

XIXth International Congress on Sexual Plant Reproduction
“From gametes to genes” (Budapest, Hungary, 11–15 July 2006)

The XIXth International Congress under the auspices of the International Association of Sexual Plant Reproduction Research (IASPRR) was organized by the employees of the Agricultural Research Institute of the Hungarian Academy of Sciences in Martonvásár. The title of the conference “From gametes to genes” underlined the wide range of topics concerning plant reproduction covered at the Congress. Scientific sessions were held in the Budapest Congress & World Trade Center located in the capital city of Hungary. About 160 participants from 32 countries took part in the proceedings. The participants came from all continents, but Europe was most strongly represented. People from 18 European countries took part in this event, including 3 researchers from Poland. The participants were greeted by Prof. Beáta Barnabás (chairperson of the Organizing Committee) and Prof. Zoltán Bedő (member of the National Advisory Committee).

After the Opening Ceremony (in room “Bartok”), four plenary lectures (40 minutes each) were presented by invited speakers, distinguished European researchers Dénes Dudits, Thomas Dresselhaus, Ueli Grosniklaus and Rui Malhó. Their lectures concerned different aspects of the processes preceding and leading to fertilization and seed development in plants. The topics of the successive lectures were as follows: the basic molecular mechanism of cell cycle regulation and activation of wheat egg cells, the importance of cell-cell communication and polarity for double fertilization, maternal control of seed development through an epigenetic regulatory cascade, and correlative analysis of [Ca²⁺]_c and apical secretion during pollen tube growth and reorientation.

Each scientific session started with two half-hour keynote lectures followed by several 20-minute oral presentations. Altogether 7 keynote lectures and 45 oral presentations were given during the Congress.

Prof. Scott D. Russell from the University of Oklahoma in Norman (USA) chaired the first part of the session entitled “Male gametophyte development and female gametophyte development”; the second part was presided over by Prof. David Twell from the University of Leicester (United Kingdom). David Twell and Lucia Colombo

each presented a half-hour keynote lecture. The first lecture regarded genetic analysis of cell divisions during male germ line development. The speaker presented the results of a study of molecular mechanisms controlling cell division (and how this is integrated with cellular differentiation) showing different male gametophytic mutants with novel cell division phenotypes. Pollen morphogenesis screens in *Arabidopsis* have led to the identification of a number of male gametophytic mutants with novel cell division phenotypes. These affect asymmetric division (*gemini pollen-gem*), cytokinesis (*two-in-one-tio*) and/or generative cell cycle progression (*duo pollen-duo*). A new achievement was isolation of a novel class of *Arabidopsis* male gametophytic mutants termed *duo pollen (duo)* mutants, which specifically block division of the generative cell. The research team is developing tools to investigate the regulation, protein interactions and putative target genes to reveal the mechanism of action of DUO1 and DUO3 in generative cell cycle control.

The second keynote lecture focused on molecular control of ovule development in *Arabidopsis*. To identify the targets of ovule identity complexes, Prof. Lucia Colombo with her team adopted two approaches: (i) a genetic approach, by analysing genetic interaction between various genes involved in ovule development and (ii) a molecular approach, combining micro-dissection, microarray expression analysis, bioinformatics and ChIP analysis.

The first session included 9 oral presentations. The topics of these presentations were strictly connected with the title of the session. Two oral presentations were devoted to the pollen of olive. Juan De Dios Alché from Granada in Spain presented the results of a study of characterization of profilin polymorphism in the pollen of olive (*Olea europaea* L.) cultivars. Polymorphism of the olive pollen allergen Ole e 1 and its biological implications were discussed by Antonio J. Castro also from Granada. Marcio Alves-Ferreira from Federal University of Rio de Janeiro (Brazil) used microarray and functional analysis of flower mutants *apetala3*, *sporocyteless* and *male-sterile1* to demonstrate that identification and characterization of new genes is critical to normal *Arabidopsis thaliana* stamen development. The second part of the session concentrated on the following topics: OsCP1, an anther-specific cysteine protease which is required for pollen development; Agp 6 and Agp 11 in *Arabidopsis thaliana* pollen development; proteins and lipids regulating polarized pollen tube expansion; ISIDE, which solves the enigma of type I MADS-box factors; transcriptional profile analysis of endosperm proliferation in *Arabidopsis*; and conifer sperm. The data shown during this last presentation were ornamented with beautiful pictures of conifer bonsai.

The second session was entitled "Pollination and pollen-pistil interaction and incompatibility". The chair of this session was Dr Rui Malhó from Lisbon (Portugal), and the only keynote lecture during this session was presented by Prof. Scott D. Russell. Its subject was gene expression in flowering plants sperm cells. In this session, there were ten (5 in each of two parts of the session) oral presentations concerning large scale analysis of gene expression in the tobacco stigmas/styles – the TOBEST project; the role of stigma peroxidases and reactive oxygen species in pollen-stigma interactions: insights from *Senecio squalidus* (*Asteraceae*); pollination drop retraction without pollen; stigma

development in olive; reactive oxygen species produced by NADPH oxidase and involved in pollen tube growth; pollen competition in Scots Pine (*Pinus sylvestris* L.); an extracellular pH sensing mechanism which determines the pollen germination site; unraveling the non-classic secretion of NaTrxh in *Nicotiana* styles and its role in pollen rejection; recent findings of the self-incompatibility analyses in apricot (*Prunus armeniaca* L.), and interaction between pollen tube proteins and stylar proteins 120K and HT-B in self-incompatible *Nicotiana glauca*.

The third session dealt with fertilization and early embryogenic development and was chaired by Thomas Dresselhaus from the University of Hamburg (Germany). Two keynote lectures were presented by Erhard Kranz from the University of Hamburg (Germany) and Rod J. Scott from the University of Bath in Claverton Down (United Kingdom). The first speaker concentrated on *in vitro* fertilization as a tool to study gene and protein expression in egg and central cells, in cultured *in vitro*-zygotes, apical and basal cells of the two-celled maize embryo. The second speaker discussed double fertilization in *Arabidopsis thaliana*, especially the role of polyspermy barriers in this process. The topics of four oral presentations in this session were as follows: genomic approaches to reveal gene expression changes during fertilization and early seed development in wheat; isolation of living sperm cells and *in vitro* fusion of *Torenia fournieri* gametes; MATH/BTB domain proteins and their role during egg cell maturation and early embryogenesis of wheat; and ZmEA1 as a signalling molecule required for micropylar pollen tube guidance in maize and discovery of novel EA1-box protein genes.

The fourth session, on embryogenesis and seed formation, presided over by Ueli Grossniklaus, started from a keynote lecture under an advertisement-like title "The BABY BOOM Ap2/ERF transcription factor activates novel signalling pathways during embryogenesis". This interesting effect in plant embryogenesis was presented by Kim Boutilier from Plant Research International in Wageningen (The Netherlands). Researchers from two different laboratories, in the Netherlands and Japan, elaborated the obtained results. Their findings point to the existence of novel signalling pathways underlying BBM-mediated initiation of embryo development in plants. The speakers during the four oral presentations following the keynote lecture discussed seed abortion in the diploid sexual counterpart of *Brachiaria brizantha* apomicts (*Poaceae*); the effect of heat stress and water deficit on embryo development in wheat (*Triticum aestivum* L.); barley storage proteins present in microspore-derived embryos; and ovule development and its structural organization in fertilized and partenocarpic olive fruits.

Simultaneously with sessions three and four, another two sessions were run on the fourth day of the Congress. The first one was entitled "Flower development and flowering and evolutionary aspects of plant sex development. The second of these sessions concerned applied aspects, biotechnology of sexual plant reproduction. During the first session, the speakers delivered five oral presentations. The first of these concerned flower abscission in *Plectranthus* and differential control mechanisms within this genus. The next presentations focused on introgression between *Pinus sylvestris* L. and *Pinus mugo* Turra in Slovakia; dioecy in *Actinidia* (kiwifruit); the origin of gynoecey in the

monoecious plant cucumber (*Cucumis sativus*); and ovule origin and evolution in angiosperms.

The chairperson of the other session was Rod J. Scott. This session included four oral presentations and started with a keynote lecture presented by Prof. Vipen Sawhney from the University of Saskatchewan in Saskatoon (Canada). The title of his lecture was "Male sterility in plants: Mechanisms and commercial application". The subject taken up by Professor Sawhney is extremely important because in flowering plants male sterility occurs naturally in a number of plant families, but it can also be induced by chemicals (gametocides) and genetic engineering. Male-sterile (ms) plants are useful systems for investigating the genetic, molecular and structural mechanisms of pollen and stamen development, for determining the endogenous and exogenous factors that regulate the development of these structures, and for F1 hybrid seed production. The talk reviewed research on the use of ms systems in tomato (*Lycopersicon esculentum*), canola (*Brassica napus*), and *Arabidopsis thaliana* for determining the structural, physiological (environmental and hormonal factors), and biochemical (proteomic) events crucial for normal pollen and stamen development. Additionally, the use of ms systems in the production of F1 hybrid seed in tomato and canola at the commercial level was discussed. Two oral presentations in this session focused on abiotic stress factors and their influence on microspores and anther development. The presentations were entitled: "Production of DH maize lines tolerant of oxidative stress via *in vitro* microspore selection" and "Influence of temperature in rice anther development". Another two presentations concerned usage of androgen-derived haploids in wheat breeding and developmental regulation of K accumulation in pollen, anther and papillae of barley (*Hordeum vulgare* L.).

The shortest session entitled "Embryogenesis and seed formation" was led by Prof. Vipen Sawhney. It featured only two speakers: Galina E. Titova and André A.M. Van Lammeren. The first speaker focused on the structural organization of dicot and monocot embryos and the principles of differences and possible mechanisms of their origin. During the second presentation entitled "Microtubule configurations, nuclear DNA synthesis, and distribution of PIN1 in microspore-derived embryos of *Brassica napus* cv. Topas that mimic zygotic embryo development" the speaker showed the dynamic, 3-dimensional structure of a canola embryo, which made the presentation clear and memorable.

The last session regarded apomixis, and its title was "Apomixis, partenogenesis". The session was chaired by Prof. Anna Koltunow from Australia. The chair presented a very interesting keynote lecture entitled "Analysis of reproduction in *Hieracium apomixis* mutants". Six oral presentations on different aspects of apomixis were delivered during this session. Prof. Tatyana B. Batygina presented a new concept on gametophyte cells in relation with the polyembryony problem, and Prof. Ferenc Bakos discussed wheat x rice crosses: a new distant pollination system. Jochen Kumlehn gave an interesting lecture entitled "Studies on autonomous embryo formation from Salmon wheat egg cells". The second part of the last session consisted of three oral presentations entitled "Physical mapping of the diplospory region in apomictic common dandelion (*Taraxacum*, sect. *Ruderalia*, *Asteraceae*)", "Ploidy variation, pollen formation and fertilization in the facultative apomictic *Boechera holboellii* complex: insights into differ-

ing classes of factors which lead to clonal degeneration”, and “Development of female reproductive structures and apospory in some CMS lines of sunflower”.

The topics of the oral sessions were also covered in poster sessions, in which results were presented in the form of posters.

The Congress ended with a General Assembly Meeting, during which the Closing Ceremony and the Award Ceremony took place. The awards at the 19th Congress on Sexual Plant Reproduction were given to Young Scientists. A Linksens Award was presented to Hai-Shan Chi (it consisted of a certificate and a cash award) for best oral presentation. Also, there were two poster awards given at the 19th Congress on Sexual Plant Reproduction. The poster awards went to Tomokazu Kawashima from Japan and Marina Gebert from Germany. Each award consisted of a certificate and a cash award. Additionally, two Travel Grants were awarded.

During the General Assembly Meeting, President Anna Koltunow announced updates on the next congress. The IASPRR meeting in 2008 will be held in Brazil (the offer that had been made earlier by Ana Claudia G. Araujo (Embrapa Genetic Resources and Biotechnology, Sao Paulo, Brazil) to organize a meeting in Brazil was accepted during the Board Meeting). The Assembly received the news with a great round of applause. Anna Claudia G. Araujo thanked the President and assembled and invited everybody present to Brazil.

During the General Assembly Meeting after motions of the membership, new officers were elected for the years 2006–(2008) 2010: President Professor Scott D. Russell, University of Oklahoma, Norman, USA; Vice President Professor Erhard Kranz, University of Hamburg, Germany; Treasurer, Dr. Christian J. Keijzer, Agricultural University, Wageningen, the Netherlands (for 2 years); and Secretary-General Dr. Ewa Szczuka, Maria Curie-Skłodowska University, Lublin, Poland (for 2 years). Additionally, new Members of the Executive Council were elected: Dr. Rui Malhó, University of Lisbon, Portugal, and Dr. Galina Titova, Komarov Botanical Institute of RAS, St. Petersburg, Russia. President Anna Koltunow congratulated the successful candidates.

During the General Assembly Meeting, President Koltunow thanked the organizers Beata Barnabás, Atilla Fehér, and Katalin Jäger for the excellent job that they did in organizing the current meeting. The Assembly joined her in a round of applause. Then, Professor Beata Barnabás thanked the participants for coming and taking part in the Congress.

After hearing the oral presentations on the first day of the Congress, the majority of the participants took part in a boat trip on the Danube, during which the efficient and hospitable organizers created a nice atmosphere. After the second day of debates, all the participants of the Congress were invited to visit the Agricultural Research Institute of the Hungarian Academy of Sciences in Martonvásár. During this visit, the organizers presented the history of the Institute, and showed the visitors its laboratories and equipment. They also gave information concerning research conducted in this scientific center, which is one of the most important centers of this type in Hungary. In the evening, after three days of hard scientific work, a conference dinner was held at the Lázár Equestrian Park.

After the congress in Budapest, many of the participants took part in post-congress excursions.

The atmosphere in the conference halls made the Congress in Budapest a very important scientific and social event. The abstracts of plenary and keynote lectures, oral and poster presentations were published in the form of a very elegant book of conference materials containing the programme, a book of abstracts, and the list of participants (XIXth International Congress on Sexual Plant Reproduction "From gametes to genes", Szent István Egyetem, Gödöllő, 2006).

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