Julio S. Rufas: A true chromosome lover

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Published online: 8 January 2021

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Julio. S Rufas. December 1956 – November 2020

Photograph by Ana Sánchez Castellanos

On November 18, 2020, Professor Rufas sadly passed having lost his battle to COVID-19. After a distinguished career spanning over 40 years, Julio must be proclaimed as one of the Spanish Godfathers of Cytogenetics.

Julio began his work on chromosomes under the supervision of Prof. Pedro Esponda in the Spanish Research Council (CSIC). After obtaining his PhD in 1984 and a postdoc sojourn in CSIC and Universidad de Alcalá (Madrid, Spain), he got a permanent position at Universidad Autónoma de Madrid

(Madrid, Spain) in 1988 and became Professor of Cell Biology of that University in 2011.

For decades, at UAM, Julio has been an academic reference and was admired by several cohorts of Biology students who became infatuated through his enthusiasm during his memorable teaching sessions. As a researcher, he recruited predocs who learnt how to handle chromosomes properly and with enormous effort, raised a compelling and luminous research group from scratch. In the early 1980s, he used silver staining in grasshopper meiocytes for uncovering what is now recognized as the meiotic scaffold. Julio decided to call it “raspa” (fish bone) given the obvious resemblance of chromatid cores observed in bivalents with two chiasmata and the fish skeleton (see Fig. 1). His delicate work with silver staining also provided amazing evidence of the behavior of kinetochores in meiosis and the structure and development of nucleoli under both light and electron microscopy.

Years later, Julio incorporated immunodetection techniques to study the dynamics of proteins through the meiotic process and pioneered the development of techniques for reconstructing the three-dimensional organization of chromosomes inside the nucleus. In particular, he was interested in deciphering the structure and behavior of the centromere and the kinetochores, the sister chromatid cohesion, the synaptonemal complex, the chromatid core, the meiotic recombination pathway, and the telomeres. This research provided embellished and precise knowledge about the involvement of proteins in relevant events of meiosis: pairing and synapsis, recombination and chiasma formation, and chromosome segregation.

During the past 20 years, accompanied by a notable group of cytologists who became the core of his research group and the aid of colleagues from other laboratories, Julio expanded the study of meiosis and did significant contributions in several animal species including rodents and marsupials, as well as true bugs with holocentric chromosomes and grasshoppers with incomplete synapsis.

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Fig. 1 Silver staining of metaphase I plate and selected bivalents of male *Chorthippus jucundus* ($2n = 16 + X0$)

The legacy of his industrious work remains in more than 100 research papers and many iconic images of meiotic chromosomes. The meiosis community in many labs worldwide recognizes his significant contributions in that field and his commitment and generosity for sharing his knowledge. His talent and perfectionism for illustrating with beautiful images every detail of his work, as well as

his tenacious will for communicating his findings with both passion and precision to his disciples and colleagues is an enduring remembrance.

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