

The **next** generation:

Fear Factor!

Kevin Curran puts fear under the microscope and challenges notions of what it means to be afraid





FOR A MAN WHO STUDIES FEAR FOR A LIVING, Kevin Curran exhibits little of it in his everyday life. The moment he leaves his work at Srekanth Chalasani's Molecular Neurobiology Laboratory at the Salk, he's likely sailing the open ocean, scuba diving or spearfishing. With a wide grin, the postdoctoral researcher readily admits, "I'm an outdoorsy person."

Inside the lab, however, Curran throws himself into challenges of a different kind. "Kevin chose a project that was difficult," Chalasani says, "but in a short time has made a ton of progress. In fact, we are currently writing up the results for what should be a very exciting publication."

The project that Curran adopted is identifying specific molecular pathways that modulate threat avoidance behavior, using *Caenorhabditis elegans*, a nematode, for his subject. Serotonin signaling is markedly well conserved between *C. elegans* and *Homo sapiens*, making it an ideal candidate for focused research. While previous studies acknowledge the link between serotonin circuitry and fear/anxiety behavior, less is known about how serotonin actually modulates neural circuits. This is what Curran is working diligently to identify.

His research has very real application for humans. While the ability to respond appropriately to a potentially harmful situation is critical to an organism's well-being, the behavior can go awry. In humans, for example, malfunctions in this neurobiological process can lead to such debilitating diseases as panic attacks and post-traumatic stress disorder, conditions becoming ever more prevalent in today's fast-paced and competitive society. It's estimated that the cost of treating anxiety disorders in the U.S. exceeds \$42 billion a year.

"Actual fear has a tangible stimulant: a person sees something threatening, and the body has an appropriate response, often characterized as fight or flight," Curran explains. "Anxiety, on the other hand, does not have a tangible stimulant, but the body reacts in a similarly heightened manner."

Outward symptoms such as shortness of breath, palpitations and dizziness often lead to insomnia, fatigue and physiological stress across multiple organ systems. "We are seeking to learn which novel pathways are active in *C. elegans* during avoidance behaviors and which chemicals affect those behaviors, with the goal of duplicating our findings in mammalian species."

The research so far has produced some very interesting results, says Chalasani. "In lab experiments we often forget how animals live in the natural world, the challenges they face and the strategies they use to survive and reproduce," he says. "Kevin's unique insights have changed the way we approach this project and are instrumental in us studying some very fundamental behavior. His project is one of the first to show that worms might have a rudimentary form of a very complex (likely emotional) fear-like behavior."



With the winds having landed him at the Salk Institute, Curran now lives aboard his sailboat in the San Diego harbor. “It’s a whole mix of people living on my dock,” he says. “I like the fact that they’re from all walks of life; the unifying thread is that we all love boats.”

After his usual early morning run, it’s off to the lab, where Curran enjoys a vibrant and productive working relationship with “Shrek,” as Chalasani is affectionately known. “He has an amazing capacity to generate ideas,” Curran says of his mentor. “His enthusiasm never wanes.”

When work is finished and the setting sun is polishing the marina’s gleaming white hulls, Curran eagerly returns to the ocean. And while others are stopping at the store to pick up something for dinner, Curran is donning his wetsuit and diving into his own grocery. “I spearfish for sheepshead, kelp bass, rockfish,” he says. “In season, I catch California spiny lobsters with a couple of the other guys here.” Delivering his trademark grin that knows no fear, he says, “It’s a good life!” 🦞🦞



“ [Kevin’s] project is one of the first to show that worms might have a rudimentary form of a very complex (likely emotional) fear-like behavior. ”

– SREEKANTH CHALASANI

In May, Curran was the recipient of the Alumni-Faculty Fellowship, an award that will enable him to conduct a drug screen to further identify which molecular pathways modulate threat avoidance behavior.

Out in the natural world, Curran tests his own ability to respond appropriately to potentially harmful situations again and again, especially on the ocean. While completing his Ph.D. at the University of Washington, he took sailing lessons and upon completion, bought a 30-foot keel hull sailboat named Alizé, French for “trade wind.”

As a personal challenge, he set out on a four-month journey exploring the Alaskan coastline. “I didn’t have a job lined up, so whenever I landed in a port with an Internet café, I’d check the job listings,” he says. “Eventually I came across one for Dr. Chalasani’s lab. I knew him from a presentation he’d given when I was a grad student. His talk was awesome! So I applied for the position. Luckily, Dr. Chalasani remembered me too and invited me down.”

