AAES Impact

RESEARCH NEWS FROM THE ALABAMA AGRICULTURAL EXPERIMENT STATION

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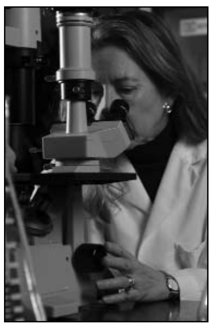
New protein could lead to Alzheimer's cure

In a study now entering its second decade, Auburn University biological scientist and Alabama Ag Experiment Station researcher Marie Wooten has discovered a protein molecule in the brain that could prove key in the search for a cure for memory-debilitating Alzheimer's disease.



LAB WORK—Marie Wooten's research focuses on neurodegeneration.

Wooten's research has shown that the protein, called p62, helps keep nerve cells in the brain healthy and capable of transmitting signals and information among themselves and that when p62 is removed from the brains of laboratory mice, the rodents become obese and develop Alzheimer's-like symptoms such as memory impairment.

Now, Wooten has been awarded a four-year, $1.3-million federal grant to genetically engineer mice with high p62 levels to further explore the protein's basic functions and whether increased levels of p62 in the brain actually protect mice from Alzheimer's. She also will mate those mice to mice that have human genes implicated in Alzheimer's disease.

Then, Wooten and her team will follow the mice as they age and compare the incidences of Alzheimer's-like symptoms in the p62-enhanced mice with those in normal mice and in mice with reduced p62 levels.

If extra p62 appears to prevent or delay onset of memory loss in mice, scientists can begin investigating ways to apply the findings to combat Alzheimer's disease in humans. ◆

OFF WITH ITS HEAD—A phorid fly like those scientists have been releasing in Alabama since 1998 to control fire ants prepares to land on and lay an egg in this fire ant's chest. When the larva hatches, it will move into the ant's head and then, when it's mature, will release an enzyme that causes the ant's head to fall off. In research at Auburn, AAES entomologist Henry Fadamiro has solved the scientific mystery of what attracts the flies to the ants: It is, he discovered, the scent of fire ants' venom. ***(Photo by Sanford Porter, USDA-Agricultural Research Service)***

AAES research will lay groundwork for rivercane revival

Well into the 19th century, vast stands of rivercane dominated bottomlands in Alabama and across the Southeast, the extensive canebrakes serving as stream buffers and stream-bank stabilizers and critical wildlife habitat as well.

But since then, the native cane has ceded more than 95 percent of its original territory to farms, forests, pastures and development, such that canebrakes now are deemed highly endangered ecosystems.

In response, several natural resource/conservation agencies and organizations have made rivercane restoration a priority, and in a new Alabama Ag Experiment Station–funded study, Auburn University wildlife scientist Mark Smith aims to determine the most practical, successful, cost-effective techniques for accomplishing that.

Because restoring megastands of rivercane requires megasupplies of cane seedlings, Smith's goal in the first phase of his three-year project is to take newly developed rivercane-micropropagation technology—technology that allows thousands of new cane seedlings to be regenerated from a single mother plant—to a mass-production level.

TAKING ROOTSTOCK—Workers load up Alabama rivercane plants that will become mother plants to thousands of seedlings.

In addition to tracking the survival, growth and development of seedlings from Alabama rivercane root stock, he will be documenting the true costs of seedling production.

In phase two, the research will move from the laboratory to the field, when the seedlings will be planted in three five-acre test plots in north Alabama.

Smith's research will yield technical production information—how to prepare planting sites, how closely to plant the seedlings, how to control competition from other plant species and how to manage and maintain these plant communities—that will be key to cost-effective restoration of valuable rivercane ecosystems to the state and region. ◆

IMPACT is a quarterly newsletter the Alabama Agricultural Experiment Station (AAES) publishes to inform state and federal legislators, public policymakers and the general public about AAES research projects and how they affect all Alabamians. The AAES (www.aaes.auburn.edu) is based at Auburn University (www.auburn.edu). Contact IMPACT at 334-844-2783 or jcreamer@auburn.edu.

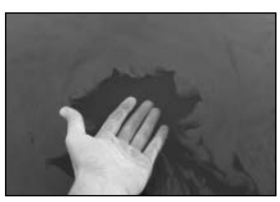
TUNNEL VISION—Shade cloths of varying colors cover colored bell pepper plants growing in high tunnels at the Alabama Ag Experiment Station's E.V. Smith Research Center in Shorter in a study to determine which color cloth cools plants most effectively. The study is part of Auburn University horticulturist Wheeler Foshee's long-term research on high-tunnel vegetable and cut-flower production in Alabama. He launched the project in 2003 and since has gethered extensive data that will help farmers who are interested in high-tunnel production make sound decisions on crop selection, production and marketing. High tunnels are arched, plastic-covered, greenhouse-like structures that allow growers to extend the seasons for some horticulture crops and have fresh produce to market several weeks earlier and later than their competitors. In their trials, Foshee and Extension research horticulturist Bobby Boozer in Chilton County say tomatoes, colored bell peppers, blackberries, watermelon and, for the cut-flower market, snapdragons and dianthus show the most profit potential in Alabama. Foshee notes, though, that while high tunnels can be a good source of extra income, they demand an intense level of management and are by no means get-rich-quick-and-easy ventures.

Study: Tiny creatures could help clear scum

Auburn University freshwater ecologist Alan Wilson is in the midst of a study that could eventually help aquaculture producers and other pond and lake managers get the upper hand on pond scum.

With a $400,000 National Science Foundation grant, Wilson and a colleague at Michigan State University are studying the food-web relationship between cyanobacteria, aka blue-green algae or pond scum, and microscopic aquatic animals, called *Daphnia pulicaria,*that feed on cyanobacteria and other plant plankton in lakes and ponds.

In freshwater habitats with high concentrations of nutrients—such as fertilized catfish ponds—cyanobacteria can form dense, toxic blooms that can harm fish, animals and people. Though previous research has indicated *D. pulicaria* can't thrive on toxic cyanobacteria, Wilson has found that those in lakes teeming with toxic cyanobacteria may adapt to and thrive on cyanobacteria in the diet.



ON THE SURFACE—Blue-green algae is easy to spot in a pond, even in black and white.

Results from the three-year investigation could lead to new strategies for managing toxic algal blooms in lakes and ponds by increasing the populations of cyanobacteria-tolerant *D. pulicaria* instead of by standard approaches, including frequent aquatic herbicide applications. ◆

Scientists team up on bug/soil project

The National Science Foundation has awarded an eclectic trio of Auburn University scientists $300,000 to find out how tunnel-digging insects affect the physical structure of soil and, subsequently, the way water moves through it.

The top objective of the three-year study is to expand scientists' basic understanding of soil hydrological processes, but it also could yield new data to help sod farmers, sports-field managers, golf course superintendents and homeowners across the South get the upper hand on a major nemesis: the turf-destroying mole cricket.

Teaming up on the project are Navin Twarakavi, a soil physicist at Auburn; Prabhakar Clement, an environmental engineer; and David Held, an entomologist.

The central focus of the study is on biopores, or subsurface pathways, that insects—in this case, mole crickets—create as they tunnel through the soil.

Held will investigate the crickets' burrowing behaviors as they build the biopores; Twarakavi will concentrate on how the biopores alter key soil-water interactions, including infiltration and runoff; and Clement will determine biopores' impact on the flow and transport of pollutants in groundwater.

The project also is expected to indicate whether insect-built biopores impact soil hydraulics and flow processes differently than man-made versions, called macropores, that typically are used in laboratory experiments.

Entomologically, the study could lead to more efficient pesticide delivery strategies for controlling mole crickets. Currently, turfgrass managers spend hundreds of dollars per acre to keep the pests in check. ◆

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