

In memoriam: A man for all eyes-Walter Gehring, 1939-2014

Panagiotis A. Tsonis,¹ Katia Del Rio-Tsonis²

¹*Department of Biology, University of Dayton, Dayton, OH;* ²*Department of Biology, Miami University, Oxford, OH*

Developmental Biology as we knew it came to an end in 1984. Until then, most experiments were done on morphological basis. Developmental biologists eagerly desired to understand the molecular basis of development. The discovery of the Homeo domain in homeotic genes in *Drosophila* provided the means whereby a new era dawned in the field. Walter Gehring and his colleagues stunned the scientific world by identifying this 60-amino acid domain with DNA binding activity [1]. Soon, homeobox-containing genes were found in all organisms and their expression patterns showed us how embryos across the



Figure 1. Walter Gehring (center) with the authors in Montevideo, Uruguay, April 29, 2012.

Correspondence to: Panagiotis A. Tsonis, University of Dayton, Biology 300 College Park, Dayton, OH 45469-2320; Phone: (937) 229 2579; FAX: (937) 229 2021; email: ptsonis1@udayton.edu



Figure 2. Walter Gehring exercising his hobby, photography, in Colonia, Uruguay, April 24, 2012.

animal kingdom come to differentiate and acquire their shape and axis. This discovery shaped the careers of a generation of scientists, including those of the authors. Moreover, homeobox-containing genes became indispensable probes in understanding evolution of basic body plans in animals [2]. Gehring, thus, can be credited as the father of Evo-Devo, understanding evolution via developmental biology.

As Gehring continued his research he also made a seminal discovery that changed the eye field. His work on the identification of pax-6 as the master gene for eye development sparked research in basically all animals with eyes, or even eye-spots. In the end it comes to the point that all eye-types are controlled by the network that pax-6 controls. This led Gehring to strongly suggest that the basic machinery for eye evolution is the same and that during evolution new parts can be added. To the end of his life he was investigating this aspect of eye evolution. In the past few years he had formulated his “Russian Doll” hypothesis to explain eye evolution [3]. According to this, the very primitive eye, a pigmented eye-spot (cyanobacteria) could have been a symbiont of eukaryotic algae as a primary chloroplast, which in turn were taken by a dinoflagellate as a secondary chloroplast, which lend its camera-type eye in a jelly fish and so on. In other words, complexity of the eye was increased by borrowing simpler eyes and by adding new elements.

He was very keen about his Russian Doll hypothesis. Here is his last e-mail to us on March 23, 2014. The symposium he is referring to was on the occasion of his 75th birthday and the 30-year anniversary of the Homeo domain publication.

Dear Katia and Takis,

...We had a two-day Symposium with over a hundred of my former collaborators from all over the world. I gave a lecture on my recent work on my Russian Doll Hypothesis, which seems to be true. At the end I could not refrain from showing some pictures from that memorable meeting in Montevideo... Then I went back to look at all the pictures with both of you reminding me of the good times we had together (Figure 1).

An unforgettable event

All the best

Walter

For his contributions to science Gehring was awarded many prizes including the prestigious Kyoto Prize. He was member of several Academies, including the National Academy of Science, USA.

As a man, Gehring was very energetic until the end. He enjoyed nature and was an avid bird-watcher (Figure 2). He loved to travel, sometimes with the only purpose to observe birds and photograph them. We will never forget a trip we took together in Colonia, Uruguay after a break from a conference we attended. There is a famous lighthouse there, quite tall, and to get to the top we had to climb a steep stairway. 73 at the time, Walter climbed up with amazing agility and enthusiasm. When at the top he used his camera to take pictures of the birds passing by.

We had attended his talks in the past, but we will forever remember his last (for us). Walter did not use any text in his slides. He wanted his audience to navigate through images only. At the end, after he marveled about the mystery of the eye and its gaze, he declared that Darwin was his hero in a humble way, like a student thanking his/her thesis advisor for guidance.

Well, Walter, you are the hero of many scientists whose career you shaped now and in the future. You will be missed.

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