Tropical Marine Invertebrates
How to care for starfish, sea urchins & sea cucumbers

Starfish, sea urchins and sea cucumbers are all types of echinoderm. They are very diverse; some species can perform an excellent 'cleaner' role in the aquarium and others will exhibit interesting behaviours. As starfish, sea urchins and sea cucumbers are so diverse, they will have many different needs. Always consult your OATA retailer before purchasing any starfish, sea urchins or sea cucumbers to ensure they will mix with current tank mates.

Water requirements

Starfish, sea urchins and sea cucumbers are usually undemanding of water chemistry and their suggested parameters are shown below. These parameters are a general guide for this group of invertebrates, so it is important to check with your OATA retailer for any species-specific requirements before purchasing. Please also note that if keeping these invertebrates in a reef aquarium, some parameters will need to be altered to accommodate more sensitive species.

Salinity:	Between 1.023-1.026
Temperature:	Between 24-26°C
pH:	7.9-8.3
Ammonia:	Zero mg per litre
Nitrite:	Zero mg per litre
Nitrate:	Not to exceed 50 mg per litre
Carbonate hardness:	Hard (8-12°dkH)
Calcium:	Between 380-450 ppm
Magnesium:	Between 1250-1350 ppm

Biology

Starfish, sea urchins and sea cucumbers are all echinoderms and show radial symmetry in their bodies, i.e starfish have evenly spaced arms. There are many different species of starfish, sea urchins and sea cucumbers found in marine aquariums. Popular starfish species include the blue starfish (*Linckia laevigata*), red starfish (*Fromia indica*) and sand sifting starfish (*Archaster typicus*). Popular urchins include tuxedo urchin (*Mespilia globulus*), long spine urchin (*Diadema setosum*) and pin cushion urchin (*Lytechinus variegatus*). Popular sea cucumbers include the yellow cucumber (*Colochirus robustus*) and sea apple (*Pseudocolochirus violaceus*).

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Starfish, sea urchins and sea cucumbers vary in size: the long spine urchin can grow spines up to 25cm long whereas the yellow sea cucumber is unlikely to grow over 7cm. Some starfish, sea urchins and sea cucumbers perform a function in the aquarium. Sea urchins are generally good for grazing algae within the aquarium, the sand sifting starfish is often used to keep the sand bed clean and brittle stars are excellent scavengers. Other species are simply ornamental.

Some species, particularly smaller individuals, are unlikely to live longer than three years, but other species can live for many years in a well-matured set-up with good water quality.

Generally, starfish, sea urchins and sea cucumbers are not social animals and so can be kept singly. They are also not territorial and so can be kept in groups, providing there is enough food availability for all individuals. As starfish, sea urchins and sea cucumbers are invertebrates, copper is toxic to them and care should be taken when using treatments in the aquarium or introducing fish from retailers that use copper in their systems.

Sea cucumbers can emit a toxic substance if stressed, and urchins have sharp spines. Therefore, they should be handled carefully, see our *Hazardous Aquatic Animals* for guidance. Please read this guidance so that you are aware of what actions to take should you or anyone else be harmed by these species. It is best practice to have a sign on the front or lid of the aquarium, warning people what hazardous species are in the aquarium and the risks they pose.

Aquarium requirements

As a general rule, you should within reason, buy an aquarium as large as possible. It is recommended that an aquarium of at least 60 litres is used for smaller species. Larger starfish, sea urchins and sea cucumbers will need a larger aquarium, the size of which will vary by species, so ask your OATA retailer for advice. Whatever the size, **a filter is essential**. For marine set-ups this can be in the form of live rock with sufficient water flow, an internal or external filter, or a sump-based filter. A protein skimmer can also be beneficial for maintaining water quality as it will help to remove dissolved organic waste before it can break down into more harmful substances.

Starfish, sea urchins and sea cucumbers are undemanding of décor and need very little. Live or artificial rock is essential as it will provide opportunities for grazing and cover. Some starfish may require a sand bed for them to hide in and feed, so the aquarium should have at least 4cm of coral sand on its base. There should be a moderate water flow to provide good surface movement and to ensure detritus doesn't accumulate.

A heater is required to maintain a suitable temperature all year round. To minimise fluctuations in water temperature, the aquarium should not be situated near any draughts or heat sources. It should also be out of direct sunlight and away from loud noises, vibrations and sudden movements. Overhead tank lighting is recommended to maintain a correct day-night cycle. This will not need to be particularly bright for starfish, sea urchins

and sea cucumbers species but may need to be brighter if keeping with coral species - see our coral care sheets for more information.

Water testing kits are essential so that water quality can be checked on a regular basis (once a week) to ensure it does not slip below the water requirements stated above.

Introducing your starfish, sea urchins or sea cucumber

Before adding any invertebrate, seek advice from your OATA retailer to make sure that your aquarium is appropriate for the starfish, sea urchins and sea cucumbers you would like to keep. Check that the water quality in your aquarium is suitable i.e. levels of ammonia and nitrite are zero. Only increase the number of livestock you have in your aquarium slowly as the population of beneficial bacteria established when maturing your aquarium filter need to increase every time more livestock is added and feeding increases. Overstocking or stocking your aquarium too quickly can result in 'new tank syndrome'. This occurs when there are not enough nitrifying bacteria to cope with the increased waste from the livestock, leading to unhealthy levels of ammonia and nitrite, which may cause invertebrates to become ill or die.

Your OATA retailer will usually sell your starfish, sea urchins and sea cucumbers to you in a plastic bag, try not to keep them in this for too long. Once purchased, take your new invertebrate home as quickly as possible because they are easily stressed by bright lights, extreme temperatures, noise and movement.

Once home, your invertebrate will need to acclimatise to their new environment and a common method of doing this is known as the 'floating bag' method. Switch off the aquarium lights and take the bag containing your new invertebrate out of its outer wrappings carefully, avoiding exposure to bright light. Float the bag in the water of your tank to ensure the temperature in the bag is the same as the aquarium water. After 10 minutes, slowly introduce small amounts of aquarium water into the bag containing the invertebrate for up to an hour. Invertebrates will struggle with changes in water chemistry more than fish and so good care should be taken during the acclimation process. Once complete, carefully place the starfish, sea urchins or sea cucumber into the aquarium whilst introducing as little bag water into the aquarium as possible. After this, dispose of the bag and any excess water appropriately.

For very sensitive species, a better method might be the use of drip acclimation. This could be achieved by keeping the starfish, sea urchins or sea cucumber in the container in which it is sold and a small airline siphon started to drip water into the container, slowly changing the water parameters to that of the aquarium. Ensure that the temperature does not fall too low during this procedure. Once conditions match, carefully remove the invertebrate from the container and place it in the aquarium. Dispose of the water in the transport container appropriately. Monitor your new invertebrate carefully for the first week, paying particular attention to water quality. If in doubt, contact your OATA retailer for advice.

If possible, quarantining new livestock in a separate aquarium for at least a week before they enter the main tank can help reduce any risk of disease spread from new inhabitants. Ask your OATA retailer for advice on this topic.

Maintenance

At least once every week, a partial water change of 25% is strongly recommended (a siphon device is useful to remove solid waste from the gravel). Filters should be well maintained, with regular checking and cleaning to prevent blockages. If the filter needs cleaning, do not run it under the tap because any chlorine or chloramine present may kill the beneficial bacterial population that has established in the media. Instead, it should be rinsed lightly in the tank water which is removed during a partial water change as this reduces the amount of bacteria which are lost. Protein skimmers should be regularly cleaned to maintain their performance

Good husbandry is essential as starfish, sea urchins and sea cucumbers can be stressed by even the smallest amounts of ammonia and nitrite which may then cause them to develop various diseases. Test the water to monitor the ammonia, nitrite and nitrate levels, together with pH and carbonate hardness every week, especially during initial set-up and after adding extra livestock. It is also important to regularly monitor salinity and use reverse osmosis water to replace any water lost through evaporation.

What to watch out for

All animals will have slight variations in their behaviour or appearance, but keeping an eye on any changes in the following will help to identify any potential problems before they become a real health issue:

- behaviour – reduction in activity levels or no movement at all
- colour – turning a darker or paler colour than normal
- appearance – development of fluffy growths, a “slimy” texture or loss of body parts
- feeding – reduced intake in food

If you are concerned about the health of any of your livestock, then test your water quality and contact your OATA retailer for further guidance.

Feeding

Starfish, sea urchins and sea cucumbers vary in their dietary requirements. Starfish have varying dietary requirements: some like brittle stars are omnivorous and will eat small amounts of frozen meaty items such as brine shrimp or mysis shrimp and prepared foods like flakes. Others will consume algae and biofilms on the glass and live foods in the sand bed. These species should only be placed into mature aquariums where these foods have

had time to grow. Some species of starfish, such as the chocolate chip starfish (*Protoreaster nodosus*) can be destructive and consume sponges, tube worms and other starfish. Urchins are herbivorous and are often used to control algae, but should be supplemented with nori algae sheets if there is insufficient in the aquarium. Some feather stars and most sea cucumbers are planktonic feeders and will require small particulate feeds in the form of prepared powdered feeds, phytoplankton or small frozen meaty items such as copepods.

As many starfish, sea urchins and sea cucumbers graze throughout the day, it is not possible to say how many times they should be fed. This will also depend on what natural food items are in your aquarium. Additional feeds should be given twice a week, but this might vary depending on the species. Take care not to overfeed as this can lead to a build-up of uneaten food which breaks down releasing toxic waste into the water. If in doubt, ask your OATA retailer for advice on appropriate feeding levels.

Compatibility

Starfish, sea urchins and sea cucumbers should be mixed with other species carefully. They will mix with fish considered "reef-safe", but other species such as triggerfish may predate on them. Harlequin shrimp (*Hymenocera picta*) predate exclusively on starfish and so should not be mixed. It is also important to check the starfish you are interested in is reef-safe. Always check compatibility with your OATA retailer before introducing any starfish, sea urchins and sea cucumbers into your aquarium.

Breeding

All starfish, sea urchins and sea cucumbers release sperm and eggs which will fertilise in the water column. When they hatch, they produce small planktonic larvae that naturally drift in ocean currents until they reach an adequate size to settle. In an aquarium setting, they are likely to get sucked into filters and pumps or be eaten by other aquarium inhabitants. They also require specific live feeds and so a specialist set-up is required to raise them to adulthood.

Checklist

Before purchase make sure:

1. You have the appropriate equipment and position for the aquarium.
2. You have researched all the species in which you are interested and your final choices are all compatible.
3. You are familiar with how to transport and release your fish.
4. You are aware of the daily, weekly and monthly maintenance your aquarium will require.
5. You are prepared to look after your fish properly for the duration of their life.

Shopping List

- Glass or acrylic aquarium
- Filter*
- Heater*
- Lighting*
- Gravel or sand
- Aquarium salt and a hydrometer or refractometer
- Access to reverse osmosis water or a reverse osmosis unit
- Water testing kits (ideally ammonia, nitrite, nitrate, pH and water hardness)
- Gravel cleaner/siphon cleaning device (recommended)
- Aquarium decorations
- Bucket for water changes
- Live or artificial rock
- Protein skimmer* (optional but recommended)
- Ultraviolet steriliser (optional but recommended)

*may be included in branded aquarium sets but can be purchased separately.

Before purchase make sure:

- The aquarium is of a suitable size that ideally can accommodate the fish once they are fully grown
- Water parameters are as advised in this leaflet.
- Aquarium is cycled and ready to receive your animals.

Always buy...

test kits and regularly check the water for ammonia, nitrite, nitrate and pH. This will allow you to make sure the water in your aquarium is not causing welfare problems for your starfish, sea urchins & sea cucumbers.

Maintain...

the water in the aquarium within the accepted parameters highlighted above. You may need to do regular water changes to achieve this.

Never siphon by mouth...

A fish tank can harbour bacteria which can be harmful if swallowed. Buy a specially designed aquarium gravel cleaner which can be started or primed without the need to place the siphon in your mouth

Establish a routine...

for testing the water in your aquarium. Record your results to enable you to identify fluctuations quickly. Also check the temperature of the water.

Always wash your hands...

making sure to rinse off all soap residues, before putting them into your aquarium, or use long sleeved rubber gloves. Wash your hands again afterwards and certainly before eating, drinking or smoking.

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Five Welfare Needs Checklist:

The Animal Welfare Act 2006 states that all pet owners have a legal duty of care to their pets. Anyone who is cruel to an animal or is found not to be providing the five animal welfare needs, as listed below, can be prosecuted.

- A **suitable environment** e.g. appropriately sized tank (with water heater if tropical set up) within a suitable location in your home.
- A **suitable diet** which meets the needs of your chosen fish.
- **Behaviour** - Fish are able to exhibit their normal behaviour e.g. hiding places for timid fish, enough room for fish to swim freely.
- **Companionship** - Ensure you know whether your chosen fish need to be kept with, or apart from, other fish.
- **Health** - Protected from pain, injury, suffering & disease e.g. you are aware of the daily, weekly and monthly maintenance that your aquarium will need.

- **Water quality test kits are a necessity not an optional extra**
- **You must be prepared to look after your fish properly for the duration of their life and provide an aquarium which can accommodate your fish when fully grown**

*Never release your aquarium animals or plants into the wild It is illegal and for most fish species this will lead to an untimely and possibly lingering death. Any animals or plants that do survive might be harmful to our native countryside. Take care to properly dispose of any soiled substrate (e.g. sand or gravel) water or decorations so that non-native organisms do not enter natural watercourses.

Visit ornamentalfish.org to find a full range of how to guides and species-specific care sheets to help you look after your fish successfully.

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