

## Description of Obelia:

Obelia belongs to the animal kingdom within the hydrozoa class and has many species. It outlines how the obelia is classified in biology:

- Kingdom - Animalia (animals)
- Phylum - Cnidaria (sea anemones, corals, jellyfishes, and other relatives)
- Class - Hydrozoa (characterized by bodies that are radially symmetrical)
- Order - Leptothecata (Hydrozoans whose hydranths are covered with gonophores)
- Family - Campanulariidae (stinging celled animals composed totally of hydrozooids)
- Genus Obelia

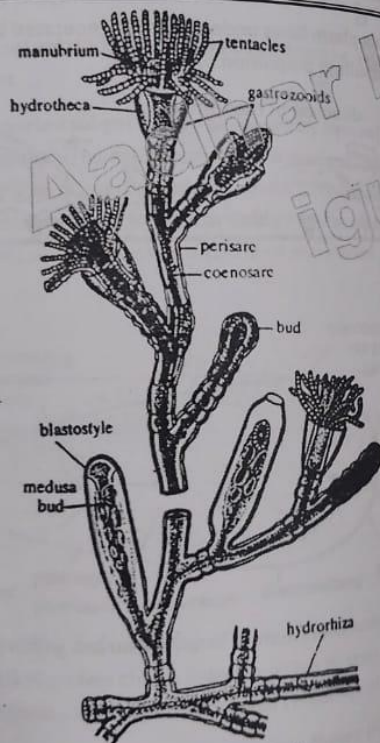


Fig. Obelia geniculata

- **Common Species** - Obelia bidentata (double toothed hydroid), Obelia castanea (sea thread hydroid), Obelia fimbriata, Obelia geniculata (knotted thread hydroid), Obelia logic yatha, Obelia longissima (Sessile hydroid).
- **Geographical distribution** - widely distributed from the arctic region down to the Pacific coast. Also, from southern California to Oregon.
- **Sense organ** - Statocyst

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Obelia is a branched, fixed colony. Some of the horizontal branches anchoring the colony are Hydrothiza while other branches are vertical and known as Hydrocaulus. Each branch consists of a granular coenosarc made of two cell layers enclosing a central cavity. The vertical branches towards the base are further branched and all the branches are of three types:

- Polyps or gastro zooids (vegetative zooids).** Barrel-shaped and responsible for feeding the colony. The perisarc enclosing the polyp is termed hydrotheca.
- Blastostyles, or gonozooids.** Club-shaped zooids, bearing the medusae buds.
- Medusae buds.** Umbrella-like reproductive zooids bearing gonads, enclosed in a protective sheath. Medusae buds are unisexual and free-living at maturity. One medusa bears either four or five radial canals.

In all cases, the tentacles are solid; the solid core or endoderm surrounded by a layer of ectoderm. The larvae are ciliated and free-swimming. The repeated branching of the simple polyps colony is formed.

### Polyps or Gastro zooids or Nutritive Zooids:

The polyp is barrel-shaped, partially enclosed in a barrel-shaped hydrotheca, a continuation of the perisarc.

At the distal end, a conical projection, the manubrium, bearing a mouth is present.

A set of about twenty-four tentacles are arranged around the hypostome. The tentacles are supported by a core of endoderm cells and are lined by a layer of ectodermal cells.

The tentacles and the hypostome bear the mouth. At the proximal end, the zooid is continuous with the coenosarc.



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(artiki, ranges from July to November, for  
 , and Jethwi, from February to July.  
 brood sticks are tied adjacent to the growing  
 hoots takes place. Within a week or two the

host plants by scraping. The raw lac thus ob-  
 tained is washed with mild alkaline water and dried.  
 This is called **rain lac** or **Chowrie**, which is further refined  
 into thin sheets which are subsequently broken

into the form of circular discs called **button lac**.  
 This is **de-waxed, decolorized lac** can be obtained

and is bleached with sodium hypochlorite to  
 produce medicinal tablets, confectioneries etc.  
 The world, producing approximately 18,000  
 tons, is exported to various countries. The USA, Germany  
 and Japan are the major buyers of the world.

It has the following uses:  
 • In the cosmetics and toiletries industry; varnish and  
 paint industry; leather industry; adhesive and  
 miscellaneous applications.  
 • In the skin cosmetic and dye for wool and silk.  
 • The use of lac for dye has been supplanted by synthetic  
 dyes to fight obesity.  
 • In the industry and textile industry.  
 • In the production of polishes etc. It is used in electric insulating  
 materials, pictures and fossils.  
 • In the production of caps, bottle sealers, lipsticks, enamels

and tunnels through the lac enclosure  
 and adults after emerging lay the eggs

2. *Hokocera pulvrea*. The damage by the brownish larva is similar to the above species. Pupa is slightly bigger and yellowish-brown.

**Parasites:**

- The following insects are parasitic on lac insect.
- *Paraecthrodryinus clavicornis*; *Erencyrtus dewitzi*; *Tachardiaephagus tachardiae*; *Eupelmus tachardiae*; *Tetrasticus purpurens*.
- The above natural enemies can be controlled by maintaining healthy cultures and by enclosing the brood lac sticks in wire mesh before inoculation so that natural enemies are not able to emerge and cause re-infestation.

**The Honey Bee: apiculture**

- Honey bees are colonial insects that visit flowers, collect nectar and convert it into a golden-yellow aromatic viscous fluid called **honey**, which is also called the liquid gold of nature.
- There is nothing comparable to honey, whether natural or manmade.
- It is a complete food made and stored by honeybees for the whole colony.
- Honey contains about 80% sugars, mainly glucose and fructose.
- Harmful sucrose is only 1-2% in honey.
- In addition, honey contains all essential vitamins, minerals and proteins.
- It has antiseptic properties, is a good blood-purifier, removes gastric problems and corrects metabolic imbalances in the body.
- It gives instant energy to sportspersons.
- A bee colony has about 20,000 workers, one queen and about two dozen drones.
- Queen can lay up to 3000 eggs per day, which is twice the weight of her body but normal fecundity is about 600 eggs per day.
- Queen can produce male or female offsprings by choice; unfertilized eggs develop into males and fertilized ones into females.
- Growing larvae can also be developed into queens or workers by choice, both of which are genetically females. Males are called drones, which are darker, robust and hairy and larger than workers.
- There are about two dozen of them in a hive and chase the queen in air every time she ventures on nuptial flight.
- One of them manages to mate with her during such flight and dies in the process. Drones are not tolerated in the hive once the queen is fertilized and are generally driven out of hive, where they eventually die of starvation.
- A worker has a lifespan of 6 weeks, the first half of which is spent in the hive attending to household chores, secreting wax and building hive, producing a highly nutritious royal-jelly and converting nectar into honey.



Cephalopoda	Squids and octopuses
Arthropoda (jointed limbs, hard exoskeleton)	Water fleas, Sacculina, Barnacles, Shrimps, Woodlice, Prawns, Crayfish, Lobsters, Crabs
Crustacea	Centipedes and millipedes
Myriapoda	Eurypterids (fossils), horseshoe crab (Limulus), scorpions, mites, ticks, spiders.
Arachnida	Cockroach, lucist, aphids, lice, mosquitoes, flies, fleas, bees, bug (e.g. rhodnius), butterfly and moths
Insecta	starfish, brittle stars, sea urchins, sea cucumbers, sea lilies.
Echinodermata (Spiny-skinned, pentaradiate)	sea squirts, acorn worms, amphioxus
Chordata (possess notochord at some stage in life history)	Lampreys and hagfishes
Protochordata (invertebrate chordates)	Elasmobranchs (Modern cartilaginous fish) e.g. dogfish, rays, sharks, teleosts (modern bony fishes) e.g. cod.
Vertebrata (notochord replaced by vertebral column)	Newts, salamanders, frogs, toads
Cyclostomata (jawless fishes)	Dinosaurs, lizards, crocodiles, turtle snakes
Pisces (true fishes)	Pigeons, gulls, kiwi, ostrich etc.
Amphibia	
Reptilia	
Aves (birds)	
Mammalia	
Monotremes (egg-laying)	duck-billed platypus, spiny anteater
Marsupials (pouch mammals with rudimentary non-allantoic placenta)	opossums, tasmalian wolf (thylacinus), koala bear, kangaroos
Eutherians (have true placenta)	the many group include the rodents great cats, and primates (e.g. baboons, chimpanzee, man)

**Taxonomical Aids**

Very useful for us to make a study on diverse organisms and learn about them. We can exploit this knowledge of various species of plants, animals and other organisms. It is thus necessary to make accurate studies about them. This accurate classification demands rigorous hard work. The first step is the collecting of specimens.

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er 3. Neogastropoda (Stenoglossa)

Shell with a short to a very long siphonal canal.

Radula consists of rows with 2 or 3 teeth in each row.

Nervous system concentrated.

Operculum is large.

Free-swimming veliger suppressed.

Examples: *Murex*, *Nassarius*, *Oliva*, *Magilus*, *Buccinum*.

Class 2. Opisthobranchia

Exclusively marine gastropods.

Shell small without operculum or no shell.

Shell when present covered with mantle or pedal cord.

Body mass torted or detorted.

Gills posterior to the heart.

Heart with one auricle posterior to the ventricle.

One kidney, one gonad.

The nervous system concentrated due to detorsion.

Monoecious; larva veliger.

er 1. Cephalaspidea

Shell present but may be partly or wholly enclosed by the mantle.

Head with the tentacular shield.

Lateral parapodial lobes prominent.

er 2. Anaspidea

Found mostly in tropical or subtropical waters.

Shell usually reduced or less covered by mantles.

Well-developed parapodial lobes.

Anterior end bears a pair of tentacles, a pair of rhinophores and a pair of eyes.

Sperm ducts open, running the body length to the penis located anteriorly.

er 3. Pteropoda

Examples: *Aplysia*, *Akera*.

Pelagic snails with or without a shell.

Parapodial fins for swimming.

With or without a mantle cavity.

Head with a pair of rhinophores.

Protandrous, hermaphrodites with an open sperm groove.

er 4. Sacoglossa

Examples: *Spiratella*, *Cavollina*, *Clione*, *Peracelis*.

With or without the shell.

The pharynx is suctorial.

- \* Arsenic
- \* Cadmium

### Bioremediation.

- By definition, **bioremediation** is the use of living organisms, primarily microorganisms, to **degrade the environmental contaminants** into less toxic forms. It uses naturally occurring bacteria and fungi or plants to degrade or detoxify substances hazardous to human health and/or the environment.
- The microorganisms may be indigenous to a contaminated area or they may be isolated from elsewhere and brought to the contaminated site.
- Contaminant compounds are transformed by living organisms through reactions that take place as a part of their metabolic processes.
- Biodegradation of a compound is often a result of the actions of multiple organisms. **When microorganisms are imported to a contaminated site to enhance degradation we have a process known as bioaugmentation.**
- **For bioremediation to be effective, microorganisms must enzymatically attack the pollutants and convert them to harmless products.**
- **As bioremediation can be effective only where environmental conditions permit microbial growth and activity, its application often involves the manipulation of environmental parameters to allow microbial growth and degradation to proceed at a faster rate.**
  - **Like other technologies, bioremediation has its limitations.**

Some contaminants, such as **chlorinated organic** or **high aromatic hydrocarbons**, are resistant to **microbial attack**. They are degraded either slowly or not at all, hence it is not easy to predict the rates of clean up for a bioremediation exercise; there are no rules to predict if a contaminant can be degraded.

### FACTORS OF BIOREMEDIATION

The control and optimization of bioremediation processes is a complex system of many factors. These factors include: the existence of a microbial population capable of degrading the pollutants;

- the availability of contaminants to the microbial population;
- the environment factors (type of soil, temperature, pH, the presence of oxygen or other electron acceptors, and nutrients).

#### 1. MICROBIAL POPULATIONS FOR BIOREMEDIATION PROCESSES

Microorganisms can be isolated from almost any environmental conditions. Because of the adaptability of microbes and other biological systems, these can be used to degrade or remediate environmental hazards.

**We can subdivide these microorganisms into the following groups:**

**Aerobic:** In the presence of oxygen. Examples of aerobic bacteria recognized for their degradative abilities are *Pseudomonas*, *Alcaligenes*, *Sphingomonas*, *Rhodococcus*, and *Mycobacterium*. These microbes have often been reported to degrade pesticides and hydrocarbons, both alkanes and polyaromatic compounds. Many of these bacteria use the contaminant as the sole source of carbon and energy.