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Pathogens and plastic: Sustainable Science at the New School



Marcus Banks, Lab Manager and the glove recycling bin.



Marcus Banks, Lab Manager, and Molly Metz, Interdisciplinary Science Student.



Marcus Banks, Lab Manager with his poster prize and his mentor Davida Smyth, Associate Professor of Biology

Davida Smyth, Associate Professor of Biology, Natural Science and Mathematics Department **Marcus Banks**, Laboratory Manager, The University Science Labs and Graduate Student in the MFA Design and Technology program, Parsons **Single Use Plastics** It's been estimated that approximately 300 million tons of plastics are manufactured every year, with a large portion of them intended for one-time-use. The production and improper disposal of petroleum-based plastics continues to damage ecosystems and is a major contributor to climate change. Knowing this, major efforts are being made to reduce plastic use with some companies and even countries, banning their use. To date 60 countries have introduced bans and fees to help reduce plastic use [1] and most recently, the European Parliament has approved a ban on single use plastics [2]. **Plastics in the Lab** There is limited data available on the contribution of research and academic/teaching labs to this problem, where many different types of plastics are used and disposed of, for safety reasons. Most lab plastics are disposed of after a single use. Data from the University of Exeter in

the UK, revealed that 280 of their bench scientists generated about 267 tonnes of plastic waste in 2014 [3].

At the New School, the University Center building houses the Biology Labs. It is a LEED-certified building [4] and knowing this, we're dedicated to being as sustainable as possible.

We've made considerable efforts to reduce, reuse and recycle as much as we can in the labs. For the teaching lab, we strive to reuse pipette tips for workshops that do not involve pathogens, glassware is substituted for plastic when possible, Millipore water drainage is used for soaking and cleaning glassware, and importantly, equipment like ice machines, incubators, when not in use, are switched off. Most recently, we've secured a service that allows us to recycle gloves in the teaching lab (Picture 1).

When Pathogens enter the Lab In Fall 2018, we established our new BSL2 (Biosafety Level 2) laboratory in the University Center. Located on the 6th floor and adjacent to the teaching lab, the BSL2 lab houses a biosafety cabinet, incubators for growing the pathogenic bacteria and our beautiful new iSeq 100 DNA sequencer, only 1 of 3 in the New York region. The additional equipment and protective equipment used in BSL2 spaces, enable students and faculty to work safely with pathogenic bacteria. As excited as

we are to have this new lab on campus, it comes with many unique challenges for sustainability. BSL2 laboratories generate biohazardous waste which needs to be incinerated. Single-use plastics are used preferentially so they can be disposed of after use. Glass can pose a challenge should it break in a lab where work is being conducted with pathogenic bacteria. These challenges and barriers resulted in our developing a proposal to secure funding from the [Tishman Environment and Design Center](#) to help us research lab sustainability in teaching and research labs, especially in BSL2 designated spaces. As part of the proposal we've designed a [survey](#) to help us identify barriers and challenges to sustainability faced by labs across the US. Our goals for the survey include encouraging our colleagues to think about sustainability in their labs as well as to gather and identify new ideas and directions for us to take sustainability here at the University Laboratories. Our results to date are coming from institutions accounting for over 350 biology and chemistry lab sections annually. 66.7% of respondents reported being aware of packaging material ship-back programs. 66.7% of the respondents reported they participate in these ship-back programs. 83% of respondents were

either unsure or do not have decontamination protocols for non-toxic, uncontaminated, recyclable glass and plastic. Only 1 respondent reported that they recycle gloves used in academic or research settings. The respondents have been positive about taking the survey and have made important statements and suggestions regarding the importance of educating students to be sustainable in their future jobs/careers such as *“Teaching or at least mentioning to students what the lab's sustainability efforts are. Hope that it sticks so that they can apply it to future jobs/research they do”* as well as offering suggestions to promote and support sustainability on campus *“Request administrative support for green practices, e.g., hire work-study students to wash and autoclave glass pipettes, or to truly practice recycling on campus (bins are set up but it's obvious that everything ends up in the trash)”*. **Getting the message out** In October, our lab attended the 51st Annual Conference of the Metropolitan Association of College and University Biologists (MACUB). Attended by approximately 350 undergraduate and graduate students, as well as faculty and college staff and featuring two keynotes, 17 short talks and 137 posters, this conference is one of the largest in our region and presented

an opportunity for us to connect our ongoing work with the greater academic community. We presented a poster (co-authored by University Lab Director, Katayoun Chamany) and gathered contact information from scientists, students and faculty interested in sustainability while inviting them to take our survey on sustainable practices in teaching and research labs (Picture 2). Excitedly, we placed third in the graduate student category for our poster (Picture 3). Leveraging social media, we've sent our survey out via Twitter, LinkedIn and Facebook as well as to professional scientific communities including [SENCER](#) (Science Education for New Civic Engagements and Responsibilities), [SABER](#) (Society for the Advancement of Biology Education Research), and [ESATYCB](#) (Empire State Association of Two Year College Biologists). We hope that through our efforts, we shall encourage our colleagues to consider alternatives to plastic where they can, and to reduce, reuse and recycle if possible. Scientists must strive to attain sustainable practices and think “sustainably” as much as they can. How can we hope for sustainability when we do not practice it ourselves?

Citations:

[1]

Single-use plastics: A roadmap for sustainability. (n.d.). Retrieved from <https://www.unenvironment.org/resources/report/single-use-plastics-roadmap-sustainability>

[2]

Yeginsu, C. (2018, October 25). European Parliament Approves Ban on Single-Use Plastics. Retrieved from <https://www.nytimes.com/2018/10/25/world/europe/european-parliament-plastic-ban.html>

[3]

Urbina, M. A., Watts, A. J., & Reardon, E. E. (2015, December 23). Environment: Labs should cut plastic waste too. Retrieved from <https://www.nature.com/articles/528479c>

[4]

University Center. (n.d.). Retrieved from <https://www.newschool.edu/university-center/sustainability/>



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