

# Wel-Come to Insect Lovers



- ◆ India is one of the 12 Mega-Biodiversity Centres in the world. It has unique fauna that is relict of Gondawana and also contains Indo-Malayan, Arabic and other elements. There is tremendous diversity and we have only understood part of that!!

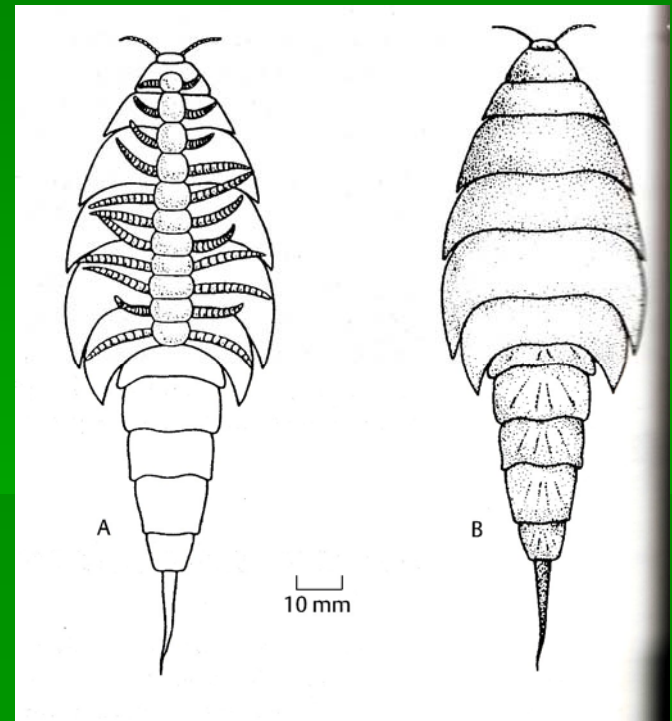
# Biogeographic Zones in India

- Trans-Himalayan
- Himalayan
- Desert (Kutchchh, Ladakh, Thar)
- Semi-arid
- Western Ghats
- Deccan Peninsula
- Gangetic Plains
- NE India (Brahmaputra Valleys)
- Islands (Andaman Nicobar Group, Lakshadweep)
- Coastal Ecosystems

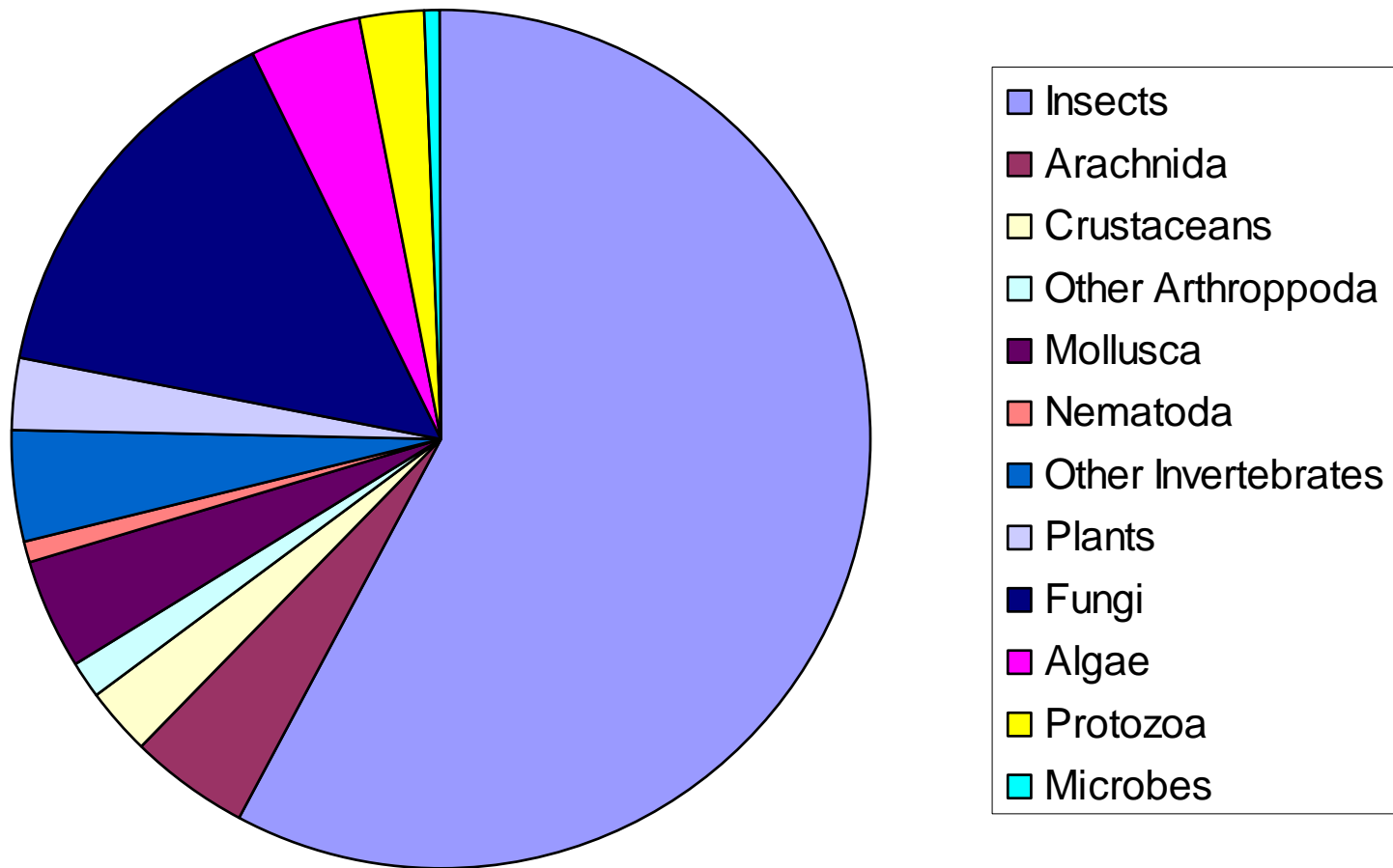


# Insects are Ancient

- More than 300 million years ago such marine forms gave rise to modern arthropods and insects evolved from among these arthropods



# Insects Are Dominant among Visible Forms on Land



# Wonderful World: Insects

- Insects are dominant animals as group with over 3,50,000 species in just one order Coleoptera or Beetles
- There are about 60,000 described species of insects in India. But there are thousands more to be described but there are no active taxonomists for many groups of insects. Even cockroaches, ants, moths, flies, pose serious problem. Beetles are so diverse that each subgroup needs a specialist. Weevils and Cerambycidae, which are serious pests need taxonomists and biologists to control them.





# Moths are Beautiful Animals

- Beautiful moths are abundant in our forested areas. Some are useful some are destructive. Considerable work is done in the past but today there are only a few experts (often restricting themselves to some subfamilies!) who work on this group. For small moths or Microlepidoptera there are no experts at all!!



# Butterflies Are relatives of Moths



# Butterfly life histories should be studied





# Insects: Pests or Beneficial

- Beetles like this tiny staphylinid *Paederus fuscipes* causes serious dermatitis in human. It gives out a peptide that causes inflammation. The number of these beetles increases after monsoon and can cause epidemic. There are mosquitoes, sandflies, and such other that spread serious diseases in plants and animals ...and even humans. At the same time there are many species of insects that are potentially useful and provide medicinally important chemicals. Also do not forget bees and other insect pollinators without whose help our crops will be poor



# Another Blister causing Beetle



# Wood Borers and Click Beetles



- **Buprestidae** and **Elateridae** beetles are often metallic bright. The colors reflect light and are difficult to photograph! At present we have only 4-5 workers on these two groups and a complete revision is necessary. Large number of species need to be described and their biology understood. In some parts of the world these beetles are used as earrings or decorative ornaments.



# More Insects



**Cockroaches: There are some 200 species in India. The group needs careful study and revision**





# Under Her Wings She carries a Brood

## Cockroach that shows parental care



# Polyphaga cockroach female





Beetles: There are over 3,50,000 described species and many unknown!



# Beetles are Everywhere!

- Cassidinae are small beetles, often called Tortoise Beetles. There are some 450 species of these beetles in India. All are leaf eaters and control some weeds. Some are also pests!
- **See color variation in one and the same population**
- Larvae of these beetles often carry waste matter on their backs and are unique in this respect



# More Tortoise beetles





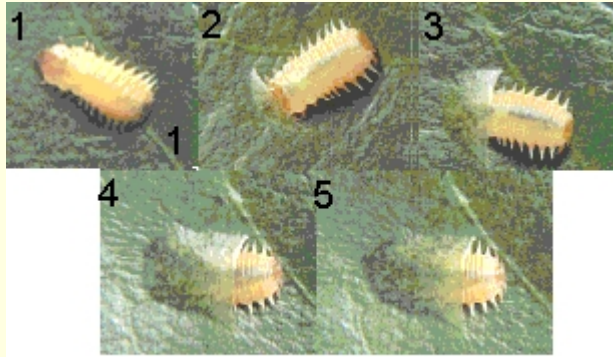
# Host plant and life history

## Conchyloctenia

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# Tortoise beetles



Notosacantha larva: Mining Stages





# Look at The Powerful Legs

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# Even Metallic Coloration Quite Common

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# Bugs are Pests of Agriculture

- Distant wrote 8 volumes on Bugs of India. These volumes are still the best documentation of the bug diversity in India. Often colorful and attractive, even with metallic coloration, bugs catch your attention on all kinds of vegetation. There are some 6,500 species known in India which is about 8% of world fauna. Of these some 1,000 species are endemic!





# Cerambycidae or Longicorns

- Cerambycidae beetles are major destructors of timber ....yet there are no recent keys to identify them. Their biology is poorly known



# More Pests



# Predatory Insects

- Mantodea are predatory insects that control other insect populations. There are some 170 species in India. At present there are only 3 experts working on this group. There are perhaps many species that need to be described. We described 3 in the last 3 years. There are no Indian museums except one where a large collection of mantids is maintained. Identification is problematic because many species are poorly described. Live coloration or photographs of Indian species are badly needed.





# Beautiful World of Mantids



# Mantids control Pest insects



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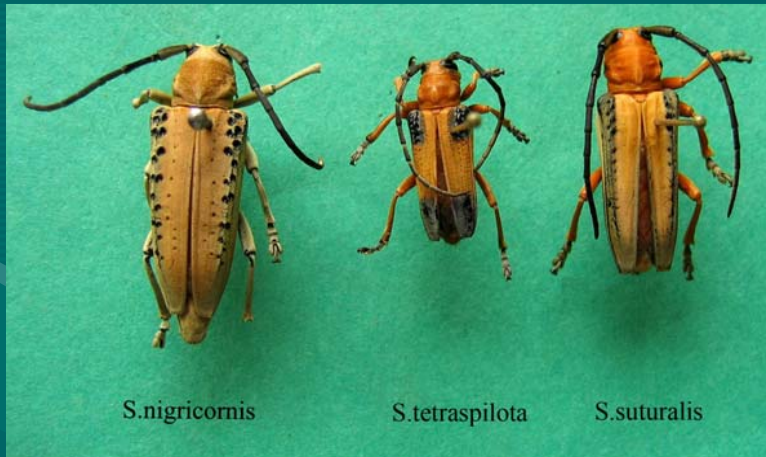


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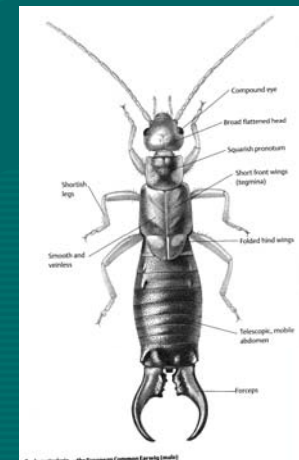
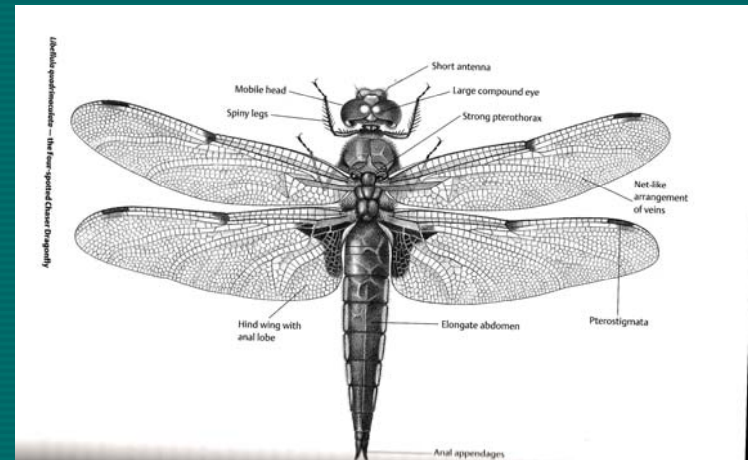
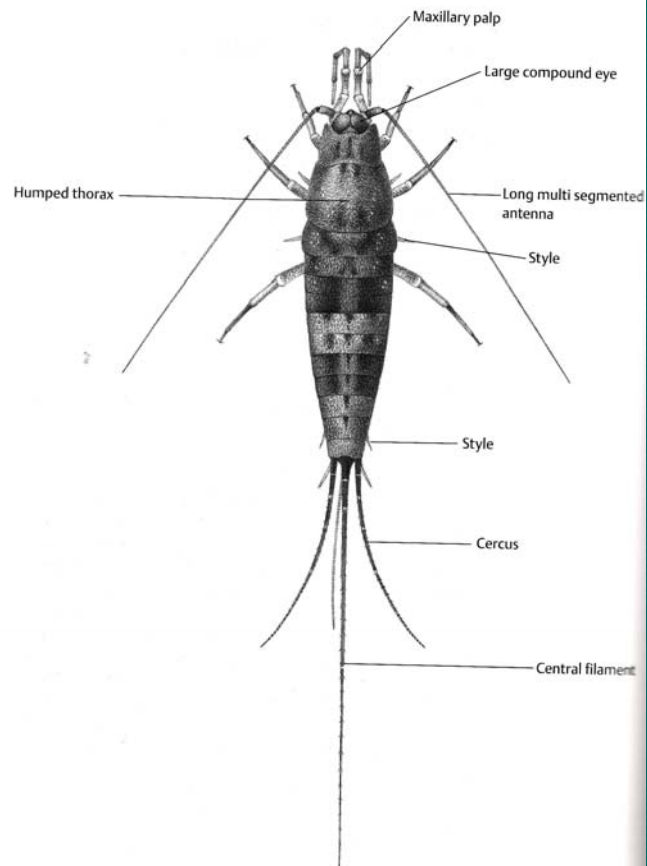
documenting our insect biodiversity.

# Immature stages are also well adapted



# Variety of Forms

62 THE INSECT ORDERS

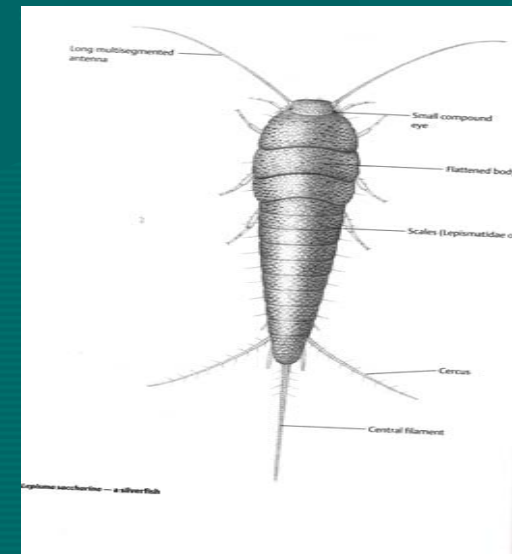
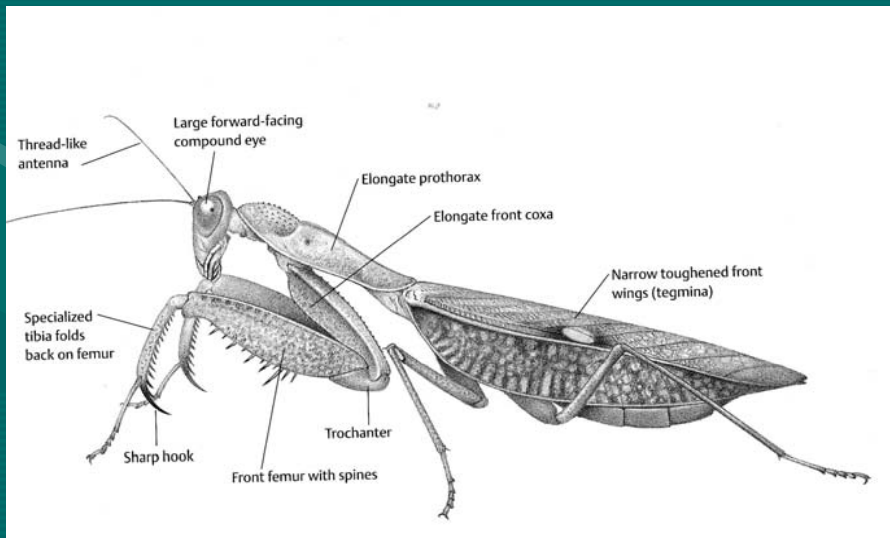
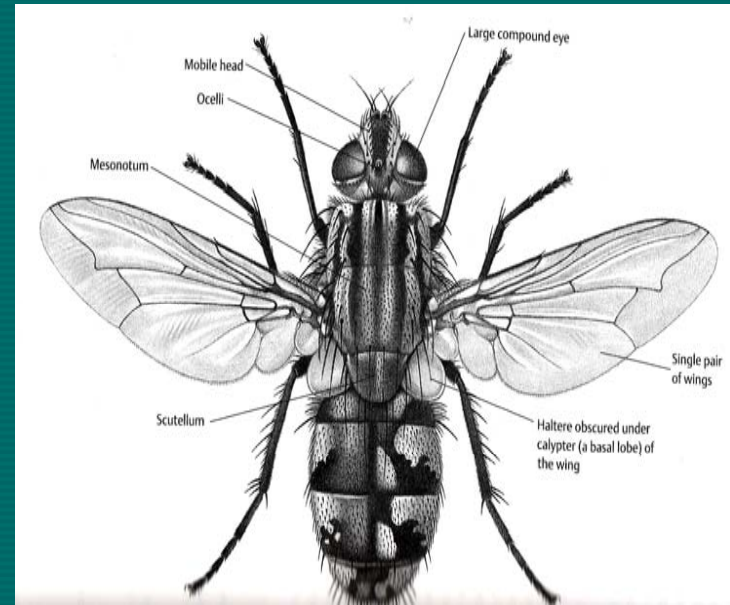
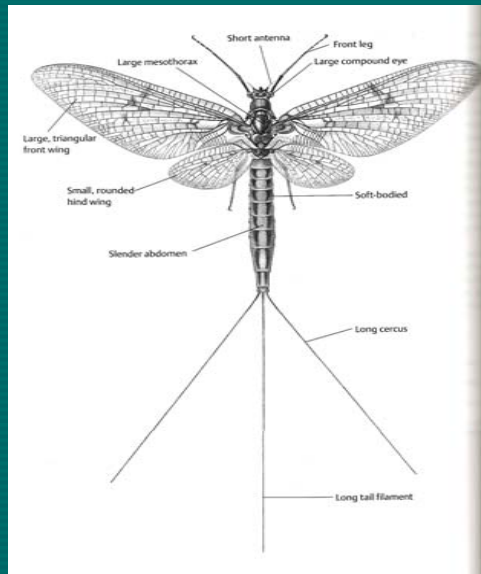




# Variety of Forms



# Insects occupy every habitat



# Leaf Mimic





# Camouflage



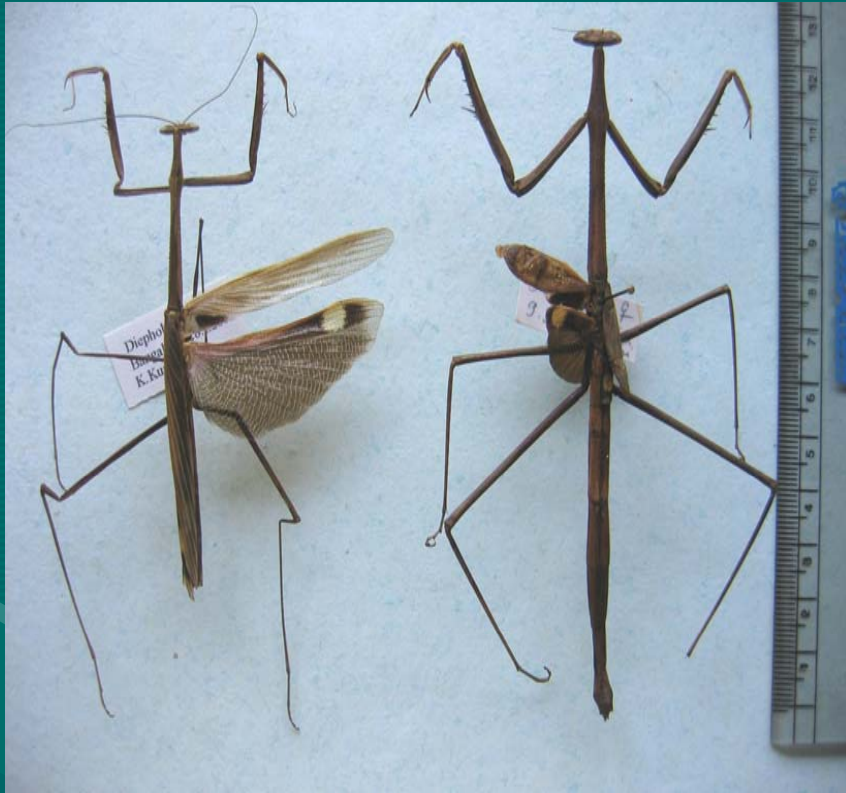
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# Leaflike Butterfly: Oakleaf



# Male Female Variation

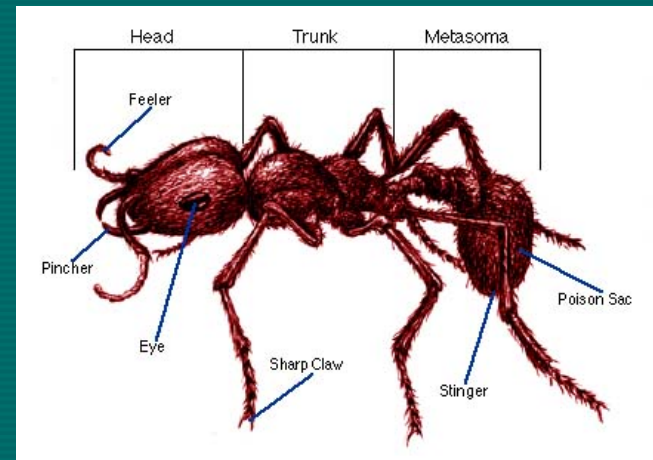




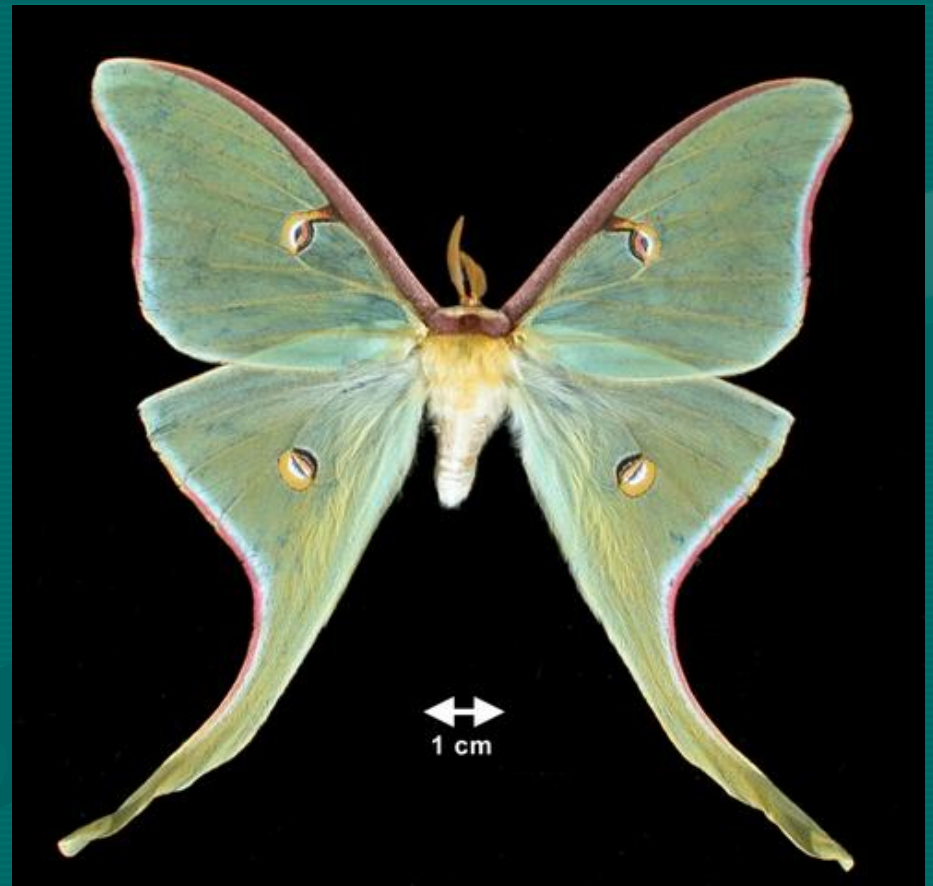
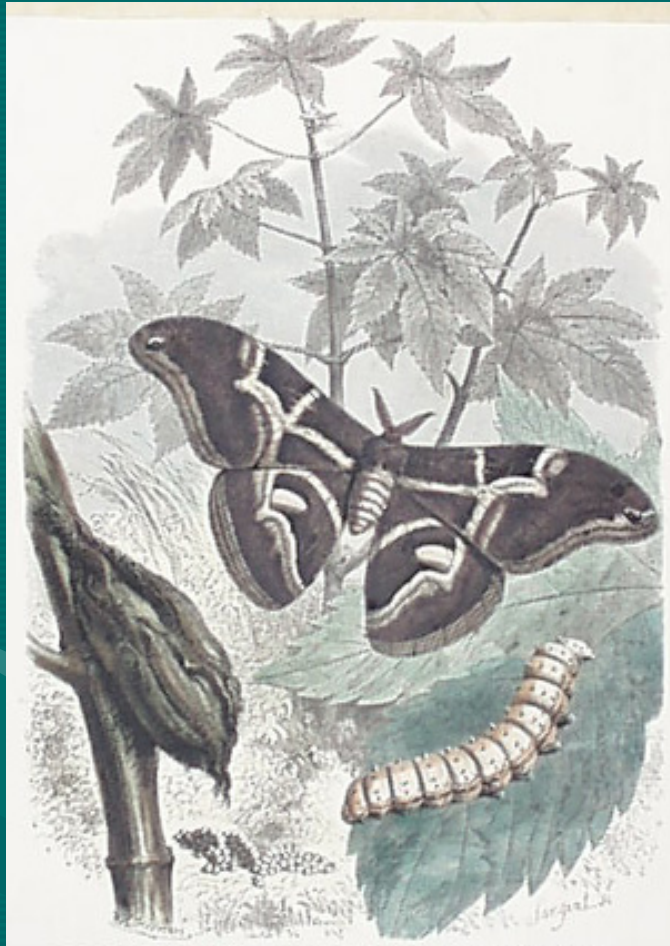


- Male female in some beetles also are very distinct
- The variation may be in coloration, size, length of antennae, etc and in some cases very puzzling, making you think these are different species !!

# Hymenoptera



# Beauty and Silk

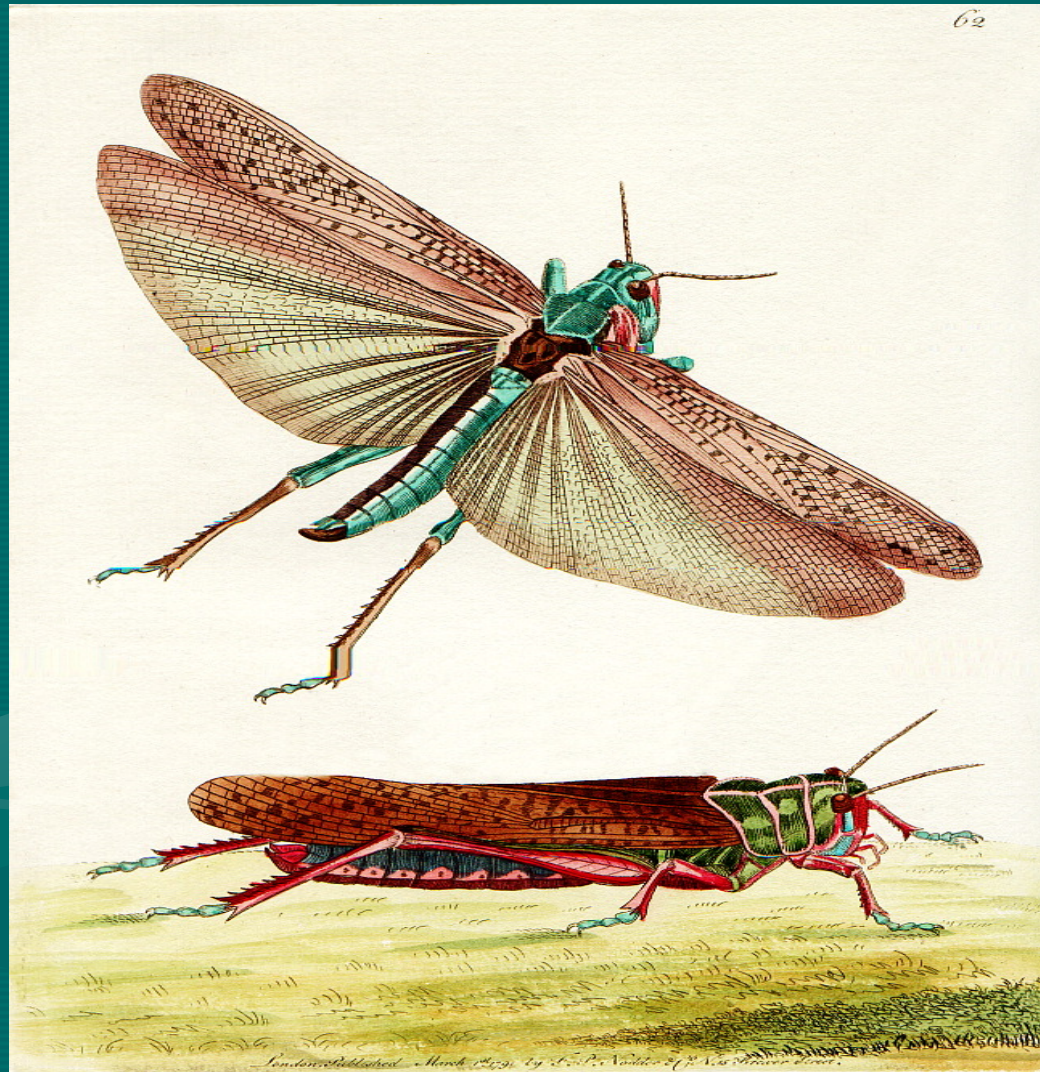




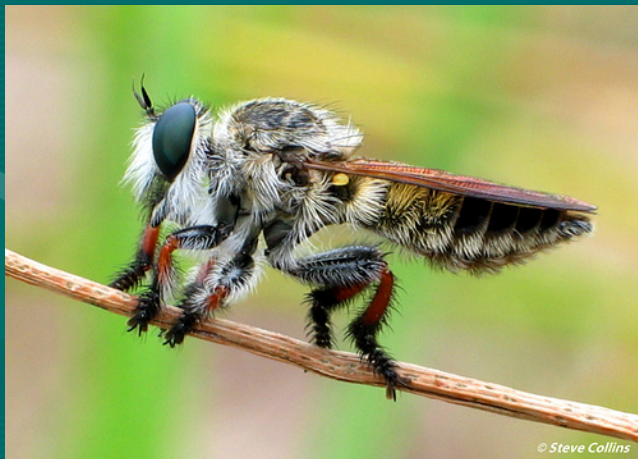
# Termites



# Locusts and Grasshoppers

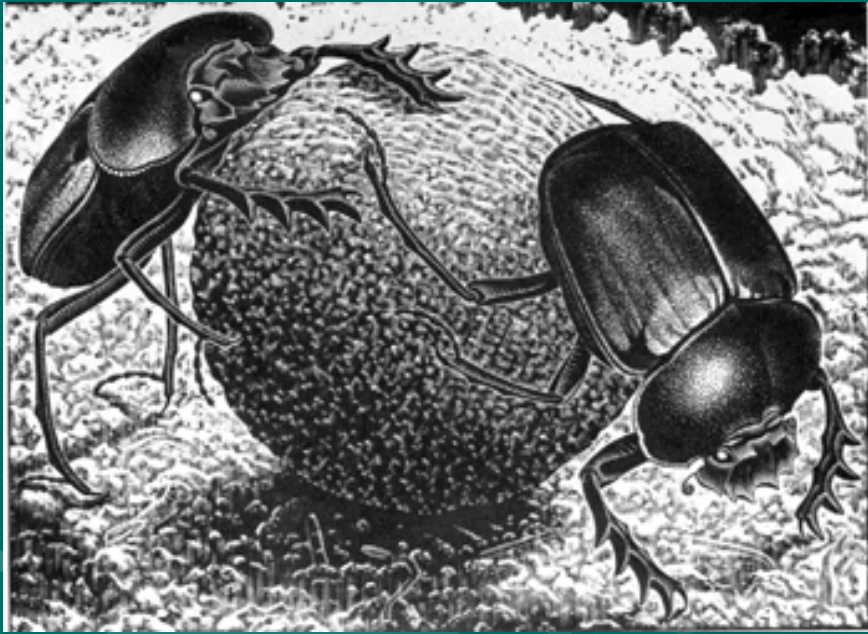


# Common insects





# Dung Beetle and Lucanid Beetle



# Organized Collection





# Storage





# Indian Scenario

- India occupies about 2% of the total landmass of the earth but has 8% of the organisms described so far....even when only about 50% of the land is surveyed exhaustively....many areas are still only partially or never studied....
- Great habitat diversity and faunal movement from Indo-Malayan and Arabic land masses is responsible for this diversity
- Cold deserts, arid lands, evergreen forests, deciduous forests, bamboo thickets, etc.....are home to myriads of animal species unique to India
- Assam and NE India is the “Faunal Gateway of India”
- Western and Eastern Ghats are harboring many animals that are endemic
- Himalayan zones are also having characteristic animals
- Big rivers like Ganga, Brahmaputra have rich faunistic wealth that we have not yet fathomed completely....so is the situation of vast oceanic ecosystems around

# Current Problems



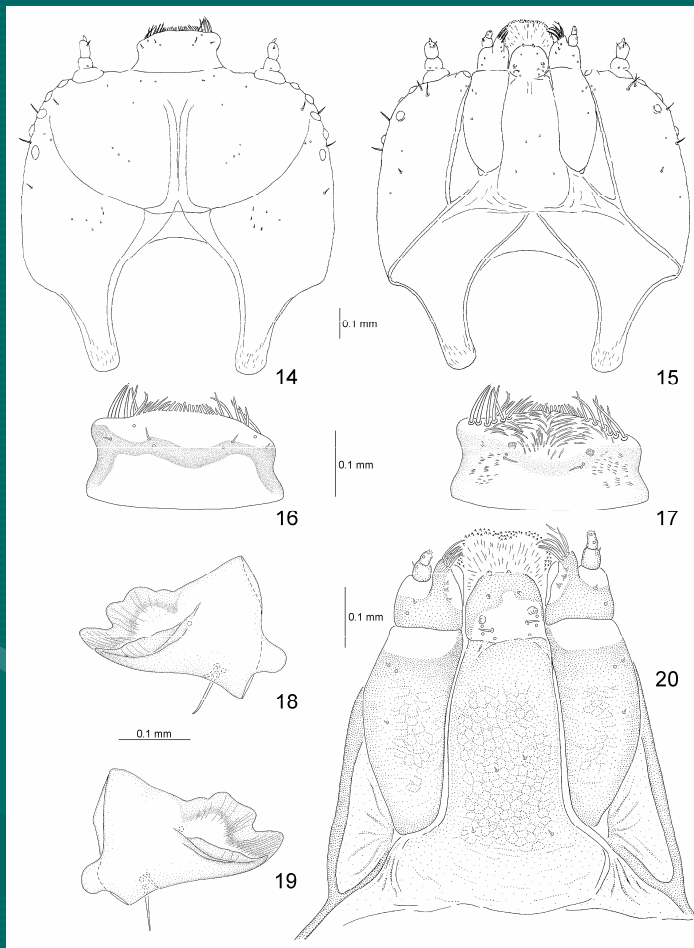
- Lack of trained manpower to document and study biodiversity
- Lack of well established museums to educate people about our biotic wealth
- Lack of good libraries that possess appropriate journals
- Syllabi at college and university level are inadequate to cope with the problem
- Inability of students to participate in survey works due to emphasis on theoretical learning
- Total lack of field work and ecological studies
- Preference for applied courses than basic sciences
- Lack of interest in natural history of animals
- Alpha taxonomy also not completed for many groups and there are no taxonomic keys to identify many important groups, especially of invertebrates
- Phylogeny work pending for most groups because of poor cooperation, facilities and adequate funds

# Problems of Conservation of Biodiversity

- Overexploitation : Fish and other edible animals
- Habitat destruction: pollution, competition for space due to unplanned urbanization and industrialization
- Zoom cultivation and destruction of forests
- Human population explosion and resulting conflict of interests bet animals and humans
- Introduction of exotic plants and animals that harm native animals
- Inadequate protection for our National Parks and Sanctuaries; often with government projects that conflict with the main interest of conservation
- Lack of trained manpower, lack of knowledge of biology for most species making it difficult to conserve them
- Lack of funds to purchase necessary equipment to monitor animals, and even strange laws that prevent scientists from studying the animals
- LACK OF INTEREST!!



# Understanding Biodiversity is Understanding Nature



- Without Taxonomy to shape the Bricks and without Systematics to tell us how to put them together, the House of Biology is a meaningless jumble....

Robert May

# *Thank You*



Studies on Natural History of Organisms is a Challenging and Absorbing Task....we need major efforts in this direction