

1. Living World



Can you recall?

1. What is the difference between living and non-living?
2. Enlist the characters of living organisms.
3. Whether all organism are similar? Justify your answer.

Planet earth is made up of abiotic and biotic components. The biotic components are obviously the living beings present around us. The question is why do we call them living and how do they differ from non-living?

1.1 Basic principles of life :

A. The living being once produced / born has to survive. For survival, it needs energy and many chemical molecules. For energy, it has to perform metabolism. Metabolism is breaking of molecules (**catabolism**) and making of new molecules (**anabolism**).

B. From birth onwards, organisms show tendency of growth and development. This **growth** is a well-orchestrated process. You might have observed sand mounds, boulders grow, etc. This growth is not from within and hence these are not living beings.

C. Growth and development are not the processes which have unlimited time span. At certain point of time, the molecules, organs, systems begin to lose their effective working and become old. This is **ageing** process of the body.

D. Life has to continue (perpetuate) hence the organism tries to produce a young one like itself. It is possible through reproduction (asexual or sexual). This ensures continuity of race. Mules, sterile worker bees do not reproduce, yet are living. Can we call reproduction as inclusive characteristic of life?

E. As the body loses its capacity to perform metabolism, the organism dies i.e. does not remain immortal.

F. Any living being responds to thermal, chemical or biological changes in the surrounding. Responsiveness or irritability is unique property of living beings.

There is immense diversity in living organisms. Since time immemorial, variety of organisms are living together on earth. In order to understand the interrelations between living and non-living as well as between two living beings or groups, systematic study of these is essential. This data is also important for various industries and agriculture. Intensive laboratory and field studies in order to identify and classify the organisms form strong basis for meaningful use of the collected data. If we need to study this diversity, certain aids called taxonomical aids can be used. These include herbaria, botanical gardens, museums, biodiversity parks, zoological parks, etc.



Can you tell?

1. How can we study large number of organisms at a glance?
2. Whether all organisms prepare their own food?
3. Which feature can be considered as all inclusive characteristic of life? Why?



Think about it

1. Can metabolic reactions demonstrated in a test tube (called '*in vitro*' tests) be called living?
2. Now a days patients are declared 'brain dead' and are on life support. They do not show any sign of self-consciousness. Are they living or non-living?

1.2 Herbarium :

The word herbarium (plural-herbaria) was coined by Pitton de Tournefort in the book '*Eléments*'. The art of herbarium was initiated by an Italian taxonomist Luca Ghini (1490-1556). Herbaria are effective tools in taxonomic studies. A herbarium is essentially a dried plant specimen that is pressed, treated variously and then mounted on standard size sheet in order to preserve it.

Date, place of collection along with detailed classification and highlighting with its ecological peculiarities, characters of the plant are also recorded on the same sheet. Local names and name of the collector may be added. This information is given at lower right corner of sheet and is called 'label'.



Fig. 1.1 Herbarium

1.3 Botanical Gardens :

Botanical gardens are the places where living plants of different varieties collected from different parts of the world, are grown in a scientific and systematic way in a *in vivo* manner. Plants are labelled. The label-board shows scientific as well as common name of the plant.

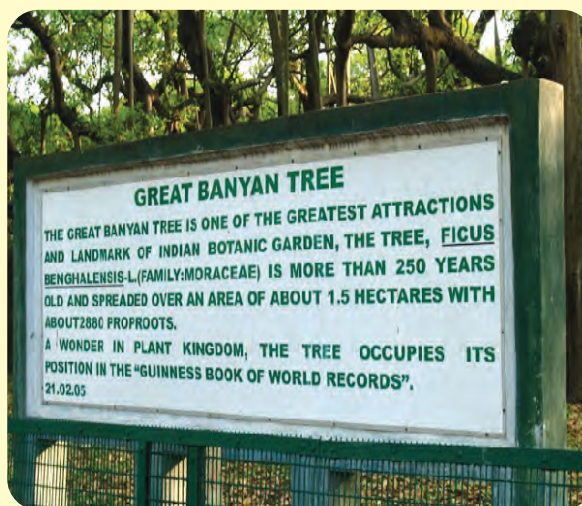


Fig. 1.2 Botanical Garden : Kolkata more than 255 years old Banyan tree



Know the scientists

In 1543, first botanical garden of the world was established by an Italian Prof. Luca Ghini (A. D. 1490-1556) at Pisa, Italy. Botanical garden at Kew in England is known for largest collection of more than 30,000 specimens (preserved plants) and more than 7 million herbaria.



Prof. Luca Ghini



Internet my friend

Collect information about Prof. Almeida, Prof. V. N. Naik, Dr. A. V. Sathe, Dr. P. G. Patwardhan with reference to their taxonomic work and biodiversity conservation.

Conservation of Biodiversity :

Biodiversity is the degree of variation of life forms in an ecosystem. Biodiversity is essential to maintain ecological stability. The extent of complexity and density of biodiversity can be regarded as a measure of health of an ecosystem. Population explosion and over exploitation of resources have resulted in a loss of biodiversity at an alarming rate. Conservation involves attempting to slow down, stop or even reverse the loss in the natural habitat of organism. This is known as *in-situ* conservation. Why does the loss of biodiversity matter? For many people, it is a simple moral or ethical issue. We share our planet with a huge range of other organisms and we have no right to harm them. Biodiversity helps to maintain stability in an ecosystem. Loss of one variety of organisms can affect the entire ecosystem.

1.4 Museum :

Museums are the repositories where, collections of preserved plant and animal specimens are kept. Plant and animal specimens may be preserved in formalin (10% to 40% formaldehyde) in transparent jars. Jars are labelled. Larger animals like birds and mammals are usually stuffed and preserved. This science is known as **taxidermy**. Specimens in dried form are also exhibited in museum.

We can even find systematic collections of shells, skeletons of animals, insect boxes etc. in museums.

Thus, biological museums in educational institutes are reference hubs of biodiversity studies.



Fig. 1.3 Biological Museum

1.5 Zoological Parks :

Zoological Park generally known as zoo, is a place of interest for common man. In a zoo, wild animals are kept in captivity. They are protected and care is taken to provide conditions similar to their natural habitat. (*ex-situ*) In a zoo, a naturalist can study food habits and behaviour of animals.

Flora, manuals, Monographs and Catalogue are some other tools of maintaining biodiversity records. Flora is the plant life occurring in a particular area on time. A **Monograph** describes any one selected biological group where as **manual** provides information, keys about identification of species found in a particular area.



Fig. 1.4 Zoological Park



Can you tell?

1. What are the essentials of a good herbarium?
2. Why should we visit botanical gardens, museums and zoo?
3. What is '*ex-situ*' and '*in-situ*' conservation?

1.6 Biodiversity parks :

It is an ecological assemblage of species that form self-sustaining communities on degraded / barren landscape e.g. Late Uttamrao Patil biodiversity park Gureghar, Mahabaleshwar. This park is the best model for conservation of natural heritage in urban landscape.

Systematic classification of living organisms is helpful in understanding the interrelations. In order to understand interrelations between organisms and maintaining harmony on planet earth, the study of biodiversity is a must.



Know the scientists

Dr. S. P. Agharkar

One of the leading botanists of India, Dr. S. P. Agharkar was born in November 1884 in Malvan, Maharashtra. He explored biodiversity of Western Ghats where he came across a species of freshwater jellyfish, which was until then only known to be found in Africa. These findings were published in scientific journal Nature in 1912. Dr. Annandale, the Superintendent of the Indian Museum in Kolkata, helped Dr. Agharkar in his further endeavours to collect, preserve and conduct microscopic examinations of animal and plant specimens. The institute ARI, Pune has been named after him.



1.7 Key :

Key is taxonomical aid used for classification of plants and animals. The dichotomous keys are based on contrasting characters. One of the contrasting characters gets accepted and other rejected. The statement in key is called a lead. Normally keys are analytical in nature. Let us study about classification of living organisms in next chapter.



Do you know ?

When plants from any forest locality are conserved on the name of holy place it is called as sacred groves. These are also considered as sacred natural sites by IUCN.



Internet my friend

1. Collect information about botanical gardens, zoological parks and biodiversity hot spots in India.
2. Gather information of endemic flora and fauna of India.



Find out

Human being is at key position in maintaining biodiversity of earth. Find out more information about the following.

1. Laws to protect and conserve biodiversity in India.
2. Environmental effects of ambitious projects like connecting rivers or connecting cities by constructing roads.
3. Did Bauxite mining in Western Ghats affect critically endangered species like – Black panther, different *Ceropegia* spp., *Eriocaulon* spp.?



Exercise

1. Choose correct option

- A. Which is not a property of living being?
- Metabolism
 - Decay
 - Growth
 - Reproduction
- B. A particular plant is strictly a seasonal plant. Which one of the following is best suited if it is to be studied in the laboratory?
- Herbarium
 - Museum
 - Botanical garden
 - Flower exhibition
- C. A group of students found two cockroaches in the classroom. They had a debate whether they are alive or dead. Which life property will help them to do so?
- Metabolism
 - Growth
 - Irritability
 - Reproduction
- E. What do you understand from terms like *in situ* and *ex situ* conservation?

4. Write short notes on:

- Role of the human beings in biodiversity conservation.
- Importance of botanical garden.

5. How can you, as an individual, prevent the loss of Biodiversity?

Practical / Project :

- Make herbarium under the guidance of your teacher.
- Find out information about any one sacred grove (devrai) in Maharashtra.

2. Distinguish between botanical gardens, zoological park and biodiversity park with reference to their characteristics

3. Answer the following questions

- Jijamata Udyan, the famous zoo in Mumbai has acclimatised the humbolt penguins. Why should penguins be acclimatised when kept at a place away from their natural habitat?
- Riya found peculiar plant on her visit to Himachal Pradesh. What are the ways she can show it to her biology teacher and get information about it?
- At Andaman, authorities do not allow tourists to collect shells from beaches. Why it must be so?
- Why do we have green house in botanical gardens?