ORDER – ISOPTERA

iso = equal

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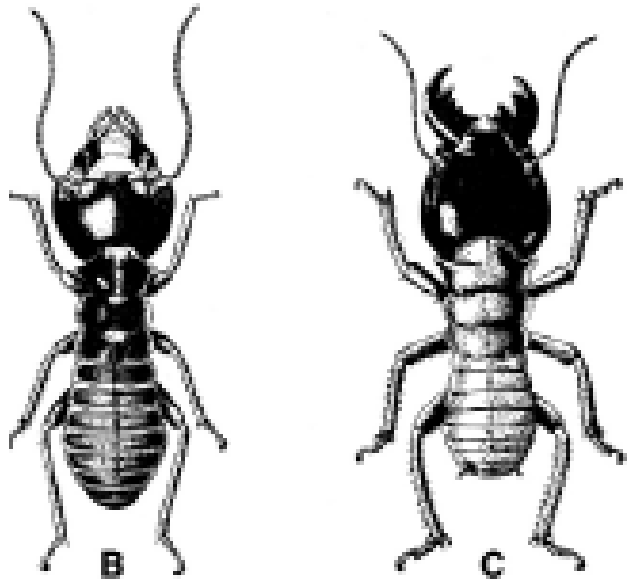
Characteristics

- Medium sized cellulose eating insects
- >2000 species
- Occur world wide from tropical to warm temperate areas
- Live in highly organized and integrated societies
- Morphologically different form – castes
- Each caste perform different duties
- Polymorphic social insects living in colonies - reproductives, soldiers, and workers
- Head with moniliform antennae and mandibulate mouthparts, compound eyes present but frequently degenerate, ocelli often absent
- Wings when present almost identical and membranous, lying horizontally over abdomen at rest, capable of being shed by a basal fracture
- Legs identical and with a large coxa, tarsi almost always four-segmented
- Cerci short and with few segments

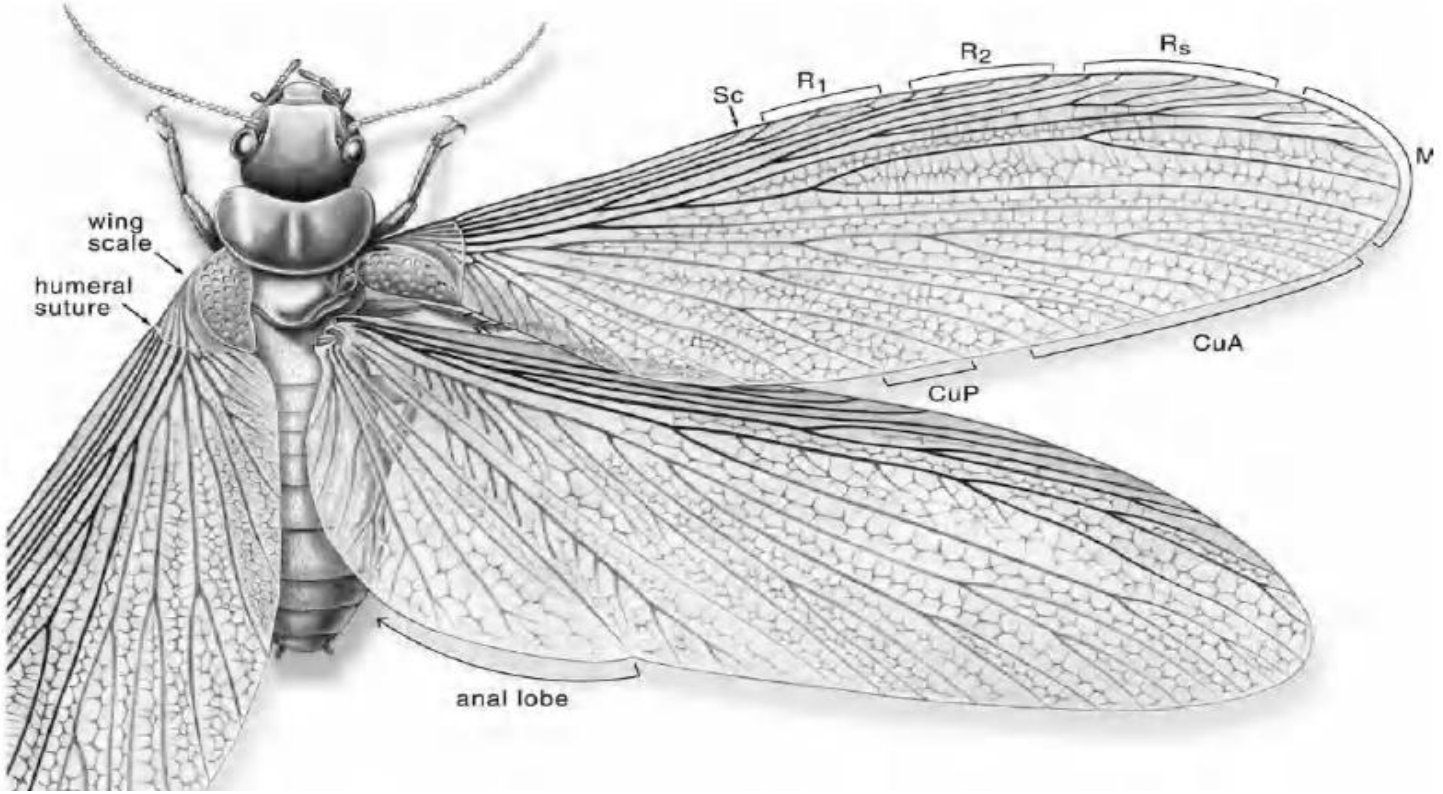
Head

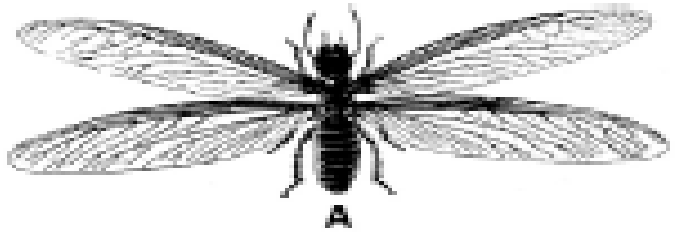
- With moniliform multisegmented antenna
- Mouth parts mandibulate
- Compound eyes present but may be vestigial often
- Ocelli absent



Thorax & Abdomen

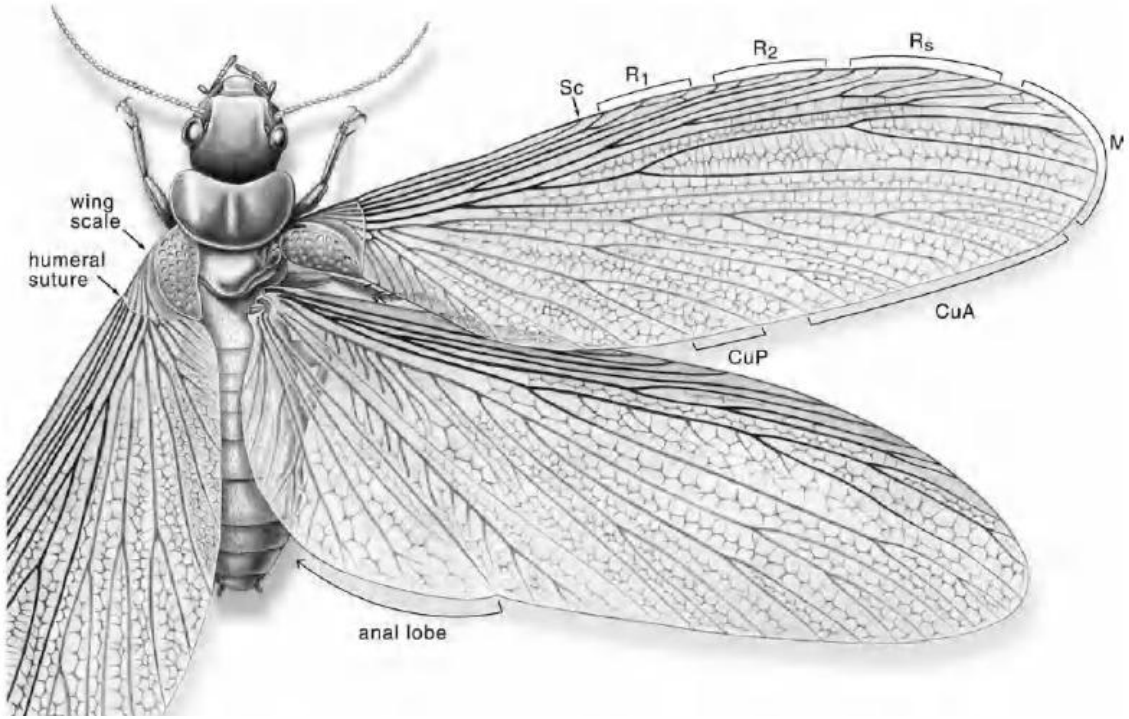
- Wings when present almost identical
- Elongate , membranous & lie horizontal over abdomen at rest
- Capable of being shed at basal or humeral fracture





Thorax & Abdomen contd

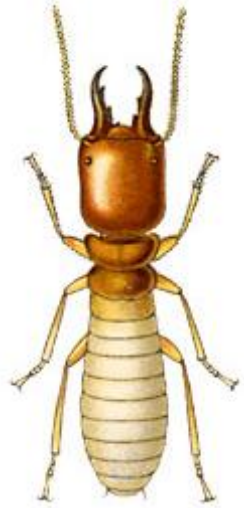
- Anterior veins highly sclerotized, regular cross veins wanting
- Legs identical with large coxa
- Tarsi always 4 segmented
- Ceri short
- External genitalia absent or wanting



Castes in Termites

- Polymorphic
- Live together in large communities
- Mature colony consists of individuals of different form and function
- Each group known as caste perform same function
- Three castes

- Reproductives – 1.Primary and
  2.Secondary



- Soldier – Sterile adults of both sexes
- Worker - Sterile adults of both sexes

Primary reproductives

- Well sclerotized, often dark coloured
- King and queen
- Physogastric queen – abdomen enormously swollen and pale coloured

Primary reproductives contd.

- Head round or oval with well developed compound eyes
- Fontanelle often open between compound eyes or behind compound eyes
- Prothorax distinct, two pair of wings very similar, anterior veins sclerotized
- Both wing have basal or humeral suture, shed after swarm
- Abdomen with 10 distinct segments. External genitalia absent
- Adapted for short aerial life, pair and form new colony

Secondary or primary or replacement reproductives

- Called neotenics
- Body less sclerotized, straw or grayish white coloured
- Have wing buds or no wings
- Normally found in colonies headed by original primary reproductives
- If king or queen (primary reproductives)die replace them
- Have no aerial life

Sterile caste - Soldier

- Apterous
- Sexual organs not developed or atrophied, sexually non functional
- With large well sclerotized head, in some spp exceed the size of body
- May be either sex
- Mandibles large and suited for biting
- Two types of soldier – Mandibulate (with powerful mandibles) and Nasute
- Nasuate – frons enlarged to form pointed rostrum, frontal gland opening at tip
- Defence

Workers

- Apterous
- Sexual organs not developed or atrophied, sexually non functional, may be male or female
- Pale coloured and weakly sclerotized
- Head directed downwards
- Compound eyes reduced are absent
- Have powerful mandibles
- Polymorphic
- Care eggs & young ones, feed & tend queen, forage for food, nest building

Internal anatomy

- Generalized
- Hind gut with large pouch – protozoan & bacterial symbionts
- Physogastric female – several thousand ovaries

Life history and habits

Colony formation – three methods

- ✓ Swarming – Nuptial chamber, Royal pair
- ✓ Budding – Group of individuals get isolated – neotenics differentiate
- ✓ Many individuals including royal pair move to new location. Original colony headed by neotenics
- ➢ Sterile castes live up to 2 – 4 years
- ➢ Reproductive castes may live up to15 – 50 years

Nests of termites

- Wide range form and complexity
- Primitive forms – Kalotermitidae in wood by making tunnels
- Some other lower forms - subterranean
- Hodotermitidae - completely subterranean nests
- Rhinotermitidae – entirely in soil or in wood or in both
- Many Termitidae construct epigeous nest – Termitaria. considerable portion of the nest subterranean
- Some species live under ground without constructing termitaria or only forming small mound like structures
- All families except Termitidae harbor protozoan
- Termitidae – anaerobic bacteria
- In subfamily Macrotermitinae – also cultures Basidiomycetes fungus *Termitomyces* in special "fungus garden" in the nest
- Fungus grow on sheet of reddish brown comb
- Primary role of fungus is lignin digestion in the comb

***Termitomyces* Fungal comb**

Exchange of food

- Only workers able to feed themselves
- Other castes and young ones must be fed
- Exchange of food material (trophallaxis) two types
  - Mouth to mouth transfer – stomodeal
  - Anus to mouth transfer – proctodeal
- Stomodeal food – semisolid regurgitated content of crop or saliva
- Proctodeal food – liquid containing protozoan, product of digestion and undigested food

Classification - Families

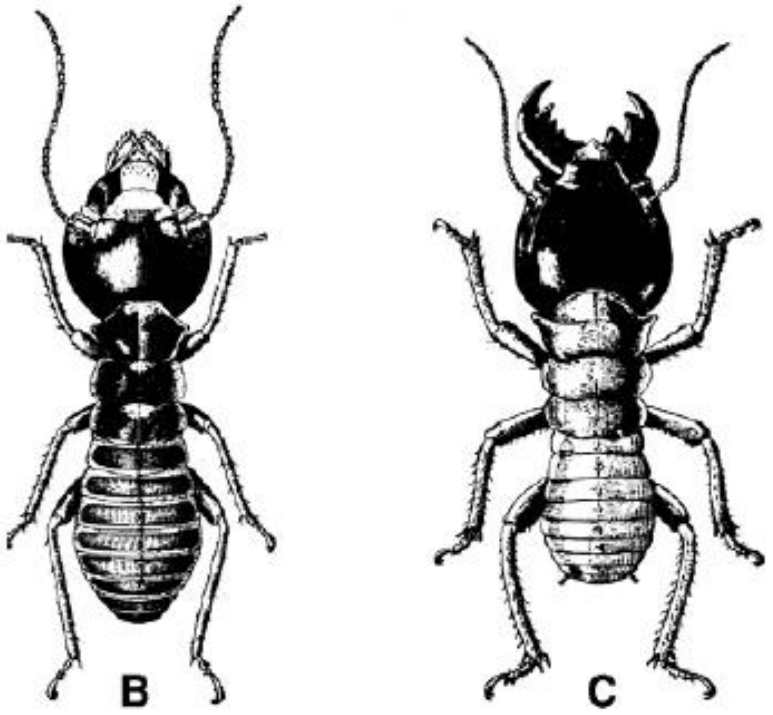
1. Mastotermitidae
2. Hodotermitidae
3. Termopsidae
4. Kalotermitidae
5. Rhinotermitidae
6. Serritermitidae
7. Termitidae

1. Mastotermitidae

- Single living sp *Mastotermes darwiniensis*
- Tropical areas Northern Australia

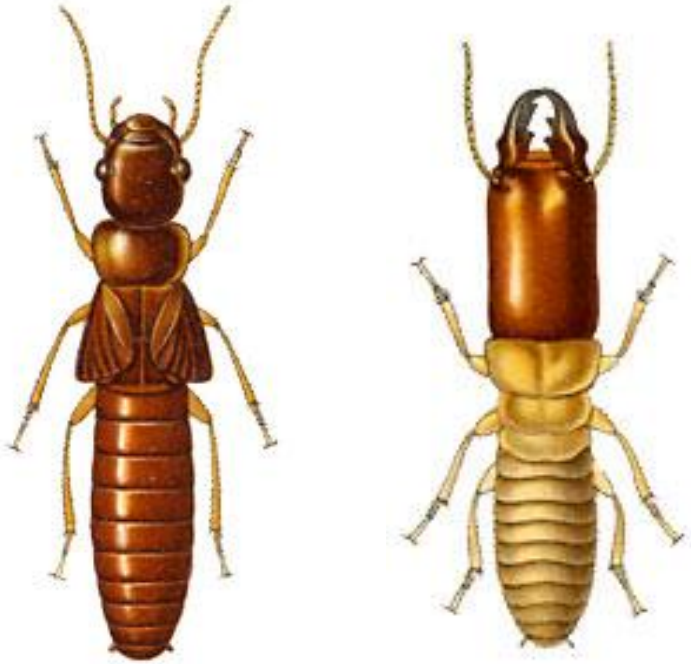
2. Hodotermitidae

- Pronotum saddle shaped
- Harvester termite



3.Kalotermitidae

- Dry wood termites
- Pronotum flat



4. Rhinotermitidae

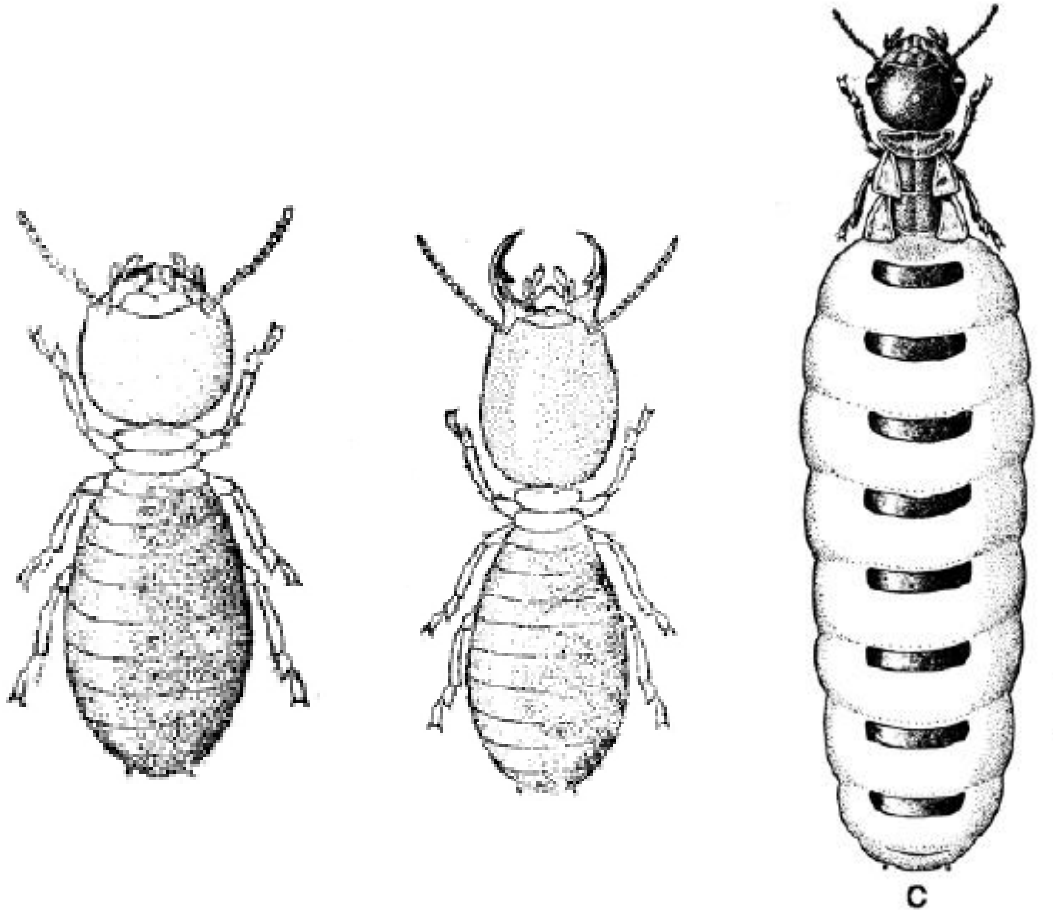
- Pronotum with out anterior lobe

5.Serritermitidae

- *Serritermes serrifer* from Brazil
- Smallest termite

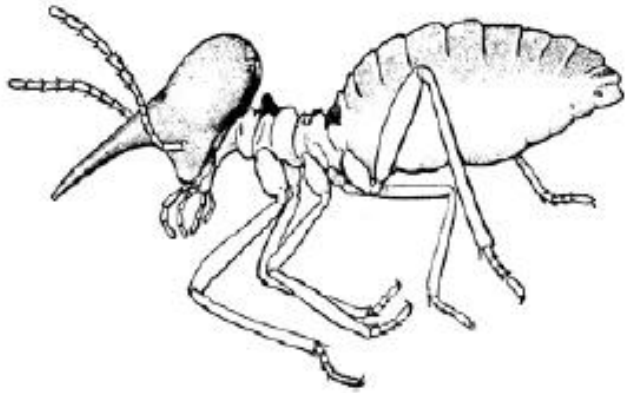
6. Termitidae

Pronotum of workers and soldiers narrow with median anterior lobe



Subfamilies of Termitidae

1. Termitinae – Largest subfamily
2. Apicotermitinae – Entirely African
3. Macrotermitinae – Fungus growing termite
4. Nasutitermitnae – Second largest

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Economic importance

- Destroy wooden structures in the buildings, furniture, books, utility poles, fence poles, fabrics etc

- Beneficial – degradation dead trees and plant products, food