

Evolution of Plant Metabolic Diversity

This meeting is funded by Cold Spring Harbor Corporate Sponsor Program

Banbury Center, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY
March 3-6, 2013

Organizers: Toni Kutchan, Danforth Center, St. Louis, Missouri
Robert Last, Michigan State University, East Lansing, Michigan
Anne Osborn, John Innes Centre, Norwich, United Kingdom

PRELIMINARY PROGRAM

Sunday, March 3

- Afternoon Arrival at Robertson House
- 6:00 pm Registration and Reception at Robertson House
- 7:30 pm Dinner at Robertson House
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Monday, March 4

- 7:15-8:15 am Breakfast at Robertson House
- 8:30-8:35 am Jan Witkowski, Director, Banbury Center, Cold Spring Harbor, New York
Welcoming remarks
- 8:35-8:40 am Robert Last, Michigan State University, East Lansing, Michigan
- 8:40-12:30 pm **Session 1: Metabolite diversity in an evolutionary/functional context**
Chair: Toni Kutchan, Danforth Center, St. Louis, Missouri
- 8:40-8:55 am Robert Last, Michigan State University, East Lansing, Michigan:
Signatures of evolution in glandular trichomes of *Solanum*
- 8:55-9:15 am Discussion
- 9:15-9:30 am Kazuki Saito, Riken Plant Science Center, Chiba University, Chiba, Japan:
Origin of metabolic diversity
- 9:30-9:50 am Discussion
- 9:50-10:05 am Monique Simmonds, Royal Botanic Gardens, Kew, London, England:
Plant chemosystematics – new opportunities for selecting plants
- 10:05-10:25 am Discussion
- 10:25-11:00 am Coffee Break
- 11:00-11:15 am Elizabeth Kellogg, University of Missouri, St. Louis, Missouri:
Secondary metabolism in the *Poaceae* (grasses)
- 11:15-11:35 am Discussion

- 11:35-11:50 am Thomas Mitchell-Olds, Duke University, Durham, North Carolina:
Metabolism and complex traits
- 11:50-12:10 pm Discussion
- 12:10-12:30 pm General Discussion
- 12:45 pm Lunch at Robertson House
- 2:00-6:00 pm **Session 2: Regulation of Metabolism: Regulation and links**
Chair: Anne Osbourn, John Innes Centre, Norwich, United Kingdom
- 2:00-2:15 pm Natalia Doudareva, Purdue University, West Lafayette, Indiana:
An alternate microbial pathway contributes to phenylalanine biosynthesis in
plants
- 2:15 -2:35 pm Discussion
- 2:35-2:50 pm Daniel Kliebenstein, University of California, Davis, California:
Evolution of regulatory links between primary and secondary metabolism
- 2:50-3:10 pm Discussion
- 3:10-3:25 pm Harry Klee, University of Florida, Gainesville, Florida:
Regulation of flavor associated chemical accumulation in the tomato fruit
- 3:25-3:45 pm Discussion
- 3:45-4:15 pm Coffee Break
- 4:15-6:00 pm **Session 2: Regulation of Metabolism: Trafficking and sequestration**
- 4:15-4:30 pm Markus Lange, Washington State University, Pullman, Washington:
Evolution of specialized plant tissues and cell types for the synthesis and
accumulation of terpenoids
- 4:30-4:50 pm Discussion
- 4:50-5:05 pm Vincenzo DeLuca, Brock University, Ontario, Canada:
Specialized metabolism and the recruitment of multiple cell types for
functional pathway organization
- 5:05-5:25 pm Discussion
- 5:25-6:00 pm General Discussion
- 6:15 pm Reception at Robertson House
- 7:00 pm Dinner at Robertson House
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Tuesday, March 5

- 7:15-8:15 am Breakfast at Robertson House
- 8:30-12:15 pm **Session 3: Pathway Evolution**
Chair: Robert Last, Michigan State University, East Lansing, Michigan
- 8:30-8:45 am Anne Osbourn, John Innes Centre, Norwich, United Kingdom:
Pathway evolution
- 8:45-9:05 am Discussion
- 9:05-9:20 am Eran Pichersky, University of Michigan, Ann Arbor, Michigan:
Terpene gene evolution, evolution of functional gene clusters
- 9:20-9:40 am Discussion
- 9:40-9:55 am Daniele Werck-Reichhart, Institute of Plant Molecular Biology, Strasbourg,
France:
CYP76 family of cytochrome P450 enzymes: evolutionary bursts in
monoterpenol metabolism
- 9:55-10:15 am Discussion
- 10:15-10:45 am Coffee Break
- 10:45-11:00 am Eleanore Wurtzel, City University of New York - Lehman College, Bronx,
New York:
Enzyme evolution and topological control of carotenoid biosynthesis in
plants
- 11:00-11:20 am Discussion
- 11:20-11:35 am Edgar Cahoon, University of Nebraska-Lincoln, Lincoln, Nebraska:
Evolution of unusual fatty acid synthesis: The case of acetylenic fatty acids
and polyacetylenes
- 11:35-11:55 am Discussion
- 11:55-12:15 pm General Discussion
- 12:30 pm Lunch at Robertson House
- 2:00-5:30 pm **Session 4: Omics approaches to studies of pathway and genome
evolution**
Chair: Harry Klee, University of Florida, Gainesville, Florida
- 2:00-2:15 pm Shin-Han Shiu, Michigan State University, East Lansing, Michigan:
Metabolic gene duplication and functional divergence/convergence
- 2:15-2:35 pm Discussion
- 2:35-2:50 pm Seung Rhee, Carnegie Institution of Washington, Stanford, California:
Genomic signatures of specialized metabolism evolution in plants
- 2:50-3:10 pm Discussion
- 3:10-3:25 pm Todd Mockler, Donald Danforth Plant Science Center, St. Louis, Missouri:
Informing metabolic studies using transcriptome profiling

3:25-3:45 pm Discussion
3:45-4:15 pm Coffee Break
4:15-4:30 pm Toni Kutchan, Danforth Plant Science Center, St. Louis, Missouri:
Using genomics to elucidate biochemical pathways
4:30-4:50 pm Discussion
4:50-5:30 pm General Discussion
6:00 pm Reception at Robertson House
7:00 pm Dinner at Robertson House

Wednesday, March 6

7:30-8:30 am Breakfast at Robertson House
9:00-12:30 pm **Session 5: Applying evolutionary principles to pathway engineering**
Chair: Kazuki Saito, Riken Plant Science Center, Chiba University, Chiba,
Japan
9:00-9:15 am Ikuro Abe, University of Tokyo, Tokyo, Japan:
Engineered biosynthesis of plant polyphenols
9:15-9:35 am Discussion
9:35-9:50 am Christopher Paddon, Amyris, Inc., Emeryville, California:
Semi-Synthetic Artemisinin: Using synthetic biology to increase the supply
of a crucial antimalarial drug
9:50-10:10 am Discussion
10:10-10:45 am Coffee Break
10:45-11:00 am Reuben Peters, Iowa State University, Ames, Iowa:
To gibberellins and beyond! The evolution of (Di)terpenoid metabolism
11:00-11:20 am Discussion
11:20-11:35 am Joseph Noel, Salk Institute for Biological Studies, La Jolla, California:
The remarkable pliability and promiscuity of specialized metabolism
11:35-11:55 am Discussion
11:55-12:30 pm Summary Discussion
12:45 pm Lunch at Robertson House
Afternoon Departure