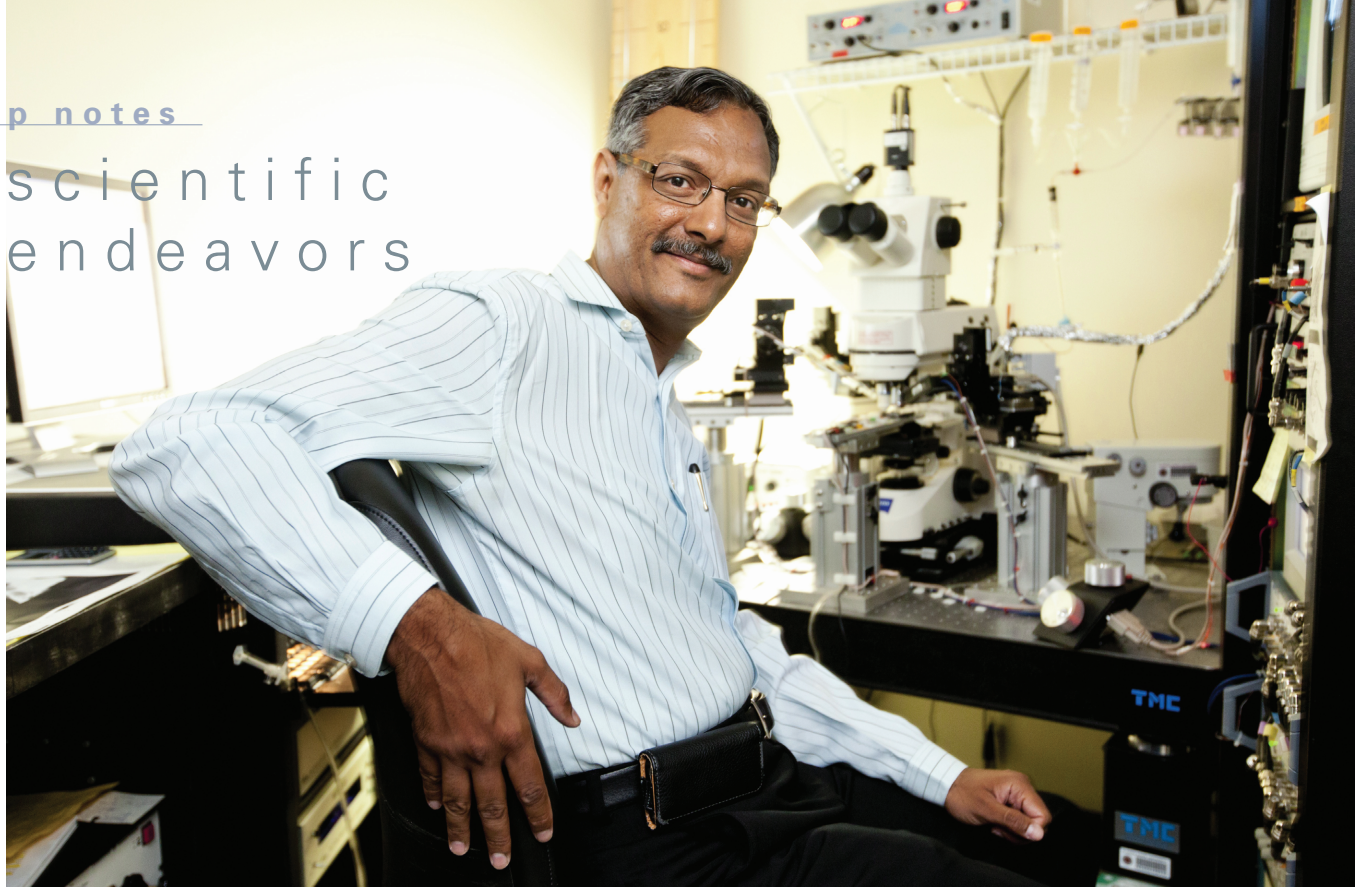
scientific endeavors



COLIN HACKLEY

This is where Sanjay Kumar, in the Department of Biomedical Sciences, made his "novel and significant" observations about NMDA receptors.

'A research gold mine'

Communication between brain cells just got easier to decipher, thanks to Sanjay Kumar's perseverance.

The assistant professor's discovery – recently published in *Neuroscience* – is a new type of NMDA receptor whose physiological properties had been overlooked. NMDA receptors are the predominant molecular devices in the brain for controlling memory function.

Kumar's paper focuses on synapses in one region of the brain, but what Kumar jokingly calls the FSU Receptor (because that's where he discovered it) exists throughout the brain, he says, influencing learning and memory. In addition to the potential implications for helping to better understand how memory works, Kumar thinks his discovery might help defuse epilepsy.

"Dr. Kumar's research shows NMDA receptors are even more complicated than we thought, allowing for highly nuanced communication among neurons," said Charles Ouimet, the College of Medicine's Faculty Scholar in Neuroscience.

Said Kumar: "We now know this receptor's location, how to identify it and what drugs serve as antagonists for it. This opens a lot of doors."

When he was at Stanford University, Kumar studied the building blocks that constitute NMDA receptors. He notes that "conventional" NMDA receptors are made up of subunit proteins referred to as GluN1 and GluN2. They're responsible for all the unique properties that enable NMDA receptors to serve as memory devices, control excitation of neural cells and enhance communications between them.

An additional subunit referred to as GluN3 was discovered about 10 years ago, but researchers previously had not been able to find a corresponding receptor.

After arriving at FSU in 2008, Kumar did experiments that appeared to identify "synaptic triheteromeric receptors" – the FSU Receptor – as the answer to the riddle.

This was such a new idea, Kumar said, that many refused to believe they existed.

Working alongside postdoctoral fellow Jyotsna Pilli, Kumar and his lab embarked on a two-year effort to persuade the neuroscience community that the data were reliable. Their effort is receiving positive reviews.

One *Neuroscience* reviewer – a fellow scientist – wrote "these observations are novel and significant."

Now Kumar is pursuing several follow-up questions, including the receptor's role in temporal lobe epilepsy in the entorhinal cortex.

"God knows what this receptor does in the rest of the brain," Kumar said. "It's a research gold mine."