Homeostasis of Isoprenoids in Plants

Alain Tissier, Leibniz-Institute of Plant Biochemistry, Halle (Saale), Germany

ERA-CAPS Grant Holders Meeting
Lisbon, May 7th

ERA-CAPS

ERA-NET for Coordinating Action in Plant Sciences

The H.I.P Consortium

Partner 1
IPB
Leibniz Institute of Plant Biochemistry

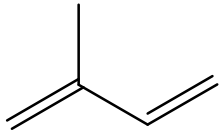
Partner 2
VC
Volcani Center ARO
Yoram Eyal
(Israel)

Partner 3
UCL
Université catholique de Louvain
Marc Boutry
(Belgium)

Partner 4
UvA
University of Amsterdam
Rob Schuurink
(Netherlands)

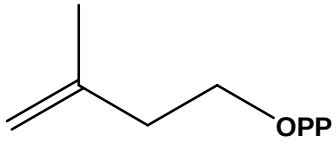
Isoprenoid building blocks

Isoprenoids: compounds that are made entirely or partially of isoprene units

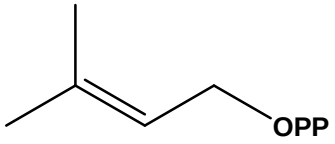


isoprene

All isoprenoids are synthesized from the same building blocks

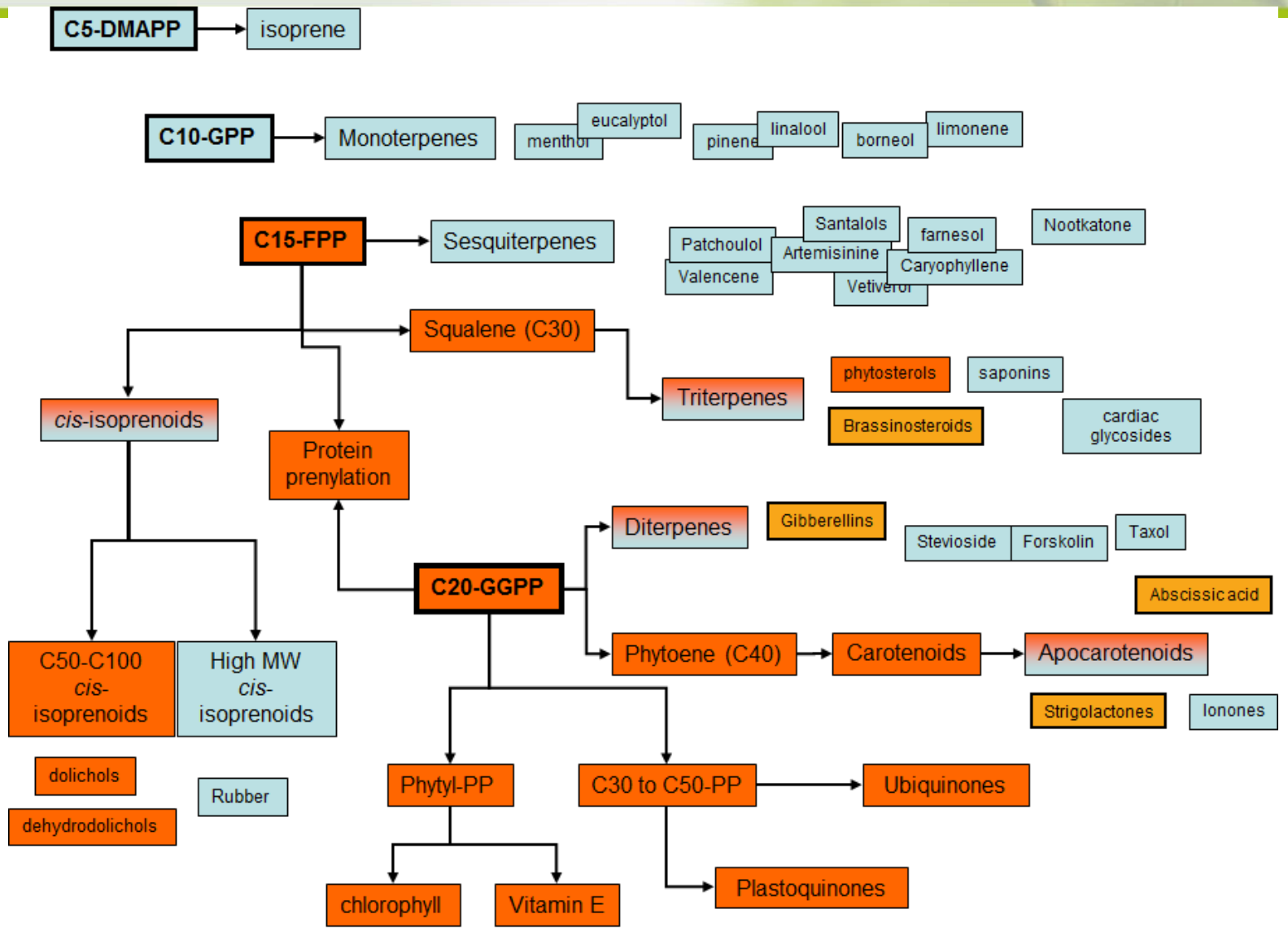


Isopentenyl diphosphate
(IPP)

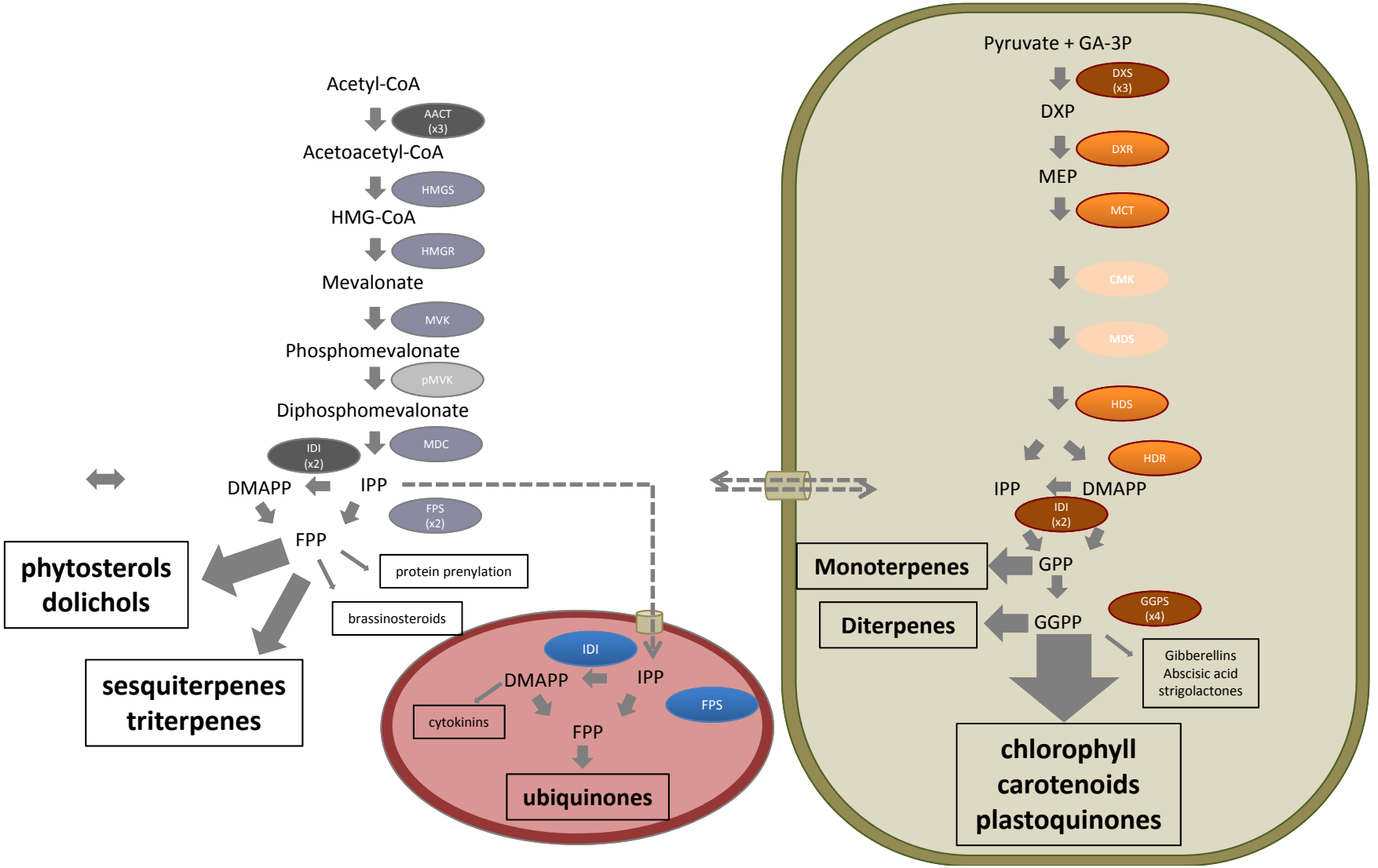


dimethylallyl diphosphate
(DMAPP)

The isoprenome



The precursor pathways

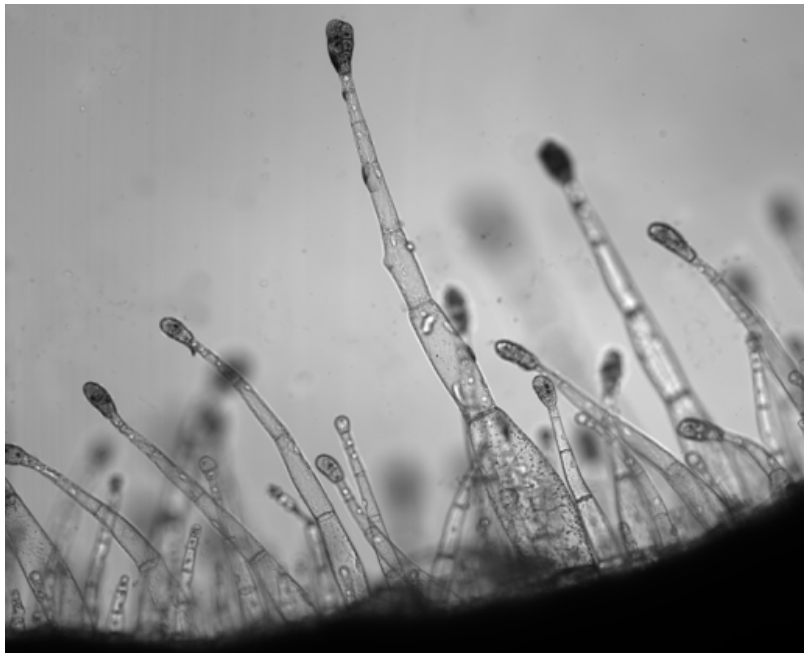


questions

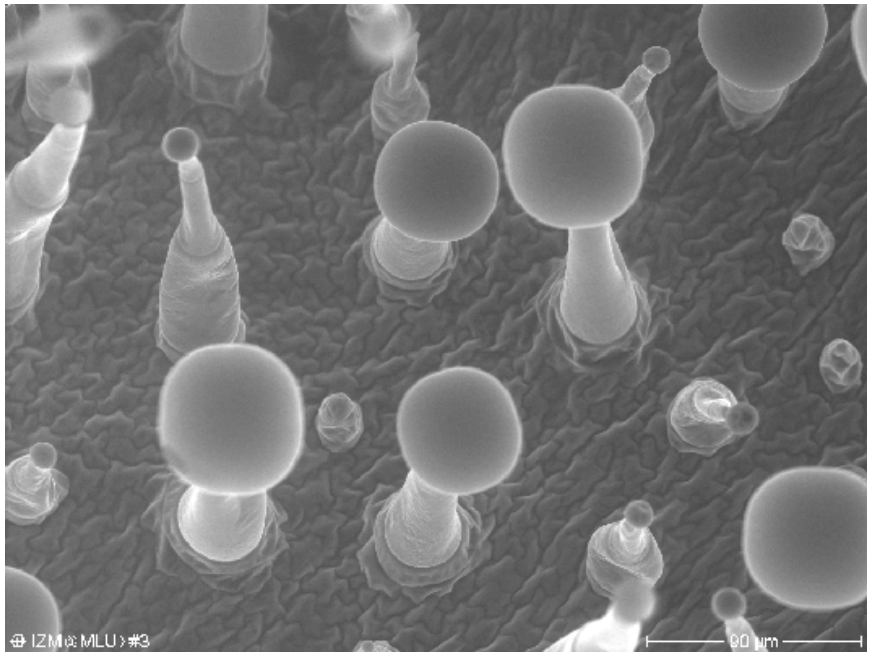
- How do cells to maintain adequate fluxes for compounds that are in large (e.g. housekeeping) and compounds that are in small concentrations (hormones)?

- How do the precursor pathways (MEP and MEV) communicate with each other?

our model systems



tobacco
Diterpenoids
(← MEP pathway)



tomato
Sesquiterpenoids and monoterpenoids
(← MEP and MEV pathway)

Tasks and WPs

Workpackage 1 (WP1): Collection and construction of biological materials

Where are the enzymes located in the cell?

Do the enzymes interact within the pathways (a) and/or with other proteins (b)?

How is the isoprenoid metabolism distributed in trichomes?

Workpackage 2 (WP2)

Fluorescent protein fusions

Proteomic analysis of trichome subcellular fractions

Targeted and non-targeted Y2H

Native gel assays
Immunoprecipitation

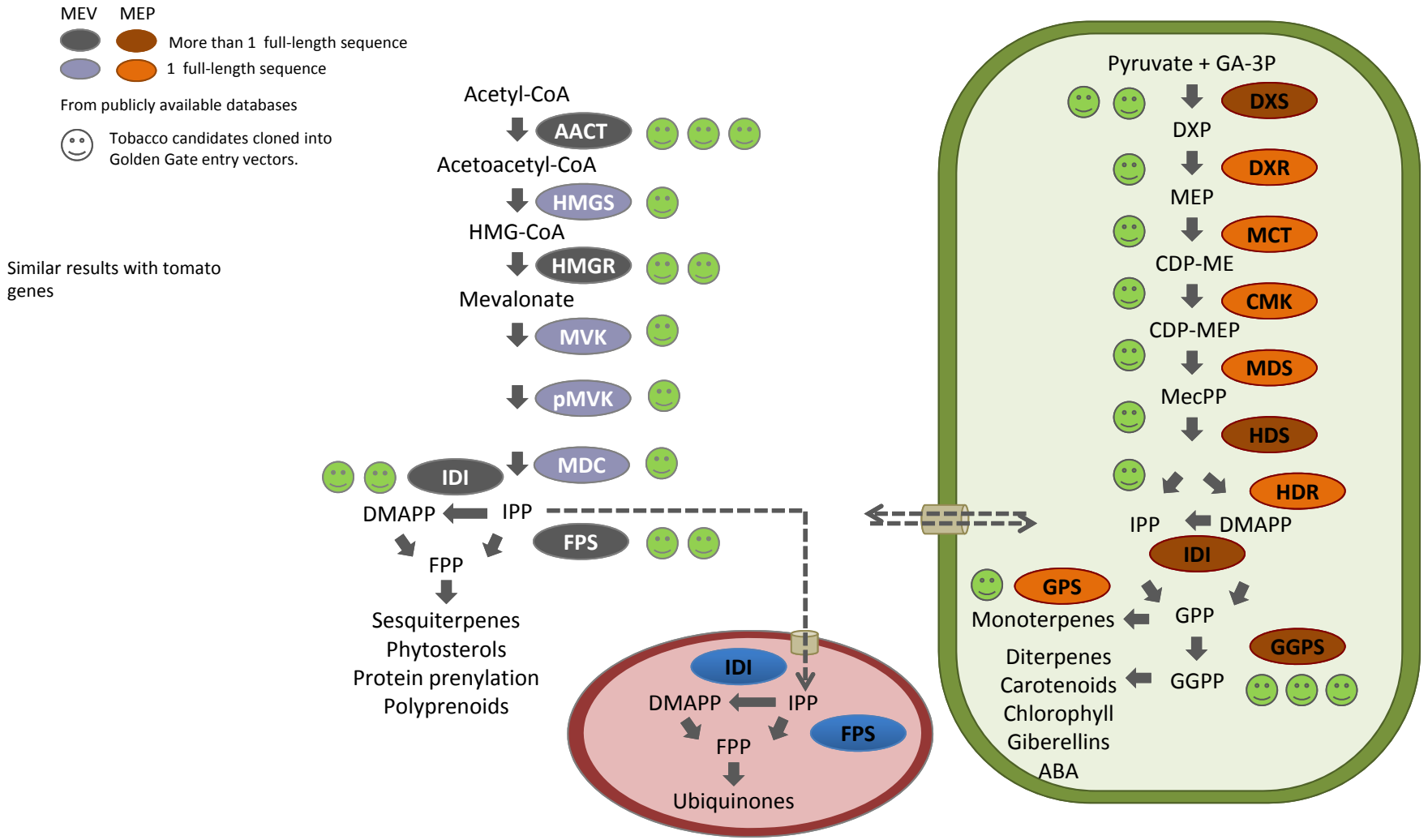
Workpackage 3 (WP3)

Search for transporter(s)

Pathway modification using RNAi and overexpression

Isotope labeling/Inhibitor Treatments - fluxomics

Comprehensive gene cloning



Ongoing

- Systematic subcellular localization of MEP/MEV enzymes
- Membrane proteomics in the presence of pathway inhibitors to identify transporters
- Immunoprecipitation to identify protein complexes

Next

- 2-hybrid (targeted and shotgun)
- Organelle-specific proteomics
- Transcriptomics and proteomics of mutants/knock-downs at specific steps of the MEP/MEV pathway

Marc Boutry
Antoine Champagne
Mathieu Pottier

Rob Schuurink
Aldana Ramirez

Yoram Eyal
Maya Sapir-Mir
Ahuva Frydman

Alain Tissier
Kathleen Brückner

Thanks for your attention

ERA-CAPS

ERA-NET for Coordinating Action in Plant Sciences