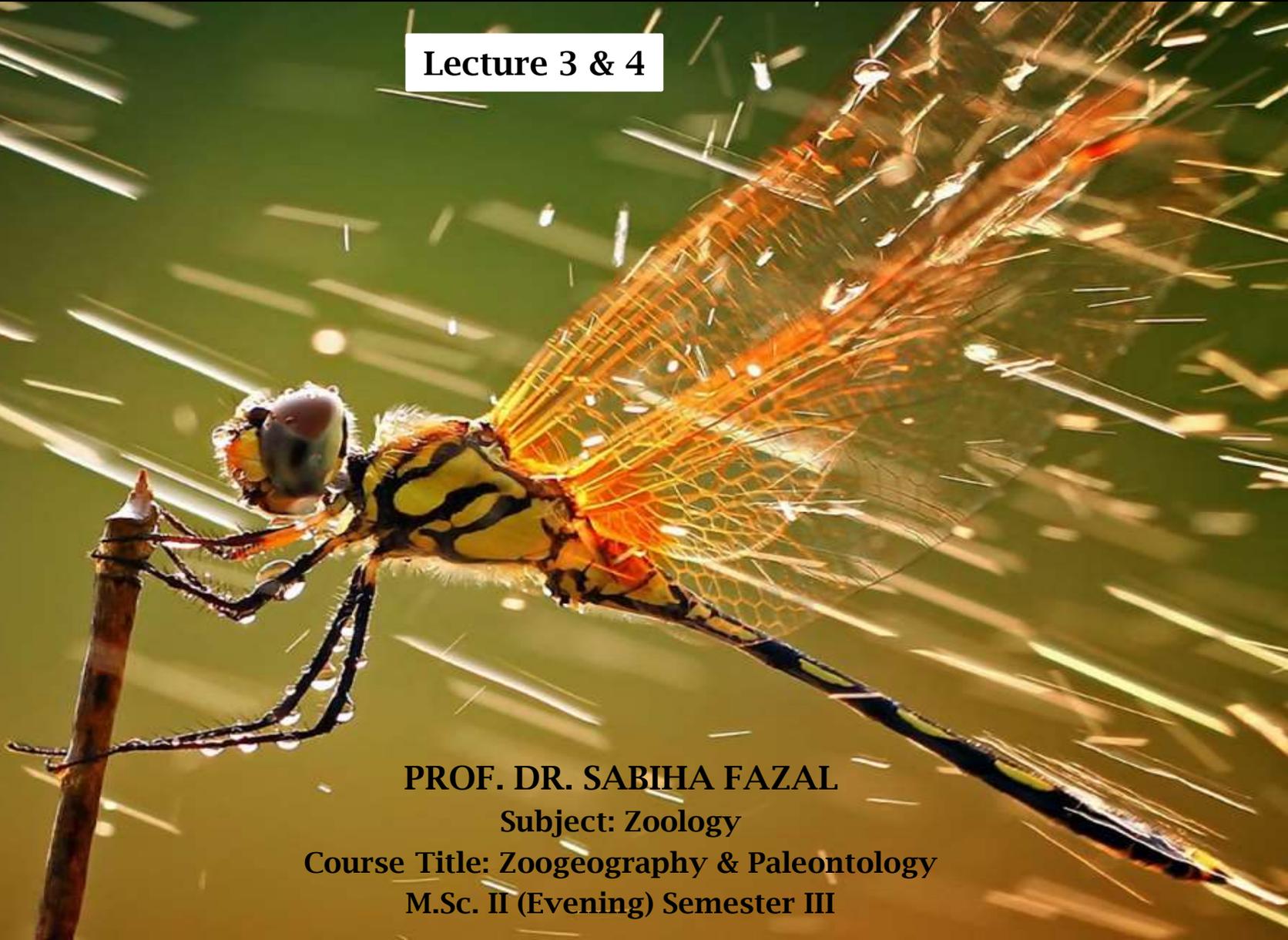


ANIMAL DISTRIBUTION

Lecture 3 & 4



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Subject: Zoology

Course Title: Zoogeography & Paleontology

M.Sc. II (Evening) Semester III

PATTERNS OF ANIMAL DISTRIBUTION

- The distribution of the animals on earth is not uniform or regular.
- There are three main patterns of animal distribution :
 1. Cosmopolitan Distribution
 2. Discontinuous Distribution
 3. Endemic Distribution

COSMOPOLITAN DISTRIBUTION

- A few animals are distributed throughout the world in all climatic zones or at least in one climatic zone of each continent.
- These forms that enjoy the global distribution are said to have **COSMOPOLITAN DISTRIBUTION**.

Examples: Rats, bats, hawks, cuckoos, earthworms.

DISCONTINUOUS DISTRIBUTION

- Often members of a particular genus, species, or a closely related species have a continuous distribution i.e., they are continuously distributed throughout their range.
- But there are a few exceptions. Some species or closely related species are found to inhabit one or more localized areas which are widely separated by thousands of miles but not present in the regions in between them. These species are said to have **DISCONTINUOUS DISTRIBUTION.**

MAMMALS SHOWING DISCONTINUOUS DISTRIBUTION

1. **TAPIRIDAE:** The **tapirs** are represented today by 4 species in South and Central America while one species in Malaysia.
2. **CAMELIDAE:** The **camels** are represented by only one genus *Camelus*, the true camels of Old World and by another genus *Llama* in South America.

MAMMALS SHOWING DISCONTINUOUS DISTRIBUTION

- 3. RHINOCERATIDAE:** The **rhinoceros** which are present in India and Africa but not in the region in between.
- 4. ELEPHANTIDAE:** The **elephants** are represented by two genera today. Genus *Loxodonta* is found in Africa while the genus *Elephas* is found in India, Burma, Sri Lanka, Bangladesh, Indonesia and Vietnam.
- 5. MARSUPIALS:** These are represented by 8 families . All are confined to Australia except **Opossum** found in North and South America.

AFRICAN ELEPHANT

ASIAN ELEPHANT

What are the differences?



EARS: Large, "Africa-shaped" ear
TRUNK TIP: Two "fingers" for grasping
HEAD: Single dome
HEIGHT (*tallest at shoulder*): 9 – 13'
WEIGHT: 8,800 – 15,400 lbs.



EARS: Small, rounded ear
TRUNK TIP: One "finger" for grasping
HEAD: Twin dome
HEIGHT (*tallest at back*): 6.5 – 9'
WEIGHT: 6,600 – 13,200 lbs.



Indian Rhinoceros

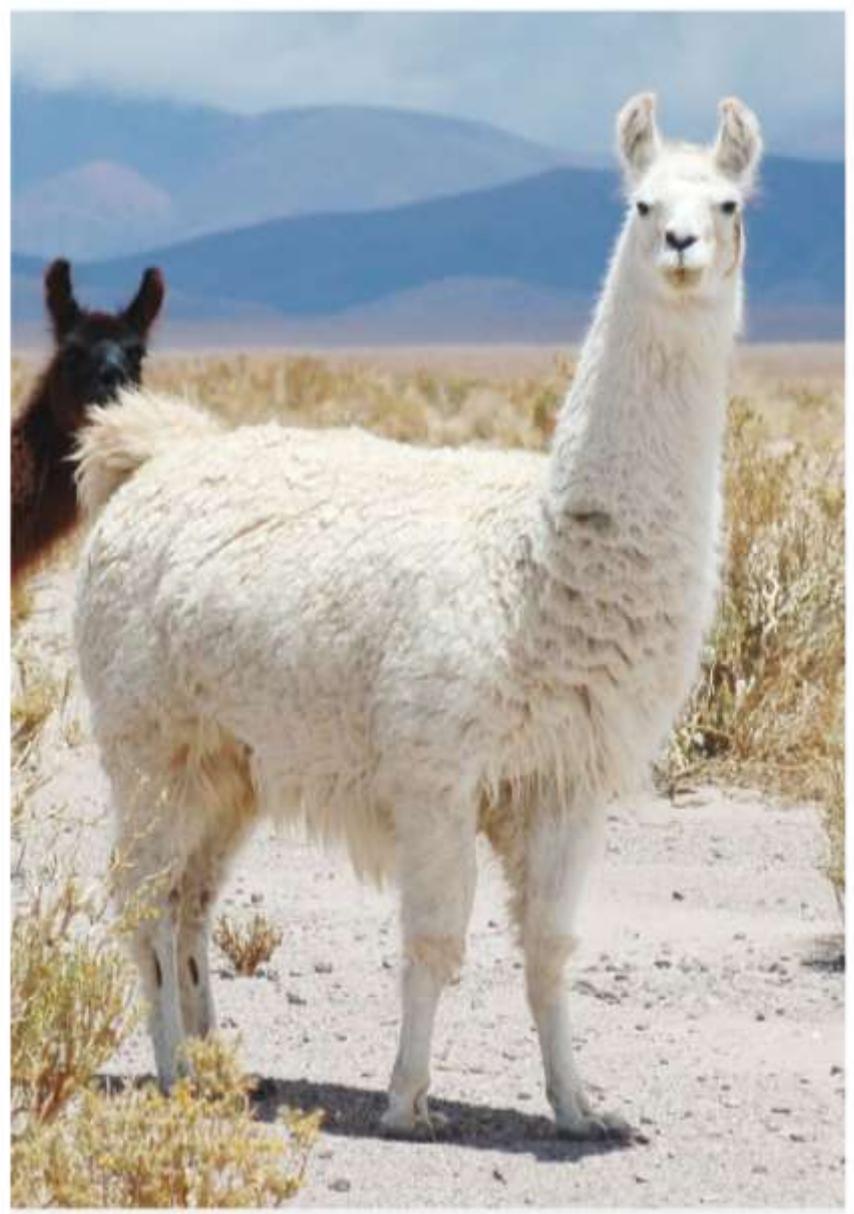


African Rhinoceros

Camel



Llama



EXAMPLES OF BIRDS, REPTILES AND AMPHIBIANS

BIRDS:

- **RATITAE**, the **flightless birds** provide an excellent example of discontinuous distribution.
- **Ostriches** are found in deserts of Africa and Saudi Arabia.
- An allied genus, *Rhea* inhabits the plains of South America.
- **Cassowaries** and **Emus**, another group of flightless birds, are found in dense jungles of New Guinea.
- **Kiwi**, the smallest flightless bird is restricted to New Zealand.

EXAMPLES OF BIRDS, REPTILES AND AMPHIBIANS

- **REPTILES**: Among reptiles **Alligators**, the members of crocodile family occur in South America and China.
- **AMPHIBIANS**: Among the amphibians, more restricted in their local range but also discontinuously distributed is a family of **primitive frogs**, the **Leopelmidae**. One genus of this family is restricted to North-West America and another to New Zealand

LUNG-FISHES - CLASSICAL EXAMPLE OF DISCONTINUITY

- Among fishes, group **Dipnoi**, the so called **lung-fishes**, represents the classical example of discontinuous distribution.
- This group is represented today by only **three** living genera, which are confined to southern landmasses.

LUNG-FISHES - CLASSICAL EXAMPLE OF DISCONTINUITY

- *Protopterus* is found in the marshes and swamps of **Africa**.
- *Lepidosiren* inhabits the same ecological zone in **South America**.
- *Neoceratodus* is found in the rivers of **Queensland, Australia**.
- Fossil history of these three genera reveals that they had a worldwide distribution in **Devonian** period, being represented in India, North America and Africa.

Distribution of Lung-Fishes

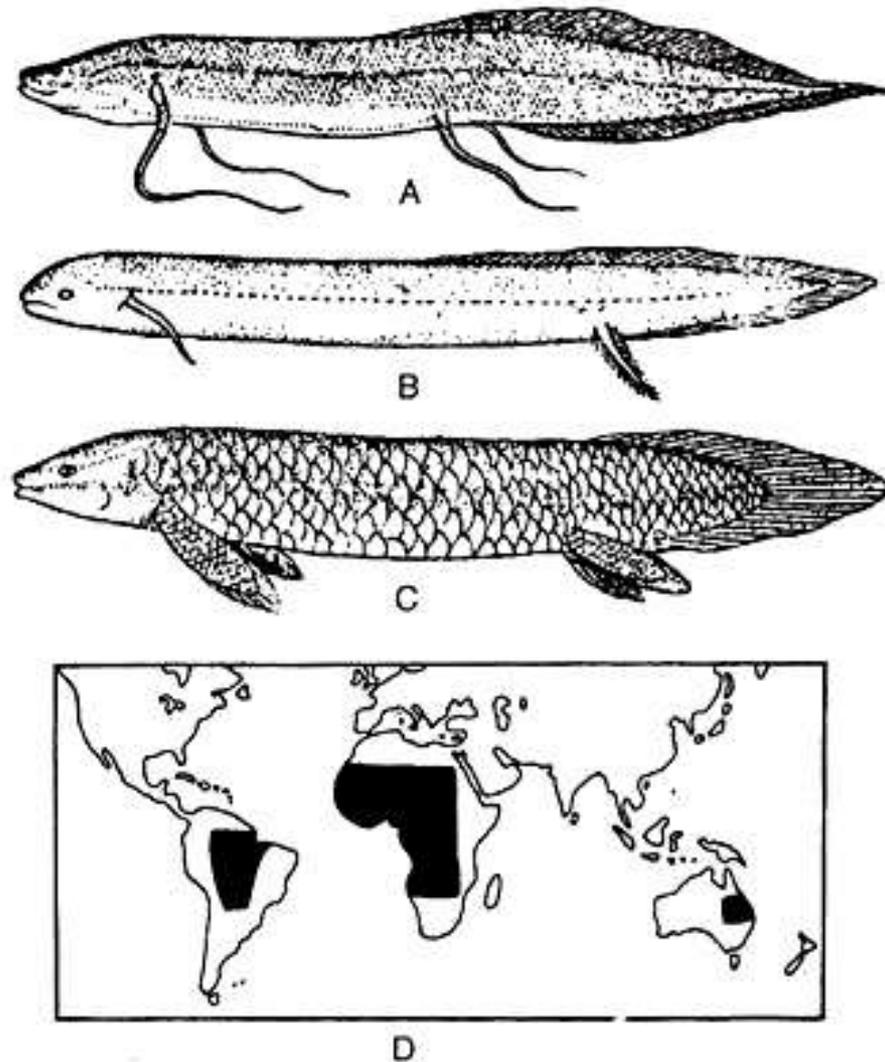


Fig. 1.47 :A. *Protopterus* (African), B. *Lepidosiren* (South American), C. *Neoceratodus* (Australian), D. Black areas of the map showing the distribution of three living lung fishes

INVERTIBRATES SHOWING DISCONTINUOUS DISTRIBUTION

EXAMPLE 1.

- The **earthworms** belonging to the genus *Notodrilus* has a discontinuous distribution.
- It is found in New Zealand, Australia, Southern tip of South America and South Africa.

EXAMPLE 2.

- Another classic example is the strange worm- like **arthropod** called *Peripatus*.
- It is found in tropical Africa, Australia, Indo-Malayan region and New Zealand.

BIPOLAR DISTRIBUTION

- Bipolar distribution is a specific type of discontinuous distribution.
- It is the interrupted distribution of plants and animals, whereby the same species, genus or family lives in the temperate latitudes of northern and southern hemispheres but is absent in the tropics.

EXAMPLES:

Marine invertebrates, e.g., mussels and crabs.

Marine fish, e.g., Basking shark.

Marine mammals, e.g., Whales and dolphins.

Explanation For The Occurrence Of Discontinuous Distribution

- Discontinuous distribution is one of the most interesting and puzzling problems of Bio-geography.
- It can only be explained by considering the nature and distribution of animals in past epochs in relation to the geographical history of ancient seas and landmasses.
- Distribution is a dynamic process and the distribution of animal groups today will not be the same in future
- The species always migrate from their centre of origin and spread to different areas as their predecessors have done in the past.

- The succession of fauna is a complicated phenomenon involving evolution, adaptive radiation, extinction of certain animal groups and their subsequent replacement by dominant groups.
- Fossil record of various groups of animals reveals that these groups had a continuous range in the past but now they exhibit discontinuous distribution. Such discontinuities may be due to extinction of populations in the intermediate areas for one or more of several reasons:

1. Unfavorable ecological conditions such as predation, catastrophic destruction of habitat due to floods, hurricane, typhoons, volcanic activity etc., severe climatic conditions such as glaciations.
2. Competition with highly advanced or aggressive forms.
3. The ability and the opportunity to cross the water barriers and establish separate population centers.
4. The destruction of former land bridge that existed at one time in the geological past between two regions or continents.

BERING LAND BRIDGE

Present day shore line
Bering Land Bridge



- Animals with a discontinuous distribution are generally members of the groups of the ancient animals which had a worldwide distribution in the geological past and, therefore, referred to as “ **Relics of the past** “.
- **Darlington**, the famous Zoo-geographer , has concluded that an animal or group of animals can become discontinuously distributed in three main ways:
 - a. By reaching the oceanic island across the water.
 - b. By the submergence of the land bridge between the range.
 - c. By the extinction of the forms in intermediate areas.

ENDEMIC DISTRIBUTION

- Species which are restricted to a particular continent or a part of it, are called **Endemic** species.
- For example, Giraffe are confined to Africa (South of Sahara desert) only and are found nowhere else in the world.
- Thus family Girraffidae is referred as endemic to Africa.
- 90% of oceanic islands fauna and flora consist of endemic species.