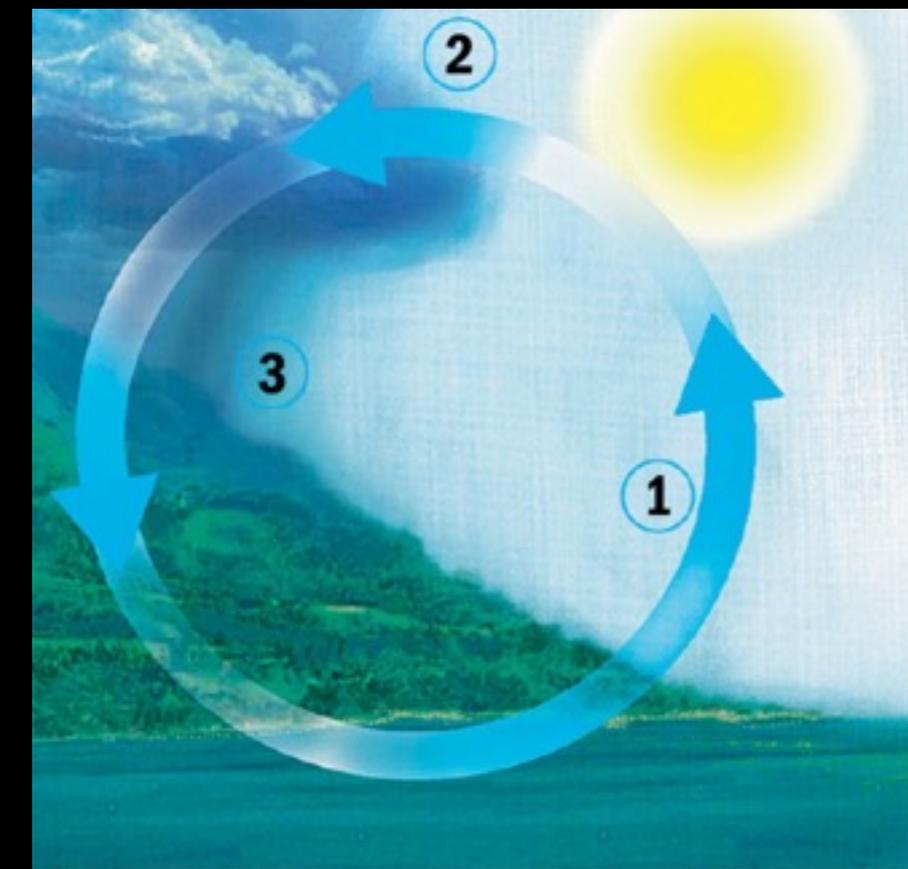
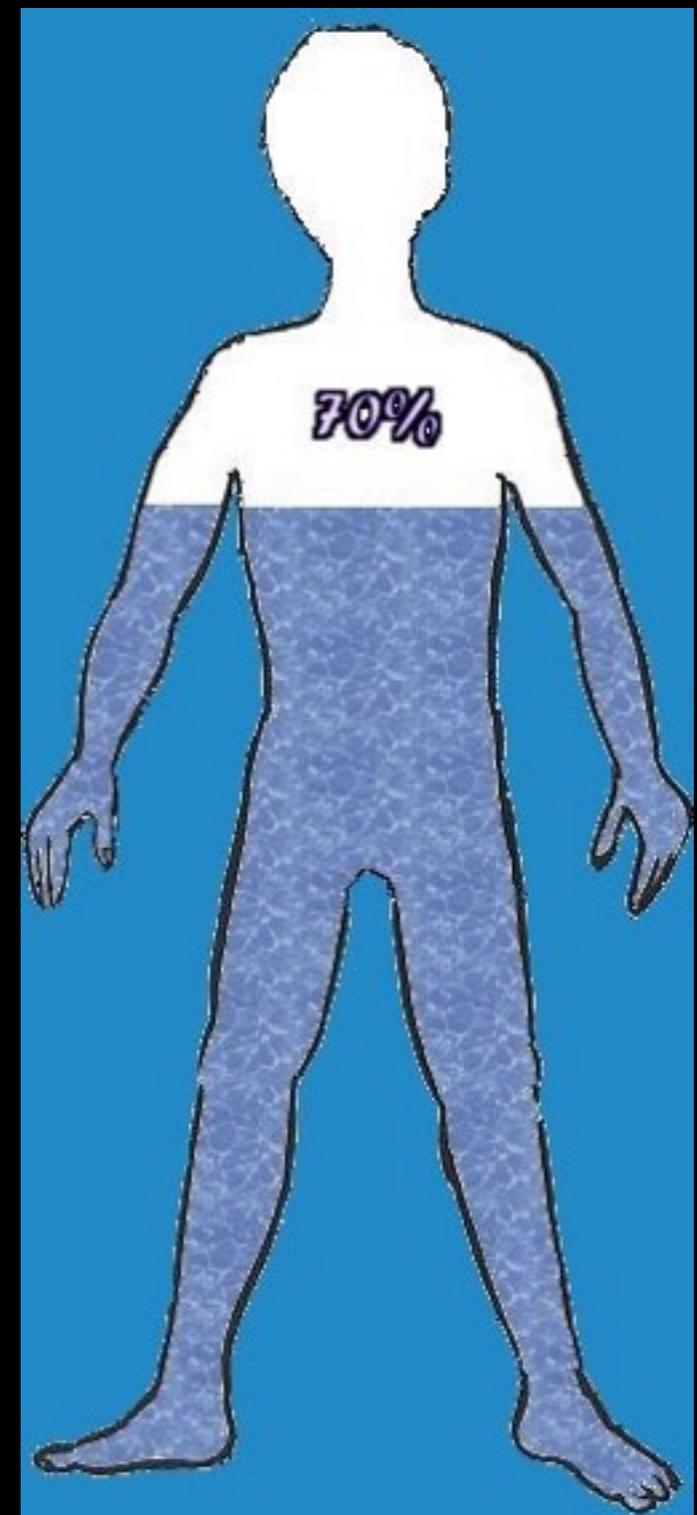
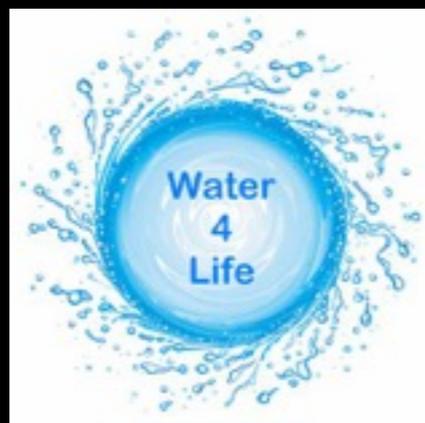
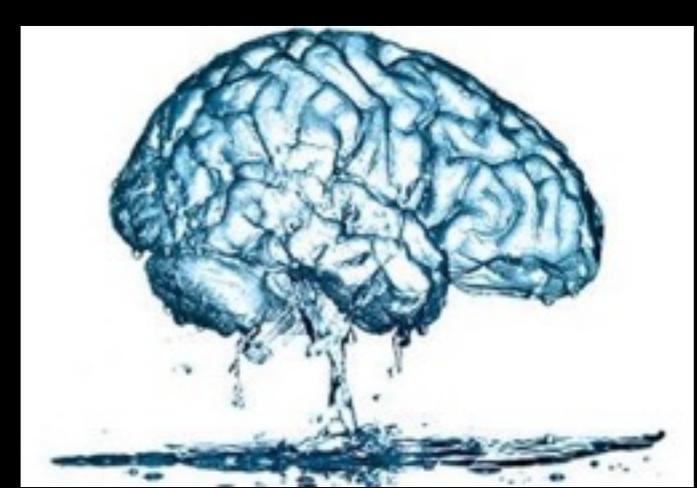




Microfibers pollution: Global monitoring initiative

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Jessica Sandoval and Sarah-Jeanne Royer

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University of California San Diego
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#нетпластикувкосметике

A large, white beluga whale is shown swimming in clear blue water. Below the whale, a single clear plastic bottle is visible, floating in the water. The scene is set against a dark blue background, suggesting the deep ocean.

**A
PLASTIC
OCEAN**

WE NEED A WAVE OF CHANGE.

PLASTIC OCEANS Ltd.
presents in association with
ADESRUM FOUNDATION HEMERA FOUNDATION
A PLASTIC OCEAN

Executive Producers: Craig Leeson, Tanya Streeter
Music by Miriam Oulter Supervising Editor: Doug Blush, A.C.
Edited by Mindy Elliott Director of Photography: Michael Pitts
Executive Producers: Soryja Norman, Daniel Auerbach
Written by Craig Leeson Produced by Adam Leipzig, Jo Ruxton
Directed by Craig Leeson
www.APlasticOcean.com

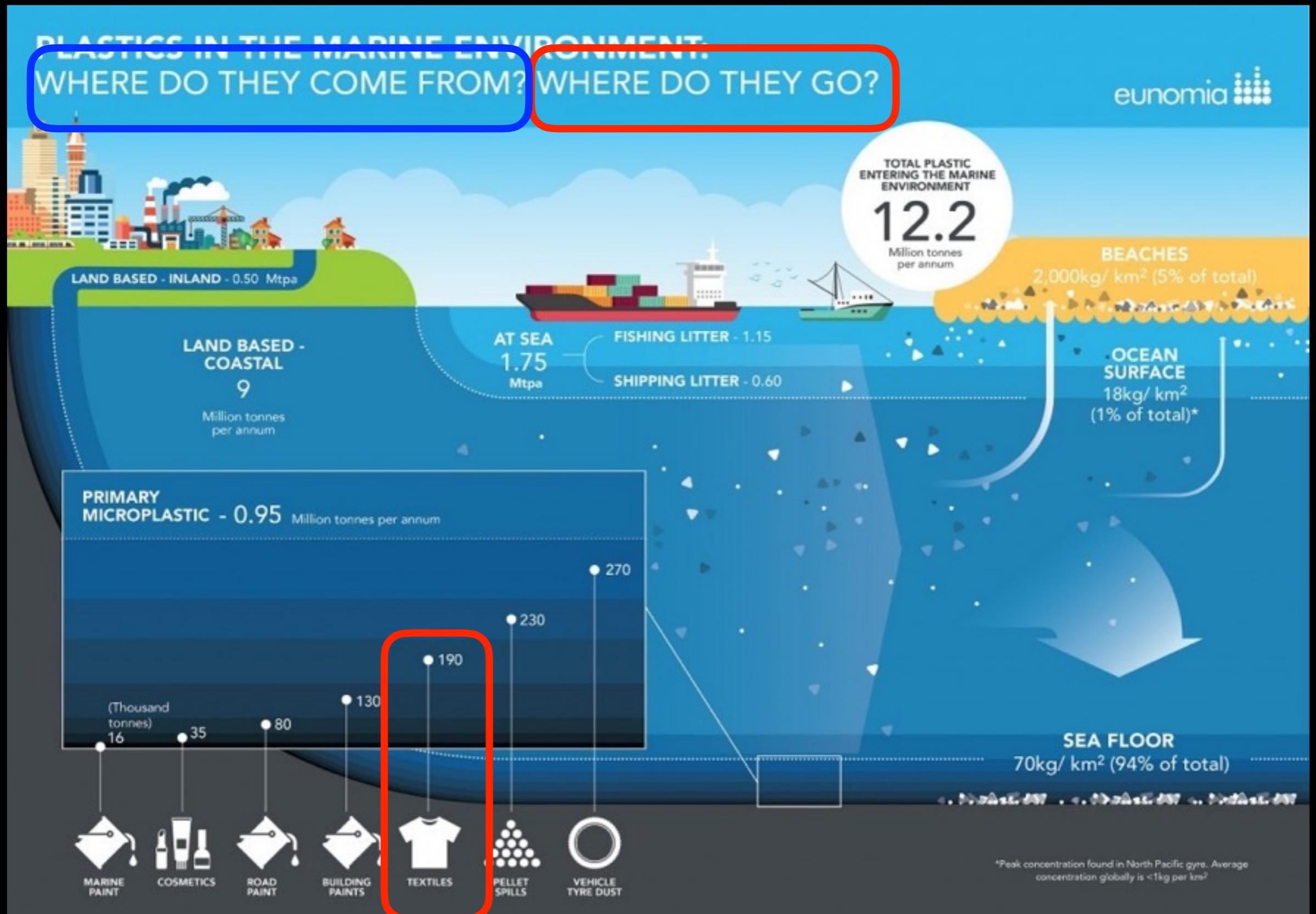
COMING SOON



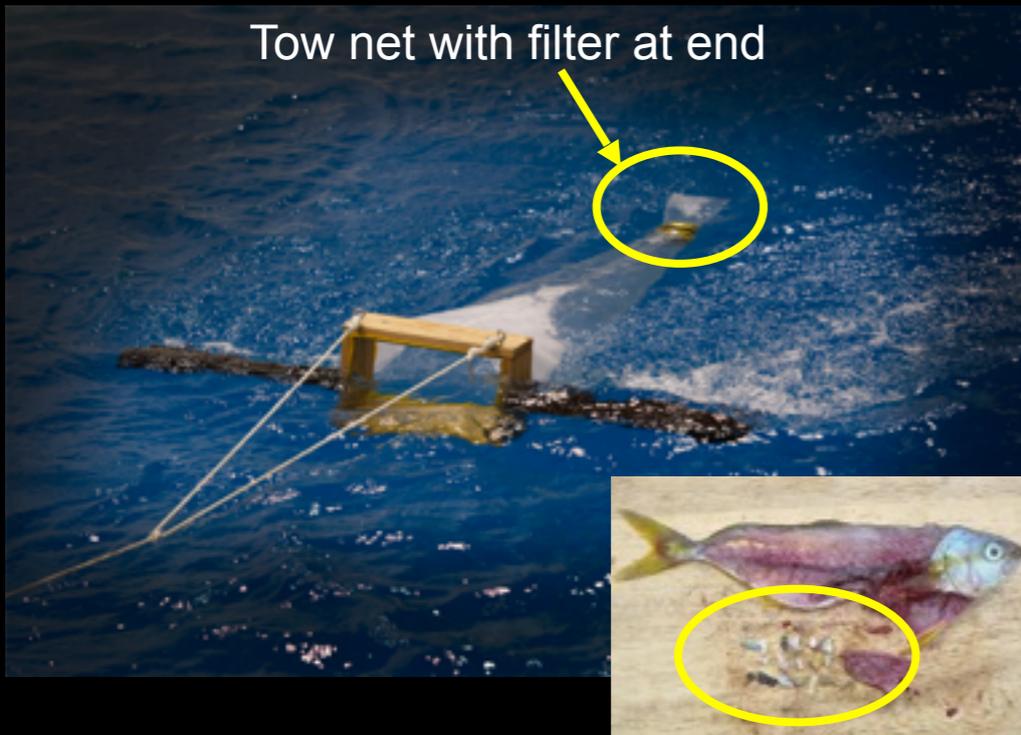
Pollution impact is clear now, and likely to worsen in the future



Plastic pollution: the challenges associated with identifying sources and targets



Studies of plastics involve heavy work for collection and for quantification by hand counting



Contents emptied



Further Lab Analysis



Hand-Counted on Ship



Hand Counting For Thousands Of Samples,
When Easy To See!!!!

Some definitions

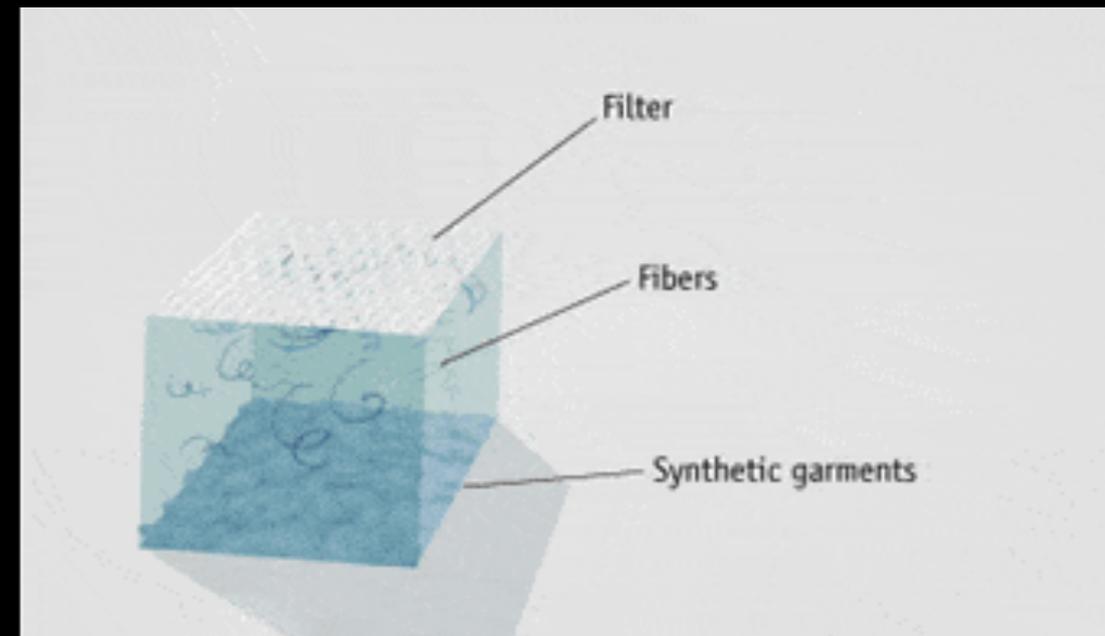
(for the plastic pieces difficult to see)

“Micro”: usually <5mm, most often <5um

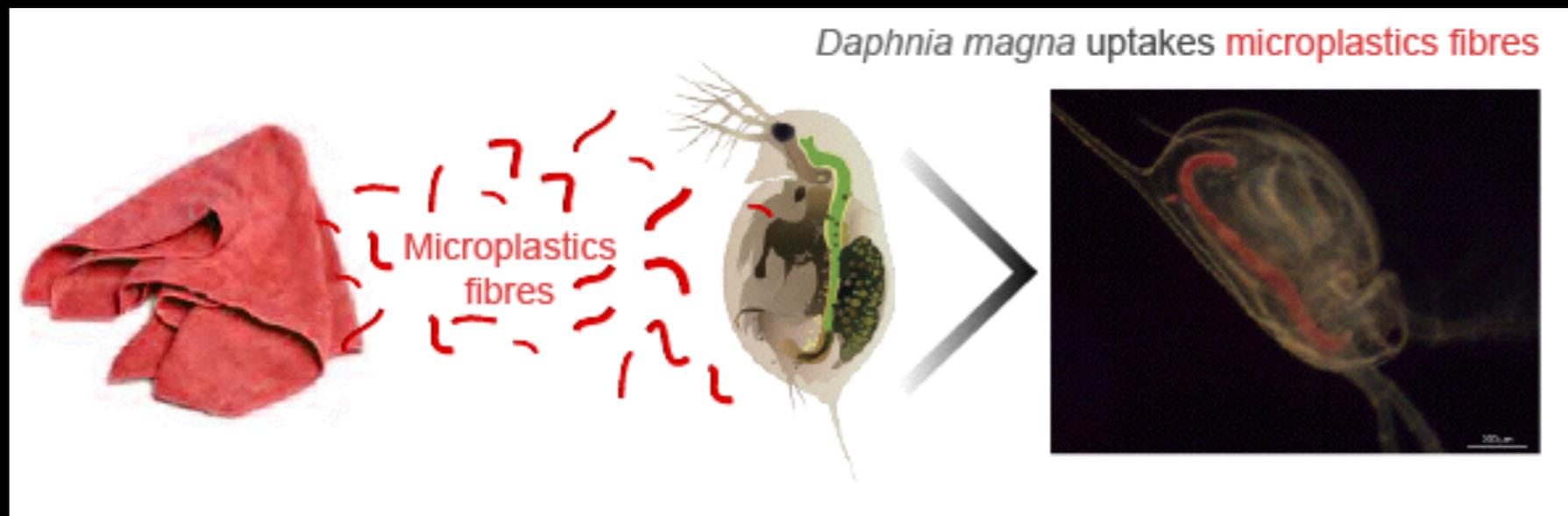
“Microplastics”: brake down from mega/
macroplastics (plastic bags, packing
pellets)

“Microfibers”: type of microplastics
sometimes coming from brake down of
larger pieces, but more often produced as
is (from synthetic fabric, textile)... and
usually <5um

Produced by shedding of synthetic garment (spandex, nylon, polyester...), especially during washing and drying



So small that it gets ingested and penetrates cells and tissues (found in fish filets), with unknown health consequences

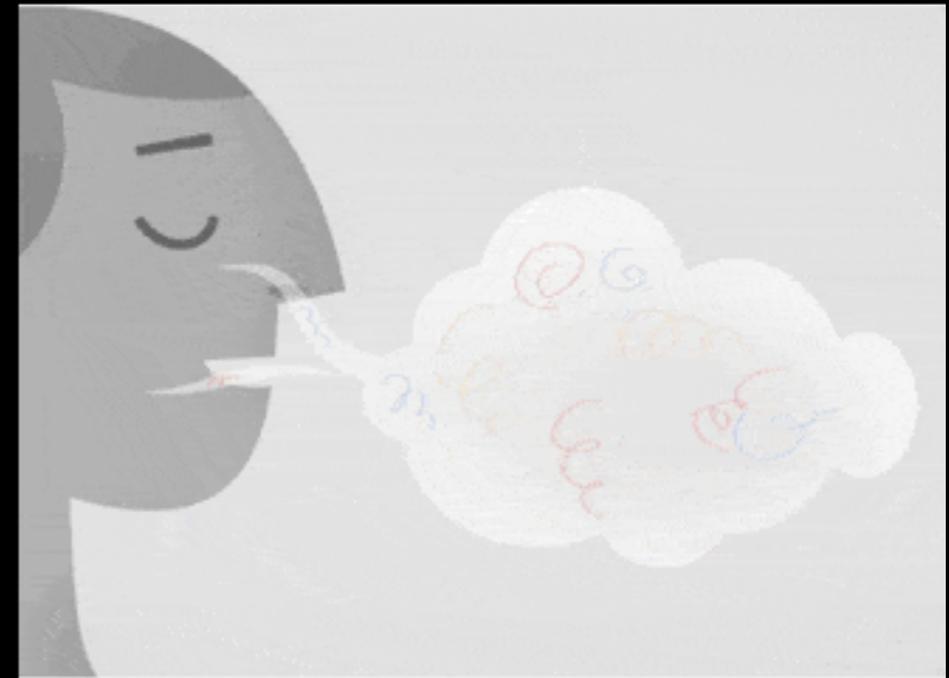


PLASTIC FIBERS IN TAP WATER, 2017



orb. one world. one story.

PREVALENCE OF MICROSCOPIC PLASTIC FIBERS BY SAMPLE SOURCE LOCATION.



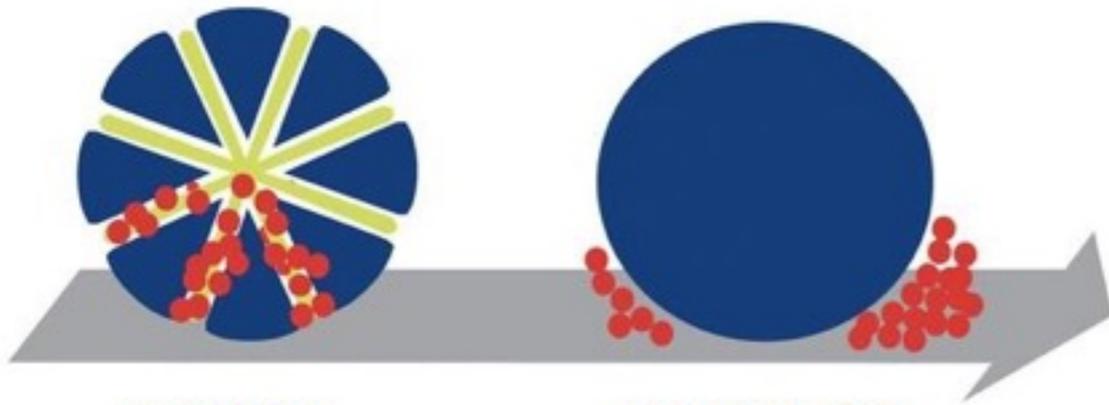
Tap water is widely contaminated by plastic



Guardian graphic | Source: Orb Media



HOW DOES MICROFIBER WORK?



MICROFIBER

lifts and locks dirt and moisture deep within fibers

ORDINARY FIBERS

push and scatter dirt and moisture

The dense construction of split microfibers creates a more efficient cleaning system through:

Positively charged microfibers attract negatively charged dust.

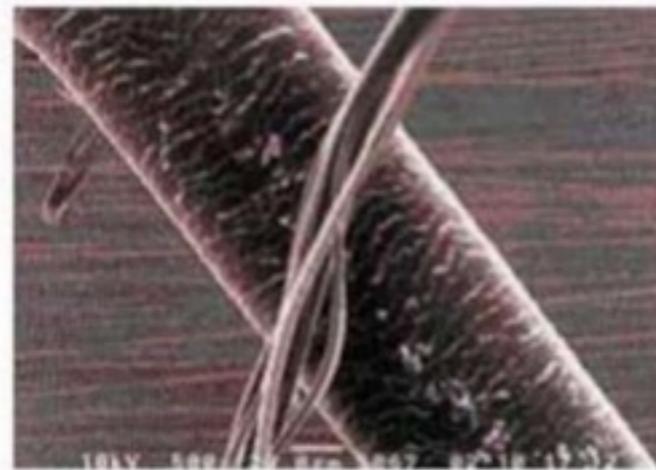
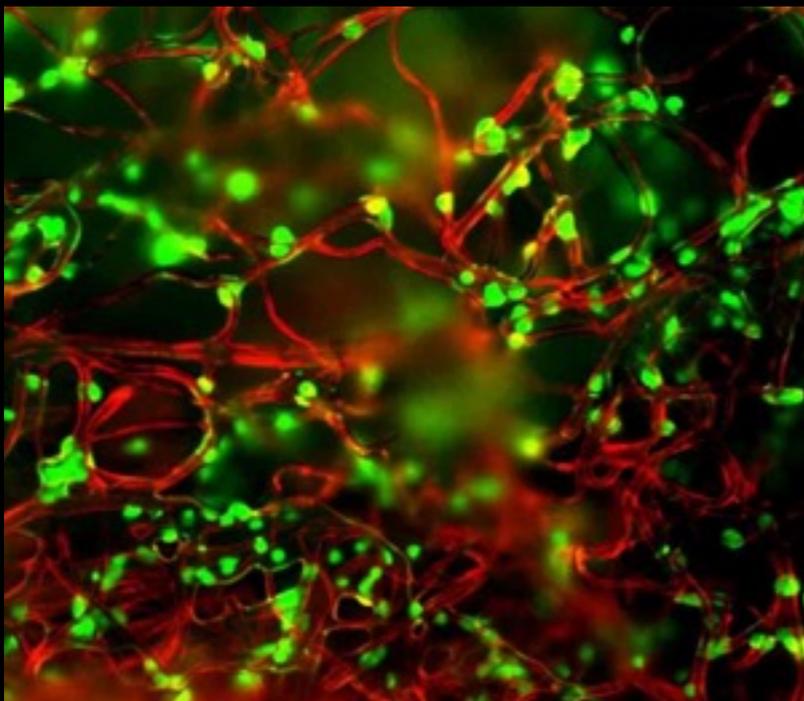
Excellent absorbing power pulls liquid away from surfaces.

Surface tension is broken, allowing the option of cleaning with water or with fewer chemicals.

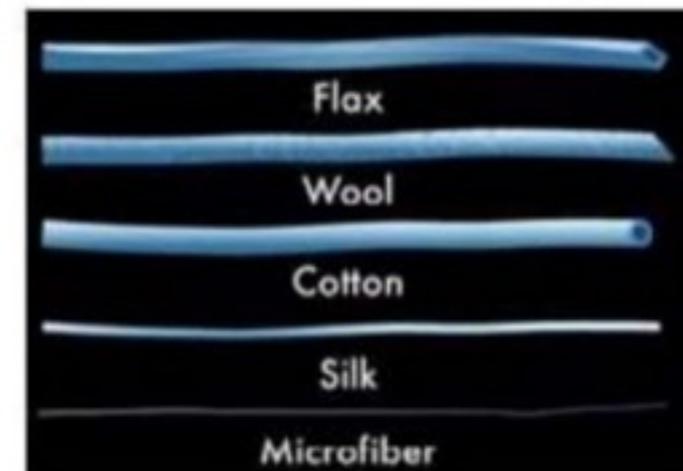
Synthetic microfibers are highly charged, they are highly reactive, and good absorber of pollutants

So small that it gets ingested and penetrates cells and tissues (found in fish filets), with unknown health consequences (yet)

Microfibers are beautifully fluorescent



Microfiber in front of a human



Microfiber thickness compared to other fibers.



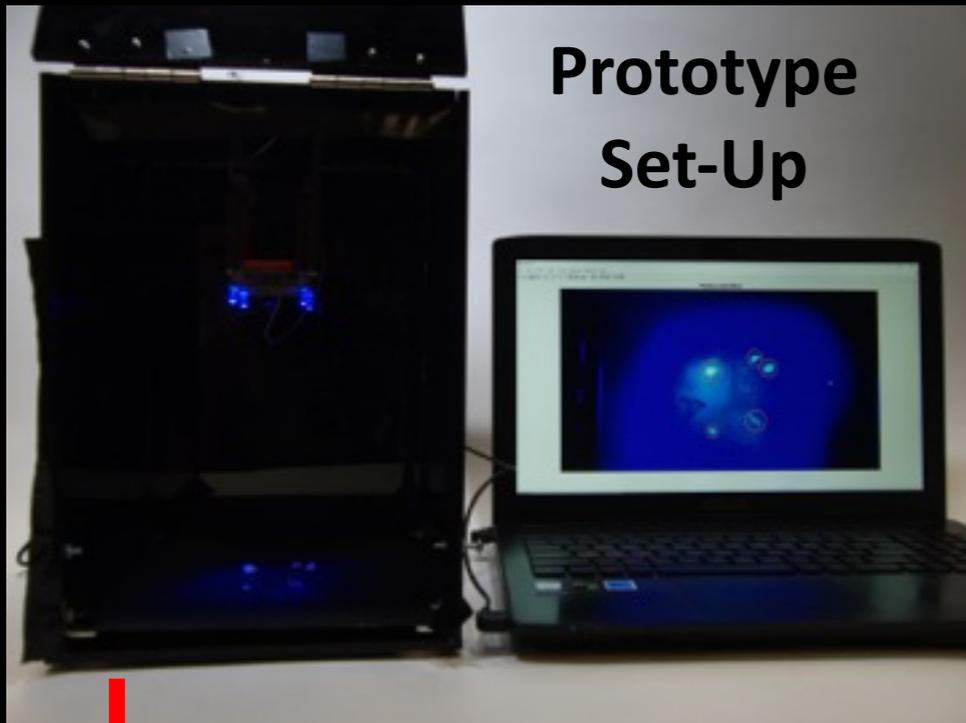
Microfiber



Cotton

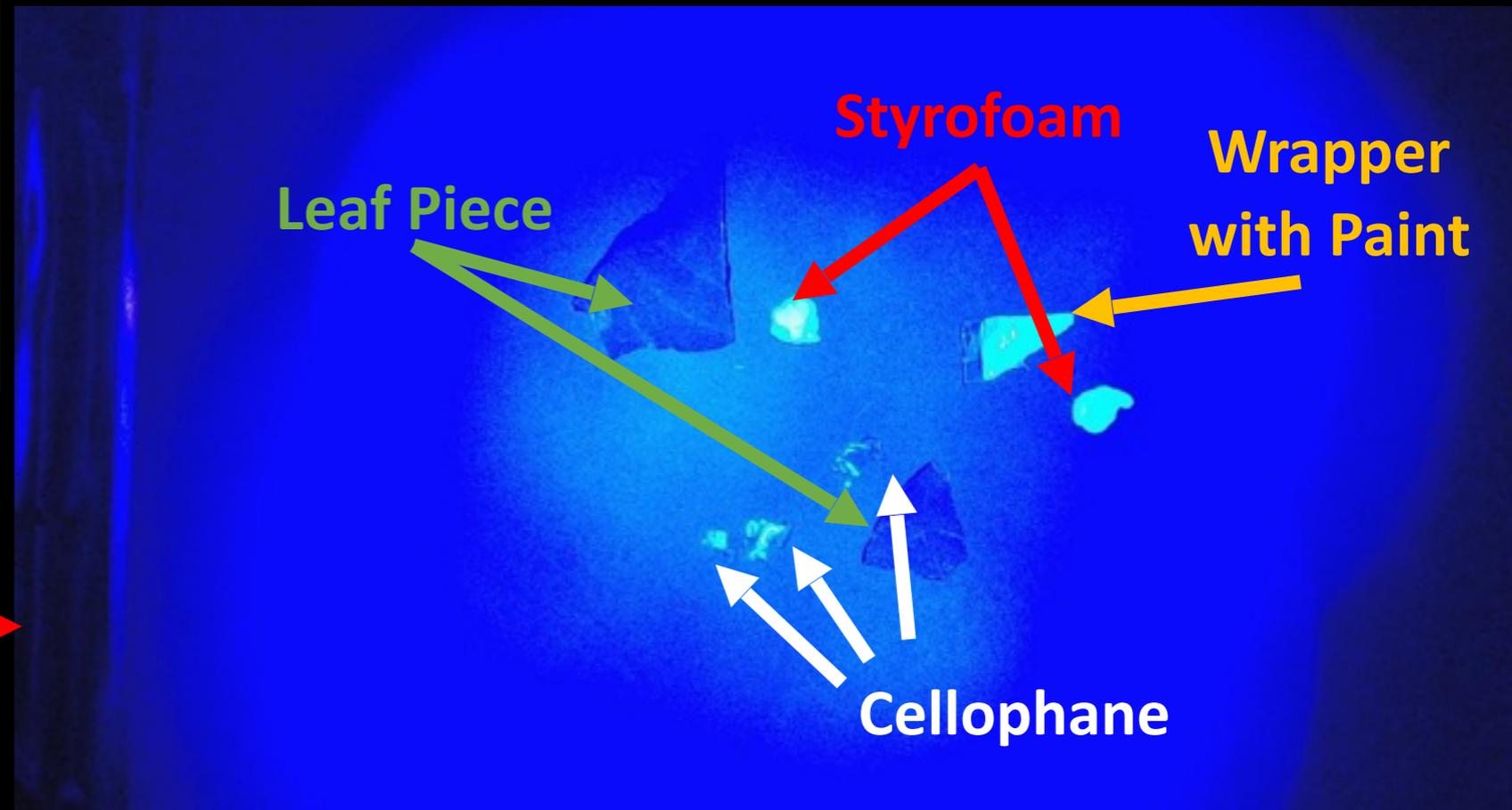


Fluorescence imaging to identify plastic in sample



AMI: Automated Microplastics Imaging (including microfibers!)

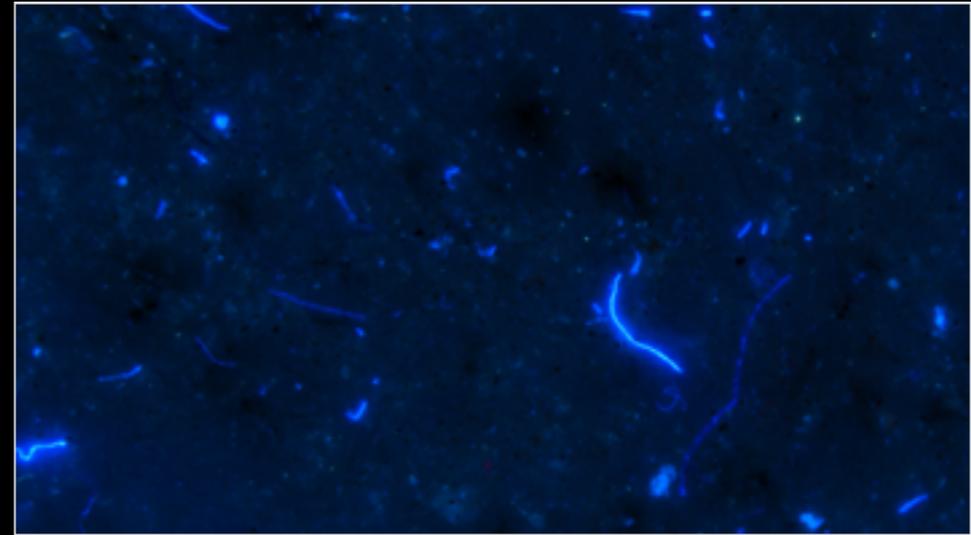
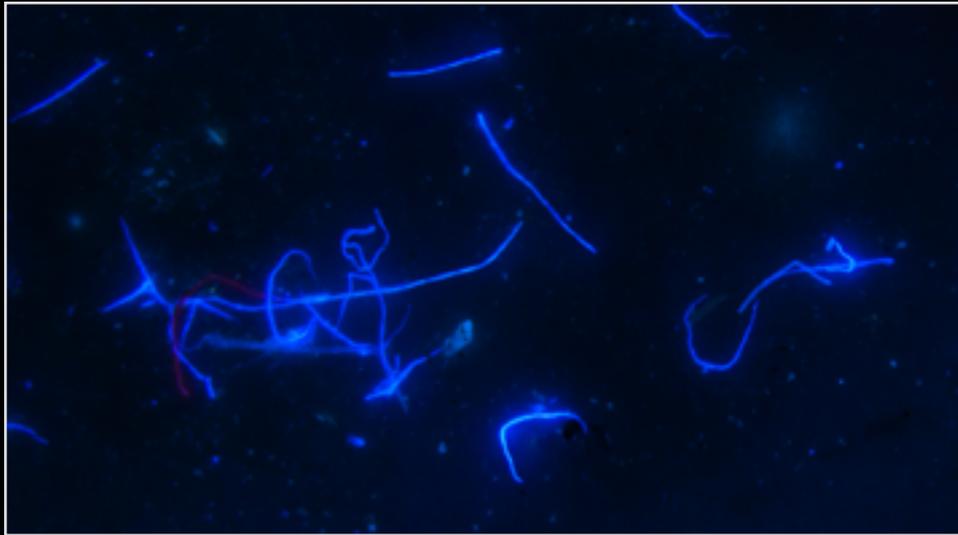
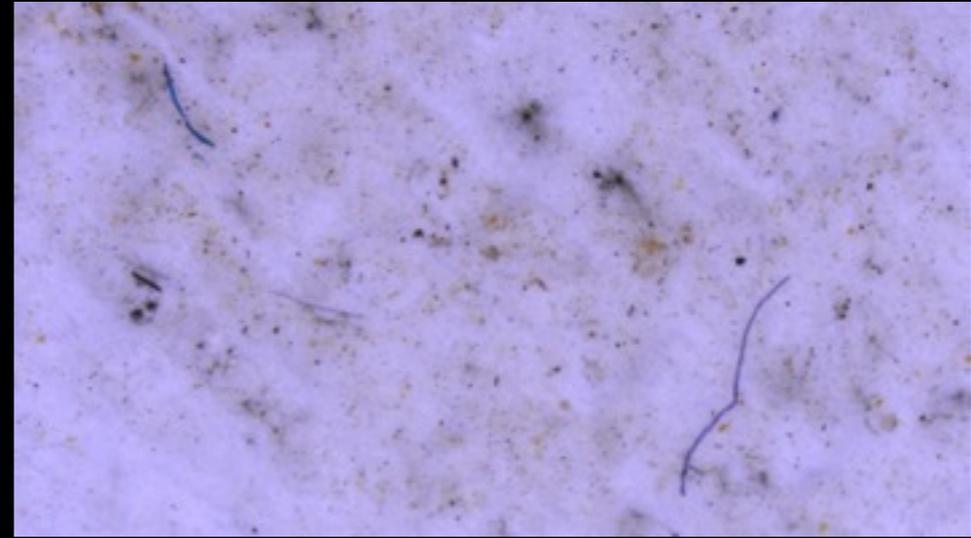
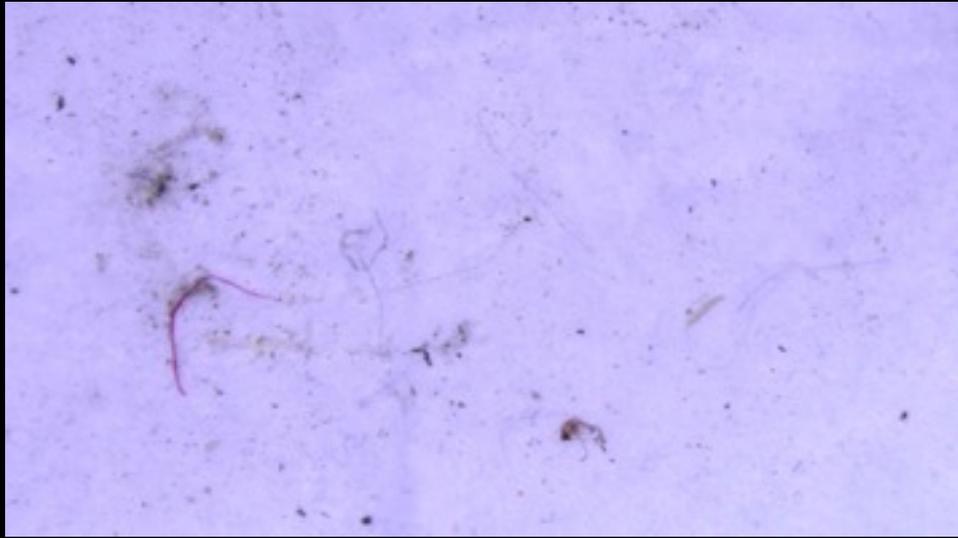
Sample Image and ID from image processing (automated "face" recognition)



Snow

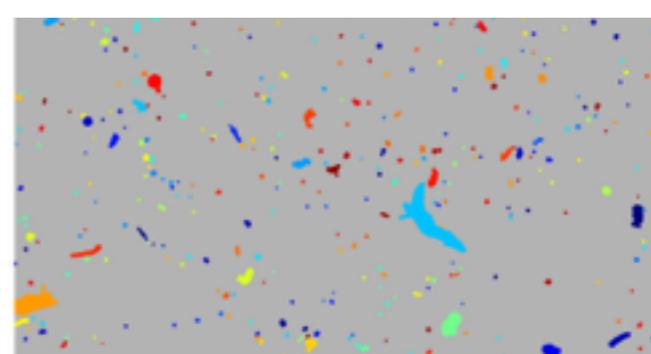
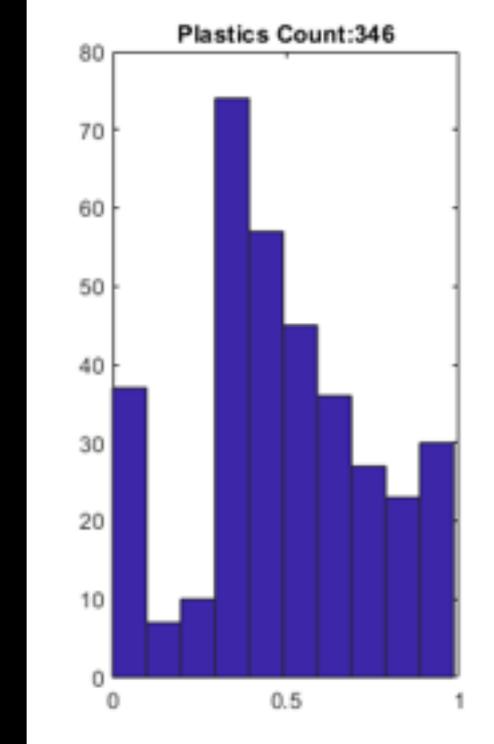
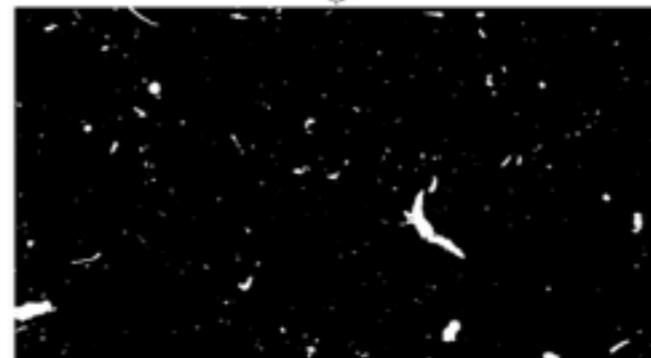
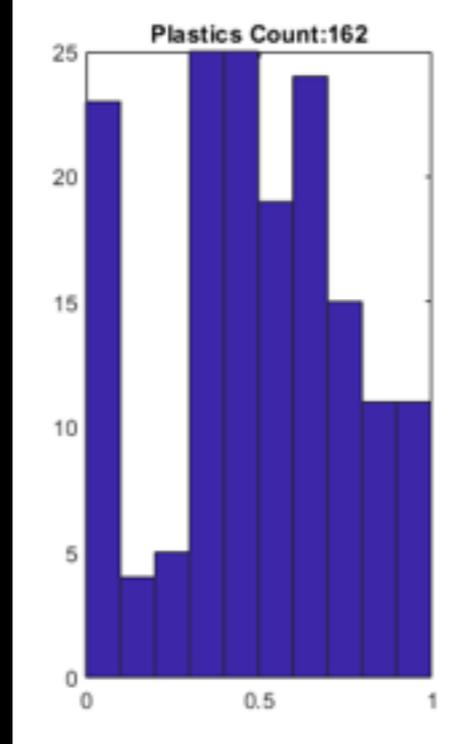
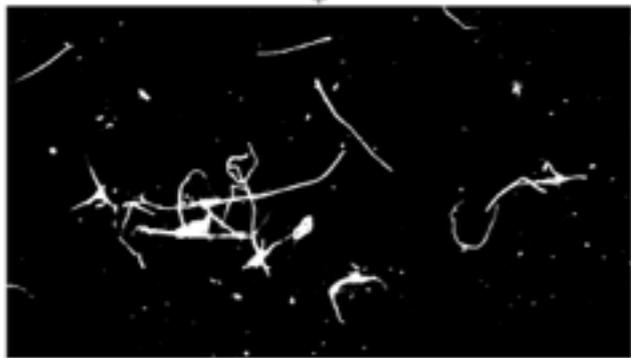
North Pole

Water



162

346

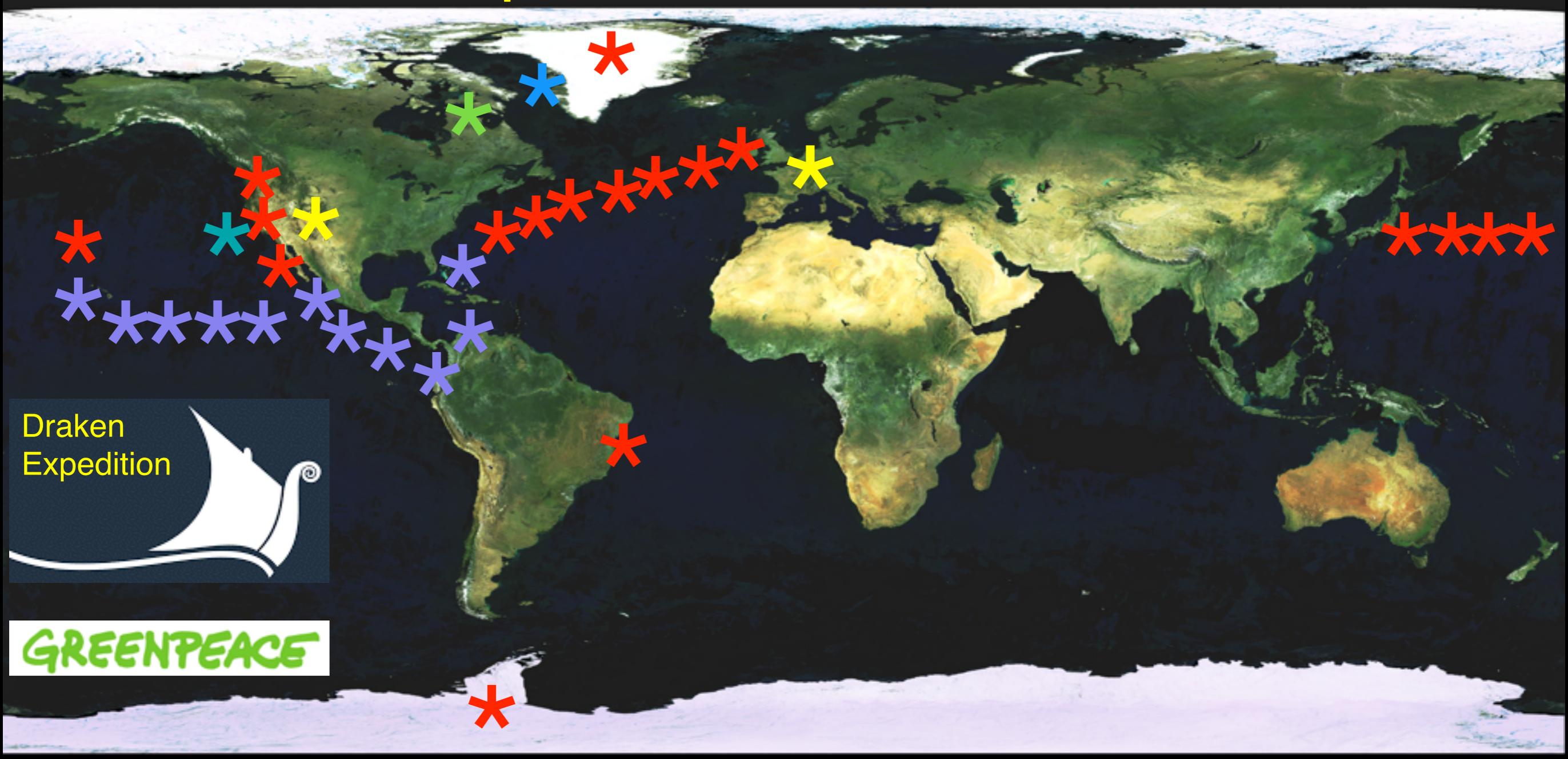




Newfoundland Circumnavigation 2018
 Oct. 2, 2018 - Oct. 12, 2018



Samples of water/snow, sediment, air, organisms being analyzed from around the world... a unique network of collaborations~!



Instrument for fast automated quantification of Microfibers is implemented (AMI)

Microfibers analyzed “everywhere”, from diversity of samples

Microfibers monitored in various environments:
Aquatic, atmospheric, organisms, sediments

What to do now ?

MICROFIBERS

SOLUTION POINTS



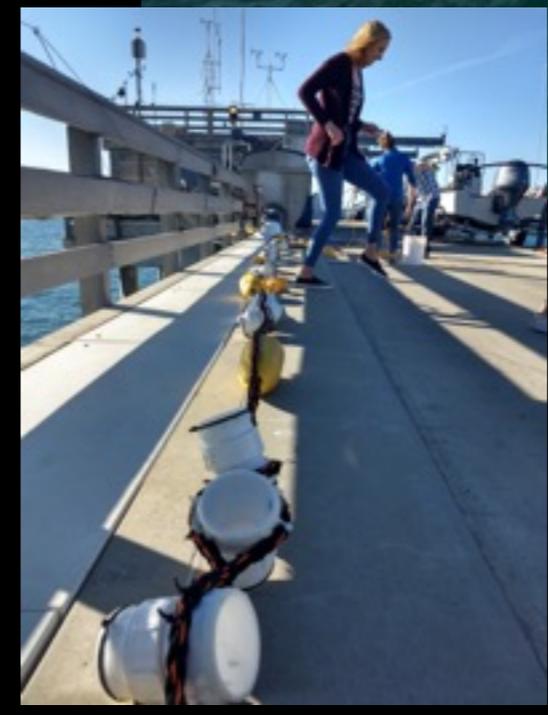
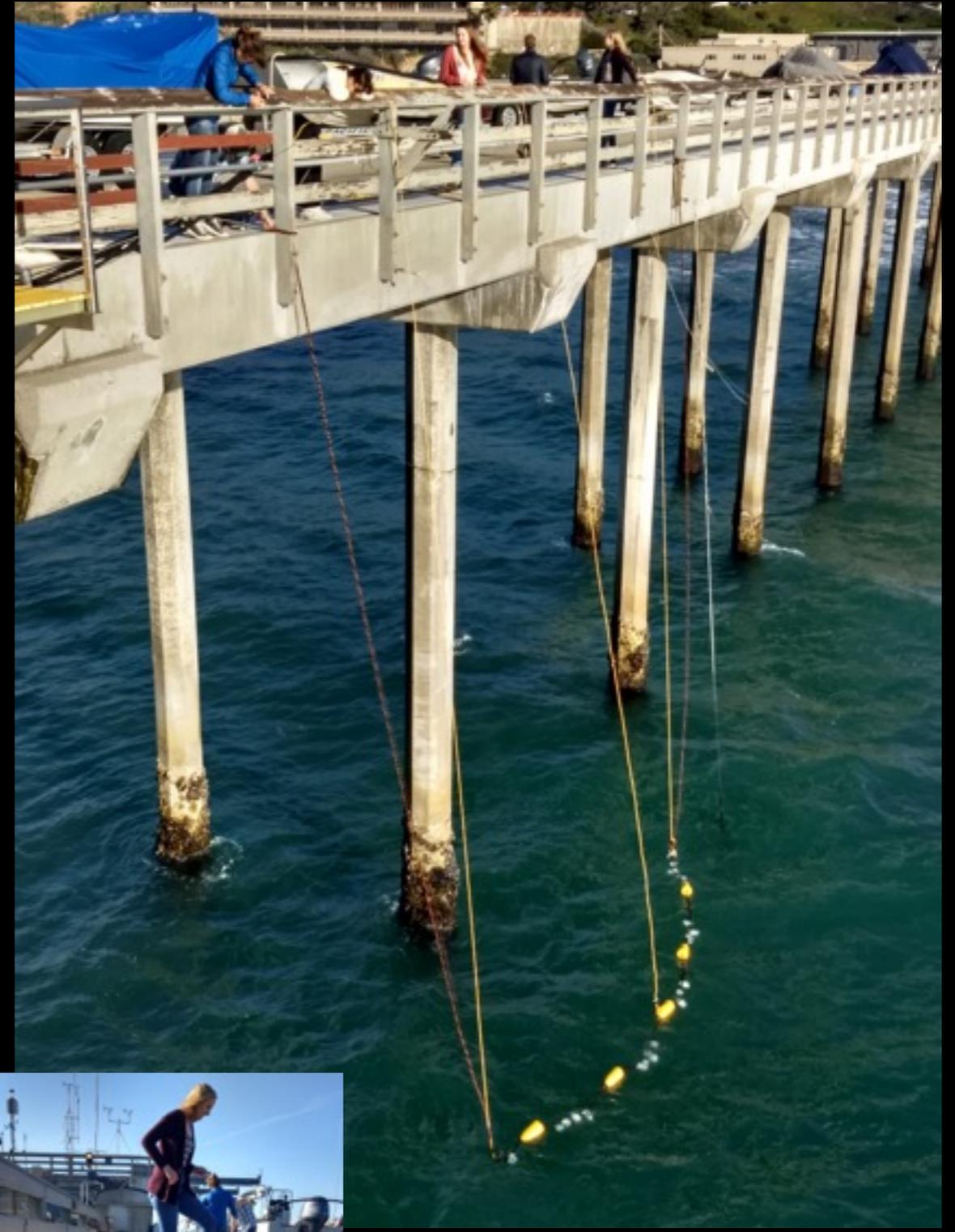
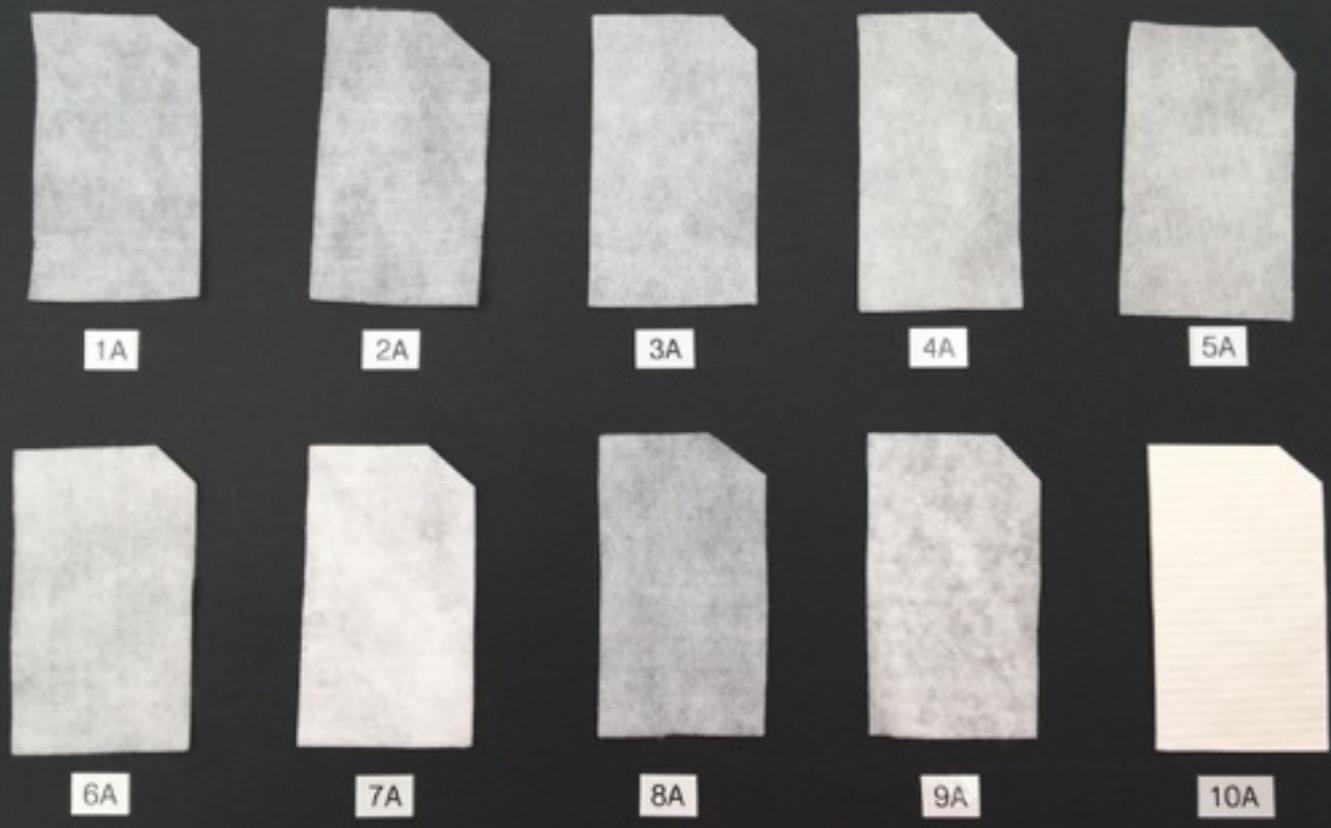
Changing the mindset of R&D between academia and industry (more collaboration)

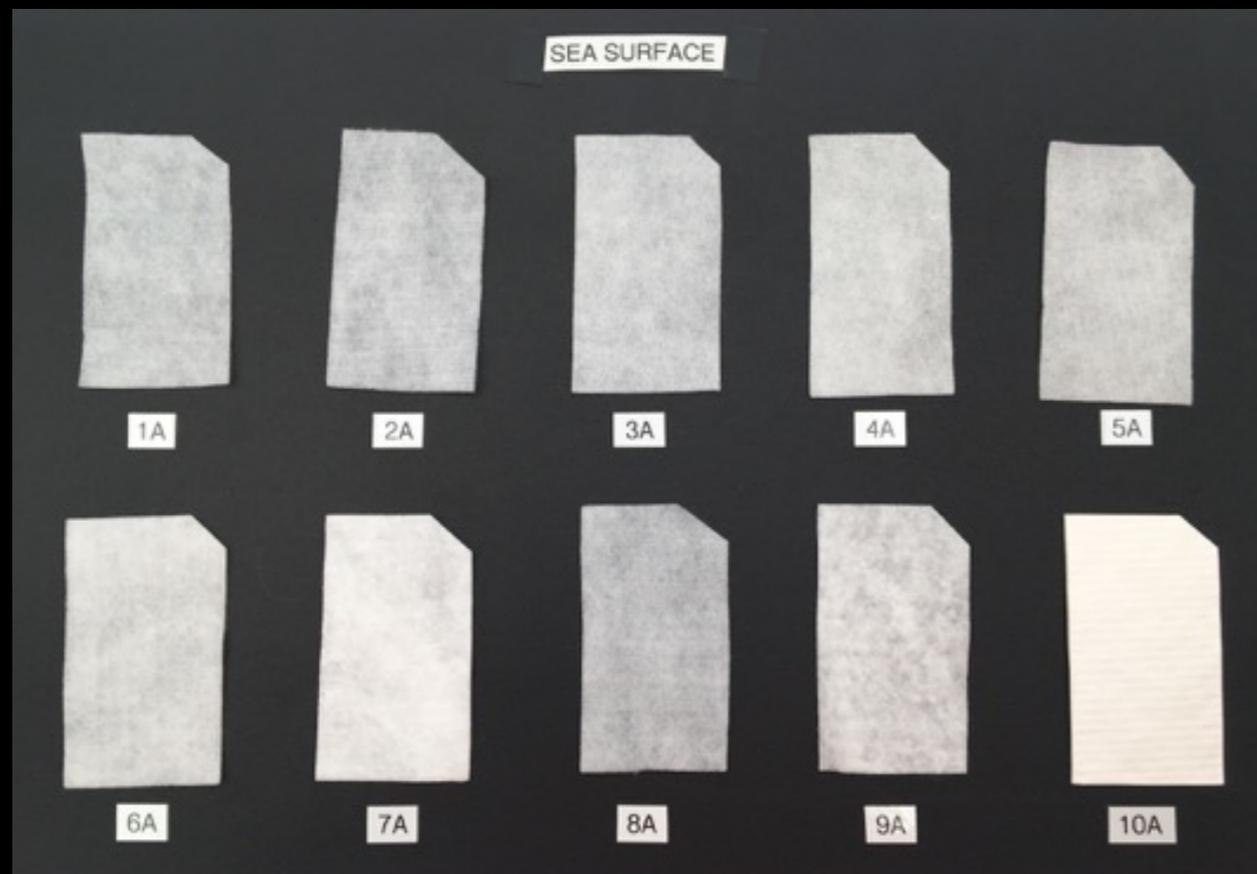


Address properties of the core material

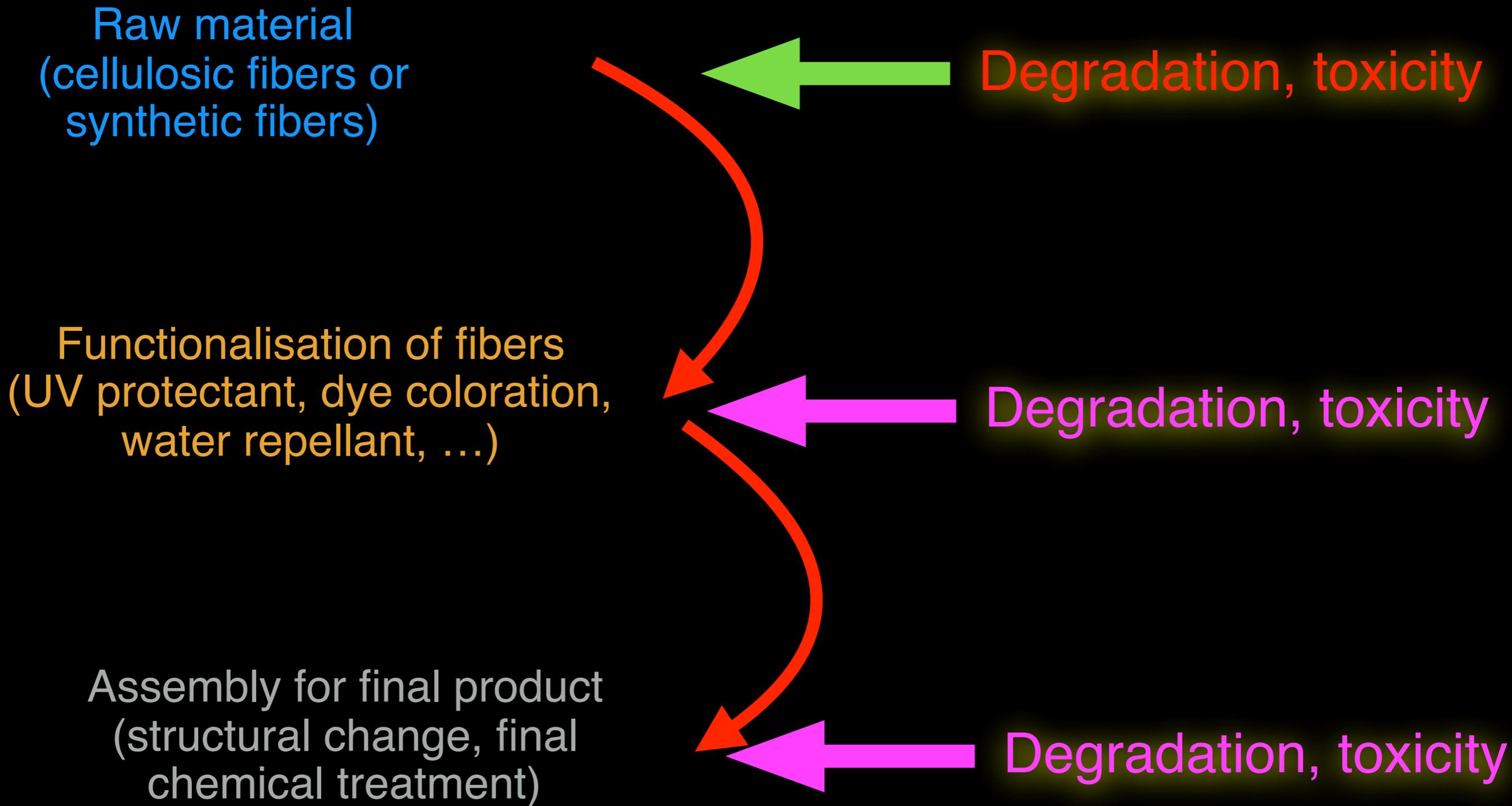
Address functionalisation of raw material with chain of chemicals treatments

SEA SURFACE

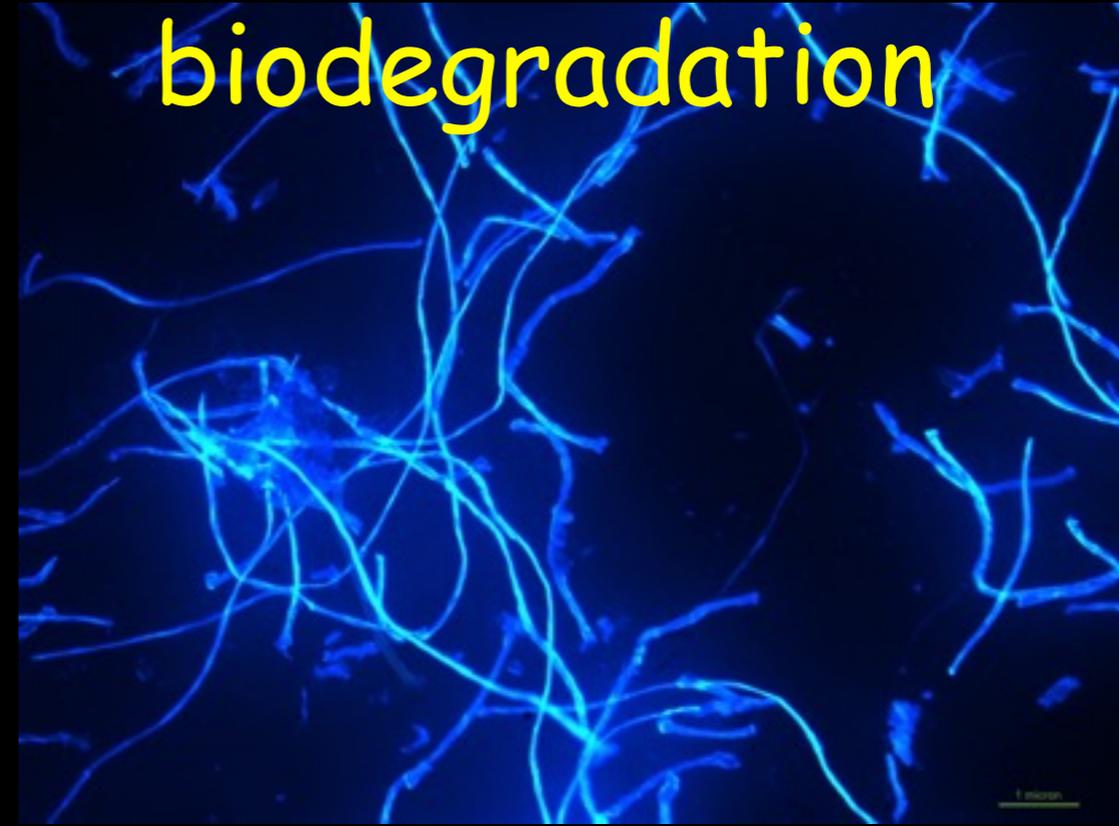




Address functionalisation of raw material with chain of chemicals treatments



Microplastics & microfiber research,



biodegradation

Royer et al. (2018). doi.org/10.1371/journal.pone.0200574

Light to track physiological (sub-lethal) health



Ecotoxicology

Take-home message

Microfibers are **different than microplastics**

Microfibers are “**ubiquitous**”

Microfibers **require global assessment**

Is pollution related to functionalisation steps?

Microfibers... toxic effects?

Biomimicry for Emerging Science and Technology Initiative **The BEST Initiative @SIO**

Students (>125): undergraduates, graduates, volunteers from UCSD or other local universities (USD, SDSU) and international institutions (Canada, Italy, France, Germany,...)



Thank you !

Microfibers: summary video on U-tube

The story of microfibers

<https://www.youtube.com/watch?v=BqkekY5t7KY>

