



BioS Reports

Glimpse into the activities of the
Master's course "Biology in Society"

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EXCURSIONS AND OTHER NEWS

Small insights in BioS points of view, field trips, and other stuff we do.

Where Chaos Meets Science - Ten Weeks of Marine Biotechnology in Naples

Anna-Lina Kerner

A car honks from one direction, a moped whizzes by on the other side, and in the middle of it all, a group of elderly men is playing cards in a bustling piazza lined with cafés and bars. People discuss loudly, gesture, laugh, argue, and then make up again. Anyone experiencing this vibrant chaos has probably arrived in Naples. It was right here that I spent my research internship in marine biotechnology at Stazione Zoologica Anton Dohrn, the oldest marine research institute in the world [1].



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At the institute, I worked with organisms that can only fully be appreciated under a microscope: diatoms. These microscopic algae, characterized by a cell wall made of silica and a diversity of shapes and forms [2,3], are important but relatively unknown organisms with lots of potential. By the time you finish reading this article, you will have consumed approximately 0.8 liters of oxygen, assuming an average oxygen uptake of about 0.4 liters per minute [4]. A significant fraction was likely produced by diatoms, which are estimated to account for roughly one fifth of global oxygen production [2,3].

"Diatoms have a complex metabolism, despite being relatively simple organisms," explained Valeria Di Dato, researcher and group leader of the Marine Biotechnology department at Stazione Zoologica Anton Dohrn. "This, together with the capability to sequence their genome, is one of the most important findings of recent years."

My internship was partly embedded within the 100 *Diatom Genomes Project*, an international collaboration involving researchers from all over the world. The project's goal is to sequence and analyze the genomes and transcriptomes of more than one hundred species to improve the understanding of their evolution, biodiversity, and ecological importance, while also uncovering genes and metabolic pathways with biotechnological potential [5]. My own contribution to this large project focused on the cultivation and molecular analysis of four different diatom species. During my first few weeks in the lab, I learned the fundamentals of algal cultivation. Maintaining healthy cultures required careful monitoring of growth conditions, preparation of culture media and regular cell counting.

The project's long-term goal is to gain a better understanding of how diatoms produce valuable natural substances and how these might be used for applications in pharmaceutical development, nutraceutical production (or health-promoting supplements), environmental biotechnology and sustainable industrial processes [6,7,8]. Examples include anticancer compounds for pharmaceutical use [9], cellular mechanisms for bioremediation—using living organisms to clean up polluted environments [10]—and extracting lipids for biofuel production, such as biodiesel [11,12].

Scientific research often appears detached from everyday life when viewed from the outside. My experience in Naples suggested the opposite. During my stay, I discovered that research here definitely doesn't take place in a vacuum. For example, the Giro d'Italia and a papal visit repeatedly caused road closures, making my commute difficult. In addition, there were minor earthquakes, a reminder of the region's volcanic activity. However, these interruptions never diminished the city's appeal. If anything, they reinforced the impression that Naples is a place where history, science, culture and daily life constantly intersect.

ANIMALS AND MONEY

This part of BioS Reports unravels relationships between animals and the economy.

Thousands of Lac Insects for a 78 RPM Shellac Record

Alp Kuşçu

Music has been a part of human culture for ages, but its transition from purely live entertainment to a widely available global industry is a relatively recent development. According to the IFPI Global Music Report 2026, the music industry has generated approximately 31.7 billion US dollars, with digital streaming accounting for 70% of the total revenue [1]. Before digital streaming, the music industry relied on compact discs, cassettes, and phonographic records. Most of the early gramophone records were made out of a natural wax, shellac [2, 3]. The emergence of shellac records was not just a technological advancement but also a consequence of a global trade network of natural materials. One of the centers of this trade network was colonial India [4].

Shellac is the natural resin refined from lac, a protective coat secreted by the lac insects (*Kerria* spp.) belonging to the *Kerriidae* family. Out of over 100 species, industrial lac production is restricted to the genus *Kerria* [5]. The lac insects attach themselves to young shoots of host trees, such as palash, ber, or kusum, feeding on the sap [5, 6]. Females produce the protective resin that covers her and roughly 1000 eggs, which is collected as lac. Each insect secretes typically between 8 and 20 mg of lac in their life cycles [6, 7]. Raw lac, after collection, undergoes a series of processes, becoming the refined shellac [4].

Shellac exports made India dominant in the global trade, supplying most global demand [8] and providing income and employment to rural populations and Adivasi communities [3]. Between 1900 and 1920, close to 4 million cases of lac (shellac, stick lac, and button lac) were exported from India under the British Raj [9]. Each case contained 2 maunds of goods (~75 kg). Shellac prices ranged between €20 and €40 per pound in the early 1900s [10, 11, 12]. India exported an estimated \$132 - \$265 million worth of lac. This involves 15 to 40 trillion insects. By the 1920s, the gramophone industry was using up to 40% of global shellac annually. Up to 100 g of shellac and 12,500 lac insects were needed for a single 78 RPM record. During the interwar period, US production exceeded hundreds of millions of records annually [3, 13].

After World War 2, shellac shortages and advances in synthetic materials led to polyvinyl chloride (PVC) replacing shellac in records, affecting Indian shellac exports and demand for labor [2, 3, 13]. Today, India is still the world's biggest shellac exporter, with lac, resin, gums, and vegetable extract exports exceeding \$1 billion annually [14]. Yet, shellac only contributes a fraction of this total, with its market estimated at \$180 million in 2026 [15]. Once a cornerstone of the music industry, shellac is now primarily used in food and pharmaceutical coatings and as a cosmetic dye [4]. Ultimately, the case of shellac, secreted by a limited number of lac insects, shows how tens of trillions of organisms collectively influence both the global music industry and the economy of colonial rule.

SCIENCE UNPACKED - THE BIOS PODCAST

Helminth Therapy: Can Worms Treat MS?

Marit Scheuringer

Could worms help treat multiple sclerosis? In our new episode, Anna, Laura and Emilie explore helminth therapy, from the hygiene hypothesis to immune regulation and clinical trials. Could these tiny parasites help retrain the immune system?

Tune in to find out what the evidence says.

EXCURSIONS AND OTHER NEWS

From Glitter to Grills: A Weekend to Remember

Patience Blossfeld Dodgson



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August came to a spectacular close for the BioS students with a double celebration—honoring all Biology Faculty graduates and marking five wonderful years of BioS!

On Friday, August 28th, the Biology Faculty held a festival to celebrate those who graduated over the last few years. Bachelor's, Master's and Doctoral alumni were honored and many guests came to celebrate them. BioS current members who received their Bachelor's degrees from TU Dresden, along with BioS alumni, appeared in their colored

sashes and were applauded with the rest as glitter rained down on them at the Biology building. Beyond the speeches about the programs, there was dancing, food and plenty of beer. Over a hundred and fifty people were in attendance and the dancing lasted long into the night. A bar was run by our very own Professor Zierau and Professor Forschauer, serving negronis and spritzes among other drinks.

Mark your calendars, the next celebratory event will be in 2029 to celebrate our amazing alumni!



The next day, on Saturday, August 29th, another grand event happened: five years of BioS students and alumni were invited to a barbecue in TU Dresden's Botanical Garden. Thanks to the brilliant organizing of Professor Oliver Zierau, we spent an evening grilling and chilling surrounded by plant species from all over the world while making new friends from every corner of the globe. 40% of all those who went through BioS attended, making for a full evening.

Everyone came in and deposited their offerings of food, from vegan bratwurst to cake and even freshly made kebabs. We waved to a nearby fox and walked around the botanical gardens, appreciating the spread of species before going through a round of introductions. Alumni and older students shared their sage wisdom regarding finding lab rotations, master's thesis labs and jobs after graduating. Several offered their aid to younger students struggling and plenty more began to trade stories.

When asked, Professor Zierau mentioned potential plans to continue this tradition in the future.

This milestone weekend reminded us just how strong and supportive our BioS community really is.

Here is to five years of BioS!

