BOT 16 BACTERIOLOGY, VIROLOGY & GENERAL MICROBIOLOGY

I

Bacterial taxonomy
Identification of bacteria
General characters of Rickettsia and Chlamydia
Diseases caused by Rickettsia and Chlamydia
Mode of nutrition in bacteria: autotrophy, heterotrophy, symbiosis

II

General account of sterilization culture media, pure culture techniques;
A general idea about bacterial toxins and enzymes;
Bacteriophage;
Bacterial diseases caused by Escherichia coli, Shigella

III

General properties and evolution of viruses;
Cultivation of virus and viral assay;
Transmission of plant viruses and control measures
Oncogenic viruses and immunogenesis
Viral diseases: Encephalitis, hepatitis, AIDS and Rabies

IV

Biological nitrogen fixation: symbiotic and non-symbiotic nitrogen fixation;
Fermentation technology: principle and types of fermentation
Microbial degradation of pesticides and hydrocarbons
Microplasmas: general account and important diseases caused by them

V

Microbial conversion of waste products with particular reference to alcohol and biogas
General account of Immunity, properties of antigens and antibodies
Allergy and types of allergies
Myotoxins and their harmful effects

CRITICALS (10):

1. Preparation of culture media.
2. Isolation of Bacillus and Rhizobium spp from soil and nodules.
3. Various methods of bacterial staining to study cell wall, endospore, capsule and flagella.
4. Identification of some important genera by using biochemical tests: Escherichia Coli and Staphylococci, Bacillus Pseudomonas Rhizobium Streptomyces Xanthomonas
7. Isolation of streptomycin-resistant mutants of bacteria.
8. Sensitivity test of bacteria using different antibiotics.
9. Purification of TMV and study of thermal inactivation point and dilution point.
10. Virus concentration determination by local lesion on host.
13. Isolation and enumeration of bacteria: Actinomycetes and fungi from soil, rhizosphere and seed using different techniques.
15. Fermentation of alcohol and biogas from waste materials (Demonstration)
T 102: BIOLOGY AND DIVERSITY OF FUNGI AND PLANT PATHOLOGY

UNIT I
Recent trends on the classification of fungi with reference to morphological and paramorphological criteria.
Comparative study of following sub-division:
- Mastigomyceina: Albugo, Peronospora, Plasmopara

UNIT II
Comparative study of following sub-division:
- Zygomycetina: Mucor, Rhizopus, Stachybotrys, Aspergilli
- Fungi imperfecti: Trichina, Chaetomium, Chaetosporis, Monilia

UNIT III
Comparative study of following sub-division:
- Basidiomyceina: Rhizoctonia, Ulocladium, Polypyris, Campylospora, Ustilagina
- Deuteromyceina: Fusarium, Cercospora, Gloeosporium

Mushroom cultivation: Mycorrhizal application in agriculture and forestry;
Fungal cytology and genetics: Heterokaryosis, parasexual cycle, mutation.

UNIT IV
Symptomatology of fungal, bacterial and viral infection of plants
Ecology and control of the following crop diseases
1. Paddy: Paddy blast, paddy blight
2. Wheat: Black stem rust, Bunt of wheat
3. Barley: green ear and Ergot
4. Sugarcane: Red rot disease of sugarcane
5. Ground nut: Tikka disease
6. Maize: Smut

UNIT V
Role of enzyme and toxins in pathogenesis;
Disease control by physical, chemical and biological methods, resistant varieties;
Crop rotation, plant quarantines, seed certification

PRACTICAL T 102:
Study of the morphological characters and reproductive structures of the genera mentioned in the theory.
Study of symptomatology of diseased species. Carbon and nitrogen utilization by fungi in culture, vitamin requirement, staining techniques, induction and isolation of mutants.

1. Study of diseased specimens of plants with reference to symptomatology.
2. Isolation, purification and single-spore culture of pathogens.
4. Laboratory testing of fungicides (systemic and non-systemic) against pathogenic fungi.
5. Demonstration of biological control of pathogenic fungi in vitro.

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UNIT I
Comparative survey of important systems of classification of algae:
- Criteria for algal classification and recent trends.
- Diagnostic features of algal phyla, range of thallus and reproductive diversity, life history patterns, parallelism and evolution.

UNIT II
Comparative account of algal pigments: light microscopic structure, ultrastructure and function of
- Cell walls, flagella, chloroplast, pyrenoids and eyespots and their importance in taxonomy.
- Study of Cyanophyceae, Chlorophyceae, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae up to
the ordinal level with reference to the following genera: Anabaena, Gonium, Chlorella, Entomophtora,
Bacillaria, Chlorella, Acetabularia, Acetabulina, Botrydium, Navicula, Cyclotella, Botryococcus, and
Geitlerinema.

UNIT III
General characteristics of the division: Diaphyta, Cryptophyta, and Cryptophyta.
Distribution of algae in soil, fresh water and marine environment, role of algae in soil fertility,
productivity in fresh water and marine environment, algae role in fisheries, algae in symbiotic
association, algae in polluted habitats, algae as indicator of pollution, fossil algae, algae in
biotechnology.

UNIT IV
Origin of Bryophytes: Primitive vs. advanced characters, derived features: evolutionary lines
Classification.
Comparative morphological, anatomical and cytological studies of gametophyte and sporophytes of
Carnivorous, Jungermanniales, Sphenocarpoles, Marchantiales, Takakiaceae, Sphagnales, and Bryales.

UNIT V
Experimental studies in Bryophytes
Spore germination, Protonemal differentiation, bud formation
Parthenogenesis, apogamy, apomixis and regeneration.
Bryogeographical regions of India with reference to Central India.
Lichens: General account, structure and reproduction.

PRACTICAL 103:
1. Collection and study of algae mentioned in theory, identification up to generic level using algal
monographs.
2. Preparation of synthetic medium and cultivation of algae, unialgal and axenic culture and their
maintenance.
3. Collection, preservation of algal herbarium (10 specimens).
4. Preparation of pigments.
5. Staining techniques of cytology studies.
- Morphology and structural study of representative member of the following group using cleared whole
amount preparation, dissection and section: Jungermanniales - Pellia and Porella (or any other leafy
Liverwort); Marchantiales: Pogonatum, Dictyota, Dimorphism, Astrakhal, Rhodia, Targionia,
Corocephara, Webocrella, Sphagnum, Bryales.
8. Experiments to study spore germination, formation of protonema and bud development.
9. Study of Bryophytes in their natural habitats.

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Biology and Diversity of Pteridophytes and Gymnosperms

Evolution of Pteridophytes: Soral and stealer evolution.
Classification of Pteridophytes

Comparative organography, systematics, reproduction and phylogeny of the following:
Psilophytes, Rhytidiaceae, Zosterophyllphytes
Psilophytes
Lycopsidae, Lepidodendrales
Sphenophytes
Ophioglossales, Marattiaceae, Osmundales, Filicales, marsileates, Salviniales

Speciation and evolutionary trends in ferns:
Cytology:
Polyplody and hybridization
Pteridophytic life cycle, apomixis, vegetative apomixis.
Recent trends in the classification of Gymnosperms

Morphology and anatomy of vegetative and reproductive organs, fossil representatives and interrelationship of Cycadales, Ginkgoales, Coniferales, Taxales, Ephedrales, Welwitschiales and Gnetales

Structure and evolution of archegonium in Bryophytes, Pteridophytes and Gymnosperms.
Distribution of living and fossil Gymnosperms in India.
Economic importance of Gymnosperms

Practicals 10.4
1. Study of morphology and anatomy of vegetative and reproductive tissues and organs using cleared whole mounts, dissections, sections, macerations and permanent preparations of living and fossil forms covered under theory.
2. Experiments on spore germination of prothallus, induction of sporophytes.
3. Preparation of models (Plastocine/thermore) to demonstrate stealer evolution.
4. Study of Pteridophytes in their natural habitats.
6. Study of the important reproductive stages through specimens and permanent slides.
7. Preparation of models (Plastocine/thermore) to demonstrate the position and structure of microsporangia of Cocos, Pinus, Taxus, Ephedra, Gnetae. Seed-scale complex in female cone of Pinus, embryo of Pinus.

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