FEDERATION OF EUROPEAN SOCIETIES OF PLANT BIOLOGY

FESPB Newsletter

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FESPB Congress 2010

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XVII Congress of the Federation of European Societies of Plant Biology (FESPB).

4-9 July 2010. Valencia, Spain.

Welcome to FESPB 2010!

On behalf of the FESPB 2010 Organising Committee, we are delighted to invite you to participate in the XVII Congress of the Federation of European Societies of Plant Biology (FESPB) to be held in Valencia, Spain on 4-9 July 2010.

The Congress is organised by **SEFV** (http://www.sefv.net/), the Sociedad Española de Fisiología Vegetal. SEFV was founded in 1974 and has over 600 members highly active in both, Academia and Education, and promoting our knowledge of plant physiology and adaptation. The scientific programme of the FESPB 2010 will cover most aspects of modern plant biology. The aim is to offer a conference with the highest scientific quality in which novelty on multidisciplinary approaches including systems biology, genetics, molecular cell biology and biochemistry, and ecophysiology will be presented. Valencia is a dazzling destination. A melting pot of 2000 years of diverse cultural influences that mingle with modern trends to create a city of spectacular contrasts. Valencia offers a wide variety of options to the visitor, including beaches, countryside, mountains and areas of cultural interest besides the possibility to enjoy an excellent gastronomy.

The Conference will take place at the "Palacio de Congresos", a building designed by Norman Foster and equipped with the most advanced technologies. The Organising Committee is determined to host a Congress that will be both scientifically rewarding and socially enjoyable.

We look forward to seeing you in Valencia at FESPB 2010.

Manuel Sánchez Díaz (President of SEFV)

José Pío Beltrán (President of FESPB)

Please, visit the Congress web site for updated information:
http://www.geyseco.es/fespb/principal.php

Research News
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Discovery of the endogenous bioactive jasmonate

In Madrid, CNB investigator Roberto Solano has made a key discovery to understand how plants defend themselves against external threats. The study, published in the latest edition of the journal Nature Chemical Biology, has been made in collaboration with researches at Karolinska Institute in Stockholm (Sweden) and the Leibniz Institute in Halle (Germany).

Journal reference: (+)-7-iso-Jasmonoyl-L-isoleucine is the endogenous bioactive jasmonate. Sandra Fonseca, Andrea Chini, Mats Hamberg, Bruce Adie, Andrea Porzel, Robert Kramell, Otto Miersch, Claus Wasternack & Roberto Solano. Nature Chemical Biology 5, 344 - 350 (2009). Published online: 6 April 2009. doi: 10.1038/nchembio.161

Nature Chem. Biol.: News and Views. The devil (and an active jasmonate hormone) is in the details - pp273 – 274. Hankuil Yi, Mary L Preuss & Joseph M Jez. doi:10.1038/nchembio0509-273.

Jasmonates are important in defending plants against pathogens and in reproductive development. New evidence resolves the stereochemistry of the bioactive jasmonate hormone and suggests a chemical mechanism for modulating levels of the bioactive molecule in plants.

New receptors for ABA

The identities of the receptors for abscisic acid (ABA) — a plant hormone that inhibits growth and regulates plant stress responses — have been elusive. Many factors have been proposed to be ABA receptors, but their ability to bind to ABA and to regulate diverse ABA responses has not been unequivocally confirmed. Two studies in *Science* now provide new important insights.

Park *et al.* identified *pyrabactin reSiStance 1* (*pyr1*) in a chemical genetic screen using pyrabactin, a selective ABA agonist that inhibits only some of the pathways that are regulated by ABA. *pyr1* encodes one of the 14 members of the START family of proteins, which share a conserved hydrophobic ligand-binding pocket. Triple and quadruple *pyr1* and *pyr1-like* (*pyl*) mutants are insensitive to ABA *in vivo*, but expression of *pyr1* or *pyL4* reverts the phenotype. These results suggest that PYR1 and PYLs are functionally redundant and mediate multiple ABA responses *in vivo*.

Ma *et al.* independently identified the same 14 member protein family (and named it RCAR, for regulatory component of ABA receptor) in a yeast two-hybrid screen for plant proteins that interact with ABI2 — one of the 9 redundant type 2C protein phosphatases (PP2Cs) that negatively regulate ABA signalling. A single amino acid mutation in ABI1 or in its structural homologue ABI2 abolishes the interaction with RCAR1 (PYL9) and confers dominant insensitivity to ABA. Furthermore, RCAR1 and related proteins bind ABA and block the phosphatase activity of PP2Cs in an ABA-dependent manner *in vivo*. The ABA affinity of the RCAR1–ABI2 protein complex is much higher than that of RCAR1, which is consistent with a heteromeric receptor complex. Transgenic plants that express high levels of RCAR1 are hypersensitive to ABA, and reducing the expression of RCAR1 by RNA interference counteracts the ABA response.

Using biochemical and genetic approaches, Park *et al.* found that ABA promotes interaction of PYR1 with group A PP2Cs. This interaction also leads to the inhibition of the enzymatic activity of PP2Cs. Notably, these findings also identify the first known regulators of PP2Cs. In light of these results, both teams conclude that PYR1, PYLs and RCARs form, in combinations with different PP2Cs, a large family of ABA receptors. Park *et al.* propose that PYR1 and PYLs are at the apex of a negative regulatory pathway that controls ABA signalling by inhibiting PP2Cs. The

redundancy in this family of co-receptors has been an obstacle to their identification as factors that are necessary for ABA responses.
The use of a synthetic ABA agonist has proven to be a powerful approach for bypassing genetic redundancy and has provided insights into the long-sought identity of the ABA receptors. Given the crucial role of ABA signalling for plant drought and stress tolerance, pyrabactin promises to have important future applications.
Francesca Cesari. Nature Reviews. Molecular Cell Biology. Volume 10, june 2009.
Journal reference:
Park, S.-Y. *et al.* Abscisic acid inhibits type 2C protein phosphatases via the PYR/PYL family of START proteins. *Science* 30 Apr 2009 (doi:10.1126/ science.1173041).
Ma, Y. *et al.* Regulators of PP2C phosphatase activity function as abscisic acid sensors. *Science* 30 Apr 2009 (doi:10.1126/science.1172408).

Key Gene Allows Plants To Survive Drought
(another comment on the same article)
A team of scientists from Canada, Spain and the United States has identified a key gene that allows plants to defend themselves against environmental stresses like drought, freezing and heat.
"Plants have stress hormones that they produce naturally and that signal adverse conditions and help them adapt," says team member Peter McCourt, a professor of cell and systems biology at the University of Toronto. "If we can control these hormones we should be able to protect crops from adverse environmental conditions which is very important in this day and age of global climate change."
The research team, led by Sean Cutler of the University of California, Riverside, has identified the receptor of the key hormone in stress protection called abscisic acid (ABA). Under stress, plants increase their ABA levels, which help them survive a drought through a process not fully understood. The area of ABA receptors has been a highly controversial topic in the field of plant biology that has involved retractions of scientific papers as well as the publication of papers of questionable significance.
A receptor is a protein molecule in a cell to which mobile signaling molecules may attach. Usually at the top of a signaling pathway, the receptor functions like a boss relaying orders to the team below that then executes particular decisions in the cell. "Scientists have been trying to solve the ABA receptor problem for more than 20 years, and claims for ABA receptors are not easily received by the scientific community," says Cutler. This team used a new approach called chemical genomics to identifying a synthetic chemical, designated pyrabactin, which specifically activates an ABA receptor in the model laboratory plant Arabidopsis. With pyrabactin in hand it was now possible to directly identify the ABA receptor. "This approach not only found a gene that had been long sought by the plant science research community but also showed that chemical genomics can identify new chemicals like pyrabactin that may have profound impacts on the way we farm in both the developing and developed world," says McCourt.
The study results appears April 30 in Science Express and in the May 22 issue of Science magazine. Lead author Sean Cutler is a former University of Toronto scientist who is now an assistant professor of plant cell biology in the Department of Botany and Plant Sciences at the University of California, Riverside. In addition to the University of Toronto and the University of California, Riverside, team members were from University of California, San Diego, Universidad Politecnica, Spain, the University of Ontario Institute of Technology, University of California, Santa Barbara; and the Medical College of Wisconsin.
Source: ScienceDaily. Retrieved May 5, 2009,
http://www.sciencedaily.com-/releases/2009/04/090430144541.htm

Why Fertilization Results In Loss Of Plant Biodiversity

When grasslands are fertilized their productivity is increased but their plant diversity is diminished. In the last 50 years levels of plant-available nitrogen and phosphorous have doubled worldwide. This additional supply of plant nutrients is predicted to be one of the three most important causes of biodiversity loss this century.

The research, led by Professor Andy Hector from the University of Zurich, shows for the first time the exact mechanisms that lead to the loss of biodiversity from grasslands following fertilization. Different plant species profit from nutrient addition to different degrees with some species growing much faster than before. Consequently, some understory species are overgrown by their faster growing neighbours, shaded and without access to sufficient sunlight eventually die out. With the help Pascal Niklaus from the ETH Zurich, researchers from the University of Zurich established an ingenious experiment where they added artifical light to the understory of fertilized grasslands. This additional light countered the negative effects of fertilization and prevented the loss of plant diversity. Counter to earlier beliefs, competition for soil nutrients had no influence on changes in grassland diversity.

"This study is the first direct experimental proof that competition for light is the main mechanism of plant biodiversity loss after fertilization", says Yann Hautier summarizing the results of his PhD work. "The addition of nutrients causes competition for the vital sunlight to follow a 'winner-takes-all' principle."

Competition for light following eutrophication is one of the main causes of the loss of plant diversity. The results of the work from Hector's research group have implications for sustainable management of grasslands and for the development of conservation policy. "Our research shows that it is necessary to control nutrient enrichment if plant diversity is to be conserved in the long term" concludes Andy Hector.

Journal reference: Yann Hautier, Pascal A. Niklaus, Andrew Hector:. Competition for Light Causes Plant Biodiversity Loss Following Eutrophication. Science, Volume 324, Issue 5927

Source: ScienceDaily 1 May 2009. 5 May 2009.
http://www.sciencedaily.com-/releases/2009/04/090430144532.htm

Plants could override climate change effects on wildfires

Scientists predict that global climate change will make many regions around the world warmer and drier, a factor which, taken by itself, would seem to increase the risk of wildfires. But a new study led by a Montana State University researcher shows that changes in the types of vegetation covering an area play a major role in determining how often that area is burned by fires and could even counteract the effects of changes in temperature and moisture.

In the study, MSU earth sciences post-doctoral researcher Philip Higuera and his colleagues show that the risk of wildfires can be either reduced or increased by changes in the distribution and abundance of plants. The study will be published in the May issue of the journal *Ecological Monographs*.

"Climate affects vegetation, vegetation affects fire and both fire and vegetation respond to climate change," Higuera said. "Our work emphasizes the need to consider the multiple drivers of fire regimes when we anticipate how they will respond to climate change."

Higuera and his colleagues studied fire history in northern Alaska by analyzing sediments at the bottom of lakes, some dating as far back as 15,000 years. In the samples from the lakes, the scientists measured the abundance of different preserved plant parts, such as pollen, to determine what types of vegetation dominated the region in the past. Like rings in a tree, different sediment layers represent different times in the past. The scientists then looked at charcoal deposits in the sediments to determine how often wildfires had burned over those soils. They compared that to the kinds of vegetation that were dominant at the time and

finally looked at what is known about historical climate changes in northern Alaska. The scientists discovered that, in many cases, changes in climate were less important than changes in vegetation when it came to affecting the frequency of wildfires. For example, 10,500 years ago, the climate in northern Alaska went from cool and dry to warm and dry. The scientists found that the vegetation changed along with the climate, from flammable shrubs to more fire-resistant deciduous trees. As a result, there was a sharp decline in the frequency of fires. Contrast that to about 5,000 years ago, when the area became cooler and wetter again. Considered alone, that would seem to decrease the risk of wildfire, yet the scientists found evidence of more frequent fires, a pattern they attributed to the development of high flammability spruce forests in the region. "Climate is only one control on fire regimes," Higuera said. "If you only considered climate when predicting fire under climate-change scenarios, you would have a good chance of being wrong. You wouldn't be wrong if vegetation didn't change, but the greater the probability that vegetation will change, the more important it becomes when predicting future fire regimes."

Higuera hopes his findings will help predict modern changes in large-scale wildfire patterns as the world's climate changes. While his work mostly deals with boreal forests, it still shows scientists that the effects of vegetation on wildfire is an important area for future study, he said. "With global climate change, we're going into a period where things aren't going to be the same as what we know," he said. "By looking into the past, we see a larger set of possibilities that will help us prepare for the future."

Source: Montana State University

From: e!-Science news April 22, 2009

PEP1 regulates perennial flowering in *Arabis alpina*

Annual plants complete their life cycle in one year and initiate flowering only once, whereas perennials live for many years and flower repeatedly. How perennials undergo repeated cycles of vegetative growth and flowering that are synchronized to the changing seasons has not been extensively studied1. Flowering is best understood in annual Arabidopsis thaliana2, 3, but many closely related species, such as Arabis alpina4, 5, are perennials. We identified the A. alpina mutant perpetual flowering 1 (pep1), and showed that PEP1 contributes to three perennial traits. It limits the duration of flowering, facilitating a return to vegetative development, prevents some branches from undergoing the floral transition allowing polycarpic growth habit, and confers a flowering response to winter temperatures that restricts flowering to spring. Here we show that PEP1 is the orthologue of the A. thaliana gene FLOWERING LOCUS C (FLC). The FLC transcription factor inhibits flowering until A. thaliana is exposed to winter temperatures6, 7, which trigger chromatin modifications that stably repress FLC transcription8, 9, 10, 11. In contrast, PEP1 is only transiently repressed by low temperatures, causing repeated seasonal cycles of repression and activation of PEP1 transcription that allow it to carry out functions characteristic of the cyclical life history of perennials. The patterns of chromatin modifications at FLC and PEP1 differ correlating with their distinct expression patterns. Thus we describe a critical mechanism by which flowering regulation differs between related perennial and annual species, and propose that differences in chromatin regulation contribute to this variation.

Journal reference: Nature advance online publication 15 April 2009. doi:10.1038/nature07988.

Renhou Wang, Sara Farrona, Coral Vincent, Anika Joecker, Heiko Schoof, Franziska Turck, Carlos Alonso-Blanco, George Coupland1 & Maria C. Albani. Max Planck Institute for Plant Breeding Research, Carl von Linne Weg 10, D-50829 Cologne, Germany. Departamento de Genética Molecular de Plantas, Centro Nacional de Biotecnología (Consejo Superior de Investigaciones Científicas), Cantoblanco, 28049 Madrid, Spain.

First Discovery Of 'Animals-only' Pigment Bilirubin In Plants

In a first-of-its-kind discovery that overturns conventional wisdom, scientists in Florida are reporting that certain plants — including the exotic "White Bird of Paradise Tree" — make bilirubin. Until now, scientists thought that pigment existed only in animals. The finding may change scientific understanding of how the ability to make bilirubin evolved, researchers say.

In the new study, Cary Pirone and colleagues note that bilirubin is a brownish yellow substance resulting from the liver's breakdown of hemoglobin, the red pigment that carries oxygen in the blood. Parents know bilirubin as the stuff that discolors the skin of newborns with neonatal jaundice, sometimes requiring phototherapy, treatment with light. Bilirubin also gives a yellowish tinge to the skin of patients with jaundice resulting from liver disease. Until now, scientists never dreamed that plants, as well as animals, produce bilirubin. The researchers used two powerful laboratory techniques, liquid chromatography and nuclear magnetic resonance, to detect bilirubin in fruit of the white bird of paradise tree. The fruits contain unusual, orange-colored, furry seeds, and bilirubin turns out to be the coloring agent. They also found the pigment in two closely related plant species. The discovery may stir evolutionary research to understand why and how plants make what everyone regarded as an animals-only pigment, they suggest.

Journal reference: Animal Pigment Bilirubin Discovered in Plants. Cary Pirone, J. Martin E. Quirke, Horacio A. Priestap and David W. Lee. *Journal of the American Chemical Society*, 2009, 131 (8), p 2830. DOI: 10.1021/ja809065g

Source: *ScienceDaily*. Retrieved April 19, 2009.
http://www.sciencedaily.com- /releases/2009/03/090316093001.htm

Tobacco Makes Medicine

Tobacco isn't famous for its health benefits. But now scientists have succeeded in using genetically modified tobacco plants to produce medicines for several autoimmune and inflammatory diseases, including diabetes.

A large team of scientists from several European research organizations have participated in the study as part of the Pharma-Planta project. Led by Professor Mario Pezzotti at the University of Verona, they set out to create transgenic tobacco plants that would produce biologically-active interleukin-10 (IL-10), a potent anti-inflammatory cytokine. They tried two different versions of IL-10 (one from a virus, one from the mouse) and generated plants in which this protein was targeted to three different compartments within the cell, to see which would work most effectively. The researchers found that tobacco plants were able to process both forms of IL-10 correctly, producing the active cytokine at high enough levels that it might be possible to use tobacco leaves without lengthy extraction and purification processes. The next step will be to feed the plants to mice with autoimmune diseases to find out how effective they are. The authors are keen to use the plants to see whether repeated small doses could help prevent type 1 diabetes mellitus (T1DM), in combination with other auto-antigens associated with the disease. The team has a particular auto-antigen in its sights – the 65-kDa isoform of the enzyme glutamic acid decarboxylase (GAD65) – which they have also produced in transgenic tobacco plants. According to Pezzotti, "Transgenic plants are attractive systems for the production of therapeutic proteins because they offer the possibility of large scale production at low cost, and they have low maintenance requirements. The fact that they can be eaten, which delivers the drug where it is needed, thus avoiding lengthy purification procedures, is another plus compared with traditional drug synthesis."

Journal reference: Bortesi et al. Viral and murine interleukin-10 are correctly processed and retain their biological activity when produced in tobacco. *BMC Biotechnology*, 2009, 9: 22.

Source: *ScienceDaily*. Retrieved April 19, 2009.

Plant Gene Mapping May Lead To Better Biofuel Production

By creating a "family tree" of genes expressed in one form of woody plant and a less woody, herbaceous species, scientists at the U.S. Department of Energy's Brookhaven National Laboratory have uncovered clues that may help them engineer plants more amenable to biofuel production.

The study, published in the April 2009 issue of *Plant Molecular Biology*, also lays a foundation for understanding these genes' evolutionary and structural properties and for a broader exploration of their roles in plant life.

"We are studying a very large family of genes that instruct cells to make a variety of enzymes important in a wide range of plant functions," said Brookhaven biologist Chang-Jun Liu. By searching the genomes of woody Poplar trees and leafy Arabidopsis, the scientists identified 94 and 61 genes they suspected belonged to this family in those two species, respectively. They then looked at how the genes were expressed — activated to make their enzyme products — in different parts of the plants. Of particular interest to Liu's group were a number of genes expressed at high levels in the woody plant tissues. "Wood and other biofibers made of plant cell walls are the most abundant feedstocks for biofuel production," explained Liu. "One of the first steps of biofuel production is to break down these biofibers, or digest them, to make sugar." But plants have strategies to inhibit being digested. For example, Liu explained, small molecules called acyl groups attached to cell-wall fibers can act as barriers to hinder conversion of the fibers to sugar. Acyl groups can also form cross-linked networks that make cell walls extra strong. "Our long-term interest is to find the enzymes that control the formation of cell-wall-bound acyl groups, so we can learn how to modify plant cell walls to increase their digestibility," Liu said. "The current study, a thorough investigation of an acyl-modifying enzyme family, provides a starting point for us to pursue this goal." In fact, some of the genes the scientists found to be expressed at high levels in woody tissues may carry the genetic instructions for making the enzymes the scientists would like to control. "Our next step will be to use biochemical and biophysical approaches to characterize these individual genes' functions to find those directly or indirectly related to cell-wall modification. Then we could use those genes to engineer new bioenergy crops, and test whether those changes improve the efficiency of converting biomass to biofuel," Liu said.

Liu's group also made some interesting observations about gene expression and gene location in their study of the acyl-modifying enzyme genes. "We discovered a few unique pairs of genes that were inversely overlapped with their neighboring genes on the genome," Liu said. In this unique organization, the paired genes (sequences of DNA) produce protein-encoding segments (RNAs) that are complementary to one another — meaning the two RNA strands would stick to each other like highly specific Velcro. That would prevent the RNA from building its enzyme, so the expression of one gene in the pair appears to inhibit its partner. Perhaps understanding this natural "anti-sense" regulation for gene expression will assist scientists in their attempts to regulate acyl-modifying enzyme levels.

Source: *ScienceDaily*. Retrieved April 19, 2009, from http://www.sciencedaily.com-/releases/2009/04/090414102648.htm

200,000 Rice Mutants Available Worldwide For Scientific Investigation

Scientists across the world are building an extensive repository of genetically modified rice plants in the hope of understanding the function of the approximately 57,000 genes that make up the genome of *Oryza sativa*. The International Rice Functional Genomics Consortium recently announced the public availability of more than 200,000 rice mutant lines, which represent mutations in about half of the known functional genes mapped for rice to date. Researchers have estimated the number of different rice mutants needed to have a mutant for every gene as somewhere between 180,698 and 460,000. Two hundred thousand rice mutants

are now available and have been mapped by the insertion of what are known as flanking sequence tags – small pieces of DNA or molecular tags that integrate into the rice genome. This approach is useful because it allows scientists to link a physical location on the genome to a specific gene and its visible feature or phenotype. Arjun Krishnan, first author on the paper and a graduate student in Andy Pereira's laboratory at the Virginia Bioinformatics Institute, stated: "Bioinformatics is making it possible to visualize the vast amounts of sequence information available to researchers. The resources described in this paper, which are the combined output of many leading international rice research laboratories, mean that researchers can see and explore on their computers the precise positions of mutations in the rice genome sequence, for each rice mutant plant. About 50 percent of the protein-coding genes have knockout mutations, which probably abolish their expression and can provide valuable information on the genes by virtue of their loss of function. This is a significant milestone for the project and the availability of these rice plants represents a powerful resource for the rice genomics community." More than 2 million rice mutants were generated in this project and the diversity of the available plants suits many of the experimental objectives of researchers looking at rice and other commercially important grasses. Mapping of the remaining genes from this population will be required to complete the resource. Many of them will be smaller genes less amenable to mutation that will pose significant challenges for researchers as they continue their work. Dr. Andy Pereira, Professor at the Virginia Bioinformatics Institute, stated: "The Oryza sativa genome was sequenced in 2002 and researchers have come a long way since. Advances in technologies such as high-throughput sequencing and RNA interference gene silencing methods should help to accelerate the process of identifying the functions of the remaining genes in the rice genome." He added: "The availability of the rice mutant resource is already helping researchers in their quest to gain insights into the biology of this commercially important crop. These efforts are critical to understand gene function and, ultimately, the many biological processes that take place in rice and other grasses, including maize and wheat, which collectively produce our staple food."
Reference: Krishnan et al. (2009) Plant Physiology 149(1): 165-170.
Source: Virginia Tech (2009, March 10). *ScienceDaily*.

Scientists publish complete genetic blueprint of key biofuels crop

Source: DOE/Joint Genome Institute
Scientists at the U.S. Department of Energy (DOE) Joint Genome Institute (JGI) and several partner institutions have published the sequence and analysis of the complete genome of sorghum, a major food and fodder plant with high potential as a bioenergy crop. The genome data will aid scientists in optimizing sorghum and other crops not only for food and fodder use, but also for biofuels production. The comparative analysis of the sorghum genome appears in the January 29 edition of the journal *Nature*. Prized for its drought resistance and high productivity, sorghum is currently the second most prevalent biofuels crop in the United States, behind corn. Grain sorghum produces the same amount of ethanol per bushel as corn while utilizing one-third less water. As the technology for producing "cellulosic" (whole plant fiber-based) biofuels matures, sorghum's rapid growth--rising from eight to 15 feet tall in one season--is likely to make it desirable as a cellulosic biofuels "feedstock." "This is an important step on the road to the development of cost-effective biofuels made from nonfood plant fiber," said Anna C. Palmisano, DOE Associate Director of Science for Biological and Environmental Research. "Sorghum is an excellent candidate for biofuels production, with its ability to withstand drought and prosper on more marginal land. The fully sequenced genome will be an indispensable tool for researchers seeking to develop plant variants that maximize these benefits." Plant DNA is often notoriously difficult to analyze because of large sections of repetitive sequence and sorghum was no different. Jeremy Schmutz of

the DOE JGI partner HudsonAlpha Institute for Biotechnology (formerly the Stanford Human Genome Center) and John Bowers of the University of Georgia pointed to these complex repetitive regions as accounting for the significant size difference between the rice and sorghum genomes, while also suggesting a common overall genome structure for grasses. "Sorghum will serve as a template genome to which the code of the other important biofuel feedstock grass genomes--switchgrass, Miscanthus, and sugarcane--will be compared," said Andrew Paterson, the publication's first author and Director of the Plant Genome Mapping Laboratory, University of Georgia. Scientists and industry officials say that completion of the sorghum genome will aid with sequencing of numerous other related plants, including other key potential bioenergy crops. "I expect our improved understanding of the sorghum genome to have a major impact on the development of improved bioenergy crops for the emerging biofuels and renewable power industries," said Neal Gutterson, President and Chief Executive Officer of Mendel Biotechnology.
Sorghum's is only the second grass genome to be completely sequenced to date, after rice. With approximately 730 million nucleotides, sorghum's genome is nearly 75 percent larger than the size of rice. Researchers used the whole genome "shotgun" method of sequencing first pioneered in the Human Genome Project. In this method, short random DNA fragments are partially sequenced and then analyzed by powerful supercomputers to reconstruct the original genome sequence. The repetitive sections and the length of the sorghum genome made assembling this "puzzle" a highly challenging computational problem. By comparing sorghum's assembled code with rice's, the scientists were able to provide a "reality check" for rice's previously published estimate of protein coding genes. "We found that over 10,000 proposed rice genes are actually just fragments," said DOE JGI's Dan Rokhsar, the publication's co-corresponding author. "We are confident now that rice's gene count is similar to sorghum's at 30,000, typical of grasses."

Pollen tube attractant found

A molecule that guides the growing pollen tube towards the embryo sac of flowering plants has finally been discovered. The so called LURE proteins are defensin-like and cysteine-rich polypeptides secreted by the two synergid cells surrounding the egg. The LURE proteins were abundantly expressed in the synergid cells and showed marked pollen tube attractive effect in vitro. When expression of the LURE proteins was inhibited by injection of morpholino antisense oligomers, attraction of the pollen tube was impaired. Tetsuya Higashiyama and colleagues from Nagoya University in Japan made their discovery in the unique protruding embryo sac of the wishbone flower (*Torenia fournieri*).
Source: Okuda et al. (19 March 2009) Nature 458: 357-361.

Building a circadian clock

To keep in balance with day and night all living organisms need a network of feedback loops known as a circadian clock. A number of components in this clockwork, namely CCA1 and LHY have already been identified in Arabidopsis but Steve A. Kay and his coworkers at University of California San Diego in La Jolla wanted to know if other proteins were able to bind to and potentially regulate them. They used a yeast-based expression system to screen a collection of proteins and identified a transcription factor, CHE, that bind to the CCA1-promoter. The CHE and CCA1 proteins represses the expression of each other and thereby establishes a negative feedback loop.
Source: Pruneda-Paz et al (13 March 2009) Science 323: 1481-1485.

Forthcoming meetings

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4th Conference of Polish Society of Experimental Plant Biology

21—25 September 2009
Jagiellonian University, Krakow, Poland
http://www.4conf.ptber.org.pl/

V International Symposium on Seed , Transplant and Stand Establishment: Integrating Methods for Producing More with Less

September 27 - October 1, 2009, Murcia (Spain)
http://www.sest2009.com
Download the new temptative programme:
http://www.sest2009.com/sest2009/programme.pdf
REGISTER NOW AT http://www.sest2009.com/

Pre-symposium Hortitour: A closer insight to mediterranean horticulture
We are planning a pre-symposium Tour dedicated to specific technical visits in Murcia and Almeria area, scheduled for Sept. 26th and 27th, of different agricultural systems and the most relevant greenhouse technologies for planting horticultural crops (organic, traditional, integrated). Please, if you are interested, let us know asap to have time enough to organize it with a competitive price so everybody can enjoy it.

Cell-cell communication in plant reproduction

14—16 September 2009
University of Bath, UK
Earlybird registration and Abstract submission deadline: 13 July 2009
http://www.biochemistry.org/Conferences/AllConferences/tabid/379/ModuleID/2545/Filter/0/ItemID/2246/view/Conference/Default.aspx

13th Evolutionary Biology Meeting

09/22/2009 - 09/25/2009
Marseilles, France.
This international meeting brings every year scientists which are specialists in the field of Evolutionary Biology and it has the peculiarity to have a transdisciplinary approach. The following subjects will be discussed: Evolutionary biology concepts and modelisations for annotations; Biodiversity and Systematics; Comparative genomics and post-genomics (at all taxomic levels); Functional phylogeny; Environment and biological evolution; Origin of life and exobiology; Non-adaptative versus adaptative evolution.
http://sites.univ-provence.fr/evol-cgr

Plant GEM 2009

7-10 October 2009 – Lisbon, Portugal
The "Plant Genomics European Meeting" (Plant GEM) is an international annual meeting on the subject of genomics in all its facets designed to be the platform for researchers from Europe and all over the world to discuss latest developments and to exchange new ideas for future projects and to improve cooperation.
More information: http://www.plant-gem.org/pages/home.php

1st International Conference on Retrograde Signaling in Plants

October 1-3, 2009.
'Harnack-Haus' of the Max-Planck-Society. Berlin, Germany.
http://www2.hu-berlin.de/dfg-forschergruppe804/international-conference/

Keystone Symposia Announces Telomere Biology & DNA Repair Meeting in Australia

October 9-14, 2009
RACV Royal Pines Resort in Ashmore, Queensland, Australia.
http://www.keystonesymposia.org/9T1
Abstract & Scholarship Application Deadline: **June 10, 2009**
Early Registration Deadline: **August 10, 2009**

The 3rd International Conference on Integrated Approaches to Improve Crop Production Under Drought Prone Environments

October 11-16, 2009, Shanghai, China
www.interdrought.org and www.plantstress.com/id3
The objective of INTERDROUGHT-III is to serve as a platform for presenting and debating key issues and strategies relevant for increasing the yield and stability of crops under drought conditions by genetic and crop management approaches. Great advances were made in recent years in understanding the molecular basis of plant response and tolerance to drought stress. Hundreds of drought-responsive genes were identified and the cellular function of many has been resolved. Still, a huge gap remains between the findings at the molecular level and the application of this knowledge at the whole plant level in the field. Excellent meetings have been dedicated to the cellular and molecular aspects of drought stress. However, there is a need in both public and private research sectors for crosstalk between disciplines involved with the molecular sciences and those seeking practical solutions to improve crop performance under drought conditions.

Workshop in Cereal Genomics.

10/13/2009 - 10/19/2009
Cold Spring Harbor Laboratory, New York.
Application deadline: July 15th, 2009. Applications and further details at: http://meetings.cshl.edu/courses/c-cereals09.shtml

9th International Congress on Plant Molecular Biology

25-30 October 2009 – St. Louis, Missouri, United States
The conference will highlight a state-of-the-art view of research in plant molecular biology. In addition to keynote addresses and invited symposia, individuals are invited to submit abstracts for presentation as talks in concurrent sessions, or as posters. Ample time will be set aside for discussion at various workshops.
More information: http://www.ipmb2009.org/

23rd New Phytologist Symposium: Carbon cycling in tropical ecosystems

11/17/2009 - 11/20/2009
Guangzhou, China.
The diverse assemblage of ecosystems in tropical regions of the Earth holds a large fraction of the terrestrial biosphere's carbon stock, and the annual exchange between tropical ecosystems (plants and soils) and the atmosphere is a critical controller of the CO2 concentration of the atmosphere and hence of climate. Large-scale changes in the structure and function of tropical ecosystems, whether from the pressures of development or the impacts of drought, can alter the balance in

the annual exchange of carbon with far reaching implications for the pace of climate change. Global models that couple the Earth's climate system to the carbon cycle must, therefore, characterize well the biogeochemical and ecophysiological processes of tropical ecosystems and their sensitivity to atmospheric and climatic change. In this symposium we will define the issues of carbon cycling in tropical environments at global and regional scales. We will then consider the evidence from research in plant physiology and plant-soil interactions and how that research can inform larger-scale analyses. We will consider all tropical regions, but our presence in South China puts a special emphasis on the tropical ecosystems of China, how they are changing, and the emerging research from the region.
http://www.newphytologist.org/carbon/default.htm

III PanAmerican Plant Membrane Biology Workshop

01/13/2010 - 01/16/2010
Puebla, Mexico
The Pan American Plant Membrane Biology Workshop is held every three years to provide an opportunity for researchers in North and Latin America to present and discuss current topics in plant membrane biology. The workshop focuses on membrane structure, transport, protein trafficking, and signal transduction, as well as the techniques and approaches utilized in plant membrane studies. Sections are anchored by prominent researchers in the focus area with secondary talks presented by Postdocs, and graduate/undergraduate students, with extensive discussion periods following talks.
http://sites.google.com/site/iiipanamericanplantmembrane/

Keystone Symposia: RNA Silencing Mechanisms in Plants

02/21/2010 - 02/26/2010
Hilton Santa Fe, New Mexico, USA.
Plants serve as among the most insightful models to illuminate mechanisms of RNA-directed DNA methylation and transcriptional silencing, antiviral defense, small RNA biogenesis and effector mechanisms, as well as the roles of small RNA-mediated regulation in development and stress responses. Session topics emphasize integration between silencing mechanisms and developmental regulation and stress responses, DNA and chromatin modification, host-pathogen dynamics, and natural variation. The symposium will also highlight cutting-edge, high-throughput technology being developed and applied to understand the roles of RNA-mediated silencing across the plant genome.
Visit www.keystonesymposia.org/10B6 for more information.

Keystone Symposia

03/14/2010 - 03/19/2010
Granlibakken Resort, Tahoe City, California, USA
Receptors and Signaling in Plant Development and Biotic Interactions. Analyses of plant genomes have revealed an immense number of genes encoding putative receptors, e.g., in Arabidopsis, about 600 receptor-like kinases and 700 F-Box proteins. Although it has been firmly established for a few of them that they function in the perception and transduction of endogenous or exogenous signals, most of them are currently orphan receptors in quest of ligands and functions. In this meeting, leading scientists from the fields of plant development and plant biotic interactions join to present exciting new insights into the structure and function of known plant receptors and to approach ways to unravel the ligands and functions of the plant orphan receptors. Scientific Organizers- Thomas Boller and Jen Sheen.
Visit www.keystonesymposia.org/10C2 for more information.

XII Simposium on Plant Biotechnology

04/20/2010 - 04/22/2010
Instituto de Biotecnología de las Plantas. Universidad central de las Villas. Cuba
TOPICS:Plant cell, tissue and organ culture, In vitro Propagation, Plant Breeding, Secondary metabolism, Plant-microbes Interactions, Functional genomics and proteomics, Bioinformatics, Biofortification and metabolic engineering, Abiotic stress, Biotechnology and biofuels, Biotechnology, climate change and food security, Biodiversity and conservation of phytogenetics resources, Biotechnology and public perception, Professional formation in biotechnology, Scientific communication in biotechnology
E.mail: simposio@ibp.co.cu http://simposio.ibp.co.cu

12th Congress of the International Association for Plant Biotechnology

06/06/2010 - 06/11/2010
St. Louis, MO, USA
A quadrennial meeting of the International Association for Plant Biotechnology which is comprised of 1,500 members in 85 countries. The meeting will bring together key speakers to disucss the latest advancements in plant biotechnology and tissue culture.
Contact: Monica Schmidt, IAPB Secretary at iapb.schmidt@danforthcenter.org
http://www.iapb-stl.org

21st International Conference on Arabidopsis Research

June 6 - 10, 2010
Yokohama, Japan
This is the largest annual international conference for researchers using the reference plant Arabidopsis thaliana and for other scientists interested in basic and applied plant biology. This year's historic 2010 meeting will be held in Japan for the first time, following the first successful Asian ICAR in 2007, and meetings in Canada (2008) and Scotland (2009). http://arabidopsis2010.psc.riken.jp/

20th International Plant Growth Substances Association (IPGSA) Conference

June 28 – July 02, 2010
Universitat Rovira i Virgili, Tarragona, Spain
The conference will feature the latest research on plant hormones. The chair of the local organizing committee is Montserrat Pages, CSIC, Barcelona. Information on the venue and scientific program will appear in due course on the IPGSA website. Until that time enquires can be sent to Valerie Sponsel (IPGSA Secretary) at http://www.ipgsa.org/contact.htm
http://www.ipgsa.org/meeting/index.htm

Plant Biology 2010

07/30/2010 - 08/05/2010
Montreal, Canada
Joint Annual Meeting of The American Society of Plant Biologists and the Canadian Societe of Plant Physiologists, Societe Canadienne de Physiologie Vegetale.
http://www.aspb.org/meetings/pb-2010/

Courses

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5th PhD Summer School on Environmental Signalling

24-26 August 2009 – Utrecht, Germany

At the Institute of Environmental Biology, Utrecht University several research groups are studying various aspects of plant biology, often using Arabidopsis as a model. In this summerschool, an attractive program is provided in which experts in the field will highlight different aspects of environmental signaling in plants. Additional speakers will be selected from submitted abstracts. Moreover, there will be ample opportunity for discussions during the poster viewing sessions. The summerschool will not only have a focus on Arabidopsis research, also contributions based on other plant species are very much welcomed. The meeting is especially attractive for Ph.D. students, but the program will also be of interest for post-docs and senior scientist.

More information: http://www.bio.uu.nl/EPS-summerschool/

PhD course on interactions between plants and microorganisms

The PhD course takes place September 23-25 in Gothenburg, Sweden.

A workshop for PhD students will be arranged September 23-25 at University of Gothenburg, Sweden. The course aims to take a broad view on interactions between plants and microorganisms and will take place in the form of a workshop. The course gives 3 ECTS points and is free but the number of attending PhD student is set to a maximum of 15. You can register by sending an email to the course organizer Mats Ellerström at mats.ellerstrom@dpes.gu.se no later than May 15, 2009. Please specify your name, institution and include an abstract for your presentation. You will be notified on your status no later than June 15.

Five invited senior researchers present keynote presentations, after which all attending PhD students will be given the opportunity to present their own work. The invited speakers are:

- David Mackey, Ohio State University, USA.
  Plant defense against bacterial pathogens.
- Hans Thordal-Christensen, University of Copenhagen, Denmark.
  Plant defense against biotrophic fungi
- Sabine Rosahl, Leibniz Institute of Plant Biochemistry, Halle, Germany.
  Chemical signals in plant microorganism interactions
- Rajagopal Subramaniam, Agriculture and Agri-Food Canada, Ottawa, Canada.
  Interaction between cereals and mycotoxin forming fungi.
- Anders Tunlid, Lund University, Sweden.
  Interaction between plants and fungi, mycorrhiza formation.

Positions available

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International PhD Program Fall 2009 : Tuebingen, Germany

The Max Planck Institute for Developmental Biology and the Friedrich Miescher Laboratory in Tuebingen would like to invite applications for PhD positions in:
- Molecular & Cell Biology
- Biochemistry
- Developmental & Quantitative Genetics
- Structural Biology
- Plant Development
- Evolutionary Biology
- Bioinformatics

Highly qualified applicants from all countries are invited to apply.
All applicants must hold or anticipate to receive a Diploma or Masters degree by the time of their start as a PhD student at our institutes.
Candidates have to be fluent in written and spoken English.
The positions are funded by Max Planck Fellowships.
Application form, evaluation forms (2 needed) and all details about our online registration are available at www.eb.mpg.de/phd-program
Application deadline is **July 10, 2009**.
After the review of completed applications selected candidates will be invited for personal interviews in Tuebingen during September 16-18, 2009.

Research Group Leaders : Dresden, Germany

The Max Planck Institute of Molecular Cell Biology and Genetics (CBG), Dresden, Germany, is searching for Research Group Leaders.
This is a broad search for outstanding candidates to establish research groups that complement those already in the Institute. Research at the Max Planck Institute of Molecular Cell Biology and Genetics (CBG) focuses on the structure and dynamic organization of cells and tissues in several model organisms (see http://www.mpi-cbg.de). Candidates taking biochemical, biophysical, developmental, genetic, structural or systems approaches will all be considered.
The position is initially for 5 years at the EG15 level according to the TVÖD scale with the possibility of extension for up to an additional 4 years. Funds are available for a postdoctoral fellow, a PhD student and a technician, together with funds for consumables and equipment.
Please send your CV, publication list and a short description of research accomplishments and future plans to Prof. Marino Zerial at the address below. Please also include the names and addresses of three referees. Applications will be considered upon receipt. We especially encouraged women to apply.
Max Planck Institute of Molecular Cell Biology and Genetics. Pfotenhauerstr. 108
01307 Dresden, Germany
zerial@mpi-cbg.de

Two postdoctoral positions

University of California, Riverside, CA. USA.
NIH-funded Postdoctoral Research Positions are available to study functional genomics and heterotrimeric G protein signaling pathways in the model eukaryotic filamentous fungus Neurospora crassa. The first position will follow up on the successful high-throughput gene knockout project in Neurospora (Colot, et al., PNAS 103:10352-7, 2006) and will utilize genome-wide approaches, including gene deletions, proteomics and protein-protein interaction studies to investigate gene function. The second position will continue the long-standing heterotrimeric G protein signaling project in the laboratory (Li et al., Annu. Rev. Microbiol. 61:423-

52, 2007). The project will be focused on identification of novel effectors and determination of the relative contributions of multiple G proteins and associated regulatory proteins to signaling networks in Neurospora. Applicants should have a Ph.D. degree in Biochemistry, Biology or a related discipline, have recombinant DNA experience and possess a good command of spoken and written English. Experience in microbiological techniques (particularly with filamentous fungi) and protein biochemistry is desirable.
Send a curriculum vitae (including a list of publications) and the names of three references to Dr. Katherine A. Borkovich, Professor, Department of Plant Pathology and Microbiology, 900 University Avenue, University of California, Riverside, CA 92521. E-mail: Katherine.Borkovich@ucr.edu. FAX: (951) 827-4294.

Postdoctoral fellowship

Purdue University, Indiana, United States
POSTDOCTORAL at Purdue University using natural variation in maize to identify gene interaction networks. Project combines phenotyping in field, marker/database analysis, and association mapping and sequencing. Send cover letter, curriculum vitae, and contact information for three references to: Cliff Weil, Agronomy Department, Purdue University, 915 W. State Street, W. Lafayette, IN 47907 U.S.A. or online to e-mail: cweil@purdue.edu

20 Research Fellowships

University of Munich, Munich, Bayern, Germany
LUDWIG- MAXIMILIANS- UNIVERSITÄT MÜNCHEN
Ludwig-Maximilians-Universität (LMU) München awards 20 Research Fellowships as of 1 July 2009. These fellowships are open to excellent postdocs in all disciplines. Applicants must have completed their doctoral studies in any field, having graduated no more than three years ago with outstanding results. Candidates must be able to design a research project and successfully carry it through to completion. The project must be supported by a professor of LMU Munich. The fellows will also be associated with the Center for Advanced Studies and be able to make use of its services. The fellowships come with an attractive award (of up to € 60,000 per year). For carrying out a research project at LMU Munich, an additional € 25,000 may be applied for as start-up funding, as well as up to € 10,000 per year as material and travel expenses. Also, in the first two years following completion of their research stay, the fellows may be provided with up to € 5,000 for continuation of cooperative efforts with LMU Munich. The fellowships are initially limited to two years. An extension of two years may be granted upon a positive academic evaluation. You will find all information about the conditions of application at: www.lmu.de/excellent/research-fellowships

Postdoctoral Fellowships 2009

CSIRO, Australia.
CSIRO is one of the largest and most diverse research organisations in the world, with its research delivering solutions for agribusiness, the environment, information and communication technologies, health, advanced materials and manufacturing, minerals and energy, services, transport and infrastructure. The CSIRO Postdoctoral Fellowship Scheme provides the opportunity for postgraduates to undertake postdoctoral research projects within CSIRO for a period of three years. 20 exciting postdoctoral positions are now being offered across a broad range of disciplines. Detailed information on the projects on offer and how to apply, can be found at www.csiro.au/careers

PhD position

Plasmodesmal dynamics related to virus movement (V/M)
Vacancy number: DPW 09-16

Plant Sciences, Lab of Virology, Wageningen University and Research Center. Wageningen. The Netherlands.
Employment basis: Temporary for 1 year with possibility of extension to 4 years.
For additional information contact Dr. Jan van Lent, jan.vanlent@wur.nl or Prof. Dr. Rob Goldbach, 0317- 483090, rob.goldbach@wur.nl.
Applications before 01-6-2009 by sending your written application with curriculum vitae to: Wageningen UR, HRM Department Plant Sciences Group.
Mrs D. Wissink, P-advisor, P.O.Box 16, 6700 AA Wageningen, The Netherlands
E-mail address: vacaturemeldingen.psg@wur.nl

PhD positions: Zurich-Basel Plant Science Center

The PhD program in Plant Sciences housed by the Zurich-Basel Plant Science Center provides graduates with the knowledge and training to develop careers in many professional fi elds which draw on an under- standing of plants and their fundamental contributions to environment health and sustainability. We offer PhD positions from molecular science to ecosystem research (for our research topics see www.plantscience.ethz.ch/organisation/members/index_EN).
The next deadline for applications is on the **1st of July 2009**.
Selected candidates will be invited for an interview taking place in Zurich in early September. Accepted students perform their research project in one of the participating research groups of their choice, according to their scientific interest.
For more information please visit: www.lifescience-graduateschool.ch

1 Postdoc or 1 PhD student

The Bio-energy Group of the Department of Plant Systems Biology at VIB/Ghent University. Belgium.
The major goal of the Bio-energy group is to understand the biosynthesis, transport, polymerization and structure of lignin to provide the fundamental knowledge that is necessary to design plant cell walls that are easier to convert to bio-fuels.
The postdoc position is for two years, the PhD position for three years
Please send your CV and letter of motivation to: Prof. Wout Boerjan. VIB-Department of Plant Systems Biology, UGent. Technologiepark 927. 9052 Gent. Belgium
Email: wout.boerjan@psb.ugent.be

Short visit grants

CAREX opens its second call for Transfer of Knowledge Grants (deadline for submission: 20 June, 2009). The primary aim of these grants is to give European scientists the opportunity to gain knowledge in a scientific or technological field relevant to research on life in extreme environments by visiting a research institution in a European Country.
This second round will result in the award of eight short visit grants (up to 1,100€ each) of which four will be awarded to students and PhD students. Details on the scope, process and eligibility criteria are attached and can be found on our website: http://www.carex-eu.org/activities/carex-transfer-of-knowledge-grants-2009.html

Ph.D. Position

Analysis of Floral Transcription Factors in Arabidopsis
University of Bremen. Department of Evolutionary Developmental Genetics
Bremen, Germany
http://www.academickeys.com/r?job=18919&o=591678&t=SC090409m

Assistant/Associate/Full Profesor and Postdoctoral Positions

King Fahd University of Petroleum & Minerals, (KFUPM)
School of Engineering. Dhahran. Saudi Arabia

http://www.academickeys.com/r?job=18392&o=591678&t=SC090409m

Junior Specialist

Graduate Student/Post-Doc
Department of Plant Sciences. University of California, Davis, CA. USA.
Apply By E-mail: fnegre@ucdavis.edu
http://sciences.academickeys.com/seeker_job_display.php?dothis=display&job[IDX]=19869

6-months position open to study the cold acclimation in pea

The project is funded by " PlantTeq3 "
To get more details and to apply, please contact Estelle Goulas or Jenny Renaut
Estelle Goulas: UMR INRA-USTL 1281. Université des Sciences et Technologies de Lille. 59 655 Villeneuve d'Ascq, France
http://www.univ-lille1.fr/pdv/labo/
http://ustl.univ-lille1.fr/
Mailto: Estelle.Goulas@univ-lille1.fr
Jenny Renaut: Centre de Recherche Public - Gabriel Lippmann. Department of Environment and Agrobiotechnologies (EVA). 41, rue du Brill. L-4422 Belvaux. Luxembourg
http://www.lippmann.lu/
Mailto: renaut@lippmann.lu

An engineer-technician for proteomics platforms

Centre de Recherche Public – Gabriel Lippmann
Department of Environment and Agro-biotechnologies
41, rue du Brill. L-4422 Belvaux. LUXEMBOURG
http://www.lippmann.lu/
Mailto: recrutement@lippmann.lu

New books

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International Review of Cell and Molecular Biology

by Kwang W. Jeon
Publisher: Elsevier Science & Technology Books
Pub. Date: June 01, 2009
ISBN-13: 9780123748065, 350pp
International Review of Cell & Molecular Biology presents current advances and comprehensive reviews in cell biology—both plant and animal. Articles address structure and control of gene expression, nucleocytoplasmic interactions, control of cell development and differentiation, and cell transformation and growth.
Authored by some of the foremost scientists in the field. Provides up-to-date information and directions for future research. Valuable reference material for advanced undergraduates, graduate students and professional scientists.

Plant Systems Biology

Annual Plant Reviews, Vol. 35.
Edited by: Gloria Coruzzi and Rodrigo Gutierrez
Publisher: Wiley-Blackwell
Pub. Date: May 2009
ISBN-13: 9780123748065, 376pp

http://www.wiley.com/go/apr
This title offers the reader: A fundamental conceptual framework for Systems Biology including Network Theory; The progress achieved for diverse model organisms: Procaryotas, *C. Elegans* and Arabidopsis; The diverse sources of "omic" information necessary for a system understanding of plants; Insights into the software tools developed for systems biology; Interesting case studies regarding applications including nitrigen-use, flowering-time and root development; Ecological and evolutionary considerations regarding living systems.

Physicochemical and Environmental Plant Physiology

By Park Nobel, University of California, Los Angeles, USA.
Publisher: Elsevier Science & Technology
Publication date: Apr-2009. Hardbound.
ISBN-13: 978-0-12-374143-1
ISBN-10: 0-12-374143-2
Imprint: ACADEMIC PRESS
http://www.elsevierdirect.com/disciplinelanding.jsp?lid=100007
This is the fourth edition of an established and successful reference for plant scientists. The author has taken into consideration extensive reviews performed by colleagues and students who have touted this book as the ultimate reference for research and learning. The original structure and philosophy of the book continue in this new edition, providing a genuine synthesis of modern physicochemical and physiological thinking, while entirely updating the detailed content. Key concepts in plant physiology are developed with the use of chemistry, physics, and mathematics fundamentals. The figures and illustrations have been improved and the list of references has been expanded to reflect the author's continuing commitment to providing the most valuable learning tool in the field. This revision will ensure the reputation of Park Nobel's work as a leader in the field.
Audience: Researchers and upper-level students studying plant physiology, physical chemical biology, plant physiological ecology, physicochemical biology, environmental biology, plant biophysics, cell biology; scientists, and academics interested in plant sciences and environmental sciences.

Crop Physiology: Applications for Genetic Improvement and Agronomy

Edited by Victor Sadras and Daniel Calderini.
Publisher: Elsevier Science & Technology
Publication date: 2009.Hardbound
ISBN: 978-0-12-374431-9
Imprint: ACADEMIC PRESS
http://www.elsevierdirect.com/disciplinelanding.jsp?lid=100007
Contemporary agriculture confronts the challenge of increasing demand in terms of quantitative and qualitative production targets. These targets have to be achieved against the background of soil and water scarcity, world-wide and regional shifts in the patterns of land use driven by both climate change and the need to develop crop-based sources of energy, and the environmental and social aspects of agricultural sustainability. Hence, this book compiles a multi-authored perspective on the ways in which crop physiology could be integrated with other disciplines. With a focus on genetic improvement and agronomy, this book addresses the challenges of environmentally sound production of bulk and quality food, fodder, fibre and energy which will be faced over the next decade.
Audience: Primary: Agronomists; plant geneticists and plant breeding professionals; crop physiologists, ecologists, and ecophysiologists; plant physiologists. Secondary: horticultural scientists; those involved with grain and cereal crops and sustainable agriculture; environmental microbiologists Tertiary: Students of plant breeding and crop ecophysiology.

Molecules of Life: DNA, RNA, and Proteins

by Russ Hodge, Nadia Rosenthal (Foreword by)
Publisher: Facts on File, Incorporated
Pub. Date: June 01, 2009
ISBN-13: 9780816066803, 192pp
Series: Genetics and Evolution Ser.

Principles of Gene Manipulation and Genomics

by Sandy B. Primrose, Richard Twyman
Publisher: Wiley, John & Sons, Incorporated
Pub. Date: May 18, 2009
ISBN-13: 9781405156660, 704pp
Edition Description: REV
Edition Number: 88
There has been rapid progress in recombinant DNA technology over the last few years, particularly in the area of large-scale biology (genomics and related disciplines). The increasing integration between gene manipulation and genomics is embraced in this book, *Principles of Gene Manipulation and Genomics*, which brings together for the first time the subjects covered by the best-selling books *Principles of Gene Manipulation* and *Principles of Genome Analysis and Genomics*. This important new text has been comprehensively revised, updated, and rewritten to encompass within one volume, basic and advanced gene-manipulation techniques, genome analysis, genomics, transcriptomics, proteomics, and metabolomics, as well as the applications of these fascinating technologies. *Principles of Gene Manipulation and Genomics* is an accessible and up-to-date guide to this exciting field, and is the essential reference for upper-level undergraduate and graduate students of genetics, genomics, molecular biology, and recombinant DNA technology.

Starch

Starch Chemistry and Technology
Edited by James BeMiller and Roy Whistler.
Publisher: Elsevier Science & Technology
Included in series Food Science and Technology,
Publication date: Mar-2009
ISBN-13: 978-0-12-746275-2
ISBN-10: 0-12-746275-9
Imprint: ACADEMIC PRESS
Description: The third edition of this long-serving successful reference work is a 'must-have' reference for anyone needing or desiring an understanding of the structure, chemistry, properties, production and uses of starches and their derivatives.
Audience: Professionals working with starch/starch derivatives processing; students in areas related to carbohydrates and starch, applied biochemistry and industrial and applied chemistry: food chemists and technologists, chemical engineers, agricultural chemists, researchers in related industries such as paper, textiles and adhesives.

Carbohydrates: The Essential Molecules of Life

Second Edition
By Robert Stick and Spencer Williams
Publisher: Elsevier Science & Technology
Publication date: 2009

Imprint: ELSEVIER
This book provides the "nuts and bolts" background for a successful study of carbohydrates - the essential molecules that not only give you energy, but are an integral part of many biological processes. A question often asked is 'Why do carbohydrate chemistry?' The answer is simple: It is fundamental to a study of biology. Carbohydrates are the building blocks of life and enable biological processes to take place. Therefore the book will provide a taste for the subject of glycobiology. Covering the basics of carbohydrates and then the chemistry and reactions of carbohydrates this book will enable a chemist to gain essential knowledge that will enable them to move smoothly into the worlds of biochemistry, molecular biology and cell biology.
Audience: Researchers, scientists, and advanced undergraduate and graduate students in biochemistry and organic chemistry.

Comparative Plant Virology

Second Edition
By .Roger Hull, John Innes Center, Norwich, UK.
Publisher: Elsevier Science & Technology
Publication date: Jan-2009. Hardbound, 400 pages.
ISBN-13: 978-0-12-374154-7
ISBN-10: 0-12-374154-8
Imprint: ACADEMIC PRESS
Audience: Advanced undergraduate and graduate students in basic and applied plant virology, plant pathology, microbiology, genetics and molecular biology, biological control, ecology, evolution, and related aspects of plant science.

Genetically Modified Plants. Assessing Safety and Managing Risk

Edited by Roger Hull, John Innes Center, Norwich, UK.
Publisher: Elsevier Science & Technology
Publication date: Aug-2009.
ISBN-13: 978-0-12-374106-6
ISBN-10: 0-12-374106-8
Imprint: ACADEMIC PRESS
A transgenic organism is a plant, animal, bacterium, or other living organism that has had a foreign gene added to it by means of genetic engineering. Transgenic plants can arise by natural movement of genes between species, by cross-pollination based hybridization between different plant species (which is a common event in flowering plant evolution), or by laboratory manipulations by artificial insertion of genes from another species. Methods used in traditional breeding that generate transgenic plants by non-recombinant methods are widely familiar to professional plant scientists, and serve important roles in securing a sustainable future for agriculture by protecting crops from pest and helping land and water to be used more efficiently. There is worldwide interest in the biosafety issues related to transgenic crops because of issues such as increased pesticide use, increased crop and weed resistance to pesticides, gene flow to related plant species, negative effects on nontarget organisms, and reduced crop and ecosystem diversity. This book is intended to provide the basic information for a wide range of people involved in the release of transgenic crops. These will include scientists and researchers in the initial stage of developing transgenic products, industrialists, and decision makers. It will be of particular interest to plant scientists taking up biotechnological approaches to agricultural improvement for developing nations.
Audience: Plant scientists studying genetically modified crops; agricultural engineers; agronomists; researchers; industrialists; lawyers; students; regulators.

Postharvest Handling. A Systems Approach

Second Edition
Edited by Wojciech Florkowski, Stanley Prussia, Robert Shewfelt and Bernhard Brueckner.
Included in series: Food Science and Technology,
Publication date: Jan-2009. Hardbound, 640 pages.
ISBN-13: 978-0-12-374112-7
ISBN-10: 0-12-374112-2
Imprint: ACADEMIC PRESS
Consideration of the interactions between decisions made at one point in the supply chain and its effects on the subsequent stages is the core concept of a systems approach. Postharvest Handling is unique in its application of this systems approach to the handling of fruits and vegetables, exploring multiple aspects of this important process through chapters written by experts from a variety of backgrounds. Newly updated and revised, this second edition includes coverage of the logistics of fresh produce from multiple perspectives, postharvest handing under varying weather conditions, quality control, changes in consumer eating habits and other factors key to successful postharvest handling. The ideal book for understanding the economic as well as physical impacts of postharvest handling decisions.
Audience: Postharvest physiologists or technologists across the disciplines of agricultural economics, agricultural engineering, food sciences, and horticulture along with handlers of fresh or minimally processed products within the fresh produce processing industries will find this to be an invaluable resource.

Structure and Function of Plants

Jennifer W. MacAdam
ISBN: 978-0-8138-2718-6
Paperback, 304 pages.
January 2009, Wiley-Blackwell
http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0813827183,subjectCd-LS93.html
Plant anatomy and physiology and a broad understanding of basic plant processes are of primary importance to a basic understanding of plant science. These areas serve as the first important building blocks in a variety of fields of study, including botany, plant biology, and horticulture. Structure and Function of Plants will serve as a text aimed at undergraduates in the plant sciences that will provide an accurate overview of complex plant processes as well as details essential to a basic understanding of plant anatomy and physiology. Presented in an engaging style with full-color illustrations, Structure and Function of Plants will appeal to undergraduates, faculty, extension faculty, and members of Master Gardener programs.