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CRAG CENTRE DE RECERCA EN AGRIGENÒMICA CSIC IRTA UAB

PETER BOZHKOV CV

SPEAKER AT:

THE DEATH OF PLANT CELLS.

FROM PROTEASES TO FIELD APPLICATIONS

October, 2nd and 3rd , 2013, Barcelona

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Peter Bozhkov received his PhD degree in Plant Physiology in 1994 at the St. Petersburg Botanical Institute. He pursued his postdoctoral studies at the Swedish University of Agricultural Sciences in Uppsala, where he has established his own laboratory in 2005. At present Dr. Bozhkov is a member of the faculty at the same university and also a group leader at Uppsala BioCentre. His group is studying mechanisms of programmed cell death and autophagy in plants.

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Cell-autonomous and Organismal Roles of Autophagy in Plant Development

Animals have evolved sophisticated machinery to remove apoptotic bodies and clean up necrotic debris for damping inflammatory response. Plants appear more pragmatic, as they utilize dying cells and cell corpses to construct their bodies, as well as to store and transport nutrients, growth factors, and secondary metabolites. The presence of rigid cell walls and the absence of phagocytosis permit cell corpses to stay post-mortem for a very long time. Disassembly of plant cells during developmental programmed cell death (PCD) is likewise a slow process, which can take up to several days. This mode of PCD is reliant on the gradual engulfment of the cytoplasm by the lytic vacuoles and is hence called vacuolar cell death. We have found that autophagy – a major cellular catabolic process - plays a central role in the execution of vacuolar cell death in the Norway spruce embryo-suspensors. The role of autophagy is cell-autonomous, since down-regulation of ATG genes specifically in the suspensor cells acts as a switch from vacuolar cell death to necrosis, which impairs embryonic patterning and leads to developmental arrest. It has become well known in the last few years that yeasts, worms, flies and mammals with enhanced level of basal autophagy live longer, whereas suppression of autophagy results in premature death or shortened lifespan. Current studies in my laboratory establish autophagy as an important process in the control of plant phenology and longevity. We have found that changes in the expression of some ATG genes can modulate autophagic flux in the leaves of Arabidopsis, which in turn affects phenology and lifespan of the plants. Interestingly, manipulation of both autophagic flux and organismal lifespan can also be achieved in wild type Columbia plants by changing their caloric status through increasing or decreasing light intensity.

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