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FAST MOVING FRONTS - 2009

March 2009

PDF

Ralph S. Quatrano talks with *ScienceWatch.com* and answers a few questions about this month's Fast Moving Front in the field of Plant & Animal Science. The author has also sent along images of his work.

Article: The Physcomitrella genome reveals evolutionary insights into the conquest of land by plants
Authors: Rensing, SA, et al.
Journal: SCIENCE, 319 (5859): 64-69 JAN 4 2008
Addresses: Washington Univ, Dept Biol, 1 Brookings Dr, St Louis, MO 63130 USA.
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Kanazawa Univ, Adv Sci Res Ctr, Kanazawa, Ishikawa 9200934, Japan.
(addresses have been truncated)

SW: Why do you think your paper is highly cited?

Our paper is highly cited because it represents the complete genome of a plant, the moss *Physcomitrella patens,* that lacks vascular tissue and seeds and serves as an example of an early land plant. Prior to this genome being sequenced, one had access to the complete genome sequence of only single-celled algae, such as *Chlamydomonas*, and seed plants such as rice and *Arabidopsis*. The complete sequence of the moss *P. patens* gives us insights into the genes that function in the colonization of land, e.g., those that protect the plant from water loss and high light.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The moss genome sequence does not describe any new methodology, but does allow us to look at the genes in various metabolic pathways that were likely operative during the colonization of land. It will encourage scientists to compare the genome of this plant with other plants (e.g., ferns) that possess traits characteristic of seed plants such as vascular tissue.

Haploid, single-cell layer,

SW: Would you summarize the significance of your paper in layman's terms?

Our paper opens the exploration of a plant genome, uniquely positioned in the evolutionary ladder of land plants, for analysis of its novel and uncharacterized genes for their role in important traits such as their ability to withstand drought and desiccation.

SW: How did you become involved in this research and were any particular problems encountered along the way?

leaf-like gametophores of P. patens

View/download accompanying slides and descriptions.

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I became interested in this research because I have been involved in utilizing *P. patens* as an experimental system for over 10 years. During this time, it was clear to me and others in our consortium that the experimental use of this system would be greatly expanded and enhanced by having the genome sequenced. It would also allow other scientists who were not utilizing the system—or who were not aware of the system—to now access the genome and experimental technologies that we developed to approach their specific problems.

SW: Where do you see your research leading in the future?

There were no specific problems that we encountered during the sequencing of the genome, except for numerous discussions with the Department of Energy's Joint Genome Institute (JGI) on the quality of the DNA that we provided and various sequencing conditions and potential artifacts. I also had available a strong group of international researchers as part of our moss consortium. They were extremely helpful in completing the final manuscript and organizing the numerous authors who cooperated in highlighting those characteristics of the genome that were in their area of expertise.

My own research will now be enriched and expanded to include many genes and gene regulatory networks that are involved with hormonal signaling pathways, the establishment of cell polarity, and the mechanisms involved with desiccation or drought tolerance in land plants. Many of these genes are uncharacterized and represent a unique opportunity to describe novel genes and their functions.

SW: Do you foresee any social or political implications for your research?

I do not foresee any social or political implications of this research except that it will definitely aid scientists around the world in having a clearer understanding of land plant evolution and the genes that are involved with plant growth and development.

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KEYWORDS: HOMOLOGOUS RECOMBINATION; OSMOTIC-STRESS; ABSCISIC-ACID; PATENS; GENE; REPAIR; SALT; CONSEQUENCES; DUPLICATION; ARABIDOPSIS.

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