

SUPER STARS!!!



Any guesses on what this is? An alien from outersapce? or something from the ocean floor? Well...it is the underside (ventral side) of a starfish and the semi-transparent red structures are many tube feet which they draw in when they are out of water. (Photo by B. Ravichandran)

The Starfish lineage

Echinodermata
[Phylum of hedgehog skinned animals]

Asterozoa
[Sub phylum of star shaped echinoderms]

Asteroidea
[Class of star-shaped radially symmetric marine invertebrates]. There are more than 1900 species of starfishes belonging to 36 families and they are found in all the world's oceans including the southern ocean near Antarctic peninsula.

Be it the cosmos or our planet's deep oceans... stars have fascinated mankind since time immemorial. The cosmos holds a vast array of unknowns and the ocean is no different when it comes to keeping secrets. In fact, the famous oceanographer Paul Snelgrove said that, "We know more about the surface of the moon and about mars than we do about the deep sea floor, despite the fact that we have yet to extract a gram of food, a breath of oxygen or a drop of water from those bodies".

And in the spirit of that quote I would like to take you on a journey among stars, some of which are far from human eyes in deep dark ocean floors and some that can be seen on our sandy shores and sometimes sadly even in fishing nets. Yes, you got it! We are going to look at the asteroids of the sea – the starfishes or sea stars. Let us start by discussing the name starfish or animals belonging to the class Asteroidea. The word Asteroid or aster comes from the greek word(s) meaning star-like or star. And the words starfish or sea stars were used because of their star-like shape. But with sufficient research we have found that contrary to their namesake, “sea stars” are not “only” star-shaped, they also come in a myriad other shapes ranging from pentagons and spheres to pin-cushion shaped fluffy looking animals, and some even have webbing between the arms similar to that between your thumb and index finger.

Now so many different shapes, sizes, colours and habitats can only mean one thing – Bountiful Diversity!!!... and just so you know I am not making this up, scientists have described over 1900 species of starfishes from our oceans (Atlantic, Pacific, Indian Arctic and Southern). This diversity has a deep-rooted history in the pages of evolution and when we take a sneak peek at the fossil records for Asteroidea, we find that the ancient form of asteroids existed in the Paleozoic era (540 – 250 million years ago). But the first fossil record of modern day asteroids as we see them today is from the Triassic period of early Mesozoic era, in other words, is from over 250 million years ago. And just to give perspective to this time scale, starfishes are older than dinosaurs!!! Older than the Steven Spielberg movie famed carnivore – the mighty Tyrannosaurus rex!!! Over these millions of years starfishes have diversified greatly and owing to their differences, each group (or family we call them) lives in a different habitat, and these

African Red-knobbed Starfish (*Protoreaster lincki*) is a magnificent predator that consumes soft corals, tube worms and even other starfishes. It is a large animal and can grow to a foot in diameter. (Photo by: B.A. Daniel)



can range from the Antarctic deep freeze to the warm tropical waters to even the 6000m deep trenches/sea floor!!!

The Antarctic peninsula boasts of a large starfish (*Labidiaster annulatus*) that can grow upto two feet in diameter and actively hunts fast moving krill as opposed to most starfishes!!! So what do most starfishes eat? And how? Starfishes have a varied diet including, organic matter in their habitat, snails, sponges, bivalves, corals, molluscs, crustaceans and krill among other things. Now to understand how they eat, we need to get a quick/basic tour of the starfish anatomy – The common star fish has four to five limbs and in most cases the side that we see is rough to touch and is the back (dorsal surface) of the starfish, all the vital organs such as the many tiny tube feet, the mouth and stomach are stashed on the under/front (ventral) side. When a starfish catches a mollusc with its feet, it crushes its shell and pushes its stomach out and starts digesting the prey directly. Once it has consumed the whole prey it takes in its stomach and continues on its daily duties, simple!

Starfishes also have some other interesting tricks (up its sleeves so to speak); if a starfish loses an arm it can regrow it, similar to that of a house gecko's tail. In fact, some species detach their arm to distract predators. And some select species even have the ability to grow the whole body from a detached arm and this process may take months. Starfishes are also known for having toxins (called saponin) similar to that of sea cucumbers. Hence, it is advised not to handle starfishes as some toxins can cause skin irritation, swelling and painful stinging and starfishes are studied for the various chemical properties; these include toxicology, immunology and biochemistry. Starfishes are truly stars when it comes to being indicators of ocean health and global warming as they are sensitive to changes in temperature, pH and other water parameters.



Brittle stars are not starfishes



Ravichandran is seen here taking photographic record of the *Protoreaster lincki*, a starfish used in aquarium and curios trade. Inset: A small brittle star found in a sponge, although mistakenly clubbed with starfishes, brittle stars don't belong to Asteroidea but to class of their own called Ophiuroidea. And just like this sponge, brittle stars are also know to live on jellyfishes. (Photos by B.A. Daniel)

These super stars, unfortunately, are getting caught in nets as bycatch (the unwanted fish and other marine creatures trapped by commercial fishing nets during fishing for a different species). And they don't seem to have any superpowers to get out of this problem but maybe we can act as sidekicks to these superstars. How? Well, the next time you are walking along the beach and you see a live starfish stranded in a net, throw it back into the sea, because even one individual can make a difference. In the long run, one of you may come up with a novel system to avoid starfishes and other animals getting caught as bycatch.



Underside (ventral side) of a starfish, the pink lines along each ray/arm are the many tube feet, the pale centre is where the starfish's mouth is located and from where it throws out its stomach to digest and ingest food.

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