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UCSB postdoc receives competitive award to investigate the genetic changes that shaped the human mind

The human brain is the most complex system we're currently aware of. Learning the genetic basis for its evolution, and the changes that distinguish *Homo sapiens* from our closest relatives, could provide us insights on many uniquely human traits and diseases.

This is the aim of Daniela Soto, a postdoctoral researcher at UC Santa Barbara, who recently earned a prestigious fellowship from the Howard Hughes Medical Institute (HHMI). The Hanna H. Gray Fellows Program recognizes early career researchers who show exceptional promise for leadership in academic science, making foundational discoveries while building an inclusive scientific culture. HHMI awarded only 16 fellowships this year following a nationwide competition.

The HHMI invests up to $1.5 million in support of each fellow over the course of up to eight years, spanning their postdoctoral training through the transition to starting their own lab as a faculty member. This support allows each fellow the freedom to pursue challenging scientific questions at the forefront of their field.

"I am thrilled to be part of the 2024 cohort of the HHMI Hanna H. Gray Fellowship," said Soto, who recently joined Professor Soojin Yi's lab. "This fellowship not only

provides valuable research funding but also fosters a supportive community that helps researchers thrive during the challenging postdoctoral phase."

Soto studies the DNA and RNA of humans and our closest living relatives — chimpanzees, gorillas and orangutans — to identify changes unique to humans. Her research focuses on human-specific forms of messenger RNA in the brain. This molecule carries instructions from DNA in the cell nucleus to ribosomes, which manufacture proteins. "Through this work, I hope to discover how our brains evolved to become so complex and why we're more susceptible to certain neuropsychiatric disorders," she said.

She pursued the field of comparative genomics to unravel the genetic basis of uniquely human traits and diseases. Scientists have gained crucial insights into human evolution and health by examining our species in the context of other great apes. And Soto's interests are comfortably at home in Professor Yi's lab. Yi and her doctoral student recently published a study highlighting the role of gene expression in the evolution and function of the human brain.

"I am really excited to welcome Daniela to my lab and the UCSB community," said Yi, a professor with joint appointments in the Departments of Ecology, Evolution and Marine Biology and Molecular, Cellular, and Developmental Biology. "Daniela is a fantastic scientist who has already made significant contributions to our understanding of human genome evolution during her PhD. And the Hanna Gray Fellowship is one of the most prestigious awards for a postdoctoral fellow."

Under Yi's guidance, Soto will apply her expertise in computational biology to study regulatory evolution in depth, focusing on the genome (DNA) and the transcriptome (RNA) in each human cell. "Daniela is a great role model for my lab and UCSB community, to women and underrepresented minority students in STEM fields," Yi added. "My lab and UCSB are extremely lucky to have her."

Soto aims to answer three key questions about human genomics. First, which of the genetic changes that distinguish us from other great apes actually led to human-specific forms of messenger RNA? Second, which of these occur in brain regions responsible for our advanced cognition, complex behavior and language? And third, do mutations in related genes affect our susceptibility to neuropsychiatric disorders?

The Hanna H. Gray fellowship will support Soto throughout her early career. The funding will provide her significant academic freedom as a postdoc to pursue her

own hypotheses as she investigates human brain evolution. Later on, it will be instrumental in helping her establish her own research group as a junior faculty member.

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