NCERT Exemplar Solutions of Class 11 Biology – Chapter: 2 Biological Classification.

LONG ANSWER TYPE QUESTIONS

1. Algae are known to reproduce asexually by a variety of spores under different environmental conditions. Name these spores and the conditions under which they are produced.

Explanation: Algae have evolved various spore types as survival strategies:

- **Environmental adaptation:** Different spores suit different environmental conditions
- **Dispersal mechanisms:** Motile spores help in dispersal, while non-motile ones focus on survival
- **Energy conservation:** Under stress, algae form resistant spores rather than continuing normal growth
- **Genetic preservation:** Spores maintain genetic material until conditions improve

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2. Apart from chlorophyll, algae have several other pigments in their chloroplast. What pigments are found in blue-green, red and brown algae that are responsible for their characteristic colours?

Explanation: These accessory pigments serve important functions:

- **Light harvesting:** Extend the range of light wavelengths that can be used for photosynthesis
- **Depth adaptation:** Different pigments absorb different wavelengths, allowing algae to live at various depths
- **Photoprotection:** Some pigments protect against excessive light damage
- **Taxonomic significance:** Pigment composition is used for classification

Specific functions:

- **Phycocyanin (blue):** Absorbs red and orange light
- **Phycoerythrin (red):** Absorbs blue and green light, allows red algae to photosynthesize in deeper waters
- **Carotenoids:** Provide photoprotection and light harvesting

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3. Make a list of algae and fungi that have commercial value as a source of food, chemicals, medicines and fodder.

Explanation: Additional commercial applications:

Algae:

- **Biofuels:** Production of biodiesel and bioethanol
- **Cosmetics:** Algae extracts in skincare products
- **Fertilizers:** Seaweed extracts as organic fertilizers
- **Pharmaceuticals:** Various bioactive compounds

Fungi:

- **Antibiotics:** Penicillin from *Penicillium*
- **Food processing:** Enzymes for food industry

- **Textile industry:** Bio-processing of fabrics
- **Environmental applications:** Bioremediation and waste treatment

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4. 'Peat' is an important source of domestic fuel in several countries. How is 'peat' formed in nature?

Explanation: Peat formation process:

1. **Waterlogged conditions:** Create anaerobic environment preventing complete decomposition
2. **Acidic pH:** Inhibits bacterial decomposition
3. **Low temperature:** Slows down decay processes
4. **Accumulation:** Partially decomposed plant material accumulates over thousands of years
5. **Compression:** Weight of accumulated material compresses lower layers

Characteristics of peat:

- **High water content:** Can hold up to 20 times its dry weight in water
- **Low energy density:** Compared to coal but still useful as fuel
- **Carbon storage:** Important carbon sink in global carbon cycle
- **Slow formation:** Takes centuries to millennia to form significant deposits

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5. Biological classification is a dynamic and ever-evolving phenomenon which keeps changing with our understanding of life forms. Justify the statement taking any two examples.

Explanation: Reasons for evolving classification:

1. **Technological advances:**
    - **Microscopy:** Revealed cellular structures
    - **Biochemistry:** Showed metabolic differences
    - **Molecular biology:** DNA/RNA analysis revealed phylogenetic relationships
2. **Discovery of new organisms:**
    - **Extremophiles:** Led to recognition of Archaea
    - **Deep-sea organisms:** Revealed new evolutionary lineages
    - **Molecular parasites:** Viruses, viroids, prions challenge traditional definitions
3. **Improved understanding:**
    - **Endosymbiotic theory:** Explained origin of eukaryotic organelles
    - **Horizontal gene transfer:** Complicated traditional phylogenetic trees
    - **Convergent evolution:** Similar features in unrelated organisms

Future directions:

- **Molecular systematics:** DNA barcoding and phylogenomics
- **Three-domain system:** Bacteria, Archaea, Eukarya
- **Continuous revision:** As new discoveries are made

The dynamic nature of classification reflects our growing understanding of life's complexity and evolutionary relationships.