Scientist announces research that will lead to genetically engineered virus-resistant plants

Roger N. Beachy, Ph.D., research scientist and professor of biology at WU, recently announced the results of research he believes will lead to the first genetically engineered virus-resistant agricultural crops.

Beachy presented results of his experiments on virus-resistant plants at the joint annual meetings of the American Society of Agronomy, the Crop Science Society of America, and the Soil Science Society of America, held Dec. 5 in Chicago. The breakthrough was announced during a symposium on "Development and Applications of Molecular Technologies for Crop Improvement."

The experiments were conducted at WU by researchers Patricia Abel and Richard Nelson, Ph.D., in collaboration with Robert T. Fraley, Ph.D., and Stephen G. Rogers, Ph.D., of Monsanto Co., which also funded the research.

"Our experiments have produced genetically transformed plants that manifest delayed symptoms of infection from tobacco mosaic virus compared to control plants," says Beachy. Tobacco mosaic virus (TMV) is a common virus that attacks many food-producing plants including tomatoes and peppers.

"We believe the breakthrough has been achieved. Now it is a matter of understanding the mechanisms that cause the resistance, and perfecting the techniques to produce plants that are field-resistant to virus infection."

"We expect this advancement will be the basis for wide-scale commercial production of virus-resistant plant seed," says Beachy.

Beachy believes transformed plants will be ready for field testing within three to four months. A field-ready strain of disease-resistant plants could be ready in one to three years, he says, depending on the specific plant and the virus.

For years, scientists have searched for a genetic engineering technique that would produce virus-resistant crops. Plant viruses are one of the main factors in reduced crop yields. According to the Chemical Rubber Company Handbook of Pest Management, for example, TMV accounted for an estimated $50 million in damage (five percent) to the U.S. tomato crop in 1982. That same year, wheat streak mosaic virus caused an estimated $95 million in losses to U.S. wheat producers.

Until Beachy's genetic engineering success, crop scientists had two primary methods at their disposal to help increase resistance to viral infection. Using conventional plant breeding techniques, crop plants can be crossed with different strains of the same plant that exhibit natural genetic resistance to a particular virus. But crossingbreeding often results in unwanted traits that must be bred out of the cultivar—a hit-and-miss process that takes years to accomplish. For some viruses, resistant strains are not available.

In a second technique known as cross-protection, a limited number of plant varieties including tomatoes and citrus and apple trees are inoculated with a mild strain of virus during transplantation as seedlings. Infection from the mild virus helps delay the appearance of a second, more virulent virus infection. The process is only applicable to crops that are transplantable.

But Beachy's research group has genetically altered plants so resistance to a virus is part of their DNA makeup, and will be passed to successive generations of plants.

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Videodisc stresses quake-awareness to future architects

With a touch to the video screen, the ground shakes, buildings collapse, and the voice of a frightened Alaskan hoots nervously. It's the sights and sounds of an earthquake in progress, captured on interactive videodisc by W. Davis van Bakergem, director of WU's Urban Research and Design Center.

The videodisc, developed with a National Science Foundation grant, points out the need to consider earthquake resistance from the earliest stages of building design. In addition to film footage and still photographs of earthquake damage, the disc shows architects how to make buildings more resistant to quake damage.

Produced by van Bakergem, the program was written with the help of Peter Seely, a WU graduate student in engineering. It has been shown to future building professionals in both the architecture and engineering schools at WU.

"Most architects think seismic resistance is something the engineer will take care of," says van Bakergem, affiliate professor of architecture. "Few consciously consider that early design decisions bear on the damage a building will sustain in an earthquake.

Although a good engineer can make almost any building strong, earthquake-aware architects can make seismically resistant buildings cost less. "We can save the expense of engineers fixing designs that aren't seismically sound," says van Bakergem.

The first section of the videodisc covers causes and effects of earthquakes. The second section, on "building configurations," explains the consequences of basic design decisions involving building size, shape and structure.

For example, a higher first-floor ceiling to accommodate a lobby makes a multi-story building more vulnerable to earthquake damage. And a stairwell or elevator shaft located off-center creates asymmetrical stiffness. This stiffness makes a building likely to twist around the stiff core and collapse.

Earthquakes generate lateral force that clashes with the vertical, gravity-bearing strength of buildings, especially at their joints and connections. Buildings usually fall down, not over, as the quake bends and shears columns, beams and walls.

The videodisc points out that "trembling ground isn't what makes earthquakes deadly. It's collapsing buildings and falling objects that cause deaths and property damage. The disc includes a chapter on non-structural systems that teaches how to keep furniture, windows and other objects from contributing to quake damage.

The program teaches with a series of interactive "quiz" frames. A touch-screen allows viewers to test their own earthquake knowledge and correct common misconceptions.

For example, a screen showing a U.S. map asks the viewer to touch the area that has suffered the most severe earthquake. If the viewer touches the West Coast, the next screen chides, "Too bad! You picked the wrong answer." If he touches the central United States, along the Arkansas-Tennessee border, the next screen says, "You are correct!" and explains that an 1811 earthquake along the New Madrid fault in the central Mississippi Valley probably measured 8.6 on the Richter scale.

That event rattled china cabinets in the English department, Robert McDowell, Ph.D., in mathematics, and Laurence Meyer, Ph.D., in economics approached Salamon about establishing a "great books" program that would draw upon the classic texts of liberal education in many disciplines.

"Once the idea was brought forth, many other professors wished to join in the enterprise, and, in fact, they have," Salamon said. "From different directions on our faculty, people remembered with affection an undergraduate sequence like they had as Chicago, Wellesley, Yale, Columbia and Holy Cross.

Simultaneously, Salamon and her associates in the dean's office noticed pre-test scores from an average 45 percent to an average 90 percent with the medium.

"The disc combines information on an important subject with the latest in technology," says van Bakergem. "It will make a good complement to architectural education on all levels.

New minor explores classic texts from many disciplines

The great thinkers — Homer, Sophocles, Plato, Machiavelli, Darwin, Thoreau, Western intellect are explored in a series of seven courses, spread over the four semesters of the first two years. Classical Literature and Early Western History were offered this fall. Puzzles and Resolutions and The Emergence of the Modern Mind will be offered next semester.

"Especially when combined with pre-medicine, science, mathematics or economics, the minor offers a well-balanced, comprehensive program of study," Salamon said.

Students and faculty are about to complete their first semester of Text and Tradition and are ready for the spring 1986 semester, but Salamon said she is eager to find faculty members in the humanities and social sciences who are interested in teaching in the sequence for the 1986-87 year. And, of course, she wants to attract students to enroll in the courses.

For more information, call 889-6840.
Basketball Bears win 2nd Lopata classic title

WU successfully defended its Lopata Basketball Classic title Saturday, Dec. 7, defeating Claremont-Mudd-Scripps Colleges of Claremont, Calif., 78-73. The Bears, now 6-2 this season, were paced by Kevin Suiter in the championship game as the 6-3 sophomore guard scored 22 points. For his efforts, Suiter was named the tournament’s most valuable player.

Joining Suiter on the all-tournament team was the Bear’s other starting guard, Brent Rueter. Rueter led the Bears with 17 points on Friday night as they defeated Johns Hopkins University 64-51.


In the consolation championship, Johns Hopkins edged Trinity University of San Antonio 66-65.

WU forwards Paul Jackson and Mark Sparrow also had strong tournament performances for the Bears. Jackson, of Pittsburgh, Pa., scored 29 points and grabbed 13 rebounds in two games.

A native of Quincy, Ill., and most recently an Illinois High School Basketball Hall of Fame inductee, Sparrow had 19 tournament points with 15 of those in the title game. He also converted two crucial free throws with 34 seconds remaining preserving the Bears’ second Lopata championship.

WU already has begun making plans for the 1986 Lopata Classic. The entrants for next year’s event will be the same ones that attended last year’s inaugural tourney — Johns Hopkins, MIT and Caltech.

The classic is made possible by a gift from Stanley Lopata, a WU alumnus and trustee. Lopata is chairman of the board and chief executive officer of the Carboline Co. and a prominent St. Louis civic and business leader.

Pathologist, computer company join efforts to create new record system

A pathologist at WU School of Medicine is working with the St. Louis-based computer company Management Techniques Inc. to develop a unique computerized system for autopsy records.

The system is believed to be first in the country to automatically cross-index the two leading systems for classifying and encoding anatomic pathology and clinical diagnoses. If successful, it could be adapted by health care institutions nationwide as a means of increasing the precision of diagnoses and the classification of diseases.

The model system will be created under a $500,000 Small Business Innovation Research grant awarded by the National Institutes of Health (NIH) to Management Techniques Inc. Daniel W. McKeel Jr., M.D., director of the Division of Autopsy Pathology at the School of Medicine, is project consultant.

In the next six months, McKeel and Robert Levitt, president of Management Techniques, hope to develop and implement a comprehensive management information system for autopsy records. The system will automatically encode, retrieve and correlate clinical and pathological diagnostic data.

Computer software will code records using the two major classifications of diseases — standard Nomenclature of Medicine (SNOMED) and International Classification of Disease, Version 9, Clinical Modification (ICD-9-CM). The software will be transferable to major computer systems, and will be efficient in a distributed network of microcomputers.

After completing the model system, McKeel and Levitt will be eligible to apply for a phase II grant, which would provide funding to develop and market the product for commercial use.

The Small Business Innovation Research program was created in 1982 to stimulate technological innovation within the small business community, provide the small business sector with an increased role in federal research and development, and attract private capital to commercialize the results of federally funded research. McKeel and Levitt applied for the grant after attending a special conference sponsored by the Regional Commerce and Growth Association.
CALENDAR

LECTURES

Thursday, Dec. 12

Friday, Dec. 13

Monday, Dec. 16


1-5 p.m. Dept. of Biological Chemistry Seminar, "Genetic and Tumor Cell Proteins Kinase C Activation." Also sponsored by the Howard Hughes Medical Institute. Cal V. Moore Aud., 1st floor. 4580 Scott Ave.

Wednesday, Dec. 18
2 p.m. Dept. of Engineering and Policy Lecture, "Technology Transfer to Third World Women Via Networks of Cooperatives." Jeanne Greer, WU master of science degree candidate, Lopata.

Thursday, Dec. 19

EXHIBITIONS


"Images of Aristocrats and Republicans." Through Dec. 29. Gallery of Art, lower gal- lery, 10 a.m. to 5 p.m. weekdays; 1-5 p.m. week- ends. For more info., call 889-4525.

"Pierre de Ronsard (1524-1585): An Ex- hibit of Books and Papers Commemorat- ing the 400th Anniversary of the Poet's Death." Dec. 16-Feb. 28. Olin Library, Special Collections, level 5, 8 a.m. to 5 p.m. week- days.


"Edward Boccia: The Triptychs," Through Jan. 5. Gallery of Art, upper gallery. 10 a.m. to 5 p.m. weekdays; 1-5 p.m. week- ends. For more info., call 889-4525.


MUSIC

Friday, Dec. 13
8 p.m. Guthrie Theater Presents Charles Dickens' "Great Expectations" at Edison The- atre. General admission is $15; WU faculty, staff and senior citizens, $10; and students, $7. For more info., call 889-6954.

PERFORMANCES

Friday, Dec. 13
8 p.m. Friends of Tyson Bird Banding

Virus-resistant plants — continued from p. 1

TMV multiplies in plant cells where it disrupts normal cell functions and reduces crop productivity.

Beachy's idea was to transform a plant cell to enable it to express a part of TMV's genetic material. The research team isolated the TMV gene that encodes the coat protein of TMV — a protein sheathing around the virus. Researchers found that the transformed plants delays or prevents the symptoms of infection, Beachy says. "We know that the product of the gene we inserted is first a mes- senger RNA that then is translated into protein. We do not yet know whether the RNA or the protein itself is responsible for the resistance." Although the exact mechanisms are not yet identified, Beachy specu- late that the techniques for producing plants resistant to TMV can be applied to many different crops and the viruses that attack them.

The measurable resistance under greenhouse conditions suggests that resistance levels currently available could be applied to field situations. In addition, increasing the amount of TMV coat protein expressed by the plants may also amplify resistance levels of field crops.

Results of the experiments are now being prepared for publication in a major scientific journal.

Robert Brick

Employers' contributions exceeded United Way goal

"Doing Something About It" and, for the sixth year, WU employees have done just that by surpassing the Uni- versity's campaign goal, which was $130,000.

The 975 employees participating in the United Way campaign contrib- uted a record $137,063. The Univer- sity will receive an award for Out- standing Achievement from the Uni- ted Way of Greater St. Louis for ex- ceeding its goal during the fall campa- ign.

Thomas A. Harig, director of General Services, is WU's United Way campaign chairman, and Chan- cellor William H. Danforth is chair- man of the St. Louis United Way Board of Directors.

Four employees who contributed to United Way received prizes through a drawing held last month. All employees contributing to the campaign were eligible to win. Wil- liam E. Knipp, director of the Interna- tional Audit Office, drew the winners' names.

Agnelli Quinones, technical assist- ant in the psychiatry department at the medical school, won the first prize of a dinner for two at Kennedy's Too. Betty Conner, house- keeper at Olin Residence on the medical school campus, received a gift certificate for a $20 pound turkey as the second-prize winner. Charles R. McManis, J.D., professor of law and the law school's United Way so- licitor, received the third prize, a $10 gift certificate at Schnucks. Fourth- prize winner Morton F. Pincus, Ph.D., assistant professor of accounting, won a $5 Schnucks gift certifi- cate.

This year's campaign coordina- tors were Florence Z. Freeman, ad- ministrative officer in purchasing, Gene Mueth, assistant business mana- ger at the medical school; John P. Sahrmann, D.M.D., assistant profes- sor of orthodontics, and Daniel Shea, Ph.D., professor of English, serving as the Hilltop faculty representative.

CALLEN

Dec. 12-21

WORKSHOP

Workshop with R.W. Coles, WU prof. of biology and director of the Toon Research Center. Tyson Central Administration Bldg.

Calendar Deadline

The deadline for submitting items for the Jan. 16-25 calendar of the Washington University Record is Jan. 2. Items must be typed and state time, date, place, nature of event, sponsor and admission cost. Incomplete items will not be printed. If available, include speaker's name and identification and the title of the event, also include your name and telephone number. Address items to King McElroy, calendar editor, Box 1070.