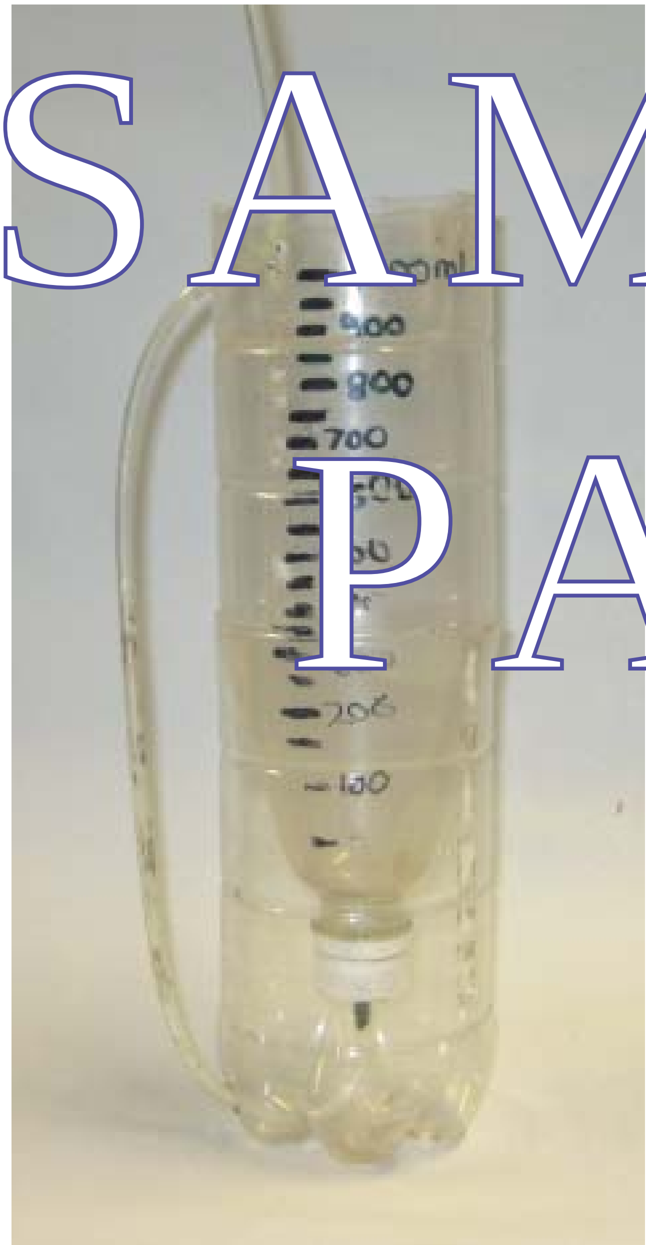
PROJECT 1.9 ARTEMIA HATCHERY (PAGE 34)



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PROJECT 2.1 SECCHI DISC MATERIALS (PAGE 41)

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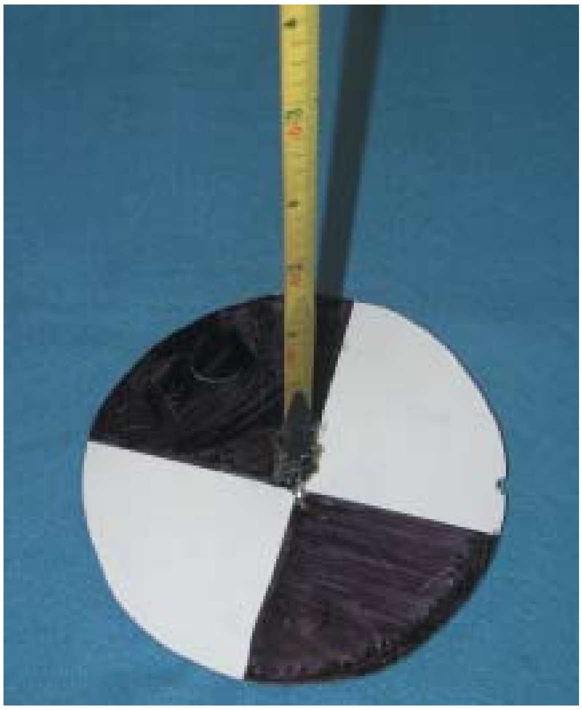

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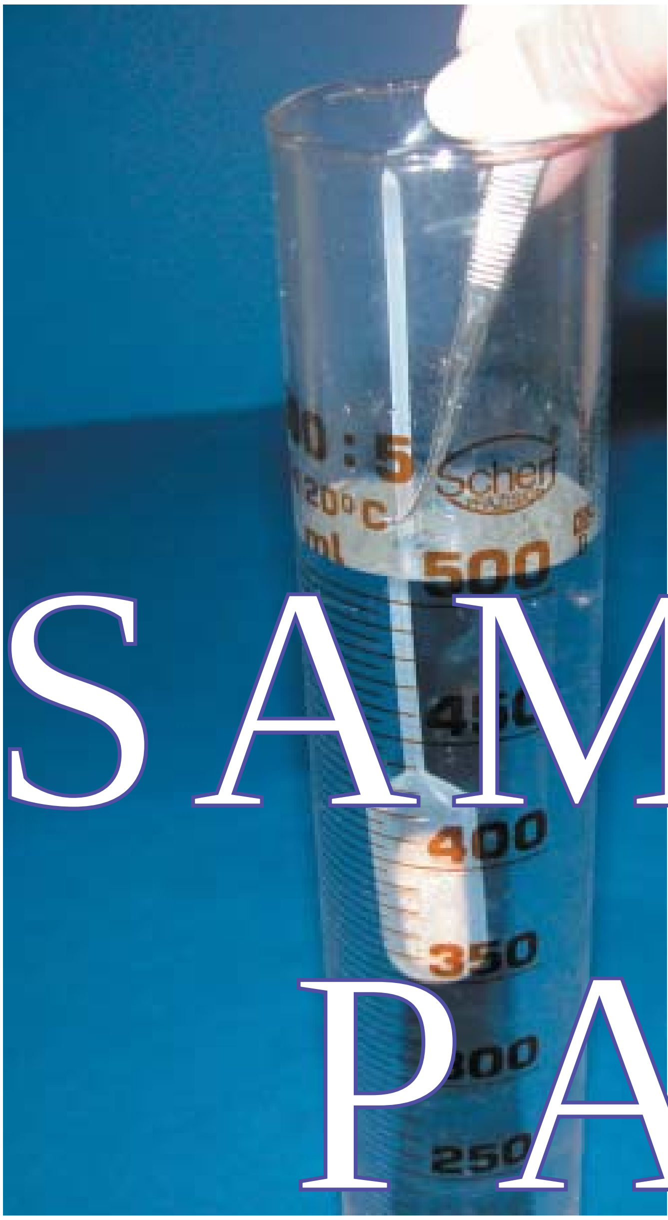
PROJECT 2.2 MAKING A SALINITY HYDROMETER (PAGE 44)



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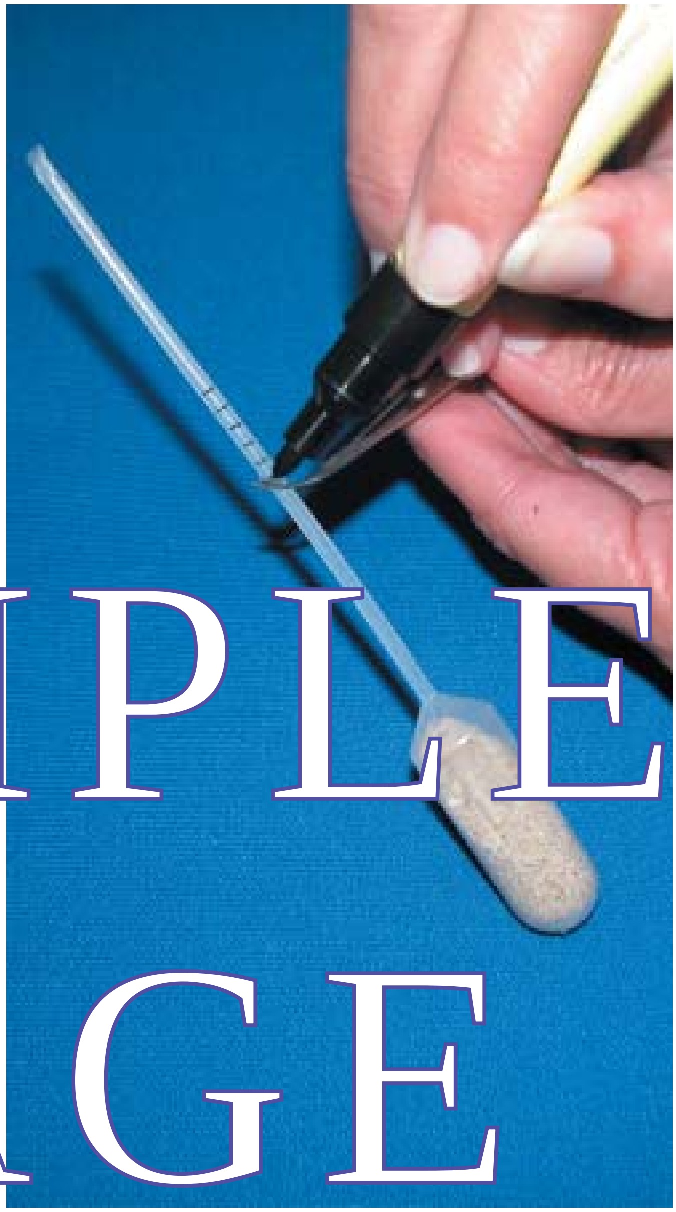

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PROJECT 2.5 TESTING WATER FOR NITRATES (PAGE 46)

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Aquasonic

PROJECT 1.1 USING POLY PIPE AND FITTINGS

Background

Pipes and fittings needed in many projects can be bought as single items or purchased in bulk from local hardware stores or retail chains. They have been manufactured for home garden irrigation systems, are well made and fit together perfectly giving nice airtight seals.

They are easy to use, a bit like playing with Lego or Meccano making them ideal for the design and construction of simple aquaculture systems.

Polyethene pipe and associated fittings

Polyethene pipe and associated fittings as shown in Figure 4.1, are ideal for carrying and distributing low pressure air to a wide variety of growth containers and aquaria for school aquaculture exercises.

They are cheap alternatives to the more costly aquarium supplies.

Size

It is important to decide on a size. The projects in this book are based on the following sizes:

- Main lines - 13 mm pipe and 13mm fittings. (This allows interchanging with standard garden hose if necessary)
- Individual air lines - 3 mm pipe and 4 mm fittings. (The 3 mm pipe is a tight fit on the 4 mm fittings and while it may be a little harder to get on it does give the peace of mind that you know it will not blow off)

  On the individual air lines it is always better to use threaded fittings to allow the 3mm pipe to be screwed on tightly.

Materials

 # *13 mm fittings for main air line from pump*

- End plug, tap, joiner and elbow T

 # 4 mm fittings for individual air lines

- Screwed adaptor, barbed off-take

Procedure

Try to keep everything standard. 13mm for the main supply pipes and fittings and 3 mm pipe for the individual lines with 4 mm fittings.

There is nothing real hard about designing and constructing this:

Step 1 Design your system

Step 2 Write down the fittings you need and the lengths of pipe you require

Step 3 Cut the pipe and place the necessary fittings in position pushing or screwing each fitting home

Step 4 Use clamps and clips to mount the lines neatly

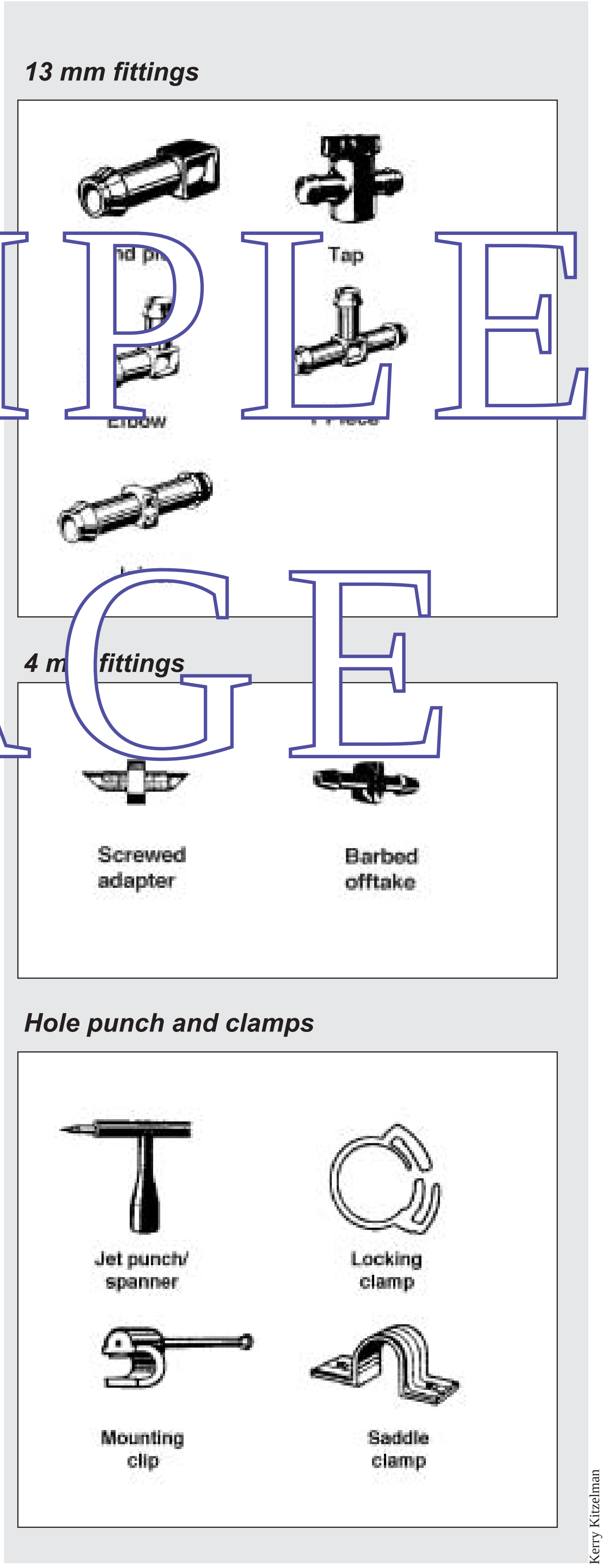

Figure 4.1 Common poly pipe and fittings

PROJECT 1.2 MAKING AN AIR FILTER FOR ALGAL CULTURES

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Figure 5. 1 Completed air filter

Background

Micro algae like all plants require carbon dioxide (CO_2) for photosynthesis.

- They obtain this gas from the air that is dissolved in the water in which they live.

When micro algae are grown in containers they have to have enough air to provide the carbon dioxide they need.

- This is not a problem when a small amount of liquid is put into a large container - the air can diffuse in and out through a cotton wool or specially designed filter plug as shown in Figure 5.2.

It does become a problem when algae are grown in containers with little free air, providing insufficient carbon dioxide for the algae to make food.

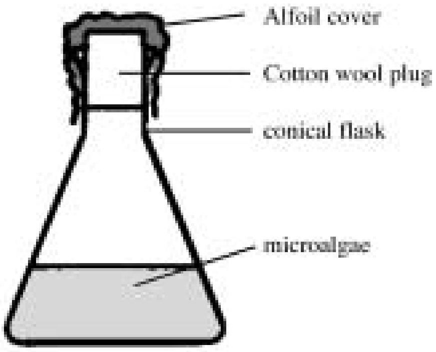

Figure 5.2 A small amount of liquid put into a large container is not a problem for a time
(Illustration Mick O'Connor)

A solution

To overcome this air must be pumped into the container as described in Figure 5.3 (below)

- Normal air will contain minute particles of dust and may also contain micro organisms such as bacteria and fungi that may be harmful to the algae or what the algae will be fed to.
- To minimise the risk of infecting the algal culture, the air being pumped in is filtered. A cotton wool filter is placed on the inlet tube, filtering the air coming in to remove micro organisms. Another similar filter is placed on the outlet tube to prevent microorganisms entering the culture as the excess air escapes.
- The double filter acts as a barrier. Air containing the needed carbon dioxide is provided continuously to the algae allowing them to grow while excluding airborne micro organisms coming back through the outlet tube.

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Project 1.3 over describes how to make this container

Figure 5.3 Algal growth container

Part A. Making the substrate

One of the best cheapest and easiest to obtain bacterial substrate for schools is plastic drink bottle tops (Figure 6.1) - recruit an army of students to collect them for you.

The plastic is food grade plastic safe for holding human food. No poisonous chemicals are present and no harmful chemicals leach out of this plastic. It is an ideal medium for bacteria to grow on and will not poison the fish.

Step 1 Collect as many plastic bottle tops as you need to fill your crates

Step 2 Using a Marine Studies class, a heat mat, a tripod and a Bunsen burner, heat up the bottom of one of the tripod legs and burn a neat hole through all the tops. This will prevent water laying in the tops and stagnating (Figure 6.1)

Step 3 Place the tops in a net bag eg onion bag and wash in detergent and rinse five or six times in clean hot water

Repeat the same number of rinses in cold water

Step 4 Place in a container of cold water to soak for [illegible] hours and rinse again in clean cold water

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Figure 6.1 Heating tripod stand to burn holes in plastic bottle tops for the biofilter

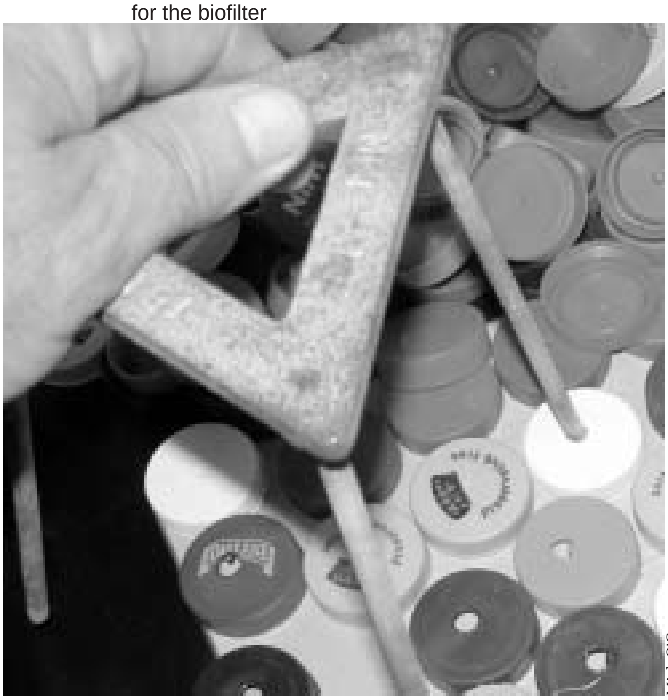

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Figure 6.2 Burning holes in caps

Part B. Making the biofilter container

Stackable crates are used to hold the bottle tops. Water is delivered to the top crate by a submersible pump. The water is sprayed through the air in the uppermost crate which is cut down to provide good air flow. It is then allowed to percolate down through the bottle tops and return to the tank..

Step 1 Mark out one of the crates as shown in Figure 6.3

Step 2 Use the 25 mm hole saw to cut two holes in the top container as shown to take the spray bar

Step 3 Using the jig saw cut the crate (Figure 6.4)

Step 4 Drill as many 3mm holes evenly distributed across the base as you wish to give even and free water flow into the underlying crate (See Figure 57.1 over)

Step 5 [illegible] the bottoms of all other crates to be used in this [illegible]er

Figure 6.3 Making the biofilter container

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Figure 6.4 Making the biofilter container

Students name ______________________________ *Teacher* ____________________________________

Label the body parts A - P on the diagrams below

Illustrations Kerry Kitzelman