Seminars in Cell & Developmental Biology 51 (2016) 53

Contents lists available at ScienceDirect

Seminars in Cell & Developmental Biology

journal homepage: www.elsevier.com/locate/semcdb

Editorial

Xenopus as a model for developmental biology

For over 100 years, *Xenopus* has been an important tool for developmental biologists. But it wasn't until the mid 1900s that this species catapulted into the forefront of embryological research. The story is quite familiar to many, that *Xenopus* essentially was used as a pregnancy test. Human urine containing high levels of hormones from a pregnant woman could induce a mature female *Xenopus* to lay eggs. The thousands of large eggs that became available from such tests were a rich resource for biologists and overcame the seasonality of the field of developmental biology. The power of *Xenopus* developed quickly, and many seminal scientific discoveries were made by scientists using this organism. For example, the first demonstration that sperm are necessary to fertilize an egg was performed in *Xenopus*, and the first eukaryotic genes were isolated from *Xenopus*, as well. Most notable, though, is that the first cloning experiments, where somatic cells were transplanted into enucleated eggs, leading to the formation of a normal adult, were done in *Xenopus* over 40 years before Dolly. These experiments showed that adult cells are totipotent, containing all the DNA necessary to grow an entire organism, paving the way to a new field, stem cell biology. *Xenopus* has also been the premier model for understanding how the body plan is formed, how neural crest is specified and migrates, and for the dissection of important signaling pathways such as Wnt and TGF-beta. This is evident when flipping through the developmental biology textbooks and seeing the overwhelming presence of *Xenopus* on its pages.

Now, *Xenopus* continues to evolve as an exciting model for developmental biologists. This evolution has been supported by important resources such as the NXR (National Xenopus Resource) and Xenbase (www.xenbase.org), as well as new genomic tools, such as gene editing capabilities and the sequencing of two *Xenopus* species. These additional tools, combined with classical embryology, has resulted in a "new awakening" for *Xenopus*. Developmental biologists are expanding the use of this frog and making novel discoveries regarding how the major embryonic structures and organs develop. Further, *Xenopus* has become especially useful for translational work, where studies are providing a better understanding of the mechanisms underlying human birth defects and vertebrate evolution. In this special section, we highlight new work that reviews how *Xenopus* is being utilized to understand the formation of the digestive system, pancreas, kidney, heart, musculature, nervous system and the face. Not only do these manuscripts each significantly contribute to their respective fields, but they also demonstrate the continued importance of *Xenopus* in the field of developmental biology.

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http://dx.doi.org/10.1016/j.semcdb.2016.03.005