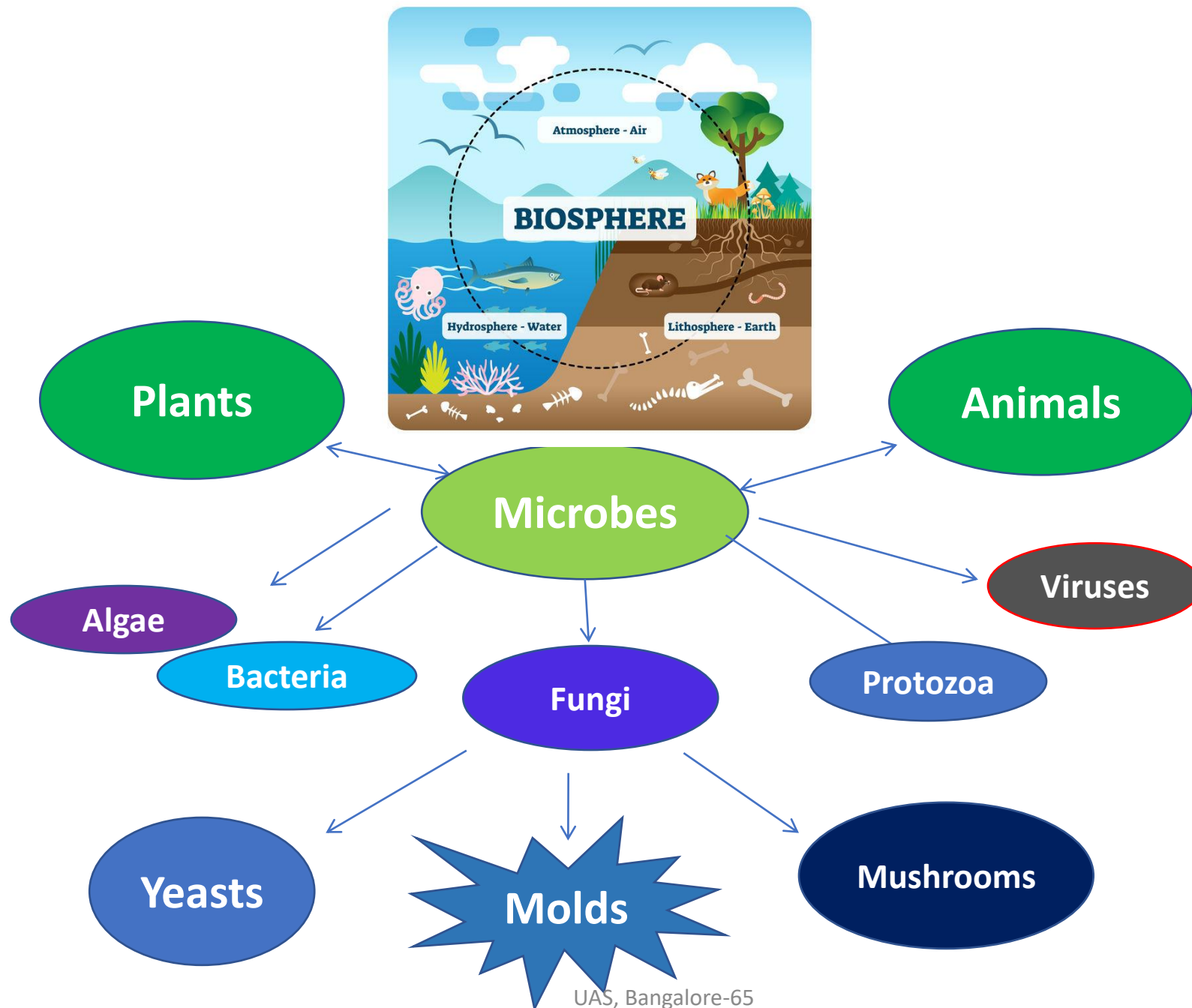


INTRODUCTION TO MUSHROOMS AND THEIR DIVERSITY





Mushrooms

Mushrooms are epigeous and hypogeous fleshy fruiting bodies of the fungi belong to *Basidiomycetes* and certain *Ascomycetes*.



History

In ancient Egypt, **mushrooms** were associated with immortality.

Hieroglyphs found in Egypt indicate that mushrooms were being consumed with meals as long as 4,500 years ago.

In China and Japan, mushrooms were associated with longevity and known for stimulating the immune system.

Mushroom stones of mayan/guatemala



Uses in ritual and religion

The toxin *psilocybin* is found in certain mushrooms, used as hallucinogen has been documented in rituals since thousands of years.

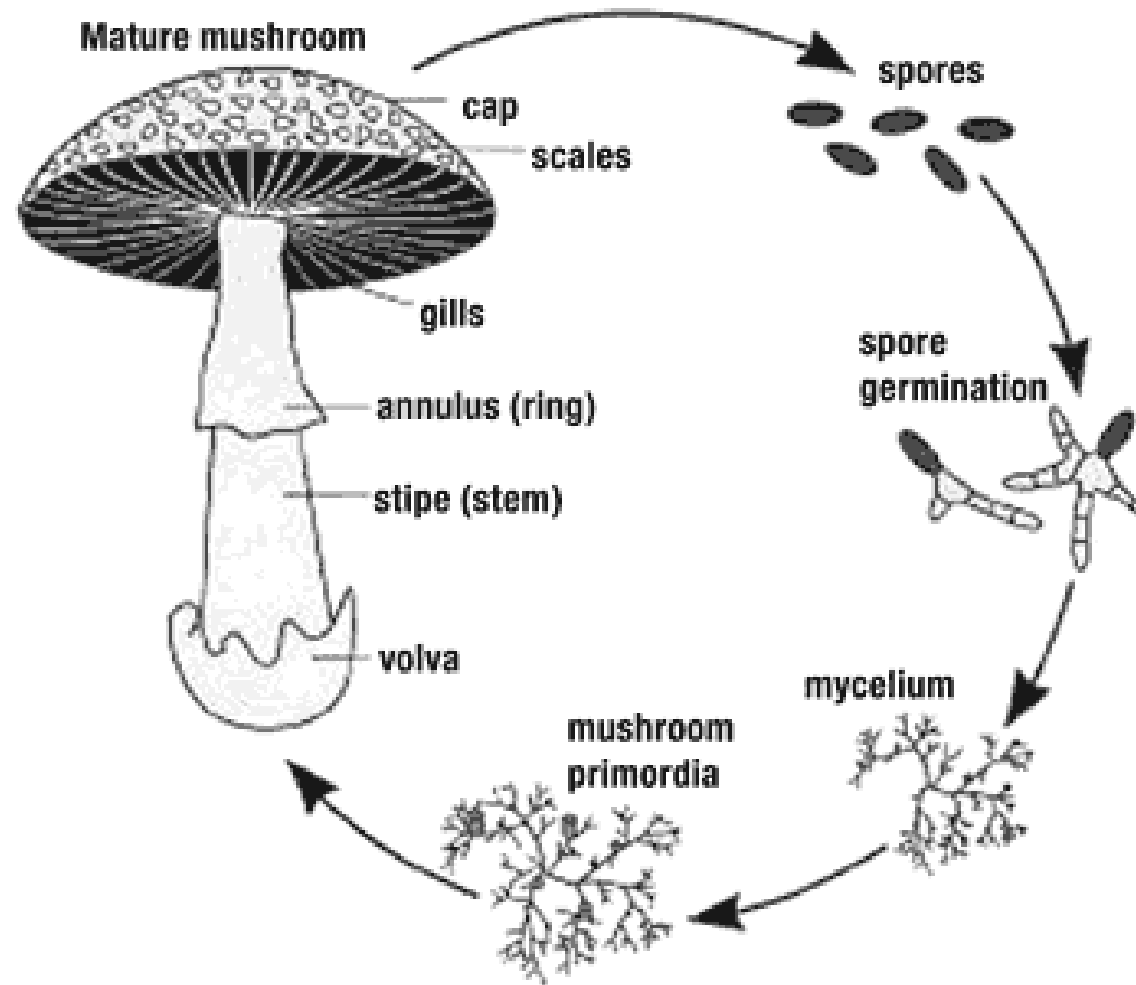
Hallucination is the perception of something that isn't real.



Psilocybin mushroom (Magic mushroom)



Mushroom Anatomy & Lifecycle

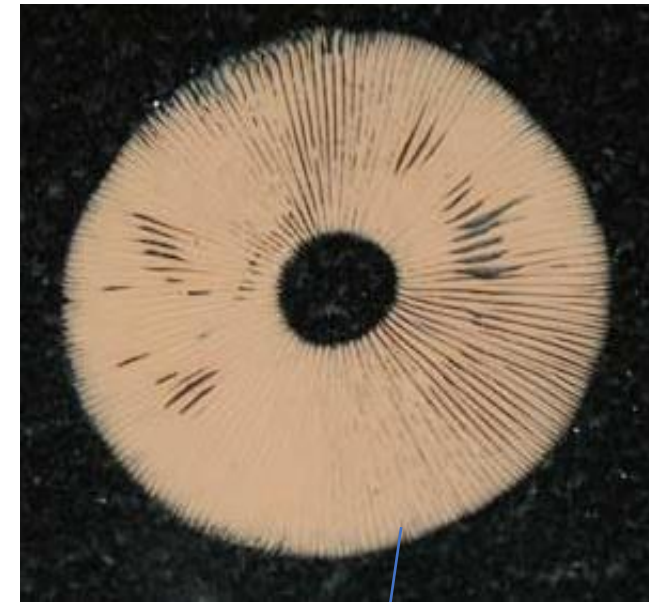
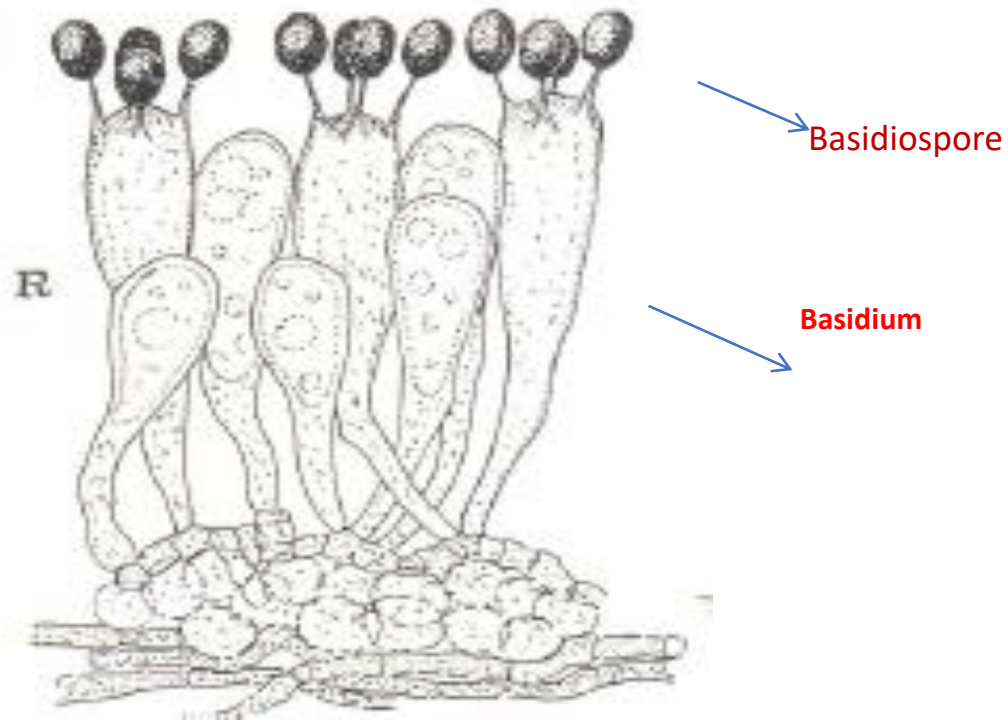


Fungal mycelium



Identification- using Morphological characters

Cap, gills, stipe, volva, annulus, spores etc.,



Spore Print



Categories of mushroom

- Edible Mushrooms
- Medicinal mushrooms
- Poisonous mushrooms

**“Our food should be our medicine
Our medicine should be our food”**



Importance of mushroom in diet

- Mushrooms are rich in nutrients, contain all nine essential amino acids, B and D vitamins, minerals such as zinc, potassium and magnesium, as well as prebiotic fibre to improve your gut micro flora. Mycotherapy is the use of mushroom compounds for health. Mushrooms are low in calories and fat, cholesterol-free, and low in sodium, meaty texture provides a satisfying meal option. Certain types of mushrooms have been used in traditional medicine as health-boosters since thousands of years.

Health benefits of mushrooms

(<https://womensfitness.co.uk/nutrition/medicinal-mushrooms-health-benefits/>)

1. Decrease the risk of cancer
2. Lower sodium intake
3. Promote lower cholesterol
4. Protect brain health
5. Provide a source of vitamin D
6. Stimulate a healthier gut
7. Support a healthy immune system





Pleurotus pulmonarius



Termitomyces



Termitomyces



Termitomyces



Edible Mushrooms



Termitomyces microcarpus



Termitomyces clypeatus



Pleurotus salmoneostramenius



Auricularia delicata



Termitomyces spp.



Lentinus squrossulus

Morels



Tubers



Pleurotus eous



Medicinal mushrooms

- Mushrooms have medicinal and antimicrobial properties.
- Pharmaceuticals worth \$700 million are produced annually in japan from *Lentinus*, *Coriolus*, *Scizophyllum* and *Ganoderma* mushrooms (Pathak et al., 2013).



Medicinal mushrooms contain beta-D-glucans

It maintains balance in your body and can help calm or increase your immune response

Terpenes are found in medicinal mushrooms

Protect the liver, lower cholesterol and blood sugar, be antioxidant, anti-inflammatory and antibacterial.

Medicinal mushrooms are adaptogens

Mushroom adaptogens modulate your stress response. Stress drives inflammation so can make other conditions worse, as well as increasing blood sugar

The Top 7 Medicinal Mushrooms

- Lion's Mane.
- Reishi.
- Cordyceps.
- Chaga.
- Turkey Tail.
- Shiitake.
- Maitake.
- Bonus: Oyster, Agaricus, Tremella.

Ganoderma lucidum



Griffola frondosa



Griffola frondosa



Cordiceps (caterpillar fungus)



Lion mane mushroom



Polyporus versicolor



Best medicinal mushroom for inflammation: Chaga mushroom

Best medicinal mushroom for fitness: Cordyceps mushroom

Chaga mushroom (*Inonotus obliquus*)



Caterpillar mushroom (Cordyceps)





Best for stress
Reshi mushroom



Best for brain health
Lion's mane mushroom



Best for heart health
Shiitake of Japan



Best for immune health
Royal sun Agaric



Best medicinal mushroom for boosting metabolism: Maitake mushroom

The maitake mushroom is a metabolic balancer containing metalloproteins which help healthy metabolic function, such as regulating blood sugars, blood lipids (including cholesterol) and blood pressure. Can be useful for weight management or insulin resistance. Animal studies show benefits for type 2 diabetes.



Mushroom products



a.



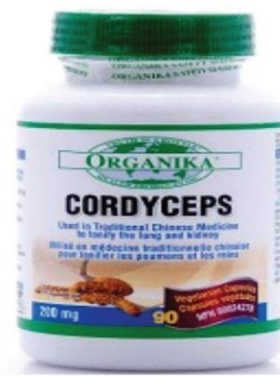
b.



c.



d.



e.



f.



g.



Collection of *Cordyceps*



Antiviral property

Leucocoprinus birnbaumii



Pycnoporus sanguineus



Fungal bioactive agents with reported antiviral activities

- Cordycepin and its Analogs
- Ganoderic Acids
- **High molecular weight compounds**

Lignin derivatives	Polyporales	Basidiomycota
Polysaccharides	Agaricales, Polyporales	Basidiomycota
Proteins	Agaricales, Polyporales	Basidiomycota
Polysaccharide-protein/amino acid complex	Polyporales	Basidiomycota
Polyketides (PKS)	<i>Amphisphaeriales,</i> <i>Pezizales,</i>	<i>Ascomycota</i>





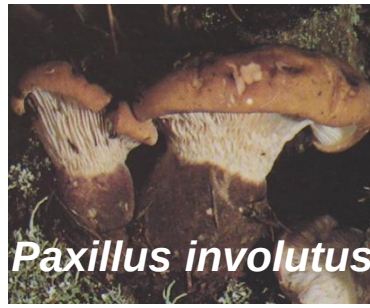
Poisonous mushrooms



Poisonous mushrooms cause harmful effects from ingestion of toxic substances present in a mushroom. These symptoms can vary from slight Gastrointestinal discomfort to death.



Psilocybe spp.



Paxillus involutus



Inocybe spp.



Clitocybe spp.



Amanita verna



Amanita muscaria



Amanita gemmata



Amanita pantherina



Amanita virosa



Amanita Caesaerea



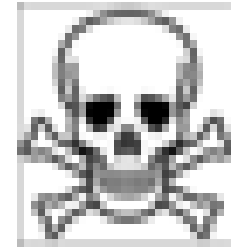
Helvella Spp.



Gyromitra Spp.

Amanita phalloides-Word's most poisonous fungi

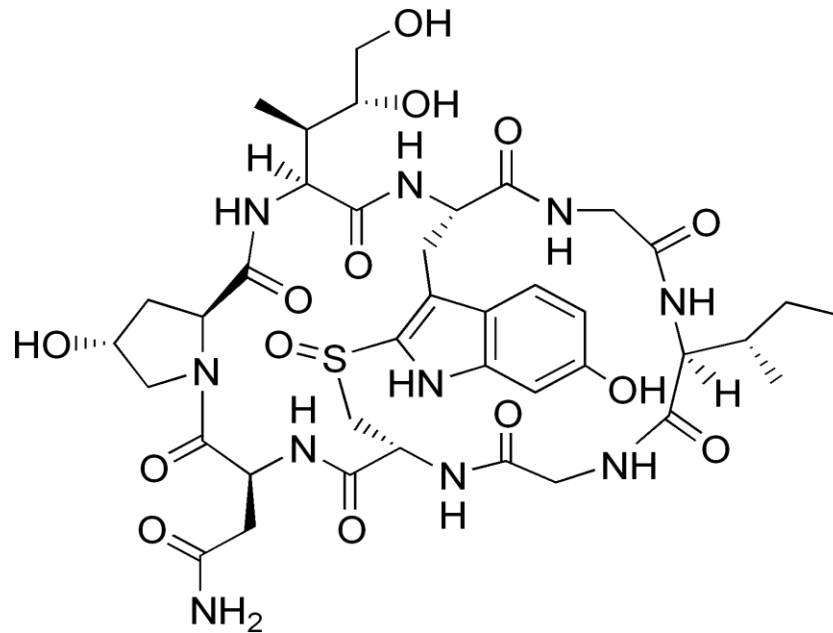




Some symptoms of poisonous mushroom ingestion include:

- Nausea
- Vomiting
- Headache
- Fatigue
- Chills
- Hallucinations
- Loss of motor skills
- Organ failure

- α - Amanitin-inhibit m-RNA synthesis in animal cells and very effective defence mechanism for predators



Identification

- **Organo-liptic test**
- **Silver coin test**
- **Use of experimental animals**



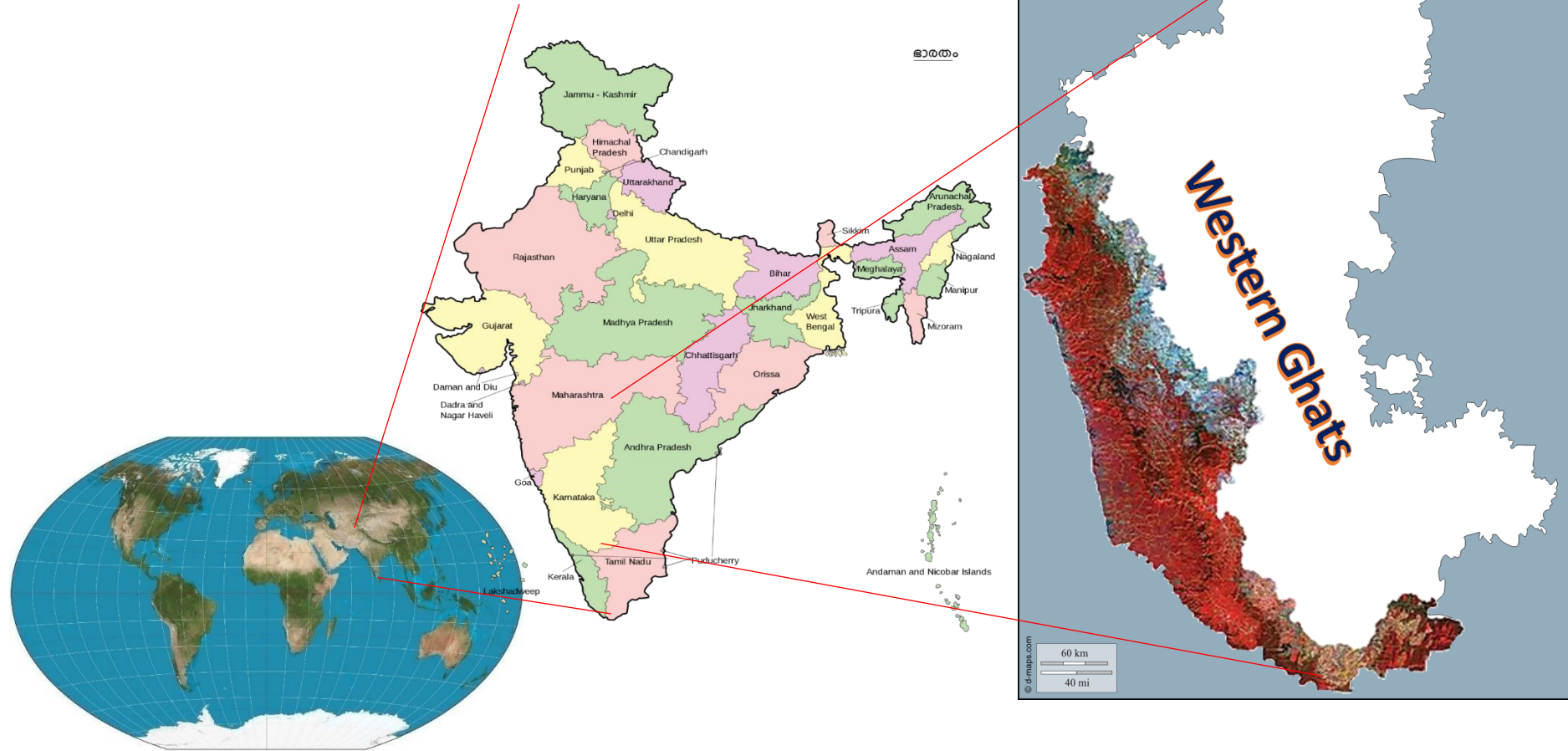
UAS, Bangalore-65

Characters of non edible mushrooms

1. Fungi are non-vascular, eukaryotic, non-motile, and heterotrophic organisms. Examples, rusts, yeasts, molds, stinkhorns, truffles, and mushrooms.
2. Fungi are not edible if they produce toxins. Bread mold, death caps, and web caps are few examples.
3. The tongue is neither burned nor stung by the edible fungus.
4. The odour of poisonous mushrooms is unpleasant, but the odour of edible mushrooms is pleasant.
5. Some non-edible mushrooms, when cut their colour changes to green or purple.
6. The edible ones are generally sweet, whereas the non-edible ones are bitter.
7. The scales are found on the cap of some non-edible mushrooms.

Mushroom diversity

The stretch of Central Western Ghats covering areas of Coorg, Hassan, Chikkamagaluru, Shivamogga, Dakshina Kannada and Uttara Kannada districts of Karnataka.



Termitomyces microcarpus



Termitomyces titanicus is the world's largest edible mushroom, with the cap measuring a little more than three feet across. (West Africa and Zambia)





China (53cm)





ಸಿದ್ದಾಪುರ ತಾಲ್ಲೂಕಿನ ಲಂಬಾಪುರ ಸಮೀಪದ ಹಳೆಬರಗಾಲದ ಬೆಟ್ಟದಲ್ಲಿ ಕಂಡು ಬಂದ ಬೃಹತ್ ಕಪ್ಪು ಅಣಬೆ ಶಿವಾನಂದ ಹೆಗಡೆ ಮತ್ತಿತರರು ಪ್ರದರ್ಶಿಸಿದರು

ಬೃಹತ್ ಕಪ್ಪು ಅಣಬೆ ಪತ್ತೆ

ಸಿದ್ದಾಪುರ (ಉ.ಕ.ಜಿಲ್ಲೆ): ಅಣಬೆಗಳಲ್ಲಿ ರೂಪವೈವಿಧ್ಯ ಸಾಮಾನ್ಯ. ಮಲೆನಾಡಿನಲ್ಲಿ ಬಿಳಿಯ ಬಣ್ಣದ ಅಣಬೆಗಳು ಮಳೆಗಾಲದಲ್ಲಿ ಆಗಾಗ ಕಾಣುವುದುಂಟು.

ಆದರೆ ಕಪ್ಪು ಬಣ್ಣದ ಅಣಬೆಗಳು ಮಾತ್ರ ಅಪರೂಪ. ತಾಲ್ಲೂಕಿನ ಲಂಬಾಪುರ ಸಮೀಪದ ಹಳೆಬರಗಾಲದ ಶಿವಾ

ನಂದ ಹೆಗಡೆ ಅವರ ಬೆಟ್ಟದಲ್ಲಿ ಕಪ್ಪು ಬಣ್ಣದ ಅಣಬೆಯೊಂದು ಕಂಡುಬಂದಿದೆ. ಸುಮಾರು ಮೂರೂವರೆ ಅಡಿಯಷ್ಟು ಅಗಲ ಮತ್ತು 28ರಿಂದ 30 ಕೆಜಿ ಭಾರವಿರುವ ಈ ಕಾಡಿನ ಅಣಬೆಯು ಮಳೆಗಾಲದಲ್ಲಿ ಕೊಡೆಯಂತೆ ಅರಳಿಕೊಂಡಿದ್ದು ವಿಶೇಷ.

Agarikon-long living (75 years)- Paul Stamets-(American Mycologist)



Gills are the structures where basidiospores originate



Reishi (*Ganoderma*)- Herb of spiritual potency



Lentinula



PUFF BALLS



Earth stars



Bird nest fungi



CUP FUNGI



Cookeina tricholoma





CORL FUNGI



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Bridal veil





Xylaria polymorpha, also known as **dead man's fingers** is a **saprobic** fungus, meaning it derives its nourishment from nonliving or decaying organic matter.

TECHNOBYTE.ORG

Morels



Tubers



Pleurotus eous



Pleuteus



Tricholosporium sp.



Phlebopus portentosus



Cordiceps (caterpillar fungus)





Collection of *Cordyceps*





Cordyceps market in Ningchi, Tibet. Cordyceps spread out on the road for buyers to view

(Holliday and Cleaver, 2008)



Thank you