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WOMEN IN BIOCHEMISTRY PORTRAIT GALLERY

Elizabeth H. Blackburn (1948)

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Elizabeth H. Blackburn, Nobel Prize in Physiology or Medicine in 2009 with Carol W. Greider and Jack W. Szostak, is a scientific reference in modern Molecular Biology because she led to the discovery of telomerase and its role in the elongation of the ends of eukaryotic chromosomes after each round of replication, contributing to the stability of telomeres. She currently works hard to identify additional functions of telomerase and to elucidate its relation to cell aging and cancer. Her scientific contributions stand out for their quality and experimental rigor. The perusal of her biography brings out especially her intellectual and human qualities, including perseverance, discretion and a high sense of responsibility.

Elizabeth Helen Blackburn was born in 1948 in Tasmania (Australia). From an early age she was attracted by the lush, rich animal diversity of the natural environment in southern Tasmania, and learned to watch it carefully. She finished high school with honors and won a scholarship to graduate in Biochemistry at the University of Melbourne. Elizabeth´s first big professional break was in 1970, as she was admitted as a pre-doctoral student in the famous laboratory of the Medical Research Council (MRC) in Cambridge (United Kingdom), where Watson and Crick had elucidated the structure of DNA. In addition, her thesis director would be Fred Sanger, a scientific reference and Nobel Prize in Chemistry for elucidating the structure of insulin (1958). As a research topic, Sanger suggested her to sequence RNA fragments. While working on this, Elizabeth met an American postdoc who later became her husband, John Sedat, who would reaffirm her interest and willingness to learn from science and research with great methodological rigor. With these premises, in 1975 she began a postdoctoral stay in Joe Gall's lab at Yale University (USA). Gall had begun the cultivation of *Tetrahymena*, a ciliated protozoan whose genome is composed of many small linear minichromosomes, and had developed a method to purify them. The proportion of chromosomal ends relative to the rest of the chromosomal DNA was far superior to that of eukaryotes studied so far. *Tetrahymena* was therefore a good model to identify these terminal chromosomal sequences, called telomeres. Blackburn showed that *Tetrahymena´s* telomeres consisted of short repeated sequences in tandem, rich in guanine (G) and thymine (T), whose synthesis depends on a new enzymatic activity. These results, really surprising, were published in Nature in 1984. Blackburn established as a priority to identify the protein responsible for copying the repeated sequences that she had described. In this phase of work, the contribution of Carol Greider, from the California Institute of Technology (Caltech), is absolutely essential. Carol, used to fight hard against severe dyslexia, enriched the team with her great perseverance and her extreme experimental rigor. These are key qualities who would help to finally describe the contribution of telomerase in the elongation of DNA chains and unveil the mechanism that compensates the incomplete replication of the ends of linear chromosomes. Later, they demonstrated that telomerase is a ribonucleoprotein present in various eukaryotic species with reverse transcriptase activity, which also contains the RNA used as a template to extend the 3' chains protruding chromosomic ends. Subsequent studies have shown that telomerase is associated with aging and is associated with many tumor pathologies. For this reason, the telomeres remain at the forefront of scientific landscape, and Blackburn, along with other researchers, is working to elucidate new functions of telomerase and help the design of anti-cancer therapies.

(Translated by Alejandra Galindo)

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