Jœlly Christmas: Induced Drift by Juvenile Jellyfish

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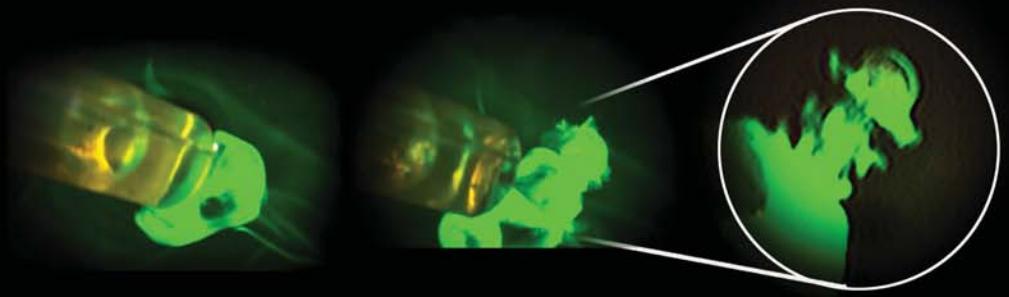
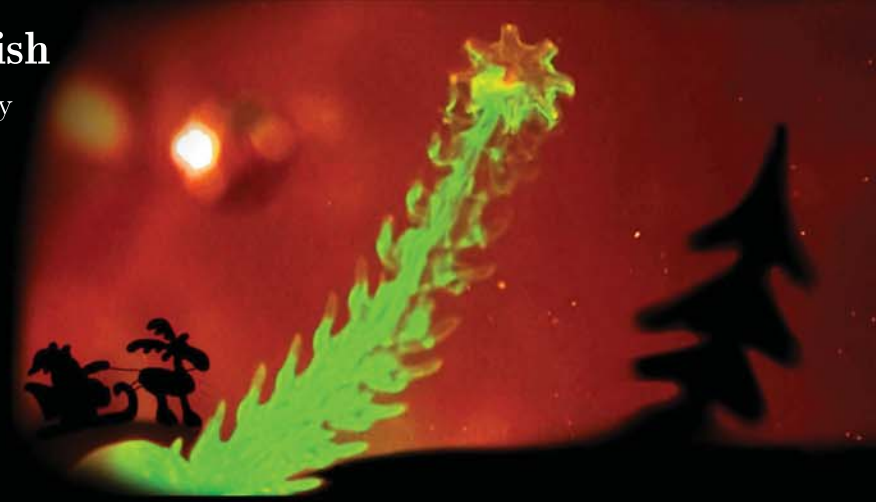
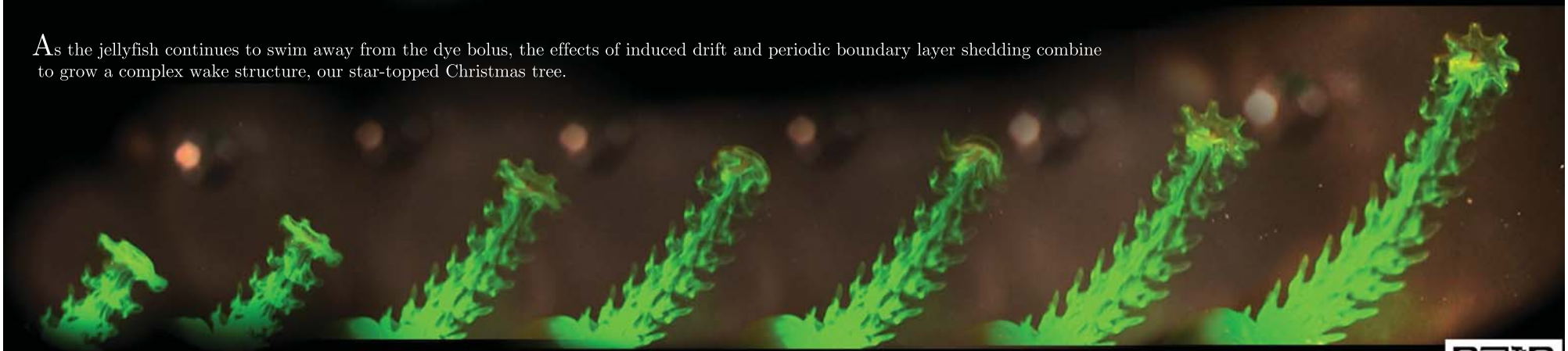
In these experiments juvenile Moon jellyfish (*Aurelia aurita*) approximately 8 mm in diameter are slowly released into regular seawater from a plastic pipette containing seawater dyed with Fluorescein. Initially, the animal is fully enclosed by the bolus of dyed water. As the jellyfish start to swim using bell contractions, it emerges from the bolus, and the Fluorescein dye visualizes the fate of the fluid volume orginially surrounding the animal. Images are captured with a Sony HDR camcorder looking onto the dye bolus that is illuminated from the side.





Paddling at Reynolds numbers on the order of 10, the jellyfish lappets are subject to viscous effects causing a thick boundary layer to form around the lobed bell as described in [1]. During each contraction cycle, a portion of the boundary layer is shed from the top of the bell, rolling into a "skirt" that resembles the branches of a Christmas tree. Furthermore, a portion of the surrounding fluid is set into motion by the body's pressure field and trails along with the jellyfish. This effect, known as induced drift, is enhanced at low Reynolds numbers and is thought to play a role in biogenic ocean mixing [2]. Here, it forms the trunk of our Christmas tree.

As the jellyfish continues to swim away from the dye bolus, the effects of induced drift and periodic boundary layer shedding combine to grow a complex wake structure, our star-topped Christmas tree.



[1] Nawroth, J.C. et al. 2010. Phenotypic plasticity in juvenile jellyfish medusae facilitates effective animal–fluid interaction. Biology Letters 6(3), 389-393
[2] Kakani, K. & J.O. Dabiri. 2009. A viscosity-enhanced mechanism for biogenic ocean mixing. Nature 460, 624-626

Scan the barcode to watch the video on YouTube,
or go to: http://goo.gl/G3ChHP