JGI JOINT GENOME INSTITUTE
A DOE OFFICE OF SCIENCE USER FACILITY

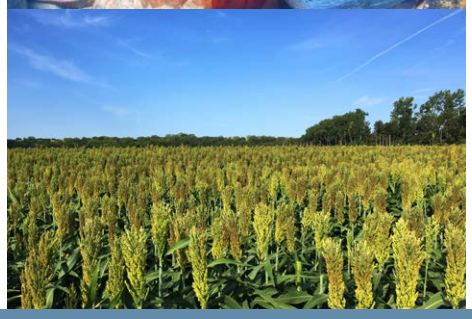
JGI/KBase Project-Related Presentations

International Plant & Animal Genome XXIV Conference

January 9–13, 2016 San Diego, CA, USA

visit us at Booth 202 | see talks schedule inside

The Department of Energy Office of Science supports both a large-scale genomics user facility at the DOE Joint Genome Institute (JGI: http://jgi.doe.gov/) and a large-scale computational resource for comparative functional genomics and systems biology of microbes, plants and their communities called the DOE Systems Biology Knowledgebase (KBase: http://kbase.us/). The core mission of both of these endeavors is to help scientists carry out experiments and analyses in areas such as improving biofuel development, understanding plant model systems, advancing plant comparative science and investigating global carbon cycling. In the JGI/KBase Workshop #3149, Tuesday, January 12, 4pm-6:10pm (see details inside), we will present current and ongoing developments from both the Plant Program at JGI and KBase toward integrative biology. We will also hear from researchers who are applying genomic sequence information from JGI to elucidate functions of plant systems and from users who are working to apply KBase computational infrastructure to plant biological inquiries. Finally, we will describe how to apply for a project with the JGI Community Science Program and how you can use the KBase system to accelerate your plant genomics research.



The Plant Program @ DOE Joint Genome Institute

The Plant Program focuses on fundamental biology of photosynthesis, the conversion of solar to chemical energy. Other areas of interest include characterizing:

- Ecosystems and the role of terrestrial plants and oceanic phytoplankton in carbon sequestration.
- The role of plants in coping with toxic pollutants in soils by hyper-accumulation and detoxification.
- Feedstocks for biofuels, e.g., next-generation cellulosic biofuels from perennial grasses and forest plantation trees.
- The ability to respond to environmental change (e.g., loss of diversity from monoculture produces vulnerabilities; nitrogen-fixing nodules in legumes reduce fertilizer need).
- The generation of useful secondary metabolites (produced largely for disease resistance) for positive/negative control in agriculture, with attendant influence on the global carbon cycle.

The Plant Program accomplishes the above through the following activities:

1. **Sequence.** Produce genome sequences of key plant (and algal) species to accelerate biofuel development and understand response to climate change.
2. **Function.** Develop data sets (and synthetic biology tools) to elucidate functional elements in plant genomes, with special focus on handful of "flagship" genomes.
3. **Variation.** Characterize natural genomic variation in plants (and their associated microbiomes), and relate to biofuel sustainability and adaptation to climate change.
4. **Integration.** Provide a centralized hub for the retrieval and deep integrated analysis of plant genome data sets.

Saturday, January 9, 2016

Workshop: Systems Biology and Ontologies
Time: 8:00 AM – 10:10 AM
Room: Pacific Salon 2
JGI Talk: 8:35 AM
Title: Functional Annotation at Scale: Pipelined Analysis of Phytozome Data and Results from Large Inter-Species Comparisons
Presenter: **Joseph W. Carlson**, DOE Joint Genome Institute, Walnut Creek, CA

Workshop: Triticeae Genetics and Genomics, Session 1: Progress in structural and functional genomics
Time: 10:30 AM – 12:40 PM
Room: Town and Country
JGI Talk: 10:30 AM
Title: The Barley Genome
Presenter: **Nils Stein**, Leibniz Institute of Plant Genetics and Crop Plant Research (IPK), Stadt Seeland, Germany

Workshop: Grasslands (Lolium Genome Initiative)
Time: 10:30 AM – 12:40 PM
Room: Esquire – Meeting House
JGI Talk: 11:30 AM
Title: Breeding and Genomic Resources for Intermediate Wheatgrass and Perennial Agriculture
Presenter: **Steve Larson**, USDA-ARS Forage and Range Research, Logan, UT

Workshop: Functional Genomics of C_4 and CAM photosynthesis
Time: 10:30 AM – 12:40 PM
Room: Towne – Meeting House
JGI Talk: 11:30 AM
Title: Comparative Evolution of Crassulacean Acid Metabolism (CAM)
Presenter: **Xiaohan Yang**, Oak Ridge National Laboratory, Oak Ridge, TN

Workshop: Computer Demo 1
Time: 1:30 PM – 3:40 PM
Room: California
JGI Talk: 3:10 PM
Title: Use of KitBase to Facilitate Forward and Reverse Genetics Research in Rice
Presenter: **Rashmi Jain**, UC Davis/JBEI, Davis, CA

Workshop: Non-Seed Plants
Time: 4:00 PM – 6:00 PM
Room: Meeting House
JGI Talk: 4:00 PM
Title: The *Porphyra* Genome Project
Presenter: **Simon Prochnik**, DOE Joint Genome Institute, Walnut, Creek, CA

Workshop: Bioenergy Grass Genomics
Time: 4:00 PM – 6:00 PM
Room: Pacific Salon 2
JGI Talk: 5:00 PM
Title: Accuracy of Genomic Prediction in Switchgrass Improved by Accounting for Linkage Disequilibrium
Presenter: **Guillaume P. Ramstein**, Department of Agronomy, University of Wisconsin – Madison, WI

Workshop: Climate Change and ICRCGC 1
Time: 4:00 PM – 6:00 PM
Room: Golden Ballroom
JGI Talk: 6:00 PM
Title: Breeding and Sustainability of Shrub Willow for Marginal Lands in the Northeast US
Presenter: **Lawrence Smart**, Cornell University, Geneva, NY

Sunday, January 10, 2016

Workshop: Comparative Genomics
Time: 8:00 AM – 10:10 AM
Room: Golden West
JGI Talk: 8:00 AM
Title: Genomic Diversity of Native Switchgrass Populations in the United States as Revealed by Exome Capture Sequencing
Presenter: **C. Robin Buell**, Department of Plant Biology and DOE Great Lakes Bioenergy Research Center, Michigan State University, East Lansing, MI

Workshop: Resources and Programs for Undergraduate Education in Genomics
Time: 8:00 AM – 10:10 AM
Room: Towne – Meeting Room
JGI Talk: 8:10 AM
Title: FPsc: A New, Plant-Based Model System for Integrated Education in Genetic and Genomic Sciences
Presenter: **Scott Woody**, UW-Madison, Madison, WI

Workshop: Fungal Genomics
Time: 1:30 PM – 3:40 PM
Room: Royal Palm Salon 3-4
JGI Talk: 2:55 PM
Title: Genomics of Anaerobic Cellulose-Degrading Fungal Symbionts of the Herbivore Gut
Presenter: **Alan Kuo**, DOE Joint Genome Institute, Walnut Creek, CA

Workshop: Sequencing Complex Genomes
Time: 4:00 PM – 6:00 PM
Room: Golden Ballroom
JGI Talk: 4:40 PM
Title: Spotting the Difference: Comparing the Genome of Corymbia with its Larger Cousin *Eucalyptus grandis*
Presenter: **Graham J King**, Southern Cross Plant Science, Southern Cross University, Lismore NSW, Australia

Monday, January 11, 2016

Workshop: Grass Genome Initiative (IGGI)
Time: 12:50 PM – 3:00 PM
Room: Sunrise – Meeting House
JGI Talk: 12:55 PM
Title: The Ancient Genome of an Aquatic Plant, *Spirodela polyrhiza*, at the Root of Monocot Evolution
Presenter: **Joachim Messing**, Rutgers University, Piscataway, NJ

Workshop: Brachypodium Community Organizational Meeting
Time: 04:30 PM – 06:30 PM
Room: Town & Country – Sheffield
JGI Talk: 4:30 PM
Title: Informal Discussion
Presenter: **John P. Vogel**, DOE Joint Genome Institute, Walnut Creek, CA

Tuesday, January 12, 2016

Workshop: Brachypodium Genomics
Time: 10:30 AM – 12:40 PM
Room: Pacific Salon 2
JGI Talk: 10:50 AM
Title: Modifications of Source-Sink Relationships and the Development of Stress-Tolerant Brachypodium
Presenter: **Nir Sade**, UC-Davis, Davis, CA

Workshop: Brachypodium Genomics
Time: 10:30 AM – 12:40 PM
Room: Pacific Salon 2
JGI Talk: 11:10 AM
Title: Pan-Genomics in Brachypodium and Implications for Related Grasses
Presenter: **Sean Gordon**, DOE Joint Genome Institute, Walnut Creek, CA

Workshop: Brachypodium Genomics
Time: 10:30 AM – 12:40 PM
Room: Pacific Salon 2
JGI Talk: 12:10 PM
Title: Establishing a Genome-Wide Sequence-Indexed Collection of Brachypodium Mutants
Presenter: **Debbie Laudencia-Chingcuanco**, USDA ARS WRRC, Albany, CA

Workshop: Cassava Genomics
Time: 4:00 PM – 6:00 PM
Room: Sunrise – Meeting House
JGI Talk: 4:00 PM
Title: Insights from Genome Sequencing of Cassava and other Manihot
Presenter: **Jessica B. Lyons**, University of California, Berkeley, CA

Workshop: Perennial Grasses
Time: 4:00 PM – 6:10 PM
Room: Pacific Salon 2
JGI Talk: 4:40 PM
Title: Genome-Wide Divergence between Upland and Lowland Ecotypes of *Panicum hallii*, a Close Relative of Switchgrass
Presenter: **John T. Lovell**, University of Texas, Austin, Austin, TX

Workshop: The Resurgence of Reference Quality Genome Sequence
Time: 4:00 PM – 6:10 PM
Room: Pacific Salon 1
JGI Talk: 4:40 PM
Title: Scalable Parallel Algorithms for de novo Assembly of Complex Genomes
Presenter: **Aydin Buluç**, Lawrence Berkeley National Laboratory, Berkeley, CA

Workshop: Perennial Grasses
Time: 4:00 PM – 6:00 PM
Room: Pacific Salon 2
JGI Talk: 5:20 PM
Title: Expected and Unexpected Patterns of Chromosomal Inheritance from Resequencing of Tetraploid Switchgrass
Presenter: **Laura Bartley**, University of Oklahoma, Norman, OK

Tuesday, January 12

Workshop 3149: Plant Science at the JGI and KBase
Time: **4:00 PM – 6:10 PM**
Room: **San Diego**
Organizers: **Gerald A. Tuskan, Doreen Ware, Jeremy Schmutz and Dave Weston**

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:00 PM
Room: San Diego
JGI Talk: 4:00 PM
Title: Joint Genome Institute Plant Science Program
Presenter: **Jeremy Schmutz**, DOE Joint Genome Institute, Walnut Creek, CA

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:00 PM
Room: San Diego
JGI Talk: 4:20 PM
Title: The DOE Systems Biology Knowledgebase: Introduction to KBase for Plant Researchers
Presenter: **Robert W. Cottingham**, Oak Ridge National Laboratory, Oak Ridge, TN

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:10 PM
Room: San Diego
JGI Talk: 4:35 PM
Title: JGI Plant Gene Atlas: Adding Experimentally Derived Functional Annotations to JGI Plants
Presenter: **Avinash Sreedasyam**, HudsonAlpha Institute for Biotechnology, Huntsville, AL

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:10 PM
Room: San Diego
JGI Talk: 4:55 PM
Title: Progress Towards an Engineering Quality Sorghum Reference Genome Sequence
Presenter: **John Mullet**, Texas A&M University, College Station, TX

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:10 PM
Room: San Diego
JGI Talk: 5:15 PM
Title: The Pan-Genome of *Brachypodium distachyon*, Capturing the Full Genetic Complement of a Plant Species
Presenter: **John P. Vogel**, DOE Joint Genome Institute, Walnut Creek, CA

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:10 PM
Room: San Diego
JGI Talk: 5:30 PM
Title: Adaptation Proceeds via Selection on Pre-Existing Genetic Variation in *Mimulus guttatus*
Presenter: **Kevin M. Wright**, Harvard University, Cambridge, MA

Workshop: Plant Science at the JGI and KBase
Time: 4:00 PM – 6:10 PM
Room: San Diego
JGI Talk: 5:45 PM
Title: When Biologists and Modelers Meet in KBase: Case Example of Modeling Plant-Microbe Metabolic Interactions
Presenter: **Dave Weston**, Oak Ridge National Laboratory, Oak Ridge, TN; **Samuel M. D. Seaver**, Argonne National Laboratory, Lemont, IL



JGI Plant Program and Related Initiatives:

Phytozome facilitates comparative genomic studies among green plants. Families of genes that represent the modern descendants of ancestral gene sets are constructed at key phylogenetic nodes. These families allow easy access to clade-specific relationships as well as clade-specific genes and gene expansions.

http://phytozome.jgi.doe.gov

Plant Flagship Genomes are the most important set of plant genomes to DOE's mission and to plant science. They have been selected to focus our computational and experimental efforts in order to move beyond sequence and function and to provide the most direct benefit for enabling world-class science.

http://bitly.com/JGI-Plants

Plant Gene Atlas is a major initiative to develop gene expression catalogs for five species, sampling a wide variety of relevant developmental and experimental conditions (uniform nitrogen application and metabolism, etc.) using deep-coverage RNA-seq methods and small RNA sequencing. In addition to facilitating direct comparisons of gene expression patterns within a species of interest, these data will enable broad inferences of shared gene function across phyla, focusing on applications to address mission-oriented research within DOE-relevant plants.

http://bit.ly/JGI-PGA

KBase, DOE's Systems Biology Knowledgebase, is an emerging software and data environment designed to enable researchers to collaboratively generate, test, and share new hypotheses about gene and protein functions; perform large-scale analyses on a scalable computing infrastructure; and model interactions in microbes, plants, and their communities.

http://kbase.us

JGI JOINT GENOME INSTITUTE DEPARTMENT OF ENERGY

KBase PREDICTIVE BIOLOGY DOE Systems Biology Knowledgebase

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