Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Multi-jet propulsion organized by clonal development in a colonial siphonophore JOHN COSTELLO, Providence College, SEAN COLIN, Roger Williams University, BRAD GEMMELL, University of South Florida, JOHN DABIRI, Stanford University, KELLY SUTHERLAND, University of Oregon —
Physonect siphonophores are colonial cnidarians that are pervasive predators in many neritic and oceanic ecosystems. Physonects employ multiple, clonal medusan individuals, termed nectophores, to propel an aggregate colony. Here we show that developmental differences between clonal nectophores of the physonect *Nanomia bijuga* produce a division of labor in thrust and torque production that controls direction and magnitude of whole colony swimming. Although smaller and less powerful, the position of young nectophores near the apex of the nectosome allows them to dominate torque production for turning whereas older, larger and more powerful individuals near the base of the nectosome contribute predominantly to forward thrust production. The patterns we describe offer insight into the biomechanical success of an ecologically important and widespread colonial animal group, but more broadly, provide basic physical understanding of a natural solution to multi-engine organization that may contribute to the expanding field of underwater distributed propulsion vehicle design.

John Costello
Providence Coll

Date submitted: 30 Jul 2015 Electronic form version 1.4