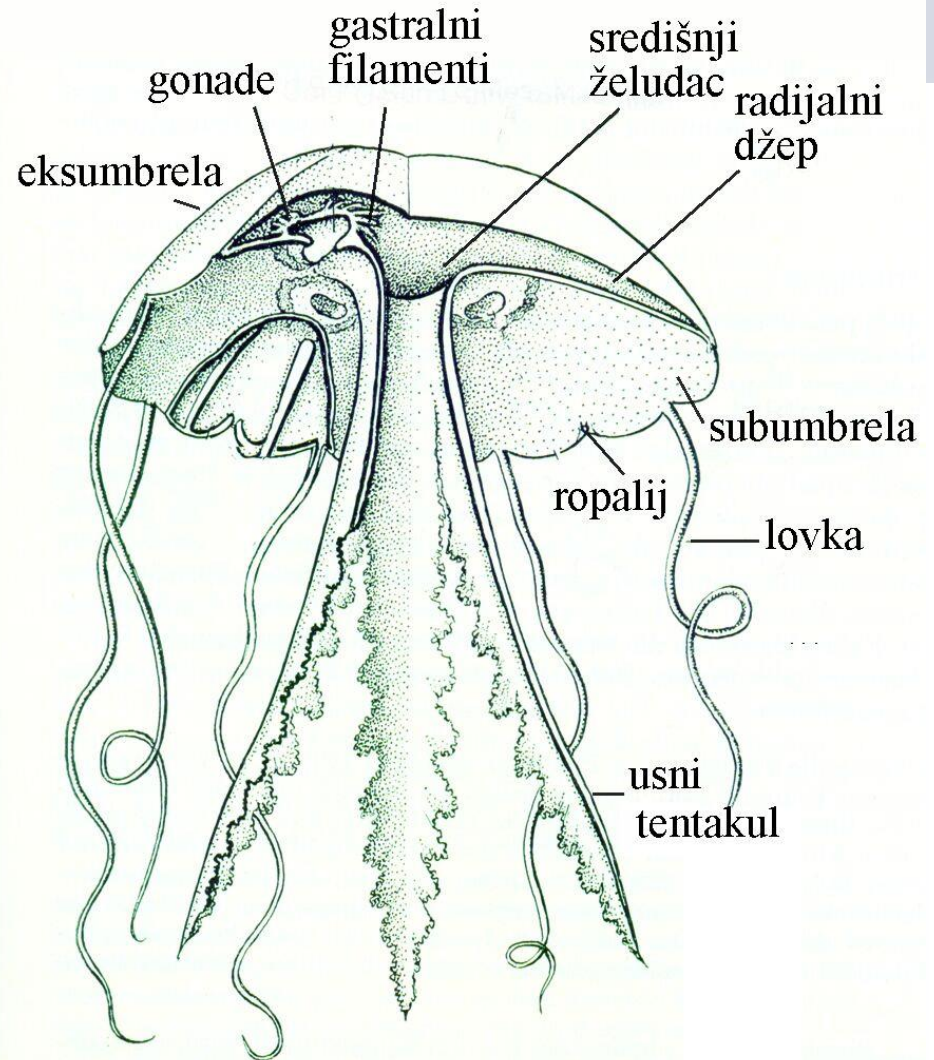
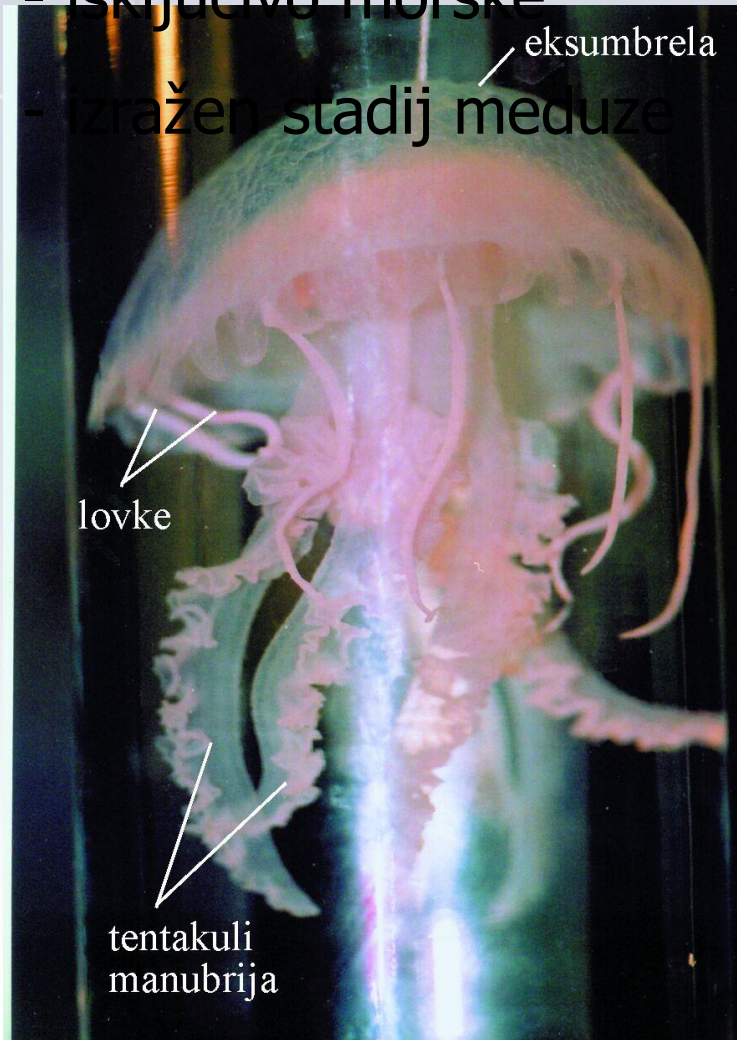
■ Hexacorallia

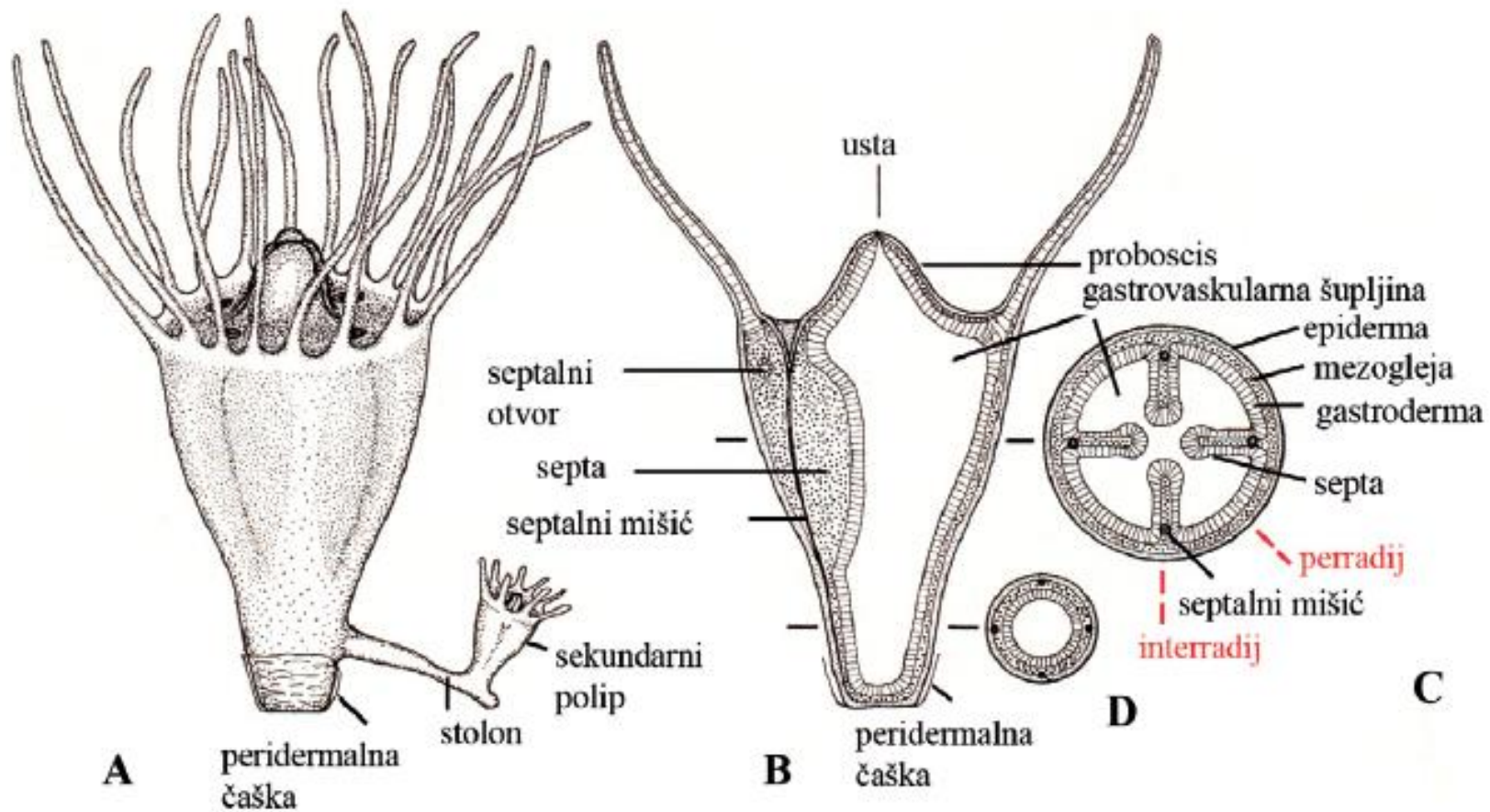
- *Actinia equina* - crvena
moruzgva
- *Anemonia viridis* – vlasulja
- *Calliactis parasitica* –
družbena moruzgva
- *Adamsia palliata* –plaštana
moruzgva
- *Cladocora caespitosa*
- *Fungia fungites* - lističava
gljivača
- *Cerianthus membranaceus*
-opnena voskovica

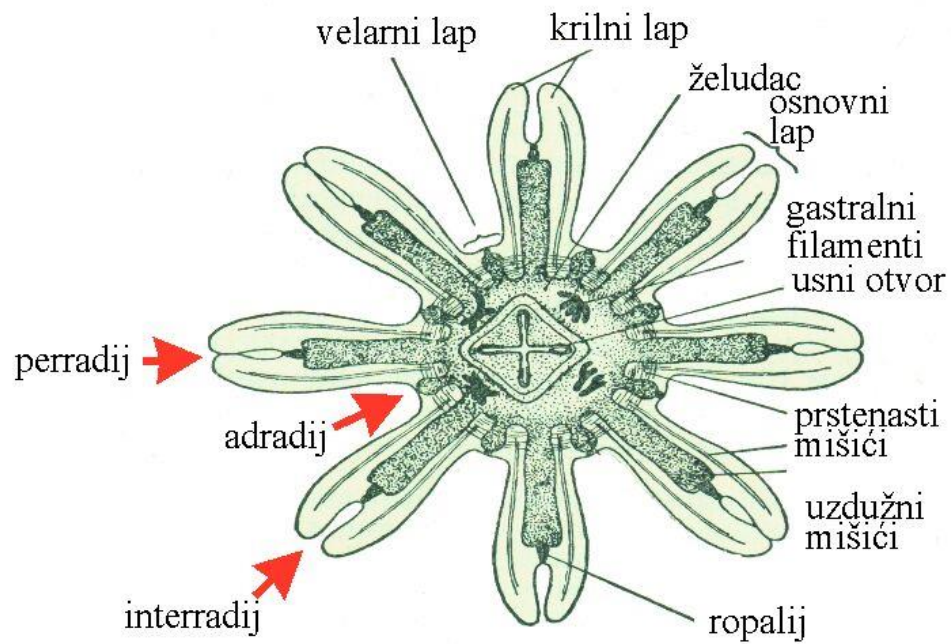
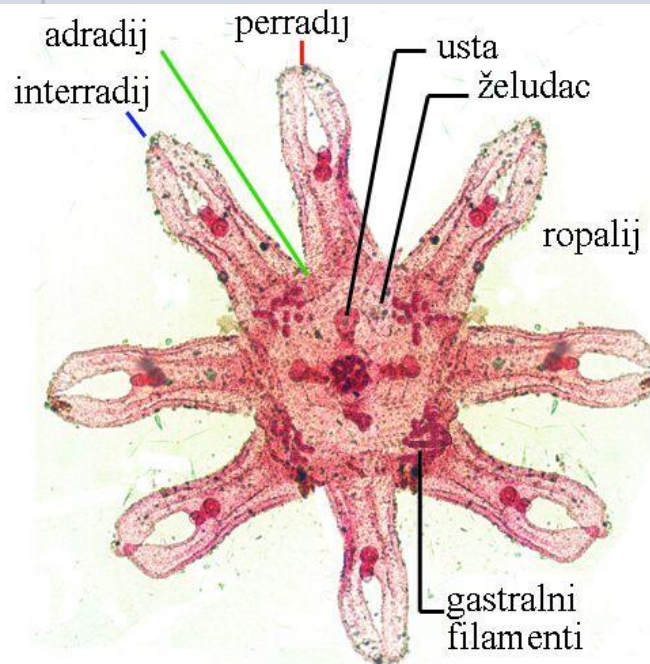
Razred Scyphozoa - režnjaci

- isključivo morske

- izražen stadij meduze



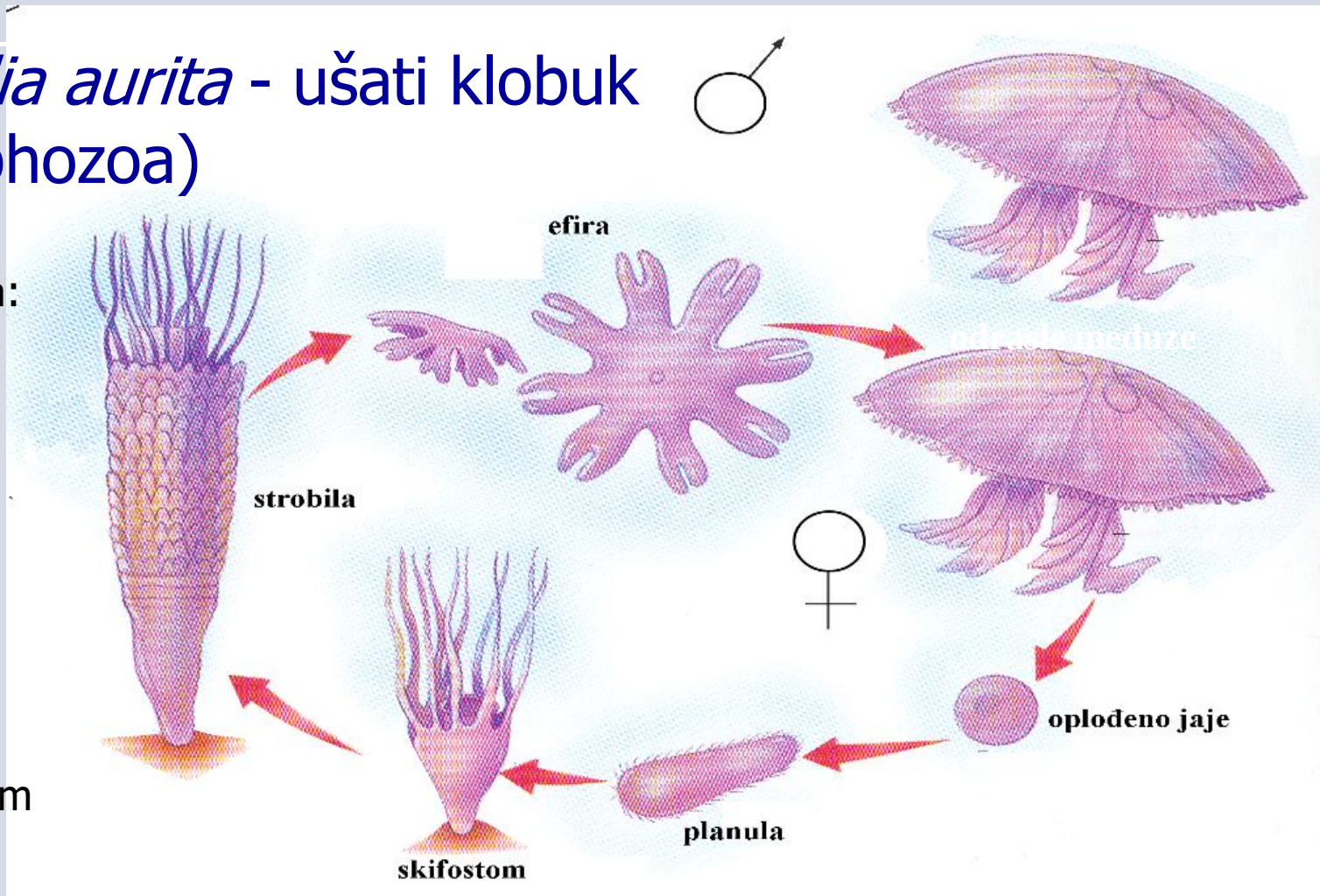




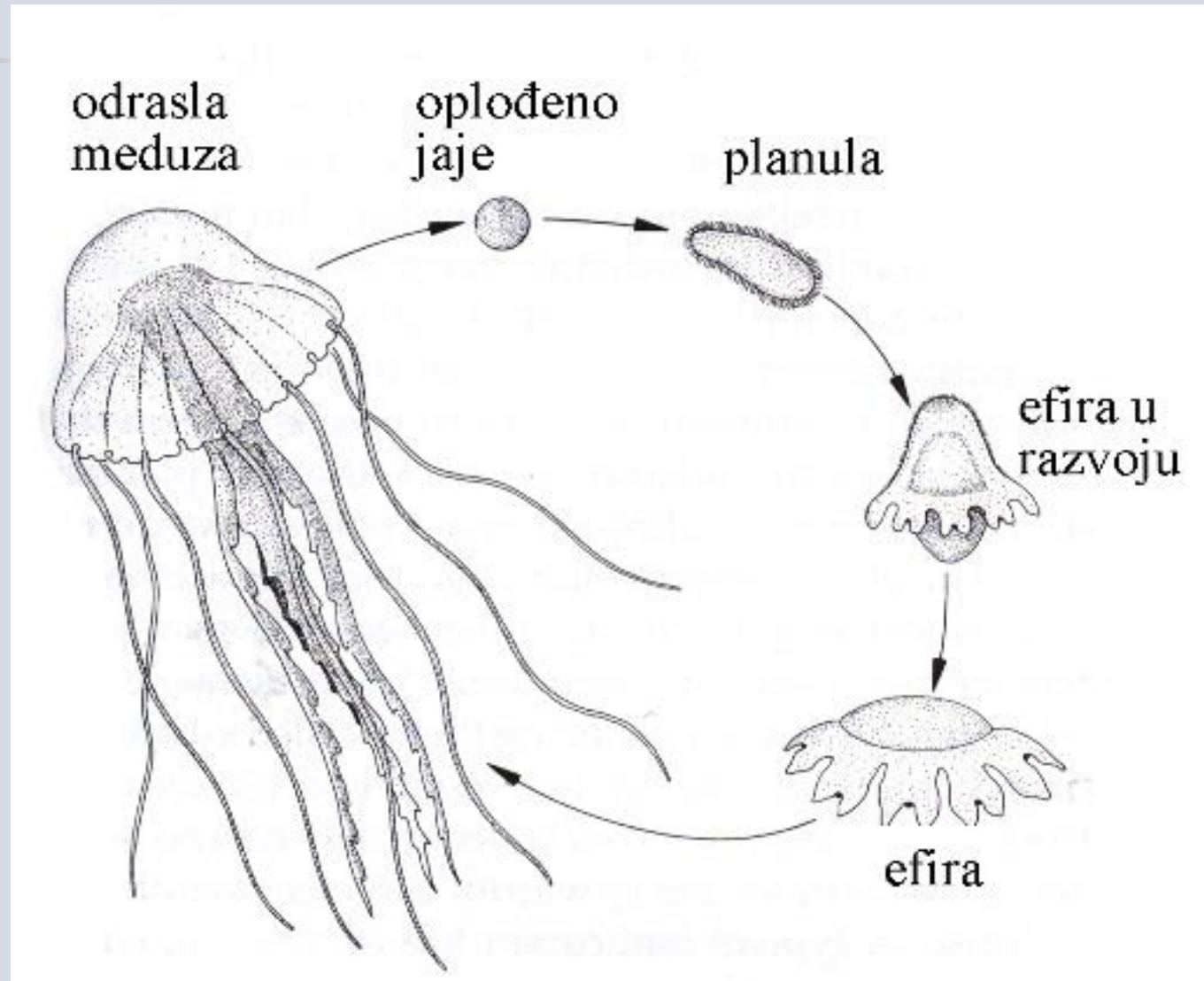
Metageneza

Aurelia aurita - ušati klobuk (Scyphozoa)

Strobilacija: mlade meduze se u obliku diska diferenciraju iz usnog područja strobile, a zatim se odvajaju transverzalnim dijeljenjem.



Pelagia noctiluca (morska mjesečina, Scyphozoa) – bez polipoidne generacije



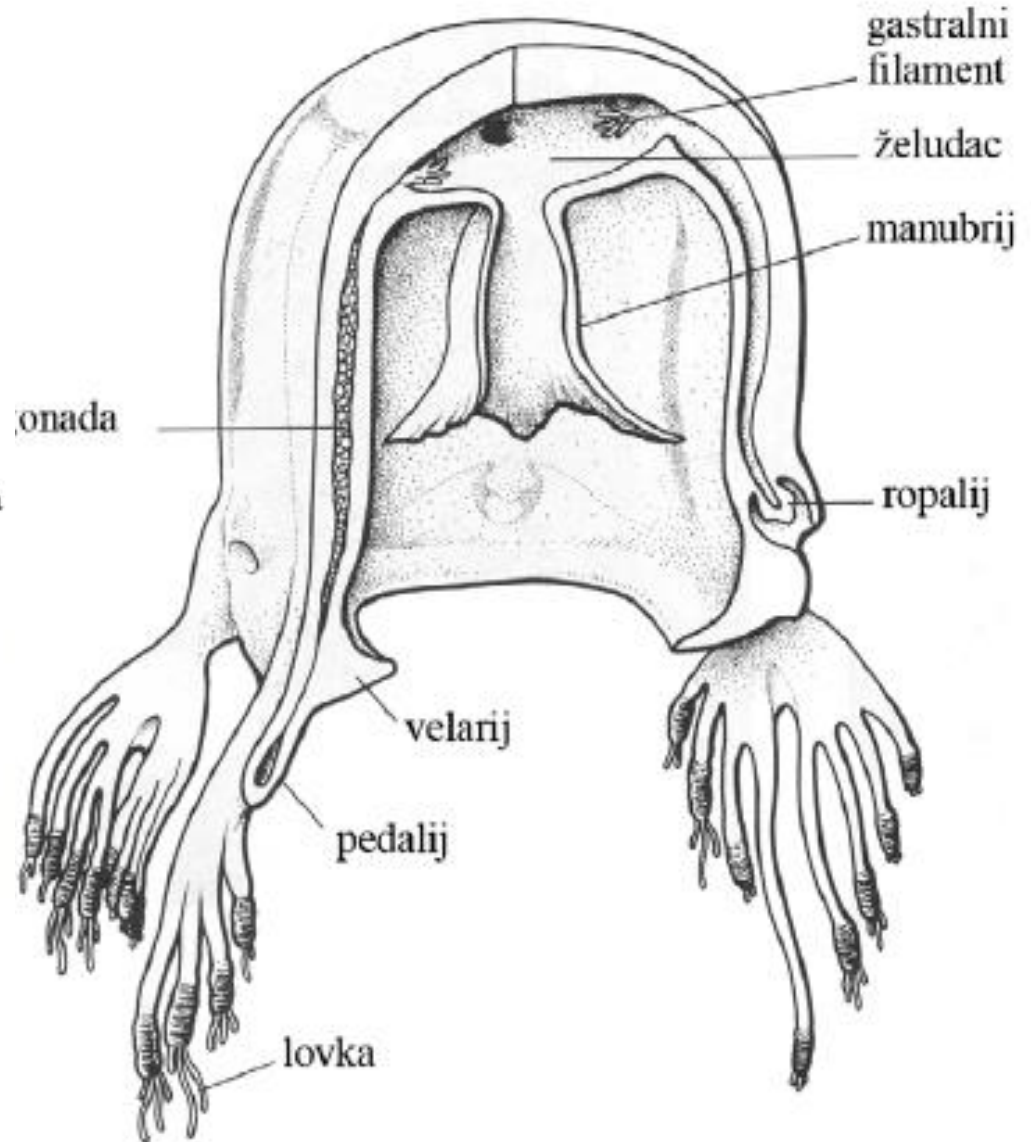
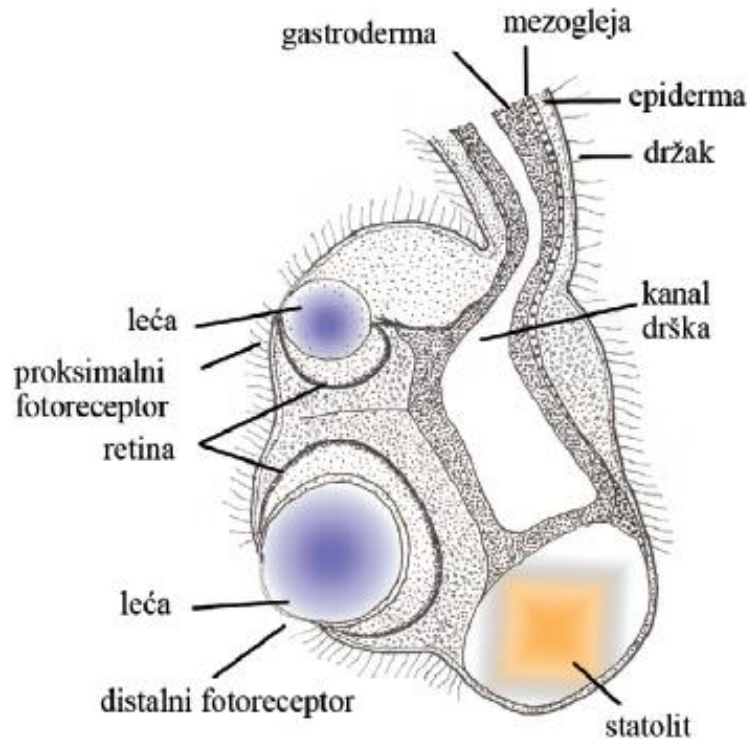
Biološka raznolikost režnjaka (Scyphozoa)

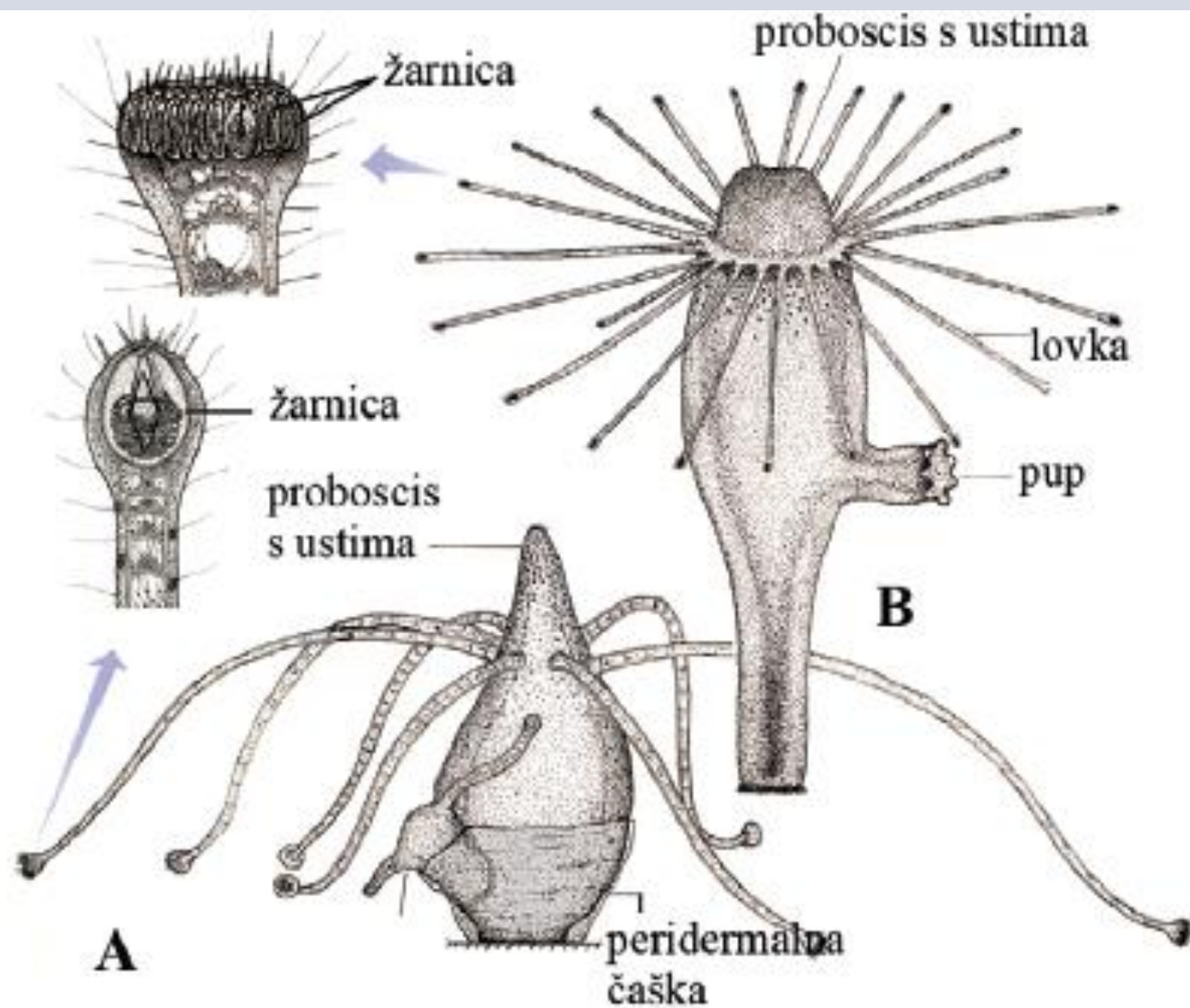
- *Aurelia aurita* - ušati klobuk
- *Pelagia noctiluca* - morska mjesečina
- *Chrysaora hysoscella*
- *Cotylorhiza tuberculata*
- Stauromedusae



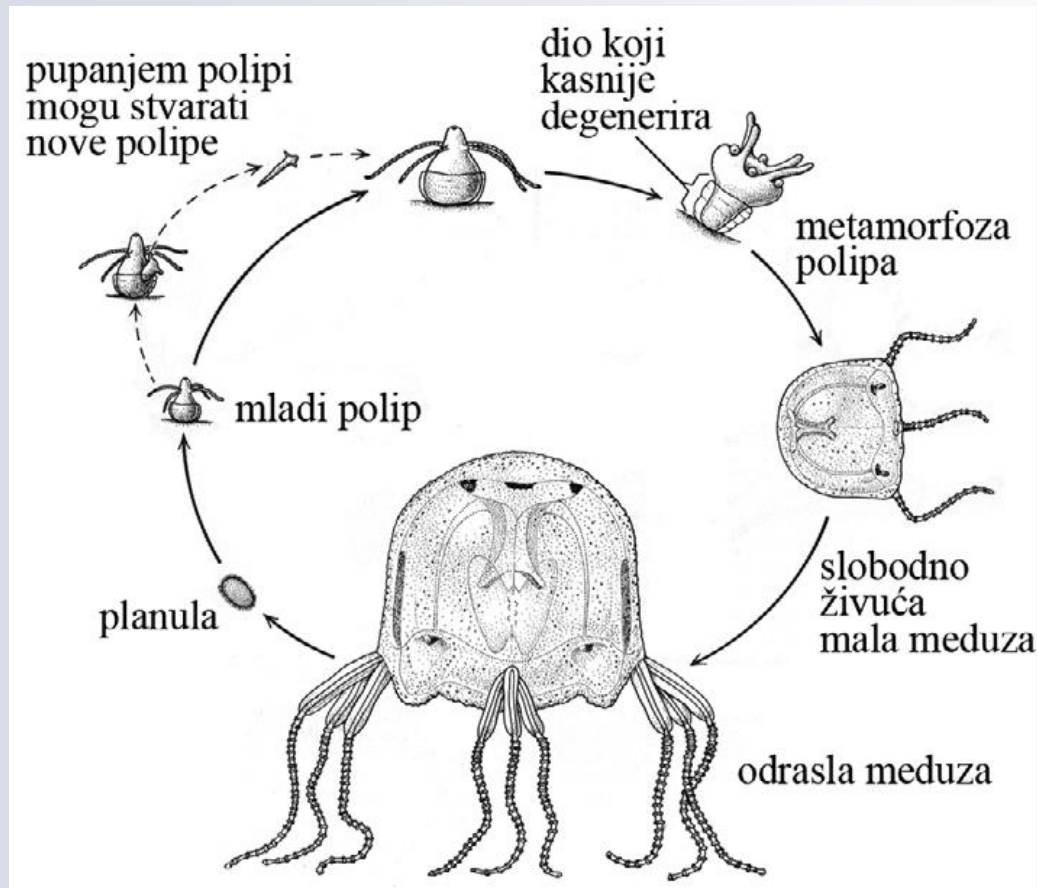
Razred Cubozoa - kubomeduze

- isključivo morske
- dominira meduza
- kockasti oblik zvona
- velarij





Metageneza kubomeduze



Biološka raznolikost kubomeduza (Cubozoa)

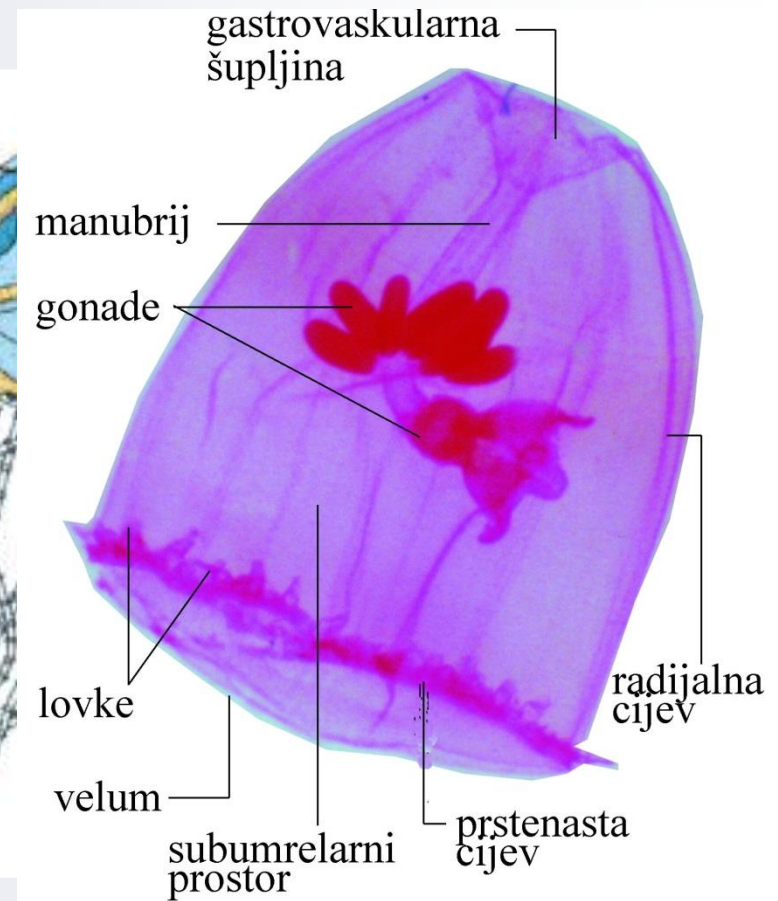


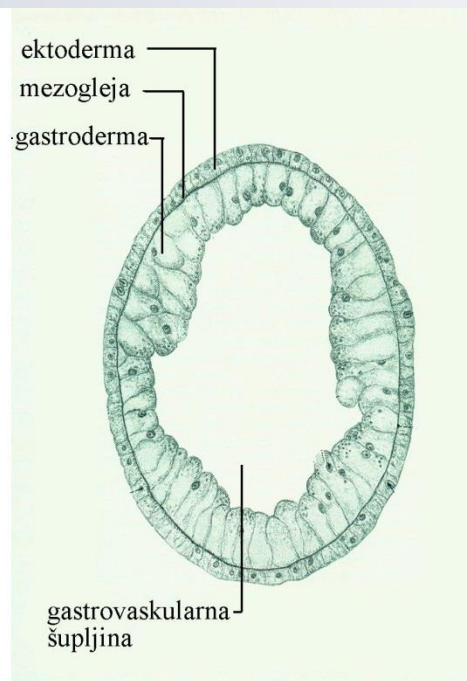
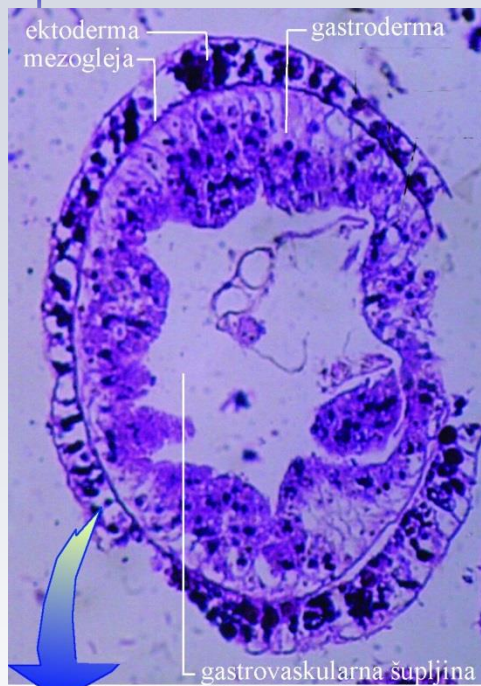
Chironex fleckeri - morska osa

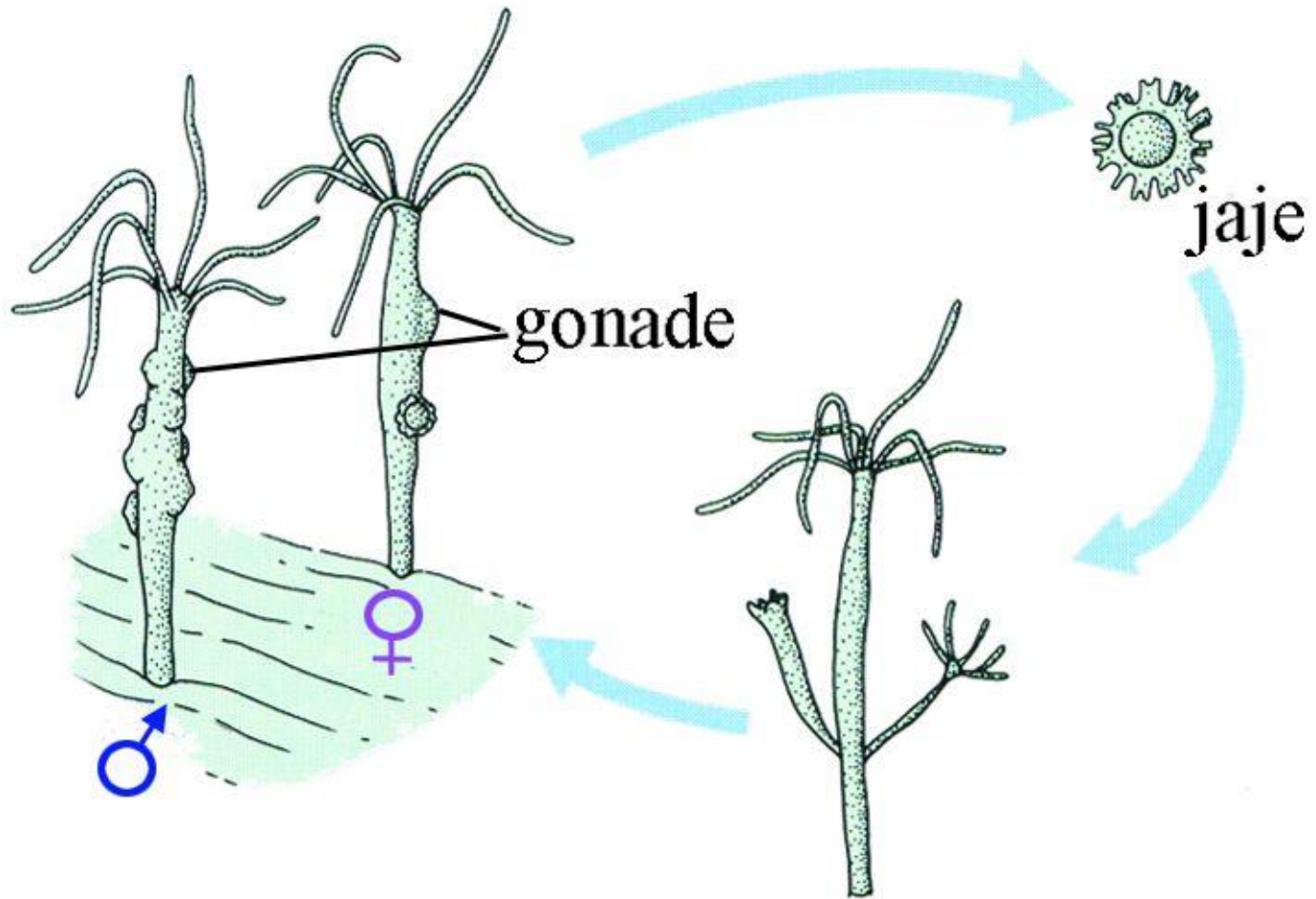


Razred Hydrozoa - obrubnjaci

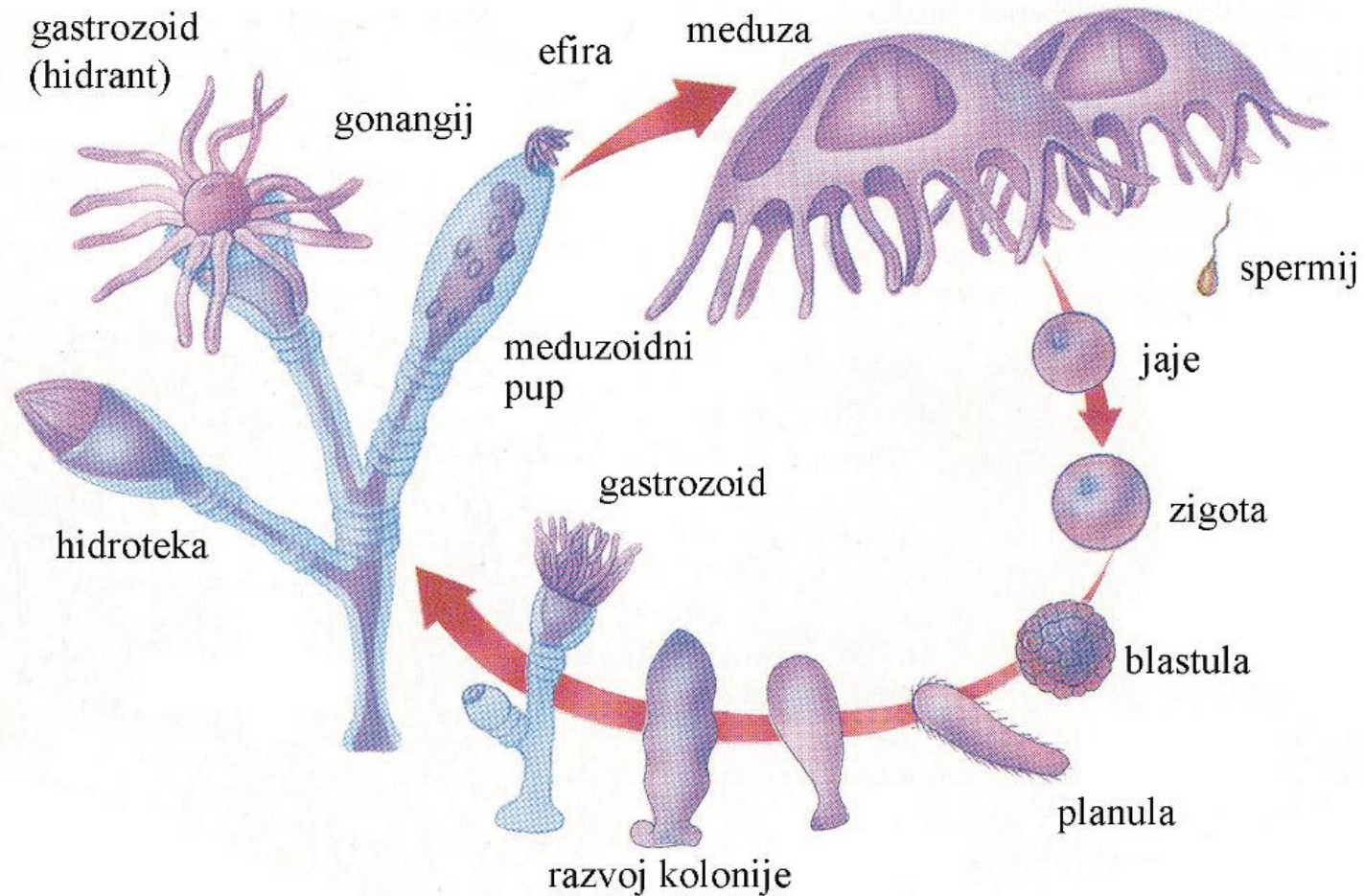
- većinom morski (ima i slatkovodnih)
- većinom zadružni (ima i solitarnih)

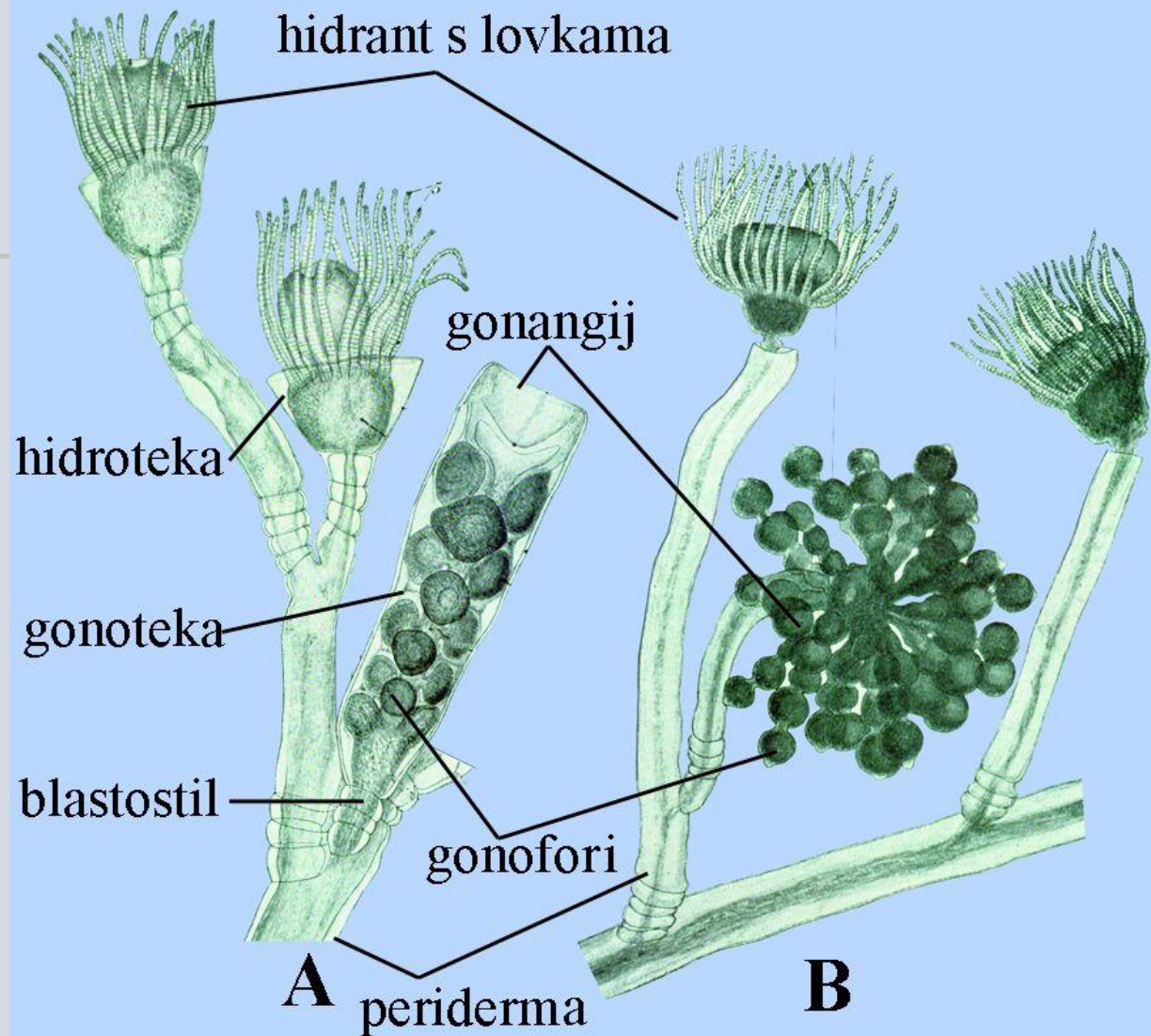






Obelia sp. (Hydrozoa)





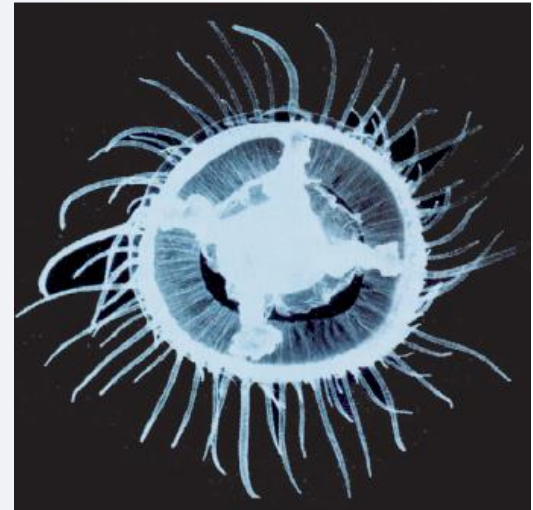
Biološka raznolikost obrubnjaka (Hydrozoa)

Eudendrium racemosum

Obelia geniculata

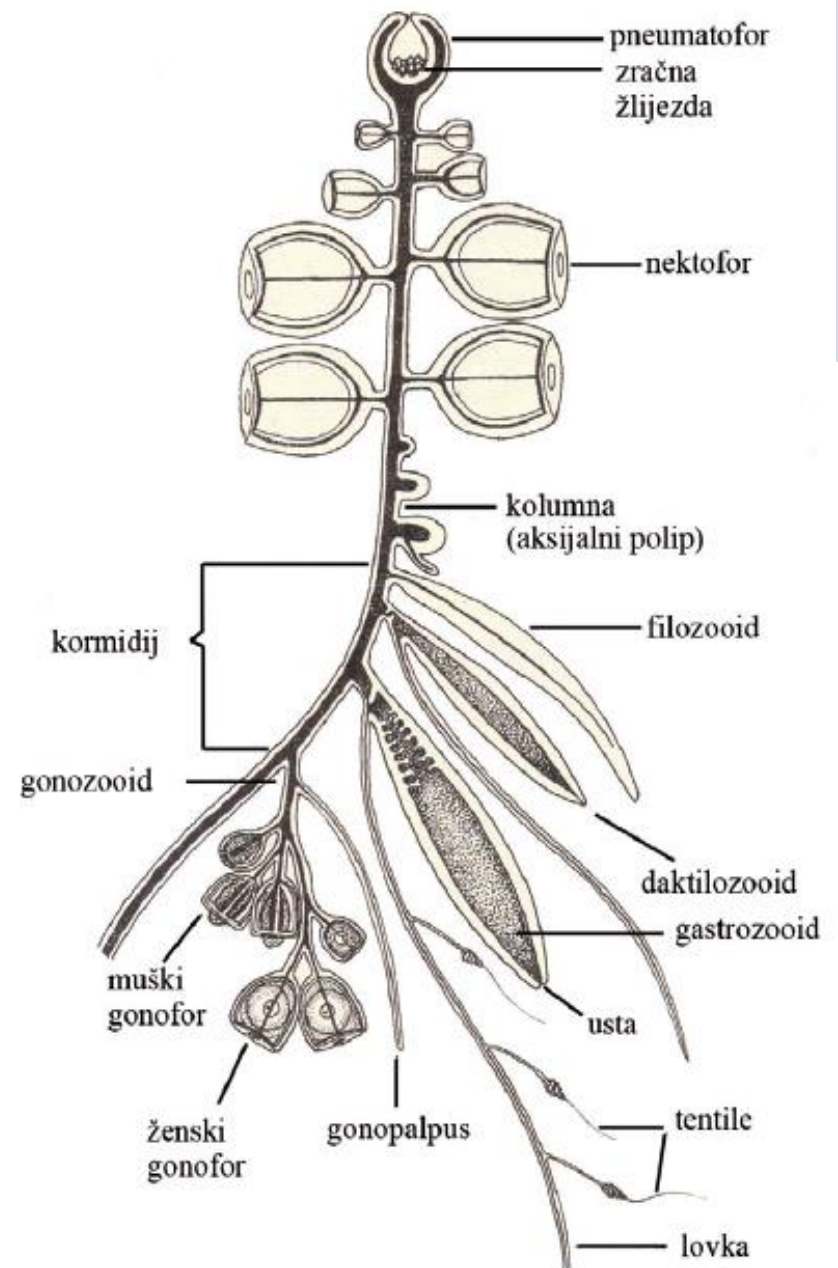
Craspedacusta sowerbyi

Hydra sp.



➤ Siphonophora - cijevnjaci

Physalia physalis – modri
loptaš, morska kobra



Funkcionalni oblici zooida

Gastrozoid: ishrana

Gonofor: razmnožavanje, nezrele sjedilačke meduze

Gonozoid: razmnožavanje

Daktilozoid: zaštita i hvatanje hrane

Tentakulozoid: zaštita i hvatanje hrane

Nematofor: hvatanje hrane

Pnematofor: plutanje

Nektofor: plivanje

Filozoid: zaštita

Definicije nekih pojmova

gastrovaskularna šupljina - tjelesna šupljina žarnjaka i rebraša koja funkcionira kao probavna šupljina i kao hidroskelet

eksumbrela - aboralni dio površine zvona meduze

subumbrela – oralni dio površine zvona u meduze

manubrij – produžetak u obliku cijevi na čijem se vrhu nalaze usta; visi iz središta subumbrele meduza žarnjaka

ropalij - osjetni organ u režnjaka smješten na rubu zvona meduze; sadrži statocist, mehanoreceptore, kemoreceptore i fotoreceptore

sifonoglif - žlijeb na ždrijelu koralja kroz koji prolazi voda izravno u gastrovaskularnu šupljinu

akoncije - nitaste tvorevine koje se drže gastralnih filamenata nekih koralja; sadrže veći broj žljezdanih i žarnih stanica te se mogu ispružiti kroz otvore na stijenci tijela

cenenhim - debela celularizirana mezogleja koja povezuje susjedne polipe kolonijalnih Octocorallia

soleniji – gastrodermalni sustav cijevi koji povezuje gastrovaskularne šupljine pojedinih polipa u zadrugi

metageneza - izmjena spolne i nespolne generacije u žarnjaka

strobilacija - proces tijekom kojeg meduze nastaju na skifopolipu poprečnom diobom oralnog područja skifostoma; nastala struktura naziva se **strobila**