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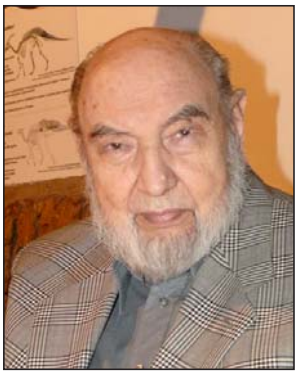
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Adam Urbanek (1928–2014)



Professor Adam Urbanek, who died in Warsaw on the 3rd of June 2014, aged 86, was one of Poland's most distinguished palaeontologists, a world-recognised specialist in the study of fossil graptolites. He worked at Warsaw University (1951–1982) and at the Institute of Paleobiology of the Polish Academy of Sciences (1982–2011).

Adam Urbanek was born on the 15th of April, 1928, in the town of Krosno nad Wisłokiem, in Poland. From his earliest childhood years he took a great interest in nature, and was always to be found amongst books—something that helped him, in the difficult wartime years, organize his own education. After the war he chose to study biology. At first he studied at the Jagiellonian University in Kraków, then after a year he was sent to study in Warsaw. There, fascinated by the lectures and personality of Professor Roman Kozłowski, that pioneer of graptolite studies (and of brachiopod studies before that), he continued his studies at Warsaw. From 1949 he began further studies supervised by Roman Kozlowski, who he later emphasized, as a key influence on developing his diverse biological interests.

Adam Urbanek's work is marked by a number of characteristics. Firstly, they were illustrated beautifully. His papers contain superb, clear—indeed, exemplary—camera lucida drawings of graptolites—largely of beautifully preserved examples, acid-extracted from limestone, and this care and attention to detail is evident too in the text, with full and useful descriptions and discussions of the phenomena being analysed. These are papers that will last the test of time, and be useful to generations of graptolite palaeontologists into the future. Part of his work was the systematic, thorough description of graptolite successions from borehole cores drilled from beneath the Polish lowlands. These successions linked the classic Silurian successions of the British Isles and of the Barrandian succession of Bohemia, and yielded a number of biostratigraphically useful new species. The care and attention to detail also resulted in the recognition of some classic examples of micro-evolution in graptolites, notably among the remarkable cucullograptids of the Ludlovian. He recognized, too, that the evolutionary changes were expressed via changes in the pattern of the microfusellar fabric around the thecal apertures.

Another key feature of Adam Urbanek's work is his understanding that the remains that he studied represented (in fact, are the collectively constructed "homes" of) living, metabolizing, evolving animals. That these remarkable colonial animals have no real analogue in today's plankton he clearly regarded as a challenge, a puzzle to which the answer might be approached by applying logic and deep biological knowledge. How, for instance, did many graptolites systematically—and with species-specific precision—change the shape of their thecae along the colony? For each graptolite zooid (itself never preserved) within a colony must, after all, have been genetically identical. The idea that he developed—that of diffusion and dilution of controlling chemical signals ("morphogens") from the first-formed zooid (the siculozooid) along the colony, to switch evolutionary innovations on or off, remains the most effective and widely-quoted explanation for the development of these complex colonies. Moreover, it was one, with characteristic ingenuity, that he tested (positively) by looking at evidence from fragmented and regrown graptolite colonies. These studies led to increased interest in graptolites by biologists working on modern colonial organisms.

Adam Urbanek also studied the modern benthic relative of the extinct planktonic graptolites, the pterobranch hemichordate *Rhabdopleura* (now generally regarded as being within the graptolite clade). This modernity as regards biological approach was matched by his quick adoption of new technology to wrest new anatomical detail from, again, that marvelous, acid-extracted material. Together with Kenneth Towe from the Smithsonian Institution, he was a pioneer of transmission electron microscopy of the tissues of preserved graptolite material, helping to redefine graptolite "skeletal" fabrics in ultrastructural terms and identifying that they had been made of collagen to further strengthen the pterobranch-graptolite link.

His studies on detailed pterobranch anatomy were often carried out with his long-time colleague Noel Dilly from St. George's Hospital Medical School, at the University of London. They established that the internal connections between the zooids in this pterobranch are homologous to comparable structures (stolons) preserved within the largely benthic dendroid graptolites. Adam Urbanek worked with many other paleontologists, including with the late Tatiana Koren' of the All-Russian Geological Research Institute (VSEGEI), St. Petersburg and Barrie Rickards from the University of Cambridge.

His great passions were evolutionary biology, the methodologies of the biological sciences and philosophy, about which he wrote much. Each of his studies were marked by great care and precision. He shared his great biological and geological—and especially palaeontological—knowledge with many students, lecturing for many years. In recent years his scientific work focused on ancient environmental crises, and interpreting them using the graptolite faunas that were so deeply influenced by these events.

Adam Urbanek was good and stimulating company—often fond of a good joke—when discussing many aspects of graptolites with his many friends and colleagues both at home and abroad. One abiding memory of one of us (JZ) is of when, in the 1970's, he visited and was a special guest at a meeting of the British and Irish Graptolite Group, held at the British Geological Survey, Keyworth. To add to the home-made lunches of bread, cheese, ham and tomatoes, Adam produced from his briefcase… a bottle of wine, so all present could symbolically raise a glass to this impromptu international palaeontological meeting. The ensuing discussions were among the most lively and convivial in that organisation's history. Adam Urbanek, as a person and as a scientist, will be long and fondly remembered.

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