FUNGAL BIODIVERSITY

By

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FUNGAL CLASSIFICATION BY AINSWORTH, 1973

KINGDOM- FUNGI

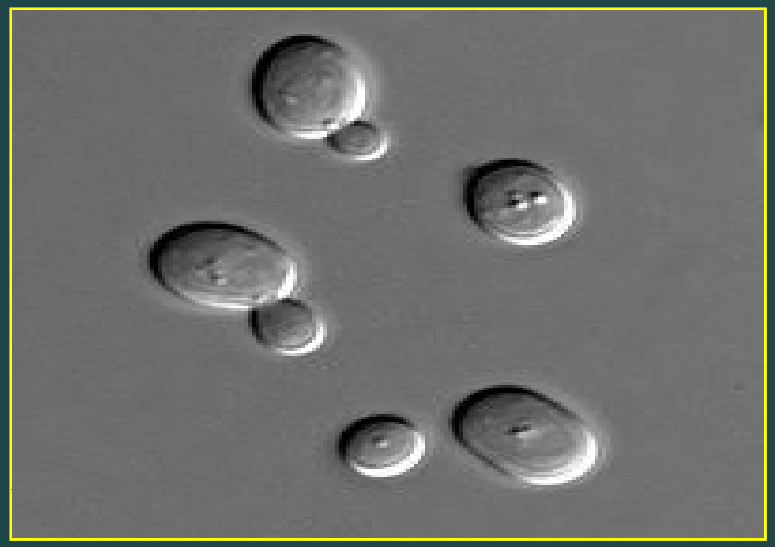
DIVISION- **I- MYXOMYCOTA**
II- EUMYCOTA

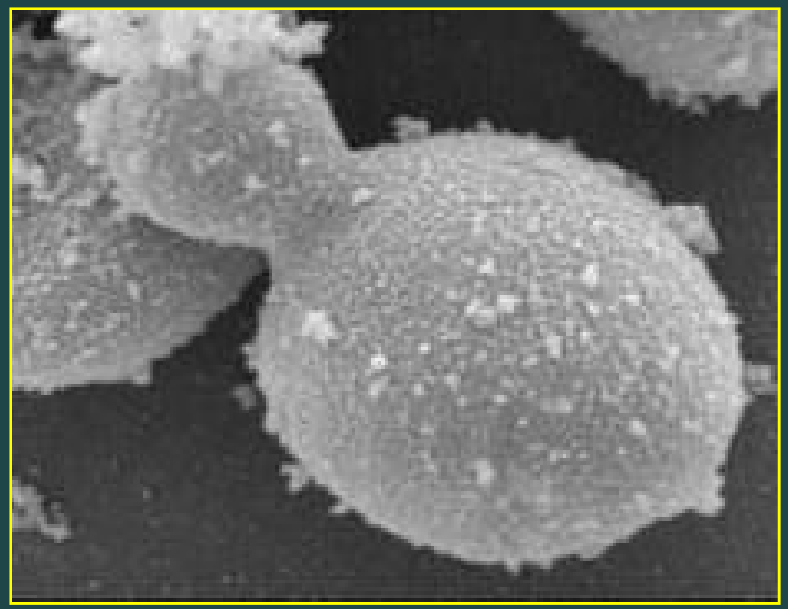
MYXOMYCOTA-
CLASSES- **ACRASIOMYCETES**
- **HYDROMYXOMYCETES**
- **MYXOMYCETES**
- **PLASMODIOPHOROMYCETES**

EUMYCOTA –
SUBDIVION – **MASTIGOMYCOTINA (03 CLASSES)**
- **DEUTEROMYCOTINA (03 CLASSES)**
- **ZYGOMYCOTINA (02 CLASSES)**
- **ASCOMYCOTINA (05 CLASSES)**
- **BASIDIOMYCOTINA (03 CLASSES)**

Macrolepiota

Saccharomyces





Neocallimastix hurleyensis

Saprolegnia

Physarum

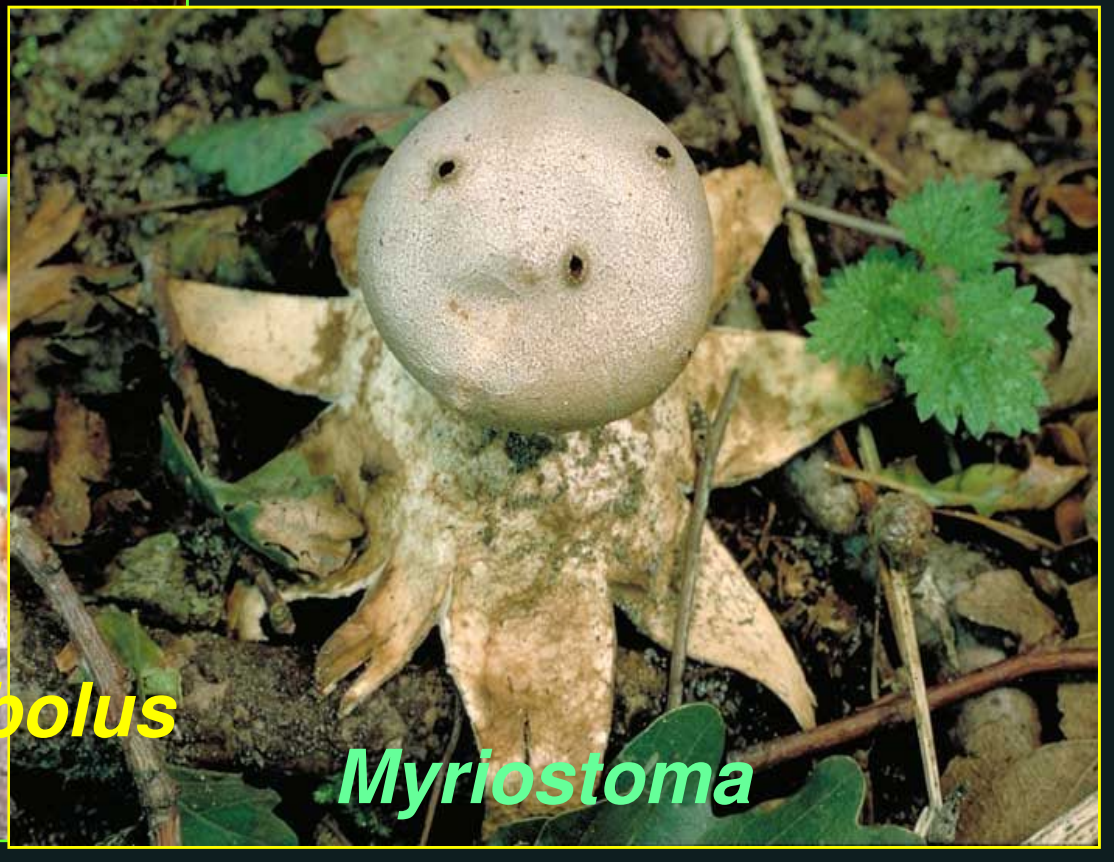
Crepidotus

Marasmius

EARTH & BARK STAR FUNGI

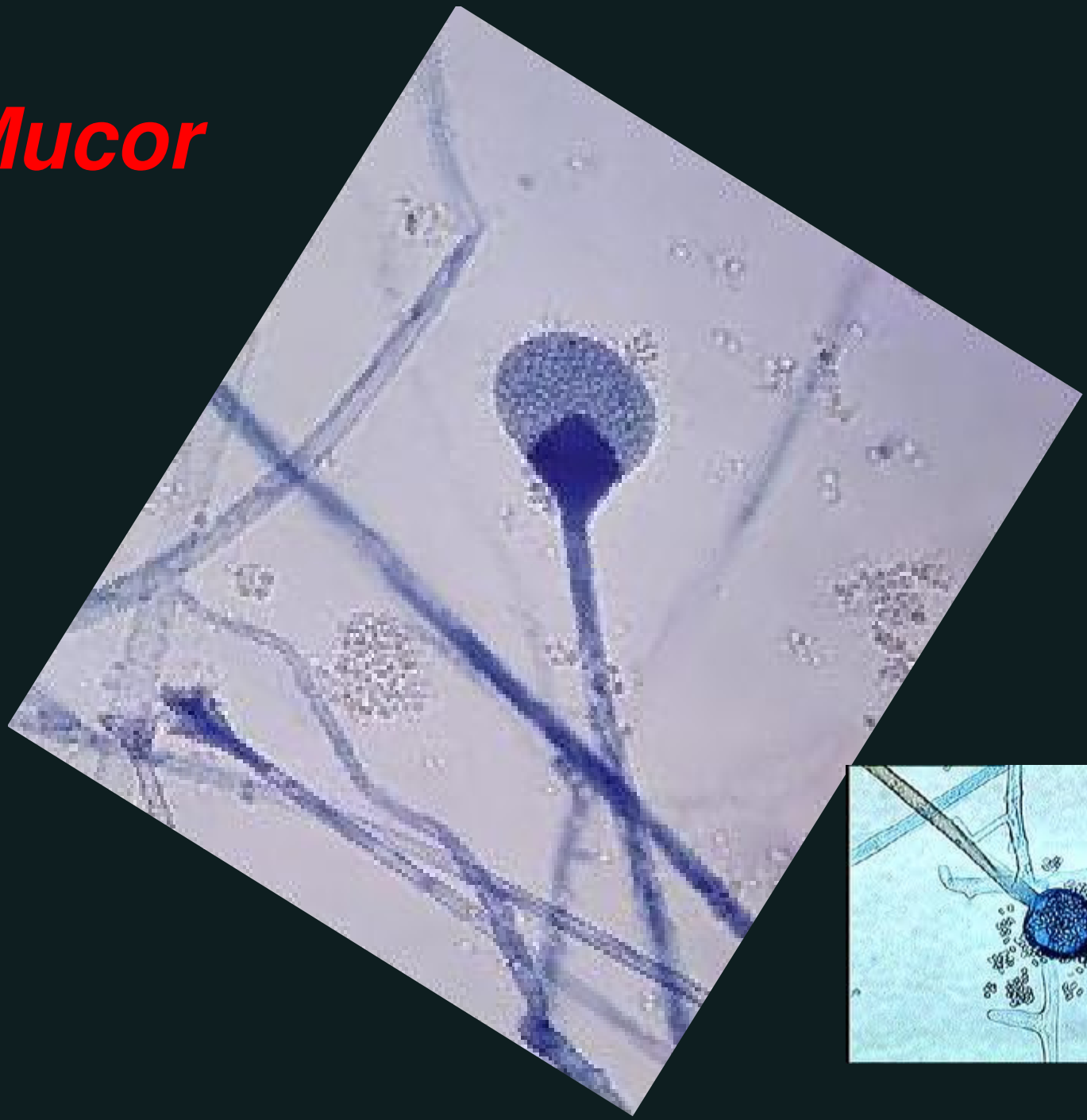
Geastrum spp.

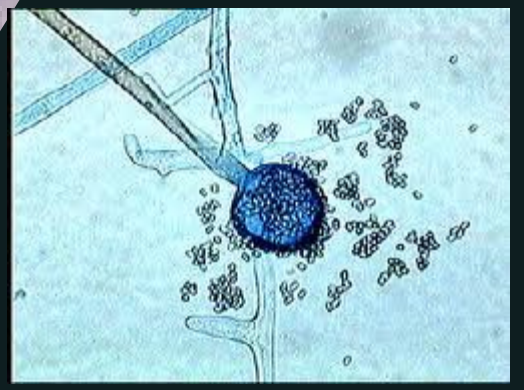
Sphareobolus



Myriostoma

Mucor





MYXOMYCETES

Physarum

SOME COMMON MYXOMYCETES

Diderma spp.

Didymium spp.

Hemitrichea serpula

Physarum spp.

ATTRACTIVE MYXOMYCETES

Stemonitis spp.

Arcyria spp.

Fuligo septica

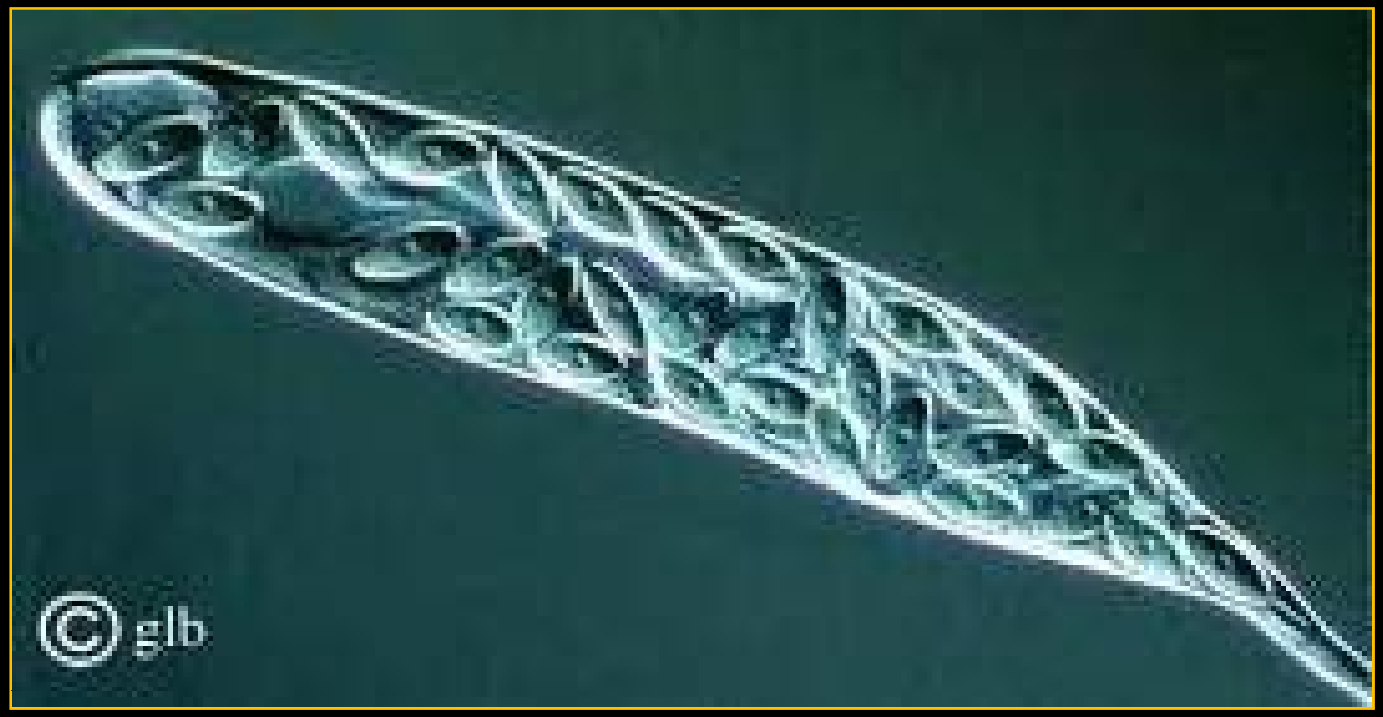
DEUTEROMYCOTINA

Alternaria

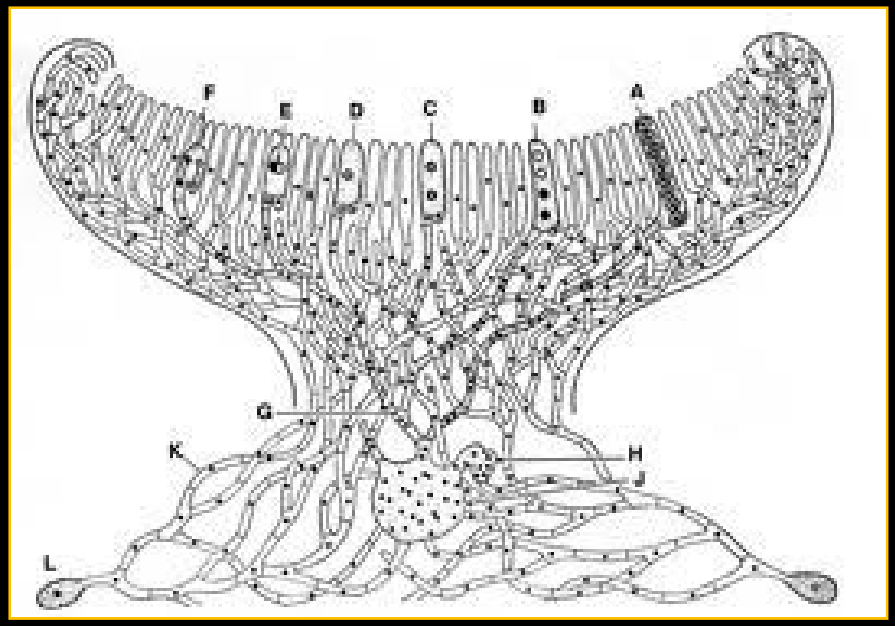
ASCOMYCETES (SAC FUNGI)

About 75% of all known fungi belong to the Ascomycota. The group is extremely large and diverse, however, and the phylogenetic relationships among subgroups are largely unknown.

Sarcoscypha spp.



Ascus with spores



Apothecium

Ascomycetes

T.S. Of

Fruiting body

Xylaria spp.

DISCOMYCETES

Sarcoscypha

BRAIN FUNGUS

Morchella esculenta

Fungi Participate in Several Types of Mutualisms

Fungi can be involved in both mycorrhizal associations and **endophytic** associations with plants.

Arbuscular mycorrhizal fungi (AMF) grow into the cells of root tissue and directly contact the plasma membrane of the plant cell . AMF are zygomycetes.

Ectomycorrhizal fungi (EMF) form a dense network of hyphae around roots but do not enter the root cell. Hyphae also extend into the soil. Most EMF are basidiomycetes.

MYCORRHIZA

Ectomycorrhizal fungi (EMF) form sheaths around roots and penetrate between root cells.

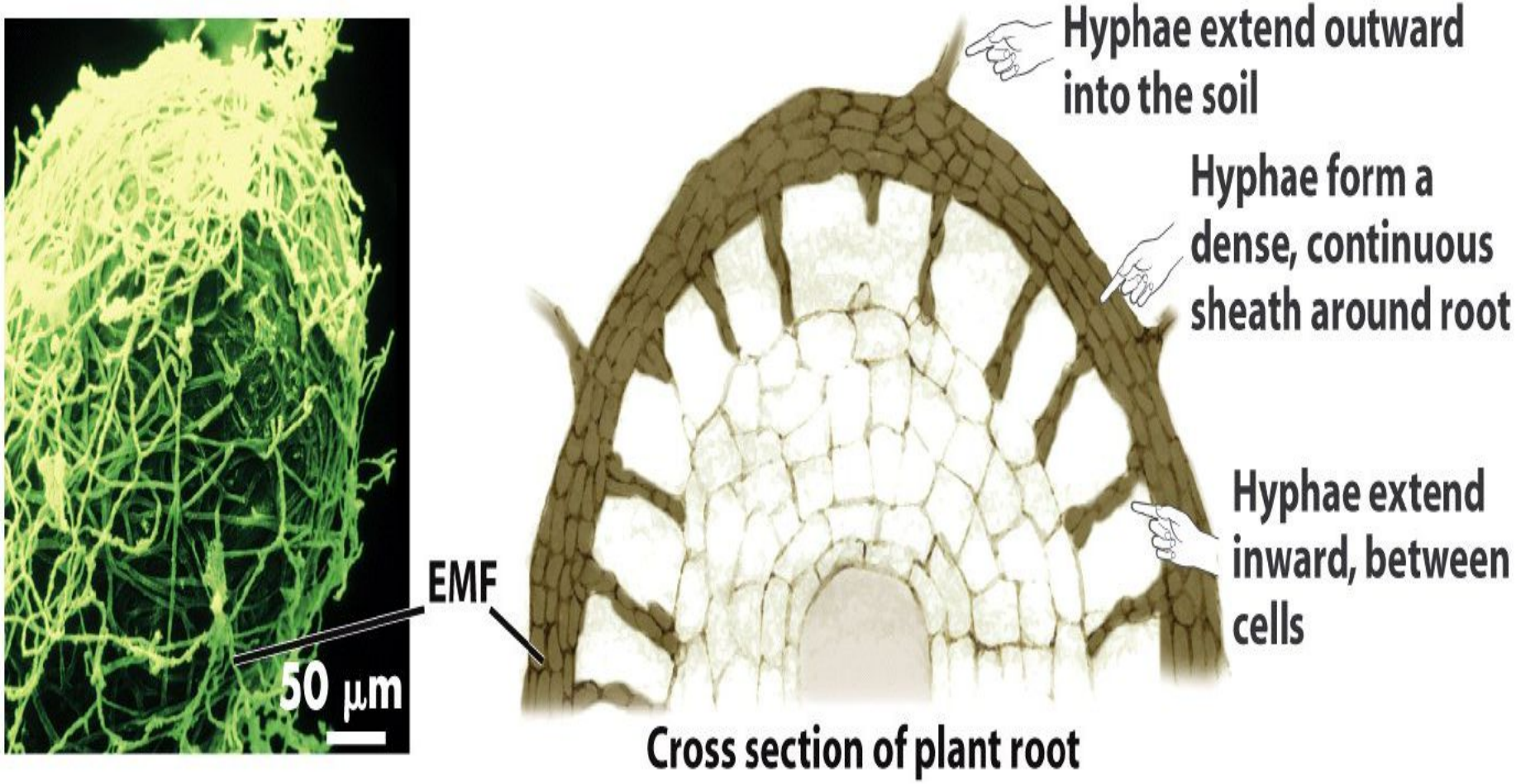
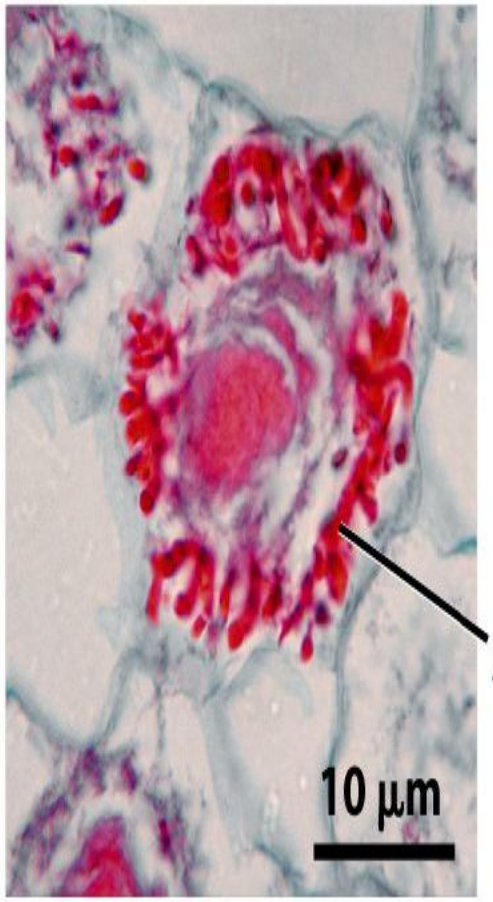


Figure 30-11a Biological Science, 2/e

Arbuscular mycorrhizal fungi (AMF) contact the plasma membranes of root cells.



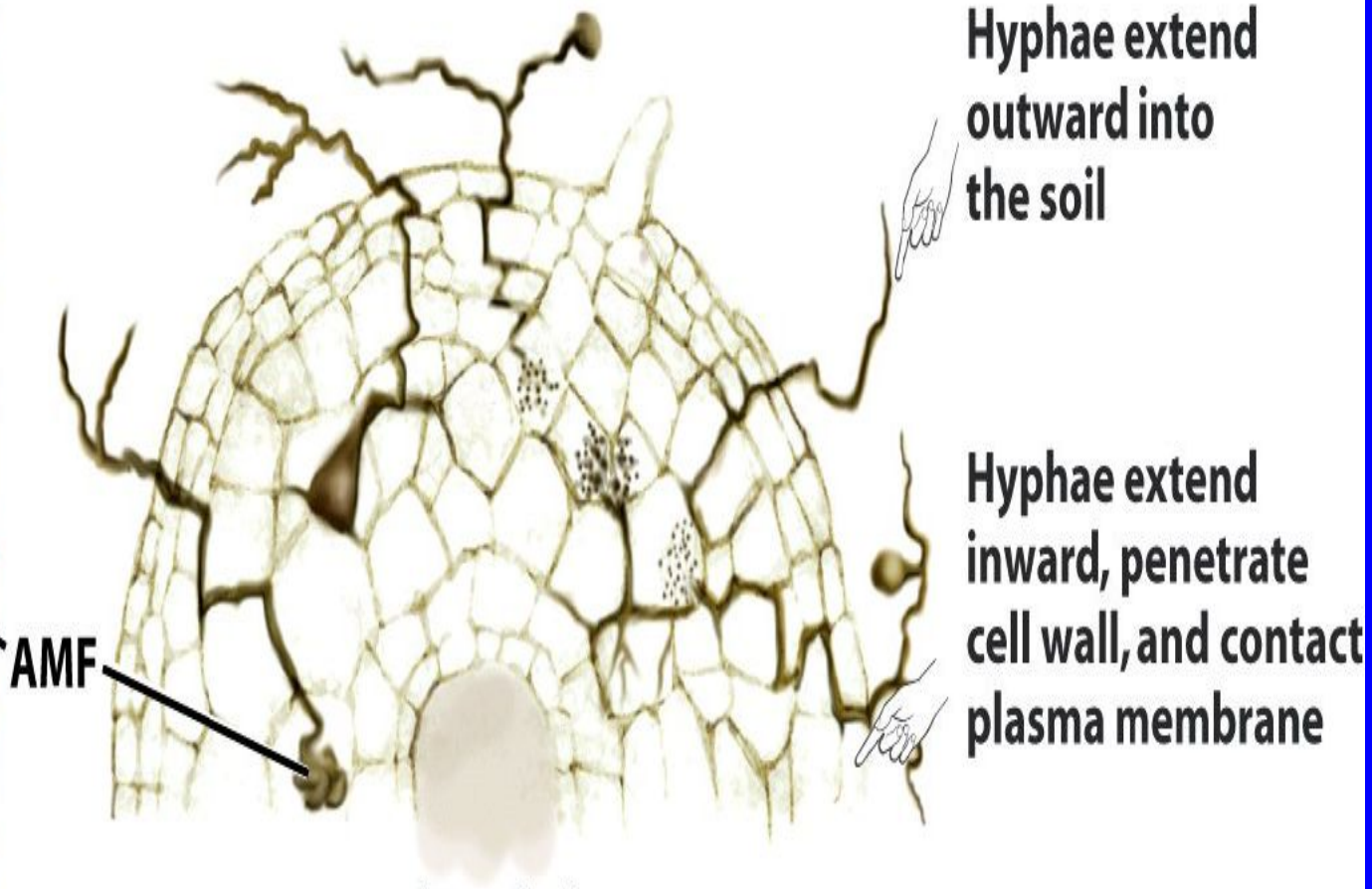


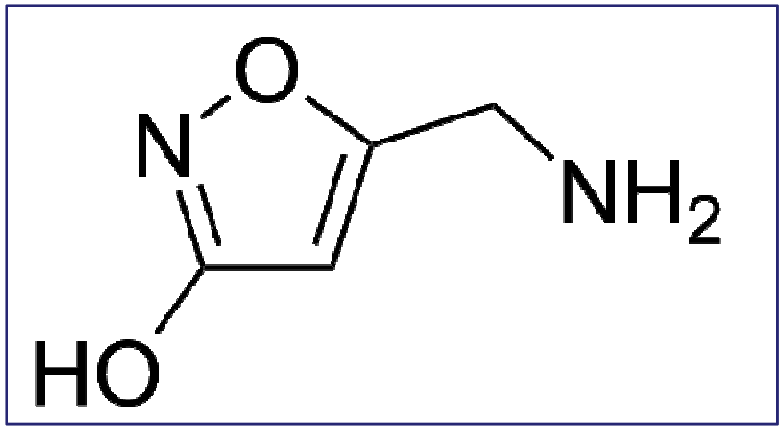
Figure 30-11b Biological Science, 2/e

ENDOPHYTES

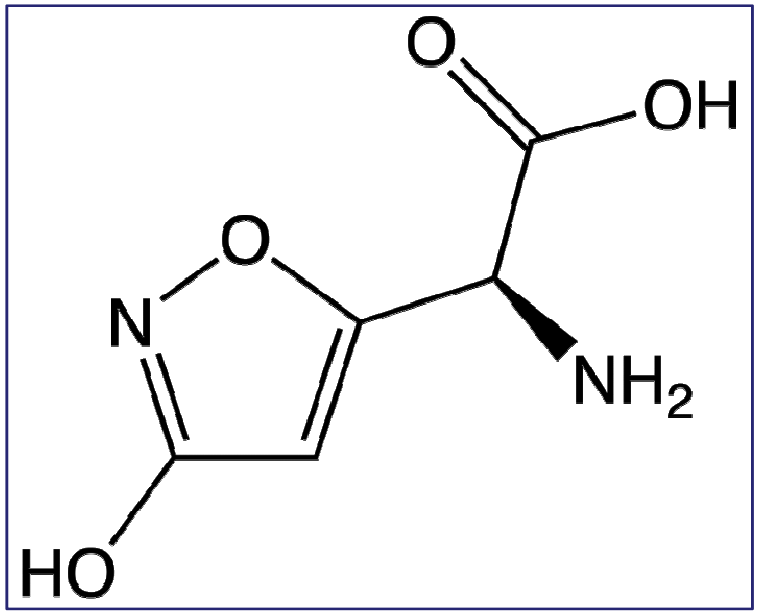
- **WHERE DO THEY OCCURE?**
- **IN WHICH FORM THEY OCCURE?**
- ***Catharanthus roseus***

POISONOUS FUNGUS

Amanita muscaria



Muscimol



Ibotenic acid

DUNG FUNGI

Panaeolus spp.

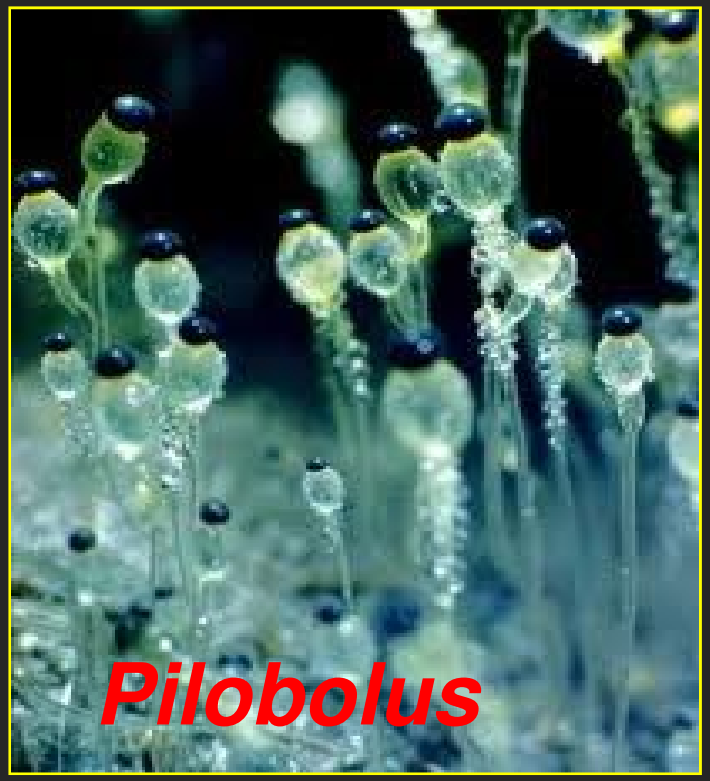
Coprinus radiatus

Cheilymenia

Cyathus

Chaetomium

DUNG FUNGI



BEAUTIFUL & SOMETHING SPECIAL

Mycena haematopus

Mycena luxcolli

Gasteromycetes

Clathrus

Lysurus

Dictyophora

PUFF BALLS

Pisolithus spp.

Aseroe

Lycoperdon perlatum

Calobovista


Laternea

Bark Star

Sphaerobolus

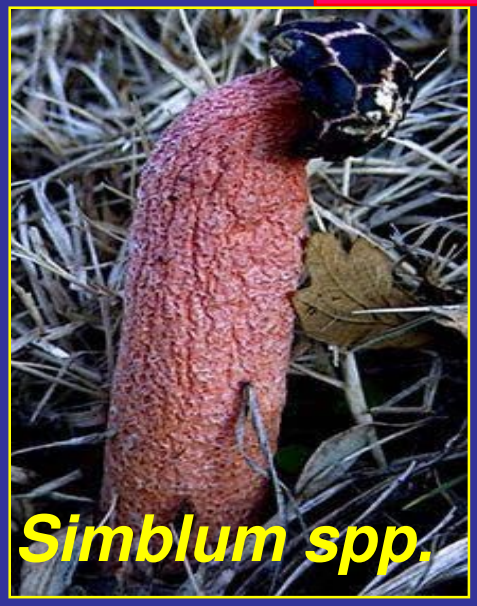
BIRD NEST FUNGI

Crucibulum spp.

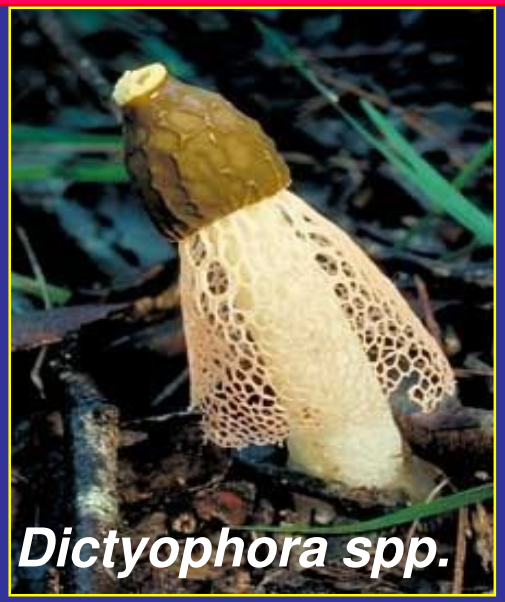
Cyathus spp.

Peridiole

SPECIAL MUSHROOMS

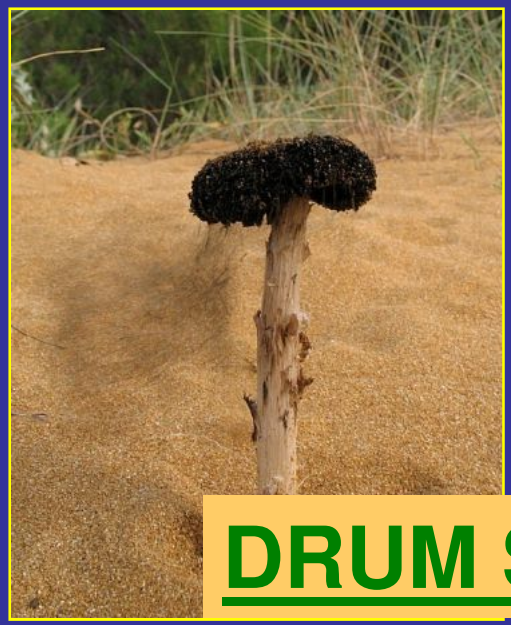


Simblum spp.



Dictyophora spp.

Tulostoma



DRUM STICK FUNGI

Montagnea

Battarrea phalloidis

CORAL FUNGI

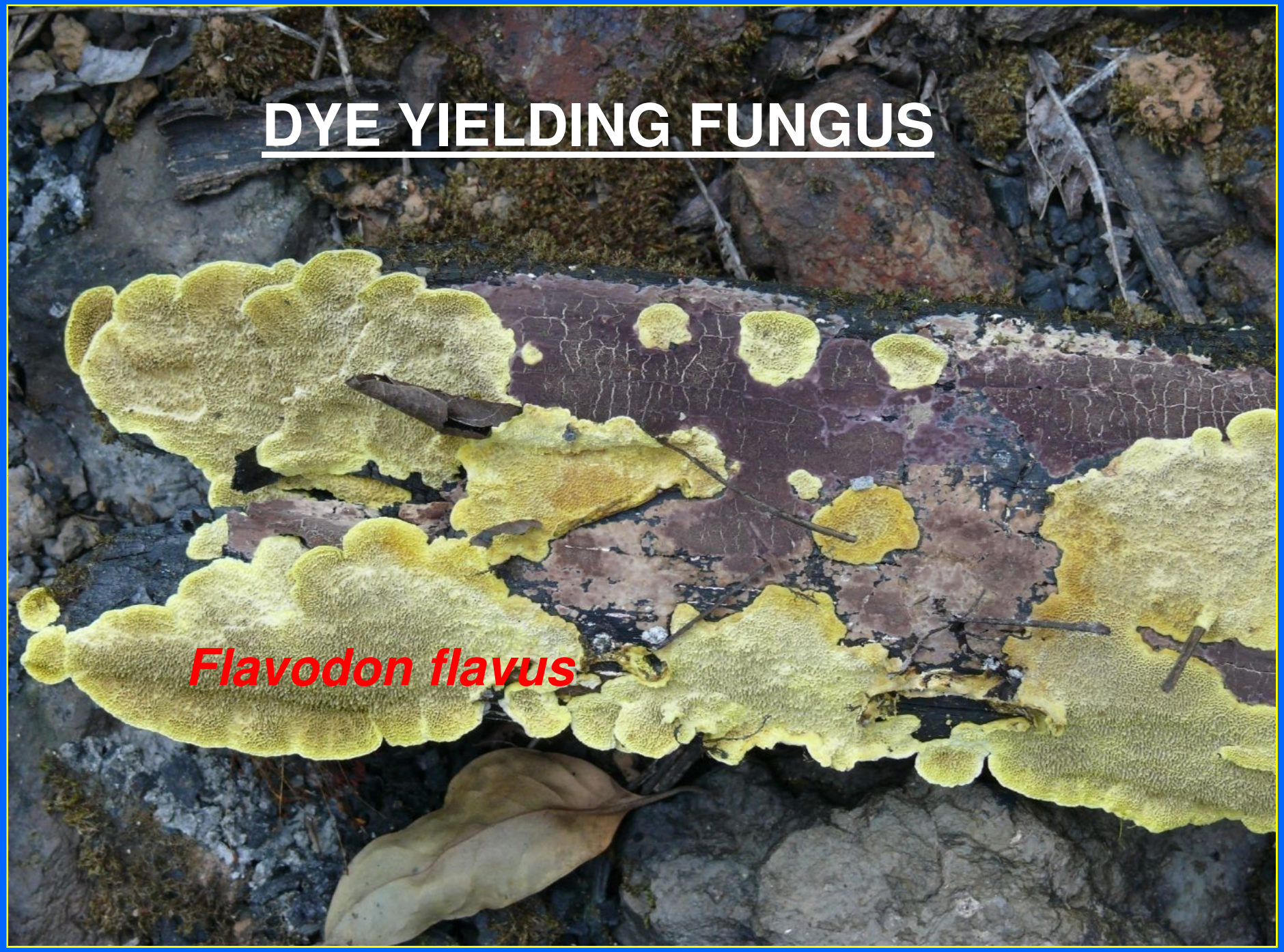
Ramaria spp.

Clavaria spp.

WOOD ROTTING FUNGI

Microporus xanthopus

DYE YIELDING FUNGUS



MEDICINAL PROPERTIES OF FUNGI

Anti-tumor;

Anti-cancer;

Anit-HIV-1

Cholesterol

Anti-allergic

Anti-aging

Anti-viral;

Nerve tonic

Immuno-stimulant

Cardio tonic

Gastric troubles

Hydrocele

Asthma

Against Arthritis

Astraeus hygrometricus

A protein mixture extracted from *A. hygrometricus* has been found to inhibit the growth of several tumor cell lines, and it had a stimulatory effect on the growth on splenocytes, thymocytes, and bone marrow cells from mice.

The protein mixture also stimulated mouse cells associated with the immune system; specifically, it enhanced the activity of mouse natural killer cells, and stimulated macrophages to produce nitric oxide.

immunomodulatory and antitumor properties.

A water-soluble polysaccharide isolated from this fungus was shown to be made of the simple sugars mannose, glucose, and fucose in a 1:2:1 ratio.

Auricularia auricula-judae

A. ***auricula-judae*** **has been concluded that two glucans isolated from the species were potent inhibitory antitumours when used on mice artificially inplanted with Sarcoma 180 tumours,[despite the fact that earlier research had shown that, while aqueous extracts from several other species had antitumour effects, extracts from *A. auricula-judae* did not.[**
B. **Further, research on genetically diabetic mice showed that a polysaccharide(FA) extracted from *A. auricula-judae* had a hypoglycemic effect on the mice; animals fed with food including the polysaccharide had lowered plasma glucose, insulin, urinary glucose and food intake.**
C. **bad cholesterol.**

F. fomentarius has been recommended as a possible means of decontaminating sites infected with *E. coli* and *Bacillus* species, in addition to several fungal species

Clavariadelphus truncates

The mushroom contains clavaric acid, which has been shown to reduce the rate of tumor development when given to mice.

Grifola frondosa

The underground tubers from which hen of the woods arises have been used in traditional Chinese and Japanese medicine to enhance the immune system. may also be useful for

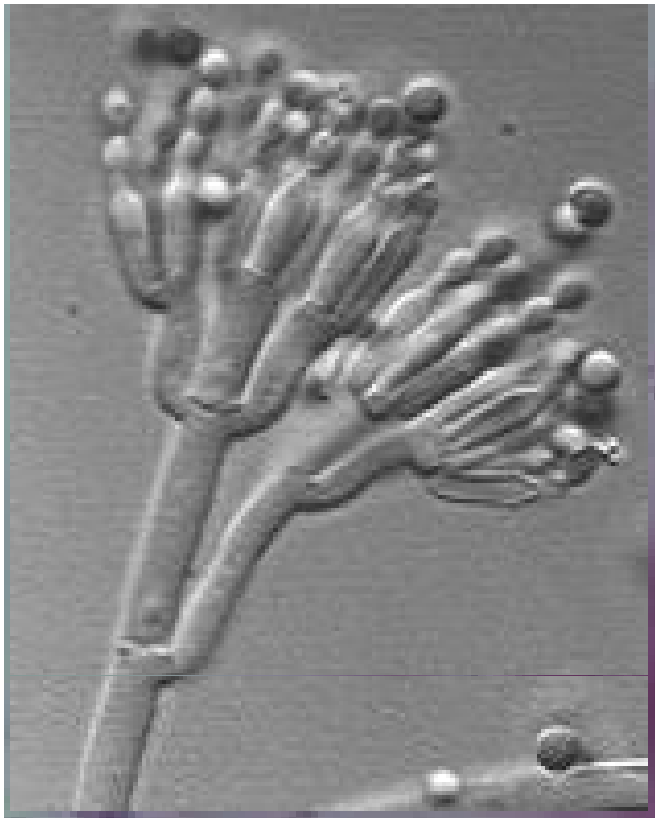
weight loss.

Penicillium

Several species of Penicillium play a central role in the production of cheese and of various meat products. *Penicillium camemberti* and *Penicillium roqueforti* are the molds on Camembert, Brie, Roquefort and many other cheeses. *Penicillium nalgiovense* is used to improve the taste of sausages and hams and to prevent colonization by other moulds and bacteria.

In addition to their importance in the food industry, species of Penicillium and Aspergillus serve in the production of a number of biotechnologally produced enzymes and other macromolecules, such as gluconic, citric and tartaric acids, as well as several pectinases, lipase, amylases, cellulases and proteases.

Most importantly, they are the source of major antibiotics, particularly penicillin and griseofulvin



SEM image of *Penicillium*

Penicillium

Lentinula edodes (Shiitake)

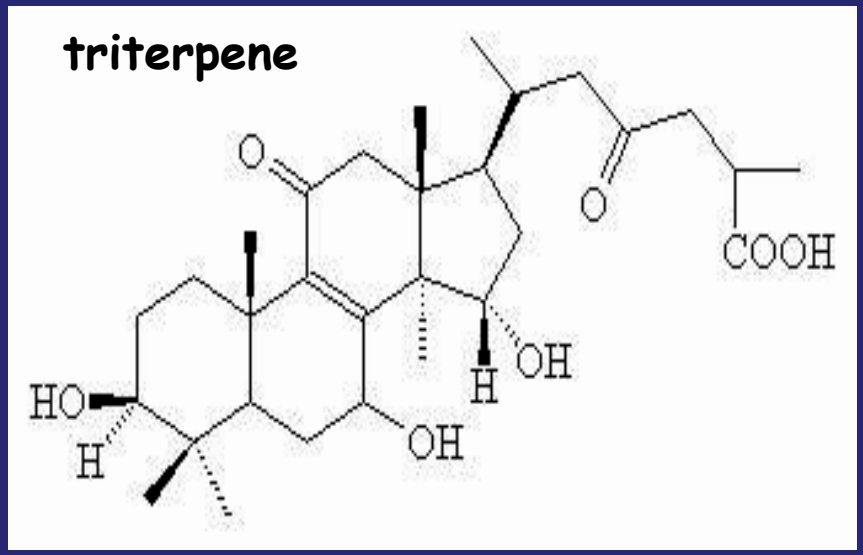
Fresh and dried shiitake have many uses in the cuisines of East Asia. In Chinese cuisine, they are often sauteed in vegetarian dishes such as Buddha's delight. In Japan, they are served in miso soup, used as the basis for a kind of vegetarian *dashi*, and also as an ingredient in many steamed and simmered dishes. In Thailand, they may be served either fried or steamed.

Shiitake are often dried and sold as preserved food in packages. These must be rehydrated by soaking in water before using. Many people prefer dried shiitake to fresh, considering that the sun-drying process draws out the umami flavour from the dried mushrooms by breaking down proteins into amino acids and transforms ergosterol to vitamin D. The stems of shiitake are rarely used in Japanese and other cuisines, primarily because the stems are harder and take longer to cook than the soft fleshy caps. The highest grade of shiitake are called *donko* in Japanese.

Today, shiitake mushrooms have become popular in many other countries as well. Russia produces and also consumes large amounts of them, mostly sold pickled; and the shiitake is slowly making its way into western cuisine as well. There is a global industry in shiitake production, with local farms in most western countries in addition to large scale importation from China, Japan, Korea and elsewhere.

***Lentinula* edodes (Shiitake)**

Ganoderma



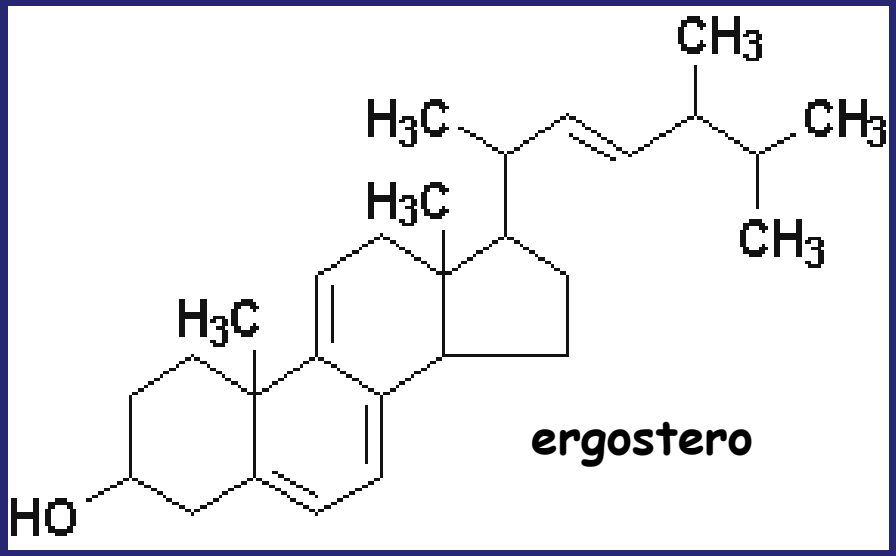
Polysaccahrides; proteo-glycans;
Protein (LZ-8).

Terpenoids and derivatives;

Ergosterol and its derivatives;
Lectins;

Nucleic acids and derivatives;

Alkaloids;



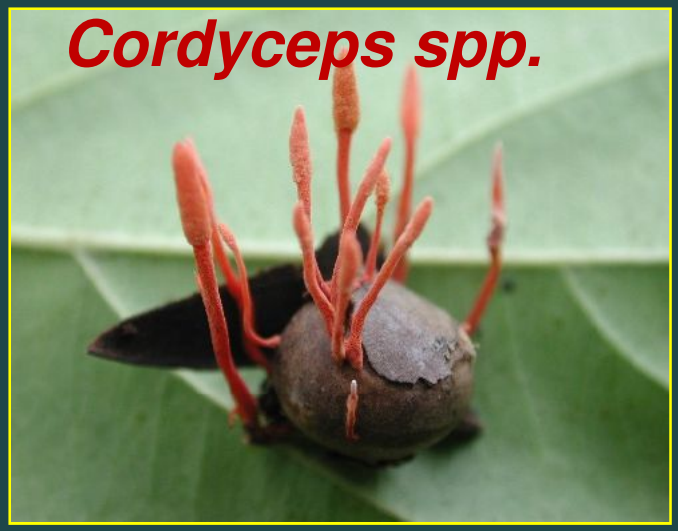
Huie and Di. 2004

ENTOMOPATHOGENIC FUNGI

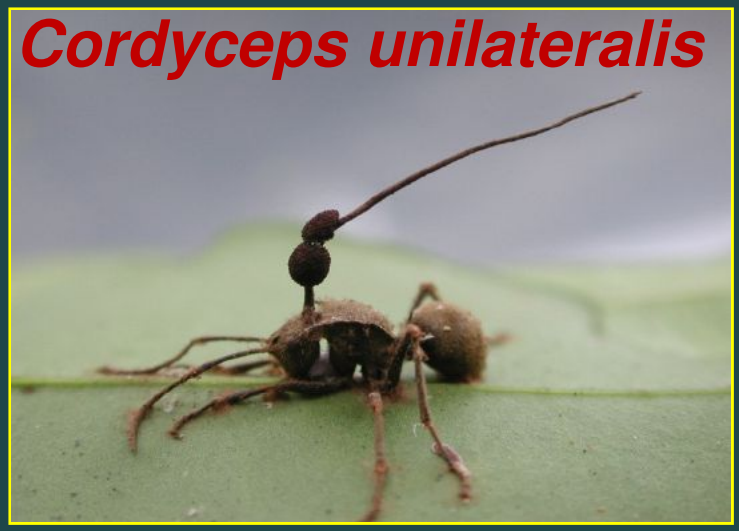
(Fungi occuring on insects)

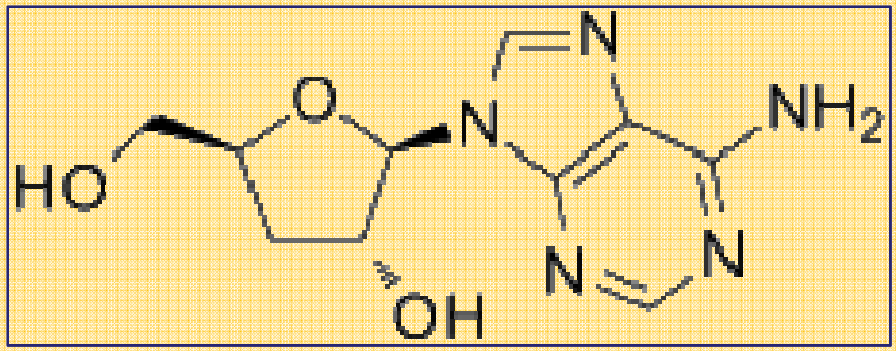
BIOCONTROL BY FUNGI

Cordyceps spp.



Cordyceps unilateralis



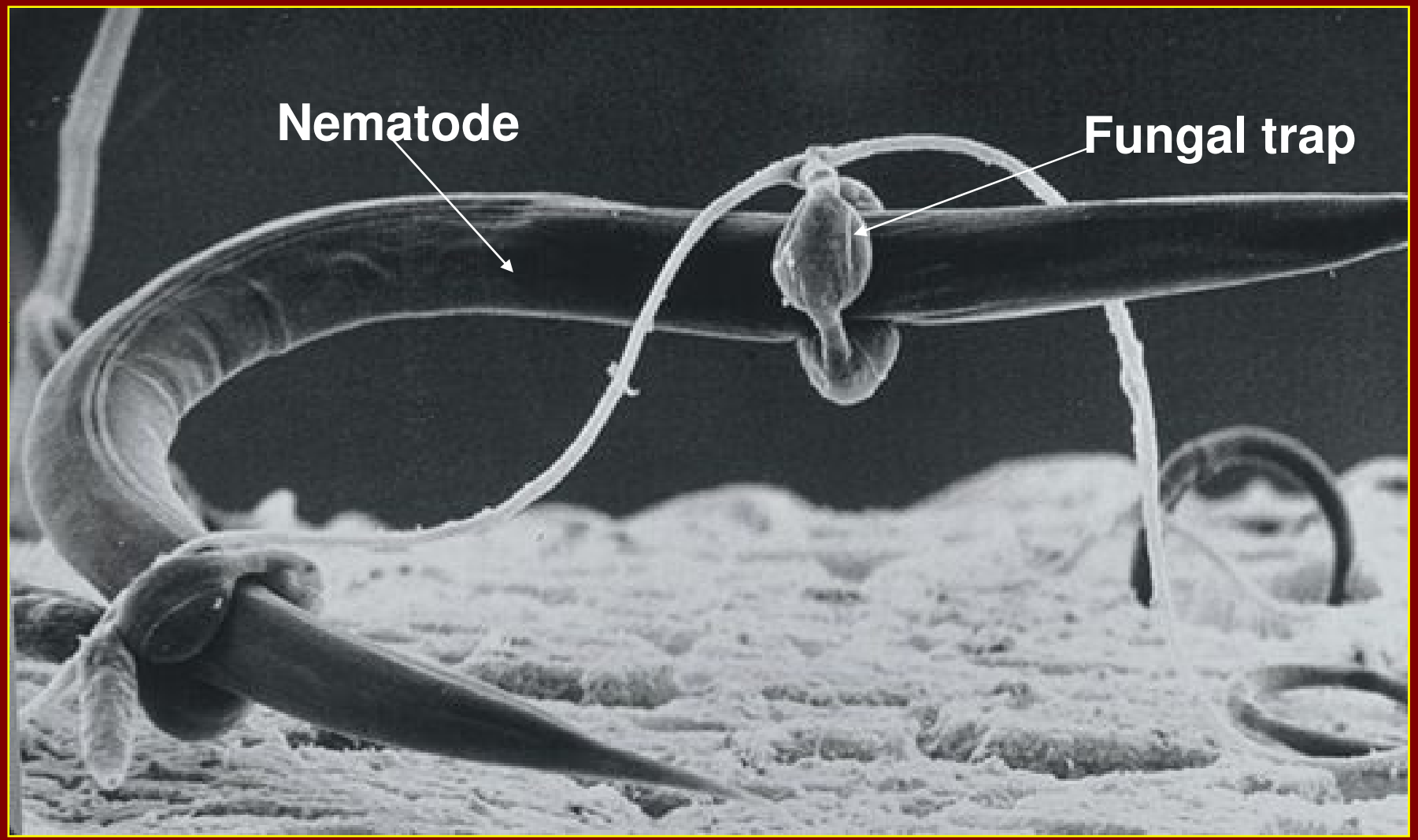


Cordycepin, a compound isolated from the "Caterpillar fungus".

O. sinensis **is known in the West as a medicinal mushroom, and its use has a long history in Traditional Chinese medicine as well as Traditional Tibetan medicine.The hand-collected fungus-caterpillar combination is valued by herbalists and as a status symbol; it is used as an aphrodisiac and treatment for ailments such as fatigue and cancer, although such use is mainly based on traditional Chinese medicine, anecdote, and a limited amount of research.**

Year	% Price Increase	Price/kg (Yuan)
1980s		1,800
1997	467% (incl. inflation)	8,400
2004	429% (incl. inflation)	36,000
2005		10,000–60,000

NEMATODE TRAPPED BY THE FUNGUS



LICHENS

- FUNGUS
- In Marathi "Dagadful"
- SYMBIOSIS OF ALGA AND FUNGUS
- ROLE OF BOTH THE PARTNERS- PHYCOBIONT(ALGA)

  AND

  MYCOBIONT(FUNGUS)
- NOT 100% SYMBIOTIC

ROLE OF LICHENS

- POLLUTION INDICATORS
- WEATHERING OF ROCK
- MEDICINAL
- DYEING
- EDIBLE

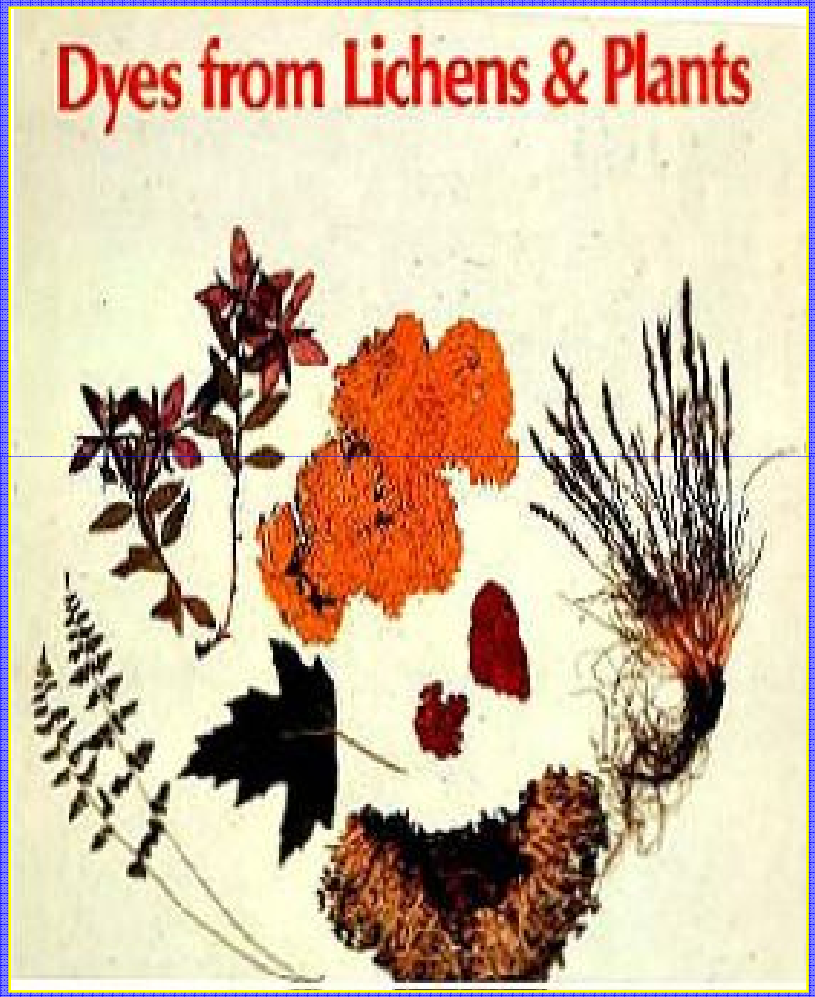
VARIOUS LICHENS

Arthothelium(On Rock)

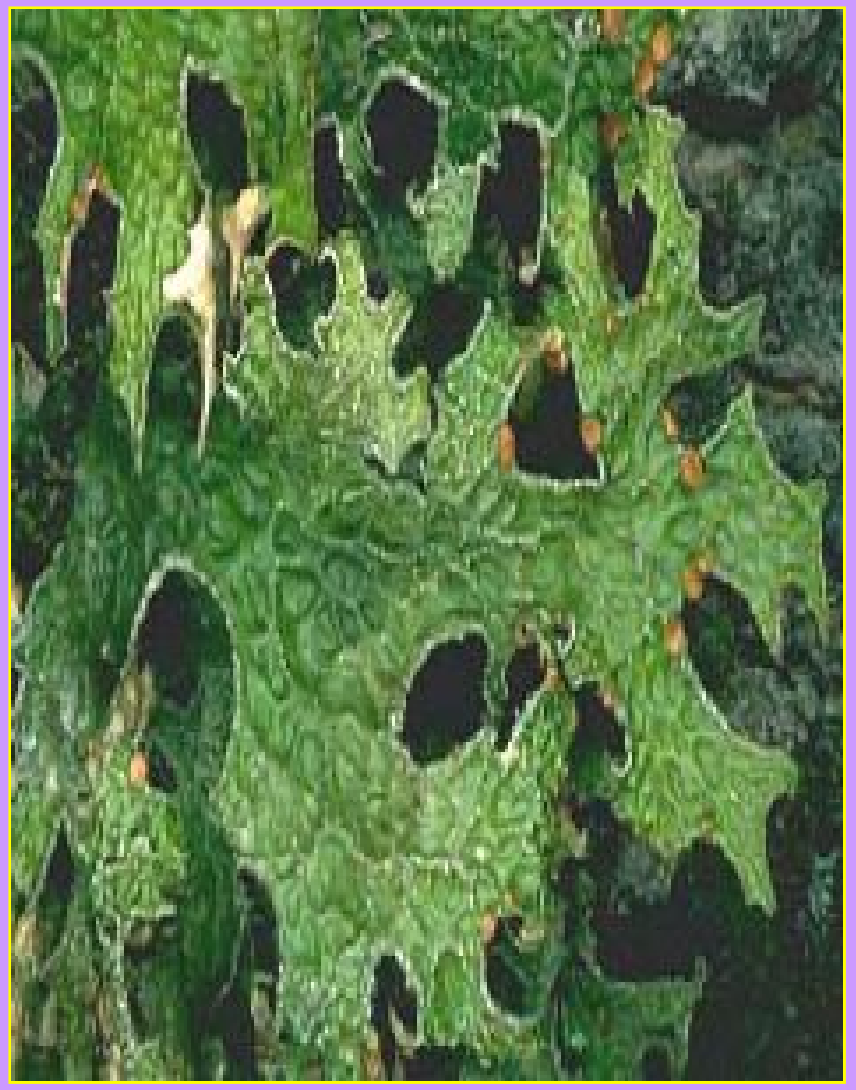
Dermatocarpon (On Rock)

Foliar lichen (On Leaf)

LICHEN DYES



MEDICINAL FOLIOSE LICHEN



Lobaria pulmonaria

DEGRADATION OF LICHENS

Degradation of the lichen thallus

Pseudevernia* and *Evernia

Oakmoss oil.
10 ml for about $30.00

Thanks a lot