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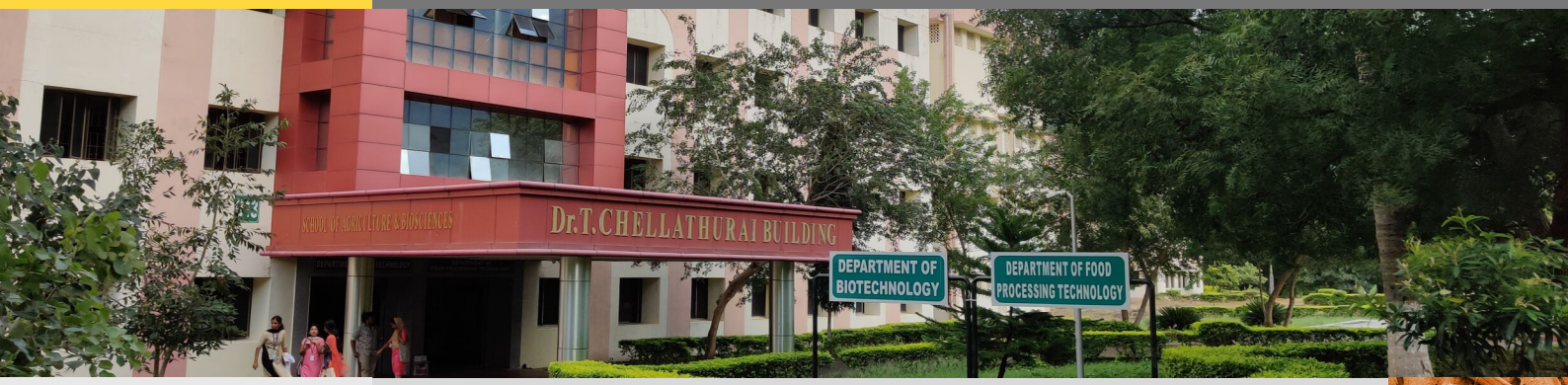
BIOLUMIÈRE

Newsletter by the Department of Biotechnology



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RESEARCHERS EXPLAIN HOW TINY ROUNDWORMS SENSE DIFFERENT KINDS OF TOUCH

Most animals can distinguish between two distinct types of touch stimuli: gentle (innocuous) and harsh (noxious/painful) touch. However, the underlying mechanisms are not well understood. *Caenorhabditis elegans* is a useful model for the study of gentle touch sensation. However, little is known about the harsh touch sensation in this organism. Shawn Xu, a biologist at Life Sciences Institute and his team showed that *C. elegans* exhibit differential behavioural responses to harsh touch and gentle touch. Laser ablations identify distinct sets of sensory neurons and interneurons required for harsh touch sensation at different body segments. Patch-clamp recordings revealed that TRP family and amiloride-sensitive Na+ channels mediated touch-evoked currents in different sensory neurons. Their work identifies the neural circuits and also characterizes the sensory channels mediating harsh touch sensation in *C. elegans*, establishing it as a genetic model for studying this sensory modality."We were looking at the neural circuits," Xu said. "The nervous system is composed of neurons that are wired together by circuits, and that's how they process information. We wanted to know which neurons are responsible for detecting the harsh and gentle touch."Worms are much simpler than humans, but their behavioural responses to touch are similar to ours," said Laurie Tompkins, who oversees behavioural genetics grants at the National Institutes of Health. Elucidating the molecules and neural circuitry involved in worms' responses to painful touch will advance efforts to understand and control pain—both in humans and other animal species as well.

IMPROVED CONVERSION OF FOOD WASTE TO BIOENERGY WITH OPTIMIZED FOOD-TO-MICROORGANISM RATIO AND SUPPLEMENTAL NITROGEN AMENDMENT

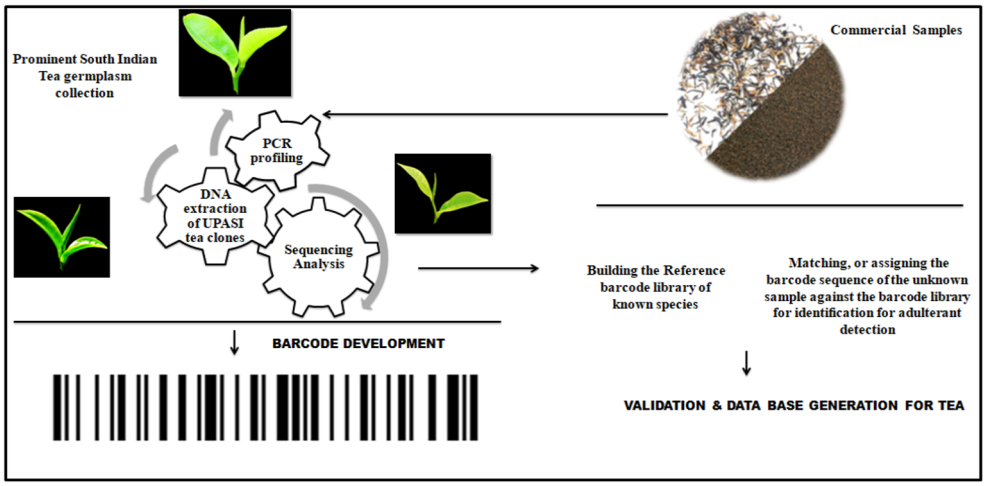
VIGNESH S, BISWANATH MAHANTY

Uncontrolled generation and unscientific disposal of large amounts of food waste is a severe environmental issue. Among various available treatment methods, anaerobic digestion (AD) to produce biogas is a proven, ecofriendly and economical route for simultaneous food waste treatment and energy recovery. Composite food-waste sample collected for an entire week from Students Hostel (Karunya Institute of Technology and Sciences, Coimbatore, India) was tested for methane production potential in four anaerobic digestion setup using anaerobic digester sludge. Experimental sets with 400 mg of COD with different food to microorganism (F/M) ratios of 0.2, 0.5, 1, and 2 (VS/MLVSS basis) was tested for biogas production for a week. Results suggest a maximum amount of biogas production (169 ml) at lowest F/M ratio and lowest biogas production (72 ml) at F/M ratio of 2 within 5 days. Optimization of carbon/nitrogen ratio (30:1) of the anaerobic digestion process was further undertaken while adding urea as nitrogen sources (while keeping F/M at 0.2). The efficiency of biogas production from food waste increased to 181 ml against the maximum theoretical yield of 280 ml. The results of this study suggest the successful application of using nitrogen sources to increase the efficiency of food waste and the production of methane can be valuable. However, assessment of any interaction between those parameters needs improved and robust experimental design to be valuable in the designed AD process.

DNA BARCODING FOR FOOD BIOTECHNOLOGY APPLICATIONS IN CAMELLIA

NTRF- RESEARCH PROJECT PI:JIBU THOMAS

Tea, the most widely consumed beverage has attained value addition in terms of herbal tea, spice tea, flavoured tea, etc. Food adulteration has been common since time immemorial and it has become more sophisticated and frequent in recent years. In general, tea powder is being contaminated or substituted with other plant components which could cause disputes in the trade of so called 'pure' or 100% tea products. Most often it possess a serious threat in the domestic market with false claims in blending or being substituted with inferior adulterants. Identification of these products based on morphology is impossible because of its powder form. DNA barcoding provides a fast and effective detection tool for identification of plant components without considering the morphological characters. It is developed as an effective, accessible and inexpensive way to verify plant based products and to find its true identity. This project sought to authenticate the similarly associated species and to generate DNA barcode database for each accessions. The prominent plant barcode regions like larger subunit of chloroplast ribulose bisphosphate carboxylase (rbcL), chloroplast maturase K (matK) and the nuclear internal transcribed spacer (ITS2) are used to identify and explore the adulteration of other plant components apart from tea. The barcode database will be generated for the natural tea and the commercial tea products using standard procedures which could be integrated into cost effective best practices for developing commercial products. This will be an advantage as it is served to produce an authentic, high quality product based on DNA barcode therefore gaining consumer confidence and preference.



THE SECRET PROTIEN BEHIND THE COLD SENSATION OF ORGANISMS

Source: University of Michigan
Summary: Researchers have identified a receptor protein that can detect when winter is coming.
"Clearly, nerves in the skin can sense cold. But no one has been able to pinpoint exactly how they sense it," said Shawn Xu, a faculty member at the University of Michigan Life Sciences Institute and senior author of the study. "Now, I think we have an answer. When the worms sense cold, they also engage in avoidance behavior -- moving away from cold temperatures, just like humans." The researchers found that worms missing the glutamate receptor gene GLR-3 no longer responded when temperatures dipped below 18 degrees Celsius (64 F). This gene is responsible for making the GLR-3 receptor protein. Without this protein, the worms became insensitive to cold temperatures, indicating that the protein is required for the worms to sense cold. What's more? It turns out that the vertebrate versions of the GLR-3 genes can also function as a cold-sensing receptor. They added the worm, zebrafish, mouse and human versions of the genes to cold-insensitive mammalian cells. With all versions of the gene, the cells became sensitive to cold temperatures.The researchers discovered, however, that this gene is also active in a group of mouse sensory neurons that detect environmental stimuli, such as temperature, through sensory endings in the animals' skin. Reducing the expression of GluK2 in mouse sensory neurons suppressed their ability to sense cold, but not cool, temperatures.The findings provide additional evidence that the GluK2 protein serves as a cold receptor in mammals."It's really exciting. This was one of the few remaining sensory receptors that had not yet been identified in nature" Xu said.

IAESTE NEWS

"A place where curious, scientific and adventurous minds contend."

Catherine Johnson
Third year Biotechnology

She had the blissful opportunity to pursue her two months internship in Jomo Kenyatta University of agriculture and technology in Kenya. Kenyan excellence in science has accomplished in the fields of agriculture, environment and conservations, medicine, engineering, and others. She was fortunate enough to work in commercial labs and assist master's students in their projects. She got the chance to delve into the field of tissue culturing focusing on banana and mushroom production. Moreover, she was able to probe her technical side by working in molecular biology labs, greenhouse farms, and organic farms.She also had a wonderful opportunity to explore this culturally rich land where she visited National park and trekked in Nong hills. Through this two months internship, she gained an interesting and challenging scientific experience which will surely take her a step ahead for her future ventures.

Daryll Samuel
Fourth year Biotechnology

To relish in science, to be adventurous and of all to experience new things, Daryll Samuel, fourth year biotechnology student has encompassed all this during his intern period in the Department of Molecular Neurochemistry of the Medical University of Lodz, Poland. He was fortunate enough to be part of ongoing research the department was carrying out, where they worked on uterine samples from newborns and neonatal babies and were finding a treatment for the congenital intrauterine infection like syndrome. As an intern, he worked on determining the cellular mechanisms, performed various techniques and also cultured cells. His work was mainly focused on the molecular biological aspects and cell culture techniques which helped him to hone his technical skills and also strengthened his academic side. Apart from the lab life he also had amazing polish experiences where he learned, cherished and came across a lot of new things.