Bio-etymology PART – 12: ECHINODERMATA

Making Biology students interested in Etymologies' !!!

- **FUN TO LEARN BIOLOGICAL TERMINOLOGY**
- **THE LANGUAGE OF BIOLOGISTS**
- **SOWING SEEDS OF SYSTEMATICS/TAXONOMY AT THE GRASSROOT LEVEL**

LEARNING BIO- ETYMOLOGY

Over a period in past centuries, Science is general and Biology in particular has accumulated a vast array of words to communicate fact(s) or phenomena through deriving their meanings.
The episode(s) of 'Bio-etymology' are, thus, devoted to analyzing the hidden meanings derived from the Names of various Animal Phyla and Classes, along with the terms specifically used to describe their respective diagnostics, important examples (Genus or species) etc.

➢ **Recollecting the Introduction of PART – 1:**

At any level, may it be animals in general or Man in particular, there is some structured or indicative or behavioural system of communication. It is simply referred to as a kind of **'Language'**. In a broader sense, **'Language'** is the method of communication that involves the use of various languages (in various countries) spoken by man. **Articulation of words** in a definite sequence is the basic of formulating a Language and **knowledge of words** forming it and their **'sense'** is of utmost importance. Accumulation of a treasure of words constitutes what is called **'Vocabulary'** defined variously as follows:

1. ***The words of a language.***
2. ***The body of words used in a particular language.***
3. ***All the words that exist in a particular language or subject.***
4. ***A list or collection of the words or phrases of a language, technical field etc.***
5. ***A listing either selective or exhaustive, containing the words and phrases of a language, with meaning or translations into another language.***

➢ The Previous Episodes of Bio-etymology :

CLICK HERE TO VIEW EARLIER EPISODES OF 'BIO-ETYMOLOGY'

PART 1 | PART 2 | PART 3 | PART 4 | PART 5 | PART 6
PART 7 | PART 8 | PART 9 | PART 10 | PART 11

BIO-ETYMOLOGY: PART – 12

PHYLUM – ECHINODERMATA

[Gk. *echinos* = hedgehog + *derma* = skin + *ata* = group]

The name of the Phylum literally means the animals with **'hedgehog'** (a spiny skinned mammal) – like **'skin'** *i.e.,* spiny-skinned animals or those having **prickly appearance** or those possessing calcareous plates or spicules embedded in the skin. The vast array of examples are commonly known as – Sea Lillies, Sea Cucumbers, Sea urchins, Sea Dollars, Sea stars/Starfishes and Brittle. The branch of study of Echinodermata is called **'Echinodermology'**.

HISTORY

The name Echinodermata originated with **Jacob Klein** (1734). **Linnaeus** included them under Mollusca and **Lamarck** under the Class – Radiata as ***'Echinodermes'***. **Leuckart** (1847) raised it to the status of Phylum. **Bather** (1900) considered them as *"one of the best characterized and most distinct Phyla of the Animal Kingdom"*.

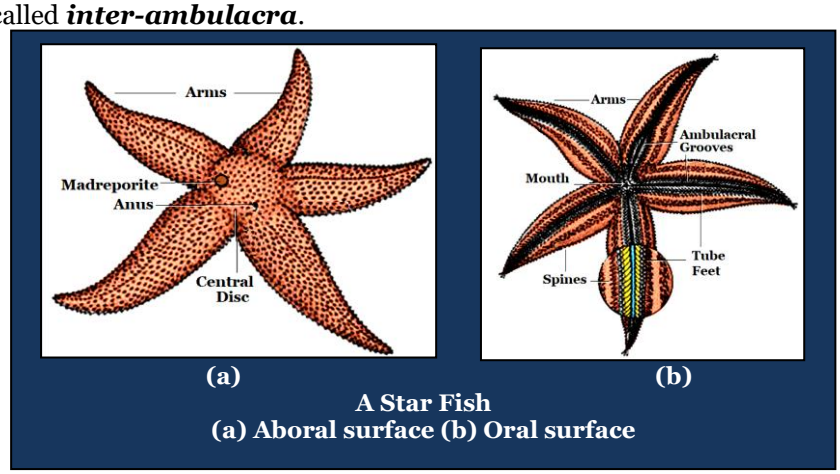
Fossil record dates back to the Cambrian period [about 518 million years ago], with about 13,000 described fossil species. **Second largest group** [after Chordata], with more than 7,000 extant species, of **Deuterstomes** (Gk. ***deuteros*** = second/next +*stoma* = mouth; *i.e.,* 'second mouth') *i.e.,* embryo's first opening, the blastopore, becoming the anus or cloaca, whereas the mouth developing opposite to it at a different site.

DEFINITION / DIAGNOSTICS

- ***Free living***, exclusively Marine – mostly deep-sea forms; some in shallow waters, too.
- ***Triploblastic:*** [Gk. ***triploos/triples***; Latin ***triplus*** = threefold/three + ***blast(os)*** = denoting embryonic cell/germ layer of an embryo/germ/ sprout + ***-ic*** < L. ***–icus***/Gk. ***–ikos*** = the suffix used to form adjectives], *i.e.,* the animal's body developing from three primary germ layers *viz.,* **Ectoderm, Endoderm** and **Mesoderm**.
- ***Body*:** Unsegmented. Globular, spherical, elongated, star-like or discoidal.

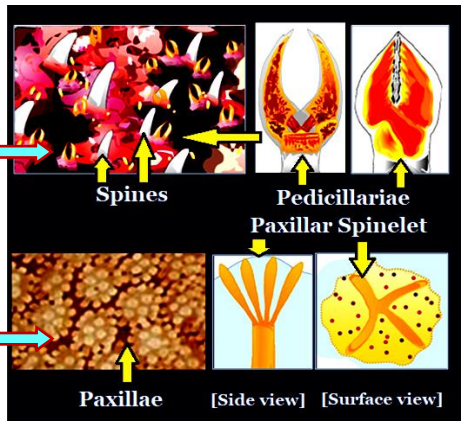
PSEUDOMETAMERISM *vs* TRUE METAMERISM
Please refer to Bio-etymology PART – 5
HOMONOMOUS *vs* HETERONOMOUS METAMERISM
Please refer to Bio-etymology PART – 5

- ***Symmetry*:** **Bilateral** [Gk. ***bi*** = two + ***lateros*** = sides] at **larval** stage but **radial/pentamerous** in **adults** *i.e,* body surface marked by **5 principal radii**/symmetrical radiating areas called ***ambulacra*** (< Latin ***ambulacrum/ambulare*** =to walk or amble or to move at a slow, relaxed pace), denoting walking slowly or leisurely; indicating towards the action and presence of locomotory organs, the **'tube feet'** along these ambulacra/ambulacral grooves on the oral surface. 5 alternating interradii are called ***inter-ambulacra***.



A Star Fish
(a) Aboral surface (b) Oral surface

- ***Head:*** Absent.
- ***Body Wall:*** rough, tough and leathery due to mesodermal calcareous ossicles and spines [constituting the endoskeleton], covered by epidermis (often ciliated).
  - ***Pedicillariae***: [L. ***pedicel*** = a small stalk or appendage + ***-aria*** = connected with/pertaining]. Referring to the tiny, claw-shaped structures (mainly in Sea Stars and Sea Urchins), located raised above the body surface or in clumps encircling the spines. They are used for keeping the body surface clean of algae, encrusting organisms and other debris that settle on the surface of these bottom-dwelling animals.
  - ***Paxillae***: [L. ***paxillus/palus*** = peg/stake/a spine like a pillar with a flattened summit] A small umbrella-shaped stalked/pillar-like ossicle found along the aboral surface (**mainly in Starfishes**). Their stalks emerge from the body wall and their umbrella-like crowns, each fringed with short spines, meet edge-to-edge forming a protective external false skin. The water-filled cavity beneath contains the **madreporite** and **respiratory papulae**.



- ***Locomotory organs:*** Hollow, sac-like tubular processes- the **tube feet**; with or without suckers.
- ***Coelom*:** [Gk. ***koiloma / koilia*** = hollow, cavity], eucoelom, **enterocoelous type** [Gk. ***enteron*** = intestine + ***koiloma / koilia*** = hollow, cavity *i.e.,* coelom derived from pockets developed on the

embryonic gut] surrounded by ciliated peritoneum and divided into several tubular spaces or sinuses which form 3 specialized systems *viz.*,

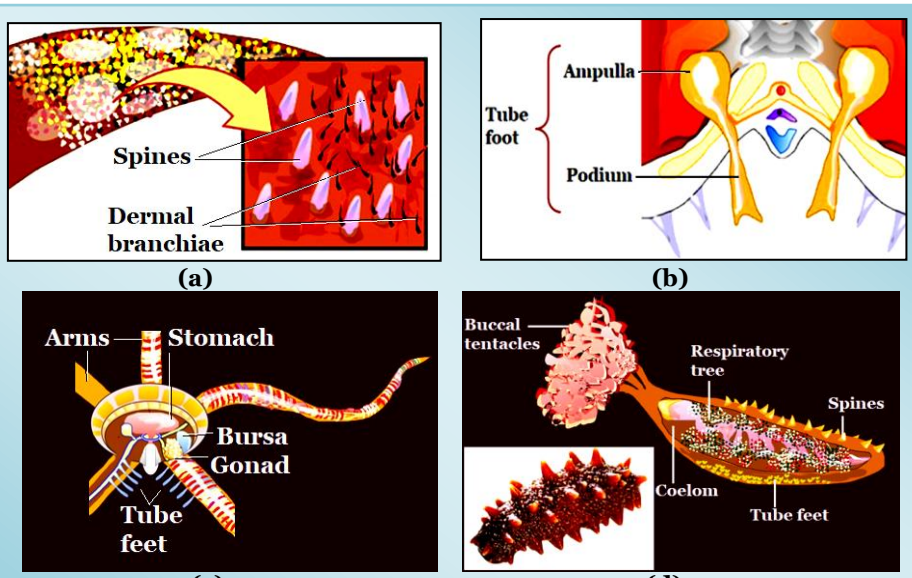
(a) **Water vascular system:** A system of canals filled with sea water and amoeboid corpuscles, bringing about locomotion by generating hydraulic pressure and carrying-out respiration *via* thin walls of tube feet. Usually with a **madreporite** [<French **madrépore** < Italian **madrepora; *madre*** < L. ***mater*** = mother **+ poro/porus** = pore),< Spanish, ***madrepora***= mother of pores; a Genus of Stony Corals]; referring to a small red or yellow button-like, hard, calcareous, porous body (like a Stony, perforated coral, ***Madrepora***), used to filter water into the water vascular system.

(b) **Haemal system** [< Gk.***haemal/haima*** = blood]**:** Representing the circulatory system, formed by intercommunicating sinuses or channels, containing coelomocytes

(c) **Perihaemal system** [< Gk. ***peri*** = around, about, beyond + ***haemal/haima*** = blood]**:** A system of tubular sinuses or vessels, around/enclosing the sinuses of haemal system.

In all the higher bilateria, from Annelids onwards, the blastocoel gets obliterated by the development of endodermal 'archenteron' [embryonic gut] and another space (true coelom or *eucoelom*) is created between two layers of mesodermal cells (peritoneum) present between the gut (endoderm) and the body wall (ectoderm).
Examples: Annelida to Chordata. ..... Bio-etymology PART – 9 onwards.
For the types of Coelom in 'Bilateria',
please 'CLICK' Bio-etymology PART – 5

- ***Digestive system*:** Complete. Alimentary canal coiled or straight.
- ***Respiratory organs*: Dermal branchiae/skin gills/papulae** (Starfishes), **tube feet** (small, flexible structures, also used for locomotion; Starfishes), **respiratory tree/poumons** (a pair of branched tubes located near anus: **Sea Cucumbers)** [<Gk. ***pneumon*** <L. ***pulmonem***<French ***poumon*** = an anatomical organ responsible for respiration, the lung] or **bursae** [L. ***bursa*** = bag, purse] (cilia-lined sacs located on the bottom of the central disk and opening between the arm bases; **Brittle Stars**).

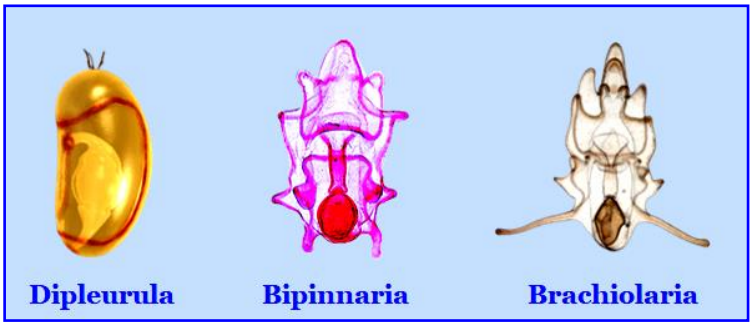


RESPIRATORY STRUCTURES IN ECHINODERMATA

(a) Part of aboral face of an arm of Starfish magnified showing Spines and Dermal branchiae or Papulae; (b) Sectional view of an arm of Starfish showing placement of Tube Feet towards oral face; (c) Anatomical view of a Brittle Star showing location of a Bursa; (d) Anatomical view of a Sea Cucumber showing the Respiratory Tree.

- ***Excretory Organs:*** Absent. Nitrogenous wastes (mainly Ammonia) expelled partly through dermal branchiae and partly through body surface.
- ***Nervous System:*** **Central Nervous System** formed by a **nerve ring** connected to a series of **radial nerve cords**, connecting various organs and effectors including the viscera, podia, body wall muscles and connective tissue.
- ***Sensory organs:*** Rudimentary, provided with structures like chemoreceptors, tactile organs and terminal tentacles etc.
- ***Reproduction:***
  (a) Asexual: By **fragmentation** (division of the body into two or more parts) and **regeneration** of missing body parts.
  (b) Sexual: Sexes separate, fertilization external, development indirect with the involvement of free swimming **diverse larval stages** in different groups *viz.*,

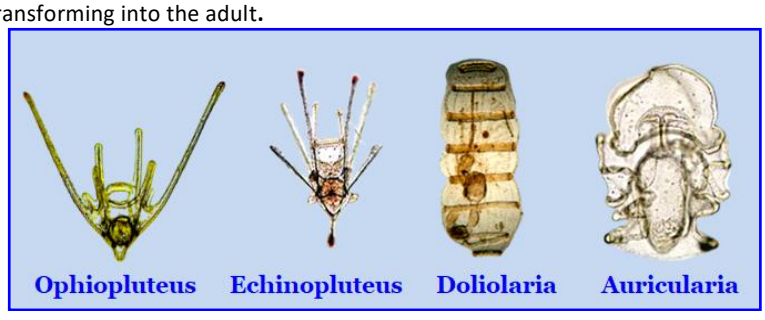
- **Dipleurula** [Gk. ***di*** = two + ***pleura* (*pleurula*)** = little side, *i.e.,* 'little, two-sided larva']**:** A basic/hypothetical larva of ancestral echinoderm; representing 'basis' of all larval forms, at least in all the **Eleutherozoans** (= a Subphylum) like **starfishes, brittle stars, sea urchins** and **sea cucumbers**. Bilaterally symmetrical, with a single ciliary band, placed on each side of the body and in front of the mouth and anus.
- **Bipinnaria larva** [Gk. ***bi*** = two + ***pinna*** = feather + ***-aria*** = connected with/pertaining to]**:** Develops from dipleurula larva of **Asteroidea**; provided with two, often sinuous, ciliated bands, forming lobes or arms - one lying in front of the mouth, the other being behind it and around the edge of the body *i.e.,* reflecting the idea of **bilaterally symmetrical larva**.
- **Brachiolaria** [L. ***brachiola/brachium*** = arm +***-aria*** = connected with/pertaining to]**:** Second larval stage among **Asteroids**, with bilateral symmetry and three (1 median and 2 lateral) additional **'arms'** used for adhesion with the substratum. (Some starfishes like *Astropecten* and *Asterina* do not pass through brachiolaria stage).



- **Pluteus** [<L. ***plouto*** = structure of boards, being shaped like an artist's/painter's ***easel*** turned upside down; an ***'easel'*** is a wooden frame, usually with legs that holds the picture] *i.e.,* indicating towards the 'arms' of the larva appearing like the 'legs' of an *'easel'*. **Two types** recognized:

  Ophiopluteus [Gk. ***ophio/ophis*** = serpent/snake + L. ***plouto*** = *(as above).....*]**:** A larva, characteristic of **Ophiuroidea** [Gk. ***ophio/ophis*** = serpent/snake + ***oura*** = tail + ***eidos*** = form] or **Brittle Stars** with at least 4 pairs of 'arms', the postero-lateral being the longest and forwardly directed.

  Echinopluteus [Gk. ***echinos*** = hedgehog + L. ***plouto*** = *(as above).....*]**:** A larva, characteristic of **Echinoidea** [Gk. ***echinos*** = hedgehog + ***eidos*** = form] or **Sea Urchins** with at least 4 pairs of **pigmented-tipped** and fragile **calcareous rod-supported** 'arms'. The **ciliated bands** become thickened, and appear as or are known as ***'epiaulettes'*** [< French ***epaulette*** = something that ornaments/protects the shoulder or a shoulder pad like that on a military uniform],
- **Doliolaria** [L. ***dolium*** = small cask/a barrel-shaped vessel + ***-aria*** = connected with/pertaining to]**:** Refers to the characteristic **'barrel-shaped'** larva of **Crinoidea** [Gk. ***crinon*** = lily + ***eidos*** = form] or Sea lilies/Feather Stars with 3 – 5 ciliated bands.
- **Auricularia** [L. ***auricular*** = ear + ***-aria*** = connected with/pertaining to]**:** The characteristic larva of **Holothuroidea** [Gk. ***holothurion*** = sea cucumber + ***eidos*** = form] or Sea Cucumbers with **'ear lobe'** like ciliated bands arranged in hoops around the body. In some examples **Doliolaria** larva is the next stage after auricularia, transforming into the adult**.**



CLASSIFICATION

Traditionally, **2 Subphyla** are recognized:

SUBPHYLUM I: PELMATOZOA

[Gk. ***pelmatos*** = stalk + ***zoon*** = animal]

A group of **plant-like** Echinoderms, known for their **sedentary habit** (stalked) *i.e.,* **body attached/fixed** to the substratum by an aboral stalk having claw-like 'legs' called cirri . **Tube feet** without suckers. **Madreporite** absent. **Arms**, 5, dichotomously branched (total 10 arms), each with small, feather-like laterally projecting branches, the 'pinnules'. Commonly called **Sea Lilies** or **Feather Stars**

CLASS 1: CRINOIDEA

[Gk./L. ***crinon*** = lily + ***eidos*** = form]

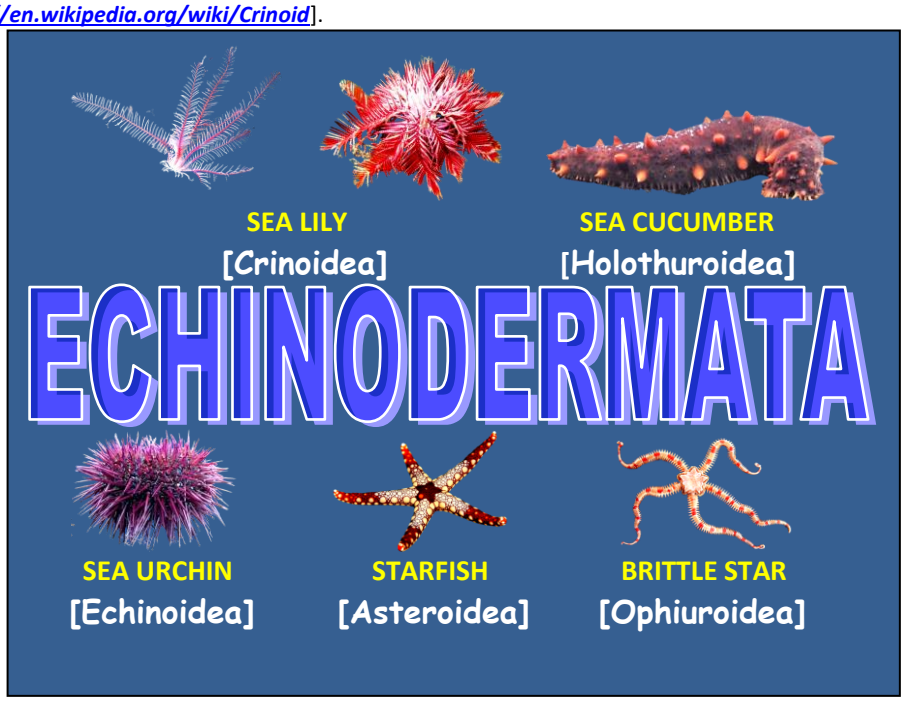
They are the first and early echinoderms of Indo-Pacific region, recording their first appearance about 300 million years ago. They have changed very little since then, hence, often referred as **'living fossils'**. During the **Cambrian** through the **Permian** periods, **crinoid forests** covered parts of the seafloor; some growing up to 2.0 m.

Commonly called **Sea Lilies** or **Feather Stars**, usually live in clumps, attaching themselves to crevices where they can hide most of their body. Most species come out at night, exposing part or all of their arms, or even the entire body. They use their arms to crawl; some swimming by alternating their arms up and down; even going down through the water by extending their arms like parachutes. They are unique for their **enchanting diverse colours** *viz.,* white, black, purple, red, green, brown, violet and sometimes with a combination of them. The deeper they live, the colour changes to pale or white.

Provide habitat for various organisms, including small fish and invertebrates and also serve as an important food source for predator sea stars and crabs.

Example(s):

- ***Antedon*** [< Gk. mythology, people named as ***Antedon*** = rejoicing in flowers *i.e.,* a delightful concept that connects the beauty of blooms with feelings of joy and happiness]**:** So called **'Rejoicing in Flowers'**, and **Sea Lilies** or **Feather Stars** owing to their plant-like appearance with diverse, enchanting colours and a **'flowery'** crown consisting of a cup-like central body known as the theca and a set of five rays or arms, usually branched and feathery.
  [**Ref:** *https://en.wikipedia.org/wiki/Crinoid*].



SUBPHYLUM II: ELEUTHEROZOA

[Gk. ***eleutheros*** = free + ***zoon*** = animal]

A group of freely moving (unattached) Echinoderms, with the mouth (oral surface) directed towards the substrate, anus is located, opposite the mouth (on the aboral surface). **Tube feet** mostly with suckers. **Sea Cucumbers, Sea Urchins, Sea Stars/Starfishes** and **Brittle Stars** are the 'common-named' examples representing

4 Classes:

CLASS 1: HOLOTHUROIDEA

[Gk. ***holothurion*** = sea cucumber + ***eidos*** = form; < L. = water polyp]

These animals are so named **'sea cucumbers'** because of their appearance/resemblance with elongated, warty body of a vegetable, called 'cucumber'. The body is **elongated** (**no arms**) along the oral-aboral axis, the anterior end bearing a mouth encircled by **tentacles**, while the posterior one with an anus. Filter feeders. The leathery-skinned **body surface** is **coarse** (= 'warty'), the endoskeleton being reduced to microscopic spicules or plates embedded within the body wall. **Madreporite** internal, lying beneath the pharynx.

Example(s):

- ***Holothuria*** [< Gk ***holothurion*** = sea cucumber; < Latin = water polyp]**:** Usually large and conspicuous sea cucumbers, although a few species are secretive, living under rocks or burrowing into sandy substrata in shallow tropical or subtropical waters.
- ***Cucumaria*** [<L. ***cucumerem/ cucumis*** = cucumber-like plant or fruit].
- ***Thyone***[< Gk. ***khein*** = to pour or ***khoane*** = a funnel]: Referring to the feeding habit where the two ventral feeding tentacles are much shorter than the others and have forked ends. Each large tentacle in turn shrinks and folds and is pushed into the

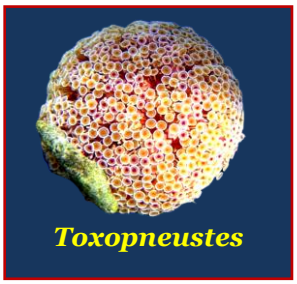
mouth (= to pour). A small tentacle is held close to the mouth and cooperates with each of the others by scraping off any food particles that are still adhering to the large one when it is withdrawn from the mouth (= funnel like).
[**Ref:** *https://en.wikipedia.org/wiki/Sea_cucumber ; https://www.sciencedirect.com/.../holothuria*].

Sea cucumbers are harvested for various products, including medicines and dietary supplements, shampoo and toothpaste. However, *beche-de-mer*, the dried outer body wall, is considered to be the most valuable part of the animal. It is a delicacy throughout Asia, especially in China and the exceeding demand for *bêche-de-mer* has reduced the stocks of many sea cucumber species across the world. [<French *bêche-de-mer* = a type of sea slug that is eaten as a delicacy in the Western Pacific. < French folk-etymology alteration of the Portuguese phrase *'bicho do mar'* = sea worm or spade of the sea due to the sea slug's appearance or perhaps its culinary use].

CLASS 2: ECHNOIDEA

[Gk. ***echinos***= hedgehog + ***eidos*** = form]

Most diverse **'spiny'** echinoderms, called the **sea urchins, sand dollars** and **heart urchins**. Regular and irregular are two general forms. **Regular echinoids** include the herbivorous or carnivorous and epifaunal-feeding sea urchins whereas the **irregular echinoids** include deposit and infaunal (*i.e.,* living buried in ocean bottom sediments) feeding sand dollars and sea biscuits. Hard calcareous endoskeleton called **'test'**, is made up of interlocking plates, to which spines are attached *via* small ball-in-joint sockets. Some use the spines to move along the sea floor but when not using the spines, a large number of tube feet are used.



Madreporite aboral. **Pedicillariae** present and stalked; **tridactylous** (with tulip-like head), **ophicephalous** (snake-like appearance), **triphyllous** (three valved) and **globiferous** (with globular poison sacs) are the four types, found distributed anywhere on the test. The inflexible stalk is provided with a skeletal rod and a flexible neck. Globiferous pedicellariae are highly venomous in species like **Flower Urchin/Mushroom Urchin/Poison claw sea urchin** (*Toxopneustes pileolus*; Gk. ***toksikon***=poison/arrow + ***pneustes*** = breath *i.e.,* poison breath); used for protection or hunting. ***Aristotle's Lantern*** is the typical chewing (feeding) apparatus.

Example(s):

- ***Echinus*** [< Gk ***echinos*** = hedgehog]**:** Sea Urchins.
- ***Clypeaster*** [<L. ***clypeus*** = round shield + ***aster*** = star]: **Sea Dollars/ Cake urchins/Sea biscuits**; with characteristic semi-flat shape and with spines lining underside of the body.
- ***Spatangus*** [< Gk. ***spatanges*** = a kind of sea urchin]: **Heart Urchins**. Referring to the bilaterally symmetrical, elongated, oval **'heart'-like** shape, with a **notch** at the distinct anterior **oral** end and a posterior **anal** end.

[**Ref:** *https://en.wikipedia.org/wiki/Sea_urchin*]

Echinoids play an important **ECOLOGICAL** and **ECONOMIC** role in marine ecosystems. The herbivorous Sea urchins help maintaining balance of marine food webs as they graze on algae, preventing it from overgrowing and disrupting the ecosystem. Ecologically, sea urchins provide food for a variety of predators, including sea otters, starfish and certain fish species, making them an important part of marine food webs. They constitute an important source of food and income for humans in many coastal communities. Therefore, Food and Agriculture Organization (FAO) supports initiatives like **sea urchin farming**, combining innovation with ecosystem restoration. Sea Urchins are harvested for their highly prized **ROE** (eggs), a delicacy in many cultures. At approximately 60,000 metric tons/ year, Japan leads the world in total consumption of whole sea urchins (primarily *Strongylocentrotus intermedius*). United States is the second largest supplier of fresh sea urchin roe. In addition, sea urchin shells are used for **decorative purposes** and in the manufacture of jewelry and other products. Most importantly, sea urchin has been the animal of choice for countless **laboratory studies** on fertilization, embryogenesis, developmental biology and heredity.

CLASS 3: ASTEROIDEA

[Gk. ***aster*** = star + ***eidos*** = form]

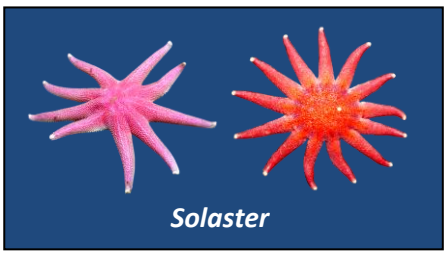
Exemplified by about 2,000 species of 'Star shaped' bottom-dweller Echinoderms ranging from the intertidal zone up to abyssal depths (at about 6,000 m) below the surface. Usually 5-armed, but the number varies, some having 6 or 7 and others up to 8–23 arms. The **Antarctic Sun Starfish** (*Labidiaster annulatus*) is reported to have over 50 arms.

Madreporite aboral. **Pedicillariae** present. Straight and crossed , are the two types; the former being larger and located on the body surface, whereas the latter are stalked, smaller and found in clumps around the spines. *Forcipulate* sea star are so called because each pedicellaria is typically composed of three forceps-like valves. Besides cleaning the surface, they assist in food capturing *e.g.*, in the deep-sea *Brisingida* sp. and the Antarctic *Labidiaster sp.*

Paxillae present in sediment-dwelling *Ludia, Asteropecten, Goniaster* spp., particularly ***Solaster paxillatus***, the **orange sun star** (8-10 armed) of Northern Pacific Ocean, their stalks being emerging from the body wall and the umbrella-like crowns articulating edge-to-edge, forming a protective external false cuticle with a water cavity beneath in which the madreporite and delicate gill structures are protected.

Example(s):

- ***Astropecten*** [< Gk ***aster***= star + L. ***pecten*** = pectin; comb-like]**:** **Comb Starfish** or **Star Comb**; so called due to the characteristic **superomarginal spines**, arranged in **'comb**-like' fashion along the outer edge of the starfish.
- ***Goniaster*** [<L. ***goni*** = angle or corner or Gk. ***gonos*** = seed + ***aster*** = star]: **Cushion Stars**; shaped like pentagonal or subpentagonal cushions or also called **Seed Stars** due to being covered densely with granular, **seed-like** protuberances.
- ***Solaster*** [<L. ***soliaris/sol*** = of the sun or sun + ***aster*** = star]: **Sun Stars**; so called as having a wide disc and 8 to 13 (usually 11 or 12) long, tapering arms, often with **turned-up tips** (as if a rising sun with radiating sun rays).



- ***Labidiaster*** [< L.. ***labium/labia*** = lips + Gk. ***dia*** = through/by/across/over + ***aster*** = star]: **Fragile sticky ray star** or **Sunflower Star**; so called as having many slender, flexible rays/arms (40-45) spreading across **(*-dia***) the 'lips' (= ***labia***) of mouth.
- ***Acanthaster*** [< Gk. ***acanthos*** = thorn/spine; < L. ***acanthus*** = herbaceous plants with spiny/toothed leaves + ***aster*** = star]: **Crown of Thorn Starfish (CoTS)**; referring to the name of the Indo Pacific Genus for its protruding, long spines that are sharp and venomous, usually causing severe pain and injury to the persons often coming into contact with them. Growing up to 50.0 cm *dia.*, these green to brown to purple starfishes with crown-like arranged arms (8 and 21; max. 23), are widely known for their destructive impact on coral reefs, being **corallivores** *i.e.,* feeding voraciously on coral polyps.

[**Ref:** *https://en.wikipedia.org/wiki/Starfish*]

CLASS 4: OPHIUROIDEA

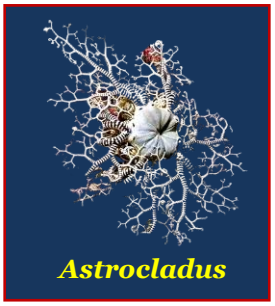
[L. ***ophiurus*** = brittle Star or Gk. ***ophio/ophis*** = serpent/snake+ ***oura*** = tail + ***eidos*** = form]

The name of the 'Class' referring to **'serpent tail like 5 arms'** and body appearing like a shining star, hence commonly-named **'Brittle Star'**. These deep water (up to >6000 m) dwelling forms arte common members of 'reef communities'. Respiration by cilia-lined sacs called bursae. Over 60 species of brittle stars are known to be bioluminescent. **Madreporite** oral. **Pedicillariae** absent.

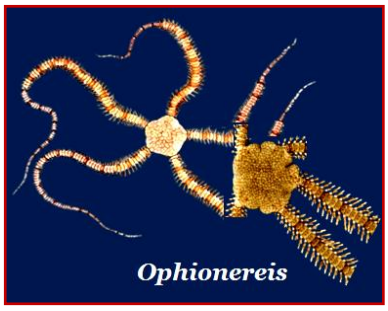
Example(s):

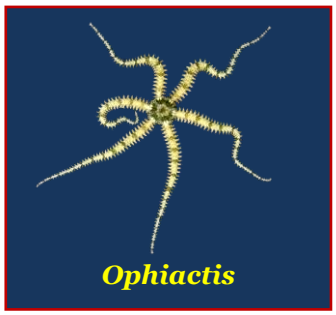
- ***Astrocladus*** [< Gk ***aster***= star + ***klados*** = branch/twig]**:** **Basket Star**; so called as the 10 arms branching repeatedly in an alternating pattern extending to form a **'basket-like net'** for filter feeding or rolled up compactly against the body disc when not feeding; or also called **Gorgon's head** [Gk. ***Gorgon*** = dreaded head/female monster of Greek mythology with a

petrifying look; any of the three hideous sisters, with writhing serpents for hair]; the name **'dreaded head'** in Greek refers to *Medusa* and her two sisters, whose hair was made of living snakes.



- ***Ophionereis*** [Gk. ***ophio/ophis*** = serpent/snake + ***nereis*** = sea nymph or daughter of Nereis]: **Reticulated Brittle Stars;** referring to **'snake'** and '**nereis'** (a type of **marine worm)**; the name essentially combines the concepts of snake-like arms and a 'Nereis', signifying their **arms** having a large number of short joints and a **fringe of short spines** on either side [as if the 'Parapodia' of a Nereis]. Called **'reticulated brittle star'** due to the aboral (upper) surface of the disc being covered with small plates and a pale grey **'network'** [L. ***reticulum*** = little net] of fine reddish-brown lines.
- ***Ophiocomina nigra*** [Gk. ***ophio/ophis*** = serpent/snake + ***kaminos*** = furnace/burning earthenware or baking bread + ***niger*** = black]: **Black Brittle Star** or **Black Serpent Star**; so called as having general colour pattern of **'black'** [L. ***niger*** = black] or varying shades of 'brown' (occasionally pale coloured also). Another explanation of the generic name is a brittle star coloured like a **'burned earthenware'** or **'baked bread'**.





- ***Ophiactis savignyi*** [Gk. ***ophio/ophis*** = serpent/snake + ***actis/actinos*** = ray of light, beam, spoke of a wheel]: **Savigny's brittle star** (named in the honour of the French zoologist Marie Jules Cesar Savigny) or the **Little Brittle Star** (due to quite small, about 5.0 mm, pale greenish-brown central disc). Unusually, with segmented arms, each segment bearing 5 or 6 thorny spines (= ***actis***).
[Ref: ***https://en.wikipedia.org/wiki/Brittle_star***]

Learning process is an on-going process:
Keep on venturing more into the fantastic world of Etymology and feel ECHINODERMATA – friendly !!!

COMING UP NEXT, 'BIO-ETYMOLOGY'
PART - 13
Phylum: CHORDATA