

PROJECT 1; GET WET
POSEIDON'S FALLACY



By Jonathan Crenshaw

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PURPOSE

The purpose of this assignment was to capture an interesting image of fluid dynamics accurately portraying a fluid dynamics phenomenon. The artist set out to capture the interaction of food coloring and water, with initial shoots done in video and later shoots in photographs. As with any artistic endeavor, a meaning is supposed to be captured and presented to the viewer for interpretation.

FLUID DYNAMICS

The flow phenomenon observed can be described as the settling and breakup of suspension drops (Bosse et. al.) or Rayleigh-Taylor Instability (Calder). Before the suspension drop hits the water, the food dye starts in spherical form as it drops through air before hitting the surface. As the drop hits the water, it loosely maintains its spherical shape while some particles stray into tails. As evidenced by the high number of mushrooming tails in the image, the disintegration process was quick and suggests a Reynolds number greater than one, though the disintegration process was not fast enough for a Reynolds number of 100 (Bosse et. al.). Rayleigh-Taylor instability occurs when a liquid of higher density is introduced to a lower density liquid, in this case the higher density food coloring being introduced to water. The higher density accelerates downward, accounting for the long tail in the top half of the image. The initial growth of the dye, as seen in the bottom portion of the image, is a consequence of the initial instability created by the differences in density between the two liquids (Calder).

VISUALIZATION TECHNIQUE USED

A Sony Cyber-Shot DSC-W50 camera was used. Focal length, exposure, depth of field and ISO sensitivity were determined by the camera at the time the photograph was taken; the exact information cannot be retrieved with Gimp photo editing software. The photo was taken in macro mode in order to attain a closer zoom. The camera was propped upon a paint can.

METHODS USED

A red wine glass measuring 20cm tall with a bowl 10cm in height and 9cm maximum width was used as the container because it was big enough to provide significant room for the food coloring to expand within the water. Filtered tap water at 9°C filled the glass to its crest. The water was kept at a lower temperature in order to inhibit its movement in contrast to the room temperature dye. One drop of blue Kroger food coloring at a temperature of 18°C was dropped into the water. Blue coloring was used because it displays more contrast with the clear water than yellow, red, or green food coloring does. At the time the photograph was taken, the body of the dye spanned approximately 4cm by 2.5cm with the tail to the top of the image measuring 5cm.



Two overhead ceiling lights were used as the only source of lighting, approximately 1.8m above the image. The glass was placed on a table covered in black cloth that was held up in the background and foreground of the image to avoid glare. The camera was placed 8cm in front of the glass at an elevated position of 13cm. White printer paper was propped up immediately behind the glass from the perspective of the camera. The frame dimensions of the original unedited image were 10cm by 14cm.

The image was edited using Gimp image editing software. The edges of the glass were cropped out. In order to brighten the background to add contrast to the image, under the color tab light balance and color enhance were selected. The curve of the image colors was then altered into a general S shape to emphasize blue while dimming red and green.

Original image:



ARTISTIC ELEMENTS

Art tends to take on meaning regardless, or at times in spite of, the artist creating it. This project began as a video of multiple drops of dye dropped over the course of ten minutes and sped up into three, the intent being to show the decreasing effect of each drop as previous drops expanded and mixed with the water. Further work on this project would return the artist to that premise. This still image is meant to display the spectacular effect of a single droplet of dye in water, so blue coloring was used to highlight the contrast between the clear water, hence earning the title of "Poseidon," the Greek God that inhabited the ocean while embodying its power. A suitable image was found and edited. At the eleventh hour the blatant phallic symbol on the right side of the image was first noticed. Time being of the essence, this remained the final image rather than starting over from a raw image. As this aspect of the image had now become in the artist's mind a ready focal point of the image, the name of the image was changed from "Poseidon" to *Poseidon's Fallacy*. *Poseidon's Fallacy* inspired a poem by the same name that should be viewed in accompaniment of the final image.

Poseidon's Fallacy

The wrath of Poseidon sitting alone,
His impotence thoroughly shone.
Athena giggles, bow in hand,
While Amphitrite strides for land.

Shaking Earth as he continues to shrink,
Deity's body to the bottom sinks
Beside blind fish refusing to blink,
Oblivious to his glowering wink.

SOURCES

Calder, Alan. "Rayleigh-Taylor Instability." *Stony Brook Astronomy*. 26 Sept. 2010. Web. 09 Feb. 2011. <<http://www.astro.sunysb.edu/acalder/val.html>>.

Bosse, Thorsten, Leonhard Kleiser, Carlos Hartel, and Eckhart Meiburg. "Numerical Simulation of Finite Reynolds Number Suspension Drops Settling under Gravity." *Physics of Fluids* 17 (2005). Electronic.