



Obituary

Obituary and Tribute: Martin Bopp, 1923–2018

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ABSTRACT

On August 30, 2018, Professor Emeritus Martin Bopp, an internationally highly regarded botanist and former director of the Botanical Institute at the University of Heidelberg, died in Wuppertal, Germany, at the age of 95 years. His scientific career, his valuable contributions to the progress of plant science and his manifold activities as editor and co-editor are described in this tribute. A photograph of him is shown in Fig. 1.

1. Life and career

Martin Bopp was born on April 12, 1923 in Ettlingen, Germany. There he attended the local schools and qualified in 1942 for admission to the university (Abitur). During the war he served as wireless operator and in 1945 became prisoner of war in a British war camp. In the autumn of 1946 he began the study of Biology and Science at the nearby Technical University of Karlsruhe. There, being much influenced by the well-known botanist Prof. Hans Kühlwein (1911–1988), he became mainly interested in plants and particularly mosses and their development. Later he continued his studies, also including mathematics and physics, at the University of Freiburg where he wrote his Ph.D. thesis under the guidance of Prof. Friedrich Oehlkers (1890–1971). The title of Martin Bopp's thesis in 1951 was: "Entwicklungsphysiologische Untersuchungen an Laubmoos-Protonemen". Martin Bopp considered Friedrich Oehlkers as his major academic teacher who not only provided guidance for the young scientist, but allowed him free development and even introduced him to the topic that would become a life-long theme when he asked him to 'look what is going on at the tip of a moss protonema tube'. In 1956 Bopp received his lecturer competence (Habilitation) at the University of Freiburg with an innovative research on the distribution, inheritance and formation of anthocyanins in different *Begonia* species. In Freiburg he also started his pioneering work on plant tumors (see below).

In 1961, being known as a young promising German botanist in developmental physiology of plants, Martin Bopp was promoted to full professor at the University of Hannover, Germany. In 1968 he accepted the prestigious chair for General Botany at the Botanical Institute at the University of Heidelberg, thus becoming the successor of the late Prof. August Seybold (1901–1965) who had been well-known for his research on plant transpiration and photosynthetic pigments, and also of Wilhelm Hofmeister (1824–1877), the discoverer of the generation cycle in plants. In Heidelberg Martin Bopp lived through the lively and tumultuous period of student protests, but also the reorganization of molecular biology research and teaching. From 1975–1978 Martin

Bopp served in Heidelberg as Dean of the Faculty of Bio-Sciences and in many other functions. From 1979 until 1991, when he became emeritus professor, he was an elected member of the university senate.

2. Other activities

In 1964/65 Martin Bopp was guest professor at the University of Lisbon. Being very open for international co-operation he was guest scientist at the Institut Pasteur, Paris, and at several foreign universities such as Helsinki, Istanbul, Pietermaritzburg (South Africa) and Tanta (Egypt). He engaged himself for our Federation of European Societies of Plant Physiology FESPP and in the 1980s he served for two years as deputy speaker of the Section of Plant Physiology and Molecular Biology of the German Botanical Society (Deutsche Botanische Gesellschaft). From 1977 to 1979 he acted as Chairman of the Society of Developmental Biology (Deutsche Gesellschaft für Entwicklungsbiologie). From 1985 to 1988 he was president (Fig. 2) of the International Plant Growth Substances Organization IPGSA and in 1985 successfully organized the IPGSA Conference in Heidelberg with several hundred participants from 40 countries. The major contributions of this conference were published in the well respected reference book "*Plant Growth Substances 1985*", Springer Verlag, Heidelberg, New York, Tokyo, with Martin Bopp as editor. He also was Editor-in-Chief of the *Journal of Plant Physiology* (see below) and a part-time co-editor of several other journals, such as *Physiologia Plantarum*, *Plant Growth Regulation* and *Cryptogamic Botany*. In addition, he served as long-term co-editor of the Heidelberg Jahrbücher (year books) of the Heidelberg University Society that were published by Springer, Heidelberg. In one of the year books he published an interesting historical article on the contribution of his Heidelberg botanist predecessors to progress in botany (Bopp, 1994) and in another one he reported on plant nutrition of the inhabitants of the Heidelberg castle in medieval times, discovering the presence of rice seeds originating from Sicily in samples from the 14th century (Bopp and Zenner, 1998). Martin Bopp was a regular participant of the originally yearly meetings of the German Botanical Society DBG and also promoted the Rhein-Mainische Botaniker Kolloquia, the yearly meetings for young plant scientists of some 12 Southwest German universities and research institutions that had been launched in 1933 by August

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Fig. 1. Photograph of Martin Bopp in his beginning 70ies. (Source: JPP, 1998).

Seybold, Heidelberg, and were reactivated in the 1960s (Lichtenthaler, 1990). Moreover, within the German Research Council (DFG) Martin Bopp acted as a long-term critical, but benevolent, peer reviewer and co-ordinator of research grant applications and was also chairman of several DFG priority research programs. In this way he promoted the research endeavors of very many younger and also older plant scientists. In addition, he wrote many review articles on Developmental Plant Biology in journals and handbooks, and repeatedly reported new trends in this field in the book series “Fortschritte der Botanik (*Progress in Botany*) published by

Springer International. Over the years Martin Bopp kept close contact to Prof. Hans Köhlwein, Karlsruhe, his first teacher in botany. Naturally in 2011, when we commemorated in Karlsruhe the 100th anniversary of the late Hans Köhlwein (1911–1988) he participated in this event (Fig. 3). Several of Martin Bopp’s own anniversaries were celebrated by small symposia at his institute in Heidelberg or in the university aula Heidelberg, to which he invited many colleagues and friends. Fig. 4 shows him at the reception for his 90th birthday in 2013 at Heidelberg, explaining matters of life to his Heidelberg colleague Prof. Thomas Rausch.



Fig. 2. Martin Bopp as President of the IPGSA Organization at the Conference in Heidelberg in 1985. (source: Bopp family).



Fig. 3. Martin Bopp and Hartmut Lichtenthaler in 2011 at the reception of the Biology Department Karlsruhe commemorating the 100th anniversary of Hans Kuhlwein (1911–1988) who was the first botany teacher of M. Bopp as well as of H.K. Lichtenthaler. (Source: HKL).



Fig. 4. Martin Bopp together with Thomas Rausch at the reception of his 90th birthday in Heidelberg. (Source: R. Hell, Heidelberg).

3. Research

Martin Bopp started his scientific research in his thesis with investigations on the morphogenesis of mosses and its regulation by internal and external factors. This topic, i.e. the physiology, development and morphogenesis of mosses and moss protonema, continued to be one of his major research fields in all his future investigations. In fact, Martin Bopp was the first to clearly distinguish between three successive phases in moss development: “chloronema, caulonema and bud formation” and studied in detail the influence of endogenous phytohormones, auxin and cytokinin, as basic regulators of moss developmental and regeneration processes. He introduced the development of mosses into plant biology, or Botany, as he would have preferred to say. He used the moss *Funaria hygrometrica* as a ‘model system’ as we would refer to it today and defined the developmental term of a ‘morphogenetic system’ for protonema development (Bopp and Atzorn, 1992). In some of his late studies in this field, performed together with his colleague Ingrid Capesius, he investigated the molecular phylogeny of mosses and liverworts by analyzing the 18 S rRNA sequence of 40 bryophyte species, thus obtaining totally new insights into bryophyte taxonomy (Bopp and Capesius, 1996). Bopp’s scientific research was not restricted to mosses. He also performed innovative research in various other fields. He investigated development and metabolic processes in dicot plants during germination, detected the dependence of cell elongation growth on DNA synthesis, and studied the formation and inheritance of anthocyanin formation in *Begonia* species. In addition, his research also dealt with various open questions of polyploidy and DNA synthesis. Starting in 1960 he was one of the first to investigate plant tumors, in particular the crown galls (Wurzelhalsgallen) being

induced by infection with *Agrobacterium tumefaciens*, which he could block by inhibitors of DNA synthesis. This pioneering research brought him widespread recognition and contributed to the later biotechnological revolution of *Agrobacterium* mediated gene transfer. Being a dedicated teacher, the wide range and innovative nature of his research was supported by many students. Indeed, Martin Bopp had more than 40 graduate students throughout his career. The wide range of his valuable scientific achievements are documented in more than 220 publications. Further details on his research activities can be found in the report of Stange (1998).

4. Honors

For his innovative research on plant tumors (crown galls) Martin Bopp received the Louis Pasteur medal in 1963. Later he received medals of merit from the universities of Helsinki, Hiroshima and Heidelberg for his other scientific achievements and his international scientific cooperation.

5. Editor-in-Chief of the journal of plant physiology (JPP)

With his excellent editorial skills Martin Bopp served from 1985 to 2000 as a highly respected Editor-in-Chief of the journal JPP, actively supported by the editors Klaus Müntz (IPK Gatersleben) and Hartmut Lichtenthaler (Karlsruhe) and not least by his wife, Dr. Gisela Bopp-Hassenkamp, with whom he was married for 62 years. During this time he considerably raised the scientific level as well as the international standing and distribution of this valuable journal for physiology, biochemistry and molecular biology of plants. Moreover, he introduced the

section “Book Reviews”, where newly released, essential books in plant physiology, plant biochemistry, plant ecology and general botany were reviewed for the scientific community, and one of us (HKL) served as book review editor from 1990 to 2002. In order to honor the great merits of Martin Bopp as Editor-in-Chief, the journal JPP published 1998 on the occasion of Martin Bopp’s 75th anniversary in April 1998 a special double issue of JPP. This issue contained 27 scientific articles of friends and colleagues that were dedicated to Martin Bopp (see below [Lichtenthaler, 1998](#)). In their editorial laudatio to this issue H.K. Lichtenthaler and Bernd Rolle, G. Fischer Verlag, stated: “*This issue is dedicated to Prof. Martin Bopp, the distinguished scientist, the prominent moss specialist, the inspiring teacher, the meritorious Editor-in-Chief, the good friend and colleague*”. With these attributes we will commemorate our esteemed colleague Martin Bopp.

6. Final remarks

Martin Bopp had a fulfilled life as a dedicated scientist and he acquired great international recognition. He was an inspiring and enthusiastic academic teacher, an excellent instructor for his graduate students, an engaged international scientific cooperation partner and an outstanding editor. He had the great fortune to find in his wife Dr. Gisela Bopp-Hassenkamp, also being a botanist, an appreciative partner who understood and fully supported all his wide range of endeavors. Martin Bopp is survived by his wife, his two daughters and two grandchildren.

The international plant science community, his former graduate students, his colleagues and friends mourn for a great personality and esteemed friend. For one of us (HKL) writing this Tribute it was a great pleasure and honor to be able to cooperate with Martin Bopp as a

colleague and scientific friend over many years in various editorial and international cooperation matters. For the other of us (RH) it was an honor to be his successor at the chair of Botany in Heidelberg (now located within the Centre for Organismal Studies, Heidelberg). Martin Bopp helped R. H. to understand the rituals of a traditional university and generously shared his wealth of knowledge in Botany and experience in science relations. The great hospitality, fine humor and invariably kind spirit of this distinguished and literate scientist will be dearly missed.

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