

Professor Ivan Regula – on the occasion of his seventieth birthday



In early 2006, Dr. Ivan Regula – Professor of Plant Physiology at the Faculty of Science, University of Zagreb – celebrated his seventieth birthday. For more than 40 years, Professor Regula contributed significantly to education and research in the field of plant physiology.

Professor Regula was born in Gornja Stubica (north-west Croatia), on January 18, 1936. He graduated in 1954 from the 1st Gymnasium in Zagreb and subsequently enrolled as an undergraduate at the Faculty of Science, University of Zagreb. In 1962, he earned his BSc degree in biology with a thesis entitled »Light and CO₂ compensation points of Mediterranean plants cultivated in the Zagreb Botanical Garden« under the supervision of Professor Zlatko Pavletić. His MSc thesis entitled »Indolic compounds in nettle (*Urtica dioica* L.)« was completed in the Tracer Laboratory of the Ruđer Bošković Institute, in 1967, under the supervision of Professor Dina Keglević, today a Fellow of the Croatian Academy of Sciences and Arts. In 1978, he defended his PhD thesis on »5-hydroxyindolic compounds in plants«, based on research performed under the guidance of the distinguished Croatian biologist and botanist, Professor Zvonimir Devidé, today a Fellow of the Croatian Academy of Sciences and Arts, and Dr. Sergije Kveder, senior scientist at the Ruđer Bošković Institute.

Professor Regula began his career in 1963, as assistant at the Department of Botany, Faculty of Science, University of Zagreb. He was appointed assistant professor in 1982, promoted to the rank of associate professor in 1991, and became a full university professor in 1999. From his first days at the Faculty of Science, Professor Regula participated in teaching with an emphasis on laboratory classes in Plant Physiology. He particularly enjoyed introducing new methods and ideas and helping students to understand contemporary experimental techniques, thus preparing them for independent practical work. Even now, he continues supporting us, his associates, in improving and updating laboratory courses for our students. One of the results of these efforts is the course manual »Practical Exercises in Plant Physiology« for 3rd year biology students at the Faculty of Science. Professor Regula is not only an excellent plant physiologist; he is an experienced botanist, as well. Together with his wife, Professor Ljerka Regula-Bevilacqua, a botanist and long-term head of the Botanical Garden of the Faculty of Science, he devoted extensive periods of time to field studies on plants in their natural habitats and participated in professional visits to foreign botanical gardens. This field experience was the source of numerous interesting examples included in his Plant Physiology lectures, which, in this way, became highly popular even

with students who otherwise did not particularly care for plant biology. In addition to regular plant physiology classes, Professor Regula introduced the course »Selected Chapters in Plant Physiology« for students with a special interest in plant biology. In the graduate school, Professor Regula taught a course on the »Physiology of Seed Germination«. As a professor of plant physiology he also worked for a number of years at the Faculty of Natural and Mathematical Sciences and Education, University of Split, and at the Faculty of Education, J. J. Strossmayer University in Osijek, contributing preferentially to the education of future biology teachers. His rich teaching experience was incorporated in a number of biology books for primary and high schools. In 1995, he published together with Professor K. D. Dubravec the university textbook *Plant Physiology* for students of biology and agriculture.

Professor Regula supervised many undergraduate theses, two master's theses and a PhD thesis. As the chair, or a member, of innumerable examination committees, he took part in defences of master's and doctoral theses, not to forget all those examinations linked to his teaching responsibilities.

In his research, Professor Regula focused on plant physiology and biochemistry. His main interest was the occurrence and physiological function of biogenic amines in plants. He mostly studied 5-hydroxyindolic compounds, which are not very common in plants, and investigated their distribution, possible roles, their precursors and metabolites. With particular interest, he investigated the occurrence and role of 5-hydroxytryptamine (serotonin) in different plant species. He succeeded in adapting some reagents, normally used for the detection of indoles on chromatograms, for the histochemical localization of serotonin in plant tissues and cells. He thus established that serotonin occurs in the vacuoles of the lower leaf epidermis, in the protein bodies of walnut seeds, in the stinging hairs of the nettle and in the mesocarp tissue of tomato fruit. The physiological effects of indolic compounds were studied in *in vitro* systems. The experience gained in these studies was subsequently extended to the application of biotests (Avena-test, Lemna-test) in monitoring the physiological effects of environmental pollutants.

Professor Regula has been an active participant in many research projects and was the principal investigator for the projects »The role of selected plant hormones in plant development« and »The effect of chemicals on physiological processes in plants«. The results of his research were published in more than 30 articles in both national and international journals and proceedings. He also presented contributions at more than 30 international and national scientific conferences. In addition, Professor Regula engaged, with much enthusiasm, in the popularisation of biology and plant physiology, giving public lectures, publishing articles in the magazine for the popularisation of natural history *Priroda* and participating in radio and television broadcasts. As a member of the state committee »Znanost mladima« (1973–1985) Professor Regula for many years attended the meetings of junior biologists.

During his professional career, Professor Regula cooperated with domestic and foreign research institutions. He visited, for instance, the Institut für Botanik in Zürich, Switzerland; the Botany School in Cambridge, Queens College in London, the Jodrell Laboratory in Kew, United Kingdom; Institut Botaniki – odjel Fizjologii rósline Uniwersytet Wrocławski, Poland; the Department of Forest Genetics and Plant Physiology University of Umeå, Sweden.

Professor Regula is an active member of numerous national and international professional societies: the Croatian Biological Society, the Croatian Society of Plant Physiologists, the Croatian Ecological Society, the Croatian Society of Natural History, Matrix Croatica, the Federation of European Societies of Plant Biology (FESPB), the International Association for Danube Research (IAD), and the New York Academy of Science. He served as the president of the Croatian Society of Plant Physiologists (1990–1992). For many years, he was the Croatian representative for FESPB. He participated in the organisation of domestic professional meetings and also was a member of the organising committee of the 6th FESPB Congress held in Split, in 1988.

Over the years, Professor Ivan Regula performed a large number of duties at the Division of Biology of the Faculty of Science. From 1992 to 1995, he was the head of the Division and, from 1993 to 1999, he served as the head of the Department of Botany.

Even after his retirement, in October 2006, Professor Regula participates in research projects and in everyday life, in our laboratory. He is always ready to answer questions by younger colleagues and give advice from his long experience in education, research, and departmental diplomatics and administration. During my 17 years at the Department of Botany, I had the opportunity to learn from Professor Regula not only plant physiology, but also efficient teaching, the skill of motivating younger colleagues and, most importantly, how to maintain professional enthusiasm in difficult situations. With particular kindness, tolerance and understanding, Professor Regula encouraged junior collaborators to pursue their own ideas and to develop their individual professional personalities. With the best wishes for good health and fortune, on the occasion of his birthday, I would like to express my personal wish: all of us would appreciate if Professor Regula could continue participating in everyday life in our laboratory, for many years to come.

Scientific papers:

- REGULA, I., PAVLETIĆ, Z., 1968: Light compensation points of some Mediterranean and Submediterranean plants in Middle European climatic conditions (in Croatian). *Ekologija* 3, 1–6.
- REGULA, I., 1969: Comparative measurements of respiration rate of green leaves and petals in some plant species (in Croatian). *Acta Bot. Croat.* 28, 329–335.
- REGULA, I., 1977: 5-hydroxytryptamine in the leaves of the crown of Pineapple *Ananas comosus* (Stickm) Merrill. *Acta. Bot. Croat.* 36, 83–86.
- REGULA, I., DEVIDÉ, Z., 1979: Occurrence of some indoles in *Shepherdia argentea* (Pursh) Nutt. *Acta Bot. Croat.* 38, 41–44.
- REGULA, I., DEVIDÉ, Z., 1980: Presence of serotonin in some species of genus *Urtica*. *Acta Bot. Croat.* 39, 64–68.
- REGULA, I., 1981: Serotonin in the tissue of *Loasa vulcanica*. *Acta Bot. Croat.* 40, 91–94.
- REGULA, I., 1985: The presence of serotonin in the embryo of *Juglans mandshurica* Maxim. *Acta Bot. Croat.* 44, 19–22.
- REGULA, I., 1986: The presence of serotonin in the embryo of Black walnut (*Juglans nigra*). *Acta Bot. Croat.* 45, 91–95.

- REGULA, I., 1987: Identification of 5-hydroxytryptamine in the sting of the *Blumenbachia contorta*. Acta Bot. Croat. 46, 44–48.
- REGULA, I., KOLEVSKA-PLETIKAPIĆ, B., KRŠNIK-RASOL, M., 1989: Presence of serotonin in *Juglans ailanthifolia* var. *ailanthifolia* Carr. and its physiological effects on plants. Acta Bot. Croat. 48, 57–62.
- REGULA, I., 1989: Serotonin in walnut (*Juglans cordiformis* Carr.). Biol. Vest. 37, 89–92.
- REGULA, I., 1989: Serotonin in the embryo of *Juglans ailanthifolia* var. *cordiformis*. Period. Biol. 91, 162–164.
- REGULA, I., 1989: The presence of serotonin in the walnut (*Juglans cordiformis* Carr.). Biol. Vestn. 37, 89–92.
- REGULA, I., POPOVIĆ, M., 1990: The presence of serotonin in the embryo of *Juglans regia* ssp. *fallax* (Dode) Popov. Acta Bot. Croat. 49, 37–39.
- REGULA, I., JELEŃIĆ, B., VIDAKOVIĆ, Ž., 1991: Presence of serotonin in the embryo of *Juglans regia* var. *membranica*. Acta Bot. Croat. 50, 37–40.
- REGULA, I., VIDAKOVIĆ, Ž., JELEŃIĆ, B., 1992: Presence of serotonin in the embryo of *Juglans sieboldiana* Maxim. Acta Bot. Croat. 51, 37–40.
- VIDAKOVIĆ-CIFREK, Ž.; JELEŃIĆ, B.; REGULA, I., 1997: Increasing of serotonin content in seeds of *Juglans nigra* L. and *Juglans cinerea* L. during ripening. Period. Biol. 99, 103–106.
- TKALEC, M.; VIDAKOVIĆ-CIFREK, Ž., REGULA, I., 1998: The effect of oil industry high density brines on duckweed *Lemna minor* L. Chemosphere 37, 2703–2715.
- VIDAKOVIĆ-CIFREK, Ž., TKALEC, M.; HORVATIĆ, J.; REGULA, I., 1999: Effects of oil industry high density brines in miniaturized algal growth bioassay and *Lemna* test. Phytion (Austria) 39, 193–197.
- VUJEVIĆ, M., VIDAKOVIĆ-CIFREK, Ž., TKALEC, M., TOMIĆ, M., REGULA, I., 2000: Calcium chloride and calcium bromide aqueous solutions of technical and analytical grade in *Lemna* bioassay. Chemosphere 41, 1535–1542.
- BRAJENOVIĆ, N., HADŽIJA, O., ISKRIĆ, S., KVEDER, S., REGULA, I., 2000: Chromatographic mobility of metals on paper impregnated with model compounds related to lignin structure and on wood slices. Anal. Chem. Acta 406, 279–281.
- HORVATIĆ, J., VIDAKOVIĆ-CIFREK, Ž., REGULA, I., 2000: Trophic level, bioproduction and toxicity of the water of Lake Sakadaš (Nature Park Kopački Rit, Croatia). Proc. 33rd IAD Conference, Osijek, 89–94.
- TKALEC, M., MLINAREC, J., VIDAKOVIĆ-CIFREK, Ž., JELEŃIĆ, B., REGULA, I., 2001: The effect of salinity and osmotic stress on duckweed *Lemna minor* L. Acta Bot. Croat. 60, 237–244.
- VIDAKOVIĆ-CIFREK, Ž., PEŠKAN, T., ŽLENDER, S., TKALEC, M., REGULA, I., 2001: Effect of calcium chloride and calcium bromide on chloroplasts of *Lemna minor* L. Acta Bot. Croat. 60, 245–252.
- VIDAKOVIĆ-CIFREK, Ž.; PAVLICA, M., REGULA, I., PAPEŠ, D., 2002: Cytogenetic damage in shallot (*Allium cepa*) root meristems induced by oil industry »high density brines«. Arch. Environ. Contam. Toxicol. 43, 284–291.

- TKALEC, M., PERINČIĆ, Z., VIDA KOVIĆ-CIFREK, Ž., PEVALEK-KOZLINA, B., REGULA, I., 2003: Physiological response of duckweed (*Lemna minor* L.) on herbicide norflurazon. Period. Biol. 105, 269–274.
- RADOVIĆ, S., VIDA KOVIĆ-CIFREK, Ž., TKALEC, M., REGULA, I., KRŠNIK-RASOL, M., 2005: Peroxidase and proteins as salinity stress indicators in duckweed exposed to oil industry high density brines. Period. Biol. 107, 33–38.

Books

- REGULA, I., 1993: Practical work in plant physiology (in Croatian). Školska knjiga, Zagreb.
- DUBRAVEC, K.D., REGULA, I., 1995: Plant physiology (in Croatian). Školska knjiga, Zagreb.

Željka Vidaković-Cifrek