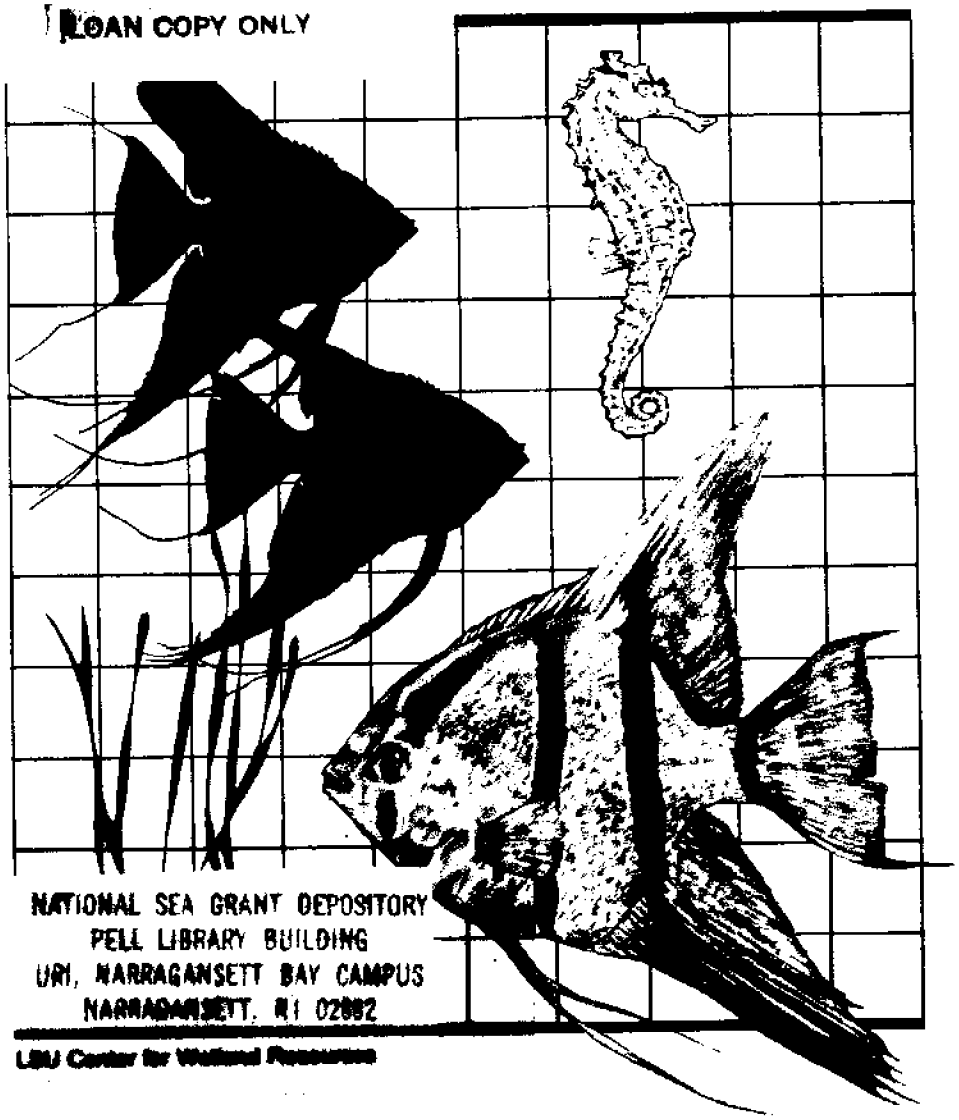
A GUIDE TO SALTWATER AQUARIUMS

Louisiana Sea Grant



LSU Center for Wetland Resources

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This publication was produced by the Louisiana Sea Grant College Program, a part of the National Sea Grant College Program, maintained by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, and by the State of Louisiana. Louisiana Sea Grant College Program, Louisiana State University Center for Wetland Resources, Baton Rouge, Louisiana 70803-7507.

Acknowledgement is given to the Sea Grant Programs of Mississippi/Alabama and Delaware for the use of their saltwater aquarium publications.

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STARTING YOUR AQUARIUM

Saltwater aquariums can be both a pleasure and a great learning experience. Many people mistakenly believe that saltwater aquariums involve too much work and require a scientist's expertise. There are a few things you need to know about setting up and maintaining a saltwater aquarium, but once you get started, your aquarium will demand little time and upkeep.

Marine animals need a clean environment. In the sea, naturally produced bacteria and algae dispose of the wastes produced by marine animals, because they use the wastes as food for growth. In an aquarium the same thing happens.

Algae grow easily; in fact, it's hard to discourage their growth. In addition to removing wastes from the water, algae provide food for fish and other aquarium animals.

Bacteria in an aquarium need to be cultivated and require three things to form: a material to live on (e.g., gravel); food (animal wastes); and oxygen.

EQUIPMENT

The first step in starting a marine aquarium is purchasing the right equipment. Like all living organisms, marine life has four basic needs—oxygen, space, food, and light—and one special need—saltwater.

There are many pet shops that sell starter kits for marine aquariums. The following equipment is basic for launching a saltwater aquarium hobby.

Glass Tank

Whether you buy or choose to make your tank, it is imperative to remember that the tank should be made entirely of glass. Metal is poisonous to marine life in an aquarium.

The size of the tank primarily depends on the number of organisms that are to live in this environment. For a marine aquarium, never buy a tank smaller than 10 gallons. A good rule of thumb is 1 inch of fish per 2 gallons of seawater. (Remember, a 20-gallon aquarium will not hold 20 gallons of water plus equipment.) A good starting size is a 30-gallon tank, which would hold roughly 26 gallons of water.

There are basically two styles of aquariums: tall and deep, and low and wide. The latter size is the best, as it has more surface area exposed to air, and more bottom area for algae and bacteria growth.

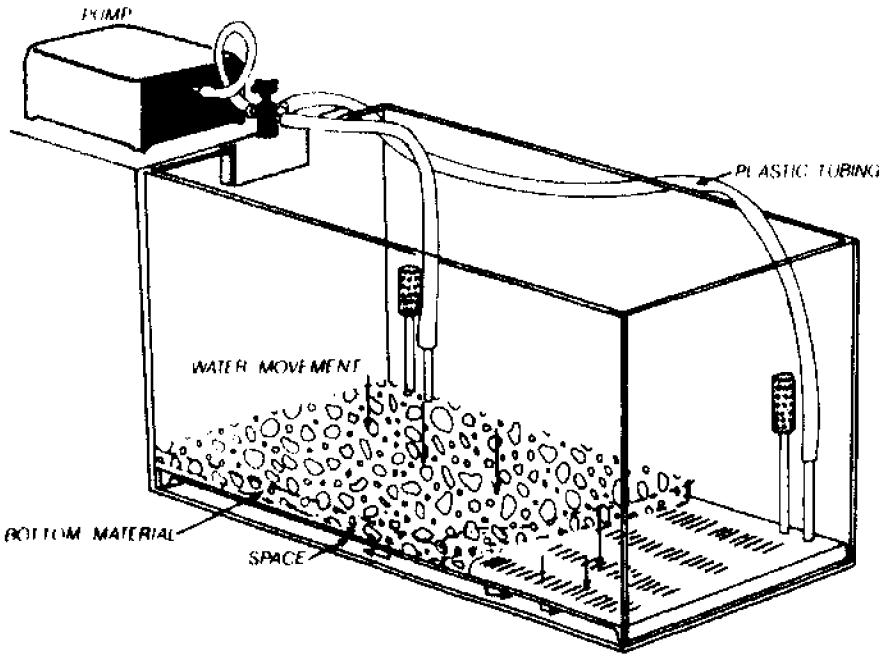
Many tanks are also sold with a recessed ridge at the top to hold a glass cover. This is an added convenience you might want to consider.

If your tank leaks when you get it home, don't try to fix it. Return it to your place of purchase for a replacement.

Undergravel Filter

This filter may be the single most important component of your system. The undergravel filter is responsible for keeping the water clean. The filter consists of a perforated sheet of plastic placed over the bottom of the tank. Several air-lift tubes are attached to the plastic sheet and open into the water under the filter. The pump that runs the filter should be placed higher than the upper water level. If the pump is below the water level, salt could travel through the tubes and into the pump. Also, in the event of an electrical failure, water won't back up into the pump.

The compressor pumps air down the tube while air mixed with water is flowing up the air-lift tubes. This pulls water up from below the filter and replaces it with water that has filtered through the gravel. The result is a continuous current of water passing through the gravel.



Outside Filter

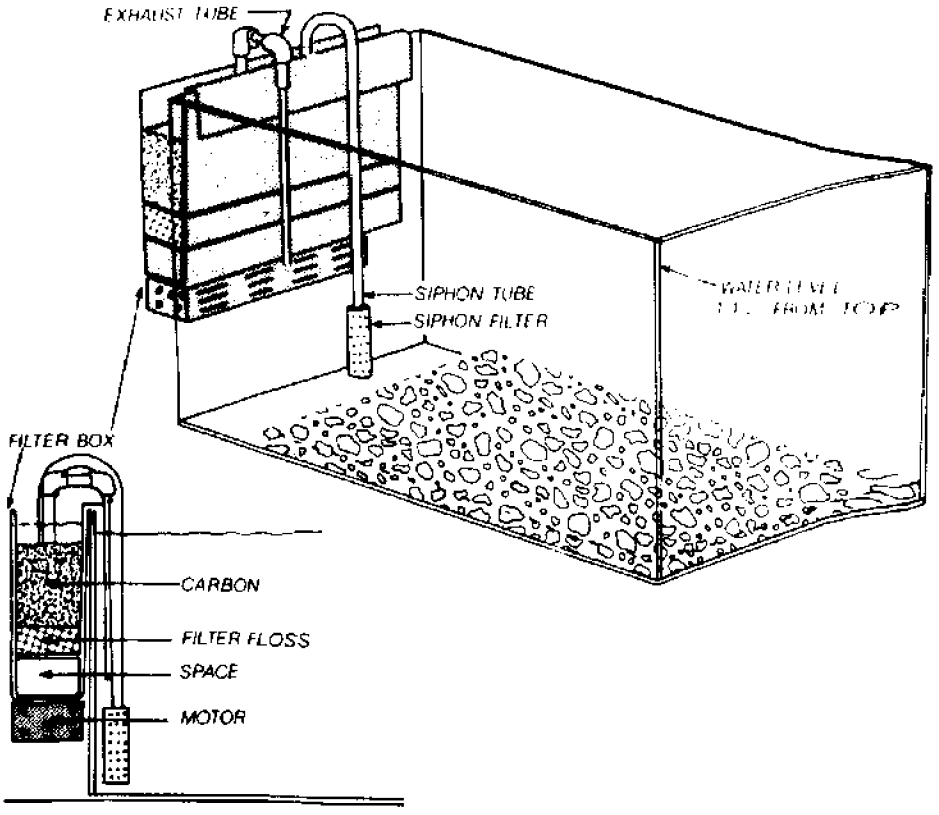
The outside filter is made to hang on the back of the aquarium. Whether air-driven or powered by a motor, the filtering units contain two filtering media: activated carbon and filter floss.

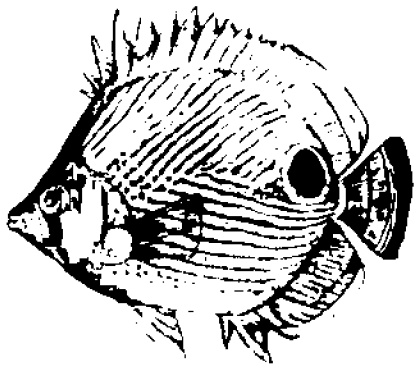
Activated carbon is a high-grade charcoal that absorbs organic wastes. Make sure you use carbon and not charcoal, as carbon lasts longer and is more effective in saltwater. The carbon should be changed at least monthly because its waste removing capacity will steadily diminish.

The bottom layer of filter floss can pick up the particles missed by the carbon. The filter floss (spun polyester, *not* spun glass) traps suspended sediments like leftover food and feces.

After the water moves through the filtering media it is pumped into the aquarium via the exhaust tube. Both the siphon tube (brings the water into the outside filter) and the exhaust tube should be above the water level for maximum effectiveness.

Frequent cleaning of the filter should not be necessary. Its effectiveness will depend on the rate of flow of the water through the filter and the quality and freshness of the carbon or floss.





Substrate (Sand, Gravel, Etc.)

The type and size of the gravel you use will help determine the effectiveness of the undergravel filter. Don't use sand or loose gravel or shell. Fine sand gets clogged with food because the spaces between grains are too small, while large gravel or shell won't trap particles.

The best material to use is coquina shells, calcified algae, crushed coral, or dolomite. All of these are calcareous materials that act as a buffer to maintain a constant pH (the indicator of acidity of the water). Do not use colored rocks or sand because they may contain preservatives that are toxic for marine animals.

If you collect your own material, you must collect it with nonmetal containers and equipment, and sterilize it before adding it to the tank. To sterilize, pour the material into a large plastic bucket (fill only ½ full). Flush the material clean with a garden hose. If you stir with a stick, the debris and organic material will float up and over the edge of the bucket. When the water is clear, drain the bucket, and scatter the material outside over a table or plastic sheet for drying. Allow to dry in the sun for at least one week.

You will need enough material to cover the sides of the tank and the filter to a depth of at least 4 inches. To calculate how much material you need, divide the height of your aquarium by 4 inches. Then divide this answer into the number of gallons held by the tank. (Ex: 16 (inches) ÷ 4 = 4, 30 (gals.) ÷ 4 = 7.5 gallons of bottom material.)

Heater

A heater is necessary for tropical animals. Fluctuating temperatures lower a fish's resistance to disease and can increase parasite growth. A long heater placed down the side of the tank will insure constant temperatures from top to bottom.

The water temperature range is 70-75°F (21-24°C) with 73°F (23°C) being the standard.

Cover and Light

A cover on the tank will decrease the evaporation rate, keep fish from jumping or climbing out of the tank (octopuses and eels are notorious for escaping), retain heat, and keep foreign matter out.

A light is not only good for bringing out the brilliant colors of exotic marine fish but it also encourages algae growth. Fluorescent light burns cooler and lasts longer; incandescent light gives off a more natural light but burns hotter. It is best to avoid direct sunlight since it cultivates an overabundance of algae.

Hydrometer

A hydrometer is necessary to measure the specific gravity (density) of the water. It floats in the water and its height indicates the water's density. Saltwater weighs more than fresh water, and when the hydrometer sits too high it means the water is too salty. The ideal reading should be 1.0252—the normal specific gravity of normal seawater. A reading of 1.020 means the water in the tank is 1.020 times heavier than the same amount of distilled water. This corresponds to 34 ppt (parts of salt per thousand parts of water).

Water

Seawater for the aquarium can be either natural or synthetic. Whichever you decide on, it's important to remember that marine animals cannot tolerate fluctuations in their environment.

Natural sea water: This water must be collected from nonpolluted areas using noncorrosive materials. Nearshore water tends to be contaminated with various chemicals and metals that react with salts in seawater. Fish collected from this same area may do well; however, exotic species that don't live in the water collected will not do well. (If you intend to keep exotic tropicals it is suggested that you use artificial seawater.)

When you get the water home, filter it through a funnel containing dacron floss or several layers of clean cloth. Store the water in a plastic bucket (with the cover on) for two weeks. This should kill most of the microorganisms and algae in the seawater.

Synthetic seawater: Artificial sea water is made by adding packaged ocean salt (available at pet stores) to tap water. Before adding the salt, remove the chlorine from the tap water. Pour the tap water into a plastic bucket and let stand for two days. Add the salt according to the package instructions.

pH

The pH or the acidity of water must be monitored to give you an idea of what's happening with waste removal. PH is measured on a scale of 0 to 14. Below 7 indicates acidity, above 7 indicates basicity. For a properly functioning aquarium, the water should be between 7.5 and 8.3. PH is rarely a problem; however, if the reading is 7.5 or lower, replace half of the water with new seawater.

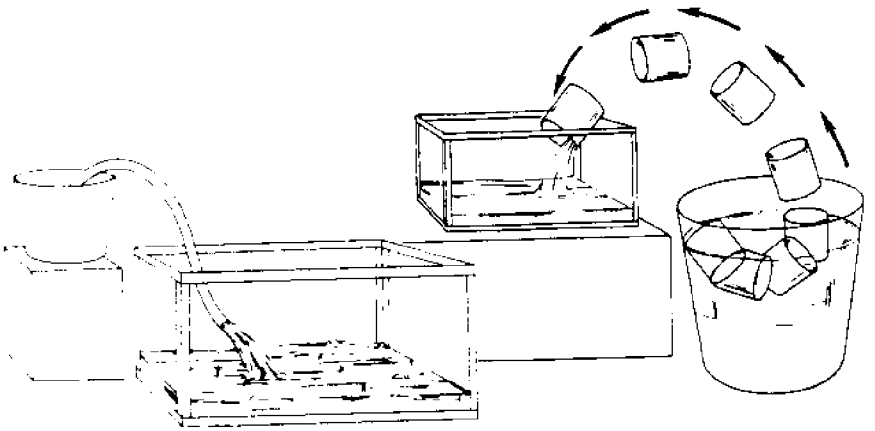
SETTING UP THE TANK

Filling the Tank

Place the tank on a heavy-duty stand (a tank with water weighs 10 pounds per gallon) away from direct sunlight. Rinse tank, filter, and equipment. Test for possible leaks in the tank by filling the aquarium to the top with tap water and allowing it to stand for 24 hours.

Next install the undergravel filter according to the manufacturer's directions. Add the gravel, bottom material, and any decorative items.

Slowly add the seawater, either by siphoning or by using a plastic bucket (see illustrations). Fill the aquarium to at least 1½ inches from the top. Place a piece of tape or mark at the water level for an evaporation indicator.



Once the aquarium is filled with water, start the air in the air lifts. Check the air tubes for leaks. Turn the lights on and leave them on until you add the animals.

Algae growth should form on the inside of the glass within one week. Remove algae off the front glass (for better visibility) by using a nylon cleaning pad and teflon sponge. Once the algae form, the tank is ready for the animals.

Conditioning the Aquarium

A conditioned aquarium occurs when the bacteria in the undergravel filter are converting toxic animal wastes to harmless compounds at about the same rate as wastes are being produced. The fish you place in the aquarium will produce wastes, thus encouraging colonies of bacteria to multiply. Acquiring a dense population of bacteria is essential in assuring a stable marine environment.

There are two methods of successfully conditioning the filter. Both are time-consuming but each will get the colonies of bacteria started.

Overloading: Add only animals to the aquarium that can tolerate high levels of ammonia. Allow these fish to remain in the tank for about three weeks to build up wastes. Crabs, tautogs (black fish), minnows, eels, terrapins (marine turtles), and black mollies are good to use.

Gradual loading: Add delicate animals (damsel fish) slowly, one fish per week for a 10-gallon aquarium. In this method conditioning will take four weeks. It is always a good idea to feed the other fish prior to adding a new fish.

Both methods can be speeded up by adding several handfuls of sand from already conditioned aquariums.

ANIMALS

A general rule is 1 inch of fish per 2 gallons of water. If you exceed the tank capacity, the fish can become overly aggressive and spread diseases more quickly and the tank will have to be cleaned more frequently.

Many people narrow their selections only to fish, but invertebrates should also be considered.

Molluscs: snails, clams, squid, octopuses, and nudibranches. Certain snails, like periwinkles and mud snails, eat algae and detritus (partially disintegrated particles of animal wastes that settle to the bottom), while other, predatory snails bore through clam and oyster shells and eat the soft insides. Bivalves (clams, oysters, and mussels) filter out single-celled algae from the water using it as food. Squid and octopuses are cephalopods and are considered by some to be the most intelligent of invertebrates. Octopuses can only be kept in an aquarium with a tight-fitting lid to prevent them from escaping. They feed on live crabs and chunks of fish. Squid will not do well in an aquarium. Nudibranches are shell-less molluscs and can be extremely beautiful in color and shape.

Echinoderms: starfish, sea urchins, and sea cucumbers. All three of these are good choices as they are easy to keep. Starfish are notorious predators of oysters and clams, but can be coaxed to eat small pieces of chopped clam or fish. Sea cucumbers are shaped as their name implies. They feed by burrowing through sediment like an earthworm, taking out nutrients. Sea urchins resemble pincushions and eat algae and detritus.

Cnidarians: jellyfish, corals, sea anemones, and hydroids. The most suitable members of this group are the sea anemones. These primitive animals are remarkably diverse in color and form. Most types

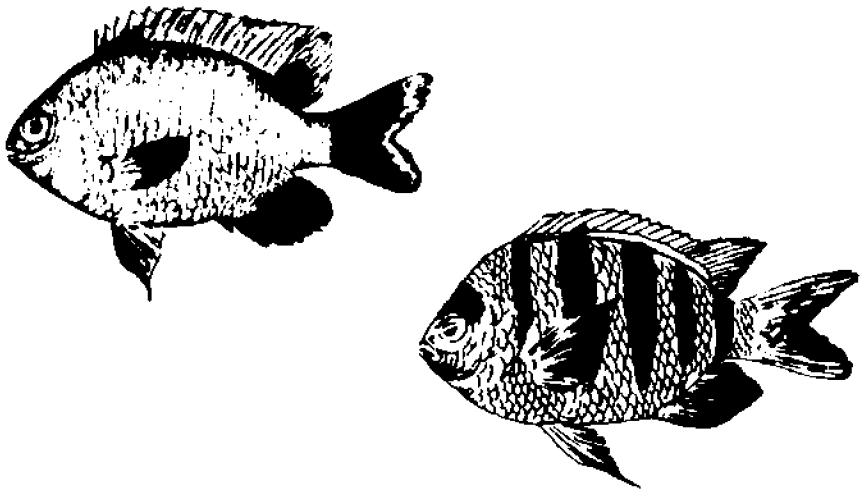
apture their prey (usually unlucky fish) by stinging when the animal touches their tentacles (human skin is usually too tough to be affected). Most fish seem to be aware of the danger and keep a safe distance. Several tropical fish have evolved an as yet unknown immunity to the sting of the sea anemone's tentacles. An example is the clown fish that lives among the tentacles of large Pacific anemones. This interesting combination makes a spectacular and easily maintained aquarium exhibit. Anemones need to be fed only once a week.

Polychaetes: worm rock, tube worms. These are often inappropriately termed "worm coral." They feed by filtering algae and microscopic animals from the water. Brine shrimp are a good source of food.

Crustaceans: crabs, shrimp, lobsters, and barnacles. Crabs are known to be efficient scavengers and are essential in maintaining a clean aquarium. But some, like the blue crab, are quite adept at predation. To avoid problems, don't keep any of these, unless they are very small. Hermit and spider crabs are relatively docile and well-suited to confinement. If there are no large fish and an adequate algal growth, shrimp will do well. Although it's not as obvious, barnacles are crustaceans, too. They feed through the water, removing small particles. Large lobsters are too agressive for an aquarium.

Vertebrates: marine terrapins. These should not be confused with box turtles or freshwater turtles. The marine species can be fed chunks of fish, clams, and shrimp.

Fish: Tropical fish are the most colorful and active animals. Damsel fish are probably the hardiest. They are very active and will chase other fish of any size. Surgeon, clown, and butterfly fishes are docile and very compatible (the butterfly can be a temperamental eater). Angelfish are highly territorial and aggressive. Cleaner wrasses



are beneficial as they eat parasites from fish. Listed below are some suggested groupings:

10-Gallon Aquarium:

1 Black Angelfish (2 inches)
1 Queen Angelfish (1½ inches)
4 Surgeon Fish (½ inch)
2 Coral Shrimp
1 Damsel Fish (½ inch)

or

2 Butterfly Fish (2 inches)
3 Neon Gobies
1 Black Angelfish (1½ inches)
1 Queen Angelfish (1 inch)
1 Hermit Crab (1 inch)
1 Cleaner Wrasse

15-Gallon Aquarium:

6 Clownfish (1 inch)
1 Black Angelfish (1 inch)
3 Neon Gobies
1 Small Spider Crab
1 Sea Anemone
1 Cleaner Wrasse

or

6 Large Sea Horses
1 Cowfish (1 inch)
1 Spider Crab

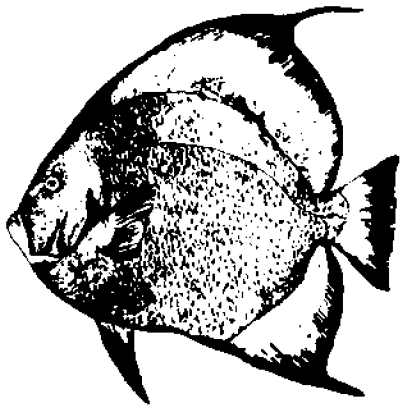
30-Gallon Aquarium:

1 Queen Angelfish (4 inches)
1 Black Angelfish (3 inches)
5 Neon Gobies
5 Sergeant Majors (½ inch)
1 Damsel Fish

or

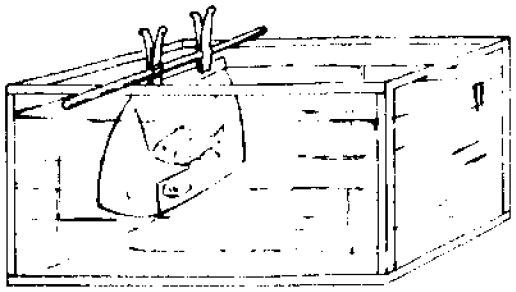
8 Clownfish
3 Butterfly Fish
4 Neon Gobies
1 Spider Crab
1 Black Angelfish (1½ inches)

When buying fish make sure you select a reputable aquarium dealer. Inspect the aquariums in the store for proper aeration and filtration. Make sure the fish's colors are bright and clear, with no blemishes or white spots. Look closely at the fish to insure that it is not breathing rapidly or swimming erratically.

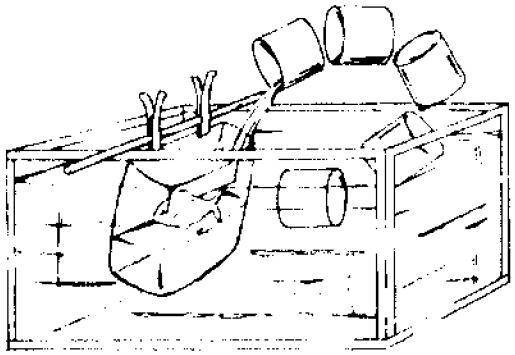


After you have picked out the fish you want, the animal should be placed in a plastic bag of seawater. The bag should not be entirely filled with water, as it is important to leave an air space after the bag is sealed. Follow the steps below when adding fish to your aquarium.

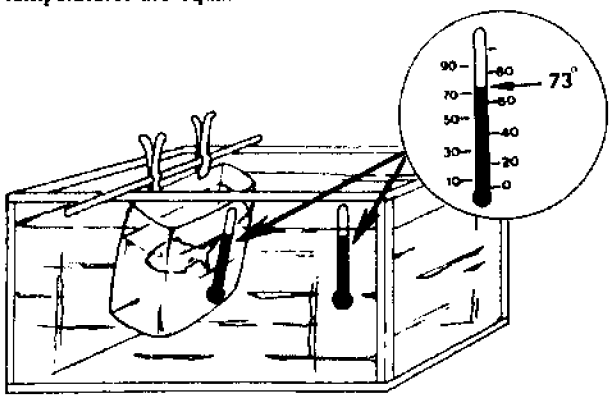
Adding the Aiminals to the Tank



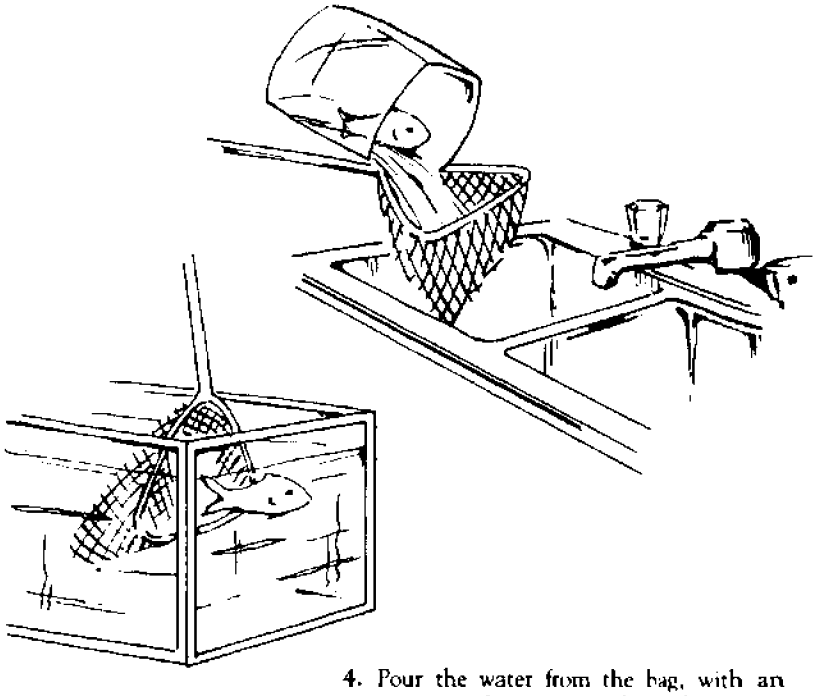
1. Float the bag (with the animal) with an airstone for weight, in the aquarium.



2. Pour ½ cup of aquarium water into the bag. Repeat every 15 minutes until the water temperatures are equal.



3. Leave the fish in the bag for an additional half hour.



4. Pour the water from the bag, with an aquarium dip-net over the sink. Immediately, but carefully, place the dip-net into the aquarium. Do not tip the bag and let the animal swim into the tank (this will cause waste products to enter the aquarium).

Feeding the Animals

Fish eat continuously in the wild, so feed the fish small amounts twice a day. Remove uneaten food before it begins to decay.

It may take some period of experimentation to determine what and how often each fish eats. Some excellent foods to use are brine shrimp, mosquito larvae, and tubifex worms. Brine shrimp are available freeze-dried or as eggs that you can buy and hatch at home. Algae should be used at least three times a week to maintain the bright fish colors. Use dried flake food sparingly. Tongs and butterfly fish can eat spinach or lettuce. Sea anemones eat once a week; worms, scallops, or fish can be dropped directly into the anemone's tentacles.

TANK MAINTENANCE: POTENTIAL PROBLEMS

It's important to replace monthly about one-fourth of the water in the aquarium with fresh seawater. The water will not look clean and it will have a smell when it needs to be changed. To change, siphon one-fourth of the water out of the aquarium, and slowly add new seawater. Remember to keep a fresh supply in plastic buckets; don't add directly from the tap.

Some water will be lost through evaporation. Replace this water slowly (so as not to shock the animals) and be sure the temperature of the water added is the same as that in the tank.

Diseases

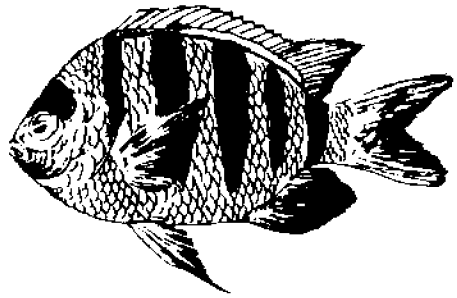
Fish are susceptible to a number of diseases. Most occur when the animal has been under stress: (1) placed in an artificial environment, (2) experienced changes in temperature, salinity, or pH, (3) fed a poor diet, or (4) frightened.

Two of the most common problems are as follows:

(1) "White spot disease." These white spots are tiny "oodinium" parasites. Infected fish usually breathe rapidly and scratch themselves against rocks and other objects. They are covered with small white or gray blisters.

To cure, put the infested fish in a separate tank containing 1 teaspoon of 1% copper sulfate solution to 1 gallon of sea water. Leave the fish in the tank for 1 week.

(2) Small, white bug-like animals on glass. These are copepods and they are not harmful to marine fish. These will appear just before the water becomes polluted, an indication that the water needs to be changed immediately.



SAMPLE MAINTENANCE CHECKLIST

	MONTH & DATE	Jan. 1	Jan. 2	Jan. 3	Jan. 4	Jan. 5	Jan. 6	Jan. 7	Jan. 8
Daily	Deaths	-0-	-0-	-0-	1 goby				
	Remove excess food	✓	✓	✓	✓				
	Check water temperature	✓	✓	✓	✓				
	Clean tank	✓	✓	✓	✓				
	Fish additions	crab	—	—	—				
Weekly	Water level	✓							
	Hydrometer reading	1.020							
	Clean algae off tank	✓							
	pH	7.5							
	Feed invertebrate	anemones							
Monthly	Replace ¼ water	2 gal							
	Change carbon and floss	✓							
	Oil power filters/mower	✓							

Comments Jan 5 - went out of town