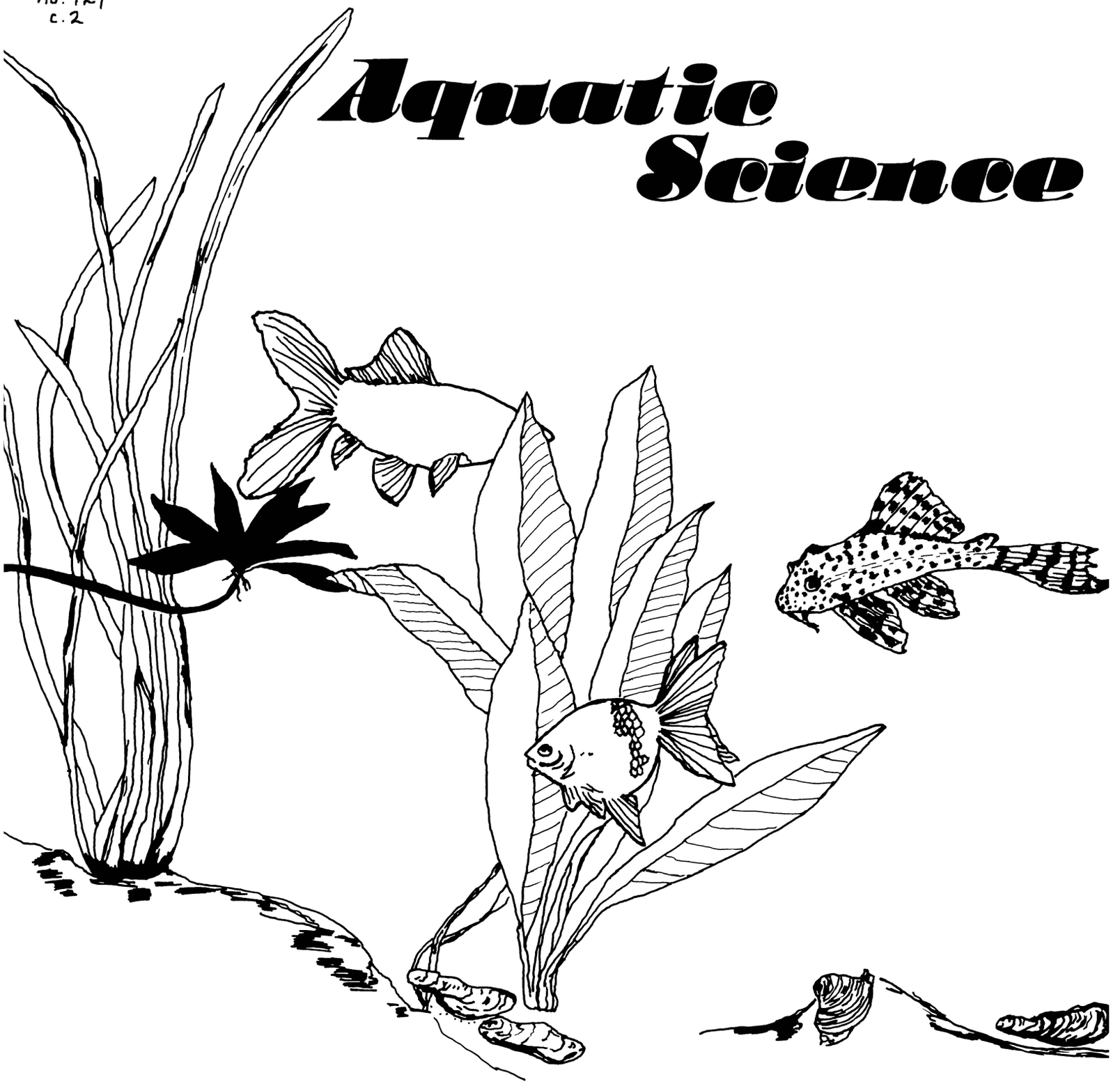
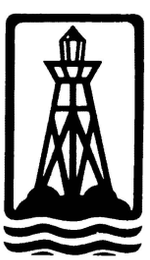
Aquatic Science



M 4-H--127



Sea Grant

Reprinted by permission from the Cooperative Extension Service.

Prepared by Richard Booker Virginia State College

Drawings by Susan Batchelder

Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, and September 30, 1977, in cooperation with the U.S. Departments of Agriculture and Commerce. M. C. Harding, Sr., Administrator, 1890 Extension Program, Virginia State College, Petersburg, Virginia 23803; W. R. Van Dresser, Dean, Extension Division, Cooperative Extension Service, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.

AQUATIC SCIENCE

Fish are lovely to look at, and with a little planning they can be inexpensive, easy, interesting, soothing, and educational. Of course, they can be expensive, troublesome, and messy... it's all up to you!

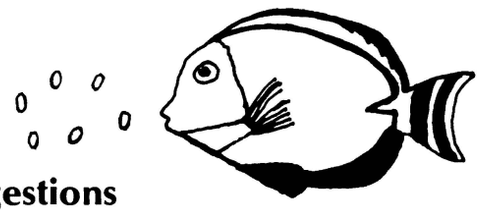
Fish are completely dependent upon you for their food and living conditions. If you develop regular fish-care habits, your fish will thrive. They tolerate occasional neglect if they are in good condition, but continual neglect will show clearly. Remember: they are living creatures! You may select this project if you give your fish regular meals, clean water, and interesting surroundings. How would you feel in a bare bowl, swimming in dirty water, hungry and not knowing when or if you would be fed? Your fish will be a reflection of the real you... careful or careless.

When you get to know your fish, you will find they have personalities. Even in a large aquarium, individuals will stand out and earn names for themselves: Baby, Grandma, Head Wife, Grumpy, Scaredy Cat, Big Papa.

Classes are divided by equipment and experience. Some of you will be meeting our tropical fish friends for the first time while others will already have equipment and perhaps some experience. Equipment will control the kind of fish you have, and experience will suggest what you do with them.

Beginners who want to continue their work with fish should start planning now. In fact, the fish you start with may dictate what you do the second year. If you want to try breeding, you will need a year for results.

Your library has many interesting books about tropical fish; ask the librarian to help you. They will be in section 597.074.



Suggestions

EQUIPMENT

Bowl... container without special equipment (use a bowl for goldfish only)

Aquarium... tank with accessories

EXPERIENCE

Beginner... at least one pair of fish with simple, appropriate environment (two fish if unable to sex). If you are using guppies, you will need three fish (two females and one male).

Advanced... above suggestions with a planned program, definite goals, and a statement of results.

EXHIBIT

Suggested according to experience grouping:

Beginners... Complete record page... identification of fish (number, species, sex... food and care record... anatomy picture and type if needed) Exhibit a specimen or pair which you have cared for at least four weeks.

Advanced... Complete record... Notebook with program plans, records, and results.. Fish appropriate to program

Examples of Advanced Programs

SIMPLE BREEDING (Short time)

Program... To start breeding records

Exhibit... Parents and selected young fish

ADVANCED BREEDING (a year or more)

Program... To breed for a specific trait (color or conformation)

Exhibit... Selected young fish

FEEDING EXPERIMENT (Short time)

Use two groups of fish. Suggestions: One group of fish could be fed live food. The second group could be fed regular dried types of food. IMPORTANT: Avoid feeding experiments that deprive the fish of food or that deliberately mistreat the fish. Your fish are living animals.

BALANCED AQUARIUM (Short time)

Program... To set up a near to balanced tank of fish and plants (A balanced aquarium is often stated as a desired goal; however, no such thing exists.)

LIVE FOOD RAISING (Short time)

Program... To raise live food

Exhibit... Fish fed on live food and sample of live food

PLANNING AHEAD

Let's think about the "home" you will have prepared for your fish when you get them. Try to allow one or two days for the fish tank to "season." This means that dissolved chemicals (chlorine and sulfur) can leave the water; bacteria have time to break down any detergents dumped in streams; the plants can get their roots settled; and, the rock dust has time to settle, leaving the water sparkling.

Here is a list of things you'll need to care for your fish in a bowl project. Additional items may be purchased for an aquarium. These include a light, pump, filter, etc. Items that are stored can be divided among your friends who have fish too.

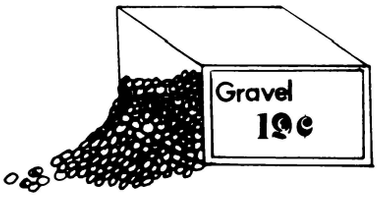
Salt (non-iodized)
Nylon Net or Cover
Siphon
Thermometer
Net
Gravel
Plants
Snails
Food

The size of the tank controls the number of fish you may keep in two ways: (1) the amount of water, and (2) the surface area. Fish need oxygen just like you do, but they take their air from the water. Putting too many fish in a tank is like putting too many people in a room. Too little surface area is like shutting all the doors and windows tight. Fill bowls only to the widest point and also allow at least two inches above the water line to keep fish from jumping out.

To find how much water you have available, measure the amount it takes to fill your tank to three inches from the top (allowing for two inches top space, one inch gravel). A gallon jar will hold six to eight neon tetras (a small, slender fish); two pair of guppies (small fish); two barba or goldfish (medium).

Overcrowding is usually detrimental. A pair of fish one inch in length requires a gallon of water (not more than two inches of fish per gallon if you have a pump and filter). A five gallon tank will house six pairs of fish together with the plants and other animals. The Labyrinth fishes who swallow surface air can take more crowding... male Siamese Fighting Fish are always kept alone in quart jars. They will kill one another if they are in the same container. It is best to allow fish plenty of elbow room until you have gained experience. Remember: fish grow and multiply! Live plants increase the available oxygen, as does an air pump.

Here is a good way to sterilize your tank and check for leaks. Wash the bowl and any accessories such as castles or marbles. Put the accessories into the bowl and fill to the top with hot water. Add as much salt as will dissolve. Let the water sit for about one hour, then dip or siphon off the water if you have a tank to prevent springing the sides. Rinse with clean seasoned water and you are ready to set up for your fish.



Gravel

A 59-cent bag of colored gravel will do for two to six one-gallon jars. Solid colored gravel is better than multi-colored because you can spot dirt and uneaten food more easily. Use care in picking up rocks to add to the bottom of your tank. Many rocks are limestone and will make the water too alkaline. Some blue and green rocks have poisonous compounds. Marbles are better. Be sure that any decorations are **colorfast** and **insoluble**.

Net

It is best not to handle fish with your hands. Buy or make a small net (49 cents). Sometimes people handle fish with their hands, but only if their hands are wet before handling the fish.

Cover

A net cover will keep hands, cat paws, and foreign objects out. A half yard of nylon (15 cents) will do for several aquaria. A wad of extra net makes a fine cleaning cloth and a narrow piece can be pulled through dirty tubing with a piece of fine wire.

Food

There are many varieties of food. Carefully look them over and check with the clerk when you buy your fish. Some fish are top feeders, some eat only from the bottom, some prefer sinking pieces and other don't care. A small packet of food goes a long way. Perhaps you and your friends would like to buy several kinds and share them. This way you can have a variety of food without spending much.

Feed goldfish once a day. Tropical fish can be fed two to four times a day. You may feed them up to every two hours if you want quick growth but you **must** keep the feedings small. Be sure they clean up every bit in five minutes. Overfeeding is easy and dangerous.

Since goldfish do best in cold, non-heated water, they should not be placed with tropical fish. Most tropical fish require warm, heated water.

Plants

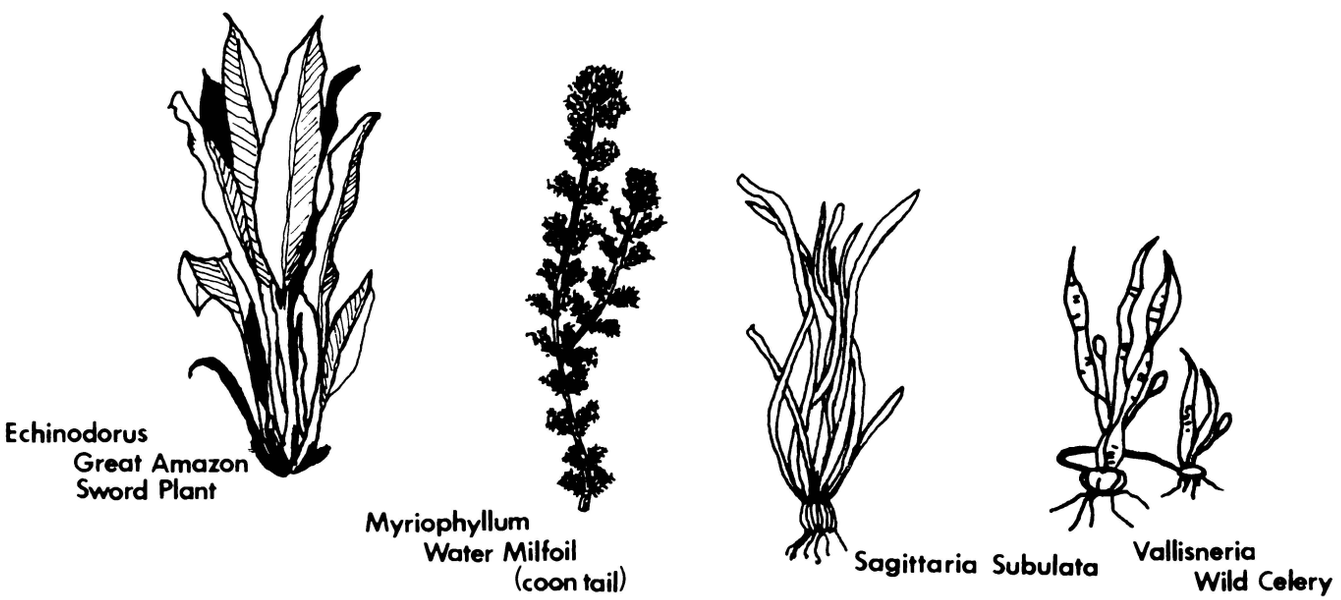
Plants increase the available oxygen in the water. Choose healthy plants with good color, clean odor, and no slime. Rooted plants will need one to two inches of gravel. Slant the gravel so it is deepest in rear; the dirt will collect at the front where it is easy to remove it. Place plants in the rear for background. Do not crowd plants as they, too, take water space and get food caught on their leaves. If plants are placed on the side with the most light, baby livebearers will swim into them for protection.

A 59-cent bunch of floating water plants will be enough for two to four bowls. While there are several plants that can be used, we would recommend the first plants be Anacharis, Cabomba, or Vallisneria, since these seem to be the hardiest plants.

Thermometer

An indoor or outdoor thermometer that you already have will do to check water temperature when you change or add water. You may want to get a small aquarium thermometer in order to keep a constant check.

Depending upon the kind of fish you raise, the temperature of the water can be a critical factor. Sudden temperature fluctuations may easily harm or kill your fish. If you are raising tropical fish, the temperature should be kept between 70° and 85° F. The ideal is about 75° F. Don't put tropical fish in water below 75° F. Goldfish do not need careful attention of temperature conditions as they may live in water from 50 ° to 75 ° F. or slightly colder.



Salt

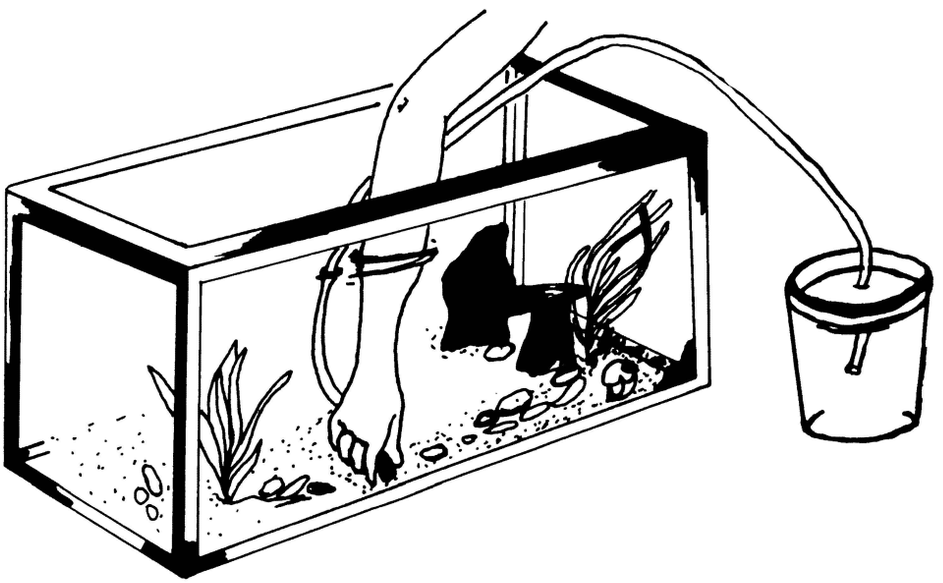
For 9 cents to 11 cents you can buy a box of plain, non-iodized table salt to use in cleaning your equipment. NEVER USE DETERGENT! Salt sprinkled on a clean cloth or wad of nylon net does an excellent job.

Sick fish can sometimes be helped by putting them in a solution of two quarts of seasoned water and one teaspoon of plain salt. Do this for one-half hour each day until the fish seems better. Plants can be rinsed in this solution when you clean the tank to get rid of food particles and algae growth. Finish by rinsing them in clear tap water.

Snail

Snails come large and small, and cost approximately 69 cents. You may find some on the plants that you buy. Baby snails look and feel like a fine grain of sand but grow quickly. They will be a nuisance if you do not control the number in your aquarium and get rid of the excess. They eat the food the fish leave and help clean the tank by removing the algae that forms on the side of the glass. Snail eggs should be allowed only in large tanks. For large tanks, large snails are good since they do not eat plants and do not reproduce rapidly.

You can use two snails per gallon of water except for the large snails. If they are used, you should not have more than three in a five gallon tank.



Siphon

Plastic tubing for a simple siphon can cost as little as 47 cents (plastic rope) or as much as $1.39 (with suction attachment). Siphon as much as 1/3 of the water from the bottom of the tank once a week. Be sure to replace with seasoned water and you will not have to change the whole tank unless you overfeed. To work, the tubing must be full. Fill the tubing at the sink or by slowly lowering it into the water. The waste end must be lower than the intake end, and the intake end must be under water at all times. Pinch the tubing by folding it sharply when you move the siphon.

If the siphon is working properly, dirt will be quickly sucked into the tube. Extend your finger below the end of the intake end to guide the tube and stir up the dirt, especially if your gravel is fine enough to be picked up. Keep the tube slightly above the bottom. If gravel or a snail is pulled into the end, they will often drop free if the tubing is pinched to stop the water flow. If they get into the tubing and stop the flow, you may be able to flush them out by raising the intake end or by using the faucet. If this does not work, hold one end of the tube with one hand and use the other hand to push the rock or snail out of the tube.

EXAMPLE:
COST FOR A SIMPLE BOWL

Snail	69
1 pair Guppies (fancy)	1.58
1 Peppered Corydoras	1.69
	$3.96

Plain Guppies 3 @ 39 cents		1.17
Book	free or	.79
Bowl	free or	1.99
Gravel		.59
Plants		.59
Food		.59
Thermometer		.98
Plastic tubing		.47
Plain salt		.11
Nylon net (1/6 yard)		.05
Net		.49
		$7.82

How To Fill Your Tank

1. Assemble the materials one or two days before getting the fish.
2. Put gravel in a pan or large strainer and run tap water over it until the water runs clear. All gravels have some dust and even after washing may cloud water until it settles.
3. Place the gravel in the bottom of the tank. Put more gravel in the back of the tank and less in the front. This will bring dirt to the front for siphoning and allow deeper gravel for background planting. In round bowls with floating plants, cover the bottom evenly with gravel.
4. Put a piece of paper or a saucer on the bottom of the tank and pour water onto it. This will lessen the disturbance of the gravel. Fill the tank 1/3 to 1/2 full. Then remove the saucer or paper.
5. Place the plants and accessories. Fill the tank to two or three inches from the top.

Alternate Method

Follow instructions 1 and 2 above.

3. Fill tank 1/3 to 1/2 full of water. Put the gravel in a cup or jar. Holding the cup under water, pour the gravel slowly into place in the tank and shape it with your fingers.
4. Place the plants and accessories.
5. To complete the filling, place your hand in the tank so your fingers touch the side of the tank and your palm is facing outward. Pour the water onto palm of your hand so that it runs down your fingers and onto the walls of the tank without disturbing the gravel.

Locating The Aquarium

Put your aquarium in a place where it receives a medium amount of light. Strong light encourages the growth of algae which turns the water green. In general, a northern or western exposure of light is most suitable—north being the better of the two. If it is necessary for it to face the sun (southern window), fasten a sheet of green cellophane to the portion facing the direct rays of the sun.

If algae turns the water green, you may add quantities of Daphnia. After the water is cleared, the fish will feed upon the Daphnia. If there are several fish in the tank, you may wish to put some of them in another tank so they won't eat the waterfleas (daphnia) before they can clean out the algae.

If sufficient light is not available and plants begin to lose their green color, place an electric lamp with a 75 or 100 watt bulb over the aquarium a few hours each day. Do not keep an aquarium close to a radiator.

Choosing Your Fish

If you have an unheated and unaerated bowl, you will have to use care in choosing the variety of fish for your project. There are many fish that will do well, but there are many which will not adapt to the lower temperatures or which are particularly hard to care for. Remember: The water temperature will be a few degrees lower than the temperature of your home. Water temperature changes more slowly than the air but if the tank is in a draft, the water temperature will be cooler than usual. Tanks that are covered and electric lighted will be several degrees warmer than the room. Guppies (74° to 84° F) will survive in the 68° water but they will not breed.

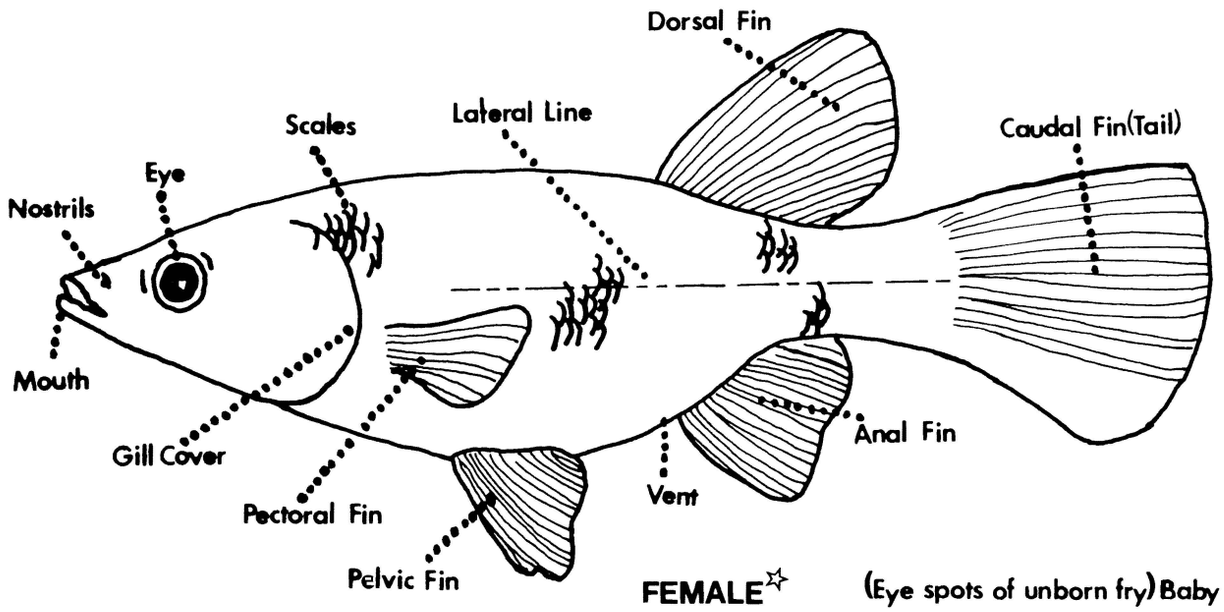
Fish Diseases

Fungi, such as water mold (Saprolegnia), and a protozoan called water itch are two of many parasites which bother fish. Fish with these conditions may show gray patches or scales on their fins, and should be isolated quickly. So little is known about many of the fish diseases that it appears most desirable to destroy the diseased fish.

You may wish to try immersing the diseased fish in a 10 per cent solution of non-iodized salt. Remove it after one hour and allow it to wash in ordinary water. Usually the patches disappear after this treatment. Put the fish into a 0.5 percent solution of potassium permanganate for 15 minutes. Quarantine the fish in a separate tank and watch it for a possible reoccurrence of the condition.

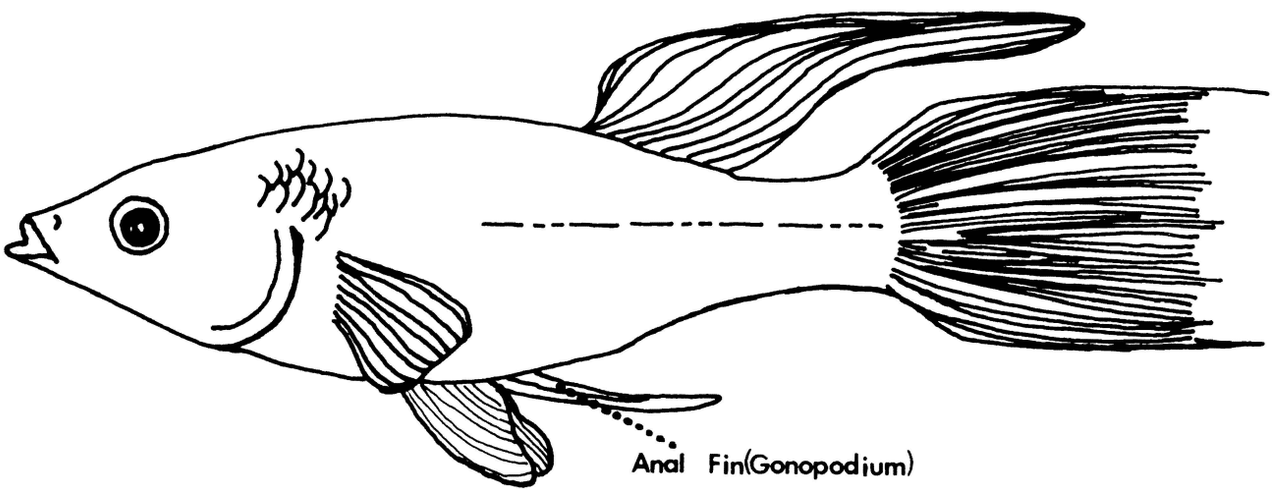
(See "Diseases" on page 9)

PARTS OF A FISH



FEMALE☆ (Eye spots of unborn fry) Baby fish

Livebearing



Male is much more colorful

★MALE

GUPPY

Fish Care Habits

Bowl Check... each time I look do I check automatically?

- ☐ Are all fish alive and healthy? Look healthy? Any torn fins, etc.?
- ☐ No uneaten food on top or bottom?
- ☐ Equipment working properly?
- ☐ Temperature? Out of drafts and full midday sunlight?
- ☐ Plants healthy and in place?
- ☐ Water level up, clear, no foul smell?
- ☐ Tank covered? No foreign objects?

General Management

- ☐ Isolate new or sick fish in a separate, small bowl.
- ☐ Keep everything but known safe objects out of water.
- ☐ Guard against sudden changes in the water temperature.
- ☐ Turn light off at night and on in the morning (constant light makes fish unfertile and/or may cause algae problems).
- ☐ Do not tease fish by splashing water or tapping on the glass. However, goldfish may be trained to come to the side of the bowl by tapping softly.
- ☐ See that members of family understand the safety rules.

Feeding

- ☐ Feed regularly: goldfish once a day, tropicals two times or more if you can.
- ☐ Feed no more than they can eat in five minutes; remove food promptly.
- ☐ Feed fish yourself. In emergency leave written instructions or have another hobby member do the feeding.
- ☐ Give a variety of food.
- ☐ Keep food out of reach of others.

Diseases

(See also "Fish Diseases" on page 7)

Other symptoms of disease are discovered by watching the behavior of the fish. Watch for the following symptoms:

- ☐ Hiding in the plants
- ☐ Lying on the bottom
- ☐ Holding fins close to their body
- ☐ Gasping for air at the top

Cleaning

- ☐ Wash hands before and after caring for fish. Rinse thoroughly before.
- ☐ Dump waste water in toilet and **not** in sink.
- ☐ Rinse any dishes or pans carefully before using. Don't use metal.
- ☐ Condition water by aging or with chemicals (well water does not need this).
- ☐ Clean the bottom of the tank by siphoning about 1/3 of the water once a week.
- ☐ Replace siphoned and evaporated water with conditioned water.
- ☐ Check water temperature before adding it to the tank. Warm the water if needed by heating a small amount. Add the water by pouring against your palm and down your fingers onto the side of the bowl.
- ☐ When changing the water in the entire bowl, save the top 1/3 to 1/2 of water if possible to place fish in, and add it to the new water later.
- ☐ When changing the water in the entire bowl (fish out), use salt, not soap, to clean the bowl.
- ☐ Scrape the water evaporation mark off the bowl regularly to prevent an accumulation.
- ☐ Use a nylon net scrap to clean the sides of the bowl.
- ☐ Keep all chemicals on a high shelf... they will kill fish if they are not used according to the instructions on the container.
- ☐ Never touch fish with your hands. Use a net.
- ☐ Wash any dishes or pans thoroughly after use and replace them.

Safety Rules

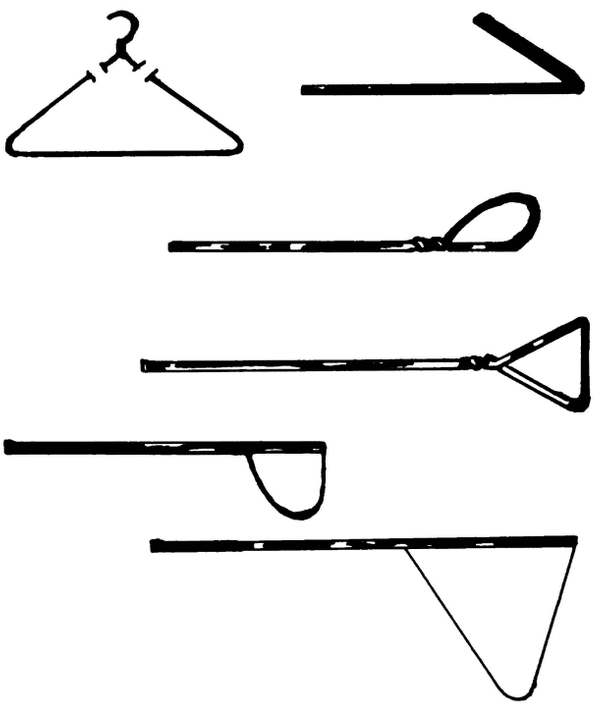
(for your family and friends)

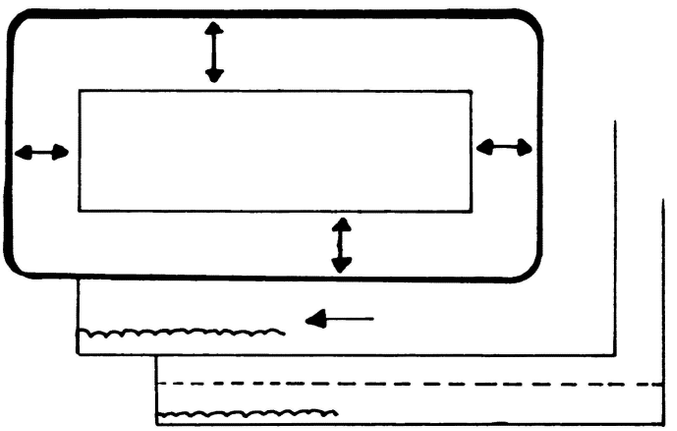
Fish need specific kinds of care. Do not leave small children alone with fish until you have supervised their first viewings and have carefully explained that they should not try to care for or play with the fish. Anyone who does not know how to care for fish should not do the following things.

- ☐ Put anything in the water.
- ☐ Feed.
- ☐ Tap on glass or splash water.
- ☐ Mess with the equipment.
- ☐ Try to catch fish.

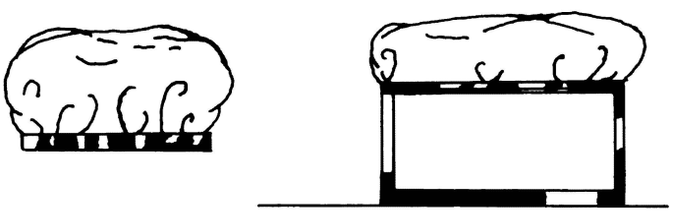
Simple Equipment To Make Yourself

Net—Wire clothes hanger, ladies old nylon hose (no holes or run in toe!), tape or file, needle and thread, pliers with wire cutter or both pliers and wire cutter. Cut hanger as in picture. Straighten. Bend short end into loop and twist around handle. Smooth rough edges with file or cover with tape. Cut about 3½ inches from toe of hose and sew onto loop of wire, or you might use a small piece of nylon net.





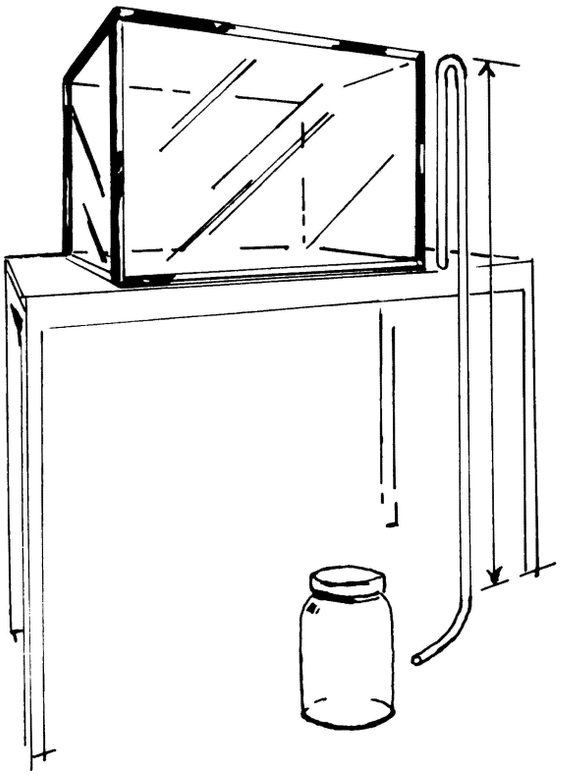
Bowl Cover—For round top you may use a square of net and secure it with a large rubber band.



Tank Cover—Piece of nylon net, narrow elastic, needle and thread. Cut nylon net five inches wider and five inches longer than tank measurements. Cut elastic long enough to reach around tank. Leaving one inch of elastic free, tack it firmly to net, fold net over elastic and sew a casing for it. Pull end of elastic forward as you sew, gathering net... elastic must pull freely through casing except where one end is tacked. When you have sewn around all four edges of net, overlap the end of the elastic (one inch free at beginning) and sew it firmly.

Siphon—For small jobs use two large plastic straws, freezer or masking tape. Pinch end of first straw slightly to insert into second straw. Tape securely to make airtight. Dampen finger and place over upper end while lowering straw into water. Remove finger and replace immediately. This sucks any dirt immediately below straw into straw. Keep finger firmly over end while removing dirty water to a waste jar. Remove finger to let dirt run into jar.

For large jobs, measure from bottom of tank to top of tank, then from top of tank,to floor and add about 6 inches. Find or buy a piece of plastic tubing this long. Get a gallon jar to put the dirty water in.



Kinds of Fish

BARBS and similar fish
Cherry Barb, +Checker Barb, *Gold Barb, +Pear Danio, +Zebra Danio, +Goldfish, +White Cloud Mountain (the last two prefer from below 64° to 74° F)

TETRAS
*Neon, Cardinal, Red-eyed, Black-lined, +Buenos Aires, +Tetra from Rio, similar fish is a +Bloodfin

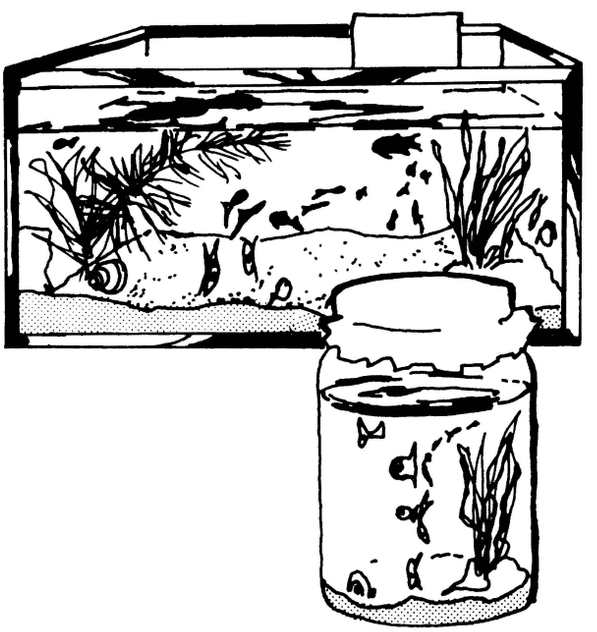
LIVEBEARERS (Can be sexed by anal fin-gonopodium)
*Guppy, *Molly, *Swordtail, *Platy

LABYRINTH FISHES (take extra air at surface) Betta or Siamese Fighting Fish (keep male in individual bowl), *+Three-spotted Gourami, +Blue Gourami, +Opaline Gourami, Dwarf Gourami

ASSORTED FAMILIES
*Peppered Corydoras (catfish), Egyptian Mouthbreeder, Glass fish, +Australian Rainbow fish

Fish Bowls—A single fish may be isolated in a clean wide-mouth quart jar such as mayonnaise or peanut butter comes in. Cover and keep water level down two inches from top. A better bowl for many babies or up to six small fish may be made. Ask a restaurant or drive-in to save you a one-gallon jar that pickles, mayonnaise, or mustard comes in. Clean carefully and rinse with salt water, then rinse several times with clear water. Fill bowl to about three inches from the top and cover it with a net, never a solid lid.

To transport or introduce fish to water of slightly different temperature use a heavy gauge, water-tight plastic bag. Test the bag first to make sure it is water-tight. Fill the bag 1/2 full with water and fish (at least a pint of water) and close it with a rubber band. Carry the bag in a large purse, cardboard container, or styrofoam box to protect the fish from chills or overheating and jolts that might rupture the bag. Do not leave the fish in the bag any longer than necessary. To introduce the fish into different water, hang the bag in the new water for at least 15 minutes, then rupture the side of the bag carefully to let the fish swim free.



*Fish I have cared for in a one-gallon bowl.
+Fish that tolerate temperatures as low as 64 degrees.

When Preparing Fish For Exhibit

- ☐ If you have several fish, choose large healthy specimens.
- ☐ Carry the fish to the show in a small bowl with a plastic cover. Put the bowl in a box and firmly hold it in place by putting foam rubber or tightly wadded paper around it to protect it from spilling and temperature changes.
- ☐ If by accident you cannot exhibit your project fish, you may get permission to buy one and be judged on choice of suitable fish. Examples of acceptable reasons are: (1) Livebearer female very close to term (birth). Guppies are fairly hardy but Mollies often lose their babies if moved; and (2) If fish died from cause other than neglect. Get permission of lender and parent. Include explanation with exhibit.

EXAMPLE:

I am not able to exhibit my project fish because . . .

_____

_____

_____

I choose the alternate fish for these reasons . . .

_____

_____

_____

(Note desirable characteristics)

Name _____