PHYLUM ECHINODERMATA

- exclusively marine
- Triploblastic, coelomate animals
- No segmentation and cephalization
- Stellate discoidal ,circular or cylindrical
- Pentamerous body symmetry in adults bilateral in larva
- Only invertebrates with endoskeleton consisting of calcareous plates
- Coelom is spacious and enterocoelous
- Water vascular system or ambulacral canal
- Tube feet present
- alimentary canal simple or coiled
- Open type of circulatory system without distinct heart
- No excretory system
- Respiration: dermal branchia (sea stars)
  Peristomial gills(sea urchins)
  genital bursae (brittle star)
  Cloacal respiratory tree (sea cucumber)
- Pedicilaria present
- Nervous system poorly developed with out brain
- reproduction sexual ,sexes separate
- Development in direct

PEDICELLARIA

- pedicellaria are unique structures present on the body of echinoderms
- They are the organs of offence and defense
- They are also used for cleaning the body surface
- Each pedicellaria is a minute jae-like or pincer-like appendage
- 2 types – stalked (have stalk at the base) and sessile (do not have stalk)

- On the basis of nature of jaws, they are of 2 types – straight (jaws meet along the length while closing) and crossed (jaws cross each other like scissors)

Classification

1. Class Crinoidea…….Antedon……..Doliolaria larva
2. Class Asteroidea……Asterias……Bipinnaria
3. Class Ophiuroidea……Ophiothrix……..Ophiopletus
4. Class Echinoidea……Echinus……echinopleteus
5. Class Holothuroidea …… Cucumaria……auricularia

CLASS – CRINOIDEA

- This class includes extinct forms also
- Body consists of cup shaped central disc
- Oral surface is directed upwards and carries both mouth and anus
- 5-10 arms, mostly branched with or without pinnules
- Tube feet without suckers
- Madreporite, spines and pedicilaria are absent
- Development indirect through Doliolaria larva

Eg. ANTEDON

- Commonly known as feather stars or sea lilies
- Body or crown is pentamerous and flower shaped, and coloured
- body consist of cup shaped central disc or calyx
- calyx covered by tegmen
- Ambulacral grooves or food grooves radiate out of mouth
- The ventral side of calyx bears a numerous slender curved whip like cirri by which the animal temporarily anchors to substratum
- They are organs for locomotion, feeding respiration and sensation
- Ciliary feeder
- Power of regeneration is high
- Arms are long and movable with branches called pinnules

- Ambulacral grooves are open extend up to tip of arms and pinnules
- Ambulacral grooves bears double rows of small finger like structures called tube feet

CLASS – ASTERIODEA

- Common name - Star fishes / sea stars
- Flattened, star shaped or pentagonal echinoderms
- Triangular arms that contain gonads and prolongation of gut, coelom and visceral organs
- Distinct oral and aboral surface
- Madreporite and anus aboral
- Ambulacral grooves open and tube feet with suckers
- Pedicellaria present
- Flexible exoskeleton
- Indirect development with a Bipinnaria larva

Eg: ASTERIA (STAR FISH)

- solitary and free living and nocturnal in nature
- exhibit remarkable power of self amputation or autotomy
- **Autotomy** is the process by which the animal sheds or discards one or more of its own body parts as a self defense mechanism
- **regeneration** is the act of replacement of part of body part that has been lost or destroyed
- Arms end in a small median tentacles
- At the base of each tentacle a small photosensitive bright red spot the eye
- Mouth is surrounded by soft and delicate membrane the peristome
- Tubefeet contains ampulla, podium and sucker. They are organs for locomotion, feeding respiration and sensation
- Pedicillarie protect the delicate skin gills and keep the body surface clean
- It may also help to capture small prey
- Madreporite and anus aboral
- **Madreporite** is a hard circular porus calcereous plate also called sieve plate
- The water vascular system communicates with the sea water through the madeporite
- The surface of madreporite carries a number of radiating narrow furrows or grooves

- It serve to filter sea water into the water vascular system and act as pressure equating valve between the ambulacral system and sea water.
- Water vascular system well developed
- **Extra oral digestion** - Everted stomach slowly engulf the prey secrete enzyme and digests outside. when digestion is partially completed the everted stomach along with the food is retracted into the body. the remaining digestion is completed inside the stomach

CLASS – OPHUROIDEA

- serpent stars /brittle stars,or basket stars
- Flattened body with distinct pentamerous or round disc
- Distinct oral and aboral surface
- Slender, flexible, jointed arms sharply marked off from disc, usually 5 in number, sometimes 6-7
- No ambulacral grooves
- Tube feet without ampullae or suckers
- Madreporite oral
- Pedicellaria, skin gills and special sense organs are absent
- Alimentary canal and anus absent
- Indirect development with Ophiopluteus larvaS

Eg : OPHIOTHRIX (BRITTLE STAR)

- free living echinoderms with great power of regeneration
- Madreporite at oral end with a central 5 rayed mouth possessing five movable jaws
- Genital bursae as respiratory organ
- Filter feeder
- digestive system simple with a large stomach without intestine and anus

CLASS – ECHINOIDEA

- Sea urchins or sand dollars sea biscuits
- body globular or hemispherical, disc like or heart shaped without arms
- Endoskelton in the form of hard test or shell formed of calcareous plates
- Body covered by movable spines and 3-jawed pedicellarie

- Mouth on oral side and madreporite on aboral side
- Ambulacral groove absent, tube feet with suckers
- Indirect development with Echinopluteus larva

Eg: ECHINUS (SEA URCHIN)

- omnivorous- feed on marine weeds algae
- Masticatory organ called Aristotle's lantern
- Aristotle's lantern or jaw apparatus
- - is a five sided inverted pyramid –like structure surrounding the pharynx
- -Formed of 5 pyramid or alveoli
- -5 elongated radial teeth, epiphyses
- -5 rotulae
- -5 compasses
- -Aristotle's lantern is surrounded by a lantern coelom formed of 5 sac like cavities
- The alveoli are large triangular calcareous plate
- The epiphyses is a curved plate that connects the two halves
- The rotulae is short rods lying radially between upper ends of adjacent alveoli
- The compass are slender rods lying above and parallel to rotulae.
- The aristotle lantern is surrounded by perignathic girdle which contains auricles

CLASS – HOLOTHUROIDEA

- Sea cucumber
- Body elongated cylindrical and bilaterally symmetrical
- Arms spines and pedicillarie absent
- Endoskeleton reduced to spicules
- Madreporite internal ,ambulacrel grooves absent and tube feet are locomotory
- Mouth and anus at opposite ends
- Cloacal respiratory tree
- Ring of tentacles surround the mouth
- Development with Auricularia larva

Eg : CUCUMARIA (SEA CUCUMBER)

- sedentary form bottom of shallow sea
- living in temporary U-shaped burrow with anal and oral ends
- differentiated into dorsal and ventral side
- tube feet arranged in longitudinal rows

Eviseration- is a defensive mechanism .

- it is sudden explusion of internal organs especially respiratory trees, alimentary canal and gonads through anus in situation in danger. this unexpected autotomy scars the enemy. the lost parts regenerate