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Information on Peat (or Breeding Annual Killies on Peat)

Species of *Cynolebias*, *Cynopoecilus*, *Pterolebias*, *Nothobranchius*, and some of the *Aphyosemion* will like to deposit their eggs at or into the bottom layer of the breeding tank. Some as *Cynolebias* and *Pterolebias* will like to dive deep into the bottom layer whereas others will place their eggs at the surface of the bottom layer.

When you want to mail eggs to friends or want to control the development of eggs kept under certain conditions you often will like to separate eggs from the bottom medium. This may be difficult indeed.

First of all -before preparing the breeding tank for such killies- you will consider the type of egg concerned. If eggs are provided with slimy filaments that cause the eggs to adhere to the peat, washing out of the eggs may be difficult or even impossible if the coarse type of peat used. For such species you will use sieved peat that passes through a sieve with holes of about 2-3 mm. Eggs from all aquarium-kept *Aphyosemion*, except *A. "filamentosum"* will have such slimy filaments and will adhere to peat. For such species it possibly will be wise to use a fine sieved mud. Eggs from many other annual killies do adhere to mud particles by means of very small filaments or perhaps by a sticky surface of the membrane. But such eggs normally will not adhere so firmly to coarse peat particles that they will not be separated from such particles during washings. Eggs of *Cynolebias*-*Pterolebias* will adhere to small particles of peat that often cover the eggs to such a degree that eggs are difficult to spot during the last sorting of eggs from peat. Eggs of *Nothobranchius*-*Cynopoecilus* (and *Aphyosemion "filamentosum"*) do not adhere any peat to the surface of the membrane. Such eggs are easily picked out of the last washing of peat and eggs. Even though eggs of *Cynopoecilus* and also *Nothobranchius* are provided with stiff "hairs", peat does not normally adhere to these filaments. You might try to use fine mud only and then sieve eggs out of the mud by using a sieve that will hold back the eggs but not the mud. But this method has some bad points. The breeding act of the fish will whirl up the fine mud and, after a few days, if you do not use a very thick layer, all your fine mud is in the corners of the tank. Most breeding fish will like to eat any egg they are able to spot. If the peat is not adhering to the eggs so that they are hidden, the active breeding fish will pick up the eggs and eat them. Try this simple method with *Nothobranchius* - watch the fish and soon you will find another way of breeding! I normally only find fine mud to be suited for *Aphyosemion*, except "*filamentosum*", because the egg soon camouflages itself as a piece of peat. You can stop the collection of the fine mud in the corners by scattering many small stones, pieces of glasstubes, etc., over the bottom.

You also might use coarse peat only for all species except *Aphyosemion*. Coarse means peat (or better say peat moss) that will not pass through a 3 mm mesh sieve. Such peat moss or filamentous peat will not collect into the corners from the activity of the fish. However, if you do not use a thick layer, the fish may find the eggs and eat them. I like to use a certain mixture of filamentous peat and fine mud for all species except *Aphyosemion*. The filamentous peat (not passing a 3 mm sieve) keeps the bottom layer evenly distributed all over the bottom of the tank. The fine mud (only enough to form an even layer about 2-3 mm deep) will sink deep into the filamentous peat and cover the bottom and hide the eggs.

If you want to keep the breeding pair (pairs) spawning for many weeks or months before you take out the peat, you possibly will use more fine mud in order to be sure that the eggs will not develop. Eggs that are not in the bottom (fine) peat will have a good supply of oxygen may develop before you want it. I know that the mixture of fine mud and filamentous peat will cause a little more work later on during the washing, but on the other hand it gives me some advantages during spawning.

Separating peat and eggs

When the spawning is over after days, weeks or months, you remove the breeding fish, stones and plants (I only use the "water fern" *Ceratopteris*, normally anchored into the bottom peat using small stones). Take away the water and wash (using a plastic bottle with a very narrow nozzle) all peat into the 1 mm mesh sieve in order to get a "cake" of peat which might be handled easily.

Fill up one 6-8 liter cylindric bucket nearly to the edge (water from the breeding tank might be used). Take the 3 mm sieve, dipping it partly into the water, putting into it a small amount of peat and separating the filamentous peat from the mud by lifting and lowering the sieve into the water. After some minutes (peat from a 15 liter tank) the coarse and filamentous peat has been separated from the mud and the eggs. Now eggs and mud are in the bucket as deposits on the bottom. If you now take out half the water into another bucket and pour it back into the bucket containing eggs and mud all deposits will raise from the bottom. But as fertile eggs sink more quickly to the bottom compared to the smaller peat particles, after some seconds you are able to pour about half the water from that bucket into the other bucket. This water contains only peat and no (fertile) eggs. If you have more clean water at your disposal, you fill up the "egg bucket" once more, wait for some seconds, and in this way you go on until most of the smaller particles are separated from the eggs and the more heavy peat particles.

At this time I use a 2 liter glass to wash the remaining eggs and peat in order to have better control. The amount of peat is now reduced very much. Eggs are concentrated in a small amount of coarse and heavy peat. This is a fine mixture if you want to dry up eggs in peat. If you want to do so, wash out peat and eggs into a little sieve, forming a "cake", let the cake dry out partly (notice that you have to stop when the surface of the cake begins to get lighter in color). You will find that at this state the cake will fall into crumbs even if you only touch it with one finger. That is because all the fine particles have been removed.

In order to separate eggs totally from any peat we go on washing in the glass. From the side, with the light falling through the glass, you can easily see the eggs sinking quickly to the bottom. Also, during the

pouring, you can use a light shining from below through the glass to easily spot any egg which tries to escape together with the peat particles. During these washings, coarse peat that adheres to the eggs will be separated from the egg and many of the particles that might adhere to the eggs will be washed away, making it more easy to you to see eggs in water.

At this point it is not useful to go on washing. The last phase of separating eggs from peat will take place in a big plastic or glass bowl (flat bottom). Pour into this bowl little peat containing eggs. Water level in bowl 5-7 mm (otherwise eggs and peat will drift into "islands") and with light from below you easily will see any egg and be able to lift it out using a pipette (small glass tube with a rubber "ball"). Do not put more peat into that bowl than you easily can see any egg.

Infertile eggs should be removed by these washings, as the infertile eggs are not nearly as heavy as fertile eggs. If you fear that many eggs will catch fungus, possibly you will not want to separate the eggs totally from the peat, but stop at a state where you have only coarse peat together with the eggs. Then you can place this peat and eggs in a flat bowl (those used by photographers are advantageous) and keep this mixture on low water for one week or so. The coarse peat will separate the eggs from each other and fungus will not so easily transfer from one egg to another. The coarse peat also will permit oxygen to penetrate the whole mixture and start the fungus on infertile eggs. Clean eggs in a bowl will form lumps and if fungus attacks, the eggs will adhere to each other very firmly. Therefore you possibly will inspect your bowls with clean eggs twice a day and remove any "white" or "gray" eggs that you spot. Place the bowl on a dark support, shine a light from the side, and this light will make any infertile egg look whitish. Also use lighting from below and to detect any whitish "nimbus" around the egg. If in doubt use a magnifying glass, use low bowls.

After about 14 days, all infertile eggs will have developed fungus, the rest are ready for shipments or further research on developments. Big eggs in fine mud you also may separate very quickly by using the 1 mm mesh sieve in the same way as you used the 3 mm sieve. Remember, eggs that you remove from fine mud are not very hard. It seems as if these eggs should need some hours on low water (oxygen?) before they get their full strength. Also any "antibacterial" drug such as methyleneblue, gentiane violet or acriflavine will penetrate such eggs, if you add these drugs at once after washing out eggs. The "washing water" will be very dirty indeed. But Daphnia will feed on it and soon make it usable again. The peat you washed away from the eggs, on the other hand, is cleaner as it was before and you might use it at once for further breeding of the same species.

During the washing out you will find many "weeds", that is to say eggs that did not come from the species you breed, but which might have been in the peat for months or years. Separate these eggs from the other eggs, as the hatching of different species together may not be clever. Some fry may grow much quicker than other fry and the "weeds" might eat up the more desirable fry before you discover the "weeds" in your breeding tank.

Storing eggs

Eggs spawned deep into fine mud by annuals will not develop as long as water covers the mud. We may use this fact when storing eggs of such killies over many months. Separate eggs from filamentous peat

and put eggs and the finer mud particles into a high glass. Keep always water above the peat surface. Place a lid with an air entrance on glass. Store away at room temperature. How long they will stay fertile nobody knows. However, eggs from the real annual species possibly will last for more than one year under these conditions. Storing in ampoules, closed and filled with water, will liberate H₂S if only one egg dies, and this gas is very poisonous and may ruin all other eggs. You cannot stop the more or less belated development of these eggs if oxygen is present around the eggs. However, you may store eggs of annuals also by drying up the whole mass of peat, mud and eggs, by this way turning one egg after the other into the phase of resting fry. However by this method you will never be sure that you still have the possibility to "reset" the species concerned.