

Wet/Dry & Trickle Filters

The purpose of this article is to discuss wet/dry filters and who and what requires a system with this type of filtration. When it comes to keeping fish and invertebrates there are so many different opinions on how their world should be built. Your animals are going to be spending their life in this world you are creating for them so it should be your goal to try to duplicate their natural habitat and create a healthy environment. What does it take to have excellent water quality free from stress and parasites? There are many answers to this question but most important is to start with the proper nucleus that is your wet/dry filter. In future articles we will discuss adding features such as protein skimmer, ozone generators, and ultra violet lights.

There are two major functions of a wet/dry or trickle filter and that is:

- (1) a form of biological filtration
- (2) a water gas exchange filter

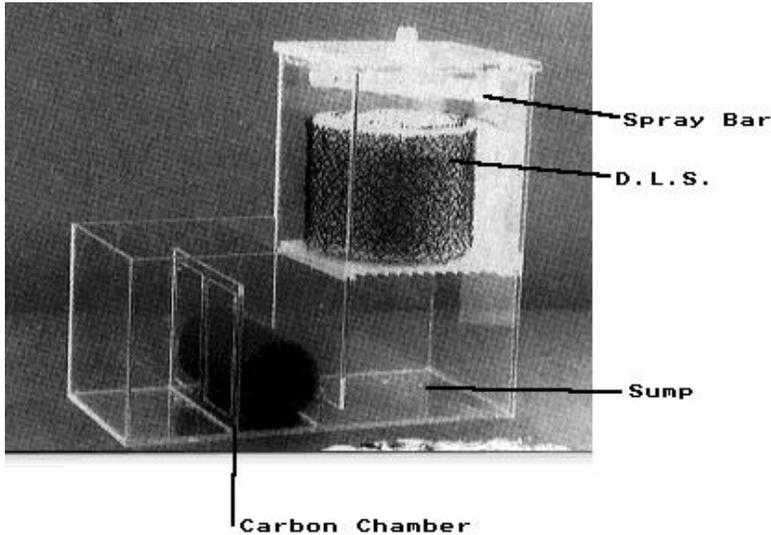
The filter also does the duty of a chemical and mechanical filter. The latter two can be done by any type of power filter so they will not be an important issue here. It is noteworthy though that the latter two mechanical (removing particulate matter with the prefilter) and chemical (carbon or any other resin put in the chemical chamber) makes your wet/dry an all in one filter where as no other power or undergravel is needed to have a complete system.

To give our water high oxygen saturation we must break it up into small particles, which will absorb oxygen and in exchange release carbon dioxide. Without a trickle filter (wet/dry and trickle being one in the same) the only place you have this interaction between carbon dioxide and oxygen is at the surface where there is water agitation via powerheads, powerfilters, or uplift tubes with airstones. When you heavily aerate your water you do not put oxygen in at the bottom where you are pushing the air but only at the surface where the bubble bursts taking carbon dioxide out of the tank.

The biological portion of the filter is where the nitrogen cycle takes place. This is what keeps the water free of ammonia and nitrites. The nitrogen cycle is covered in detail in Beverly's Pet Publications issue #1 "The First Four Weeks." The choice we have here is in choosing a media to grow the live bacteria. Different filter manufacturers offer wide varieties of these medias (bioblock, bioball, biodiscs, D.L.S., etc.) As we discuss the gas exchange factors of the wet/dry we will point out the advantages and disadvantages of these choices.

With a wet/dry filter we are looking for a gas/atmosphere exchange, this is done by breaking down the water into small particles (the smaller the better). The best way is via a spray bar because you will get a wide spray pattern with your media constantly being hit in the same area.

This will result in fresh oxygenated water feeding your nitrifying bacteria. The dry area is where you get your gas exchange. (see fig. #1)



Gas exchange will vary depending on the type or types of media used in your system. Void space in a dry media is an air space where you have gas exchange. The choice you have is high surface area and low void space (the high surface area gives you ample room or surface to grow bacteria), or low surface area and high

void space (greater for gas exchange but poor for biological growth). In general D.L.S. (double layer spiral) has low void space and Bioballs have a high void space. A happy median can be found depending on the load and type of animals going into the system. In recent research we have found that plastic media in the tower and D.L.S. under it probably will give you an ideasituation for excellent gas exchange and excellent biological activity.

Oxygen is essential to almost all life forms. If oxygen is decreased there will become a stress factor that usually shows up as a form of gill disorder or breathing problem in your fish. Most of you can relate to cases of oodinium or cryptocaryon that usually originates from low oxygen saturation in combination with any other form of stress. Ninety percent of all fish disease start in the gills. The amount of oxygen dissolved in the water is called oxygen saturation. This will vary from factors such as salt levels or temperatures. The amount of oxygen dissolved in water is measured in ppm and will decrease as saliently and temperature increase. Dissolved oxygen usually ranges from 4 to-6 ppm. Fish and invertebrates will suffer as dissolved oxygen drops below 3.5 and few will survive below 2 ppm. With the use of a wet/dry filter you should reach or exceed oxygen saturation.

To sum up the benefits of wet/dry you will not be fighting the epidemics of gill disease. You will find a temperature decrease of two to four degrees which will enhance oxygen content. Removal of your undergravel (or extra thick gravel) will omit the chance of anaerobic bacteria bloom that could cause a complete wipe out of the tank. The wet/dry is an all in one filter, and with the competitive market you should find the cost difference between conventional and wet/dry not to be too great. An initial investment in a proper system will save you money down the road and make your fish keeping much more enjoyable.