

*If in doubt contact your  
local OATA  
retail member  
for further information*

**IMPORTANT THINGS TO REMEMBER:**

**ALWAYS PURCHASE** test kits and regularly check the water for ammonia, nitrite, nitrate and pH. This will allow you to ensure that the water in your aquarium is not causing welfare problems for your fish.

**ESTABLISH A ROUTINE** for testing the water in your aquarium. Record your results to enable you to highlight fluctuations quickly. Also check the temperature of the water.

**MAINTAIN** the water in the aquarium within the accepted parameters highlighted in this leaflet. You may need to undertake regular water changes to achieve this.

**ALWAYS** wash your hands, making sure to rinse off all soap residues, before putting them into your aquarium. Wash them again afterwards and certainly before eating, drinking or smoking.

**NEVER** siphon by mouth. A fish tank can harbour bacteria which can be harmful if swallowed. Purchase a specially designed aquarium gravel cleaner which can be started without the need to place the siphon in your mouth.

**NEVER RELEASE YOUR AQUARIUM ANIMALS OR PLANTS INTO THE WILD.**

Never release an animal or plant bought for a home aquarium into the wild. It is illegal and for most fish species this will lead to an untimely and possibly lingering death as they are not native to this country. Any animals or plants that do survive might be harmful to the environment.

**Checklist...**

**Equipment:**

- Aquarium
- Gravel cleaner
- Water testing kit
- Marine salt
- Marine substrate and live rock
- Reverse osmosis, deionised water or tap water conditioner
- Heater, thermometer and hydrometer
- Filter and protein skimmer

**Before purchase ensure that:**

- The aquarium is well established.
- Water parameters are as advised.
- This organism is a suitable addition to your aquarium.



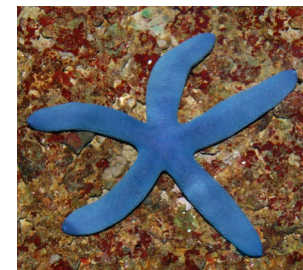
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**How to  
care for...**



**Starfish, Sea Urchins  
and Sea Cucumbers**

## Introduction...

All of these species belong to the echinoderms, and all show a five-fold symmetry of the body, although this is less obvious in sea cucumbers.

They are found throughout the oceans' depths, although the ones associated with the aquarium industry are found predominantly in tropical coral reefs.

## Water requirements...

Some of the species in these groups demand very good water quality, therefore the parameters are recommended to be within the guidelines below, although some animals are able to acclimatise to different water:

Temperature: 23-26°C

Ammonia: 0mg/l (0.01mg/l may be tolerated for short periods)

Nitrite: 0mg/l (0.125mg/l may be tolerated for short periods)

pH: 8.1-8.4

S.G: 1.020-1.026 at 20-25°C

## Biology...

All echinoderms contain a unique water system known as the ambulacral system. This is used to aid locomotion, feeding and respiration. This system is characterised by the tube feet found on all species.

Size range varies enormously between groups. The most common aquarium species, however, are not huge and therefore will not often outgrow an aquarium.

All echinoderms are capable of regeneration, that is to say any damage caused either from predators or in defence can be re-grown relatively quickly. They also use this mechanism during asexual reproduction.

The sea urchins have a unique feeding apparatus known as the Aristotle's Lantern. This is located underneath the animal and is made up of five calcium carbonate "teeth" which are used to grind food.

Echinoderms are unusual as they tend to have five or multiples of five appendages. This is known as penta-radial symmetry, the Sunflower starfish may have up to 25 legs! It is unusual in the animal kingdom as most other animals have pairs of appendages.

## Aquarium requirements...

The majority of the species in these groups are relatively small, however due to their intolerance of poor water, they should never be added to a new set-up. Ideally, it would be best to provide them a stable mature reef aquarium, from a nano to larger set-ups so in which the water parameters remain stable.

A suitable marine substrate is essential and a large reef or live rock base is advised. These organisms are active in tanks and shelter provided by the rocks is beneficial.

The aquarium should include adequate marine lighting and filtration. A hydrometer, thermometer and a UV steriliser are beneficial. Be careful to ensure all power heads and outlets are covered as sea cucumbers are capable of flattening and squeezing their bodies through very small gaps.

If keeping some of the sea cucumber species protein skimmers are essential. The skimmer can quickly remove the toxins that some of these species release if stressed.

## Maintenance...

At least every two weeks, a partial water change of 25-30% is strongly recommended (a siphon device is also useful to remove waste from the gravel). This helps to reduce the build-up of potentially harmful nitrates and other pollutants. Replacement water should be dechlorinated using strong aeration or a tap water conditioner (if not using reverse osmosis water). Ideally, replacement water should be heated and enough salt should be added to achieve the correct salinity.

Filters should be checked for clogging and blockages. If the filter needs cleaning, then do not wash it using tap water; any chlorine present may kill the beneficial bacteria that has established within the media. Instead, it can be rinsed in tank water which is removed during a partial water change. This should reduce the number of bacteria lost.

Good husbandry is essential as invertebrates can be sensitive to even the smallest amounts of ammonia and nitrite. Test the water weekly to monitor ammonia, nitrite and nitrate, especially after initial set-up and after adding new fish. Don't forget to check the salinity as this may increase due to evaporation of water.

These invertebrates are highly sensitive to copper which can be found in some fish medications. If a medication is required, consult your retailer to obtain a copper-free medication.

## Feeding...

Predominantly these animals feed upon detritus in the wild. This can make them particularly welcome additions to mature set-ups as they can "hoover" the substrate and remove waste.

However some, for example the green brittlestar, will eat aquarium fish when the lights go out at night. This species may start as a small brittlestar but be warned it will quickly grow and can predate upon small fish and invertebrates.

The addition of most aquarium foods should be sufficient to maintain these animals. Food which sinks to the bottom of the tank will readily be scavenged. This includes shrimp, mussels, algae and marine flake. Feed these animals 2-3 times a day remove uneaten food to reduce waste build up.

## Common problems...

A water quality problem will affect echinoderm behaviour and can be shown by loss of colour, reduced feeding and erratic movement. Immediately test the water if any of these symptoms are shown. Poor water quality is the main cause of disease outbreak in aquariums.

If in doubt ask your retailer for advice.

## Compatibility...

Echinoderms are more difficult to keep due to the extremely good water quality they demand. For this reason they are not recommended for beginners.

Some urchins can cause damage to rock and coral through the use of the Aristotle's lantern and some of the more aggressive brittle stars can make light work of small fish. Sea cucumbers should not be added to tanks where they may be damaged by large aggressive fish or threatened as this can lead to them releasing toxins.

## Breeding...

It is unlikely that successful breeding of any of these species would be achieved in an aquarium. In the wild the reproductive strategy involves a prolonged period of larval development in the plankton.

Occasionally starfish and brittle stars have reproduced asexually via budding from the side of their body.