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<b>Topic</b>	-	<b><u>Phylum – Arthropoda; General Characteristics</u></b> <b><u>and compound eye structure</u></b>

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**For**

Undergraduate Students (B.Sc. Zoology)

**Prepared by**

**DR. BRAJ KISHOR GUPTA**

Assistant Professor,

Department of Zoology

Indira Gandhi Govt. PG College, Bangarmau, Unnao.

(CSJM University, Kanpur, UP)

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## **PHYLUM - ARTHROPODA**

Arthropoda is the largest phylum with about nine lakh species. They may be aquatic, terrestrial or even parasitic. They have jointed appendages and a chitinous exoskeleton.



An *arthropod* is an invertebrate animal having an exoskeleton, a segmented body, and paired jointed appendages. Arthropods form the phylum Euarthropoda, which includes insects, arachnids, myriapods, and crustaceans.

### **General Characteristics**

The Arthropoda characteristics are mentioned below:

1. The body is triploblastic, segmented, and bilaterally symmetrical.
2. They exhibit organ system level of organization.
3. The body is divided into head, thorax, and abdomen.
4. Their body has jointed appendages which help in locomotion.
5. The coelomic cavity is filled with blood.
6. They have an open circulatory system.
7. The head bears a pair of compound eyes.
8. The exoskeleton is made of chitin.

9. The terrestrial Arthropods excrete through Malpighian tubules while the aquatic ones excrete through green glands or coxal glands.
10. They are unisexual and fertilization is either external or internal.
11. They have a well-developed digestive system.
12. They respire through the general body surface or trachea.
13. They contain sensory organs like hairs, antennae, simple and compound eyes, auditory organs, and statocysts.



### **Compound Eye: Structure and function**

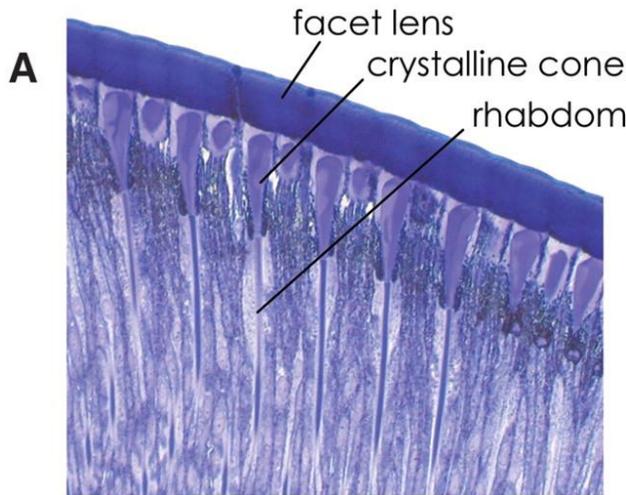
- A compound eye is a visual organ found in arthropods such as insects and crustaceans. It may consist of thousands of ommatidia, which are tiny independent photoreception units that consist of a cornea, lens, and photoreceptor cells which distinguish brightness and color.
- Compound eyes are typically classified as either apposition eyes, which form multiple inverted images, or superposition eyes, which form a single erect image

➤ **Apposition eyes**

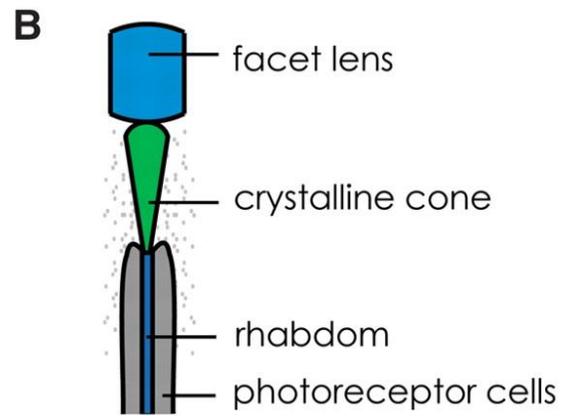
Apposition eyes can be divided into two groups. The typical apposition eye has a lens focusing light from one direction on the rhabdom, while light from other directions is absorbed by the dark wall of the ommatidium.

➤ **Superposition eyes**

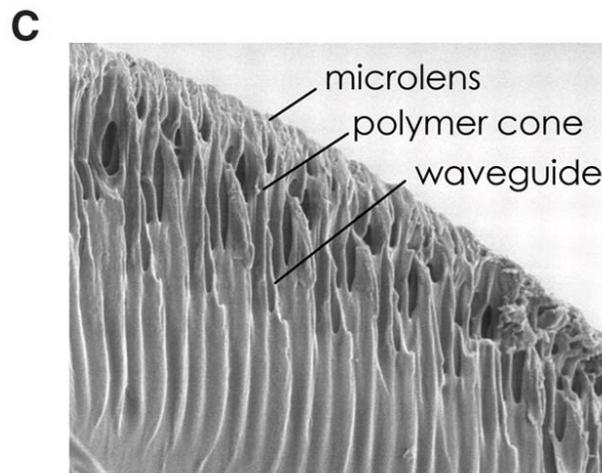
The second type is named the superposition eye. The superposition eye is divided into three types; the refracting, the reflecting and the parabolic superposition eye.



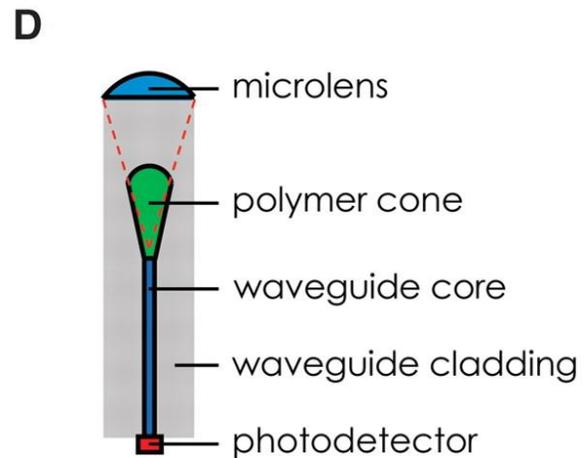
**natural compound eye**



**natural ommatidium**



**artificial compound eye**



**artificial ommatidium**

## **Function of Compound Eye in Arthropods**

The **compound eye** is the main visual organ of arthropods such as **insects and crustaceans**. It is made up of many small visual units called **ommatidia**. Compound eyes enable arthropods to detect light, movement, color, and direction efficiently, ensuring survival in diverse environments.

### **Functions:**

**1. Image Formation:**

Compound eyes form a **mosaic image**, allowing arthropods to see the shape, movement, and position of objects.

**2. Detection of Movement:**

They are highly sensitive to **movement**, which helps arthropods escape predators and capture prey.

**3. Wide Field of Vision:**

Compound eyes provide a **very wide angle of vision**, often nearly 360°, useful for environmental awareness.

**4. Light and Color Perception:**

They can detect **light intensity** and, in many insects, **colors**, including ultraviolet light.

**5. Orientation and Navigation:**

Help in **navigation, flight control, and orientation**, especially in flying insects.

**6. Polarized Light Detection (in some species):**

Assists in **navigation using sunlight**, particularly in bees and ants.

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