

Young Mexican given award for developing bacterium that eats oil



Luis Caleb Damas, a Biotechnology Master's student at Tec de Monterrey, has received the Sergio Sánchez Esquivel award from the Mexican Society of Biotechnology and Bioengineering (SMBB) for a thesis protocol on an "anti-oil" bacterium.

The 23-year-old's **research** is based on the efficient use of a **bacterium** that **organically degrades oil in the event of** a spill on a body of water, such as a sea, and does so less expensively.

*"Oil spills have a big impact on the environment. This bacterium produces 2 compounds that remove the oil: **pyocyanin** and **rhamnolipids**,"* explains Luis Caleb.

The award was given during the **19th National Biotechnology and Bioengineering Conference**, held from September 27 to October 1. A financial prize was also given.

The **Sergio Sánchez Esquivel award** is given to undergraduate and graduate researchers **every two years**. It's the **first time** that a **Tec student** has been **given a prize** by the **SMBB**.



Seeking a cheaper and more effective process

Luis Caleb explains **that the pyocyanin and rhamnolipid compounds** help to **isolate the oil** and make it **easier to remove**.

*“If you use **bacteria**, you can remove more than **90%** without people having to go clean the oil up,”* says the young scientist.

Caleb adds that this **process** is called **bioremediation**. Although it is already used, the young scientist is now looking to investigate **a way** to make the process **cheaper** and **more efficient**.

*“The **bacterium** makes the **2 compounds**, but **producing them is complicated**, as very little is produced, and the **compounds vary** with each bacterium.”*

*“(As part of the research) we want to **increase the production of both compounds** and improve the removal of hydrocarbons from the water,”* he says.

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He adds that the **prior planning** of the **research** that he will carry out during his master’s degree at Tec de Monterrey is known as a **thesis protocol**, which is what earned him the award.

This **protocol** is entitled *“The design of rational metabolic engineering strategies for the co-production of pyocyanin and rhamnolipids in Pseudomonas aeruginosa IGPR1 for the bioremediation of water bodies polluted with hydrocarbons.”*

“Right now, we’re at the **strategic point** of defining which **genes** we’re going to **modify** and we’re making our **first attempts** to modify the bacterium with the genes that we’ve identified.

“We’ll conduct the research during the rest of the semester and the next to see how **efficient the removal of hydrocarbons** is,” says Caleb.



His research was inspired by seeing an oil spill at sea

When he was younger, Caleb witnessed the damage caused by an oil spill on a **trip** to the **beach** on **Padre Island, Texas**, in the **United States**.

“My dad explained that it was because the **oil spill** had reached the beach. At that time, I didn’t understand, but later I realized the **huge impact** it has.

“If it was **awful** for us to remove the **black oil** from our feet, how much more horrible was it going to be for the affected animals?” recalls Caleb.

The young man from Monterrey points out that his **interest** in **biotechnology** came from **his father**, who has a **doctorate** in the same area.

“As a child, I heard about **bacteria, parasites, DNA, and microbiology**. I developed an interest as I was growing up,” he explains.

Caleb became interested in **Metabolic Engineering** during his degree course. After graduating, he applied to study for a **master’s degree in Biotechnology** at **Tec de Monterrey**.

That **story** and his **area of study coincided** during his graduate course, giving rise to an interest in investigating a **more efficient way** to deal with **oil spills** and reduce **environmental damage**.



Looking to a future with less ecological damage

*“This **project** has (future) **commercial applications**. There’s a possibility of more spills around the world, so I’d like **people** to be able to **access this information easily**.”*

*“I hope that it can be **freely accessible** because it’s **cheap** and easier to do than any other methods that are currently used,”* says the young researcher.

Caleb adds that there are **similar projects** at universities such as **UNAM**, but some of them **focus on only 1 of the 2 bacteria**.

*“Now we have to do the lab work, see how the **planned modifications** react, reject **strategies**, and improve the ones we already have,”* says Caleb, who works at the **facilities** of the **FEMSA Biotechnology Center** on the **Tec’s Monterrey campus**.

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He shares that he’ll not only work on this project but also on the **applications** of **other bacteria** to **benefit humanity** and mentions that he would like to teach at some point in his career.

*“Applying the same process to other **bacteria** as we have done to this one means we can **produce drugs** easily and produce **food supplements** or **bacteria** that can help us produce very interesting compounds.”*

*“My dream is to get to a very renowned university and be a **lead researcher**, have my **own laboratory**, and teach: to give people this range of opportunities,”* concluded Luis Caleb.



Oil spills, a complex mix of many chemicals, have the potential to cause devastating impacts on the environment.

According to the **United Nations**, oil spills can kill corals, which support a fourth of all marine life, provide food security and livelihoods for at least 500 million people, and protect coasts by mitigating the impact of waves, storms, and floods.

In the event of a massive spill, **human health** can also be **affected** by direct contact with or inhalation of the oil, or by consuming contaminated seafood or fish.

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