Study: Plants Can ‘Hear’ Their Attackers’ Approach

Some plants can hear and react to enemy caterpillars

Scientists have known that certain plants respond to sound vibrations—corn roots, for example, lean toward vibrations of a specific frequency—but until now it hasn’t been clear why they’re able to do so. In this experiment, researchers from University of Missouri exposed one set of plants to a recording of caterpillars eating plants and found they emitted more of the anti-caterpillar chemical and did it more quickly than the plants that weren’t exposed to the sound.

The researchers also found that background noise like wind or insects had no impact on the plants, indicating that the plants could distinguish the sound of their attackers.

Now the researchers are looking for the “ears” of the plants that allow them to hear, though they suspect they take the form of proteins known as “mechanoreceptors” found in plants and animals that respond to pressure.
Plants can hear loud leaf munchers

"Our work is the first example of how plants respond to an ecologically relevant vibration," said Heidi Appel.

By Brooks Hays | July 2, 2014 at 11:00 AM | 0 Comments (Leave a comment)

A hungry caterpillar that doesn't know it's participating in a lab experiment. (Roger Meissen/Bond LSC)

COLUMBIA, Mo., July 2 (UPI) -- Plants don't have ears in the traditional sense, but they can "hear" -- or at least detect and respond to sonic vibrations.

Researchers at the University of Missouri found Arabidopsis, a small flowering plant similar to cabbage and mustard, could recognize the munching sounds of an invading caterpillar. Upon hearing the hungry insect, the plant released additional mustard oils, a compound caterpillars find unappetizing.

"Previous research has investigated how plants respond to acoustic energy, including music," said lead researcher Heidi Appel. "However, our work is the first example of how plants respond to an ecologically relevant vibration."

"We found that feeding vibrations signal changes in the plant cells' metabolism, creating more defensive chemicals that can repel attacks from caterpillars," Appel added.

Previous studies have shown some of the ways plants respond to touch and even wind. But this new study, published in Oecologia, showed the plants were selective in which sounds they paid attention to. Only when caterpillar munching vibrations were recorded and played back for the plants, did they excrete additional mustard oil -- not so for recordings of wind and other vibrations.
"This indicates that the plants are able to distinguish feeding vibrations from other common sources of environmental vibration," explained study co-author Rex Cocroft said.

The researchers say better understanding how plants detect and respond to ecological threats could help botanists design plants with improved defense mechanisms.

"Once you understand these things you can mess around with it in plant breeding through conventional methods or biotech approaches to modify plants so they are more responsive in the ways you want to make them more resistant against pests," Appel said. "That's the practical application one day."

Researchers also want to figure out exactly how the plant senses vibrations. That remains a mystery, though Appel and Cocroft guess a protein called mechanoreceptors, which can respond to pressure or distortion, likely plays an important role in the process.

"Finding that out is our next step," said Appel.

Read more: http://www.upi.com/Science_News/2014/07/02/Plants-can-hear-loud-leaf-munchers/8521404309498/#ixzz36PWTezAp

Robert Shay is one to remember

By BILL CLARK

Wednesday, July 2, 2014 at 11:22 am

One of the problems of hiring a successful person is losing that success story to the next level – and there always seems to be a next level.

So it is with Robert Shay, the immediate past chairman of the University of Missouri School of Music, whose highly successful six–year run came to an end on Monday.
Rob Shay will become the dean of the University of Colorado College of Music in Boulder where he will have the responsibility of over 600 music majors — more than twice the number at MU.

He will be replacing Dan Sher, the dean who retired after 20 on the job.

“The Shays were happy in Columbia,” Rob commented. “We didn’t seek the job at Colorado; they called us.” It is the next level.

Rob leaves behind a history of innovation and success for his replacement, Julia Gaines, who is moving up from her role as professor of percussion.

Since replacing Melvin Platt before the 2008-09 school year, Rob has been most proud of the growth of the Mizzou New Music program, which has received multimillion-dollar support from Jeanne and Rex Sinquefield, who also have been deeply involved with the K-12 development program for almost a decade. He is proud, too, of his staff of 40 full-time faculty members who give MU leadership with both classroom and performance experience so vital to the 300 music majors.

The School of Music has created or expanded its role in the Columbia music and entertainment scene with partnerships involving the Odyssey Series, the Plowman Chamber Music Competition, “We Always Swing” Jazz, Jazz Workshop, the Columbia Civic Orchestra and for giving our community more than 125 faculty, student and guest concerts at Missouri Theatre and Whitmore Recital Hall.

The school has partnered with Stephens College and strengthened its ties with the St. Louis Symphony.

Rob also has ensured MU students of a chance to tour the world. Since 2010, MU has sent its wind ensemble to China (2010) and Italy (2014); the MU singers to Italy (2010) and Austria/Hungary (2014); and Marching Mizzou to Dublin, Ireland, in 2012 for the St. Patrick’s Day parade.

“I toured Europe when I was a student, and I want others to share that experience,” Rob said.

Columbia has sustained a double loss. Betsey, Rob’s wife of 28 years, also will leave a void in our community. She has served Odyssey as treasurer as that program continues to grow; is a part-time employee of “We Always Swing” Jazz and has been a development officer for the past three years at Stephens College.

Their daughter, Katie, however, will remain with us. A mezzo-soprano who majored in vocal music at MU, Katie has switched to film-making and has enrolled in the film program at Stephens College this fall.

'Tis a bit late, but here a few facts about erstwhile Robert Shay.
He was born in 1961 in Fairfield, Conn., to nonmusical parents but had three siblings who were musical. His first instrument was the saxophone in the fifth grade, but by high school, he switched to choral music.

Rob majored in music education and vocal performance at Wheaton College, toured Europe for six weeks with the Wheaton Glee Club, moved on to Northeast Conservatory in Boston for his master’s degree, then to the University of North Carolina at Chapel Hill, where he became a basketball fan, earned a doctorate in music history, spent a summer in England researching 17th-century music, then moved on to Arkansas College for eight years, including two years as dean of fine arts, finally landing on Longy School of Music, where he was dean before coming to MU.

In early July, the Shays will be in Salzburg, Austria, where Rob will present a research paper on 17th-century English music. They will leave Columbia behind on July 20.

And Columbia will be a bit less with their departure.

COLUMBIA MISSOURIAN

Missouri revenues fall short of projections

By DAVID A. LIEB/The Associated Press
July 2, 2014 | 7:10 p.m. CDT

JEFFERSON CITY — Missouri ended its annual budget year with revenues falling significantly short of what had been expected, meaning the state may soon have to dip into reserves to pay its bills.

Figures released Wednesday show that net general revenues declined 1 percent for the 2014 fiscal year when compared with the previous year. That translates to $308 million short of what Democratic Gov. Jay Nixon projected and $241 million short of the forecast by Republican legislative leaders.

As a result, Missouri started its new budget year Tuesday with a cash balance of $222 million — a lower-than-typical amount that will likely require state officials to tap into a
reserve fund to meet its obligations in July, said Linda Luebbering, the director of the Division of Budget and Planning, part of Nixon's administration.

The drop in annual state revenues was the first since the 2010 fiscal year, when Missouri was suffering the effects of a national recession. Although the U.S. economy is not currently classified as in a recession, the federal government reported last week that the economy shrank at an annual rate of 2.9 percent from January to March.

As recently as this past January, Missouri's governor and legislators had been forecasting growth, though they differed on how much.

Missouri's sales tax revenues did grow, but individual income tax collections — which account for about two-thirds of Missouri's general revenues — slightly declined. Overall, the state took in about $8 billion in net general revenues for the 2014 fiscal year, which ended Monday.

The financial shortfall will have lingering effects in the 2015 budget year, because the state is at a lower starting point than had been assumed when Nixon forecast a growth rate of 5.2 percent and legislators predicted 4.2 percent.

Nixon already has vetoed or frozen hundreds of millions of dollars of spending for the 2015 budget. That's partly because of the decline in state revenues and partly because of the potential for legislators to override his vetoes of various tax-break bills that Nixon contends would reduce revenues even further.

There are several potential reasons for Missouri's declining revenues.

Luebbering said some Missouri residents took capital gains in the 2012 calendar year to avoid an increase in the federal capital gains tax that took effect in 2013. That resulted in higher state income tax revenues when those 2012 taxes were paid in the first half of the 2013 calendar year, and lower-than-normal capital gains tax collections in 2014, she said.

The 2014 revenues also appeared lower because the prior year's figures included a nearly $40 million payment from a settlement with mortgage lenders, Luebbering said.

**State tax credits may also play a role in diminishing revenues, though the details on how many credits were claimed won't be known until later, said**
Joe Haslag, an economist at the University of Missouri-Columbia who helps legislative and executive branch officials develop revenue forecasts.

Haslag said Missouri's declining revenues reflect a longer economic trend.

"The undisputed fact is we just haven't been growing fast as a state for a couple of decades," Haslag said.

In June, the federal Bureau of Economic Analysis released state-by-state figures for the 2013 growth in the real gross domestic product, a commonly used method for measuring the strength of the economy.

Missouri had 0.8 percent growth, which was a full percentage point behind the national rate. Missouri's economic growth ranked 45th nationally, ahead of only Alaska, Maryland, New York, Pennsylvania and Virginia.

COLUMBIA MISSOURIAN

MU Multicultural Center takes on Stephanie Hernandez Rivera as coordinator

By Jenny Justus
July 2, 2014 | 8:46 p.m. CDT

COLUMBIA — Stephanie Hernandez Rivera began her new job Monday as the coordinator for MU's Multicultural Center.

The position was left vacant for nearly a year after Pablo Mendoza resigned in 2013.

The 27-year-old is at MU while finishing up her master's degree in Women's and Gender Studies from Rutgers University in New Jersey.

The first thing Hernandez Rivera said she will do is assess and observe how the center is running.
"I want to see what's working and then what needs to be re-evaluated and go from there," Hernandez Rivera said.

Her personal goal as the coordinator is to create an environment where students can ask questions and challenge preconceived notions. Students, she said, will be her focus.

"To an extent, it's not about what I want. It's about what the students' needs are, what the students need the center to be, and how I can assist in helping that occur," Hernandez Rivera said.

"I think the Multicultural Center serves as a resource and an educational piece outside of the classroom for students from majority groups on campus to become more culturally aware and culturally adept," she said. "I also think it serves a purpose for students who have been marginalized in different ways depending on cultures or groups they're a part of in society."

While the students work toward earning their degrees, Hernandez Rivera said she hopes that the center will help people become more attuned to the world around them.

Hernandez Rivera is also interested in exploring how to combat students — particularly students of color — from being "tokenized" in classrooms. She's brainstorming about an idea she calls "Things I wish my professor knew."

"It would be focus-group style just getting in and asking students their perspectives on what are some things they've experienced in the classroom that they wish their professors knew," she said. "And then hopefully that would encourage professors to have some kind of training regarding these issues and how to create a more inclusive environment."

She said that the goals of the Multicultural Center and college professors are similar because they're both trying to educate a community of people.

"If we joined forces, we'd be able to create students who are socially conscious global citizens who understand not just the climate here at the University of Missouri or the climate in Missouri but the climate — globally," Hernandez Rivera said.
Danielle Walker is the graduate assistant for the Multicultural Center. She helps the coordinator with logistics, programming and advising the student organizations.

**Last year, when the center was without a coordinator, students and leaders from other organizations took on responsibilities to help everything run smoothly.**

"Having a coordinator now will definitely help bring a little bit more stability and structure back to the center," Walker said. "That allows the student organizations to receive the proper attention and resources to help them flourish."

Walker has been involved with the Multicultural Center for several years and thinks it will benefit the students to have a coordinator again because they have knowledge and background to help students access and use various resources.

"I'm looking forward to the Multicultural Center expanding itself on Mizzou's campus, making its presence fully known with the other social justice centers," Walker said.

MU student Debielle De La Haye has been involved in the Multicultural Center since she first came to MU nearly four years ago. Now, she's an intern for the Hispanic American Leadership Organization on campus.

"I'm excited to have a person who hasn't been at Mizzou or in Missouri that can bring a fresh ideas and a new perspective," De La Haye said.

Hernandez Rivera said she's excited for this opportunity and is eager to see what the semester has in store.

"I'm really really passionate about what I'm doing," Hernandez Rivera said. "No matter what I do, I'm going to give it everything I have."
So much has been said about the rising cost of college. So much has been written about student loan debt reaching crisis proportions.

Now a report by the Brookings Institution comes with some unexpected news: Student loan debt isn’t as bad as it’s been portrayed, and fears of a looming student debt crisis are overblown.

The report’s authors suggest that those borrowers burdened with $100,000 debt loads, who frequently appear in media coverage, “may not be part of a new or growing phenomenon.”

Sure, some students and families will get in over their heads as they borrow more to afford the level of education the industry tells them is essential for success.

But typical borrowers “are no worse off now than they were a generation ago,” the report says. “The percentage of borrowers with high payment-to-income ratios has not increased over the last 20 years.”

Because evidence of widespread financial hardship wasn’t found, the report concludes that broad-based policies aimed at all student borrowers are likely “unnecessary and wasteful.”

In the nation’s troublesome trillion-dollar student loan debt total, Brookings pointed out that “roughly one-quarter of the debt increase since 1989 can be directly attributed to Americans obtaining more education, especially graduate degrees.”
But isn’t that exactly what President Barack Obama and the nation’s governors have said they want — more Americans getting a college education?

**It gets murky, said Rob Weagley, chairman of the personal financial planning department at the University of Missouri.**

“There are two sides to this issue, and both sides want to use the same story to make their point,” he said.

One side blames colleges for spending too much to build fancy facilities and overpay faculty, driving up the cost of higher education.

“They think we need to rein in the costs,” Weagley said.

Another side blames state lawmakers for not seeing that investing more in higher education will pay dividends for those individuals and for the country down the road.

There’s yet another group, said William Elliott, associate professor of social welfare at the University of Kansas.

“We have some who really see the value of student loans as increasing access to higher education” for families who couldn’t afford it any other way, he said.

Those people, said Elliott, who’s an expert in assets and education, “don’t want to say anything negative about the student loan program for fear the program will be lost altogether.”

ASPEN, Colo. -- Like many of his predecessors, Education Secretary Arne Duncan is known mostly as a K-12 person; that’s his background and clearly his passion, and much of the department’s work is in what happens to students before they get to college. And not surprisingly, as a result, his public speeches and statements tend to veer toward K-12 (and increasingly early education) more than higher education.

That made his nearly hourlong interview here at the Aspen Ideas Festival noteworthy, even if he didn’t break any terrifically new ground or touch on some of the major topics that are occupying some of his staff members right now (like the department’s negotiations to force Corinthian Colleges to sell or close its 107 campuses with 72,000 students).

In the capable hands of his interviewer, David Leonhardt of The New York Times, Duncan offered fairly expansive comments about the college rating system the Education Department is producing (making clear just how personal an issue this is for President Obama and how intensely focused he is on it) and the seriousness of the student debt problem -- including conceding that the rhetoric about the issue sometimes fails to distinguish between good debt and bad debt.
First, for the many college officials who keep hoping that the administration will abandon its idea of rating colleges: Don't hold your breath.

Asked by Leonhardt to respond to the criticism that the government can't rate colleges intelligently and effectively, Duncan reiterated that department officials know they have a hard job ahead. "We're going into this with a huge sense of humility," he said, and recognize that "intellectually it is difficult." But given that the federal government puts out $150 billion in federal student assistance each year "and none of it is based upon outcomes," he said, "for us to do nothing is untenable."

Duncan's list of the outcomes he anticipated the system holding colleges accountable for suggested that the department has been listening (as its officials have insisted) to at least some of the criticisms lobbed at the ratings idea.

"Are you increasing your six-year graduation rate, or are you not?" he said. "Are you taking more Pell Grant recipients [than you used to] or are you not?"

Both of those metrics, if they were to end up as part of the rating system, would hold institutions responsible for improving their performance, not for meeting some minimum standard that would require the government to compare institutions that admit very different types of students.

A rating system focused on the extent to which individual colleges got better over time would still surely be criticized, but by comparing a college to itself over time, rather than to institutions that were very different, it would blunt critiques that the system would aim to compare the incomparable.

Duncan did ask the ratings system's many critics to reserve judgment until they actually knew what it would look like.

"This system that people are reacting against doesn't exist yet," he said. "Tell us what you like; help us do this.... Let's not be against something that has not been born yet."
Duncan also made it clear that the rating system, and the larger push for higher education accountability, is coming directly from the top of the Obama administration.

The education secretary described his relationships with President Obama and his wife Michelle, whose brother, Craig, and Duncan were high school friends in Chicago. "To have your friend become president is one of the craziest things to have happen," Duncan said.

Duncan described the paths that Michelle Obama and the president took to get the elite higher educations they gained, and the many letters the president receives from former students burdened with debt.

"He talks about this all the time," Duncan said. "He was talking about this in a cabinet meeting yesterday."

Student debt is driving much of the president's interest in the rating system and accountability generally -- but Duncan conceded in response to a question from Leonhardt that, as the Times writer recently argued, some of the rhetoric about student debt is overheated.

"If you have reasonable debt and you're getting a college degree," the education secretary said, that debt is probably worth it, because it has been demonstrated that a college degree is still "the best investment you can make."

"But if you have inordinate debt and no degree, you're in a worse situation than where you started," he added.

Leonhardt pushed Duncan further, describing someone who had taken out $30,000 in student loans to earn a bachelor's degree from a "good state university." "Are you comfortable with that person having $30,000 in debt?" he asked Duncan.
"In a perfect world, it would be less than that," the secretary said. "But on the top 10 things that keep me up at night, that's not on it. It's not the end of the world. But where you have $60,000, $70,000, $80,000 and no degree, that is the end of the world. That is catastrophic."

Editorial: Job creator tells Missouri Legislature it is wrong on Medicaid

By the Editorial Board

Over the past two years, a small faction of Missouri Republicans has blocked Medicaid expansion in the state despite overwhelming evidence that besides being the right and moral thing to do, it also would be a boon for the state's economy.

They ignored a University of Missouri study that predicted that the influx of billions of federal dollars into the state's health care sector would create tens of thousands of jobs and an increase in other economic activity.

They ignored a report from fellow Republican Jay Barnes, a House member who has been leading a GOP guerrilla effort to pass Medicaid expansion, that showed the move would actually improve the state’s general revenue picture for several years.

They ignored state economic development studies and actual results in states that have expanded Medicaid and seen improved economic activity.

They ignored the simple moral imperative that when more people have health insurance, fewer people die. Perhaps a letter from a job creator will do the trick.

Paul Taylor is the chief executive officer of Ozarks Community Hospital, located in the Republican hotbed of Springfield, Mo. The health system operates in southwest Missouri and northwest Arkansas. It has, for now, at least, about 800 employees.

Mr. Taylor recently informed Missouri’s Dislocated Worker Program that Ozarks Community Hospital is about to lay off employees in the state. The reason? No Medicaid expansion.
The company is adding jobs in Arkansas, which has agreed to a Medicaid expansion similar to the one Mr. Barnes has proposed, and state Sen. Ryan Silvey, R-Kansas City, has supported. They can’t even get a vote in the House or Senate.

Mr. Taylor’s letter isn’t a prediction of something hypothetical. It’s a real letter from a real CEO laying out how Missouri’s Legislature has chosen to be a job killer.

“The layoffs will occur solely in the Springfield hospital and clinics. In fact, we recently added 62 (jobs) at our hospital and clinic in northwest Arkansas,” Mr. Taylor wrote. “The reason we are hiring in Arkansas and laying off in Missouri is that Arkansas chose to expand Medicaid under the Affordable Care Act and Missouri did not. We certainly wish it were otherwise. … Unfortunately, even if Missouri expands Medicaid in the future, it will be virtually impossible for us to recapture this loss of capacity. Hospitals cannot shrink and expand as readily as other industries. I fear that Missouri will never recover the ground it is now losing statewide as a result of political posturing.”

Missouri Republicans said they opposed “Obamacare” because they might not have the money for it some day in the future. Tax breaks for “job creators” came first.

This one job creator says they got it wrong.

Maybe they’ll finally listen next year. How many more jobs and people will they have to kill?