

Loculoascomycetes

- ✱ Askokarp je **askostroma**, unilokularna ili multilokularna.
- ✱ Askusi su bitunikatni,
- ✱ Patogeni biljaka, gljiva i insekata, simbionti, razlagači celuloze.

- ✱ **Myriangiales**
- ✱ **Dothideales**
- ✱ **Pleosporales**

Myriangiales

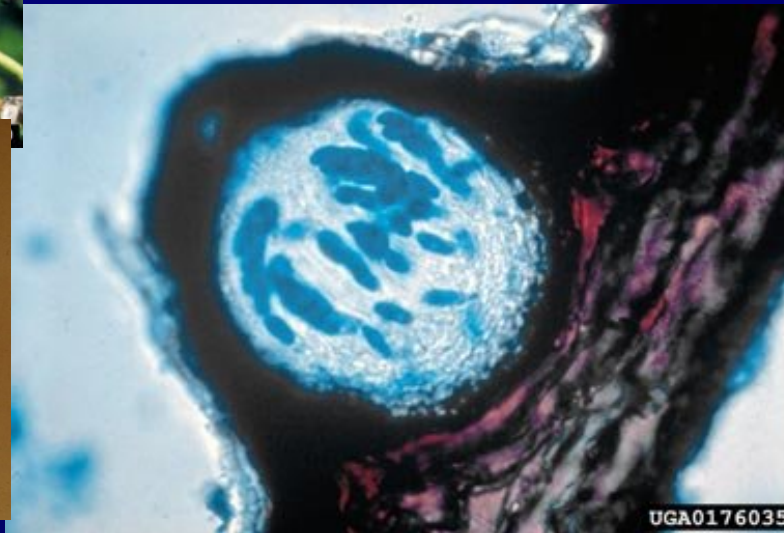
- većinom saprobi u tropima i malobrojni paraziti,
- **strome sa lokusima u kojima je po jedna askus,**
- konidije se obrazuju u želatinoznoj masi.



Elsinoe veneta/Gloeosporium venetum
antraknoza maline i kupine

Dothideales

- askostrome ili pseudotecije,
- bitunikatni askusi,
- paraziti ili saprobi biljaka,
- konidije obrazuju u piknidijama, acervulama ili na slobodnim konidioforima.



pseudotecija

Guignardia bidwelli/Phyllosticta ampelicida crna trulež grožđa

- značajna bolest vinove loze,
- inficira mlade delove biljke,
- formira strome sa pseudotecijama,
- konidije obrazuje u piknidijama.

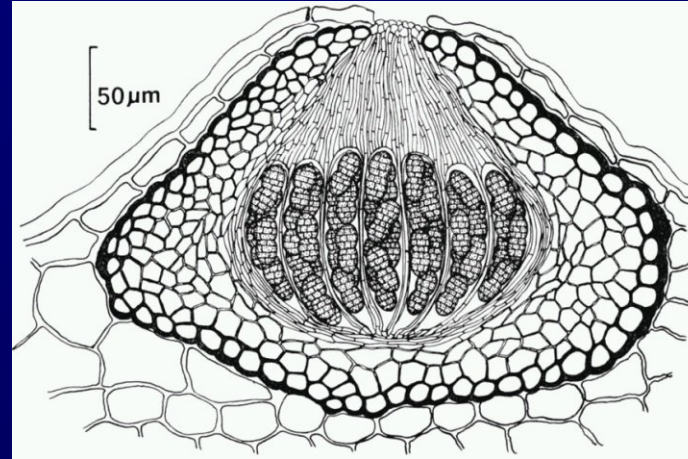


piknidija

Pleosporales



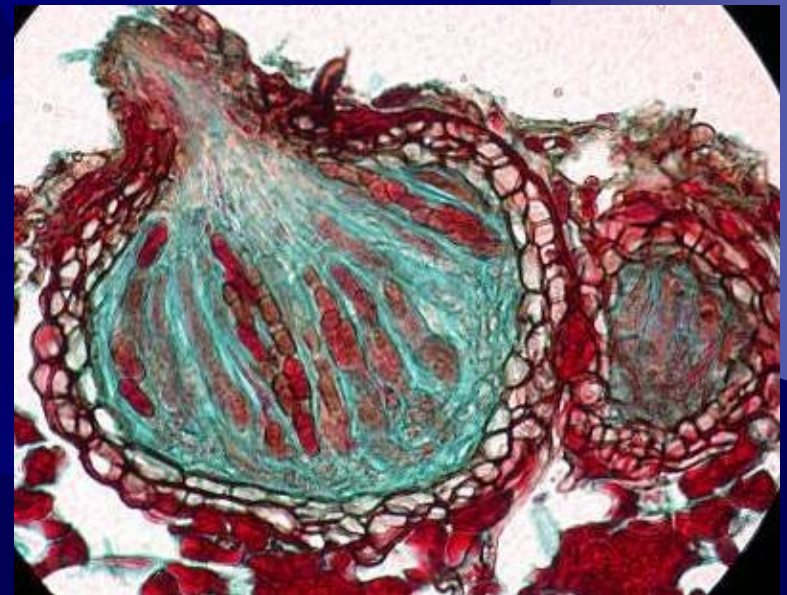
- saprobi i malobrojni paraziti biljaka,
- askokarp, **pseudotecija** sa dlakama ili setama,
- askospore septirane, parafize,
- konidijski stadijum često prisutan.



pseudotecija

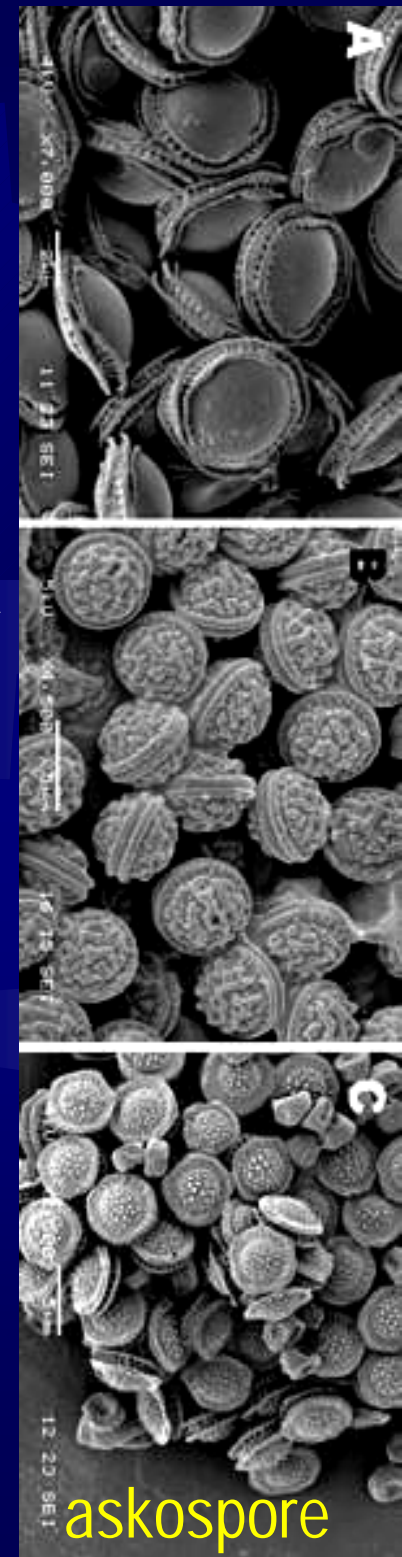
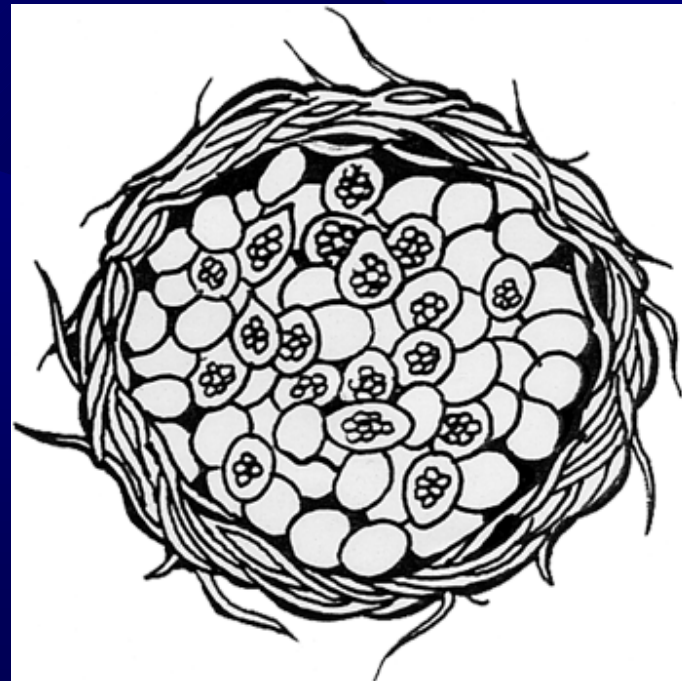
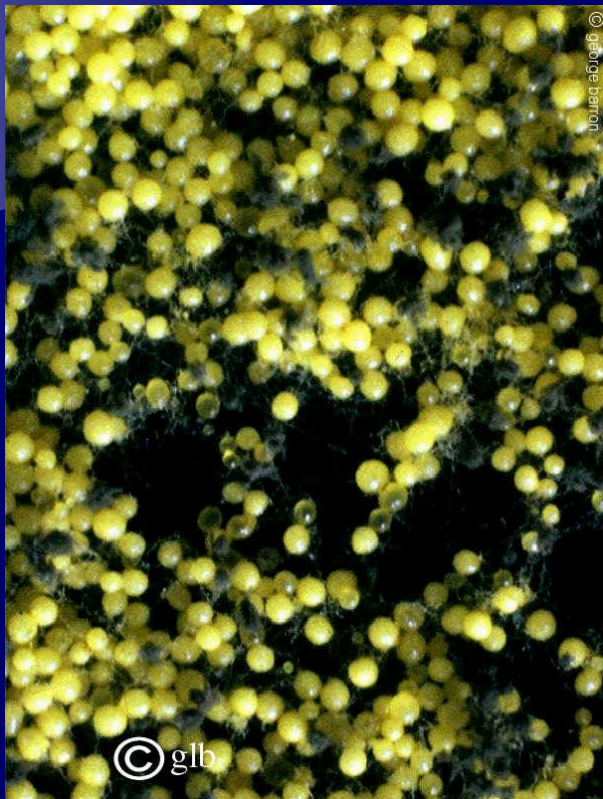
Venturia inaequalis/ Spilocaea pomi čađava krastavost jabuke

- rasprostranjena vrsta u uslovima hladne i vlažne klime,
- parazit i saprob na listovima i plodovima,
- askospore dvoćelijske.



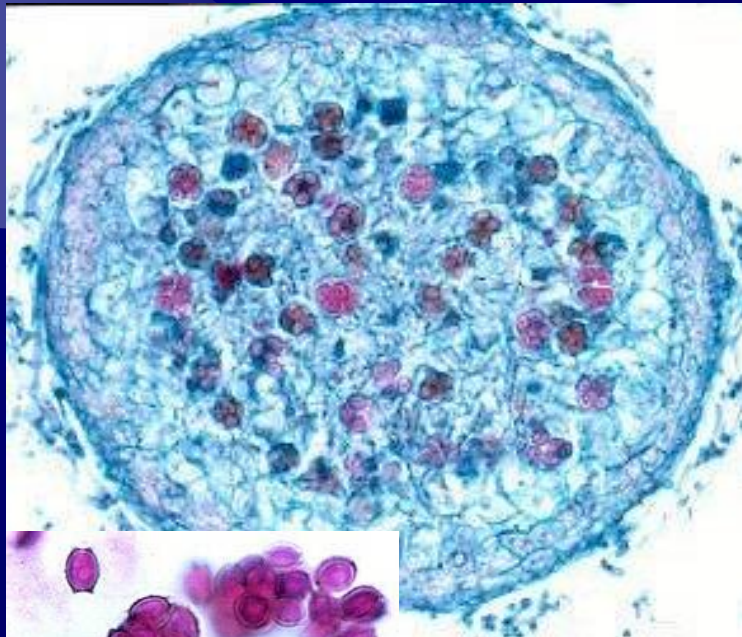
Plectomycetes

- primitivna grupa karpaskomicetida,
- askokarp tipična **kleistotecija**,
- neuređeni askusi u askokarpu,
- **askospore neseptirane**, ne oslobađaju se aktivno,
- **konidije** često preovlađuju u životnom ciklusu,
- **saprobi** u zemljištu, biljnim i životinjskim ostacima, na namirnicama, retko **paraziti**.



Eurotiales

- micelija dobro razvijena,
- ne obrazuju svi plodnosna tela,
- **kleistotecija** – mala, loptasta na miceliji,
- askusi loptasti,
- **konidije** česte i brojne,
- građa konidijskog aparata važan taksonomski karakter,
- saprobi i paraziti biljaka i životinja.



penicillium
conidiophore

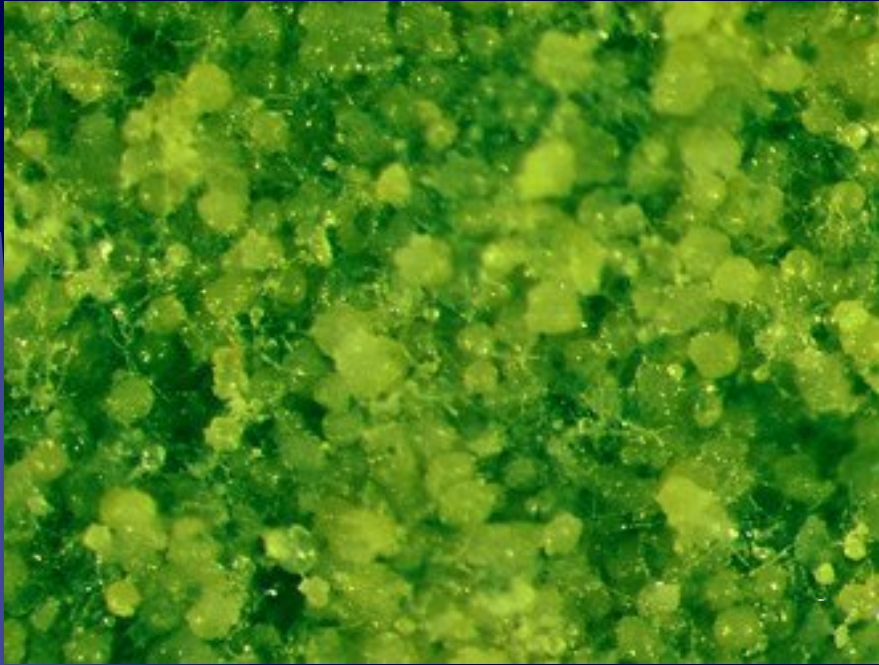
10 μm



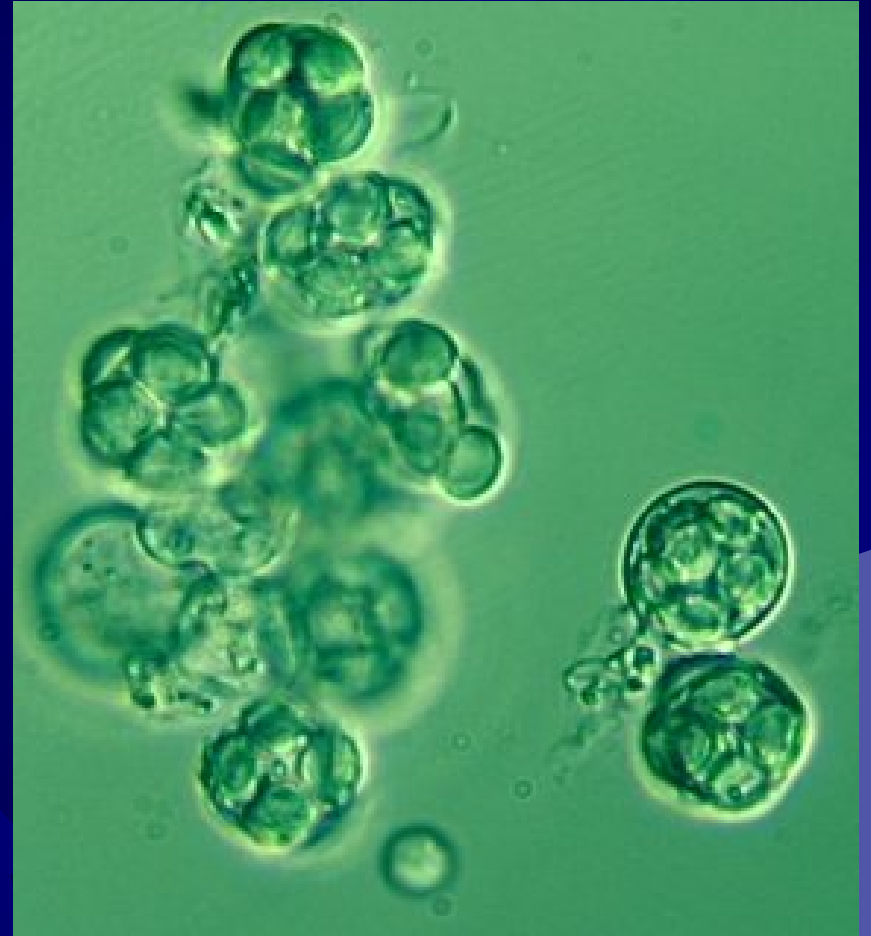
aspergillus
conidiophore

10 μm

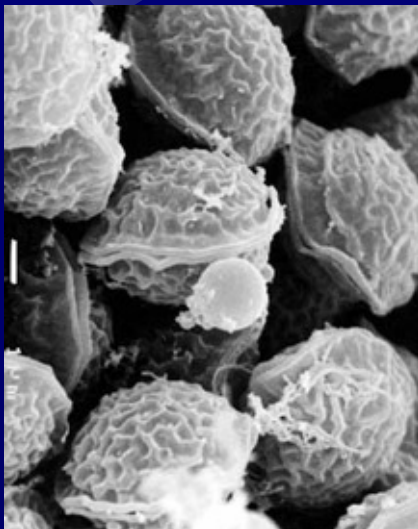
Eurotiales



Eupenicillium/Penicillium sp.



Eurotium/Aspergillus sp.



Neosartoria/Aspergillus sp.



Eurotiales

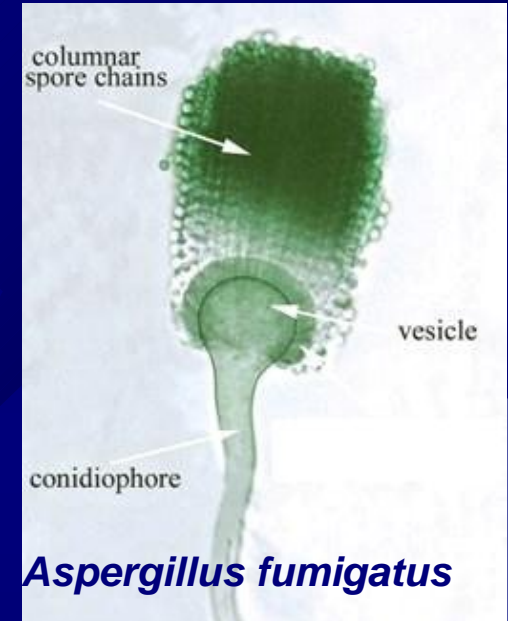
Neosartorya fumigata / *Aspergillus fumigatus*



kultura *in vitro*



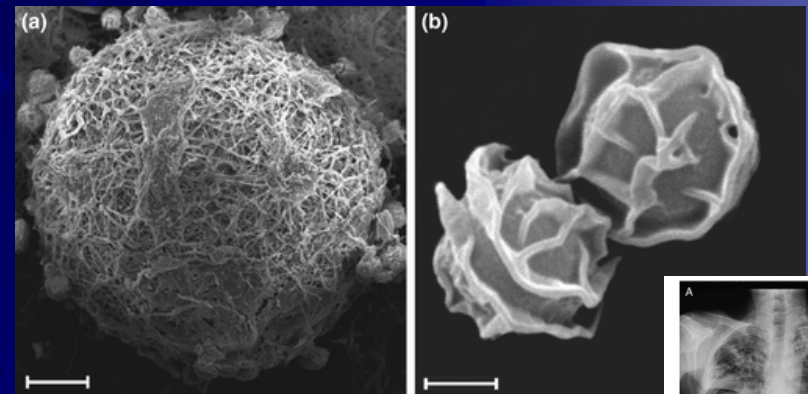
anamorf + teleomorf=holomorf



Aspergillus fumigatus

anamorf

- raste na temperaturi od 37°C do 50°C,
- humani i animalni patogen (imunokompromitovane osobe),
- može proizvoditi genotoksične i citotoksične mikotoksine (gliotoksin).

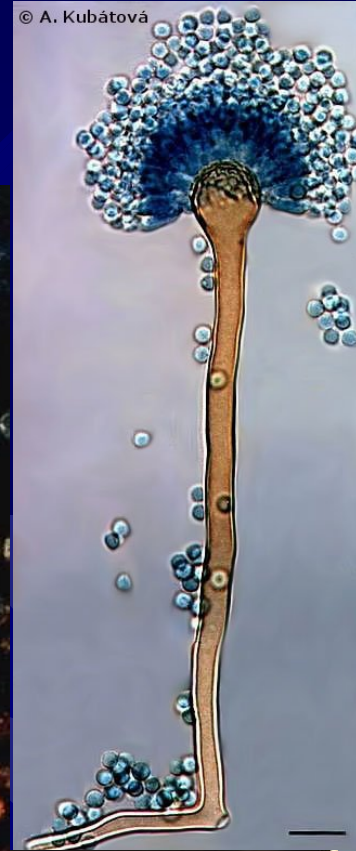
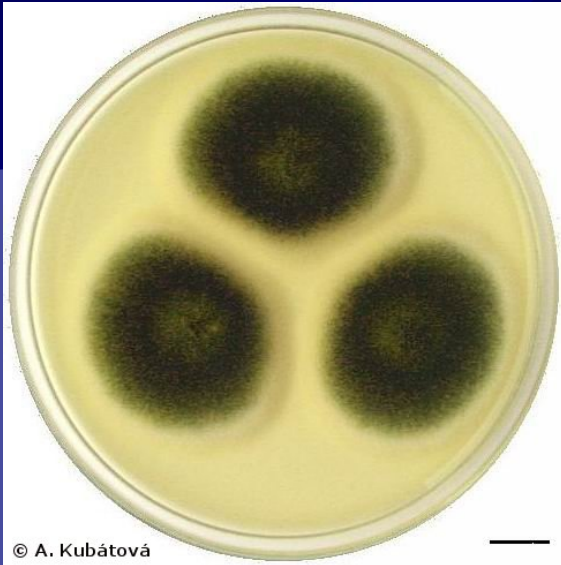


Neosartorya fumigata

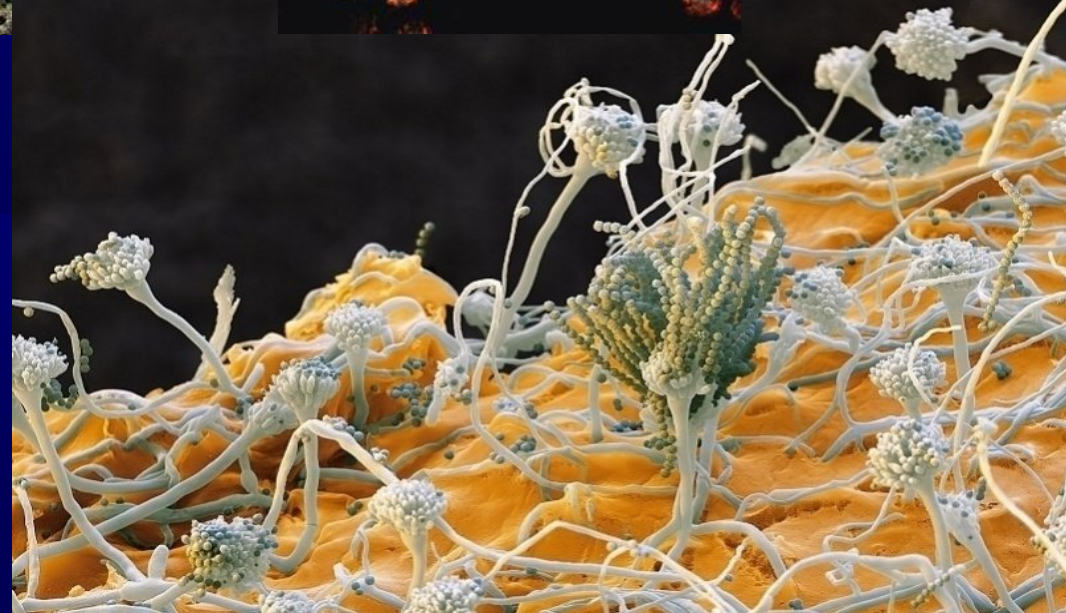


Eurotiales

Emericella/Aspergillus nidulans

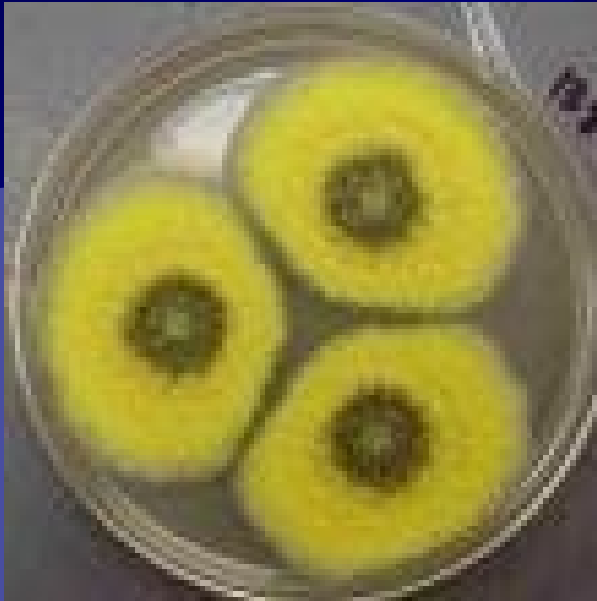


- homotalusna vrsta, obrazuje kleistotecije u kulturi,
- model organizam za naučna istraživanja.

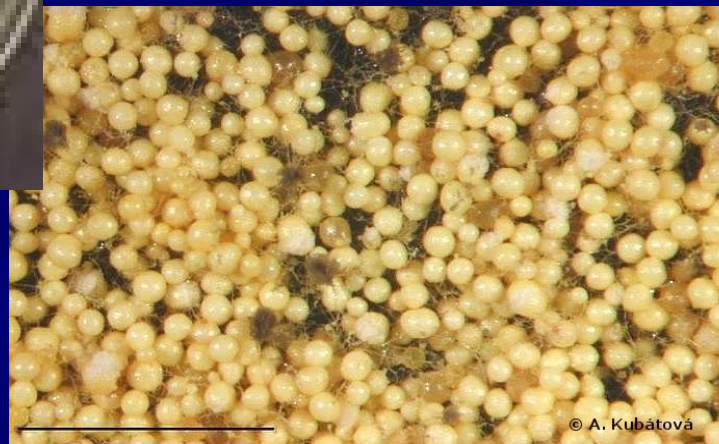


Eurotiales

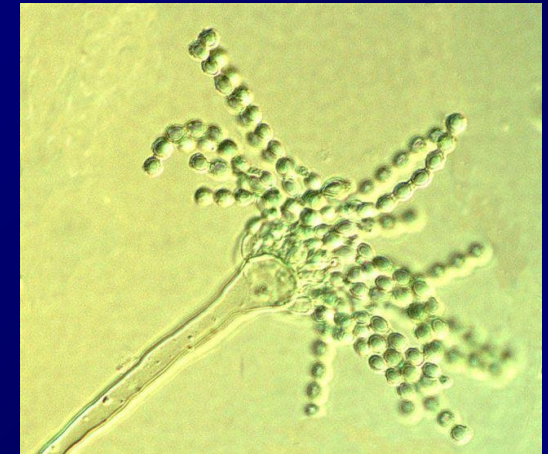
Eurotium/Aspergillus amstelodami



kleistotecije

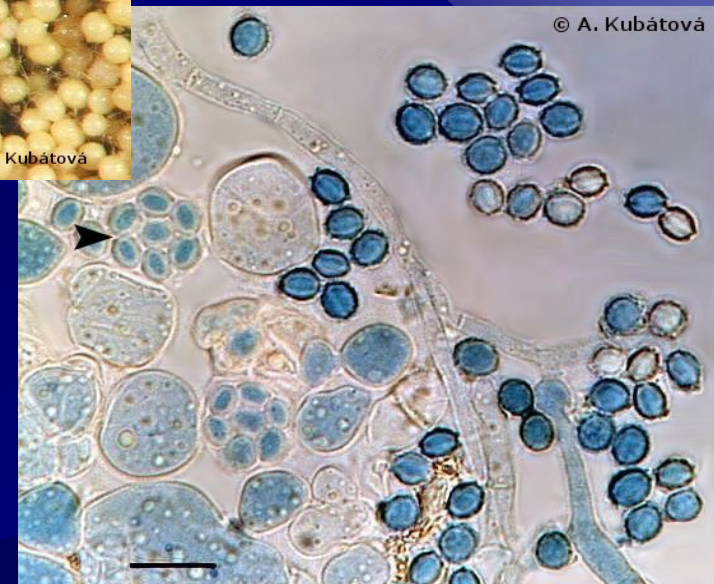


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anamorf

askusi sa askosporama

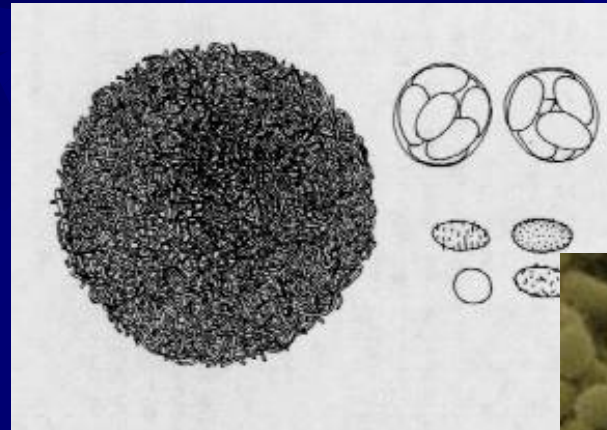
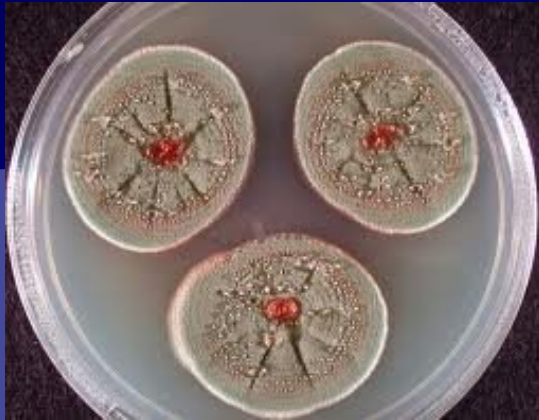


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- razvija se na organskim supstratima sa niskom Av,
- humani i animalni patogen – **aspergiloze**.

Eurotiales

Talaromyces/Penicillium chrysogenum

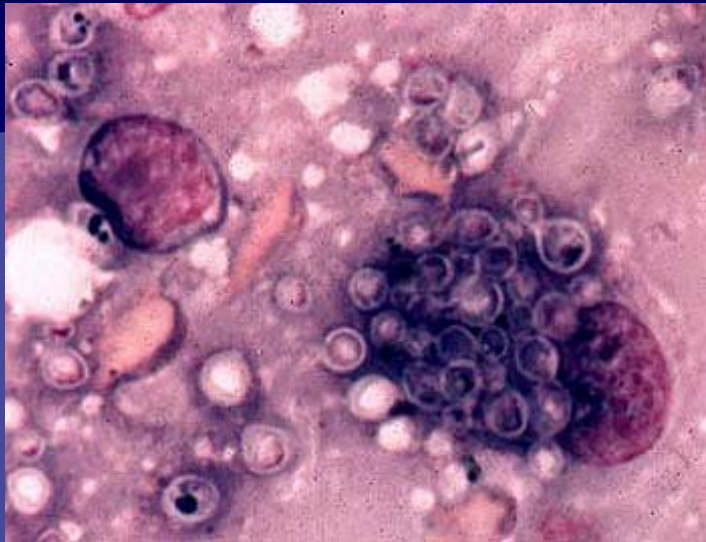


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- *P. chrysogenum* je producent **penicilina** ali može biti i humani patogen.
- *Penicillium* spp. imaju važnu ulogu u prirodi kao i u proizvodnji hrane i lekova.

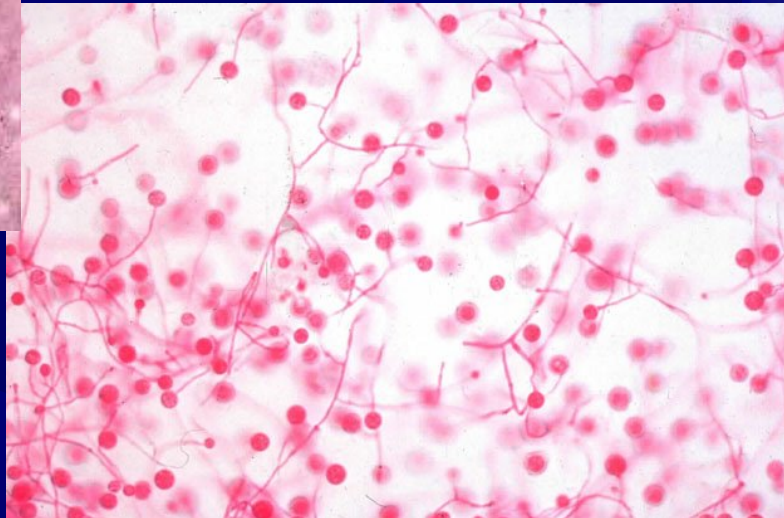
Eurotiales

Emmonsia/Histoplasma capsulatum



kvasolika forma

mikrokonidije



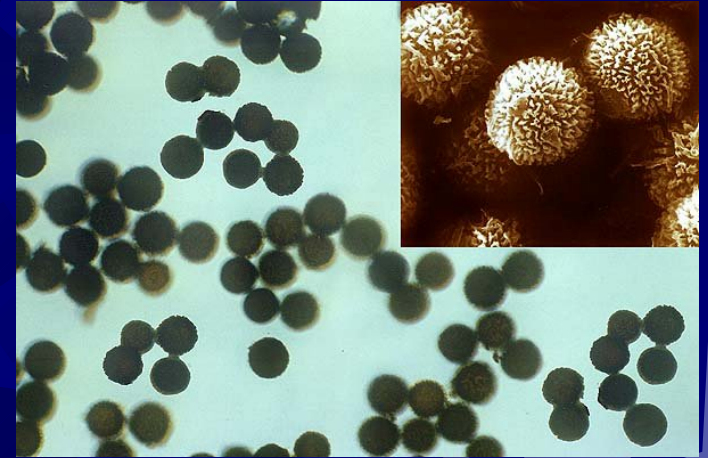
makrokonidije i hife

- kosmopolitska, dimorfna vrsta (micelija na 25°C, kvasolika forma na 37°C),
- ekskrementi ptica i slepih miševa,
- izaziva **histoplazmoze** ljudi i životinja,
- plućna, sistemska, kutana mikoza.

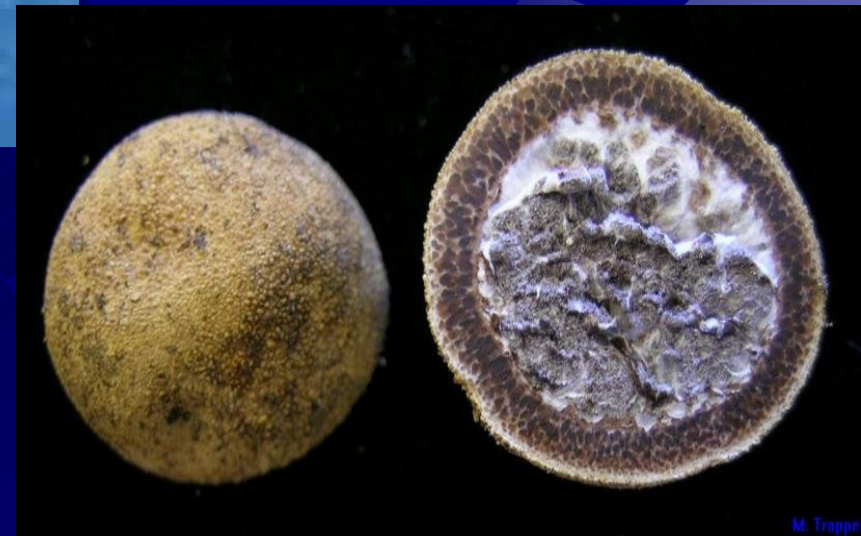


Eurotiales

Elaphomyces spp.

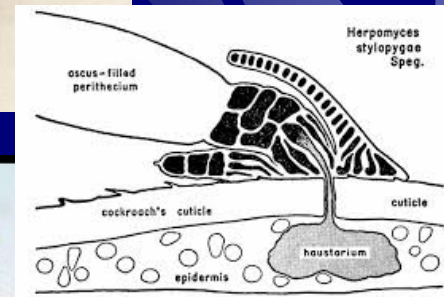


- ☀ kleistotecije - krupne, tvrde, hipogeične,
- ☀ ne formiraju himenijum, askusi su razbacani, razlika sa tartufima
- ☀ grade **obligatnu mikorizu** sa korenovim sistenom drvenastih biljaka.

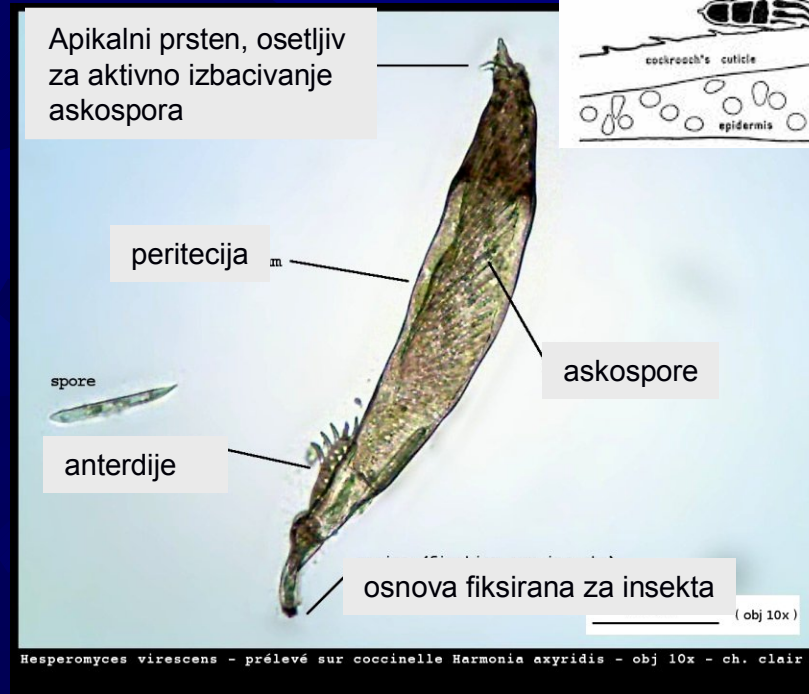


Laboulbeniomycetes

- micelija redukovana na **receptakulum** sa **bazalnom ćelijom** i **haustorijama**,
- na receptakulumu **peritecije**,
- askusi uređeni, bez parafiza,
- 4-8 dvićelijskih askospora u askusu,
- **dietske** ili **monetske** vrste,
- obligatni egzoparaziti artropoda,
- uski specijalisti u izboru domaćina,
- kosmopoliti, najbrojniji u tropima.



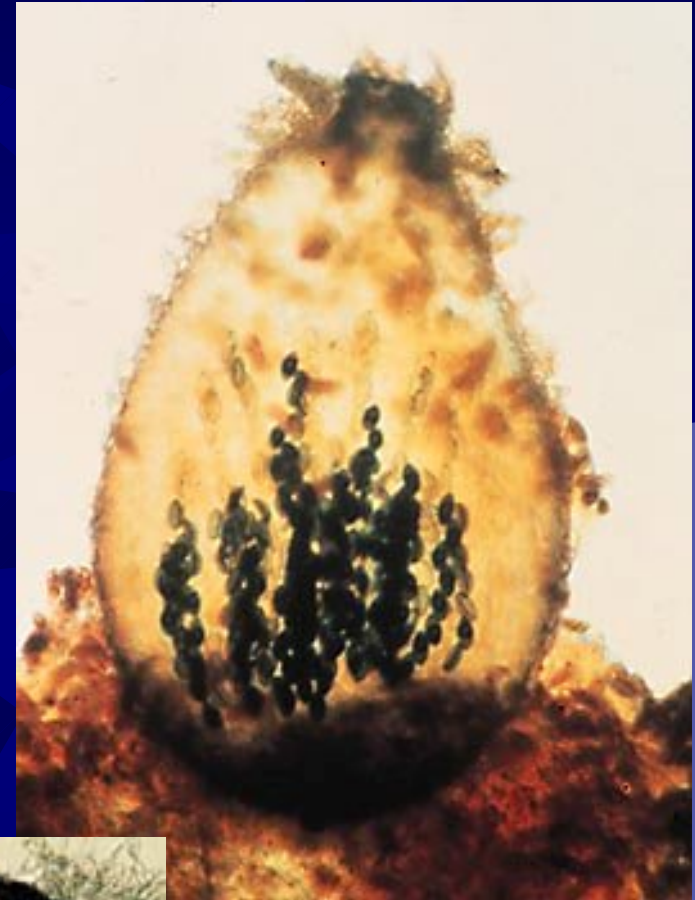
Herpomyces virescens



Pyrenomycetes

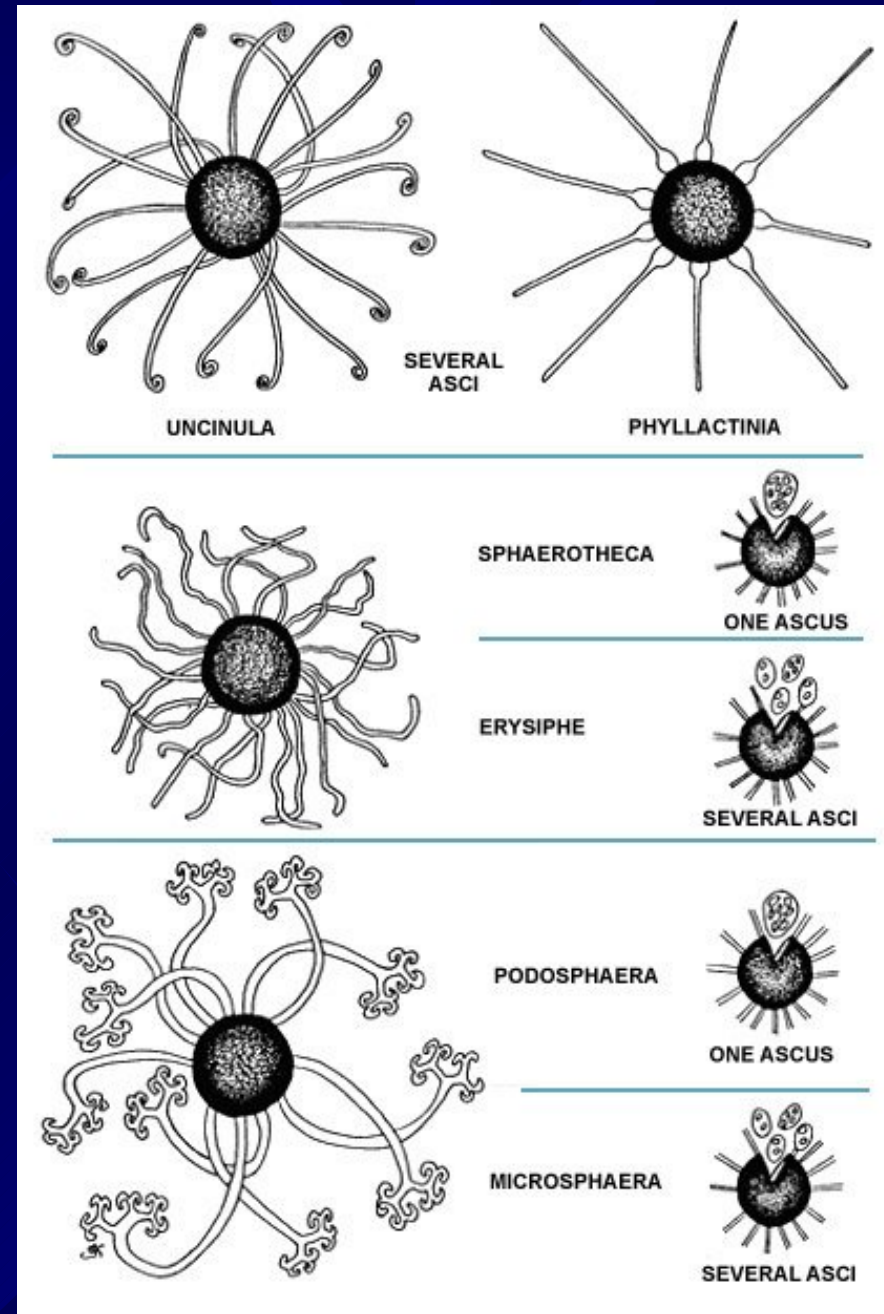
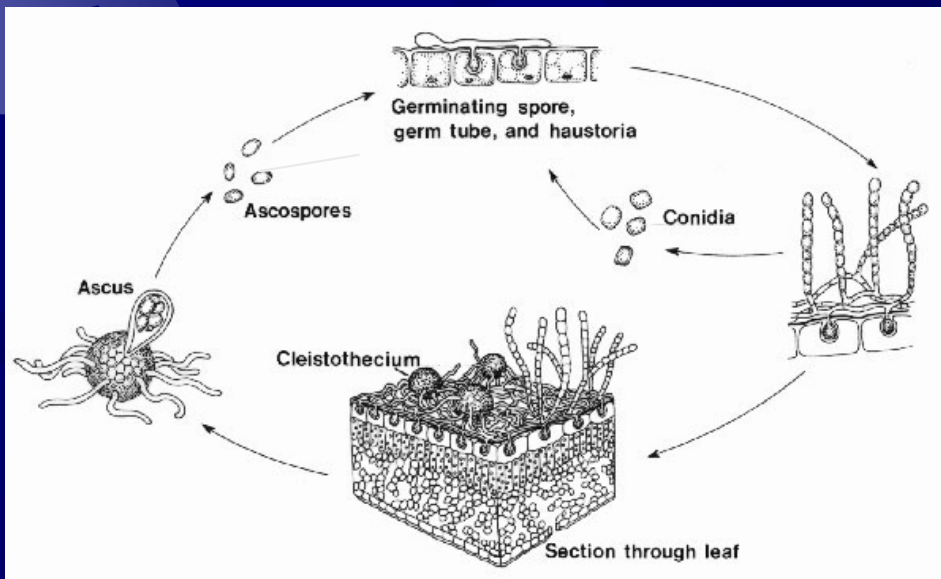
- najbrojnija klasa gljiva, oko 6000 vrsta,
- askokarp je u tipičnom slučaju **peritecija**, na miceliji ili na/u stromi.
- askusi:
 - pravilno raspoređeni,
 - unitunikatni,
 - sa porom ili pukotinom na vrhu,
 - himenijum.
- samo mala grupa formira **kleistotecije** sa unitunikatnim askusima raspoređenim u snopiće i aktivnim oslobađanjem askospora.

- ✱ Erysiphales
- ✱ Meliolales
- ✱ Coronophorales
- ✱ Sordariales
- ✱ Sphaeriales



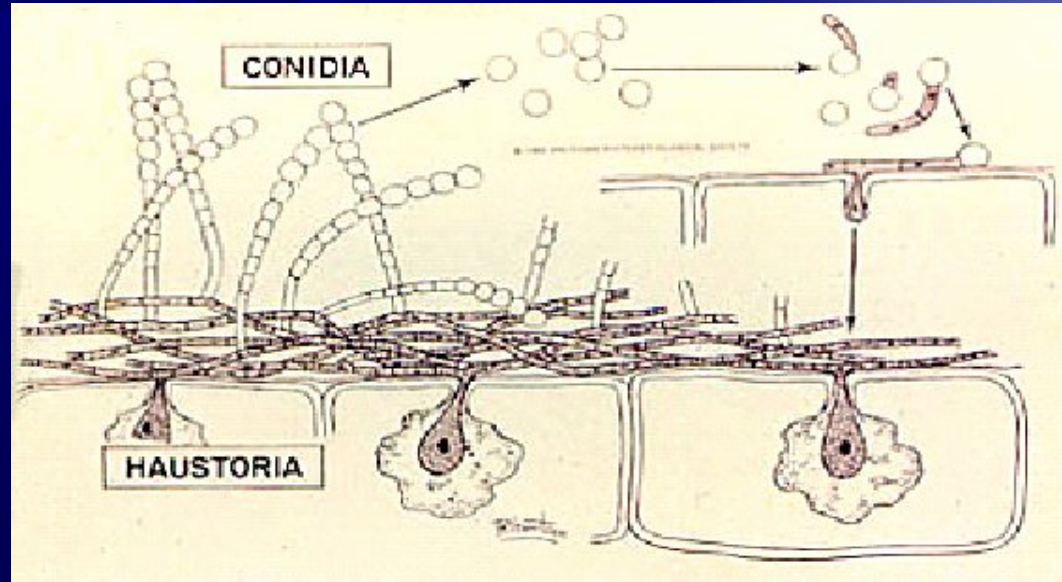
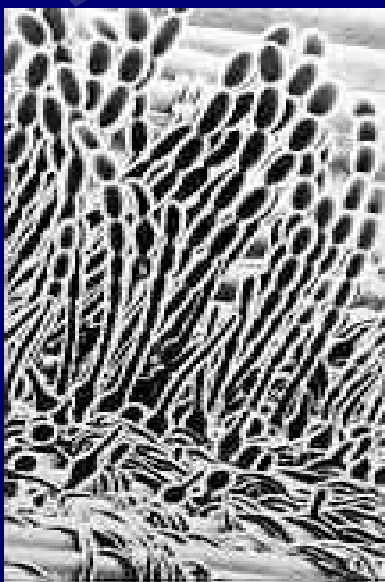
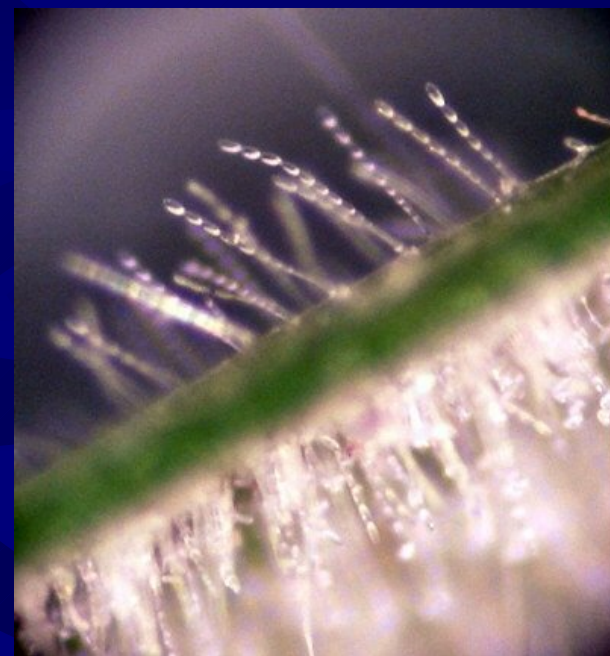
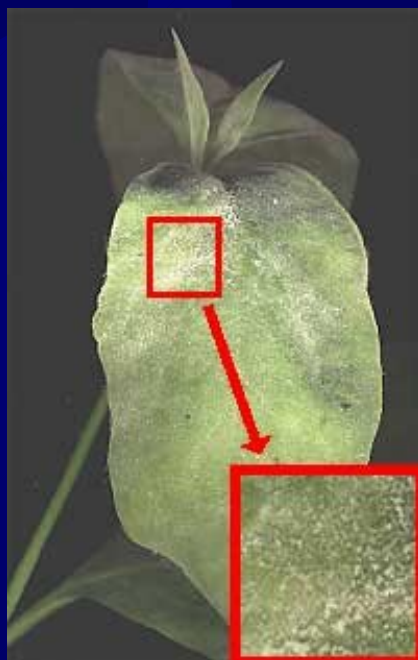
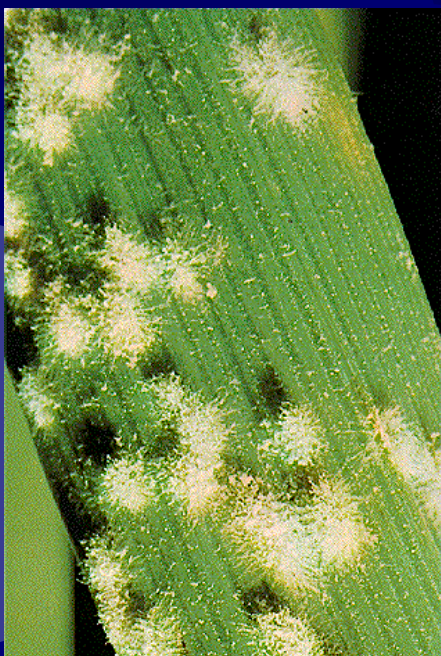
Erysiphales

- kleistotecije na miceliji, bez parafiza sa apendiksima,
- askusi loptasti ili izduženi,
- aktivno izbacivanje askospora,
- obligatni paraziti široko rasprostranjeni,
- izazivači bolesti “pepelnice”,
- konidijski stadijum *Oidium*,
- klasifikacija izvršena na osnovu broja askusa u kleistoteciji i građe apendiksa,



Erisiphales

Oidium sp.



Erysiphales

Sphaeroteca panosa – pepelnica ruže



- u kleistoteci jedan askus
- apendiksi prosti



S. fuliginea
pepelnica dinje

Erysiphales

Podosphaera leucotricha – pepelnica jabuke

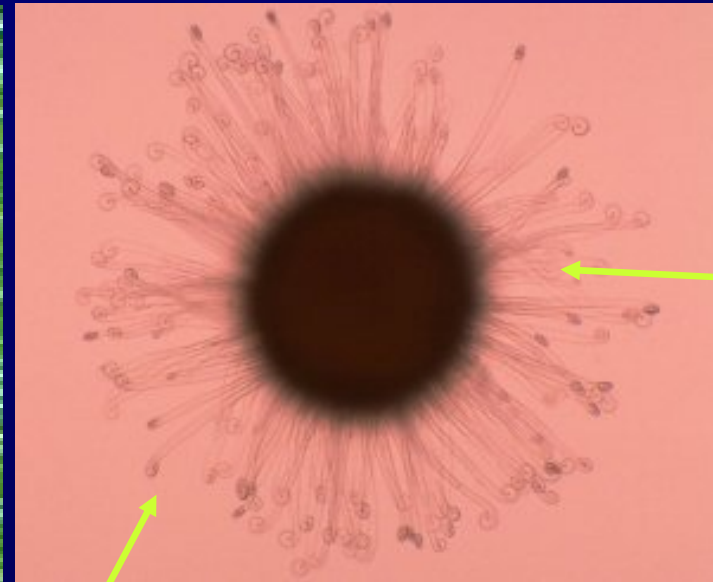


- u kleistoteci jedan askus,
- apendiksi dihotomo granati,
- heterotalusna vrsta

Erysiphales

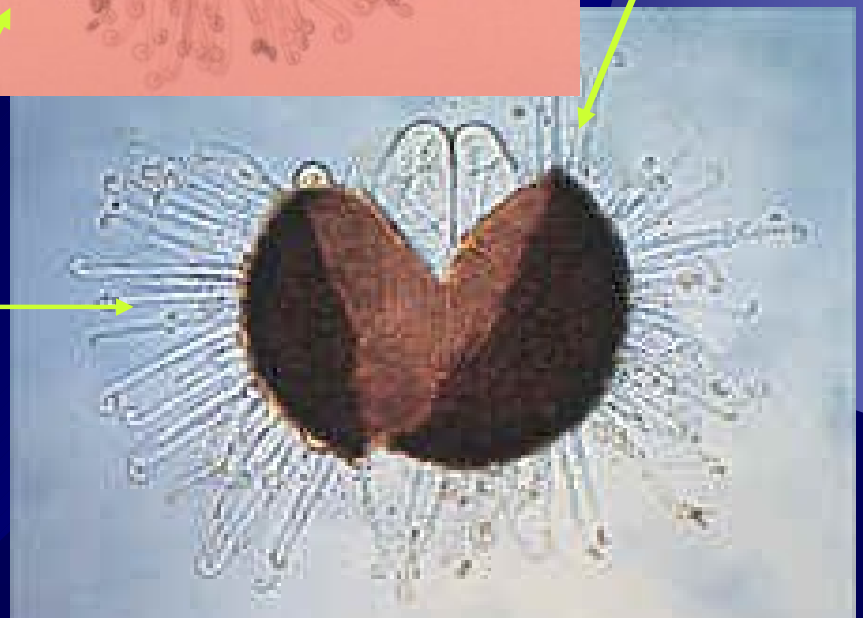
Uncinula necator – pepelnica vinove loze

Kleistotecije na listu vinove loze



kleistotecija

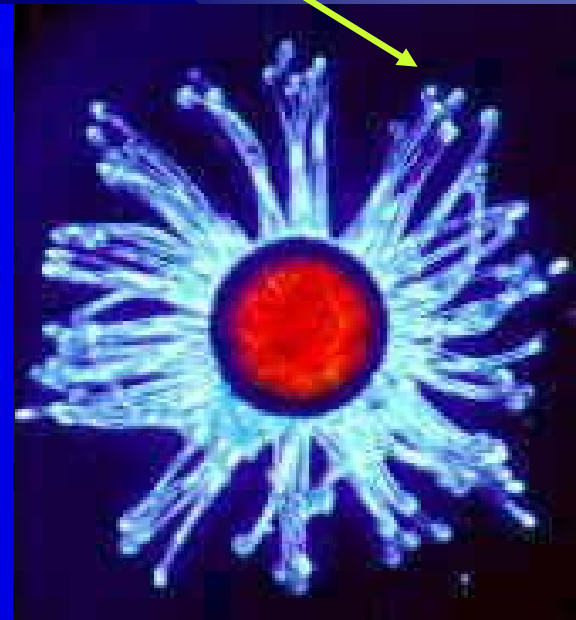
apendiksi



- u kleistoteci više askusa,
- apendiksi spiralno uvijeni na vrhu.

Erysiphales

Erysiphe polygoni

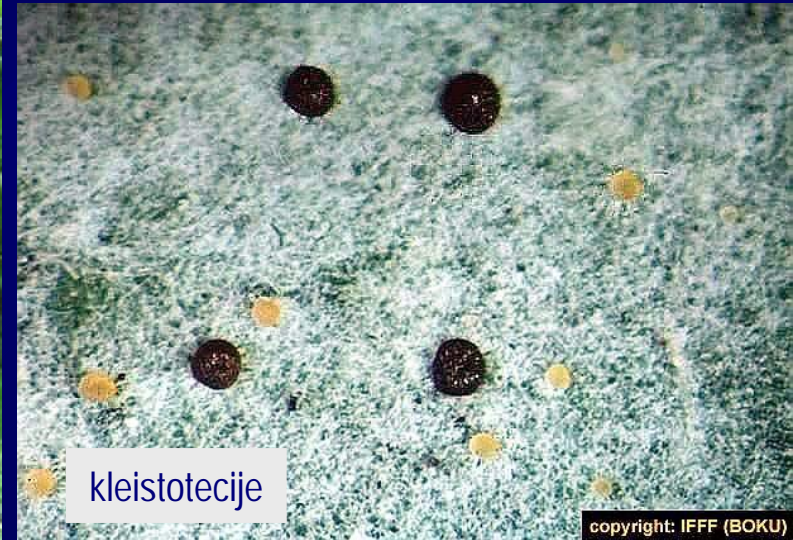


apendiksi

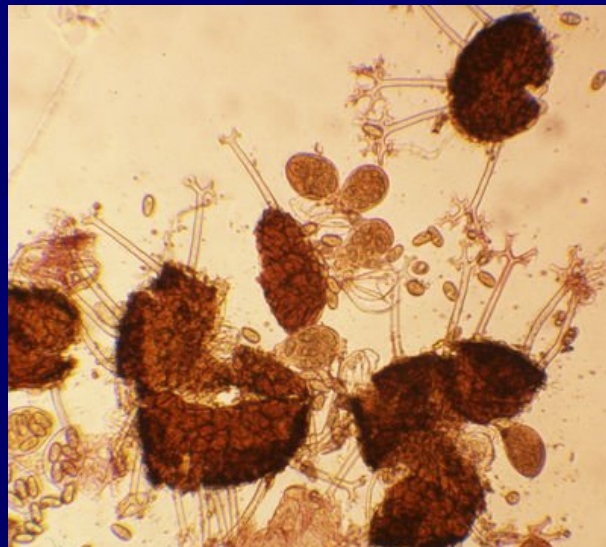
- u kleistoteci više askusa,
- apendiksi prosti,
- parazit repe i drugih biljaka,
- sinonim *E. betae*.

Erysiphales

Microsphaera alphitoides - pepelnica hrasta



Parazit na vrstama roda Quercus.

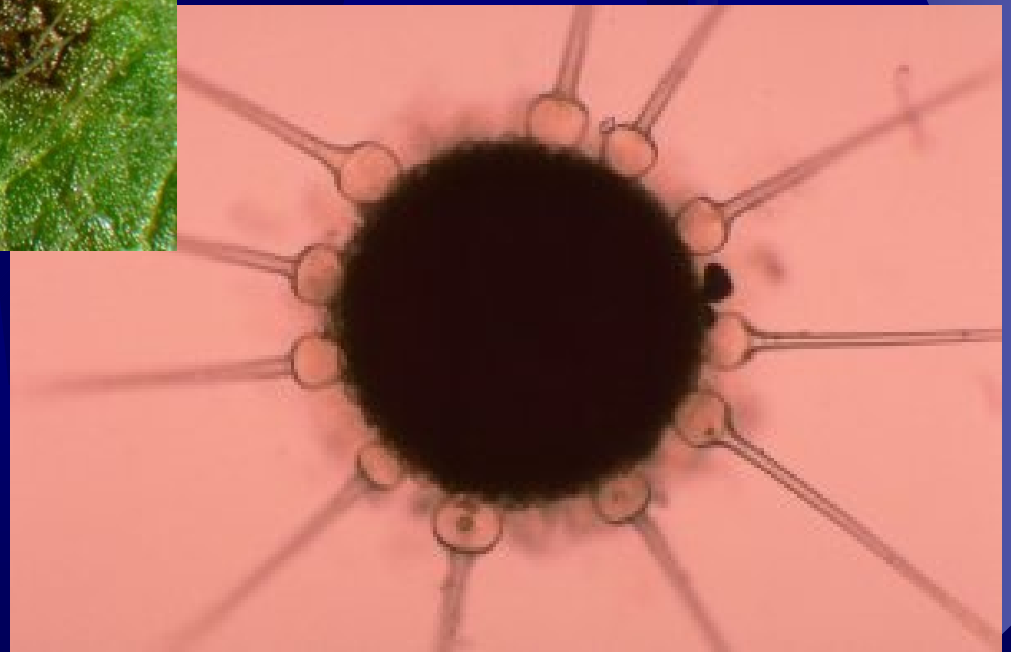


Erysiphales

Phyllosticta sojicola

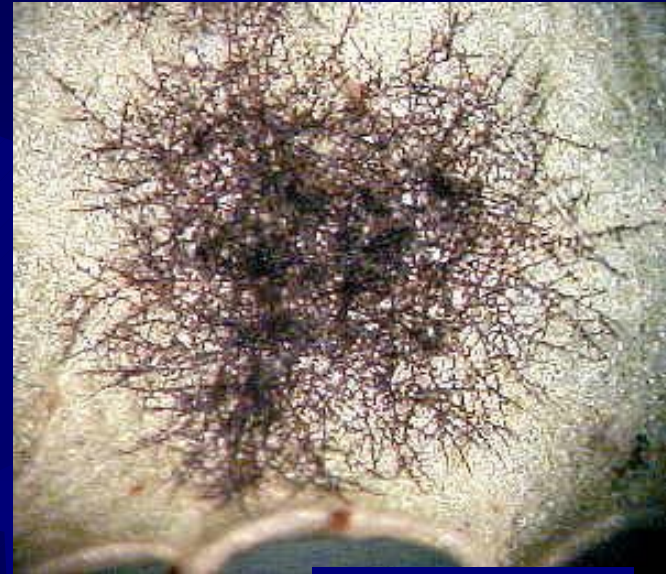


- u kleistoteci više askusa,
- apendiksi šiljati u osnovi mehurasto prošireni,



Meliolales

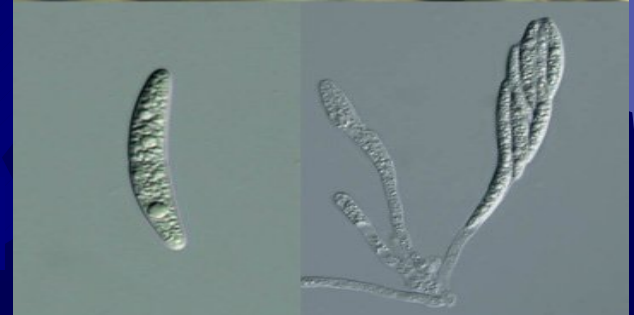
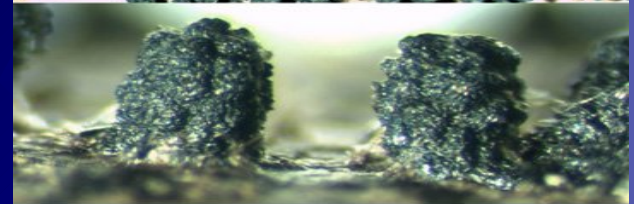
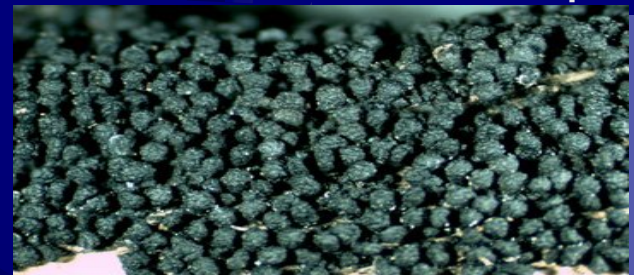
- paraziti i epifiti,
- **kleistotecije** sa setama ili apendiksima,
- askusi sa 2, 4 ili 8 askospora,
- askospore sa 2-5 septi,
- konidijski stadijum odsutan.
- biljni patogen *Meliola/ Oidium mangiferae*, poznata kao crna pepelnica,.



Meliola sp.

Coronophorales

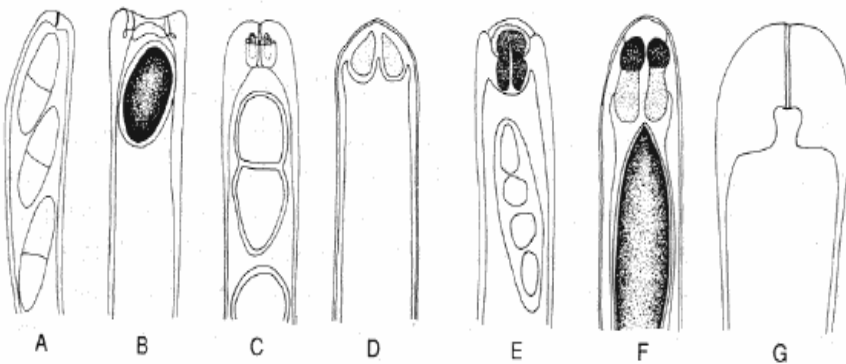
- paraziti, micelija slabo razvijena u tkivu domaćina,
- **askomata** pojedinačne ili u stromi,
- askomata nemaju pravi ostiolum,
- askusi brojni, nepravilno raspoređeni,
- askospore jednoćelijske ili višećelijske.



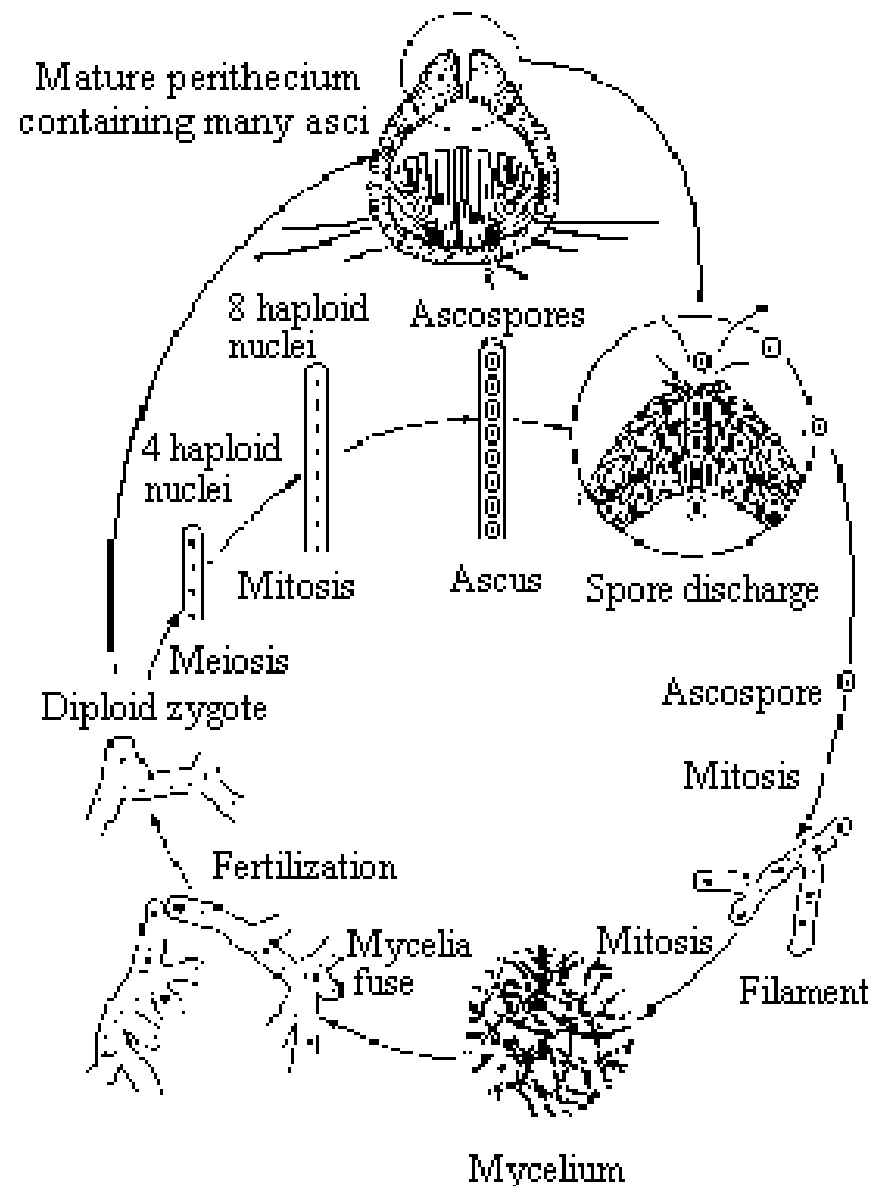
Bertia moriformis

Sordariales

- tipične **peritecije**, na miceliji,
- većinom ne obrazuju konidije,
- saprobi ili koprofilne vrste.

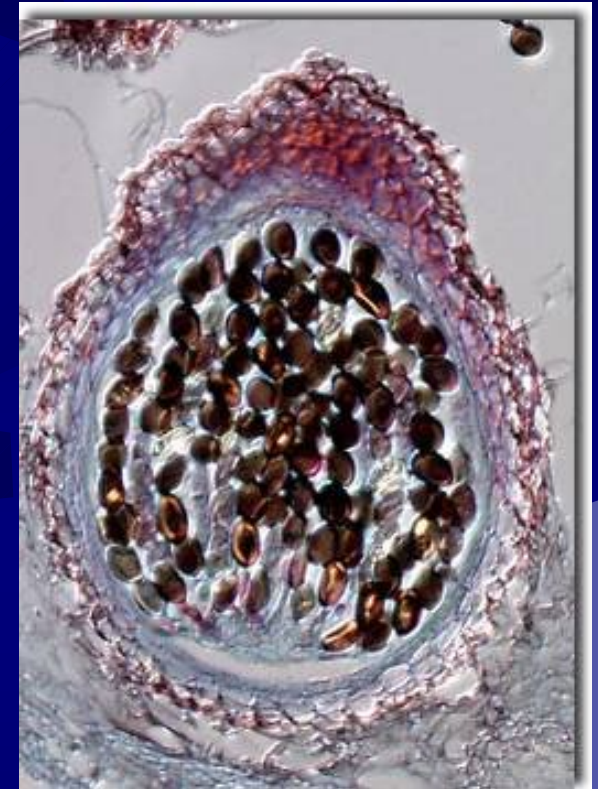
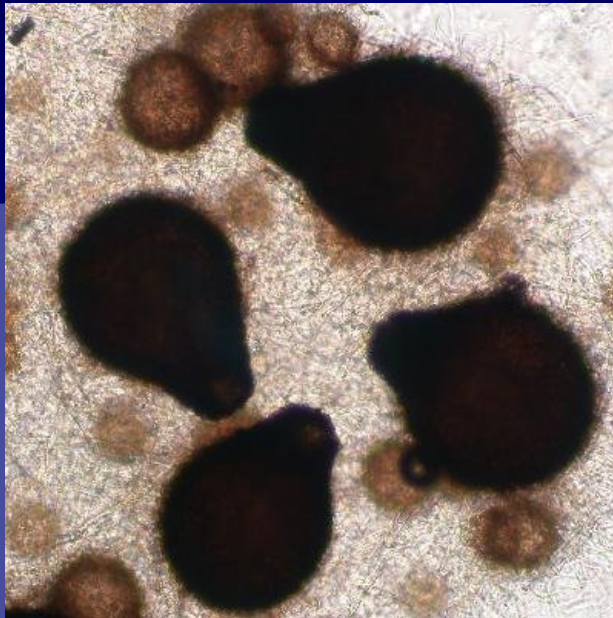


Unitunicate-inoperculate asci. A: *Nectria* (Hypocreales); B: *Sordaria* (Sordariales); C: *Melanconis* (Diaporthales); D: *Claviceps* (Clavicipitales); E: *Microglossum* (amyloid ring, Leotiales); F: *Rosellinia* (amyloid ring, Sphaeri-ales); G: *Lecanora* (Lecanorales).



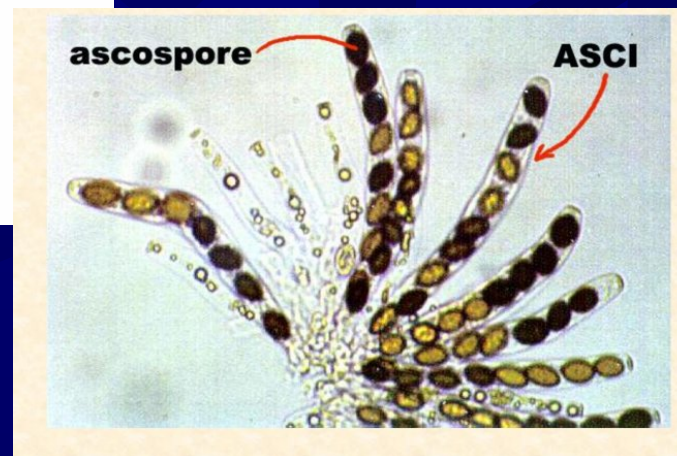
Sordariales

Sordaria fimicola – koprofilna vrsta



Sordaria Lab

Determining Cross Over Frequency



➤ Jedn od model organizama za proučavanje genetike gljiva.

Sordariales

Neurospora/Chrysonilia crassa – rak rane



- proučavana genetičke rekombinacije u askosporama (genom od 7 hromozoma) i biohemijska istraživanja,
- vrsta značajna za poljoprivredu, medicinu i ekologiju.

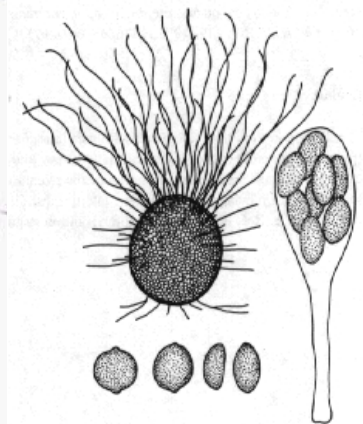
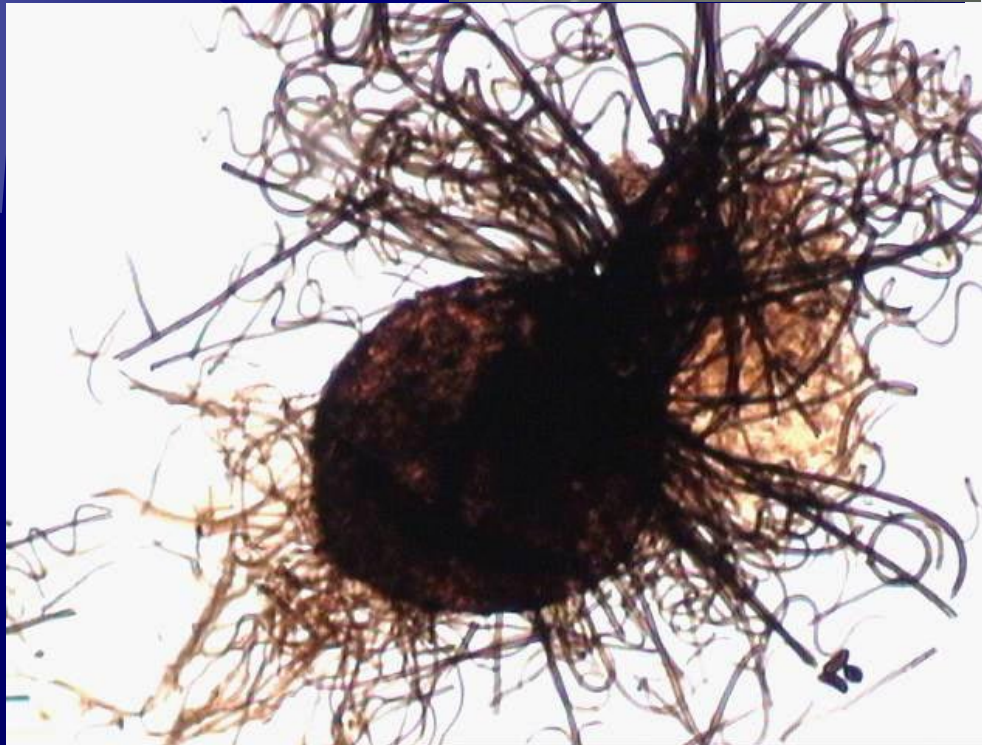
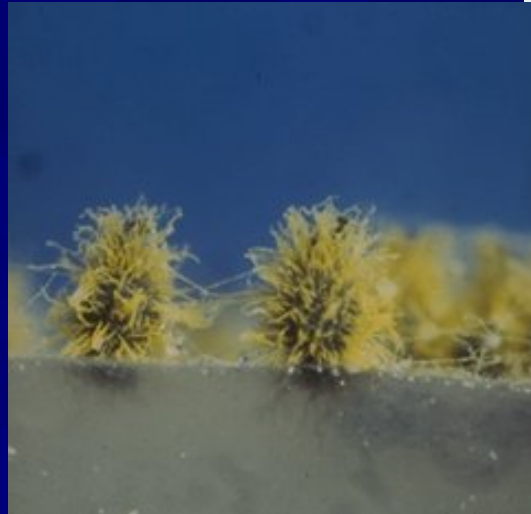


Sordariales

Chaetomium spp.

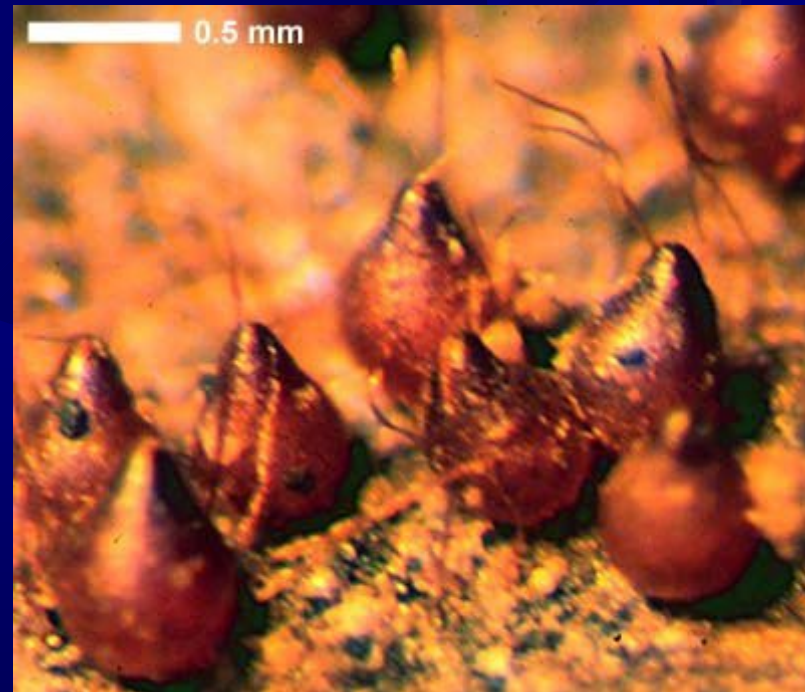
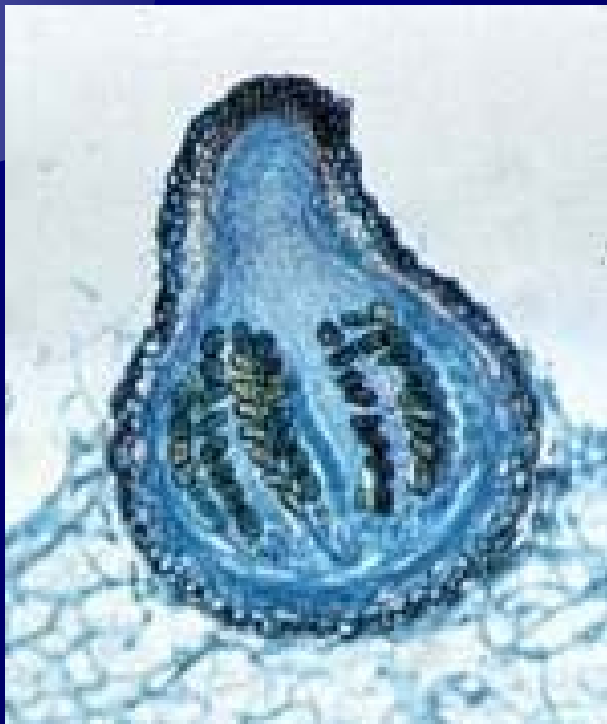
★ anamorfni stadijumi:

- *Botriotrichum*
- *Scopulariopsis*
- *Trichocladium*
- *Papulospora*
- *Humicola*



Sphaeriales

- 225 rodova sa 1300 vrsta,
- peritecije na miceliji, na ili utisnute u strome,
- peritecije crne i čvrste, isto i strome ako postoje,
- prisutan himenijum,
- aktivno oslobađaju askospore,
- saprobi, paraziti i koprofilne vrste.

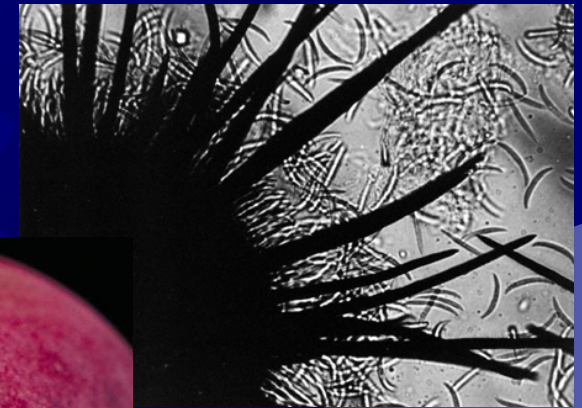


Sphaeriales

Glomerella/Colletotrichum spp. - antraknoze



Colletotrichum acutatum



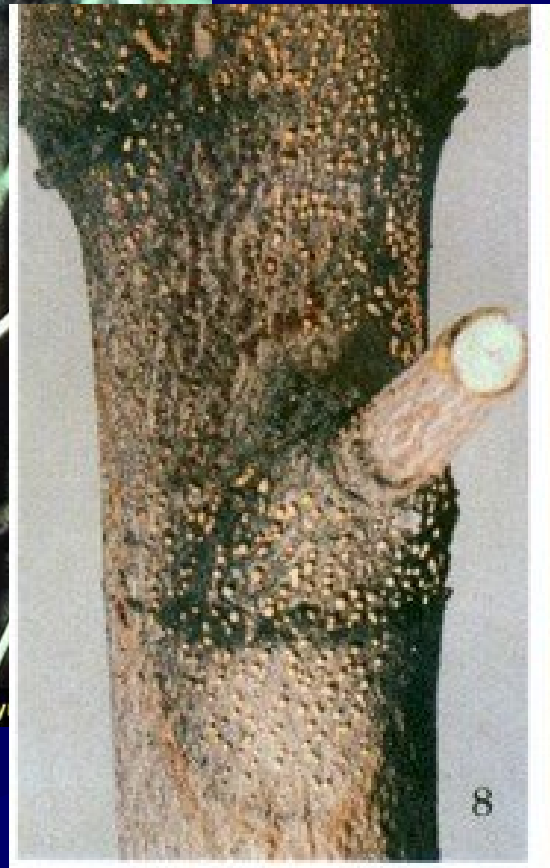
Glomerella cingulata /Colletotrichum gloeosporioides

➤ polifagna vrsta, parazitira brojne vrste voćaka.

Sphaeriales

Nectria cinnabarina/*Tubercularia vulgaris*

rak rane



- parazit rana,
- prezimljava u vidu micelije, stroma ili peritecija.

Sphaeriales

Nectria galigena – rak rane



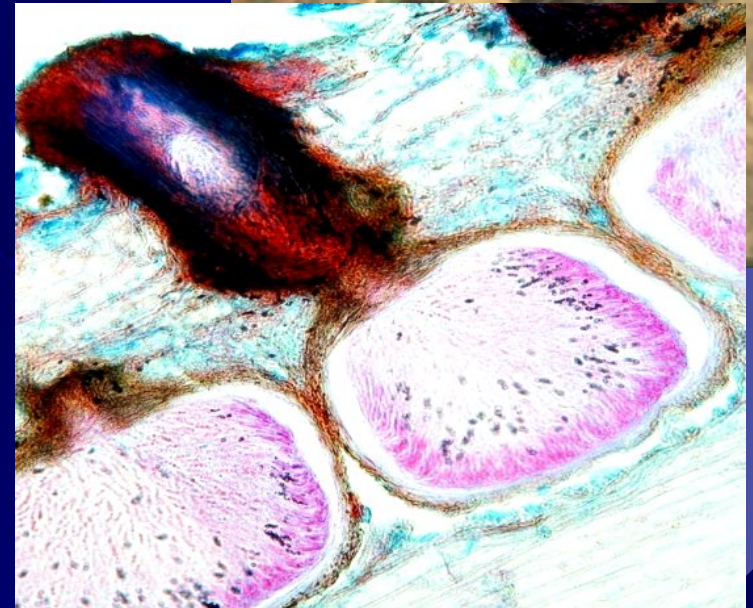
Photo 67. A. L. Jones and T. B. Sutton

Sphaeriales

Diaporthe/Phomopsis helianthi



piknidija



peritecije

Sphaeriales

Claviceps purpurea/Sphacelia segetum glavnica raži



sklerocija

strome

Peritecija-askospore
vrše infekciju



presek kroz stromu



"medna rosa"
konidije

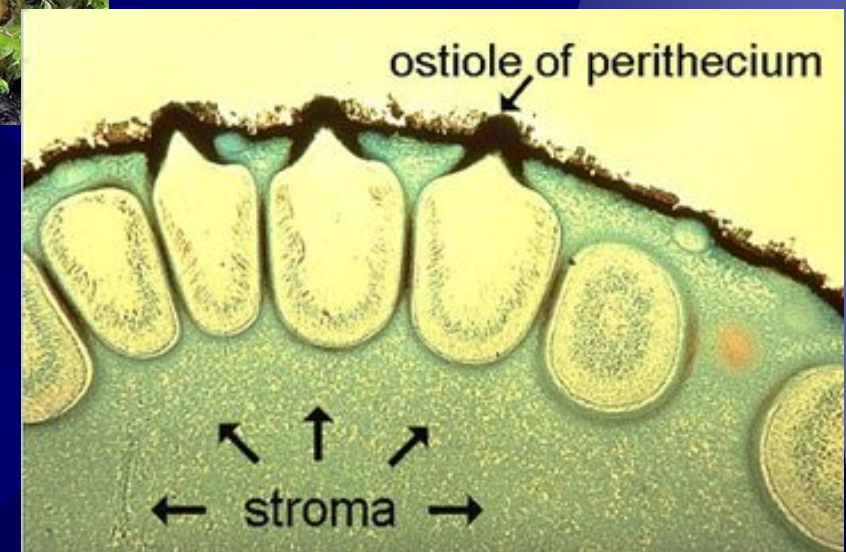
Ergotizam-vatra Svetog Antuna

Sphaeriales

Xylaria polymorpha



- krupne, tamne i tvrde strome,
- retko formira anamorfni stadijum,
- saprob u osnovi trulih panjeva.



Discomycetes

- Askokarp **apotecija** ili **modifikovana apotecija**:
 - gimnokarpne ili hemiangiokarpne,
 - sa drškom ili sedeća,
 - epigeična ili hipogeična,
 - različitih boja,
 - mikroskopskih ili makroskopskih dimenzija.
- **himenijum** grade askusi i parafize,
- askusi uglavnom unitunikatni, retko dvojna tunika,
- retko obrazuju konidije,
- uglavnom saprobi, ređe paraziti biljaka,
- klasa je podeljena na 7 redova:

- **Phacidiales**
- **Helotiales**
- **Pezizales**
- **Tuberales**

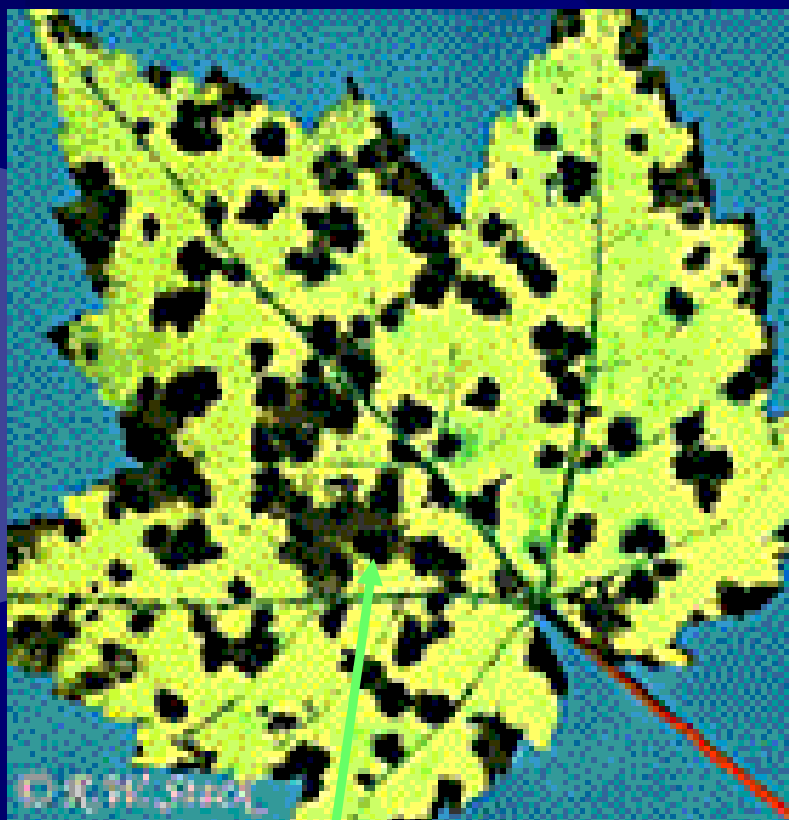


Peziza, an ascomycete



Phacidiales
Rhytisma acerinum

katranasta pegavost lista



strome sa apotecijam

Helotiales

Sclerotinia fructigena

truljenje jabuka i krušaka

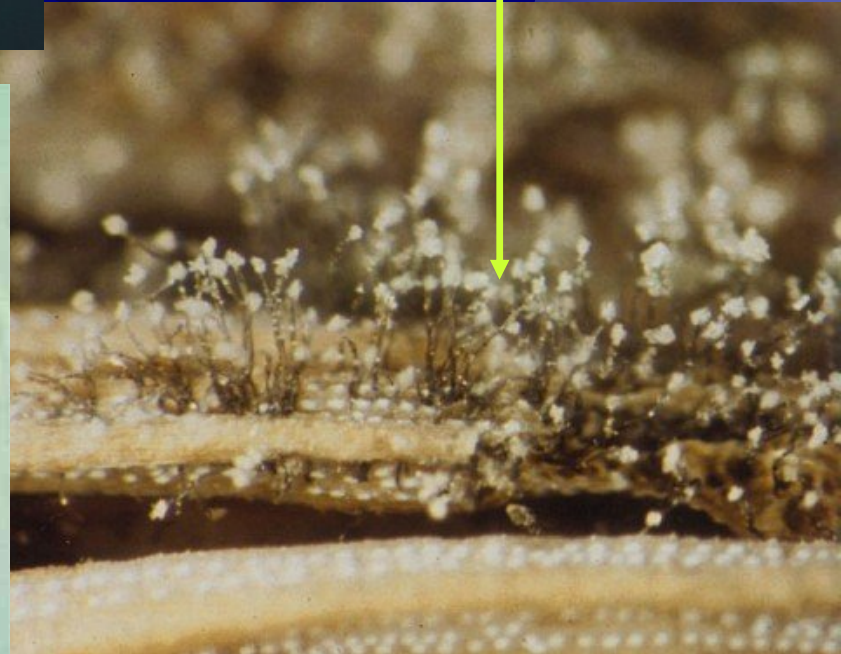
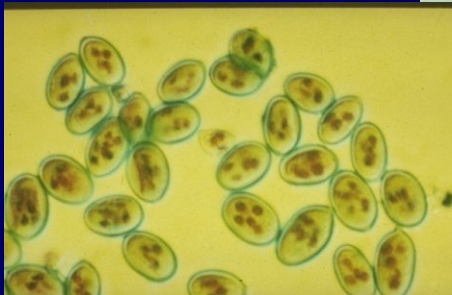


Helotiales

Sclerotinia/Botrytis cinerea — parazit vinove loze

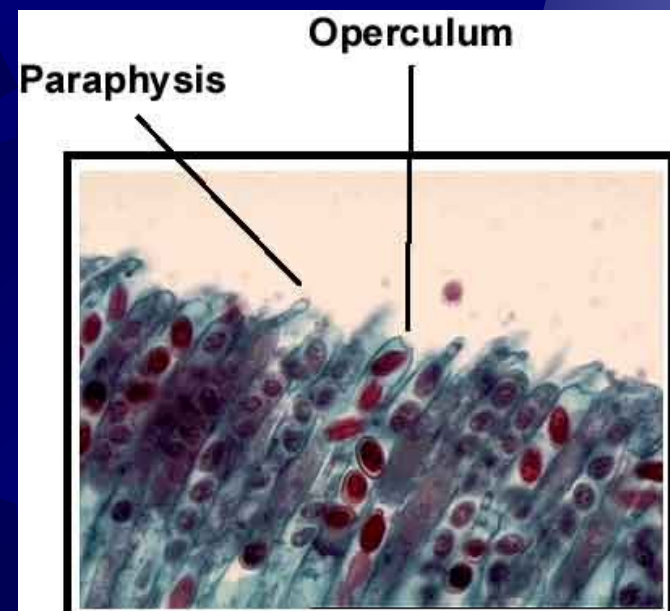
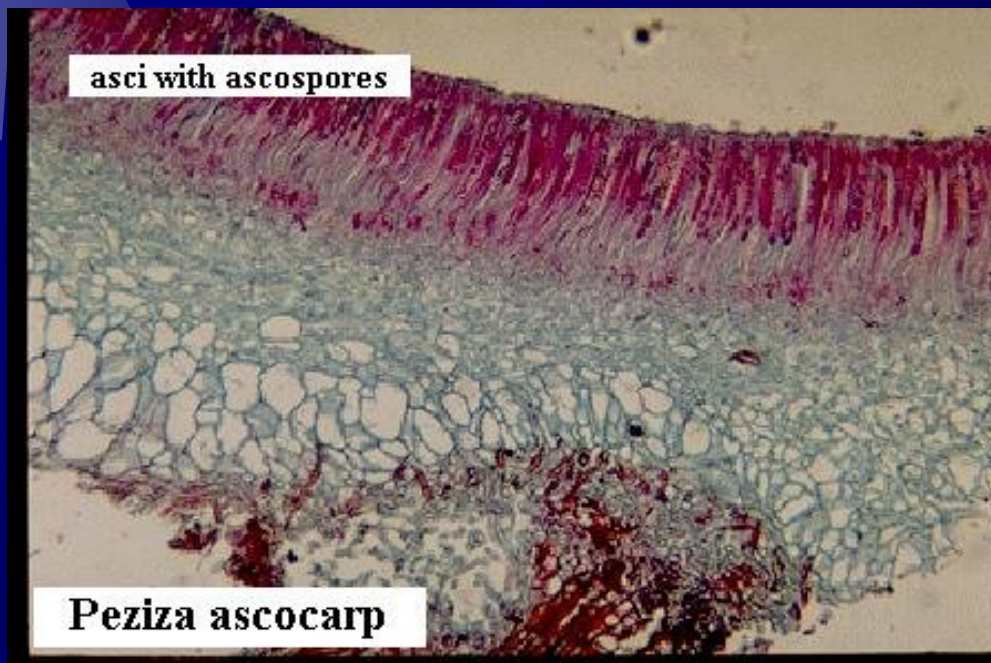


konidiofori sa konidijama



Pezizales

- ☀ Apotecije:
 - ☀ **gimnokarpne** - otvorene od početka razvoja,
 - ☀ **hemiangiokarpne** - na početku zatvorene, kasnije se otvaraju,
 - ☀ različitih boja,
 - ☀ dimenzija od jedan do desetak centimetara,
- ☀ retko obrazuju konidijski stadijum,
- ☀ polni proces često odsutan, askospore se obrazuju **partenogenetski**,
- ☀ saprobne vrste, plodonosna tela dok su mlada često jestiva.



Pezizales
Peziza spp.

P. arvenensis



P. ostracoderma



P. badioconfusa



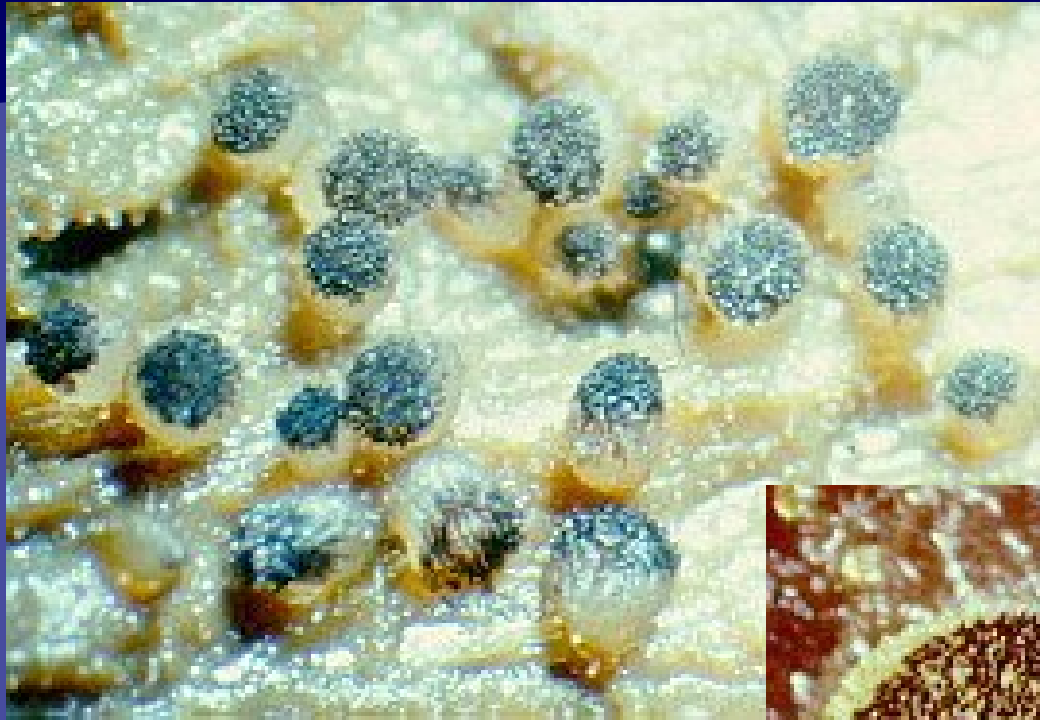
P. repanda

Pezizales
Sarcoscypha coccinea

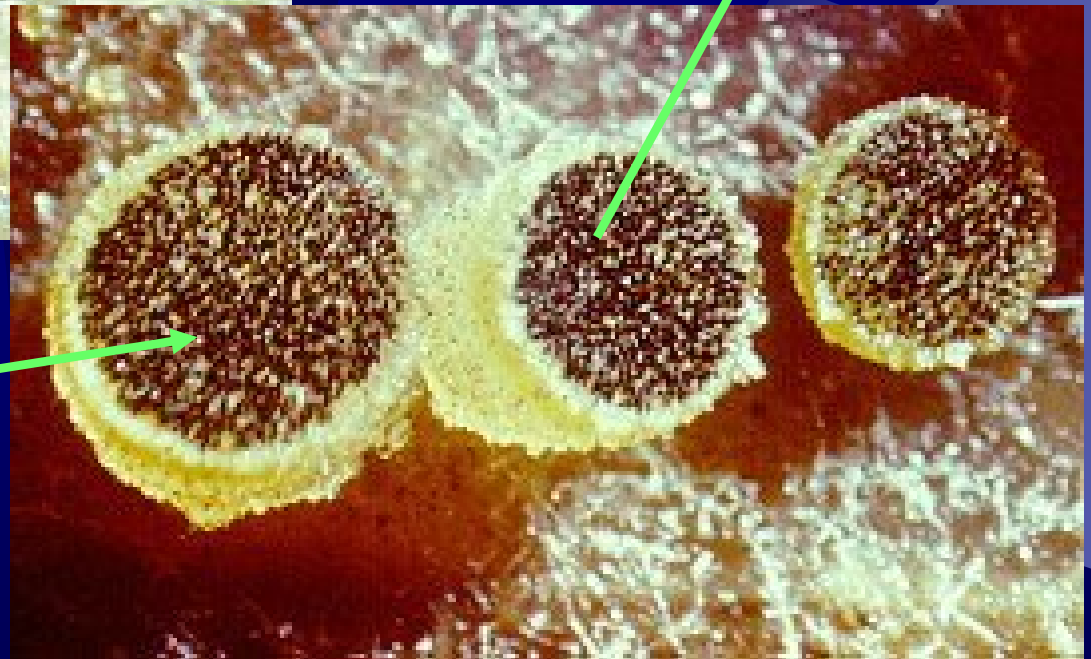


Pezizales

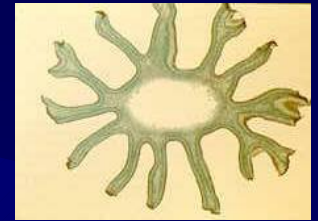
Ascobolus sp. – koprofilna vrsta



askusi sa askosporama



Pezizales
Morchella spp.



M. ecculenta



Pezizales
Verpa spp.



V. digitaliformis



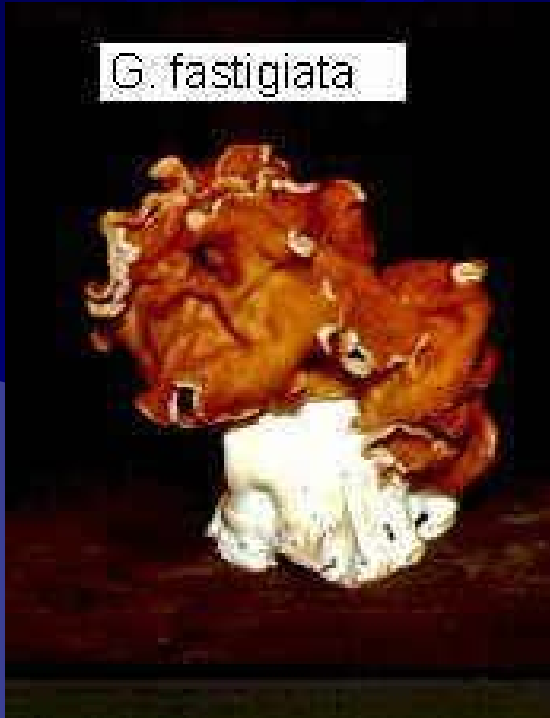
V. bohemica

V. conica



Pezizales
Giromitra spp.

G. fastigiata



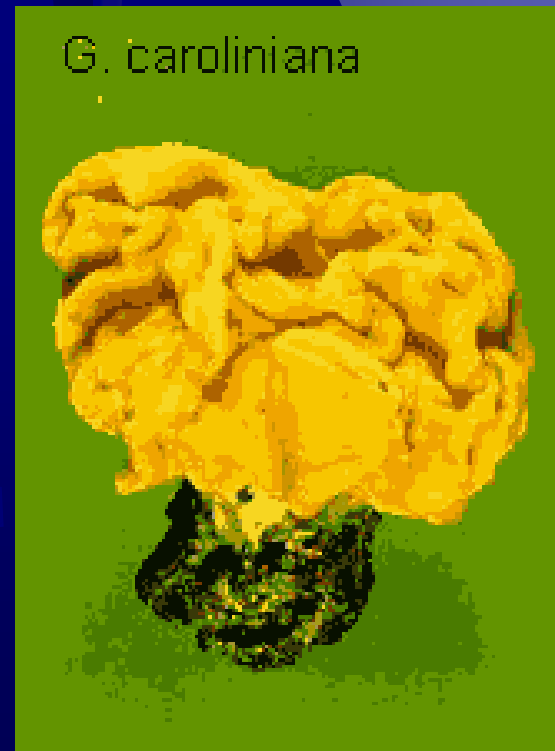
G. esculenta



G. infula



G. caroliniana



Tuberales

- Askokarp **modifikovana apotecija**:
 - hipogeičan**, krtolast i krupan,
 - obavijen čvrstom peridijom, glatkom ili bradavičastom,
 - u početku otvoren, kasnije se zatvara.

- askusi cilindrični ili sferični, uređeni u unutrašnjim venama,

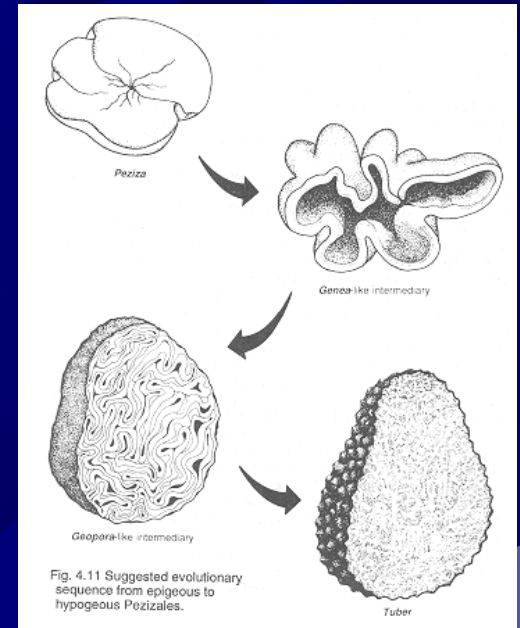
- u askusu 1-4 askospore, retko 8,

- askospore jednoćelijske, krupne, sa ornamentisanim zidom, u stanju aktivnog slobađanja,

- svi predstavnici reda **mikorizne vrste**,

- cenjeni gastronomski specijaliteti,

- pronalaze se uz pomoć dresiranih pasa ili svinja.



Tuberales

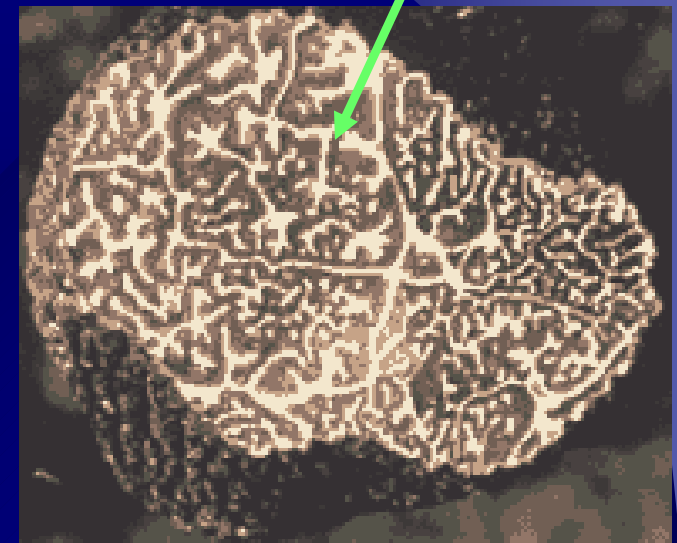
Tuber melanosporum – crni tartuf



apotecija



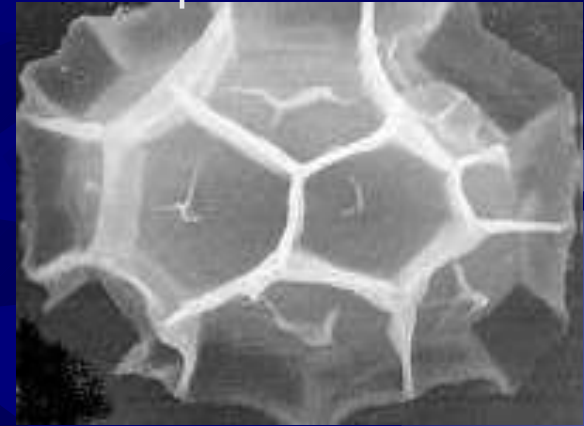
askospora



Tuberales
Tuber magnatum – beli tartuf



askospora

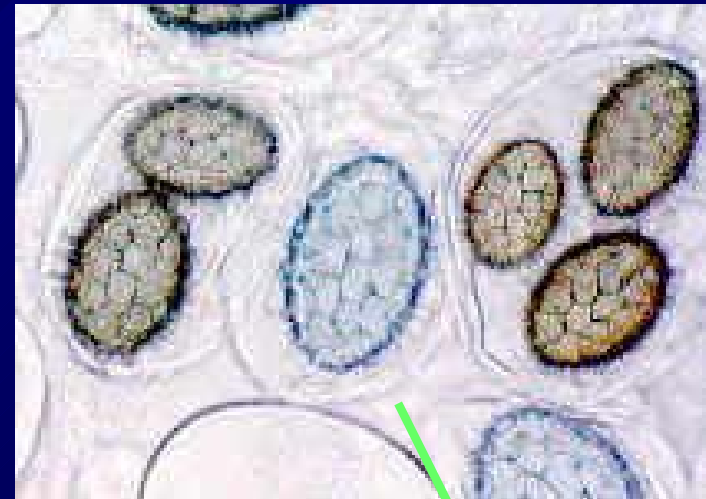


apotecije



Tuberales
Tuber aestivum – letnji tartuf

askusi sa askosporama



apotecija

