Arabidopsis as a model for cell wall biosynthesis in bioenergy crops

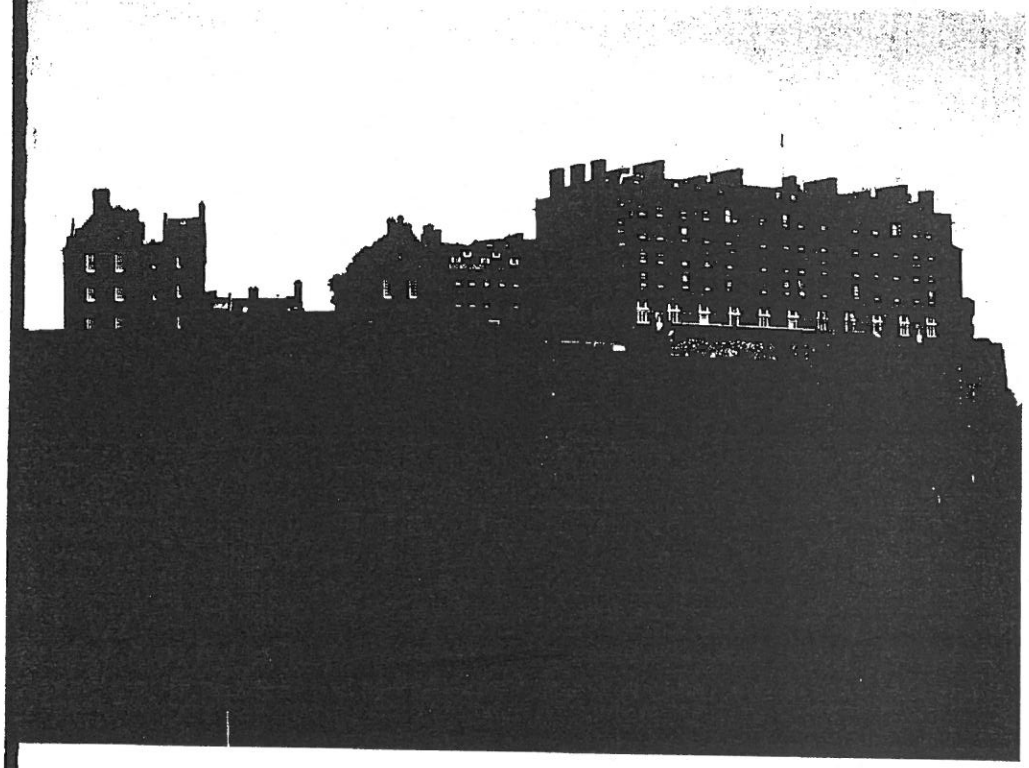
Scheller, Henrik Vibe; Manabe, Yuzuki; Oikawa, Ai; Suttangkakul, Anongpat; Geshi, Naomi; Verhertbruggen, Yves; Truong, Michelle; Yin, Lan; Jensen, Jacob K; Nafisi, Majse; Sakuragi, Yumiko; Knoch, Eva

Publication date:
2009

Document version
Publisher's PDF, also known as Version of record

HENRIK SCHELCER

20th International Conference on Arabidopsis Research



Edinburgh, Scotland, United Kingdom

30th June - 4th July 2009

Arabidopsis as a model for cell wall biosynthesis in bioenergy crops

C42
Saturday 14:00 - 14:30
Bioenergy

Henrik Vibe Scheller1
Yuzuki Manabe1
Ai Oikawa1
Anongpat Suttangkakul1
Naomi Geshi2
Yves Verhertbruggen1
Michelle Truong1
Lan Yin1,2
Jacob K Jensen1
Majse Nafisi2
Yumiko Sakuragi2
Eva Knoch1,2

1Joint Bioenergy Institute
Lawrence Berkeley National Laboratory
California

2Department of Plant Biology and Biotechnology
University of Copenhagen
Denmark

Declining sources of fossil fuels, global warming and political instability in oil producing regions have led many countries to develop strategies for alternative energy. Plant biomass is a convenient way to harness solar energy and photosynthesis, and biomass is already an important supplement to fossil fuels. However, the energy efficiency of biofuel production is low, and environmental impact can be high. There is a great need to develop new technologies that can provide fuels, especially liquid fuels for transportation, in an efficient and environmentally friendly way.

Plant cell walls are composed mainly of polysaccharides and production of biofuels from biomass requires decomposition of the polymers. Many of the polymers are recalcitrant to degradation and some degradation products cannot be converted efficiently into fuels or may even be inhibitory. Better understanding of the biosynthesis of the cell wall polysaccharides may enable development of crops with improved properties as biofuels feedstocks. Despite rather detailed information on the structure of the cell wall polysaccharides, little is known about their biosynthesis. The key enzymes are glycosyltransferases (GTs) and plants need a large number of GTs to synthesize the complex polysaccharides present in the walls. However, only a few GTs have had their activity demonstrated. In Arabidopsis, approximately 450 GT genes have been identified, and The Joint Bioenergy Institute has undertaken a systematic analysis of these enzymes. Biosynthesis of hemicelluloses is particularly important since they are the most abundant non-cellulosic component in biomass.