Abstract Submitted
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**Jellyfish stinging is driven by the moving front of the nematocyst's tubule** URI SHAVIT, Civil and Environmental Engineering, Technion, IIT, SINWOOK PARK, Mechanical Engineering, Technion, IIT, GADI PIRIATINSKIY, Marine Biology Department, The Leon H. Charney School of Marine Sciences, University of Haifa, GILAD YOSSIFON, Mechanical Engineering, Technion, IIT, TAMAR LOTAN, Marine Biology Department, The Leon H. Charney School of Marine Sciences, University of Haifa — Nematocysts are ultra-fast stinging organelles that are utilized by the Cnidaria phylum for prey capture, defense and locomotion. They consist of a capsule and a tubule and exert high pressure and acceleration to penetrate the target organism. Previous studies report that the ejection and elongation of the tubule are driven by a buildup of osmotic potential in the capsule. We question this explanation using a microfluidic system that controls the osmotic potential by directing the tubule through oil, where no osmotic potential can develop, while keeping the capsule in water. It was found that the time needed for elongation through oil is orders of magnitude larger than through water. Our mathematical model shows that the p$\gamma$Glu concentration in the tubule is higher than in the capsule and the internal pressure that develops there serves as the elongation driving force. These findings imply that modifications of the environment along the tubule route have the potential to slow down the process and reduce its impact. This may shed light on prey defense strategies, human protection against jellyfish stinging, the use of nematocysts for drug delivery and exploration of osmotic based methods for nanotubes production and elongation.

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