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Cells detect and transform specific external stimuli into precise biochemical functions in a process termed signal transduction. Sensory systems are one example of signal transduction. Dr. Pablo Villar will investigate a unique sensory system: octopus chemotactile receptors that mediate contact-dependent aquatic chemosensation. Dr. Villar will use single-cell sequencing, cryo-EM, and physiology to investigate the molecular logic of receptor expression, complex formation, and physiological function in cephalopods. These experiments will be conducted in [Dr. Nicholas Bellono's lab](#) at Harvard University. Villar's studies will reveal general principles for the evolutionary fine tuning of signal transduction and help connect adaptations in protein structure with octopus behavior.

As a graduate student in [Dr. Ricardo Araneda's lab](#) at the University of Maryland, Villar examined how neuromodulatory brain regions regulate circuits that process sensory information. Specifically, Dr. Villar showed that the [basal forebrain activates shortly after the onset of a sensory stimuli, and in a stimulus-specific manner](#). With this experience in neuroscience and sensory stimuli, Villar will now examine the signal transduction of stimuli at a molecular level in cephalopods.

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