



BIOSYLVAN News

New Project To Study Insect-Specific Responses Of European Field Elm

The Deutsche Forschungsgemeinschaft (German Research Foundation), the Max Planck Institute for Chemical Ecology in Jena, Germany (MPI-ICE: www.ice.mpg.de/main/home/home_en.htm), and the Institute of Biology at the Freie Universität Berlin (FUB: www.biologie.fu-berlin.de/azoet/index.html) have agreed to jointly fund a project to study the molecular — genetic defense responses of the European field elm (*Ulmus campestris*) to insect attack.

Specifically, the project will be studying the ecological interactions between *U. campestris*, the elm leaf beetle (*Xanthogaleruca luteola*) and its egg parasitoid (*Oomyzus gallerucae*). The larvae and adults of the elm leaf beetle are major natural pests of the European field elm, and can occasionally defoliate whole trees. Field elms respond to oviposition of these beetles by releasing novel blends of volatiles, which attract the elm leaf beetle egg parasitoid *Oomyzus gallerucae*, even in the absence of herbivory.

continued on page 3

The Institute of Forest Biotechnology (IFB) is on the move — our new location is on the Centennial Campus in Raleigh, NC. details on page 2

New Century, New Trees

Biotechnology as a Tool for Forestry in North America

This conference brought together 80 participants for a two-day forum held November 16 – 17, 2004, at the North Carolina Biotechnology Center, Research Triangle Park, NC. It focused on several questions:

- What is the history of forest biotechnology?
- What is the status of forest biotechnology research and development in North America?
- What are the projected future products and their respective net benefits?
- What are the key scientific issues?
- What are the key societal and public policy issues for forest biotechnology in North America?

- What are appropriate strategies for the future?

The conference offered a unique opportunity to learn about cutting-edge technologies as applied to forestry and the part this growing field plays in policy development and societal responses to biotechnology. It also provided an excellent opportunity to actively engage in discussions with leaders in the fields of forest biotechnology, forest genomics, forest economics, trade and regulatory issues, and societal responses. Representatives from forest companies, universities, government agencies, public interest organizations, and others were in attendance.

continued on page 2



IFB is on the move

Since our last communiqué we have relocated to Centennial Campus, Raleigh, North Carolina. Our four years of being housed at the North Carolina Biotechnology Center in Research Triangle Park, NC were memorable ones, and we made many lasting friendships in addition to receiving leadership, financial and moral support.

Centennial Campus is built on partnerships between university, industry and government. It is described as a “technopolis” in which the interaction among partners is facilitated by shared intellectual pursuits and space. A feature of the Campus is the availability of office and laboratory space for start-up organizations. Working in collaboration with the College of Natural Resources, IFB secured office space in one of the buildings (Venture II, 920 Main Campus Drive, Suite 101) that is proving to be ideal for our needs.

The relocation was not without its travails. It involved the physical part of the move but, more importantly, it involved the functional office. Gone are the days when an office-relocation involved only grunt work. Now, it entails computers as the major method of communication, composition, editing, record keeping, and accounting. Mail call might result in an advertisement circular but no business letter, and the office telephone rarely jingles anymore.

Computers are a great convenience when all is working well, but they are an enigma for those of us that don't know the benefits of one program versus another or don't know a server from a modem. It largely remains for the younger generation to recommend the units to buy, and to direct the assembly of parts and installation of programs. Fortunately, we had strong backs and computer knowledge in the way of family members of Susan McCord to make us operational. We thank them.

New Century, New Trees

continued from page 1

The conference specifically bridged connections between Canada and the United States in the area of forest biotechnology research and devel-

opment, policy, and societal considerations. Two projects were discussed and follow on participation encouraged. One is the burgeoning American chestnut genome project that is now growing in interest and participation with Canadian partners. The other is a conference in Canada in 2005 on the social, ecological and cultural issues associated with forest biotechnology. There was broad consensus of support for the chestnut genomics project along with the recognized need for including, societal, ecological and

cultural considerations. A conference proceeding will be published in Spring 2005.

In conjunction with this conference, a lecture series was orga-

nized by the College of Natural Resources, NC State University. Invited lecturer, Dr. Risto Sepälä, Professor, Finnish Forest Research Institute and President, International Union of Forest Research Organizations (IUFRO), gave two seminars. One seminar focused on the forest biotechnology research underway at the Finnish Forest Research Institute and the other seminar discussed the current activities of IUFRO including an update on its Forest Biotechnology Task Force and upcoming report.

NEW CENTURY, NEW TREES *Biotechnology as a Tool for Forestry in North America*

European Field Elm

continued from page 1

This system is of special interest, because it has been very well characterized ecologically and is an entirely natural system that has not been disturbed in any way by agricultural selection pressures. An elicitor from the oviduct secretion that glues the eggs to the leaf triggers the release of volatiles in the field elm that specifically attracts *O. gallerucae*, prior to any herbivory having occurred. This volatile release exactly coincides with the time needed for the leaf beetle eggs to hatch, whereupon the tree ceases to be attractive to the egg parasitoids. Larval feeding elicits a different set of volatile emissions, which probably serves to attract larval predators, as has been observed in other plant – insect systems, but whether any specialist predators are involved in this is not yet clear.

It is the intention of this project to dissect how this exceptionally interesting suite of responses in elms is initiated and regulated at the molecular – genetic level, including by the use of biochemical and physiological analyses, cDNA & EST libraries, large scale gene sequencing, DNA micro-arrays, genetic transformation to up and down regulate insect responsive genes, and rigorous ecological experimentation. Of particular interest are the terpene and octadecanoid biosynthetic pathways, as well as any other aspects of the signaling cascade found to be involved.

It is also hoped that the construction of a wound & leaf beetle induced oligo-nucleotide gene array will be of use to the wider community of elm researchers. To facilitate this further, gene sequences from elm plants induced by the causative organism of Dutch elm disease (*Ophiostoma novo-ulmi*) will be included if possible, as well as other arthropod pests.

The project is a collaboration between Dr Trevor Fenning in Jena (Department of Biochemistry/ Head: Professor Jonathan Gershenzon) and Dr



Torsten Meiners in Berlin (Department of Applied Zoology and Ecology of Animals/ Head: Prof. Monika Hilker), with most of the molecular

– genetic work and the elm transformations being performed in Jena, while the ecological experiments and most of the biochemical work will be undertaken in Berlin. In addition, there will be a close collaboration with Professor David Gang of the Department of Plant Sciences at the University of Arizona for the production

of the cDNA / EST libraries and micro-arrays, and Professor Kevan Gartland of the University of Abertay Dundee in Scotland will advise on the inclusion of Dutch elm disease induced transcripts and also the plant transformations.

For further information, please contact either Trevor Fenning (fenning@ice.mpg.de) or Torsten Meiners (meito@zedat.fu-berlin.de).

Thanks go to Trevor Fenning, Max Planck Institute for Chemical Ecology, Jena, Germany who sent us this article for inclusion in Biosylvan News. You will remember Trevor as a co-author of the challenge document, Forest Biotechnology and Europe's Forests of the Future, which was prepared for the forum, *Forest Biotechnology in Europe: Impending Barriers, Policy, and Implications*, that was held in Edinburgh, Scotland on September 12–13, 2002.

J. Craig Venter Institute

J. Craig Venter of Human Genome fame consolidated three of his research not-for-profit organizations into the J. Craig Venter Institute in September 2004. The three entities were the Center for Advancement of Genomics (TCAG), Institute for Biological Energy Alternatives (IBEA) and J. Craig Venter Science Foundation Join Technology Center (JTC). The new institute, located at Rockville, Maryland (USA) will continue the research and policy activities of the three separate organizations, *i.e.*, basic science genomic research, high-throughput genomic sequencing, and genomic policy research. IFB board member **Robert Friedman** is Vice President, Environmental and Energy Policy at the J. Craig Venter Institute.

Forest Service Partners With The American Chestnut Foundation

The USDA Forest Service has taken a major step in restoration of American chestnut. The event was the signing of a memorandum of understanding (MOU) between the federal agency and The American Chestnut Foundation (TACF), to use 'scientific research and a breeding program developed by TACF founders to restore the once dominant hardwood tree to its native woodlands'.

In the TACF backcross breeding program the goal is to produce a tree that has the resistance of Chinese chestnut but the phenotype (growth, form, nut production) of American chestnut. Good progress is being made in that endeavor, but the result will never be finite because in any breeding program with an outcrossing species some unwanted genes will be included with the genes of desire. That is where forest biotechnology comes in.

A group of scientists, including representatives from TACF and the Forest Service, convened by IFB has the objective of identifying the genes in Chinese chestnut that confers resistance to the blight. Upon completion of the project, the results can be used in two ways: (1) to identify the offspring in a breeding program, with the genes for resistance, for deployment, and (2) for insertion of the genes for resistance into American chestnut seedlings for deployment. In the first instance, the tree will have a complement of Chinese chestnut genes in its genome; in the second instance, the only genes from a foreign species will be the two or three directly inserted from Chinese chestnut. This dual approach allows for the most comprehensive strategy to regain American chestnut. The general public will, thus, have an option on the type of tree they want to plant.

IFB Reaches Across The State

The Forestry Issues Forum of North Carolina State University Extension Forestry has developed a Video-teleconference Series that has gained wide attention because it allows attendees to participate from diverse locations rather than having to travel to the meeting spot. Topics range from forest nutrition, to timber sales to forest taxation. New to the agenda is one on forest biotechnology that was organized by IFB. It was transmitted to 10 stations in North Carolina and one station in Conway, South Carolina on February 9, 2005 with an attendance of more than 100. The program was moderated by Dr. Susan Moore, Director, Forestry Education Outreach Program (FEOP). The topics and presenters for the three-hour session were:

What is forest biotechnology?	Ron Sederoff
Introduction to the Institute of Forest Biotechnology	Susan McCord
Vegetative propagation of forest trees	Barry Goldfarb
Clonal forests in the world	Bob Kellison
Restoration of American chestnut	Paul Sisco
Limits to forest biotechnology	Bob Kellison

The IFB is committed to sharing information about the benefits and potential limitations of forest biotechnology to help guide the public debate of the emerging science.

University Of Washington Rebuilds Laboratory

Nearly four years ago eco terrorists firebombed the laboratory of Dr. Toby Bradshaw at the University of Washington campus in Seattle. Great amounts of valuable plant material, data sets, and laboratory equipment were lost in the attack. The terrorists assumed that Toby was genetically transforming trees in his confined quarters when, in reality, he was pioneering the gene sequence of black cottonwood (*Populus trichocarpa*). The event so disheartened the scientist that he gave up his work with poplars, and is now concentrating his skills on horticultural crops. The forestry community lost a willing partner in the process but all was not lost. Other scientists from the US Department of Energy, Oak Ridge National Laboratory, University of California

Lucier Succeeds Burke As Chair



LUCIER

At the Board of Directors meeting of IFB on Nov. 16, 2004, Alan Lucier, Senior Vice President, National Council for Air and Stream Improvement (NCASI), succeeded Steven Burke as Chair. Al, a native of Connecticut, received his Ph.D. from North Carolina State University. He worked for three years as a research project leader at International Paper's Southlands Experiment Forest in Bainbridge, Georgia. He has spent the past 21 years with NCASI, where he has held several positions with increasing responsibility. Al is a member of the Executive Committee of the National Commission on Science for Sustainable Forestry; co-chair of the Sustainable Forestry Task Group for AF&PA's Agenda 2020 Program; and a member of the Secretary of Agriculture's Forestry Research Advisory Committee.

Steven Burke, Senior Vice President, Corporate Affairs, of the North Carolina Biotechnology Center, has given yeoman service to IFB. As early as 1998, he conceived the idea of an institution that would address the needs and concerns of an emerging forest biotechnology community and public. That initiative led to the formation of an Advisory Committee that recommended the formation of IFB. Steven served as chair of the Founding Board, and then full board until November 2004. Steven's distinctive style and cadence will be missed as chair, but we look forward to his continuing support as an IFB board member. The forestry community will be forever grateful to Steven for his foresight and vigilance in making IFB a reality.

University Of Washington Rebuilds Laboratory

at Davis, University of Minnesota and University of Umeå, Sweden took up the challenge and in September 2004 they announced completion of the gene sequence for black cottonwood, the first tree species in the world to be gene sequenced.

The structure was designed to highlight the university's emphasis on environmental conservation.

The sequel to that story is that the University of Washington recently showed off the new \$7.2 million building that replaces the

one destroyed. The structure was designed to highlight the university's emphasis on environmental conservation. It includes solar panels, storm water recycling system, low-flush toilets and furniture made from salvaged city trees. Application has

been made to the US Green Building Council's LEEDS (Leadership in Energy and Environmental Design) program for certification. Three cheers for Dr. Bradshaw and the University of Washington.

Le Master Retires

Board member, Dennis LeMaster, Head and Professor, Department of Forestry and Natural Resources, Purdue University retired on June 30, 2004. Having held the post for 16 years, he honored the university and the incoming department head by overseeing special projects for the following six months, severing his ties officially on December 31, 2004. He now resides in his boyhood-home of Everett, Washington where he attempts to reduce the fish population of the area.

Dennis has experienced an interesting life with undergraduate and advanced degrees in economics from Washington State University. Following graduation in 1961, his duties, in sequential order were: U.S. Army (Germany), LeMaster Builders Supply (Everett, Washington), Federal Bureau of Investigation (Denver and Los Angeles), Washington State University faculty (Pullman, WA), Society of American Foresters (Washington, DC), Committee on Agriculture (US House of Representatives, Washington, DC), and a second stint with Washington State University as Chair and Professor, Department of Forestry and Range Management (1980-1988). His career was culminated as Head and Professor, Forestry and Natural Resources, Purdue University from 1988 to 2004.

While at Purdue, Dennis oversaw major expansions in facilities, teaching, research and outreach programs. His reputation identified him as logical choice to serve on local and national committees, one of which was the Institute of Forest Biotechnology. Dennis will be retiring from IFB's board in May, 2005. His reasoned logic and can-do attitude will be sorely missed at IFB.

Atmospheric Carbon Dioxide And Methane Build-Up Predates Industrial Revolution

An emerging hypothesis is that the build-up of carbon dioxide and methane in the atmosphere started long before the industrial age. Interpretation of clues provided by ice cores from Vostok Station in Antarctica suggests that deforestation and agricultural irrigation might have played a part. Basic to the hypothesis is that the oscillation of the earth around the sun causes the temperature to vary by more than 10 percent over parts of earth. Such changes occur at intervals of 100,000, 41,000 and 22,000 years are sufficiently great to cause ice ages. In olden times, carbon dioxide and methane invariably decreased with the cold cycle and reversed themselves with the warm cycles. About 8,000 years ago, however, the two gasses began increasing when they should have

been decreasing. Looking for a reason, scientists¹ concluded that the events coincided with the cropping of the land. The cause is suspected to be the release of carbon dioxide from burning and decaying wood and the release of methane from irrigation systems common to the Orient. The industrial age, with the burning of fossil fuels has only compounded the problem being witnessed today. We add the precaution that not all scientists are in agreement with the hypothesis. Some are of the opinion that the increase in CO₂ and methane at the time when a decrease would have been expected is an anomaly associated with the orbiting of the earth around the sun. Stay tuned.

¹ Ruddiman, William F. 2005. How did Humans First Alter Global Climate? *Scientific American* 292(3):46-53.

The Bridge Builder

Ward R. Munson, uncle of board member Ken Munson of International Paper, was a guest at an official function of the company when he was called on to share his philosophy of a full and fruitful life. The spry 92-year-old of clear mind and keen wit revealed to the room-full of young foresters that he'd patterned his life after "The Bridge Builder". He then recited the poem, authored by Will Allen Dromgoole, from memory and with emphasis. Reading the poem will be secondary to hearing it recited by Mr. Munson, but you'll get the drift:

The Bridge Builder

*An old man, going a lone highway,
came, at the evening, cold and gray,
to a chasm, vast, and deep and wide,
through which was flowing a sullen tide.
The old man crossed in the twilight dim;
the sullen stream had no fears for him;
but he turned, when safe on the other side,
and built a bridge to span the tide.*

*"Old man," said a fellow pilgrim, near,
"you are wasting strength with building here;
your journey will end with the ending day;
you never again must pass this way;
you have crossed the chasm, deep and wide;
why build the bridge at eventide?"*

*The builder lifted his old gray head;
"Good friend, in the path I have come,"
he said, "there followeth after me today
a youth, whose feet must pass this way.
This chasm, that has been naught to me,
to that fair-haired youth may a pitfall be;
he too, must cross, in the twilight dim;
good friend, I am building the bridge for him."*

Not too long after the recitation, Mr. Munson's life came to an end while returning from a trip to China where he had just checked off another activity on his life-list, to walk on the Great Wall. This amazing man touched the lives of all who knew him.



Fewer Genetically Engineered Crops Being Evaluated

The Center for Science in the Public Interest (CSPI) has found that the Food and Drug Administration (FDA) approved, on average annually, 9.4 varieties of genetically engineered food crops during the period 1995-1999, and only 3.0 per year from 2000 to 2004. Similarly, the Animal and Plant Health Inspection Service (APHIS) approved 8.2 varieties of transgenic crops from 1994 to 1999, but only 2.6 from 2000 to 2004. Approval by the different agencies is dependent upon the use to be made of the product. FDA is concerned about the safety of humans consuming the transgenic products, and APHIS is concerned about the effect the plants have on native ecosystems.

The consensus reached by CSPI for the reduced numbers is that the time for approval today is double that of the 1990s. The speculation is that the reductions are the result of cost:benefit as opposed to disinterest or rejection of transgenic crops.

The reduction in the number of varieties being tested doesn't square with the acceptance of biotechnology crops. According to the Biotechnology Industry Organization (BIO), 1.25 million more farmers planted biotech crops in 2004 than in 2003. Even more striking, 90% of those additional farmers were in developing countries. Of the 17 countries now planting transgenic crops, 11 are categorized as developing.

As evidence of acceptance of transgenic crops, 200 million acres were planted in 2004, up 20% over 2003. Even more compelling is that only 7 million acres were devoted to transgenics as recently as 1996. The total value of the biotech crop market is expected to exceed \$5 billion in 2005.

From The Treetop

Thomas Edison's assistants came up with the idea of electric lights for Christmas trees.

Wisconsin Natural Resources Magazine

Trees were used to help fortunetellers divine the meaning of dreams. In medieval Europe, dreaming of a green oak tree indicated a long life; a cypress was the harbinger of problems in business. Dreaming of a palm tree was the best of omens, while the vision of a pine was a dark hint of looming problems.

"Growing Greener Cities: A Tree-Planting Handbook" by Gary Moll and Stanley Young

Why do we "knock on wood?" It comes from a superstition. People knocked on wood to thank the tree's spirit for granting them a favor.

Trees of the Bible

The King James Version of the Bible was completed in 1611, long before botany became an exact science. It was a translation by many brilliant scholars, who were not botanists, and chose to identify some of the trees of the bible with familiar plants of England. This may have been done to assist our greater understanding of the scriptures.

Consequently, the terebinth was called an elm or a teil, aspens were called mulberries, a mulberry was called "sycamine", a species of fig was called "sycomore." The Oriental planetree, related to the sycamore, was called a chestnut. The apricot became an apple, and the native Aleppo pine was called a fir or even, in Isaiah 44:14, an ash. The words fir, pine, cypress, juniper, and sometimes the cedar, are so used that it is almost impossible to determine what trees are referred to in certain passages. www.euxton.com/treebibl.htm

Institute of Forest Biotechnology
920 MAIN CAMPUS DRIVE, SUITE 101
RALEIGH, NORTH CAROLINA 27606

BIOSYLVAN NEWS is a publication of the Institute of Forest Biotechnology and is issued two times a year. Address all correspondence to Editors:

Bob Kellison, President
bob_kellison@forestbiotech.org
Phone (919) 424-4464

Susan McCord, Program Manager
susan_mccord@forestbiotech.org
Phone (919) 424-4461

920 Main Campus Drive, Suite 101
Raleigh, North Carolina 27606
Fax (919) 424-4401

www.forestbiotech.org



INSTITUTE OF FOREST BIOTECHNOLOGY

3rd International Conference Held

New Century, New Trees: Biotechnology as a Tool for Forestry in North America is the third in a series of conferences organized by the Institute of Forest Biotechnology with the help of partners around the world. The first two were held in Europe and South America. Read more about the conference inside this issue of the *BioSylvan News*.

Also Read About

- A new project on European field elm
- A partnership for restoration of American chestnut
- A look at atmospheric CO₂ and methane buildup
- Treetop trivia