

INNOVATORS & IDEAS: RESEARCH LEADER

Raül Andero Galí: Bridging animal and human studies to understand stress and memory

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From pianist to pioneering neuroscientist, Dr. Raül Andero Galí brings a unique perspective to his role as ICREA (Institutió Catalana de Recerca i Estudis Avançats) Research Professor at the Autonomous University of Barcelona (Universitat Autònoma de Barcelona). Following his PhD in Neuroscience, earning the Extraordinary Doctoral Prize, he worked alongside Dr. Kerry Ressler at Emory University's Howard Hughes Medical Institute, pioneering innovative approaches that bridge mouse and human studies in fear research. After a productive tenure as an Instructor in Psychiatry at McLean Hospital-Harvard Medical School, he established his laboratory at UAB in 2016, where he continues to break new ground in understanding how stress shapes fear memory formation. His laboratory uniquely combines sophisticated techniques, from *in vivo* calcium imaging in mice to human fear response studies, focusing on how sex differences and hormonal cycles influence fear processing. Through this work, his team is uncovering new possibilities for treating anxiety disorders and PTSD, offering hope for more targeted therapeutic approaches. Beyond the bench, Professor Andero has cultivated an intellectually stimulating laboratory environment that reflects his broader vision for advancing neuroscience through comparative studies. We are pleased that he completed the Genomic Press Interview, offering our readers valuable insights into both his scientific journey and personal philosophy that drives his innovative research forward.

Part 1: Raül Andero Galí – Life and Career

Could you give us a glimpse into your personal history, emphasizing the pivotal moments that first kindled your passion for science?

I was born and raised in the Barcelona, Catalonia area. As a preteen and teenager, I developed a strong interest in music, particularly piano playing. I have performed classical music and jazz in bands and as a soloist. At some point in my late teenage years, I considered pursuing a career in it. One day, I challenged myself to play piano for 8 hours. It was grueling, and I did not even complete it full-time. That day, I realized that being a professional pianist was not going to work for me. So, I decided to pursue a degree in Psychology at the Autonomous University of Barcelona. Before starting, I had enjoyed reading Sigmund Freud, but from the beginning, I discovered that my favorite subjects were those related to neurobiology. Particularly inspiring were the classes taught by Professor Roser Nadal, which sparked my interest in neuroscience.

We would like to know more about your career trajectory leading up to your most relevant leadership role. What defining moments channeled you toward that leadership responsibility?

I obtained my PhD in Neuroscience in 2010 at the Autonomous University of Barcelona under the direction of Professor Antonio Armario.



Figure 1. Raül Andero Galí, PhD, ICREA, Autonomous University of Barcelona, Spain.

During that time, I studied the neurobiology of stress and its implications for memory mechanisms. After that, I joined as a Postdoctoral Fellow at the laboratory of Professor Kerry Ressler, who was a Howard Hughes Medical Investigator at Emory University. A defining moment in my career was when we pioneered the integration of mouse and human data with neuroimaging in the field of fear research, published in *Science Translational Medicine* in 2013. Since then, I have found it fascinating and intellectually very challenging to combine data of different species in fear studies. For instance, in the same study, we showed concordant data with *in vivo* calcium imaging of fear in freely moving mice (Miniscopes, UCLA system) and functional neuroimaging in humans (Florida et al. 2024 *Science Advances*).

Please share with us what initially piqued your interest in your favorite research or professional focus area.

From the start of my career, I realized that focusing on stress and memory provides valuable insights that can be applied across many areas of neuroscience. All animals face threats throughout their lives, triggering adequate stress responses vital for survival. I am also interested in memory, primarily because of the brain's remarkable ability to store and retrieve information, subtly altering it with each recall. Memories shape our reality, and the fact that these are not fixed truths, but malleable constructs influenced by emotions fascinates me. Finally, an essential thing about the stress and memory field is that it can be studied at





multiple levels, from cell cultures, animal models, healthy volunteers, and patients.

What impact do you hope to achieve in your field by focusing on specific research topics?

I hope that shortly, we will develop better treatments for fear-based disorders like PTSD. Current treatments involve psychotherapy and pharmacology, and while there have been positive advancements in both fields, pharmacology faces the challenge that most drugs target receptors distributed throughout the entire brain. My lab has focused on neuropeptide receptors, which are predominantly expressed in the brain's emotional regions. I believe these could serve as promising new pharmacological targets for treating fear-based disorders.

Please tell us more about your current scholarly focal points within your chosen field of science.

Several fascinating areas are a focal point of my lab at ICREA (Institutió Catalana de Recerca i Estudis Avançats or Catalan Institution for Research and Advanced Studies). First, we are strengthening both our human fear laboratory and Miniscope recordings in mice. In the human lab, healthy volunteers participate in fear conditioning experiments, where we collect saliva samples to measure sex hormones using novel and highly sensitive liquid chromatography-mass spectrometry methods. We aim to understand how the menstrual cycle influences fear memory formation by combining fear-potentiated startle and skin conductance responses with sex hormone levels. In mice, Miniscopes allow us to monitor hundreds of neurons in real time during behavior in a specific brain region. This approach helps us explore intriguing questions, such as why male and female mice exhibit equivalent behaviors, yet their neuronal responses in crucial brain areas differ significantly.

What habits and values did you develop during your academic studies or subsequent postdoctoral experiences that you uphold within your research environment?

The most important thing for me in my laboratory is that it has a healthy and positive environment in which the different members interact and learn from each other. It must also be an intellectually changing place where individuals can grow toward their future career goals.

At Genomic Press, we prioritize fostering research endeavors based solely on their inherent merit, uninfluenced by geography or the researchers' personal or demographic traits. Are there particular cultural facets within the scientific community that warrant transformative scrutiny, or is there a cause within science that deeply stirs your passions?

I believe we need to transform how neuroscience research is conducted by breaking down the traditional barriers between animal and human studies. Too often, these remain separate domains, limiting our progress. We can create a more comprehensive and translatable understanding of the human brain by advocating for more integrated cross-species approaches. This methodological shift is crucial for advancing neuroscience and developing more effective treatments.

What do you most enjoy in your capacity as an academic or research leader?

What I enjoy most is the opportunity to connect with fascinating people from around the world. These interactions help me remember that our work as neuroscientists should ultimately benefit as many people as possible.

Outside professional confines, how do you prefer to allocate your leisure moments, or conversely, in what manner would you envision spending these moments given a choice?

I love spending time in nature with family and friends. The beach is always a good time for me.



Figure 2. Raül Andero Galí at Costa Brava, Catalonia, Spain, following his regular swim in the Mediterranean sea. As a neuroscientist studying stress, he finds that time spent at the seaside is an essential balance between his research pursuits and personal well-being.

Part 2: Raül Andero Galí – Selected questions from the Proust Questionnaire¹

What is your idea of perfect happiness?

Snorkeling and fish-watching in Costa Brava, Catalonia, Spain (see Figure 2).

What is your greatest fear?

Death of my family members.

Which living person do you most admire?

At a professional level, my postdoctoral mentor Professor Kerry Ressler.

What is your greatest extravagance?

Planning trips around exciting food.

What are you most proud of?

Starting my laboratory studying the neurobiology of fear in mice and humans.

¹In the late nineteenth century, various questionnaires were a popular diversion designed to discover new things about old friends. What is now known as the 35-question Proust Questionnaire became famous after Marcel Proust's answers to these questions were found and published posthumously. Proust answered the questions twice, at ages 14 and 20. In 2003 Proust's handwritten answers were auctioned off for \$130,000. Multiple other historical and contemporary figures have answered the Proust Questionnaire, including among others Karl Marx, Oscar Wilde, Arthur Conan Doyle, Fernando Pessoa, Stéphane Mallarmé, Paul Cézanne, Vladimir Nabokov, Kazuo Ishiguro, Catherine Deneuve, Sophia Loren, Gina Lollobrigida, Gloria Steinem, Pelé, Valentino, Yoko Ono, Elton John, Martin Scorsese, Pedro Almodóvar, Richard Branson, Jimmy Carter, David Chang, Spike Lee, Hugh Jackman, and Zendaya. The Proust Questionnaire is often used to interview celebrities: the idea is that by answering these questions, an individual will reveal his or her true nature. We have condensed the Proust Questionnaire by reducing the number of questions and slightly rewording some. These curated questions provide insights into the individual's inner world, ranging from notions of happiness and fear to aspirations and inspirations.



What is your greatest regret?

Not using my second surname, Galí, in my scientific publications, where I go by Raul Andero (Andero R on PubMed).

What is the quality you most admire in people?

Connecting with others and sending a good vibe.

What is the trait you most dislike in people?

Manipulation.

What do you consider the most overrated virtue?

Writing grants.

What is your favorite occupation (or activity)?

I appreciate any outdoor activity with my family, such as hiking or bike riding.

Where would you most like to live?

Where I live now: in the north area just outside Barcelona.

What is your most treasured possession?

My books from when I was a child that my kid is already reading.

When and where were you happiest? And why were so happy then?

Seeing my wife and kid healthy after delivery.

What is your current state of mind?

A good balance between age and wisdom.

What is your most marked characteristic?

Curiosity.

Among your talents, which one(s) give(s) you a competitive edge?

Learning from colleagues in very different fields and combining that knowledge.

What do you consider your greatest achievement?

Mentoring brilliant young neuroscientists.

If you could change one thing about yourself, what would it be?

I would be more patient.

What do you most value in your friends?

The fact that they pick up the phone when I call them.

Who is your favorite writer?

Anthony Bourdain.

Who are your heroes of fiction?

The main characters in the "Back to the Future" trilogy.

Who are your heroes in real life?

My mom and dad.

What aphorism or motto best encapsulates your life philosophy?

Fool me once, shame on you. Fool me twice, shame on me.

Raül Andero Galí, PhD¹ 

¹Autonomous University of Barcelona, UAB Campus. Cerdanyola del Vallès, 08193. Barcelona, Spain

✉ e-mail: raul.andoero@uab.cat

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