

Mainly for
beginners

WHY FILTER?

Dr David Ford, of Aquarian Laboratories, answers a question on the lips of many fishkeepers faced with setting up an aquarium for the first time — or changing to a more advanced system.

YOU do not find power filters in the jungle, or undergravel filters in the coral seas — so surely such man-made gadgets are as artificial as plastic plants? If you believe a natural system is the best route to colourful, healthy fish, then why use filtration?

The reason is that filtration *does* occur in nature, providing you take a global view. The hydrological cycle involves the same water evaporating from the seas, raining down on the mountains, filtering through the rocks to springs that form streams, which join to form rivers until back it all flows to the seas. God in his heaven does not do a 25 per cent water change every two weeks!

Power filtration is a hydrological cycle in miniature. The bubble-up foam (or box) filter is a much simplified version, too. Only the undergravel system can be considered rather different to anything found in nature.

Fish swimming in a small body of water soon pollute their environment. Not only soluble excreta, but solid matter that combines with plant debris, surplus food and surface dust, forms the material known as 'detritus,' which aquarists call 'mulm'.

Mulm is the grey-brown colour of sludge, but particulate in texture. It sinks slowly to the bottom of the tank and it also coats all the solid surfaces, including the glass front of the aquarium.

A fish with powerful fins, such as a goldfish, will stir-up the mulm to cloud the water, as any owner of a goldfish bowl will confirm.

Undergravel filters tend to suck the mulm into the stones. Bacteria within the filter produce more mulm as they break down the soluble material. These solubles are ammonia and nitrite, converted

to nitrate as explained in "Deadly Soup", the second article in this series.

The problem with undergravel systems is that the mulm remains trapped, and it is difficult to remove without breaking down the whole aquarium. A siphon tube pushed down the uplift tube for drawing off water from under the filter base helps reduce the mulm build-up.

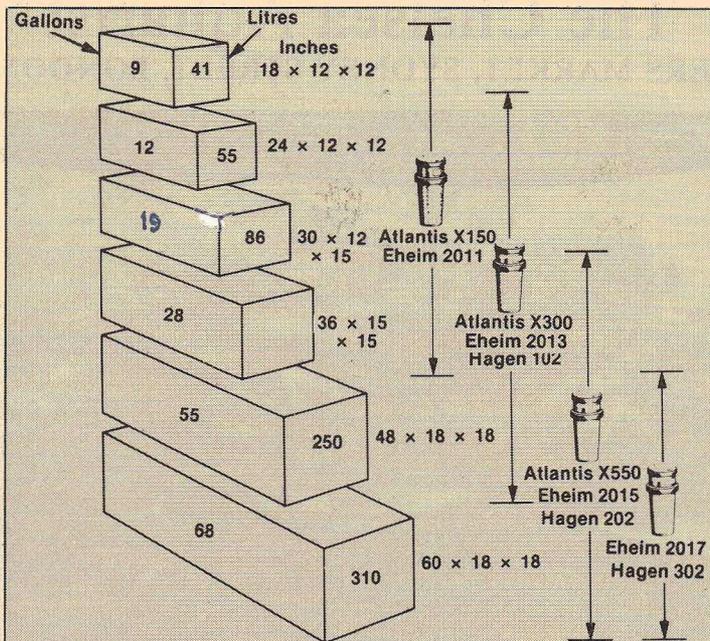
A better system for clear water is the foam filter, or box filter. Both are cheap and easy to operate with an ordinary airpump. The mulm is trapped *within* the box filter, which should contain easy-to-replace polyester floss. Gravel or carbon can also be used as filter media. The box can be easily lifted out for rinsing clean.

The foam filter has one advantage over other systems — it is ideal for the breeding tank. The fry are not drawn into the filter and the mulm that collects on its surface develops a layer of bacteria and infusoria. The fry can eat the minute life-forms as a first food. This is particularly useful for tiny fry, such as Dwarf Gouramis or Coral Fish babies.

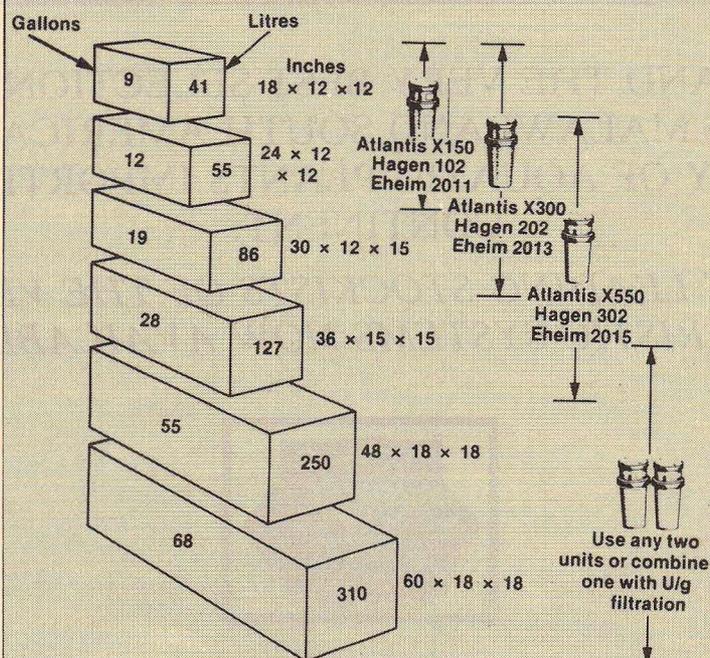
Power filters are the most efficient method of cleansing the water. There are two types, internal and external. The internal filters have the advantage of being unobtrusive and silent; external filters are more powerful and require less frequent servicing.

The internal filters have a foam insert that is easy to clean, or even to renew. The foam can also be replaced by carbon in a nylon bag — a nylon stocking leg is ideal — or by ceramic filter media. This granular filtration is particularly useful with goldfish.

An external power filter is the



Some power filters for freshwater aquaria.



Some power filters for marine aquaria.

most efficient filtration method — especially if the throughput is sufficient to turn over the total volume of water at least once per hour for freshwater, and twice per hour for marine aquaria.

Why do manufacturers make claims for flow rates far beyond the actual value found in use? The reason is that it is impossible to quantify the water flow when the filtering medium is present. The filtering material may be open (such as gravel) with high throughputs or dense (such as foam) with low throughputs. Fibre wool is very efficient, but rapidly clogs with use, slowing the water flow.

Additionally, the power filter is usually housed under the aquarium, so the pump has to lift water against the head of water above it, which reduces the flow rate.

Manufacturers have to measure the pump's flow rate under ideal, and therefore impractical conditions. This is where the pump is level with the aquarium, giving no head of water, and the filter body contains no filtering material at all.

Use the throughput figures to compare the power of the various pumps, but when calculating the water flow divide the published values by two. This assumes that under load, particularly after several weeks or month's use when the mulm has built-up on the fibre medium, the flow rate is 50 per cent of the ideal.

Placing the filter unit beneath the tank reduces the flow rate even more, so try to fit the aquarium into a space where the filter can be housed alongside the tank. If the unit *must* be sited under the tank, choose a larger, more powerful motor to compensate.

To really polish the water, to give it a glossy clarity like gin, you need a filter medium that filters down to one micron (one millionth part of a metre) or less. The perfect medium is diatomaceous earth (the silica



Diatomic filters soon clog — they should be used occasionally, not continuously, to give water that final 'polish'.

shells of microscopic animals). This is the white powder used in diatom filters. The problem with diatom filtering is that the filter rapidly clogs and requires cleaning within an hour or so. Hence do not use diatom filters continuously, but only occasionally as a polishing filter.

Diatom filters are expensive for just occasional use, so it is recommended that aquarium clubs obtain one. They can be hired out to members as required. The Diatom is a U.S.A. model found in the second-hand market (the new model had to be withdrawn when the U.K. Electrical Regulations came into force).

One problem with power

filters is noise. They are not obtrusive like air pumps, but an annoying rattle can develop with age. This is because the impeller develops 'play' within its impeller chamber. A cure for this problem is to wrap a small length of nylon wire (a fishing line is ideal) around the shaft above the blades. Two wraps are sufficient. Tie a tight knot and snip off the ends. The nylon slips around easily within the impeller chamber, but acts as a buffer, or washer, to prevent the wobble that causes the rattle.

What is the best filtering system? In my experience, the small internal power filter. This is because of its low initial cost, low running costs, silence in operation and ease of cleaning.

Several models are available. The **Eheim Octagonal** has a variable pump, and several filter cartridges can be added according to the aquarium size. They also have a small 180 litre/hour unit, the **2007**. **Rena** have a unit with output variable to 400 litres/hour, the **R.325**. The **Mini-Powerstream** is a small internal unit by **Interpet** with around 100 litres/hour. A more powerful unit is the **Hagen 51**, with 450 litres/hour output.

Atlantis have the greatest range of internal filters, and their triangular shape allows

them to be tucked lightly into a back corner. I particularly like the **Atlantis Filter F180**. This miniature model all but disappears in the tank, but placed on the gravel it shoots a jet of water along the tank bottom. This causes the plants, whether real or plastic, to wave around most attractively. The aqua scene becomes "alive", just like a flowing river.

Most power filters, even the **Atlantis F180** can operate a jet bar, giving excellent aeration. So much so that a noisy airpump (even an expensive silent pump gives noisy air bubbles) can be dispensed with. Note that the **Atlantis F240 to F600** series has an optional aeration system, if required.

If power filtration is used, you will find that most species of fish enjoy the water flow and will actually swim in the jet stream. However, a still-water area should be supplied, so the fish can rest. Easily achieved by arranging two rocks to give a cove, or add a ceramic flowerpot.

Some aquarists prefer a very natural set-up with peat and sandy base, heavily planted and brightly lit. This type of aquarium — almost a water garden with only a few fish — is very popular in Belgium and Holland. A gentle filtration system is needed here, and the cascade filter is ideal. This is a box that hangs on the back of the tank, drawing water through a filter medium by siphon and returning it by a cascade waterfall. Some are powered, with cheaper versions operated by an airpump. They can be temperamental.

The secret of avoiding problems such as overflows, or water flow ceasing, is regular cleaning and ensuring that the unit is absolutely level.

Why filter? Because it cleans the water, reduces the toxic solubles, oxygenates, exercises the fish and reduces maintenance time. That's why.



This small internal power filter (now relaunched under the Atlantis brand name) is silent, unobtrusive and easy to service.

THROUGHPUT OF INTERNAL POWER FILTERS

Eheim 2007	180 litres/hour
Rena 325	30 to 400 litres/hour
Hagen	450 litres/hour
Mini-Powerstream	110 litres/hour
Atlantis Range: F240	240 litres/hour
F360	360 litres/hour
F480	480 litres/hour
F600	600 litres/hour
Atlantis Minifilter F180	180 litres/hour