NEXT GEN

Neuroscientist and self-described history geek Jared Smith wants to boldly go where no one has gone before.

"If this were the 1400s," asks Smith, "and we were Europeans exploring the world, where is the new world?"

For Smith and colleagues in Xin Jin's lab, the answer is simple: the brain. Using an array of sophisticated tools, the team is learning how neurons translate sensory signals into decisions and decisions into actions.

Smith wasn't planning to study neuroscience. He entered his freshman year at Bucknell University, about an hour from his home in Harrisburg, Pennsylvania, intent on chemistry. But a mind-blowing psychology class sent him in a different direction.

"Day one of undergrad, I took a class called 'Distortions of Reality,'" says Smith. "The professor asked: 'Do you think everything you see is exactly the way it is?' I was 18 and, for the first time, I realized my brain completely makes up my reality."

There were more epiphanies along the way. While interviewing for a doctoral program at Penn State, he listened to brain signals for the first time.

"It's a great sound, kind of like Rice Krispies –snap, crackle, pop," says Smith. He was hooked.

After earning his PhD and conducting postdoctoral research at Penn State, he couldn't resist the in-depth brain studies being conducted by Xin Jin at Salk.

"One aspect of our work is looking at how we process sensory information," says Smith, "and how that sensory processing guides our interactions with the outside world; that is to say, how the brain takes that perceptual information and uses it to make decisions."

Smith is studying brain regions in the basal ganglia, which help govern how we both choose and implement specific actions. These regions are linked to schizophrenia, Parkinson's disease and other conditions. Specifically he's investigating a nucleus to the basal ganglia called the striatum, which contains many opioid receptors in dense neural clusters called patches—critical studies, given the ongoing epidemic.

While these biological questions are compelling, the tools Smith and his colleagues in the Jin lab use are just plain amazing. One approach, pioneered by Salk's Ed Callaway, uses an altered rabies virus to map how brain cells share information. Rabies is unique because it jumps across synapses. By modifying it to jump only one synapse, researchers can get a highly detailed view of how neurons interact.

Another approach uses the toxin diphtheria to destroy small numbers of neural cells to determine how they influence animal behavior. The lab can also turn neurons on and off using light, allowing researchers to delineate the different pathways and see how they function in real time.

"Now we have the technology to tease out how brain regions, as well as the types of cells within those brain regions, are talking to each other," says Smith.

At home, Smith likes to play guitar, walk Henry the beagle and spend time with his wife and one-year-old son. He tries to segregate his personal and professional lives, with mixed success.

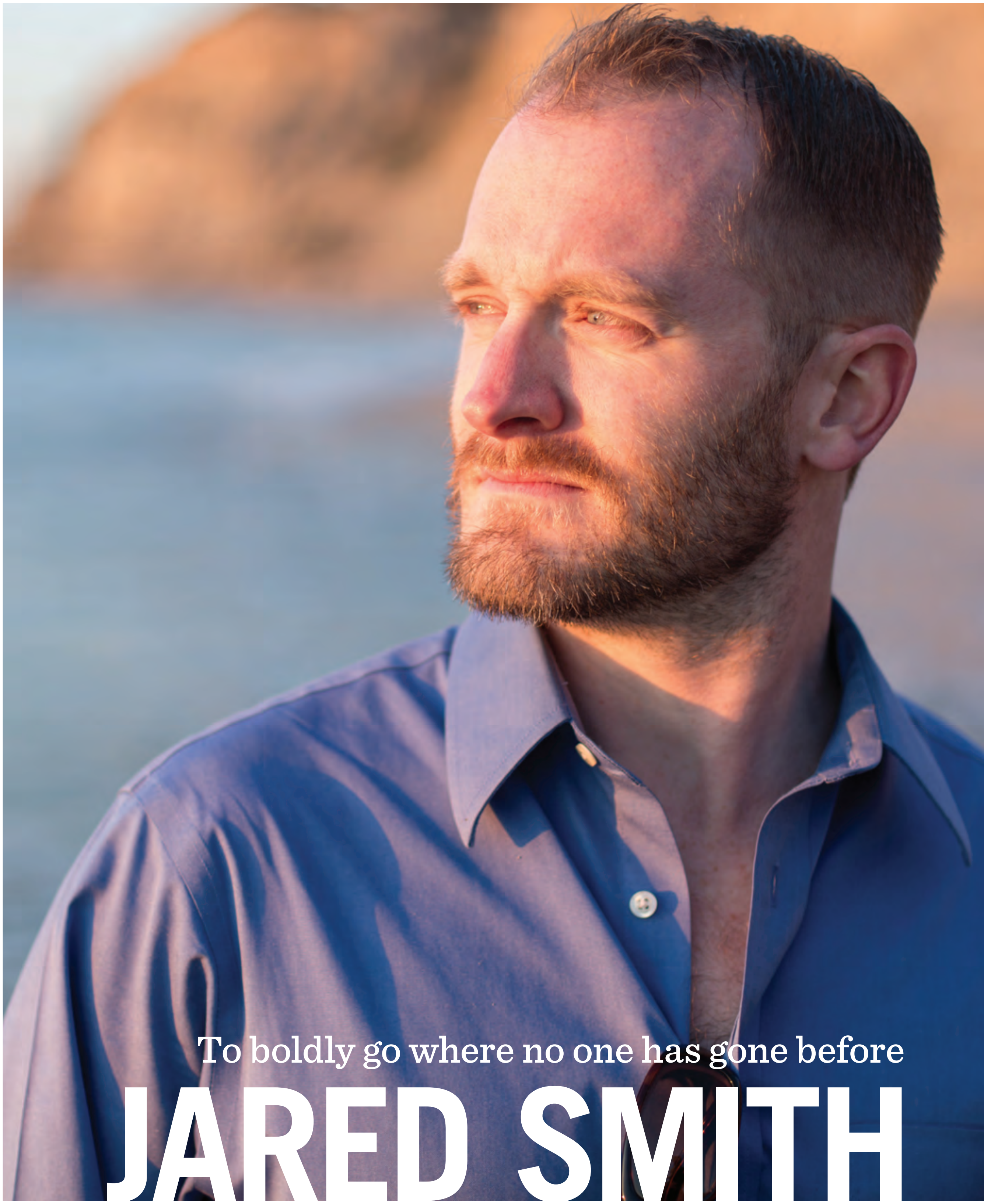
"Much to my wife's dismay, I spend our vacations thinking about the data, worried about how that's going to turn out," he says.

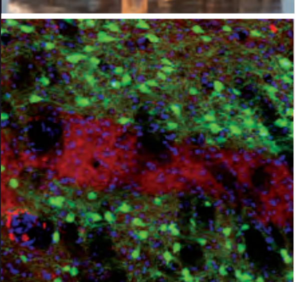
Like all parents, Smith enjoys watching his baby learn to walk—but of course, there's a twist.

"The thing I keep telling myself is to not turn it into an experiment, to spend time really enjoying him," says Smith. "But it's hard not to. Watching him walk was particularly fascinating. I'd done gait analysis in my last postdoc."

Eventually, when Smith runs his own lab, the time spent chasing his toddler may allow him to explore even more complex questions.

"What is the neural basis for curiosity?" asks Smith. "Why are humans wired to go out and explore from the very beginning? Where is that inclination in the brain?"





To boldly go where no one has gone before

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