

Ornamental Fish Farming

Some stages of the development of eggs can be seen with the naked eye when the eggs are viewed from above with a torch beam shone through them from underneath. The developing outline of the embryo in large eggs, darkening of the embryo (especially the eyes) in eggs which take several days to hatch, and movement of the embryo before the eggs hatch, are quite easily visible. When the eyes are dark enough to be seen in the egg, the eggs are

referred to as being 'eyed' – a common and useful term in general aquaculture.

If viewed microscopically soon enough after fertilization, the results of the earliest cell division (called cleavage) can be seen on the surface of the yolk, which itself is surrounded by a layer of clear fluid, with the outer egg membrane (shell) on the outside. The cell divisions continue until there is a

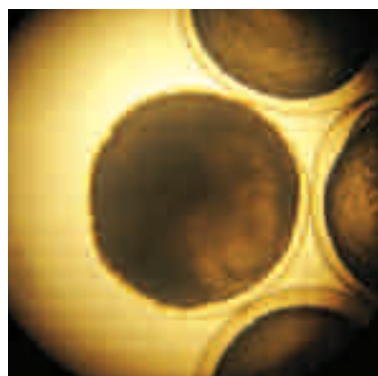


FIG 3.39. *An unviable egg (centre). These turn opaque white in colour within about 24 hours of being laid. This is followed by the growth of fungus over the egg unless measures are taken to prevent its growth.*

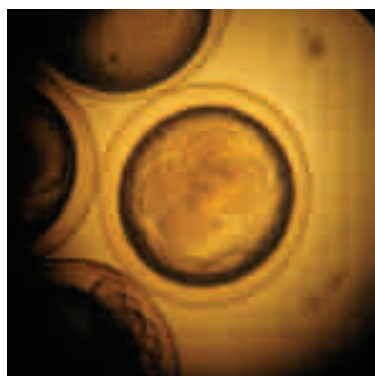


FIG 3.40. *A viable embryo after the second cleavage (2 cell divisions), 2 to 3 hours after spawning, at approximately 26°C (79°F). Four adjacent cells can be seen attached to the outside surface of the yolk. (Visible on the centre of the yolk in the photograph.)*

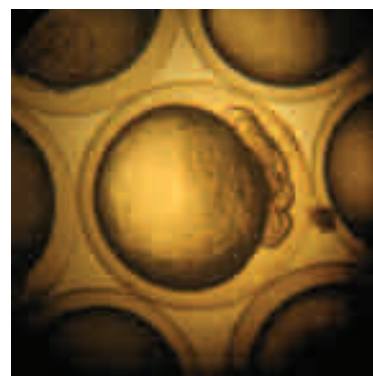


FIG 3.41. *Several hours later, the embryo after about 4 cell divisions, visible on the right hand side of the yolk in the photograph.*

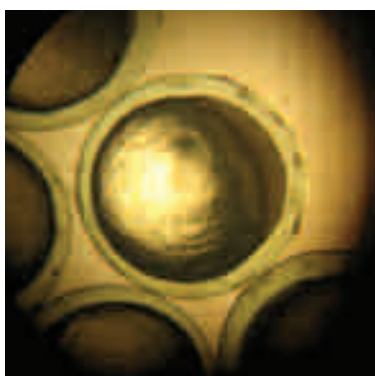


FIG 3.42. *Individual cells have reduced considerably in size over many divisions, and now appear as a raised opaque area (on the right hand side of the yolk), about 10 to 12 hours after spawning.*

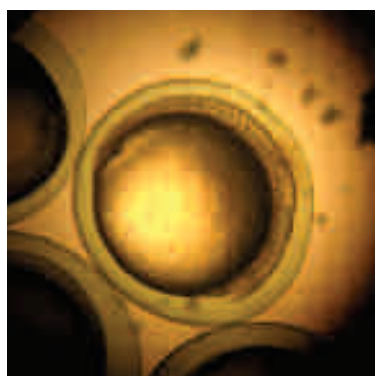


FIG 3.43. *Vertebrae are clearly visible in the backbone after about 24 hours.*



FIG 3.44. *After about 48 hours the heart is well developed, its pumping is clearly visible and blood cells can be seen pulsating through the body. Eyes are also becoming evident, visible at about the '5 o'clock' position on the right of the yolk. From time to time the embryo now wriggles inside the egg.*