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

BioS Reports in 2024: Growth Over Time

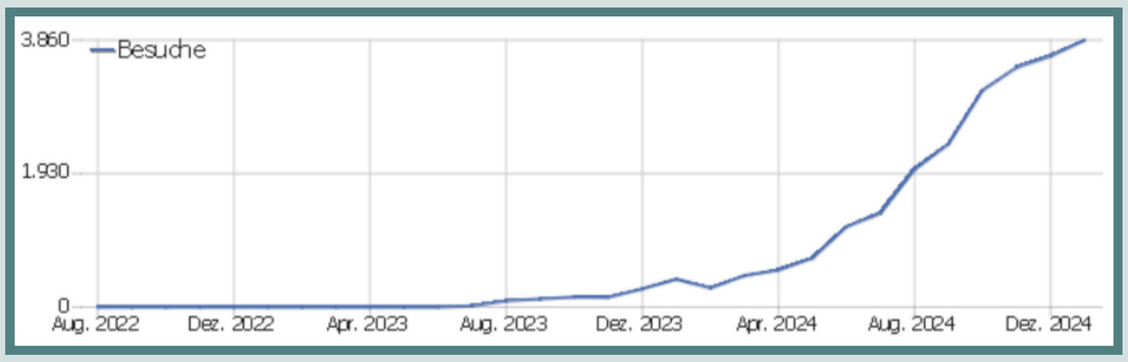
Min Mao & Sophie Merz

As part of her lab rotation in the Public Relations office, Min Mao, a 3rd year BioS student, was able to gain some valuable and interesting insights about the statistical data of BioS Reports. The data showed that over the past year, the BioS Reports website has seen a significant increase in visits. From March to October a total of 8019 visits were recorded, indicating a growing interest. By the end of the year almost 30% of all visits to the website of the Faculty of Biology are visits to BioS Reports - that makes around 2616 visits per month!

Before June, the number of visits to BioS Reports articles remained stable at around 300 visits per month. However, from July onwards the number of visits increased dramatically, reaching the thousands (see graph below). One of the factors having a big influence is our increased effort on Instagram, with the first reel reaching almost 4000 people. Now, we have 180 followers and around 1k views on our videos with increasing tendencies. Will this upward trend continue next year? That remains to be seen.

Most visitors came from Germany, accounting for around two-thirds of the site's total traffic. This is not surprising given that BioS Reports is hosted by the Faculty of Biology at the TU Dresden, a German institution. This language preference is also reflected in the number of article visits: of the 11 articles analysed, only two (Scabbardfish and Alpacas) received visits in both English and German. The remaining nine articles received visits in German only. In total, only 416 visits (about 5.2%) were to English language articles.

This year we hope to increase the visits from our English-speaking community and increase our outreach. Other ideas on shaping the future of BioS reports would be an expansion of content like multi-page issues and gaining more collaborators and funding. Let's see what 2025 has in store for our little journal!



EXCURSIONS AND OTHER NEWS

Lab Rotation: Genetics of Siamese Twin Fish

Konrad Skowronek

The motto of this lab rotation was "Easier said than done". It's astonishing how many challenges such a project can entail. But let's take a step back. In 2018, a special crossbred line of medaka (*Oryzias latipes*) was discovered at the Faculty of Biology at the TUD. The crossing produced identical twins, fused at their body axis, at an astonishingly high rate. During my Bachelor's thesis, I started working with this line, aiming at reproducing the inheritance of this specific phenotype. I crossed many different lines, in which this anomaly possibly occurred, but with no significant result. Dr. Froschauer then continued the crossing and again found a few twins. The main goal was now to identify the responsible gene(s) for this axis-deformation using mRNA-sequencing. The biggest problem was the sample size. Isolating RNA from embryos is quite a tricky procedure, since the available amount is comparably small. So, even small pipetting errors can mess up the whole sample. However, there are certain kits which (according to the manufacturer) make it possible to separate mRNA from other cell compounds very quickly and precisely, resulting in a higher yield. During my lab rotation, I applied such a kit, collecting medaka mRNA and analyzing the kit's efficiency. I used techniques such as classical native gel electrophoresis, writing a cDNA with subsequent PCR and various concentration measurements using a Qubit and nanophotometer. The kit worked, but not as well as expected for our methods. The yield was extremely low, and I still found contamination from other RNA-types in the sample, which would render sequencing useless. Nonetheless, with each experiment, we gained more knowledge to understand the mechanisms behind the biology of *Oryzias latipes*.

ANIMALS AND MONEY

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

European Green Crab Invasion: The Dimension and Commercialization of the Sea Plague

Karola Kovacs

Carcinus maenas, or European Green Crab (EGC), is known as the "most successful invasive predator" [1] and is listed in the top 100 worst invasive species worldwide [2]. EGCs are native to northern Europe but they are distributed in all continents, except for Antarctica [2,3], after being introduced to the Atlantic coast of North America [4] and, later on, to the Pacific Coast (Redwood Shores Lagoon) [2] almost 200 years ago.

EGC females lay eggs 1-2 times a year [5], each time producing an average of 184,900 eggs [6]. Their resilience to extreme environmental conditions like temperature, salinity, and hypoxia, increases their reproductive success [7,8]. EGCs consume a wide range of prey, including bivalve molluscs, crustaceans, and polychaetes [1]. A single EGC feeds on about 40 soft-shell clams per day [9,10], threatening the shellfishery on the Atlantic Coast with damage costs in the millions [11]. Through their search for prey, EGCs dig up eelgrass beds [12] and destroy the nutritious and protection-offering habitats of native species [9,13].

Damages caused by invasive crabs over the last 60 years were estimated at about US$150.2 million [14], or US$2.46 million/year. The invasion of EGCs accounts for 56% of that [14], amounting to US$1.38 million per year. Most costs caused by invasive crabs are attributed to damage and management costs (41.8 %) [14]. Management strategies and control efforts include population monitoring, fencing, trapping, and harvesting [1,15]. The search for a suitable natural enemy to reduce the population is not straightforward because the EGC´s natural enemies such as birds and fish are not specialists and their introduction would supposedly cause unwanted predation. The same applies for some parasitoids, parasites, and pathogens [16]. The latter are effective mostly in stressed, captive populations, but less effective in the natural environment where EGCs can move freely [16]. While further control strategies are being researched, there are also efforts to commercialise EGCs [15].

Commercialisation could be achieved by establishing a soft-shell market for EGCs, like the one existing for the blue crab [1], or the EGC market in Italy [17]. Soft shell crabs come from recent moulting, when the crab sheds its old exoskeleton and is left with a vulnerable new shell. They sell better in restaurants because they are easier to process and eat than the hard shell [18]. Launching a soft-shell EGC market is partly limited by the difficulties in predicting the moulting stage for male and female crabs [18]. The non-profit organisation Manomet (Atlantic Coast, North America) is addressing this issue by adapting techniques of the Venetian soft-shell industry. The goal is to create an economically viable market for soft-shell EGCs, which would need to achieve a market price of around US$25/pound [15,18].

Approaches to increase the market price attempt to change the negative image of EGCs and to expand the range of its utility. For instance, they are used as compost in agriculture [19], as feed for livestock (e.g., chicken) and/or aquafeed [20], or as food for humans [1,21]. Some chefs, store holders, and environmentalists advertise EGCs, or their eggs, as delicacies on the food market and even launched an EGC whiskey [9,21]. Will Robinson, a whiskey store holder, and environmentalist, started launching the "Crab Trapper" whiskey, which sells for US$65 per bottle [9,22]. To produce one batch (≈ 250 bottles) of it, 80 pounds of crabs (ca. 1,000 crabs) are necessary [9]. After detecting the costs of production, one batch of this whiskey yields an estimated profit of US$14,470 [22]. Could this make the crab profitable enough to at least supplement the funds for combating the crab invasion?

Lummi Bay is a 750-acre (3.04 km2) sea pond in Washington, USA [23]. In 2021, over 86,000 EGCs were captured [23], a remarkable increase compared to the 2,000 crabs recorded the previous year [24]. This translates into a 4,200% surge in the number of EGCs captured. If the 86,000 crabs were converted into whiskey, this would equate to 86 batches or 21,500 bottles, generating a profit of around US$1,244,420. However, the short-term emergency funding requested by the Washington Department of Fish and Wildlife is estimated at US$8,568,000 [23]. This gap underscores the severity of the EGC invasion. Even if every crab was commercialised for the premium-priced Crab Whiskey, the revenue would still fall far short of covering the needed funding.

The whiskey example helps illustrate the significant costs of the EGC invasion. Effective management will require collaboration between scientists, fishermen, chefs, and local communities, as well as detailed research on crab biology and moulting dynamics. While eradication may be unlikely, the focus should be on minimizing future damages through population control and continuous monitoring.

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