



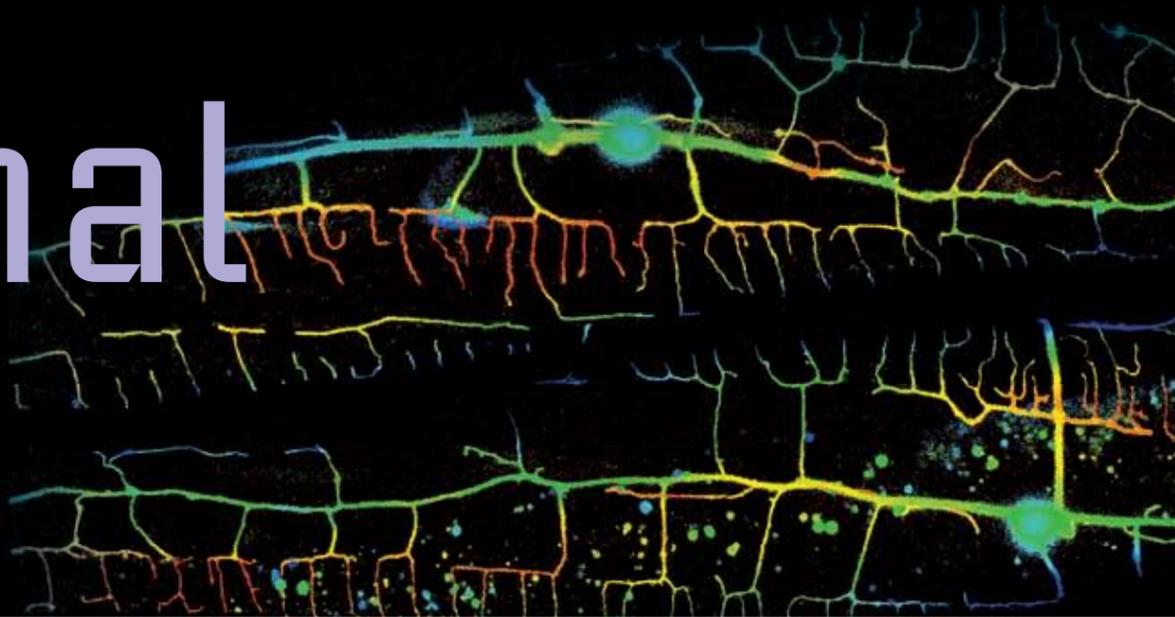
Technion - Israel Institute of Technology

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-FOCUS

Pruning Neuronal Trees



Confocal fluorescent reconstruction of two PVD neurons that form reproducible branching trees that look like menorahs.

By studying the small (1 mm) roundworm *C. elegans*, a Technion-led international research team has discovered *how* tree-like nerve structures are formed and maintained. Published online in the May 6th issue of *Science Express*, this breakthrough may have applications in the treatment of neurodegenerative diseases and in the repair of nerve damage. Prof. Benjamin Podbilewicz of the Technion Faculty of Biology reports that

while biologists have known for years that many neurons form complicated tree-like structures, it was not understood how the neurons form and maintain them. To unravel this mystery, his PhD student Meital Oren-Suissa, 30, and the research team first examined the dynamic development of two mechanoreceptor neurons known as PVDs required for reception of strong mechanical stimuli in *C. elegans*. Podbilewicz comments that Martin Chalfie, the 2008

Nobel Prize in Chemistry laureate, had previously shown that when a worm is hit on the body, it responds by moving away, demonstrating that the PVDs are necessary for *C. elegans* to sense pain.

"The PVDs give rise to neuronal trees comprising structural units that we call 'menorahs,' because they look like Jewish

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Multi-Culti Math



"All ornament should be based upon a geometrical construction"
—Proposition 6 in Owen Jones's 1868 seminal book, *The Grammar of Ornament*.

By Amanda Jaffe-Katz

Two Technion researchers from diverse ethnic backgrounds are meeting a universal challenge – how to teach geometry to high-school pupils in an applied and meaningful

way. Russian-born Jewish Prof. Igor Verner of the Department of Education in Technology and Science is co-leading the project with Faculty of Mathematics Prof. Daoud Bshouty, an exemplary member of the Israeli Arab Christian

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ENGINEERING with A SOUL

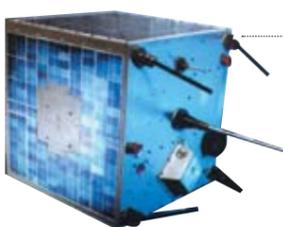
Israel's first chapter of *Engineers Without Borders*, from Technion, installs biogas systems in rural Nepal providing sustainable energy and improved sanitation.

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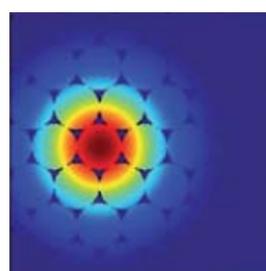
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O(R)bituary



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FUNNEL VISION



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TECHNOBRAIN



ENGINEERING

with **A** SOUL

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By Amanda Jaffe-Katz



Hands-on Prof. Mark Talesnick (second from right) leads the EWB-Technion team in Namsaling, Nepal.

Prof. Mark Talesnick says, "We teach our students how to think, how to crunch numbers... but nowhere do we teach them anything to do with a social conscience. Nor are we training our graduate engineers as leaders in society." Now, through EWB, Talesnick offers students "Engineering with a soul," in hands-on engineering tasks. He says that even small budget projects have a big effect on the community.

"A small push from us can stimulate huge gains for the community and great gains in the development of our engineers," he says. About 25 students took part in the project and its preparations. A group of three women and three men students together with Talesnick implemented the project on the ground in Nepal.

Hannah Bardin, 27, has been involved in the EWB-Technion initiative since the initial meeting held on campus. "This is a really unique opportunity to combine my engineering education with social values," says this master's student who is specializing in water management. She continues, "Being able to apply engineering skills in order to help a community and actually deal with real life engineering challenges was an experience I couldn't get anywhere else."

Their expedition supplied the financing of a subsidy of 40 reactors, a revamped construction scheme for the reactor dome, a sustainable construction scheme for the building of many more reactors, and a means to test compost for any harmful bacteria with an innovative on-site lab.

In addition, EWB is helping the residents of Namsaling to build and use more sanitary toilets, thus providing "fodder" to the biodigesters and preventing

contamination of the water by human and animal waste caused by lack of sanitary facilities.

Namsaling was not new to biodigesters. However, the traditional construction scheme is very time- and labor-intensive. It involves filling in a pre-constructed pit with earth, shaping a dome and concreting the surface. After completion of the cast the earth below the dome must be removed.

The Technion's improved design is based on a lightweight, modular and reusable framework for the construction of the dome. Twelve composite surfboard-shaped slices made from a laminate of Styrofoam and fiberglass are assembled on an aluminum frame like an igloo to provide the template on which the concrete is cast. Four days later, it is dismantled and the construction engineers can move on to the next reactor.

Learning from their experience, and wanting to adapt the design to materials available locally, Talesnick's crew came up with the idea to replace the Styrofoam with bamboo that grows abundantly in the area. "We'll make big sushi mats," explains Talesnick, "and not only will their production be sustainable, but they can be rolled up for storage and transportation to the next biodigester site." Bardin adds that the perfected design, which can be mass-produced at a national level, will be more suitable for the villagers' needs.

"Simple things like these change their lives," Talesnick says. The Technion team plan to make annual return visits during a five-year period, "and then it will be time to move on to another project in a new location," he says.

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 - **Problem:** In rural villages throughout Nepal, landlocked between India and China where there is no access to gas or kerosene, old-growth forests are being cut down and wood serves as the main energy source for cooking and heating. With no proper ventilation in the home women, who do the cooking, are at risk for respiratory disease.
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 - **Solution:** A sustainable technology, "biogas digestion", can produce flammable gas from the decomposition of animal and human waste, providing families with reliable, renewable energy without the need for labor-intensive firewood. How does it work? The bacteria in the manure produce methane gas – dubbed "GoberGas" by the locals – that can be used for cooking and heating. In addition, the byproduct – safe and rich compost – is a money maker.
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 - **Means:** Engineers Without Borders – Technion (EWB) trip to Namsaling, Nepal – 2009-2010, led by Prof. Mark Talesnick from the Faculty of Civil and Environmental Engineering. Two student members of the team went in December 2008 on a fact-finding trip to observe the needs of the villagers.
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 - **Result:** Clean energy for cooking. Animal and human waste do not infect clean water sources, rather they become a sought-after commodity. Less deforestation, and associated soil erosion.

EWB

Engineers without Borders (EWB) was founded in 2001 by French-born Bernard Amadei, who is now at the University of Colorado at Boulder. EWB now numbers 300 chapters worldwide, and more than 600,000 people in 41 countries have benefited from the humanitarian aid provided. EWB is dedicated to fostering sustainable engineering projects in developing and disadvantaged communities world over. EWB-Technion chapter was established in 2008, and in addition to the team who joined the expedition to Nepal, some 20 to 30 other students attended meetings and were involved in the design and preparations for the project.

In July-August 2010, Talesnick and Amadei will teach an accredited summer program for international and Israeli students to be held at Technion, on "Engineering for Developing Communities." Students will assess the needs within the community, conduct laboratory work, and later implement their projects.

<http://ewbtechnion.wordpress.com>