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Predation by the Dwarf Seahorse on Copepods: Quantifying Motion and Flows Using 3D High Speed Digital Holographic Cinematography - When Seahorses Attack! BRAD GEMMELL, University of Texas, JIAN SHENG, University of Minnesota, ED BUSKEY, University of Texas — Copepods are an important planktonic food source for most of the world's fish species. This high predation pressure has led copepods to evolve an extremely effective escape response, with reaction times to hydrodynamic disturbances of less than 4 ms and escape speeds of over 500 body lengths per second. Using 3D high speed digital holographic cinematography (up to 2000 frames per second) we elucidate the role of entrainment flow fields generated by a natural visual predator, the dwarf seahorse (*Hippocampus zosterae*) during attacks on its prey, *Acartia tonsa*. Using phytoplankton as a tracer, we recorded and reconstructed 3D flow fields around the head of the seahorse and its prey during both successful and unsuccessful attacks to better understand how some attacks lead to capture with little or no detection from the copepod while others result in failed attacks. Attacks start with a slow approach to minimize the hydro-mechanical disturbance which is used by copepods to detect the approach of a potential predator. Successful attacks result in the seahorse using its pipette-like mouth to create suction faster than the copepod's response latency. As these characteristic scales of entrainment increase, a successful escape becomes more likely.

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