Department of Biology
The College of Arts + Sciences | Indiana University Bloomington

Carlos O. Miller Lecture

Thu., Sep. 29, 2016 • 4–5 p.m. • Myers Hall 130

Mark Estelle, Ph.D.

Distinguished Professor
Section of Cell and Developmental Biology, University of California, San Diego
Investigator of the Howard Hughes Medical Institute and Gordon & Betty Moore Foundation

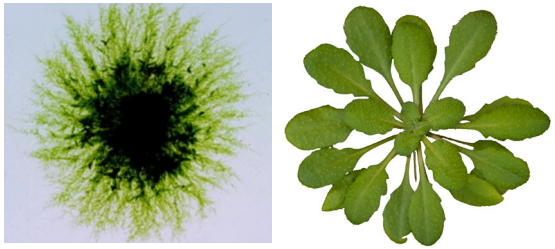
Auxin signaling from moss to mouse ear cress

Auxin controls growth and diverse physiological processes through a complex gene regulatory network that includes thousands of genes. Auxin regulates gene expression by promoting the degradation of transcriptional repressors called Aux/IAA proteins. The Aux/IAAs repress transcription by interacting with AUXIN RESPONSE FACTOR (ARF) transcription factors and recruiting members of the TOPLESS (TPL) family of co-repressors to the chromatin. The 29 *Aux*/IAA genes in *Arabidopsis* exhibit unique but partially overlapping patterns of expression. Although some studies have suggested that individual *Aux*/IAA genes have specialized function, genetic analyses of the family have been limited by the lack of loss-of-function phenotypes, presumably because of overlapping function. Further, with a few exceptions, our knowledge of the factors that regulate *Aux*/IAA expression is limited. We have used two model systems, the moss *Physcomitrella patens* and *Arabidopsis thaliana* to explore the function of the Aux/IAA proteins. Our results indicate that these proteins have a surprisingly broad role in transcriptional regulation. Further, we find the *Aux*/IAA genes are regulated by many transcription factors and that some *Aux*/IAAs are required for tolerance to abiotic stress. We hypothesize that transcriptional control of *Aux*/IAA genes plays a central role in the establishment of the auxin-signaling pathways that regulate organogenesis, growth, and environmental response.

About Dr. Estelle

Mark Estelle has played a leading role in revealing how the plant hormone auxin regulates plant growth and development.

Using genetic approaches to identify mutants with altered auxin responses, followed by identification of the genes and proteins involved, Estelle's lab has identified the auxin receptor and the molecular basis for auxin responses. His lab has shown that auxin binds the receptor to activate its ubiquitin ligase activity, leading to the degradation of a family of transcriptional repressors that keep numerous genes turned off. By removing the repressors, the genes are turned on, programming a variety of cellular and whole-plant responses.



Auxin regulates growth in all land plants from *Physcomitrella patens* (left) to *Arabidopsis thaliana* (right).

Estelle's visit will also be a homecoming. He served on the IU Biology faculty from 1986-1999 and again from 2002-2008. Estelle was the first holder of the Carlos O. Miller Chair in Plant Growth and Development, endowed by the late Carlos O. Miller. Estelle established the lecture series in 2004 to honor Miller and his contributions to the department and the scientific community.

The Carlos O. Miller Lectures honor Professor Carlos Miller (1923-2012), a legendary plant hormone pioneer and beloved member of the IU Biology faculty for 55 years. Miller had a longstanding interest in the mechanisms of plant growth and development. Established in 2004, the lecture series brings prominent scientists to Bloomington to discuss their research.

Lecture hosted by
Craig Pikaard, Distinguished Professor of Biology and
Carlos O. Miller Chair in Plant Growth and Development

Refreshments served prior to lecture