

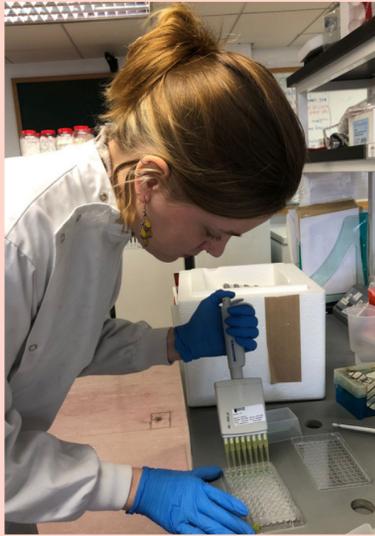


## EXCURSIONS AND OTHER NEWS

Small insights in student's or professor's points of view, field trips, and other stuff we do.

### New Ways to Treat Cancer: Lab Rotation at the TTMI Dublin

Cosima Sagurna



It's been known for some time now that cancer treatments are not „one size fits all“. A line of treatment that works perfectly for one person might do nothing for the next, even though they are being treated for the same type of cancer. For this reason, the Trinity Translational Medicine Institute (TTMI) in Dublin is working closely with cancer patients of the adjacent St. James' Hospital. With samples of the patients, TTMI aims to find out which factors play a role in treatment success and how treatment can be optimized to get the best possible response and survival rate. To get a little insight of the inner workings of the TTMI and the broad spectrum of oncology research, I spent three months in Dublin.

The main treatment I worked with was Electroporation. This method permeabilises the cell membrane through short electric pulses applied by an external electric field. This can be done reversibly (the cell membrane recovers after a period of time) or irreversibly (the cell membrane is irreversibly broken, cell death ensues). Electroporation has been used in clinics for a while, mostly in combination with other therapies. Combined with e.g. chemotherapeutic drugs, electroporation can help localise and specify treatment while decreasing the side effects chemotherapy would have if applied on the whole body.

What my research group wanted to find out was whether combining electroporation with a calcium solution might be another effective but less damaging way to treat tumours. Calcium electroporation has been shown to not only treat tumours; it also activated the immune system to fight the cancer in the body. Metastases that had not been treated cleared up as well as the treated ones. Knowing this, we compared the effectiveness of electroporation with calcium to electroporation only on model tissue, tumour samples and cancer cell lines. The project is ongoing, but already yielding promising results.

## EXCURSIONS AND OTHER NEWS

### Lab Rotation Talks: BioS Comes Together

Layanne Abu-Bader

The first two cohorts of Biology in Society have long been finished with lectures, seminars and exams. During this last phase of our master's, many of us have parted ways to complete our lab rotations (that's our term for internship). Some of us stayed in Dresden, while others traveled far and wide to get some hands-on experience in the fields that they find most interesting. And so, on a chilly January afternoon, BioS students from all three cohorts gathered to learn what our fellow classmates have been up to during our months apart. Seven students prepared captivating talks and posters to share their diverse experiences.

In the spirit of Biology in Society, the lab experiences varied greatly, ranging from research on transgenic cells in carp, dietary research in fruit flies, helping to develop multiplex PCR for bacterial detection, learning various cancer research methods, and even facilitating the transport of zoo animals in and out of the country. The students who presented showed confidence and passion for the work they have done, which is one of the most important goals of this experience after all! Afterwards, we had a nice relaxing time to catch up with our peers over coffee and cookies. The afternoon was warm, friendly, and inspiring, especially to the newest BioS students, who will be starting their own lab rotations before they know it.

## ANIMALS AND MONEY

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

### How Coral Reefs are Benefiting Egypt's Economy

Leonie Hobohm

Coral reefs are one of the most diverse and productive ecosystems on earth. They are home to more than 25% of all marine species and provide essential ecosystem services to millions of people worldwide[1]. Corals are animals, specifically small polyps that often live in colonies. Reef-building corals are stony corals, meaning they create hard structures from calcium-carbonate. On this skeleton, new polyps can settle and over time create a coral reef. Stony corals live in symbiosis with microalgae – a mutually beneficial relationship. The microalgae living inside the coral provide energy building blocks and in turn receive nutrients, CO<sub>2</sub> for photosynthesis, access to sunshine and protection from grazers[2]. Coral reefs offer hiding and nursery spaces for smaller fish, thereby protecting them from predators and supporting the fish stock. The corals' complex structure affects the current, water temperature and light distribution of their surrounding[3]. This way, corals provide suitable environments for many different species[1].

Despite only carrying 5% of the world's coral reefs[1], the Red Sea is defining for Egypt's tourism and fishing industry. Marine fisheries are a small sector of Egypt's economy, contributing 0.16% of the country's GDP in 2010[4], of which the Red Sea region accounts for 38%[4]. It is estimated that 25% of fish stock relies in some way on coral reefs[1]. Any destruction of coral reefs would reduce fish stocks and fishing activities. Therefore, the loss of coral reefs would probably reduce the whole GDP by 0.015%.

A larger share to Egypt's economy comes from tourism, amounting to 7.7% of the country's GDP in 2022[5]. Over 90% percent of tourists are beach tourists, but reef tourism is also significant[6]. Because of the large species biodiversity and its "bucket list" reputation[7,8] it can be assumed that all diving tourism relies on the Red Sea's coral reefs. Supposing there remains 10% of tourists, and they are there specifically to dive at the reef, around 0.77% of the country's yearly GDP depends on the corals. Egypt's nominal GDP of 2022 was 4.356 billion US\$[9]. Assuming GDP values of marine fishery remained stable over the years, reef fishing and reef tourism together make up 0.785% of the GDP. The Red Sea coral reefs would provide a benefit to the Egyptian economy of ca. 34.1 million US\$ annually.

Sadly, coral reefs are under threat globally and Egypt is no exception. One of the main reasons for coral reef health decline is the increasing growth of macroalgae. They shade the corals[1] and impede the energy production of the corals' symbiotic microalgae. The reason for this algal bloom is excessive use of fertilizer in agriculture. Fertilizer seeps into bodies of water, causing an abundance of nutrients for algae. In combination with rising ocean surface temperatures, algal bloom eventually leads to coral bleaching[1]. This is when stressed corals expel their beneficial microalgae as a defense mechanism, but in turn deprives them of energy production and causes the coral's death[2]. The Red Sea reefs are among the least affected by coral bleaching, with only 4.1% of corals showing long term decline[1]. A reason for this slower decline is the widespread growth of the hard coral *Stylophora pistillata* that only starts bleaching at higher water temperatures of 33-34°C[10].

The importance of their coral reefs has not gone unnoticed by Egypt and protection measures have been put in place. Maintaining fishing and diving tourism as an important stream of income while preserving coral reefs needs to be carefully balanced. Corals can easily break off and even trained scuba divers sometimes destroy corals[11]. Once destroyed, the corals grow very slowly, between 0.3 – 10 cm annually[12]. This is why in 2022 Egypt has launched a pilot project to propagate broken coral pieces in nursery stations and later reintegrate them into reefs[11]. Additionally, dive tourists in marine national parks must pay a fee that goes towards animal and environment protection.

Although the Red Sea reefs have shown resilience to coral bleaching, they are still under threat. To keep the substantial revenue stream Egypt must prioritize the conservation of its coral reefs and continue sustainable practices to ensure the corals' health, as well as develop new practices, like making conservation zones inaccessible to divers.