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Metagenomics of the Puerto Rican Soil [1]

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El Yunque National Forest. One of the sampling sites of GeMS.

Although we are in a constant war to get rid of them, we have always lived in a world dominated by microbes. Interestingly, there is a new science field that aims to reveal the secrets of the microbial planet, but not as a tactic of war. Even though we donít pay a lot of attention to our microscopic friends, the microbial communities support all life of Earth, even ours. For this cause, understanding the characteristics of this unexplored microbial world may help us to solve many of the environmental, medical, biotechnological, energetical, and economical challenges of the world. The name of this new science is ***Metagenomics***. ***Metagenomics*** is the new field of science that studies the genetic material obtained directly from environmental samples without the need of isolating and culturing the individual microbial species. By isolating the genetic material of the sample and not from the individual species, important characteristics of the existing microbial community are revealed as a whole.

In Puerto Rico, directly from *La Playa of Ponce*, Dr. Carlos Ríos-Velázquez [4], professor of the Biology Department [5] of the University of Puerto Rico at Mayagüez (UPRM) [6] and a member of **CienciaPR**, is one of the key promoters of the Puerto Rican metagenomics. **Dr. Ríos-Velázquez** obtained a Ph.D. in bacteriology from the University of Wisconsin-Madison [7] and completed postdoctoral studies at the National Institutes of Health (NIH) [8]. His research efforts are focused

in the areas of *microbial biotechnology* and *bioprospects*.

Recently, **Dr. Ríos-Velázquez** along with Dr. Lilliam Casillas [9] from the University of Puerto Rico at Humacao (UPRH) [10], obtained funding from the United States Department of Agriculture (USDA) [11], through the ***Cooperative State Research, Education, and Extension Service (CSREES)*** program, to create the research institute ***GeMS of Puerto Rican Soils (Geomicrobiological and Metagenomic Studies of Puerto Rican Soils)*** *[12]*. **GeMS** main goal is to train and educate the new generation of professionals of Puerto Rico in the area of metagenomics. With the help of participant students of the project, **GeMS** was able to generate new metagenomic libraries of different forest soils in Puerto Rico, like the *Dry Forest of Guánica*, the *El Yunque National Forest* and the *Cabo Rojo Salterns*. Additionally, the initiative aims to develop and implement new courses in metagenomics in the **UPRM** and **UPRH**. Also, some schools of the country and high school teachers have been taught courses in soil microbiology and forest conservation with the goal of changing their overall perception of our forests. **GeMS** initiative also counts with the collaboration of important scientists of worldwide recognition like Dr. Jo Handelsman [13], pioneer of metagenomics from the **University of Wisconsin-Madison**, Dr. Pieter T. Visscher [14] from the **University of Connecticut**, and Dr. Tamas Torok [15] from the **Lawrence Berkley National Labs**.

Particularly, this summer, **GeMS** students from the UPRM and UPRH, participated of the workshop *First Short Course in the Generation and Monitoring of Metagenomic Libraries*, in the new facilities of microbiology and the lab of **Dr. Jo Handelsman**, in the **University of Wisconsin-Madison**. Thanks to this initiative, the students had the unique opportunity to learn new techniques and metagenomic technologies by processing samples from the soils of Puerto Rico. Currently, about five metagenomic libraries of the Puerto Rican forest soils have been generated with more than 800,000 clones. These are been monitored by the students to assess new activities like novel antibiotics, antibiotic resistance, and enzymes to degrade complex compounds. Also, **Dr. Ríos-Velázquez** has established partnerships with scientists from other institutions and in different fields of study that may benefit from the Puerto Rican soils metagenomic libraries.

Besides been in charge of **GeMS**, **Dr. Ríos-Velázquez** also collaborates with the Cabo Rojo Salterns Microbial Observatory [16] of **Dr. Lilliam Casillas** from the **UPRH** and is co-Director with Dr. Fernando Gilbes Santaella [17] of the **UPRM**, of The Center for Hemispherical Cooperation in Research and Education in Engineering and Applied Science (CoHemis) [18]. Through **CoHemis,** he is coordinating the SciTeCC 2008 congress in Astrobiology [19] that will take place on **October 23rd, 2008** at the **UPRM**.

Thanks to the efforts of **Dr. Ríos-Velázquez** and **GeMS**, some of their undergraduate student participants have continued graduate studies in the US and Puerto Rico. A great example of this, is the member of CienciaPR Francisco Sánchez-Rivera [20], that participated in **GeMS** for three years and currently continues his graduate studies in biology at **MIT**. If you will like to learn more about ***metagenomics*** and Dr. Carlos Ríos-Velázquez [4] and his projects, please visit his profile at CienciaPR.org [4] or the GeMS website [12].

Tags:

- Carlo Ríos [21]
- UPR-Mayagüez [22]
- Metagenomics [23]
- Microbiology [24]

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- Biological and health sciences [25]

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