# General Characteristics and Classification of Echinodermata

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Echinodermata word has been derived from :

- Echinos = Hedge hog/ Uneven/ Rough or Spiny
- Derma = Skin

Animals having uneven or spiny skin are called Echinodermata

Sea Star

# General Characteristics

- 1800 living species are found in all over the world.

- Habitat- All the existing echinoderms are marine. They generally live at the bottom of the sea. Most of them are pelagic (free swimming in open water) and few are sessile (attached to the substratum).

Body form- It varies, some are star like, some are spherical or cylindrical. It is unsegmented and body lacks head.

Many echinoderms bear spines and pincer like pedicillariae.
Spines are protective in function. The pedicillariae keep the body surface clear of debris and minute orgnisms.

# Symmetry

- The larva is bilateral but adults are pentamerous radial symmetrical.
- Body parts are arranged in five or multiple of five.

# Body Wall

- Epidermis is single layered and ciliated.
- In many echioderms there is endoskeleton of calcareous plates in the dermis, which are mesodermal in origin.

# Ambulacral System

It is characteristic feature of this phylum. This system is of coelomic origin. It consists of a chain of different tubes or canals attached with each other. It starts from a perforated plate called madreporite and ends into tube feet. All the canals are filled with the fluid or sea water and subsequently helps in locomotion.

# Digestive System

Usually complete digestive system is present,  having two stomach cardiac and pyloric stomach. Out of which cardiac stomach can come out of the mouth during the capture of the prey.

# Haemal & Perihaemal Systems

Instead of blood vascular system, the haemal & perihaemal system represent the open circulatory system. Blood has no respiratory pigment and there is no heart.

# Respiratory Organs

In star fishes there are dermal branchae for the gaseous exchange.

It is finger like, thin walled elongated tubular structure present on the aboral surface, filled with coelomic fluid.

These fluid exchange the gases through the semipermeable dermal branchia.

# Excretory Organs

Specialized excretory organs are absent. Nitrogenous wastes are diffused out via gills. Ammonia is chief excretory matter.

# Nervous System

It consists of a nerve ring and radial nerve cords.  Brain as such is absent.

Sense organ is poorly developed.

# Sexes & Fertilization

Except a few individual the sexes are separate. There is no sexual dimorphism. Fertilization is usually external.

# Development

It is indirect and includes a ciliated, bilaterally symmetrical larva that undergoes metamorphosis to change into the radially symmetrical adult.

# Autotomy & Regeneration

Often well marked.

# Unique Features

- Presence of spines and pedicellariae
- Ambulacral system
- Haemal system
- Mesodermal endoskeleton of calcarous plates
- Bilateral symmetry in the larva and radial symmetry in the adult

# Degenerated Characters

- Lack of head
- Simple sense organs
- Incomplete digestive tract in some forms
- Reduced circulatory system
- Absence of excretory system

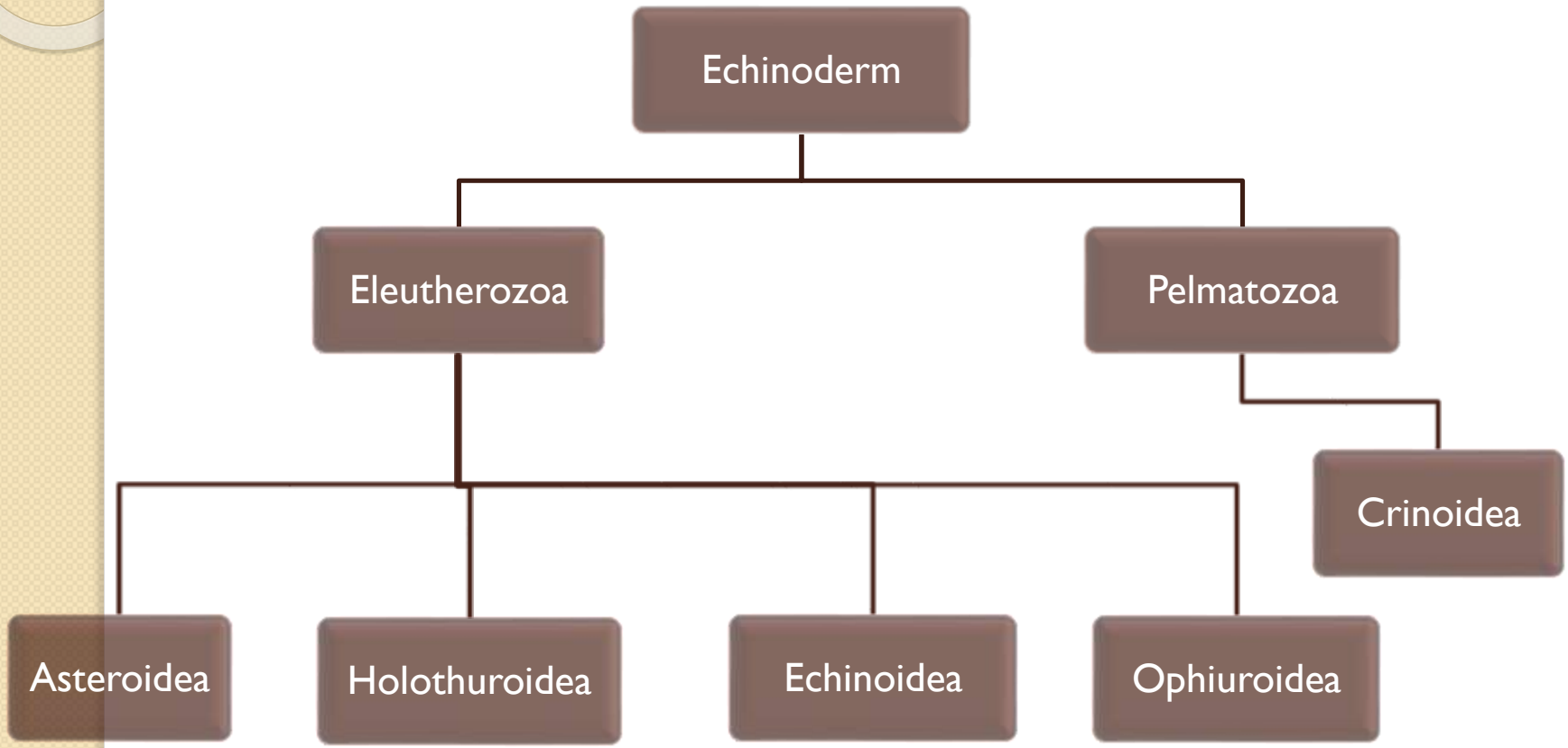
# Resemblance with Chordates

- Radial and indeterminate cleavage
- Gastrulation and invagination
- Mouth derived as an ectodermal invagination
- Adult anus derived from embryonic blastopore
- Mesodermal endoskeleton
- Enterocoelous coelom

From these resemblances, it is proved that Echinoderms are nearer to the chordates than any other groups.

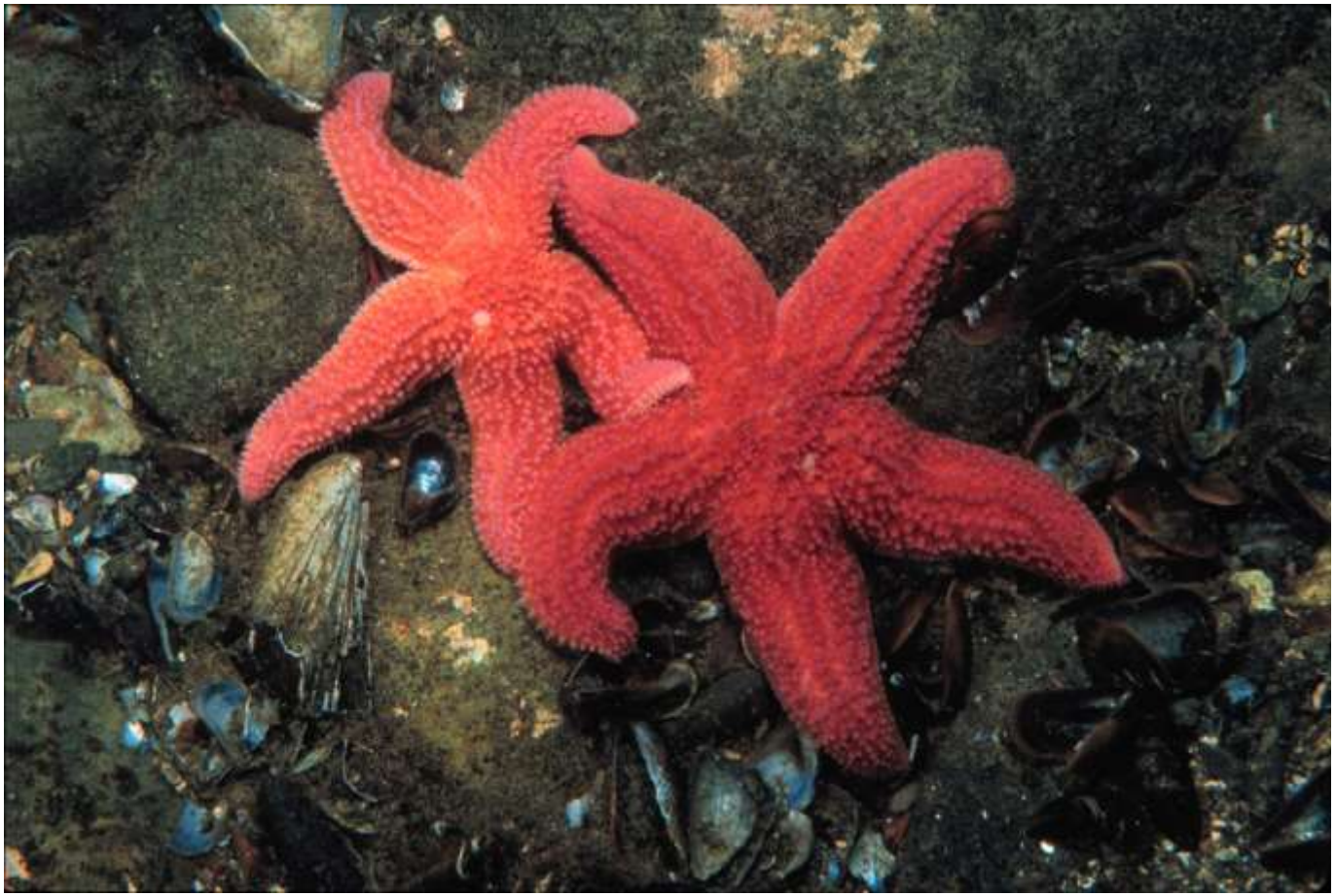
It also indicates that the chordates have been evolved from the echinoderms as ancestors.

# Classification



# Class 1: Asteroidea

- Body is star like
- 5 arms are usually present which are not sharply marked off from the central disc.
- Larval forms are Bipinnaria and Branchiolaria.
- Example: Asterias



Asterias

# Class 2: Ophiuroidea

- Body is star like
- Arms are sharply marked off from the central disc
- Ambulacral grooves are absent
- Pedicellariae are absent
- Larval form is Ophiopluteus
- Example: Ophiothrix, Ophioderma, Ophiocoma, Ophiura

Ophiothrix

# Class 3: Echinoidea

- Body is globular or disc like
- Biting and chewing apparatus with teeth called Aristotle Lantern is present
- Ambulacral grooves are absent
- Larval forms are Pluteus and Echinopluteus
- Example: Echinus (sea urchin), Echinarachinus (sand dollar), Echinocardium (heart urchin)

Echinus

# Class 4: Holothuroidea

- Body is elongated and cylindrical
- Oral end has mouth surrounded by tentacles
- Ambulacral groves are absent
- Spines and pedicellariae are absent
- Larval forms are Auricularia and Doliolaria
- Example: Holothuria (Sea cucumber), Cucumaria (Sea cucumber)

Cucumaria

# Class 5: Crinoidea

- Body has a central disc which is attached to the substratum
- Arms are branched dicotomously having 10 arms
- Spines, pedicellaria and madreporite are absent
- Larval form is Doliolaria. They are commonly called feather stars or sea lillies.
- Example: Antedon, Feather star, Sea lillies.

Antedon

# THANK YOU