JRC SciArt Summer School on NaturArchy
Requirement: Resonances IV on NaturArchy Project Proposal
Artist: JD Whitman
Project Proposal (2/2): Nanoplastic digestion by bioindicators
Due Date: August 31st 2022

RESONANCES IV ON NATURARCHY - PROJECT PROPOSAL

Artist (PI)	JD Whitman
Collaborators	JRC Researchers: ● Andrea Valsesia (PI) (Have meetings scheduled for beginning of September) ● Dora Mehn. (Confirmed) ● Jessica Ponti (Have meetings scheduled for beginning of September) ● Marisa Sarria Pereira De Passos (PI) (Have meetings scheduled for beginning of September) Summer School Attendee(s) ● Danijela Brkovic, Policy (Confirmed)
Focus	Nanoplastic digestion by bioindicators and their potential threat to humans as they enter the food chain.
JRC Site	Ispra
Exhibition Site	European Science Cube in Ispra

1) DESCRIPTION

This project will be a community-specific, immersive art installation illuminating JRC research on nanoplastics (pNP) digested by bioindicators and their potential threat to humans as they enter the food chain. Specifically, it will visually highlight pNP concentrations in bioindicator species, as well as how nanoplastics are moving through organisms like zooplankton.

Discarded plastic will be collected from the community and used to construct a site-specific, large-scale, enterable plastic inflatable. The inflatable will be built as a series of connected tunnels and caverns (similar in form to an actual digestive system). The walls of the inflatable will be projection-mapped with larger than life images/videos (procured from the aforementioned research) transforming the interior into a captivating, immersive environment. The installation will be designed and constructed to completely surround viewers with materials, visuals, and sounds from their community and relating to the JRC research. This will connect viewers with the research on a personal and relatable level, allowing for a more successful transfer of information on the problem, and solutions to the problem.

- Materials: The physical materials used to build the entire installation space will include recycled sheet plastic collected from the community (JRC campus and the town of Ispra). The plastic will be ironed together to make large plastic sheets. These sheets will be used to build the plastic inflatable structure (the interior of which will become the experienced installation space). The scale and design of the installation space will be dependent on the amount of community plastic consumption and collaboration.
- Visuals: Images and videos will be projection mapped onto the exterior surfaces of the inflatable (and experienced from inside the inflatable). These visuals will include images of pNP concentrations in bioindicator species (captured through scanning electron microscopy), as well as videos of nanoplastics moving through organisms like zooplankton (recorded through spectroscopy and transmission electron microscopy). These projected visuals will activate the walls of the plastic inflatable, the interior space, and viewers. Different images/videos will be projected on each chamber of the inflatable, and arranged in a specific order to create an engaging visual narrative for viewers to follow. Overlaying visuals of pNP in digestive systems on top of a large scale structure mimicking the form of a digestive system will physically immerse viewers in the research being communicated. This arrangement will abstractly visualize the materiality, transformation process, and absorption of plastics, relating it to both marine species and humans.
- Sound: Speakers will be utilized to further transform the space into an immersive and engaging environment. The space will have multiple, strategically placed (and hidden) speakers playing audio recordings at sporadically changing volumes to enhance the atmospheric and spatial quality of the installation. The audio recordings will be close-mic recordings of plastics (i.e. common plastic objects being used by people, plastic objects breaking down, plastic in water, etc.). In addition to the audio recordings, the plastic inflatable will be constantly producing its own unique sounds due to the forced air pressing against the plastic walls and changes in pressure.

- Engagement: Viewers entering the inflatable will take part in a very corporeal and physical, immersive experience. The interior of the inflatable is constantly changing in form (due to changes in air pressure) prompting viewers to bend/move with the material and spatial transformations. This will inevitably lead viewers to get closer to and observe the plastic material. Actually, the plastic material will completely completely saturate each viewer's senses. While inside the inflatable, viewers will smell, see, hear, touch, and even taste (from the air they breathe) the plastic they are interacting with.

There are a few things that will also be included in the installation but the "how" of the inclusion needs to be discussed with JRC collaborators as this project progresses.

- Access to Research: Information on the negative effects of plastic ingestion will be included and/or accessible in the installation space. (Some examples of how this can be achieved include: text in the space, info pamphlets, gallery attendants stationed in the inflatable, or QR codes linked to publications or a secondary interactive, online space).
- Access to Solutions and Action Steps for Individuals and the Community: Information on alternatives to plastics, altering plastic-based behavior, and their relation to the European Green Deal and the United Nations Sustainable Development Goals will be accessible in the installation space. (Some examples of how this can be achieved include: text in the space, info pamphlets, gallery attendants stationed in the inflatable, or QR codes linked to publications or a secondary interactive, online space).

2) RELATION TO NATURARCHY

To improve our relationship with nature we need to strengthen both our collective awareness and ecoliteracy. In response to the current climate, ecological, and pollution crises, ecophobia and climate anxiety are decreasing ecoliteracy rates and stalling or debilitating people's desire to act, change, and advocate for change. People are overwhelmed with the enormity of the coming challenges to our species, believing it is too late to fight for a better future. This growing phenomenon is fueled by a lack of seeing and understanding. People need to see how we are adversely affecting nature, understand it can be fixed, and be reminded of nature's beauty, importance, and recovery potential. Artists can address this need by recreating out-of-reach environments in public spaces, translating complex scientific ideas through digestible, captivating visuals, and enchanting people with tangible beauty and wonder through spatial experiences. Art holds the power to translate nature to the masses. Artists, through interdisciplinary collaborations, have the responsibility of harnessing this power to illuminate anthropogenic threats to nature, present potential solutions, and provoke environmental stewardship. Art prompting public engagement can generate understanding, spark positive conversations and hope, facilitate ecoliteracy, and serve as a catalyst for action and change.

This project will be a product of interdisciplinary collaboration occurring at the intersection of art, scientific inquiry, policy, and public engagement. It will bring critical research on nanoplastic digestion by bioindicators (and their potential threat to humans as they enter the food chain) to viewers in a way that is creative, relatable, and understandable. By building the installation out of recycled plastic collected from the community, this project places the viewer (and community) at the center of the highlighted research, connecting them directly as contributors to the problem and solution. Viewers will not be able to walk into the space and ignore their plastic-based habits. The project will also force viewers to consider their own health as they are confronted with the fact that the food chain and our food sources are littered with pNP. While the immersive space will be captivating and illuminate the wonders of microscopic worlds, it will also inundate viewers in plastic (as human's have down to all other species and the environment). If this sparks a viewer to become interested in learning more about the problem to protect themselves, then the installation will have further information on current policy, potential solutions, and action steps for individuals. Hopefully, this will result in plastic-based behavioral changes at an individual level, which could inadvertently lead to improved relationships with nature and systemic changes in the community and beyond (ultimately protecting the environment).

The art installation will not only bridge the gap between JRC research and viewers, but between policy, potential solutions, and action steps (relating to the research) and viewers. The community-specific and immersive traits of the installation will create a strong audience experience, while also facilitating the transfer of information to/engaging with a non-specialist target audience. The captivating, interdisciplinary environment will engage viewers to develop awareness, provide information, spark change, and drive action towards a new, sustainable relationship with nature.

3) COLLABORATORS

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JRC Researchers	Andrea Valsesia (PI). (Have meetings scheduled for beginning of September) ● Andrea.VALSESIA@ec.europa.eu ● Heading research on nanoplastics and bioindicators while using scanning electron microscopy. Dora Mehn (Confirmed) ● Dora.MEHN@ec.europa.eu Jessica Ponti (Have meetings scheduled for the beginning of September) ● Jessica.PONTI@ec.europa.eu Marisa Sarria Pereira De Passos (Have meetings scheduled for the beginning of September) ● Marisa.SARRIA-PEREIRA-DE-PASSOS@ec.europa.eu ● Working with zooplankton and tracking how nanoplastics are moving through them using spectroscopy and transmission electron microscopy.
Summer School Attendees	Danijela Brkovic (Confirmed): ● danijela.r.brkovic@gmail.com ● Public Relations diploma at the University of Victoria in British Columbia, Canada. Major in Political Science with a concentration in European Studies, Minor in Social Justice Studies. ● (2022 Intern) European Commission, director general of international partnerships (INTPA) in Sustainable Development and Policy, in partnership with the United Nations, World Bank and the IMF. I have asked her to collaborate with me on this project in order to ensure the link between the presented research and current EU policy is accurately translated to viewers. I will also be working with her to ensure the potential solutions to the problem and action steps for individuals are up to date and in line with the European Green Deal and the United Nations Sustainable Development Goals.
External Professional Collaborator	Ted Charles Brown (Confirmed): ● tedcharlesbrown@gmail.com , https://tedcharlesbrown.com ● Professional Lighting/Video programmer working in New York City, USA. Ted is my programmer that I collaborate with on all large scale installation projects requiring four hands for equipment set up and implementation. I have worked with him on a number of international projects since 2017.
4) SCIENTIFIC BACKGROUND	
Research Focus	I asked to work with Andrea Valsesia, Jessica Ponti, and Dora Mehn because of their ongoing work first published in "Detection, counting and characterization of nanoplastics in marine bioindicators: a proof of principle study" (April 2021). Here is the abstract to that paper: ● Plastic particulates in the environment pose an increasing concern for regulatory bodies due to their potential risk to higher organisms (including humans) as they enter the food chain. Nanoplastics (defined here as smaller than 1 μm) are particularly challenging to detect and analyze at environmentally relevant concentrations and in biological matrices. The tunicate Ciona Robusta is an effective bioindicator for microplastics and nanoplastic contamination in the marine environment, due to its capacity to filter substantial volumes of water and to accumulate particulates. In this proof-of-principle study that demonstrates a complete methodology, following controlled exposure using spiked samples of a model nanoplastic (100 nm diameter polystyrene spheres) the nanoparticles were separated from an enzymatically digested biological matrix, purified and concentrated for analysis. The described method yields an approximate value for nanoplastic concentration in the organism (with a limit of detection of 10^6 particles/organism, corresponding to 1

	ng/g) and provides the chemical composition by Raman spectroscopy. Furthermore, this method can be extended to other biological matrices and used to quantitatively monitor the accumulation of nanoplastics in the environment and food chain. Dora Mehn recommended that I also ask to work with Marisa Sarria Pereira De Passos because she is currently capturing video recordings of nanoplastic ingestion by zooplankton.
Publication(s)	Valsesia, A., Parot, J., Ponti, J. *et al.* Detection, counting and characterization of nanoplastics in marine bioindicators: a proof of principle study. *Micropl.&Nanopl.* 1, 5 (2021). https://doi.org/10.1186/s43591-021-00005-z

5) TECHNICAL FRAMEWORK

Exhibition Space	European Science Cube in Ispra

Here is a list of what is needed to install this project.

Gallery Specifications:
(The design and scale of the installation will be dependent on this information)

- Detailed floor plan (including electrical points and window dimensions)
- Electrical grid information.
- Ceiling grid specifications/dimensions (if there is one)
- Restrictions and regulations

Dark Space:
I will need to be able to blackout the exhibition space and cover/close all incoming light sources (windows, entrances, exits, fixed lights, etc.) in order for the projection mapped components and installation space to work.

Equipment To Rent:
(Will change based on TBD design and scale of installation. This is the equipment list based on specifications for the largest project scale I would complete).

- (5x) **Short Throw Projector** – example: InFocus IN128HDSTx. This is the minimum projector type that is needed. Necessary features: 1080p(1920x1080) native resolution; Short throw lens (0.495 throw ratio); 3500 lumens of brightness; Display over HDMI, VGA, composite or S-video; 15,000:1 contrast ratio.
- (5x) **Projector Mount/Stand –** compatible with projectors
- (2x) **Macintosh Laptop -** Minimum system requirements needed: MacOS 10.10 or greater; 2GB RAM minimum, 4GB or greater recommended; 2.0 GHz i5 Processor minimum.
- (1x) **ISADORA software and license**
- (2x) **External GXM –** example: Matrox TripleHead2Go DP Edition External GXM Minimum system requirements needed: 3 Outs; Max resolution per monitor: 1920 x 1080.
- (2x) Video adaptor (for use from Mac to External GXM)
- (6x) Adaptor from full display port to HDMI
- (6x) 50’ HDMI cables
- (1x) OLab software
- (1x) 2 channel PA sound system
- (4x) power strips
- (3-4x) High power carpet dryer blower/fan.

Wifi:
Needs to be functional/high-speed in order to run equipment.

6) BUDGET

An accurate budget cannot be determined at this time because I do not have the gallery specifications. The specifications to determine the scale and design of the installation, which in turn will determine the cost. However, the budget will be broken into four categories:

1. Artist Time: Time spent developing the installation for exhibition.
2. Materials: Any materials used in project development or implementation.
3. Project Shipping: Any costs accrued for shipping parts of the installation from Ireland to Exhibition space (if there are any).
4. Equipment Rentals: Cost to rent the needed equipment for the duration of the exhibition. This price fluctuates based on rental company, location, and duration.

A rough estimate of an expected budget needed for this production (based off of past similar productions) will fall within your average budget range: € 10,000 and € 25,000.

7) ADDITIONAL INFORMATION

To see examples of past inflatable projects, please click here: https://www.jdwhitman.com/plasticity-project

[The project's sketches and graphics start on the next page.]

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