Compound eyes

- In cockroach a pair of compound eyes are present on the dorsolateral sides of head.
- They arc kidney or bean shaped structures.
- Each compound eye consists of 2000 ommatidia.
- Ommatidia are structural and **functional units** or visual units in the compound eye.
- Cornea is the outermost layer and allows light rays.
- It is a transparent layer which acts as a biconvex lens.
- Cornea is shed during Ecdysis of Nymph.
- Cornea is secreted by **two corneagen cells** or lenticular cells present beneath the cornea
- **Crystalline cone** is a triangular cone like structure present beneath the corncagen cells.
- Crystalline cone is surrounded by **four cone cells (4) vitrellae.**
- **In the ommatidium, crystalline cone and vitrellae together form the** focusing region or dioptrical region.
- The pigment sheath present around vitrellae is called **iris pigment** sheath.
- Rhabdome is surrounded by seven retinulae or Retinular cells. They act as Photoreceptors.
- Each retinular cell bears a nerve fibril at the inner side and the cells are rest upon basement membrane.
- In the ommatidium rhabdom and retinulae together form the **receptor or photoreceptor region. Where images of objects are formed.**
- The pigment sheath present around the retinulae is called **retinular pigment sheath.**
- **Working of compound eye or formation of images**
- Diurnal insects form **apposition image** or mosaic vision by ommalidia.
- Noctural insects forms **superposition image.**

Apposition image

1. These images arc formed in **diurnal insects** like houscflies in which the retinulae lie immediately below the vitrellae and crystalline cone.
2. They are surrounded by a dark pigmented sheath called retinal sheath, which absorbs light rays and prevent them from passing to the adjoining ommatidium.
3. Crystalline cone is surrounded by iris sheath. Therefore, only light rays entering the cornea of ommatidium converge on the rhabdome.
4. Thus, a small separate image of a part of the object is formed in each ommatidium.
5. The total image formed in the compound eye is a **mosaic** of several small images.

Such an image is called **apposition image** because it is formed by the juxtaposition of small discrete images formed in each of the ommatidia. This type of vision is called mosaic vision.

2. **Superposition images**

The images are formed in **nocturnal insects** like cockroach in which the retinulae are present deep below the vitrellae and crystalline cone.

Retinal sheath is absent. Therefore, the rhabdome and retinulae of an ommatidium receive not only light rays that enter through its own cornea but also light rays that enter through the corneas of the adjoining ommatidia.

This results in the overlapping of images. The image formed by overlapping of images is called **superposition image.** It is a blurred image.