

PLANT-BASED VACCINES, ANTIBODIES & BIOLOGICS

8-10 June 2015, University of Lausanne/CHUV, Lausanne, Switzerland

FINAL ORAL PROGRAMME & POSTER PROGRAMME PBVAB 2015

SCIENTIFIC ADVISORY PANEL

Conference Chairman: Julian Ma (*St. George's University of London, London, UK*)

Diego Orzaez (*CSIC, University of Valencia, Spain*)
 George Lomonosoff (*John Innes Centre, Norwich, UK*)
 Kevin Whaley (*Mapp Biopharmaceutical Inc., USA*)
 Rainer Fischer (*RWTH Aachen, Germany*)
 Charles Arntzen (*Arizona State University, Tempe, Arizona, USA*)
 Pascal Drake (*St. George's University of London, London, UK*)
 Ed Rybicki (*University of Capetown, South Africa*)
 Yuri Gleba (*Icon Genetics GmbH, Halle, Germany*)
 Hugh Haydon (*Kentucky BioProcessing, Owensboro, Kentucky, USA*)

Scott Deeter (*Ventria Bioscience, Fort Collins, Colorado, USA*)
 Marc-Andre D'Aoust (*Medicago Inc., Quebec, Canada*)
 Ann Depicker (*University of Ghent, Ghent, Belgium*)
 Yoseph Shaaltiel (*Protalix Biotherapeutics, Carmiel, Israel*)
 Takeshi Matsumura (*AIST, Japan*)
 Marcos da Silva Freire (*Bio-Manguinhos/Fiocruz, Brazil*)
 Andres Wigdorovitz (*INTA, Buenos Aires, Argentina*)
 Sun Lee (*NEXGEN Biotechnologies Inc., Seoul, South Korea*)
 Robert Erwin (*iBio Inc., Newark, Delaware, USA*)



08.30-10.45

Arrival, Registration, Coffee & Poster Set-Up

10.45 -10.50

Welcome & Opening Remarks

Julian Ma (*PBVAB 2015 Conference Chairman*)

SESSION 1: SPECIAL OPENING PLENARY SESSION:

'Plant-Based Therapeutics for Ebola Virus and Other Infectious Diseases'

Moderator: Charles Arntzen (*Arizona State University, Tempe, Arizona, USA*)

10.50-11.00

'Plant-made vaccines and antibodies to prevent/treat Ebola virus infection'

Charles Arntzen (*Arizona State University, Tempe, Arizona, USA*)

11.00-11.40

'Design and testing of ZMapp as a therapeutic for Ebola treatment'

Larry Zeitlin (*MAPP Biopharmaceuticals Inc., San Diego, California, USA*)

11.40-12.00

'Manufacturing challenges and successes in large scale antibody therapeutic production'

Barry Bratcher and Hugh Haydon
(*Kentucky BioProcessing, Owensboro, Kentucky, USA*)

12.00-12.15

'Strategy and capabilities of BARDA to address Ebola threat using plant based manufacturing'

Chia-Wei Tsai (*BARDA, Washington DC, USA*)

12.15-12.35

'Plant derived monoclonal antibodies: A public health perspective'

Martin Friede (*WHO, Geneva, Switzerland*)

12.35-13.00

Questions & Discussion

13.00-14.00

Lunch & Posters

SESSION 2: PLENARY

Moderator: Julian Ma (*St. George's University of London, London, UK*) and Vikram Vridi (*University of Ghent, Ghent, Belgium*)

14.00-14.20

'Plant-based technologies for developing countries: Bio-Manguinhos recent developments'

Marcos da Silva Freire (*Bio-Manguinhos, Rio de Janeiro, Brazil*)

14.20-14.40

'Optimizing vaccines and therapeutics production, synthetic biology to the rescue'

Marc-Andre D'Aoust (*Medicago Inc., Quebec City, Quebec, Canada*)

14.40-15.00

'Expanding the pharmaceutical applicability of plant-based technologies'

Robert Erwin (*iBio Inc., Newark, Delaware, USA*)

15.00-15.20

'Developing issues in obtaining patent protection for plant-based vaccines and natural products'

Konrad Sechley
(*Gowling Lafleur Henderson LLP, Vancouver, British Columbia, Canada*)

15.20-15.40

Tea Break & Posters

SESSION 3

Moderator: George P. Lomonossoff (*John Innes Centre, Norwich, UK*) and Noboyuki Matoba (*University of Louisville, Louisville, Kentucky, USA*)

15.40-16.00

'Development and evaluation of a plant-made recombinant protein for the treatment of fibrotic disease'

Terence Ryan (*iBio Inc., Newark, Delaware, USA*)

16.00-16.20

'Moss-aGal: Pre-clinical and clinical performance of a moss-made drug to treat Fabry disease'

Andreas Schaaf (*Greenovation GmbH, Freiburg, Germany*)

16.20-16.40

'Novel treatment for Fabry disease – IV administration of plant-derived alpha-GAL-A enzyme phase ½ safety and efficacy study – interim report'

Einat Brill-Almon, Raul Chertkoff, Myriam Golembo, Sari Alon, Vered Kivity, Bat Chen Amit-Cohen, Alona Paz and Yoseph Shaaltiel
(*Protalix Biotherapeutics, Carmiel, Israel*)

16.40-17.00

'Plant rabies immunoglobulin (P-RIG)

Markus Sack (*RWTH, Aachen, Germany*)

17.00-17.20

'Update on mucin-type O-glycan engineering in plants'

Richard Strasser, Martina Dicker, Daniel Maresch and Friedrich Altmann
(*University of Natural Resources & Life Sciences, BOKU, Vienna, Austria*)

17.20-17.40

'Production of alpha-1 antitrypsin in *Nicotiana benthamiana* stably expressing the mammalian sialylation pathway'

Alexandra Castilho, Markus Windwarder, Stefan Werner, Carola Engler, Pia Gattinger, Richard Strasser, Friedrich Altmann and Herta Steinkellner
(*University of Natural Resources & Life Sciences, BOKU, Vienna, Austria*)

17.40-18.00

'Evaluating plants transformation strategies for multiple gene insertions'

J. Palaci, V. Virdi and A. Depicker (*Ghent University, Ghent, Belgium*)

18.00-18.20

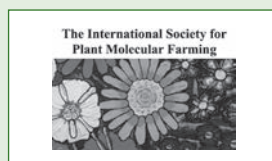
'Therapeutic potential of plant-produced glycoprotein-specific antibodies for treatment against filovirus infections'

Vidadi Yusibov (*Fraunhofer USA, Newark, Delaware, USA*)

18.20-19.20

PBVA 2015 Welcome Reception & Poster Session

Sponsored by The International Society for Plant Molecular Farming and Kentucky BioProcessing



SESSION 4

Moderator: Kevin Whaley (*MAPP Biopharmaceuticals, San Diego, California, USA*) and Audrey Teh (*St. George's University of London, London, UK*)

08.40-09.00

'Plant-made colicins for control of enterotoxigenic *Escherichia coli*

A. Gyrych and Y. Gleba (*Icon Genetics GmbH, Halle, Germany*)

09.00-09.20

'Clinical evaluation of plant-produced protective antigen vaccine against anthrax'

Vidadi Yusibov (*Fraunhofer USA, Newark, Delaware, USA*)

09.20-09.40

'Performance of plant-produced antibodies in an array of biodefense-relevant preclinical nonhuman primate disease models'

Chad J. Roy (*Tulane University, New Orleans, Louisiana, USA*)

09.40-10.00

'Production of butyrylcholinesterase, a nerve agent bioscavenger, in metabolically regulated transgenic rice cell cultures'

Karen A. McDonald, Jasmine Corbin, Bryce Hashimoto, Kalimuthu Karuppanan, Raymond L. Rodriguez, Somen Nandi, James Pannucci and Brian A. Roberts (*University of California, Davis, California, USA*)

10.00-10.20

'Plant-produced human butyrylcholinesterase variants for treatment of cocaine addiction-related diseases'

Tsafir Mor, Katherine E. Larrimore, R Player Kendle, Tameen Jamal and Janet Neisewander (*Arizona State University, Tempe, Arizona, USA*)

10.20-10.40

'Engineering, characterization, and anti-HIV activity of a bispecific HIV entry inhibitor'

Adam S. Husk, Lauren Seber Kasinger, Krystal Hamorsky and Nobuyuki Matoba (*University of Louisville, Kentucky, USA*)

10.40-11.00

Coffee Break & Posters

SESSION 5

Moderator: Yoseph Shaaltiel (*Protalix Biotherapeutics, Carmiel, Israel*) and Alexandra Castilho (*BOKU, Vienna, Austria*)

11.00-11.20

'Plant-made cholera toxin B subunit as a candidate oral immunotherapeutic agent against ulcerative colitis'

Joshua M. Royal, Keegan Baldauf, Calvin Kouokam and Nobuyuki Matoba (*University of Louisville, Kentucky, USA*)

11.20-11.40

'Plant-derived MAb therapeutics for flaviviruses with enhanced efficacy and safety'

Qing 'Shawn' Chen, Jonathan Hurtado, Ming Yang, Huafang Lai and Adrian Esqueda (*Arizona State University, Tempe, Arizona, USA*)

11.40-12.00

'Mucosal delivery of a L2-based fusion vaccine provides cross-neutralizing protection against multiple HPV types'

Joshua Fuqua, Shonna Riedel, Amanda B. Lasnik, Janice Walker, Krystal Hamorsky, Nobuyuki Matoba and Kenneth E. Palmer (*University of Louisville, Kentucky, USA*)

12.00-12.20

'N-Glycosylation of cholera toxin B subunit in *Nicotiana benthamiana*: Impacts on host stress response, production yield and vaccine potential'

Krystal Teasley Hamorsky, J. Calvin Kouokam, Jessica McMullen, Bailey Nelson, Lauren Bennett, Adam Husk, Hiroyuki Kajijura, Kazuhiro Fujiyama and Nobuyuki Matoba (*University of Louisville, Kentucky, USA*)

12.20-12.40

'Plant-derived actin inhibition resistance deoxyribonuclease I (AIR-DNase), novel treatment for cystic fibrosis'

Yoseph Shaaltiel, Liat Fux, Avidor Shulman, Ilya Ruderfer, Lilach Chen, Dani Bartfeld, Yakir Nataf, Liora Sklair-Tavron, Myriam Golembo, Vered Kivity and Einat Brill-Almon (*Protalix Biotherapeutics, Carmiel, Israel*)

12.40-13.00

'Advantages of plant expression systems for the rational design of oral therapeutics'

Vikram Virdi, Paloma Juarez, Jorge Palaci, Bert Devriendt, Henri De Greve, Eric Cox and Ann Depicker (*University of Ghent, Ghent, Belgium*)

13.00-14.00

Lunch Break & Posters

SESSION 6

Moderator: Ann Depicker (*Ghent University, Ghent, Belgium*) and Marcello Donini (*ENEA, Rome, Italy*)

14.00-14.20

'Tandibodies: Towards a universal plant-based antigen display platform'

Hadrien Peyret, Eva C. Thuenemann, Benjamin Duckworth and George P. Lomonosoff (*John Innes Centre, Norwich, UK*)

14.20-14.40

'Engineering a rabies virus neutralising single-chain antibody for therapeutic delivery'

Waranyoo Phoolcharoen, Christophe Prehaud, Craig van Dolleweerd, Leonard Both, Ashley Banyard, Anthony Fooks, Monique Lafon and Julian Ma (*St. George's University of London, London, UK*)

14.40-15.00

'In-solution antibody capture with plant-made hydrofobin-Protein A fusions'

K. Kurppa, L. Reuter, A. Ritala, M.B. Linder and J.J. Joensuu (*VTT Technical Research Centre of Finland, Espoo, Finland*)

15.00-15.20

'The Plantiserum Technology: Exploiting virus homologous interference for the production of complex mixes of recombinant antibodies'

Diego Orzaez, J.M. Julve, E. Huet-Trujillo, A. Fernandez-del-Carmen, J.J. Calvete, C. Gutierrez, J.M. Gutierrez, A. Segura and A. Granell (*IBMCP-CSIC-UPV, Valencia, Spain*)

15.20-15.40

'Impact of glycoengineering on antibody Fc effector functions'

Szymon Stelter and Julian Ma (*St. George's University of London, London, UK*)

15.40-16.00

'Engineering antibodies aimed for passive mucosal immunization against HRSV'

P. Juarez, J. Palaci, B. Schepens, X. Saelens, A. Depicker and Vikram Virdi (*Ghent University, Ghent, Belgium*)

16.00-16.20

Tea Break & Posters

SESSION 7

Moderator: Edward Rybicki (*University of Cape Town, Cape Town, South Africa*) and Andreas Schiermeyer (*IME, Aachen, Germany*)

16.20-16.40

'Everything you always wanted to know about Medicago but were afraid to ask'

Andy Sheldon (*Medicago Inc., Quebec City, Quebec, Canada*)

16.40-17.00

'The algal lectin Griffithsin induces salicylic acid-dependent HR-like cell death in *Nicotiana benthamiana*'

Bo Min Kim, Joshua Fuqua and Kenneth E. Palmer (*University of Louisville, Kentucky, USA*)

17.00-17.20

'The PREVENT integrated preclinical development program to develop plant-produced Griffithsin as a topical microbicide'

Nobuyuki Matoba (*University of Louisville, Kentucky, USA*)

17.20-17.40

'A MERS-CoV receptor decoy produced in *Nicotiana benthamiana* plants'

Keith L. Wycoff, J.M. Maclean, A. Belle, Z. Mo, Y. Tran, L. Harjono, S. Jiang, L. Du, N. Zhang, J. Tang, M. Frieman, C. Coleman, B. Haagmans and V.S. Raj (*Planet Biotechnology Inc., Hayward, California, USA*)

17.40-18.00

'Plant virus-like particle-based cancer immunotherapy'

Nicole F. Steinmetz, Steven Fiering, Patrick Lizotte and Amy M. Wen (*Case Western Reserve University, Cleveland, Ohio, USA*)

18.00-18.20

'Plant virus vector-based engineering and production of AvFc, a novel lectin-Fc fusion protein with broad anti-HIV/HCV activity'

Nobuyuki Matoba, Krystal Hamorsky, Adam Husk, Calvin Kouokam, Tiffany Grooms-Williams, Mary Kate Morris, Carl Hanson, Steve Hume, Thibaut Vausselin and Jean Dubuisson (*University of Louisville, Kentucky, USA*)

18.20-18.40

'Therapeutic and antiviral antibody production: How fast, how good, how much'

R. Barry Holtz, Hal Padgetta and Robert Erwin (*Caliber Biotherapeutics, Novici LLC, iBio Inc., USA*)

SESSION 8

Moderator: Marc-Andre D'Aoust (*Medicago Inc., Quebec City, Quebec, Canada*) & Sandy H.-S. Lo (*University of Nottingham Malaysia Campus, Selangor, Malaysia*)

08.45-09.10

'Human papillomavirus vaccines made in plants – A review'

Edward Rybicki (*University of Cape Town, Cape Town, South Africa*)

09.10-09.30

'Transient expression of polio VLPs in *N. benthamiana*: Developing a novel polio vaccine'

J. D. Marsian and G.P. Lomonosoff (*John Innes Centre, Norwich, UK*)

09.35-09.50

'Polymeric IgG-dengue fusion proteins as vaccine candidates'

M.Y. Kim, R. Reljic, J.R. del Valle, C. van Dolleweerd and J.K-C. Ma (*St. George's University of London, London, UK*)

09.50-10.10

'Plant viruses for peptide vaccine autoimmune disease therapy'

Linda Avesani, M. Merlin, R. Zampieri, G.P. Lomonosoff, Y. Meshcheriakova, A. Brozzetti, A. Falorni and M. Pezzotti (*University of Verona, Verona, Italy*)

10.10-10.30

'Production and testing of plant-made subunit vaccine candidates for porcine epidemic diarrhea virus and enterotoxigenic *E. coli*'

Rima Menassa, Hong Zhu, Angelo Kaldis and Igor Kolotilin (*Agriculture and Agri-Food Canada, London, Ontario, Canada*)

10.30-10.50

'Rapid development of multistage-multicomponent malaria vaccines using transient plant expression'

Holger Spiegel (*Fraunhofer IME, Aachen, Germany*)

10.50-11.10

'Development of a candidate Chickungunya virus vaccine in plants'

Bala Murugan and Julian Ma (*St. George's University of London, London, UK*)

11.10-11.30

Coffee Break & Posters

SESSION 9

Moderator: Marcos da Silva Freire (*Bio-Manguinhos, Rio de Janeiro, Brazil*) and Inga Hitzeroth (*University of Cape Town, Cape Town, South Africa*)

11.30-11.50

'Vaccines for cattle Lumpy Skin Disease'

Larry Grill (*Keck Graduate Institute, Claremont, California, USA*) and K.B. Phiri and S.W. Mpoloka (*University of Botswana, Gaborone, Botswana*)

11.50-12.10

'Human serum albumin manufacturing and pre-clinical trials'

Daichang Yang (*Wuhan University, Wuhan, China*)

12.10-12.25

'Production of plant based edible vaccines against porcine disease'

Takeshi Matsui, Eiji Takita, Toshio Satoh, Takashi Hamabata, Ko Kato and Kazutoshi Sawada (*Idemitsu Kosan Ltd, Chiba, Japan*)

12.25-12.40

'HPV pseudovirions produced in plants'

Renate L. Lamprecht, Paul Kennedy, Suzanne M. Huddy, Susanne Bethke, Inga I. Hitzeroth and Edward P. Rybicki (*University of Cape Town, Cape Town, South Africa*)

12.40-12.55

'Development of the Ti-plasmid based CMV vector'

Noriho Fukuzawa, Chikara Masuta, Atuko Sato, Katsunori Murota, Noriko Itchoda and Takeshi Matsumura (*National Institute of Advanced Industrial Science & Technology, Sapporo, Japan*)

12.55-13.10

'Membrane filtration can substitute chromatographic purification steps for plant-derived and ELP-tagged biopharmaceutical proteins'

Johannes F. Buyel, Patrick Opendensteyn, Hannah M. Gruchow and Rainer Fischer (*RWTH Aachen, Aachen, Germany*)

13.10-14.00

Lunch Break & Posters

SESSION 10

Moderator: Pascal Drake (*St George's University of London, London, UK*) and Johannes Buyel (*RWTH, Aachen, Germany*)

14.00-14.20

'Manufacturing of recombinant glycoproteins in plants: Transient versus transgenic approach using engineered production host'

Victor Klimyuk (*Icon Genetics GmbH, Halle/Salle, Germany*)

14.20-14.40

'Biochemical characterization of the first recombinant human antibodies produced in the microalgae *Phaeodactylum tricornutum*'

Muriel Bardor, Gaetan Vanier, Franziska Hempel, Philippe Chan, Michael Rodamer, David Vaudry, Uwe G. Maier and Patrice Lerouge (*Institut Universitaire de France (IUF), Paris, France*)

14.40-15.00

'Molecular farming: Comparing 3 platforms with a case study'

Vikram Virdi, Paloma Juarez, Veronique Boudolf, Jorge Palaci and Ann Depicker (*Ghent University, Ghent, Belgium*)

15.00-15.20

'Production of an active anti-CD20-hIL-2 immunocytokine in *Nicotiana benthamiana*'

M. Donini, C. Marusic, F. Novelli, A. Salzano, A. Scaloni, E. Benvenuto and C. Pioli (*ENEA, Rome, Italy*)

15.20-15.40

'Recombinase mediated targeted gene swapping in the nuclear genome of *Nicotiana tabacum*'

Sean Collison, Craig van Dolleweerd, Annalies De Paepe, Ann Depicker, Pascal Drake and Julian Ma (*St. George's University of London, London, UK*)

15.40-15.55

Tea Break And Poster Breakdown

SESSION 11

Moderator: Julian Ma (*St. George's University of London, London, UK*)

15.55-16.10

'A plant manufactured HER2-targeting conjugate vaccine for metastatic breast cancer'

Warayut Chotprakaikiat, Alex Allen, Duc Bui-Minh, Jantipa Jobsri, Federica Cavallo, Elena Quaglino, Yuri Gleba, Freda Stevenson, Christian Ottensmeier, Victor Klimyuk and Natalia Savelyeva (*University of Southampton, Southampton, UK*)

16.10-16.25

'Ferret models to study plant-based clinical intervention strategies against influenza'

Leon de Waal, Koert Stittelaar, Edwin Veldhuis Kroeze, Geert van Amerongen, Judith MA van den Brand, Joost Kreijtz, Erhard van der Vries and Albert Osterhaus (*Viroclinics Biosciences B.V./Erasmus Medical Center, Rotterdam, The Netherlands*)

16.25-16.40

'Objective, qualitative and quantitative assessment of viruses and nanoparticles'

Musa Sani (*Vironova AB, Stockholm, Sweden*)

16.40-16.50

PBVAB 2015 Conference Review and Closing Remarks

Julian Ma (*St. George's University of London, London, UK*)

Poster 101

'The expression of Crimean Congo haemorrhagic fever virus nucleocapsid antigen in *Nicotiana benthamiana*'

Ann Meyers *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 102

'The transient expression of Rift Valley fever virus nucleocapsid protein in *Nicotiana benthamiana*'

Sandiswa Mbewana *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 103

'N-glycan and proteolytic processing of human alpha-1 antitrypsin expressed in *Nicotiana benthamiana*'

Alexandra Castilho *et al.*

(University of Natural Resources & Life Sciences, BOKU, Vienna, Austria)

Poster 104

'Recombinant barley-produced antibody for the detection of the major bovine milk allergen, a-actoglobulin'

Anneli Ritala-Nurmi *et al.*

(VTT Technical Research Centre of Finland, Espoo, Finland)

Poster 105

'Co-expression of Bluetongue virus serotype 8 capsid proteins and *in situ* characterization of VLPs in *N. benthamiana*'

A.R. van Zyl *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 106

'An oral vaccine candidate for infectious bronchitis virus through chloroplast engineering of *Chlamydomonas reinhardtii*'

P.D. Rajakumar and S. Purton (University College London, London, UK)

Poster 107

'A Hepatitis B core-based production of plant virus-like particles as dengue vaccine candidate'

Ee Leen Pang *et al.*

(University of Nottingham Malaysia Campus, Selangor, Malaysia)

Poster 108

'Plant-made E2 subunit marker vaccine sheds new light on CSFV eradication'

Eun-Ju Sohn (BioApp Inc., Pohang, Korea)

Poster 109

'Significant decreasing of repair enzyme MGMT gene expression in Hep-2 cells under the treatment with the extracts of transgenic carrot plants accumulating interferon alpha 2b'

M.V. Kuchuk *et al.* (NASU, Kiev, Ukraine)

Poster 110

'Synthesis of human-like polysialylated N-glycans in plants'

Somanath Kallolmath *et al.*

(University of Natural Resources & Life Sciences, BOKU, Vienna, Austria)

Poster 111

'Production of protein antibiotics in microalgae'

Max Blanshard *et al.* (University College London, London, UK)

Poster 112

'Synthesis of antibacterial protein in the green alga *Chlamydomonas reinhardtii*'

J.C. Ramos and S. Purton (University College London, London, UK)

Poster 113

'Optimisation of transient expression, purification and structural characterisation of HPV-16 L1/L2 chimaeric virus-like particles in *Nicotiana benthamiana*'

Inga Hitzeroth *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 114

'Rotavirus capsid protein expression in *Nicotiana benthamiana*'

Inga Hitzeroth *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 115

'Production of a universal influenza vaccine in tobacco plants'

Francisco Pera *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 116

'Towards plant-derived universal influenza vaccines: Conserved antigens and rigid helical carriers'

Peter Ivanov *et al.* (Lomonosov Moscow State University, Moscow, Russia)

Poster 117

'Plant production of potential *Salmonella Typhimurium* diagnostic antibodies'

L. Kopertekh *et al.*

(JKI, Federal Research Centre for Cultivated Plants, Quedlinberg, Germany)

Poster 118

'Development of a single-replicon miniBYV vector for co-expression of heterologous proteins in plants'

Alex Prokhnevsky *et al.* (Fraunhofer USA, Newark, Delaware, USA)

Poster 119

'Fast-neutron mutagenesis in *N. benthamiana*'

Rich Mundell *et al.* (University of Kentucky, Kentucky, USA)

Poster 120

'Plant-based recombinant vaccine: Purification of HPV16 L1 protein and VLPs from tobacco leaves'

Maryam Zahin *et al.* (University of Louisville, Louisville, Kentucky, USA)

Poster 121

'Use of plant-made dengue antigens for the development of surface acoustic wave diagnostic kits'

Eridan Orlando Pereira *et al.* (Universidade Estadual do Ceara, Fortaleza, Brazil)

Poster 122

'Coping with proteolytic degradation of recombinant proteins produced in tobacco BY-2 cells'

Andreas Schiermeyer *et al.* (IME, Aachen, Germany)

Poster 123

'Tobacco factories for production of recombinant human proinsulin'

Ky Young Park *et al.* (Suncheon National University, Chonnam, Korea)

Poster 124

'Transient recombinant protein expression and the unfolded protein response in plants'

Kiva Ferraro *et al.* (PlantForm Corporation, Toronto, Ontario, Canada)

Poster 125

'Monoclonal antibody production for the Sudan Ebola Virus'

Michael D. McLean *et al.* (PlantForm Corporation, Toronto, Ontario, Canada)

Poster 126

'Development of a plant-based expression platform for the production of HIV envelope subunit vaccines'

Emmanuel Margolin *et al.* (University of Cape Town, Cape Town, South Africa)

Poster 127

'Oral immunization of H5 expressed in plant ER with adjuvant saponin protects mice against highly pathogenic avian influenza A virus infection'

Hyangju Kang *et al.* (POSTECH, Korea)

Poster 128

'Expression of hepatitis E ORF2 capsid protein in *N. benthamiana* using transient expression system'

Milena Mazalovska *et al.* (University of Plovdiv, Plovdiv, Bulgaria)

Poster 129

'Epigenetic modulation of *Medicago truncatula* cell suspension cultures for improved production of recombinant proteins'

Rita Abranches *et al.* (ITQB, Universidade Nova de Lisboa, Oeiras, Portugal)

Poster 130

'Enhancing the tobacco chassis: Applications of Cas9-based genome editing technologies to heterologous protein production in plants'

Matthew Dent *et al.* (John Innes Centre, Norwich, UK)

Poster 131

'Extracellular peptidase hunting for improvement of protein production in plant cells and roots'

J. Lallemand *et al.* (Universite de Liege, Liege, Belgium)

Poster 132

'Recombinant protein accumulation patterns in *Nicotiana benthamiana*'

Marie-Claire Goulet *et al.* (University of Laval, Quebec, Canada)

Poster 133

'NMR-based structural validation and SPR-based functional analysis of therapeutic human antibody produced in transgenic *Nicotiana benthamiana* cultivated by hydroponics in closed plant factory'

Yasushi Tasaka *et al.* (AIST, Sapporo, Hokkaido, Japan)

Poster 134

'Addressing low accumulation of recombinant *E. coli* antigens in transplastomic tobacco'

Jacqueline MacDonald *et al.*

(Agriculture and Agri-Food Canada, London, Ontario, Canada)

Poster 135

'Sjogren's syndrome diagnosis: The Green solution'

Roberta Zampieri *et al.* (University of Verona, Verona, Italy)

Poster 136

'In planta production of the candidate diabetes vaccine GAD65'

Linda Avesani *et al.* (University of Verona, Verona, Italy)

Poster 137

'Gene inactivation by CRISPR-Cas9 in *Nicotiana tabacum* BY-2 plant suspension cells'

Sebastien Mercx *et al.* (Universite Catholique de Louvain, Louvain, Belgium)

Poster 138

'Alternative to *Nicotiana tabacum* for heterologous expression in plant suspension cells'

Jeremie Tollet *et al.* (Universite Catholique de Louvain, Louvain, Belgium)

Poster 139

'New plant models for the production of recombinant proteins: Why not the carnivorous plants?'

Estelle Nisse *et al.* (Plant Advanced Technologies, Vandoeuvre-les-Nancy, France)

Poster 140

'Seedling production of transgenic *N. benthamiana* for plant-made marker vaccine using hydroponics'

Sung-Woo Jeong and Jong-Tae Lim

(Research Institute of Science & Technology, Kwangyang-City, Korea)

Poster 141

'The use of transient expression for the rapid production of virus-like particles in plants'

Hadrien Peyret *et al.* (John Innes Centre, Norwich, UK)

Poster 142

'Development of GM soyabean that overexpressed material protein for bio-industrial use'

Eun Hye Kim (Celltron, Yeonsu-gu, Incheon, Korea)

Poster 143

'Transient co-expression of Foot-and-Mouth disease virus capsid precursor (P12A) and protease 3C in *Nicotiana benthamiana*'

Andres Wigdorovitz *et al.* (INTA, Buenos Aires, Argentina)

Poster 144

'Evaluation of intranasal vaccination with plant-derived VP2 against IBDV'

Andres Wigdorovitz *et al.* (INTA, Buenos Aires, Argentina)

Poster 145

'Glycan variants of IgG secreted from plant suspension cells'

Catherine Navarre *et al.* (Universite de Louvain, Louvain, Belgium)

Poster 146

'Molecular characteristics of plant-expressed chicken anemia virus VP3 protein in *Nicotiana benthamiana*'

Sandy H.-S. Loh *et al.*

(University of Nottingham Malaysia Campus, Selangor, Malaysia)

Poster 147

'Immunogenicity and protective efficacy of recombinant E protein-based Yellow Fever Vaccine expressed in *Nicotiana benthamiana*'

Rosane Cuber Guimaraes *et al.* (Bio-Manguinhos, Rio de Janeiro, Brazil)

Poster 148

'Modulating secretory pathway pH by proton channel co-expression can increase recombinant protein stability in plants'

Philippe V. Jutras *et al.* (Universite Laval, Quebec, Canada)

Poster 149

'Immunocontraception as a means of population control in wildlife and domestic animals'

M.M. O'Kennedy *et al.* (CSIR Biosciences, Pretoria, South Africa)

Poster 150

'Enhanced-transient expression of human tissue plasminogen activator (tPA) in *Nicotiana benthamiana*, a protein with therapeutical applications'

Mahsid Amiri *et al.* (Tarbiat Modares University, Tehran, Iran)

Poster 151

'Transient expression of hepatitis C virus polytope-HBs Ag in *Nicotiana tabacum* leaves using p19 silencing suppressor'

Parastoo Ehsani *et al.* (Pasteur Institute of Iran, Tehran, Iran)

Poster 152

'Transient expression of human nerve growth factor in *Nicotiana benthamiana*'

H. Ofoghi *et al.* (IROST, Tehran, Iran)

Poster 153

'Development of IgG, IgA and SigA Mabs to *Clostridium difficile* toxins using a plant-based expression platform'

Clare Soares *et al.* (St. George's University of London, London, UK)

Poster 154

'Polymeric IgG-Ag85B fusion proteins as TB vaccine candidates'

Gina Webster *et al.* (St. George's University of London, London, UK)

Poster 155

'Expression of the multimeric and highly immunogenic *Brucella* spp. Lumazine synthase fused to bovine rotavirus VP8d as a scaffold for antigen production in tobacco chloroplasts'

E. Federico Alfano *et al.* (INBEGI-CONICET, Buenos Aires, Argentina)

* This final programme is correct at the time of printing, however the organizers reserve the right to make any alterations that may be required in the interests and integrity of the final conference programme.