HPU prof hopes to combat hunger with micro-animal farming

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BROWNWOOD—Howard Payne University professor Martin Mintchev and students from his engineering science class aim to combat world hunger using micro-animal farming.

Martin Mintchev (left), professor of engineering at Howard Payne University, and students Jayden Modrall and Rylee McGee have developed a laboratory project to grow tardigrades, microscopic animals to be cultivated as a potential food source. (HPU Photo)

Their design, provisionally called Microfiest, attempts to grow microscopic animals known as tardigrades as rapidly procreating cellulose-to-protein

converters. Once the contained environment is converted from being dominated by cellulose to being dominated by tardigrades, it will be dried and milled into protein-rich flour.

“These micro-animals can survive tremendously varied and even very difficult environmental conditions and, if properly farmed, multiply rapidly,” said Mintchev, professor of engineering and chair of HPU’s department of engineering.

“Because they consume cellulose while growing protein in the process, and due to their extremely high reproducibility, they can be considered an extremely rapid cellulose-to-protein converter and a potentially reliable food source.”

Mintchev devised the micro-animal farming project not only as an educational opportunity for his students in engineering design and entrepreneurship, but also to motivate them to become part of a possible solution of one of the world’s most pressing problems—hunger.

“If we learn how to farm micro-animals in huge quantities by feeding them with cellulose that is indigestible for humans, the resulting protein might deliver valuable and much needed nutrition,” he explained.

Tardigrades can preserve themselves in a dormant state even if light, water and cellulose become unavailable, without any need for refrigeration or special conditions, he noted. That creates the possibility of long-term simple storage.

Project has a patent pending

The fully functional tardigrade farm is, for now, a glass container full of algae, moss, water, light and an initial population of approximately 120 tardigrades. The tardigrades live, grow and procreate under a caging

nanomesh lid.

The project has a pending patent authored by Mintchev; Gregory Hatlestad, associate professor of biology; and Lester Towell, former professor of computer information systems and former chair of the department of computer information systems.

The initiative was designed to position the team at the forefront of the fight against hunger while giving the students an opportunity to participate in the process of developing a real business partnership.

For now, the team is learning whether tardigrades can be farmed in unpretentious environments and in great enough numbers. The second part of the project will seek to maximize protein yield by providing engineering control of moisture, temperature and cellulose supply while ensuring continuous tardigrades population-growth monitoring.

“We have left the estimates of the eventual protein yield and calories for last, when we become certain that these micro-animals can be reliably farmed,” Mintchev said.

Previous and ongoing attempts at farming miniature animals such as ants, flies, grasshoppers and crickets delivered some protein yields, but the problems related to the special farming environment needed jeopardized their potential as a reliable food source, he explained.

“In contrast, tardigrades do not require any particularly special conditions to thrive and rapidly procreate, as long as cellulose content and water are provided,” he said.

Potential to benefit millions globally

Mintchev formed the Microfiest Partnership with two seniors majoring in engineering science—Jayden Modrall of Yantis as chief executive officer

and Rylee McGee of Freeport as chief operating officer. Mintchev serves as president of the partnership.

“This is a very interesting project for our students,” said Gerry Clarkson, dean of HPU’s School of Science and Mathematics. “Dr. Mintchev has given Jayden and Rylee the opportunity to participate in a project that can potentially address the global problem of inadequate food resources while simultaneously learning about all the processes involved in designing and implementing a major project from its very early stages. Such projects are a valuable and integral part of the education of our engineering students.”

Mintchev expressed enthusiasm for the endeavor’s long-range potential.

“I hope this new farming niche will result in the most rapid and yet the most simple and unpretentious cellulose-to-protein converter ever, and that our work will one day benefit the millions of hungry people around the globe,” he said.