

IN MEMORIAM



Prof. Andrzej Krzysztof Tarkowski (1933-2016)

Tarkowski

Professor Andrzej Krzysztof Tarkowski passed away last September (2016) at the age of 83. He initiated his pioneering research on mammalian developmental biology in the 1950s. However, his dream about being a developmental biologist started much earlier. As early as in high school he had plans for the future - inspired by two books on embryology, he became determined to specialize in developmental biology (Tarkowski *et al.*, 2008; Maleszewski and Tarkowski, 2008). In the early 1950s, in spite of a war-caused-gap in his education, he was admitted as a student to the Faculty of Biology and Earth Sciences, University of Warsaw (Poland). Lack of mentors specializing in the field of developmental biology in post-war Poland did not prevent him from searching for research opportunities. First, he contacted Prof. August Dehnel, who was setting a field research station in Białowieża, and, as a result, focused on the reproduction of a common shrew. Next, he switched his research model to the laboratory mouse. In his first *Nature* paper (Tarkowski, 1959), he showed that a single blastomere isolated from a 2-cell stage mouse embryo was able to support full term development and that the resulting mouse was healthy and fertile. He also tested the developmental potential of more advanced blastomeres (e.g. Tarkowski and Wroblewska, 1967; Tarkowski *et al.*, 2010). These discoveries proved to be fundamental not only for modern mammalian developmental biology but also

facilitated advancements in animal breeding and assisted reproduction. His other notable achievements include: generation of the first chimaeric mice produced experimentally by aggregation of two genetically distinct cleaving embryos (Tarkowski, 1961; Tarkowski, 1998); the first proof that artificially activated mouse oocytes can develop until mid-gestation (Tarkowski *et al.*, 1970), and establishment of the blastomere electrofusion technique that allows for production of tetraploid embryos (Kubiak and Tarkowski, 1985). These, and many more of his findings, have become indispensable tools for immunological, genetic, and oncological studies, as well as for generating transgenic animals which are instrumental for studying gene function in living animals. His work and discoveries provided a tremendous input to the contemporary developmental biology of mammals.

Importantly, Tarkowski himself used the above-mentioned methods to study the potential and fate of early blastomeres (Tarkowski *et al.*, 2001; Tarkowski *et al.*, 2005; Suwinska *et al.*, 2008; Tarkowski *et al.*, 2010) and the developmental effects of induced chromosome aberrations in chimaeric animals (Tarkowski *et al.*, 1977; Suwinska *et al.*, 2005). He was also vividly involved in the studies on oocyte maturation, fertilisation, remodelling of somatic nuclei (Czołowska *et al.*, 1984), and finally, in generating mouse-rat chimaeras – this latter project is now being completed by his research group. During his scientific career, Tarkowski collaborated with many research centres around the world. He was a Fellow of the Rockefeller Foundation in the Department of Zoology, University College of North Wales (UK), and worked as a visiting professor at the University of Oxford (UK), Rockefeller University of New York (USA), University of Adelaide (Australia), and Institute Jacques Monod CNRS - Université Paris 6 (France).

Tarkowski's career started and ended at the University of Warsaw: he graduated from the Faculty of Biology and Earth Sciences and finally became a Professor while working here. Until 2003, when he officially retired (although he has never retired from bench-work!), he was also intensely involved in being "The Boss", as we all used to call him, i.e. Head of the Department of Embryology and, for many years, Director of the Institute of Zoology. Moreover, he was deeply engaged in the organization of science and science financing in post-communist Poland; as an expert in the Ministry of Science and Education, a member of the Advisory Board of the Foundation for Polish Science, a member of the Polish Academy of Sciences and the Polish Academy of Arts and Sciences. He was also elected to the French Academy of Sciences, the National Academy of Sciences of the USA and

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Academia Europaea. Throughout his life, he was eager to explain and advise, and to react if he felt that his science-fellows needed support. He was a great teacher, who uncovered the beauty of developmental biology and the challenges of experimental mammalian embryology to many generations of students.

Tarkowski's scientific achievements were recognised worldwide and he was awarded the Albert Brachet Prize of the Royal Academy of Belgium (1980), the Polish National Award (1980), the Alfred Jurzykowski Foundation Award (1984), the Embryo Transfer Pioneer Award, the International Embryo Transfer Society Award (1991) and the Commander's Cross with Star of the Order of Polonia Restituta (2012). In 2002 he received the Japan Prize awarded by the Japan Prize Foundation, which he shared with his long time friend and the great developmental biologist - the late Anne McLaren (R.I.P.). In 2013, he was honoured with being awarded the Prize of the Foundation for Polish Science in the life and earth sciences. We at the *Int. J. Dev. Biol.* were most privileged to have had Prof. Tarkowski as Scientific Advisor on our Editorial Board for many years.

However, for us, and for his other collaborators, students, and friends spread all over the world, he was special not only because of his achievements and the positions he held, but also because of his personality and the way he formed us as scientists and impacted our lives. For him nothing was impossible. He was always focused on his scientific questions and on the pursuit for excellence in everything he did. In his opinion, the effects were rarely perfect. And this referred not only to experimental work, but also to the bread he baked or the liqueur he prepared for our Departmental Christmas or Easter parties. With the exception of his rye bread and really fantastic tinctures, he was also known for his spectacular photographic work. His photographic exhibitions – “Botanical Impressions”, “Tree and Wood”, “The Earth We Walk On” and “On the Border of Nature and Abstraction” – have been presented over the years in many Polish cities. As in science, also in nature he was noticing things invisible to others, and perpetuated his own interpretation of nature's phenomena in his photographs.

Working with him, we all became infected with his energy and ideas. Many times he managed to convince us that even the most complicated experiment was possible to perform and worth a try, as it would give us the answers we looked for. And so we woke up at 2 am in the morning to take care of our mice or travelled across Europe with preimplantation mouse embryos in tiny medium-filled tubes attached to our bodies as natural incubators. We agreed, although not always happily, to repeat the experiments over and over and over again, and were truly surprised when they worked as he had predicted, or were gravely troubled to disappoint him when they failed. We felt that we should do our best and even more, to match his high expectations, but we also felt that we could always count on him, and on his advice and expertise. In some way, we were his second family and he treated us like a good father: rigorous and demanding, but always just. We knew he cared about us and protected us. His unique ability to fulfil scientific dreams in the harsh Polish reality of 1950-80s was perfectly described in the personal view on Tarkowski written by his friend and collaborator Chris Graham from Oxford University (UK) and published in the *Int. J. Dev. Biol.* (Graham, 2008). In addition to describing Tarkowski's struggle to acquire reagents for his experiments, Graham also pictured him as a person with a very special sense of humour and full of joy. Indeed, for Tarkowski and, thanks to him, also for us, science was above all, a joy.

Today, science still greatly benefits from the research initiated decades ago by Tarkowski. It is very difficult, if not even impossible, to imagine the recent advances in mammalian developmental biology, and biomedical sciences in general, without his pioneering work in mammalian embryology. For us, his ex-students and collaborators, it is difficult to see the door to his office closed, the door that was open until September 2016. We will miss him and his intellect tremendously.

Ewa Borsuk, Małgorzata Waksmundzka, Katarzyna Szczepańska, Anna Ajduk, Marek Maleszewski, Aneta Suwińska, Monika Humięcka, Katarzyna Bożyk, Marcin Szpila, Renata Czołowska, Teresa Rogulska, Wacław Ożdżeński, Jacek A. Modliński, Jacek Z. Kubiak and Maria A. Ciemerych

Warsaw, Poland, November, 2016

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