



MICROPLASTIC MISINFORMATION IN THE MEME AGE: FLAWED STUDIES, ZOMBIE FACTS AND WHAT CAN BE DONE

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12 October 2026



Title: Microplastic Misinformation in the Meme Age: Flawed Studies, Zombie Facts and What Can Be Done

Abstract: Most have heard we consume 5 grams of plastic per week. That is the reported weight of plastic hiding in our food as microplastics. Many may have seen the reporting showing a credit card, weighing about 5 grams, between two chopsticks. I saw that image and immediately had my doubts. Planting the picture that each bite contained a credit card's worth of plastic was intentionally misleading. A little digging showed how misleading it is. Actual consumption is about a million times lower. I'll examine where the error occurred, how it spread and how subsequent measurements in peer-reviewed papers failed to change the perception. Science is supposed to be self-correcting. It is a foundational assumption. Testing, replication, and new evidence are supposed to correct errors. Truth is supposed to vanquish erroneous conclusions. There is ample evidence the system is broken. The pace of publication is increasing while the pace of correction is slowing. Even when major errors are present and when multiple analyses confirm the error, the incorrect results continue to live on as zombie facts. Getting a paper corrected is a challenge. Getting public perception corrected is nearly impossible.



A widely reported fact about microplastic consumption is wrong.

Correction in the scientific literature is slow to correct public perception and the scientific literature.

Plastic particles are everywhere.

before I jump in, I'm going to tell you the story
of how I got interested in microplastics.

types of stories:

tragedies

comedies

fantasy

allegory – teach something

cautionary tale

epic

legend

monomyth – story of heroism





DOW

~31 years



Done.

~5 years

These are syenite, likely from near Marathon, ON.
They contain sodalite with some sulfide content.
Transported by glaciers, I find them in Michigan,
at night.



visible light



UV light
(365 nm filtered)

Lake Superior Watershed



Legend

- Cities/Towns
- State Borders
- Rivers
- - - International Border
- Lake Superior Watershed
- Diversions



The filter is important. It gets rid of stray visible light making fluorescence much easier to see.





visible light



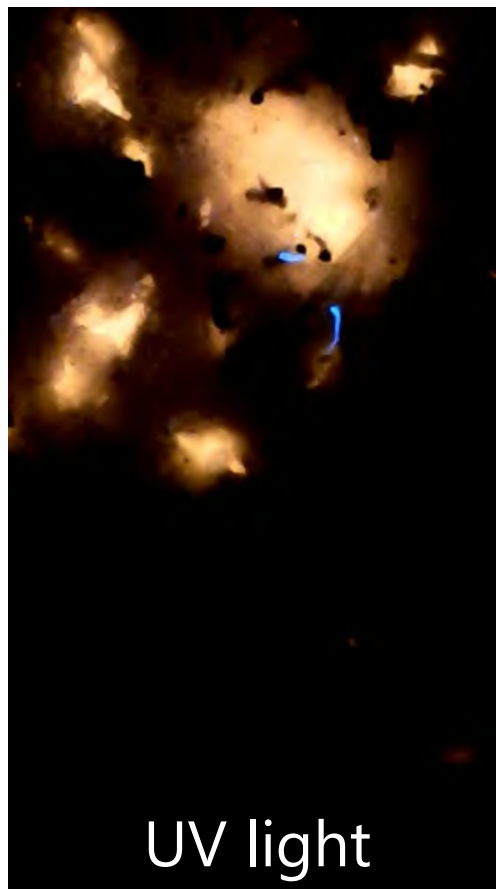
manipulated image

1ST CURVE IN THE ROAD: WHAT ARE THE BLUE FLECKS?

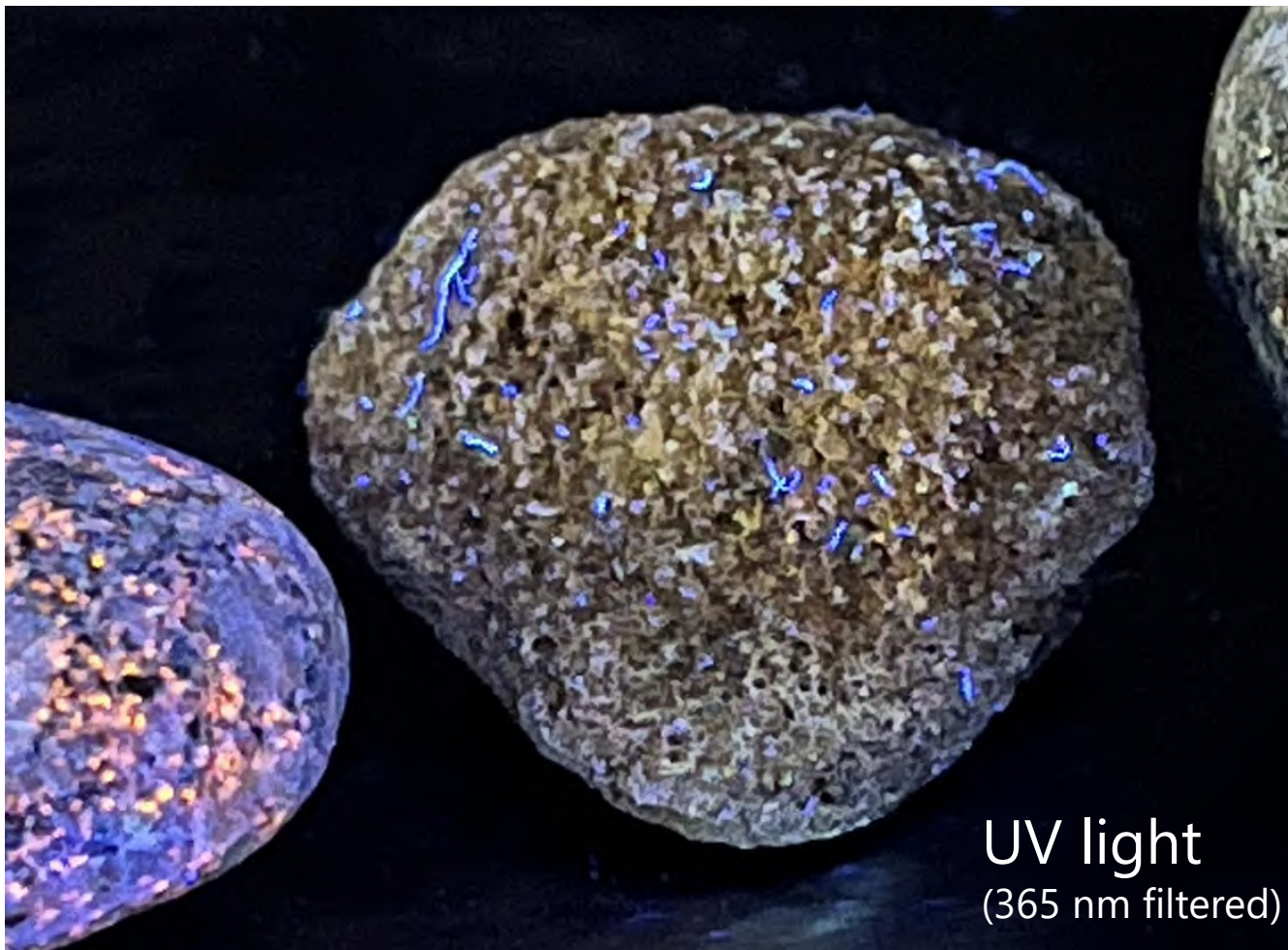




visible light



UV light



UV light
(365 nm filtered)

OBX BEACH SAND



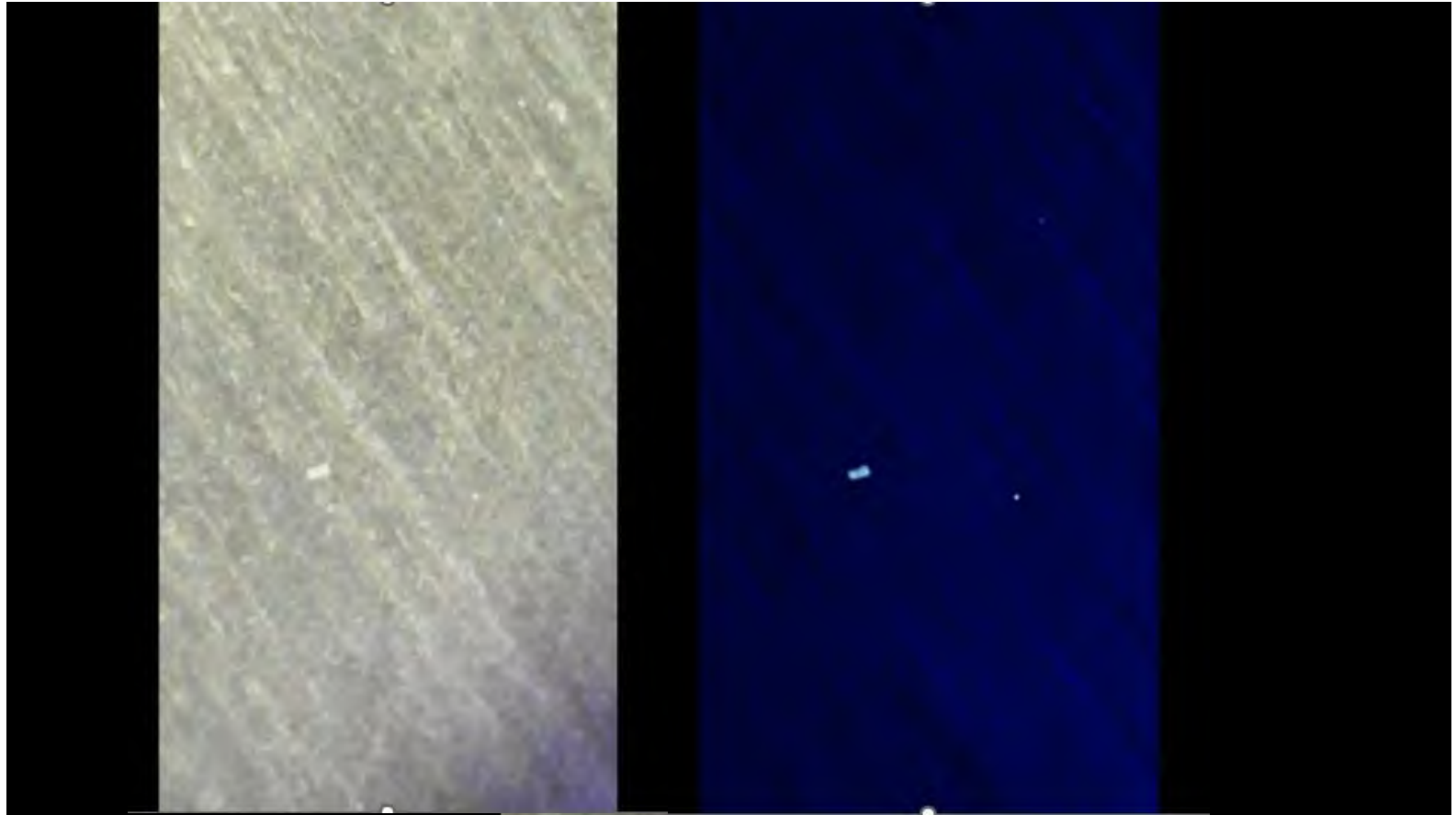
OBX BEACH SAND



OBX BEACH SAND

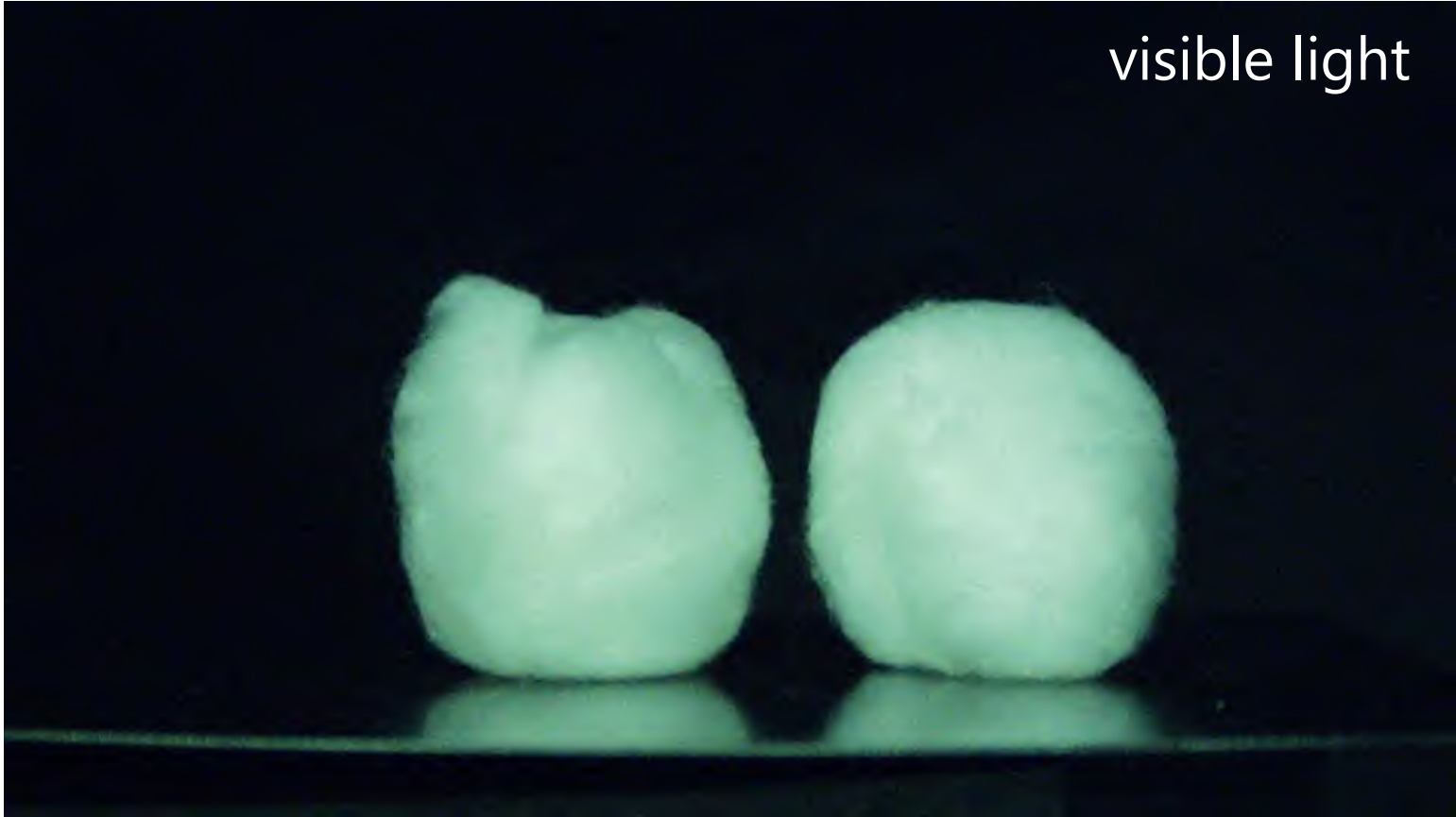


ISLE ROYALE WATER – VISIBLE TO UV

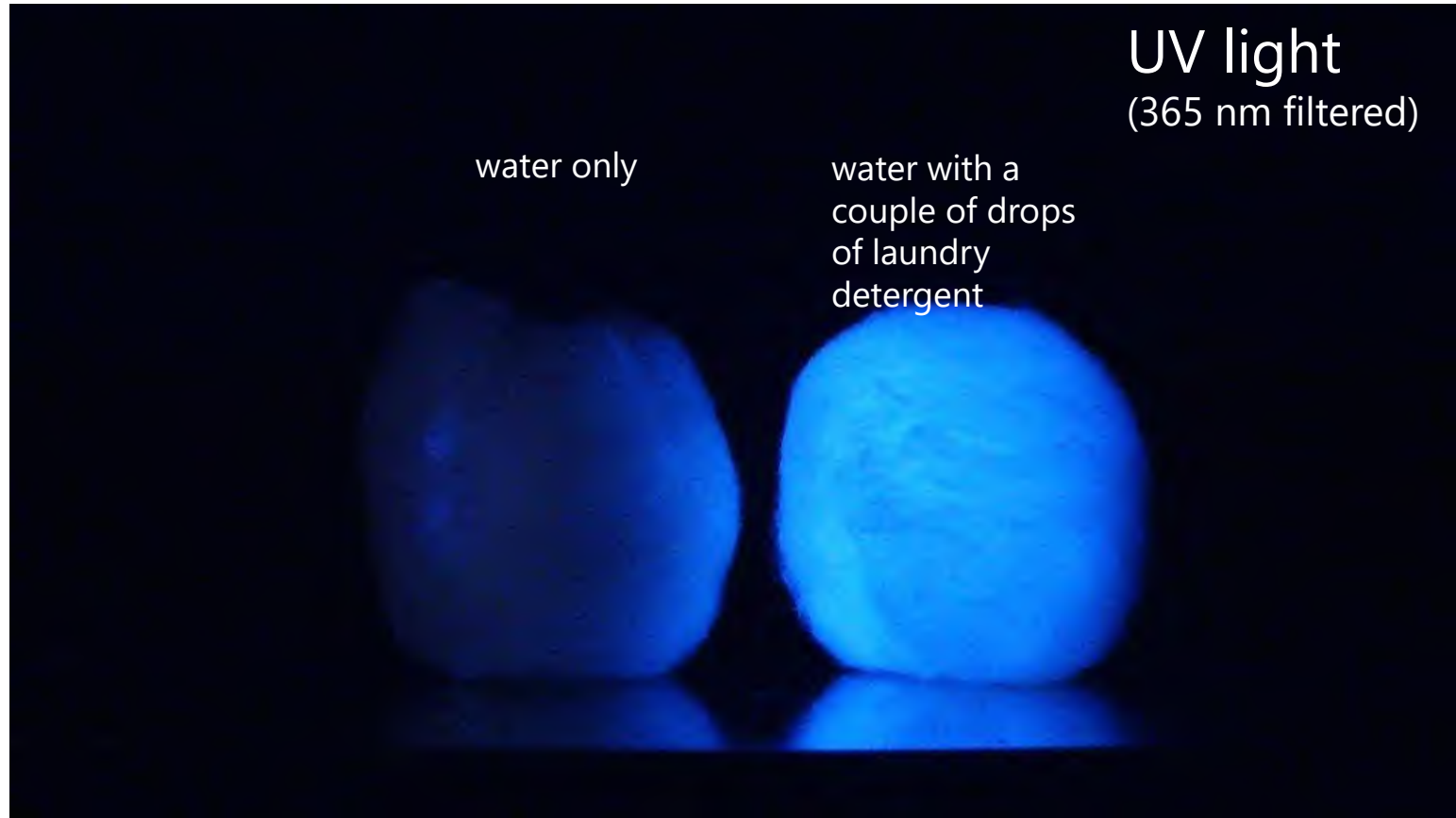


COTTON BALLS

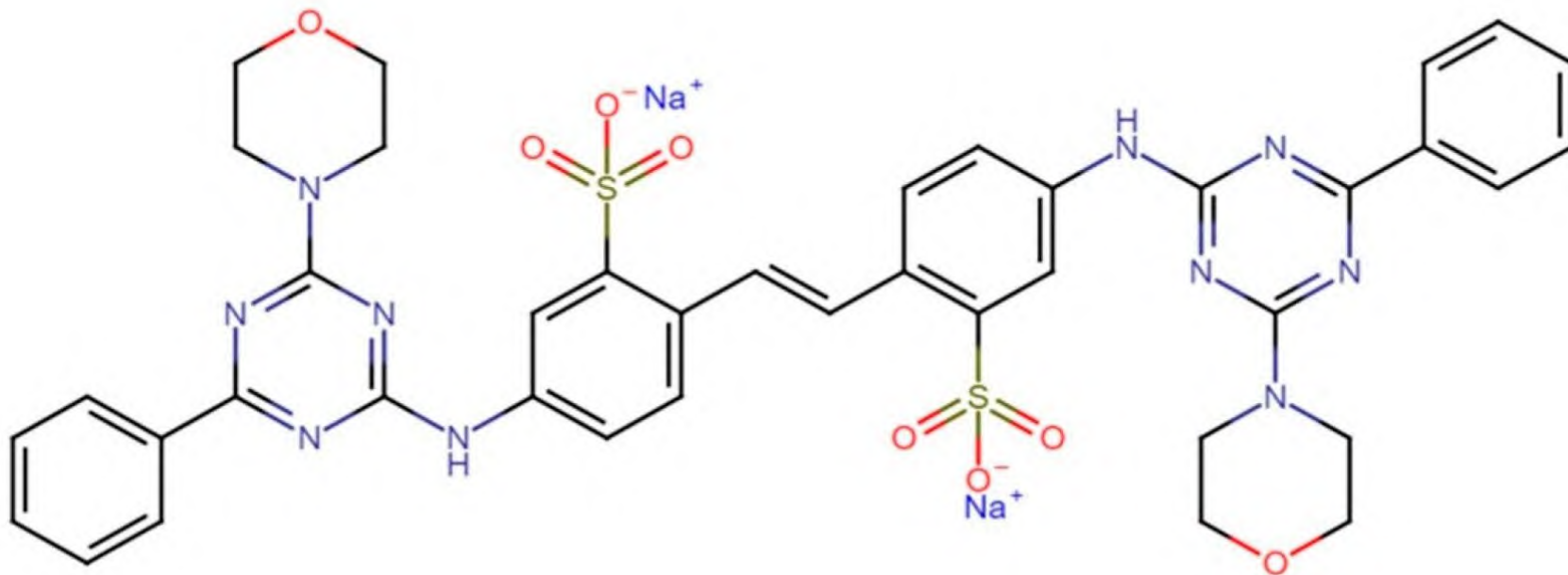
visible light



COTTON BALLS – OPTICAL BRIGHTENERS

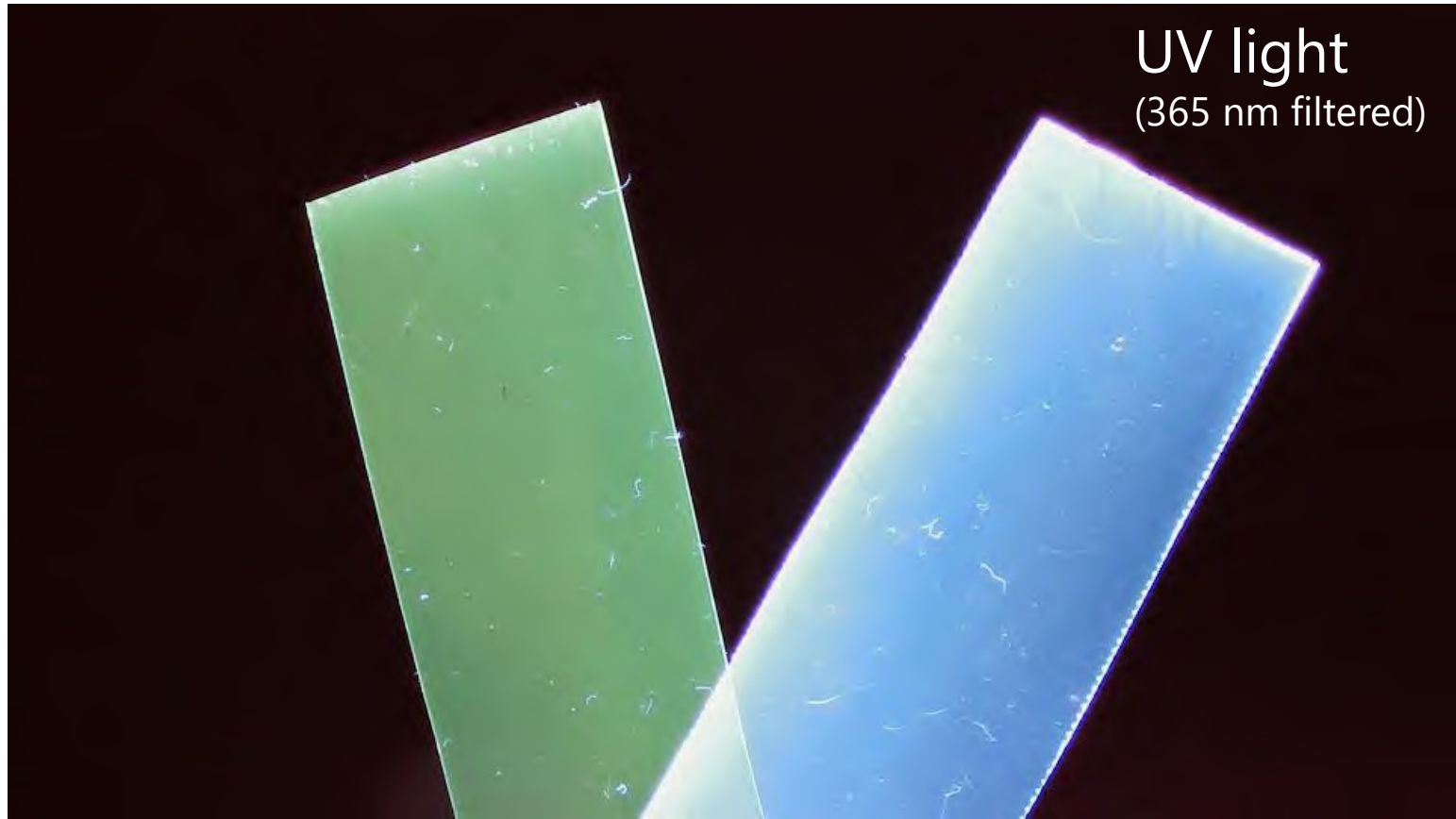


OPTICAL BRIGHTENERS





PET – OPTICAL BRIGHTENERS





UV light
filter

2ND CURVE IN THE ROAD: MICROPLASTICS LAB FOR STUDENTS?





Midland Local Section



CENTRAL
MICHIGAN UNIVERSITY

Water Chemistry in the Great Lakes Region

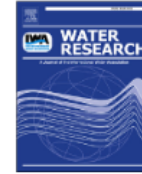
<https://www.cmich.edu/academics/colleges/college-science-engineering/centers/cmu-biological-station/h2o-q-in-the-classroom>



Contents lists available at ScienceDirect

Water Research

journal homepage: www.elsevier.com/locate/watres



Review

Microplastics in freshwaters and drinking water: Critical review and assessment of data quality

Albert A. Koelmans^{a,*}, Nur Hazimah Mohamed Nor^a, Enya Hermesen^a, Merel Kooi^a,
Svenja M. Mintenig^{b,c}, Jennifer De France^{d,**}

^a Aquatic Ecology and Water Quality Management Group, Wageningen University, the Netherlands
^b Joint Research Institute for the Environment and Urbanization, the Netherlands
^c Watercycle Research Institute, Wageningen University, the Netherlands
^d World Health Organization (WHO), Geneva, Switzerland

high quality data is difficult!

ARTICLE INFO

Article history:

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25 February 2019

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Keywords:

Microplastics

Drinking water

Waste water

Surface water

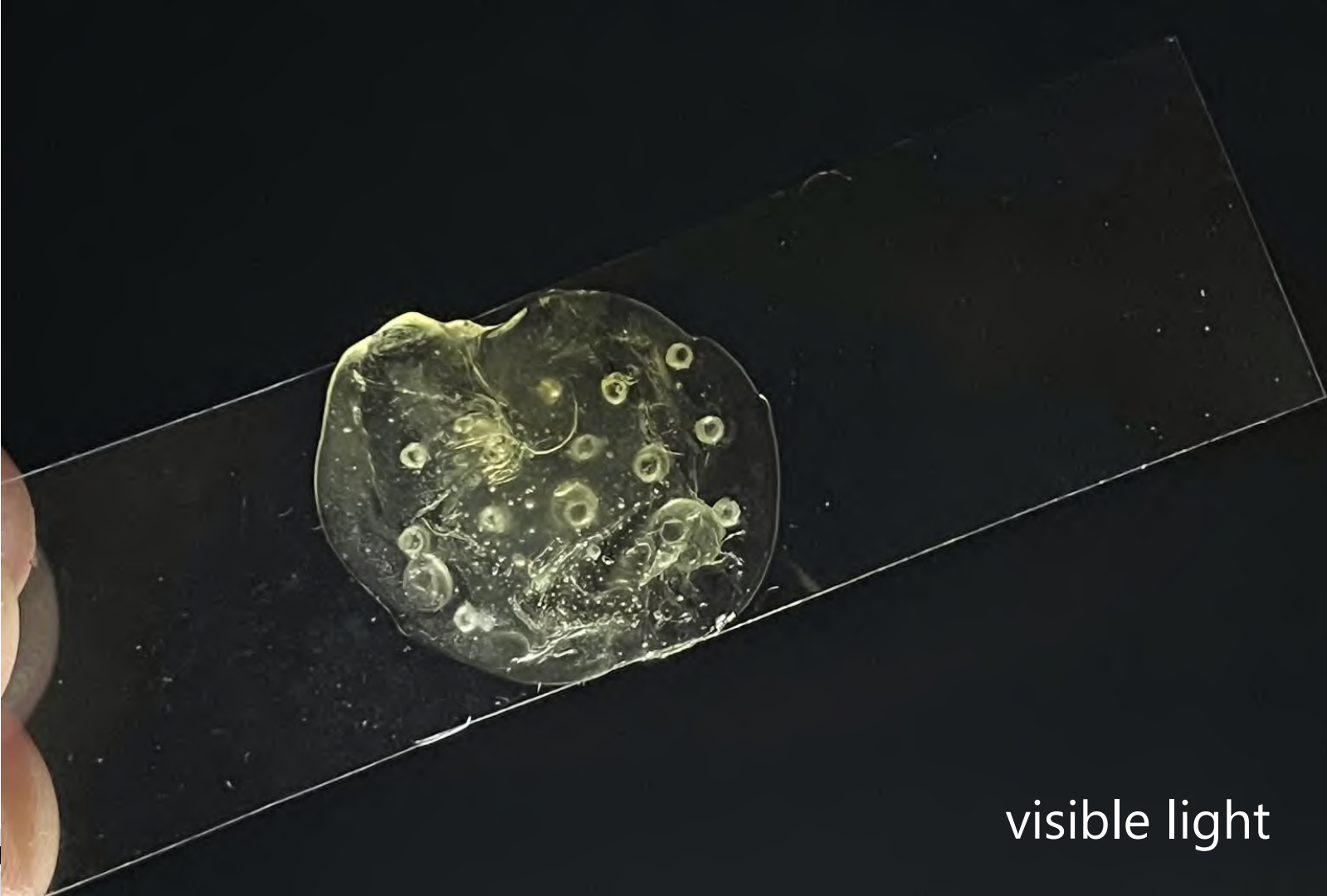
Human health

ABSTRACT

Microplastics have recently been detected in drinking water as well as in drinking water sources. This presence has triggered discussions on possible implications for human health. However, there have been questions regarding the quality of these occurrence studies since there are no standard sampling, extraction and identification methods for microplastics. Accordingly, we assessed the quality of fifty studies researching microplastics in drinking water and in its major freshwater sources. This includes an assessment of microplastic occurrence data from river and lake water, groundwater, tap water and bottled drinking water. Studies of occurrence in wastewater were also reviewed. We review and propose best practices to sample, extract and detect microplastics and provide a quantitative quality assessment of studies reporting microplastic concentrations. Further, we summarize the findings related to microplastic concentrations, polymer types and particle shapes. Microplastics are frequently present in freshwaters and drinking water, and number concentrations spanned ten orders of magnitude (1×10^{-2} to $10^8 \text{ \#}/\text{m}^3$) across individual samples and water types. However, only four out of 50 studies received positive scores for all assessed quality criteria, implying there is a significant need to improve quality.

3RD CURVE IN THE ROAD: WHAT AM I SEEING?





visible light



PARTICLE IDENTIFICATION

Cotton

Longitudinal View

- Mature flat and ribbon-like with convolutions, thick wall and small lumen
- Immature very thin wall and a large lumen with few convolutions
- Dead very thin and almost transparent
- Mercerized smooth and cylindrical, fewer convolutions and lumen or sometimes may be absent



Polyester

Longitudinal View

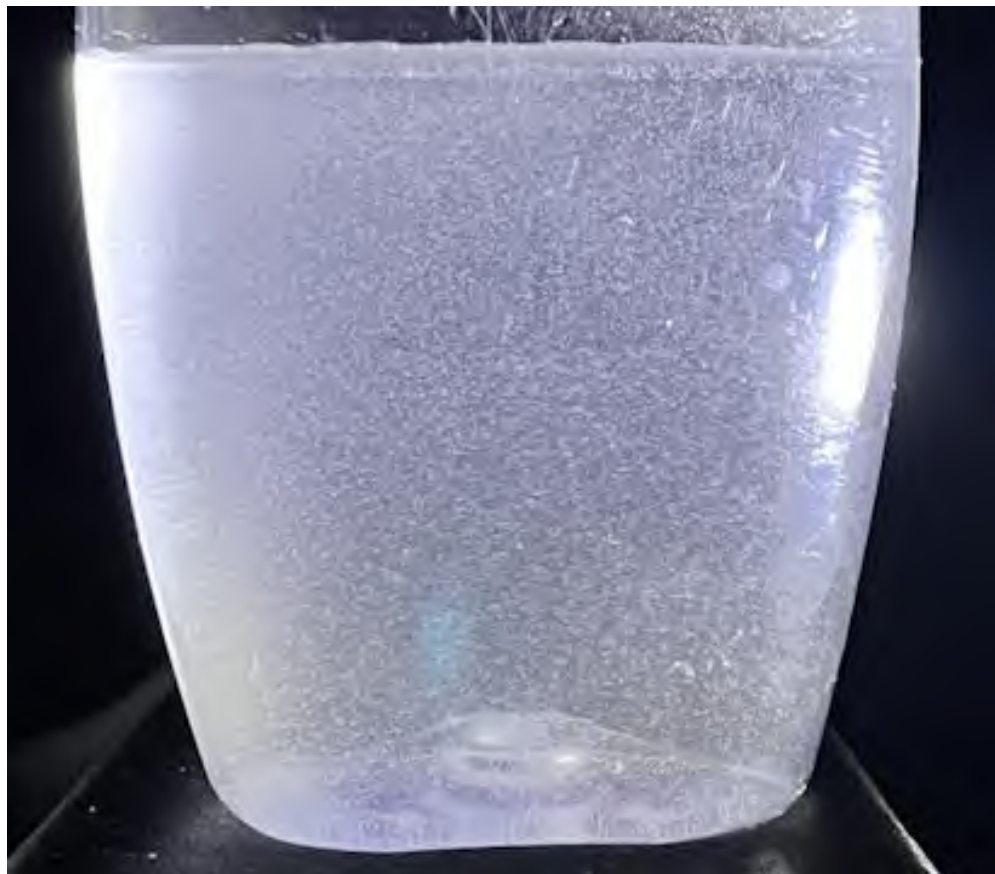
Structureless, uniform diameter, rod-like appearance



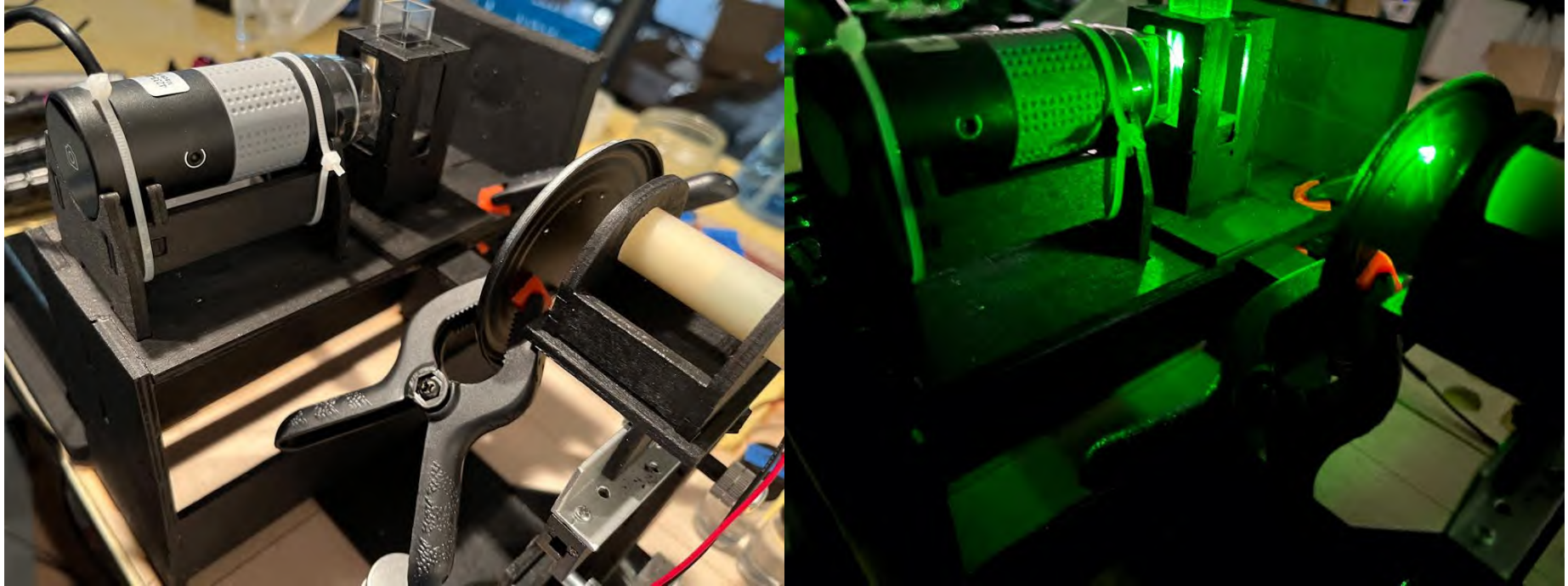


4TH CURVE IN THE ROAD: LEARNING TO MAKE MICROPLASTICS





RAYLEIGH SCATTERING



5TH CURVE IN THE ROAD: BOTTLED WATER (RIGHTING A WRONG)





A new study by the University of Newcastle, Australia suggests that an average person could be ingesting approximately 5 grams of plastic every week. The equivalent of a credit card's worth of microplastics. This summary report highlights the key ways plastic gets into our body, and what we can do about it.



It took
you up to
1 WEEK
to eat this
credit card



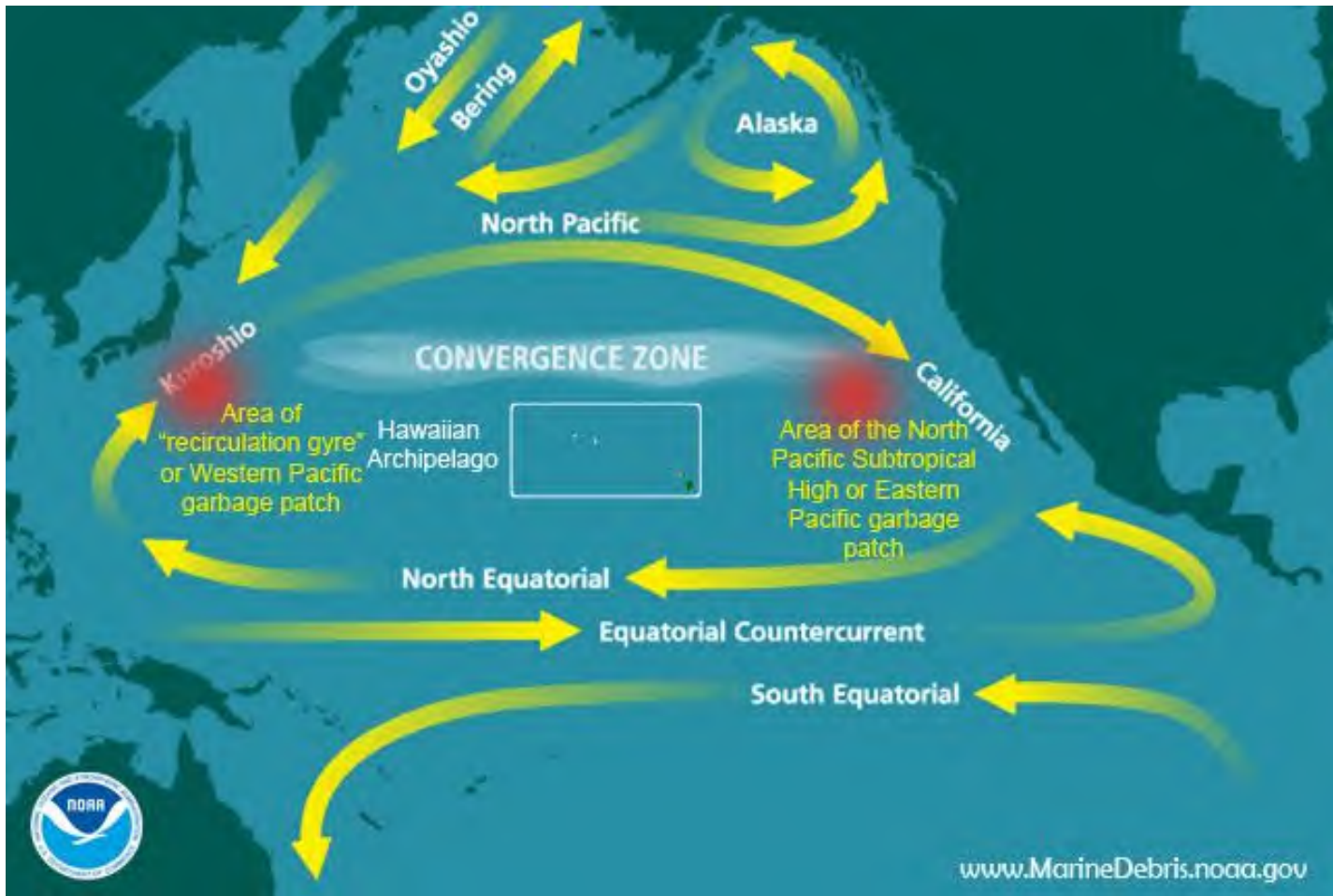
wwf.panda.org/wwf_news/?348337/Revealed-plastic-ingestion-by-people-could-be-equating-to-a-credit-card-a-week

THE GREAT PACIFIC GARBAGE PATCH



Caption:
**A Part of the Great
Pacific Garbage Patch**

http://b.parsons.edu/~pany468/parsons/political_website/source2/index.html



THE GREAT PACIFIC GARBAGE PATCH



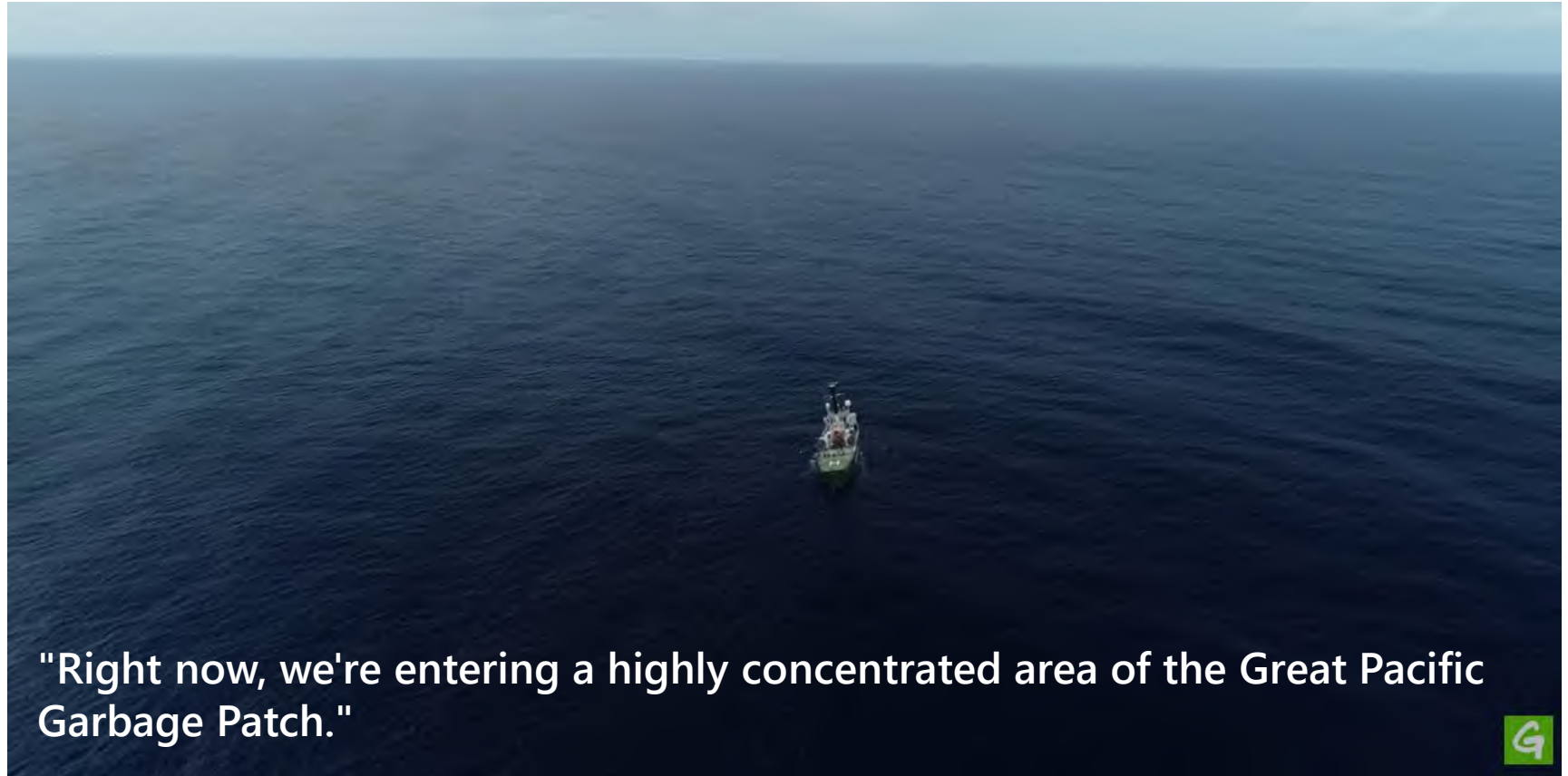
Caption:
A Part of the Great Pacific Garbage Patch

Article text:
"these patches are almost entirely made up of tiny bits of plastic, called microplastics."

Hills in background:
Honduras

http://b.parsons.edu/~pany468/parsons/political_website/source2/index.html

GREENPEACE'S ARCTIC SUNRISE IN THE GREAT PACIFIC GARBAGE PATCH



"Right now, we're entering a highly concentrated area of the Great Pacific Garbage Patch."





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Plastic ingestion by people could be equating to a credit card a week

Wednesday, 12 June 2019

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A new study finds on average people could be ingesting approximately 5 grams of plastic every week, which is the equivalent weight of a credit card.

The analysis *No Plastic in Nature: Assessing Plastic Ingestion from Nature to People* prepared by Dalberg, based on a study commissioned by WWF and carried out by University of Newcastle, Australia, suggests people are consuming about 2000 tiny pieces of plastic every week. That's approximately 21 grams a month, just over 250 grams a year.



Dr Thava Palanisami

The University of Newcastle is the first to combine data from over 50 studies on the ingestion of microplastic by people. The findings are an important step towards understanding the impact of plastic pollution on humans. It also further confirms the urgent need



REUTERS

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World

You may be eating a credit card's worth of plastic each week - study

Reuters

June 11, 2019 9:29 PM EDT · Updated 5 years ago

Aa



www.reuters.com/article/us-environment-plastic/you-may-be-eating-a-credit-cards-worth-of-plastic-each-week-study-idUSKCN1TD009/



www.cnn.com/2019/06/11/health/microplastics-ingestion-wwf-study-scn-intl/index.html

per week



whole card = 5 g



per day

$1/7$ card = 710 mg



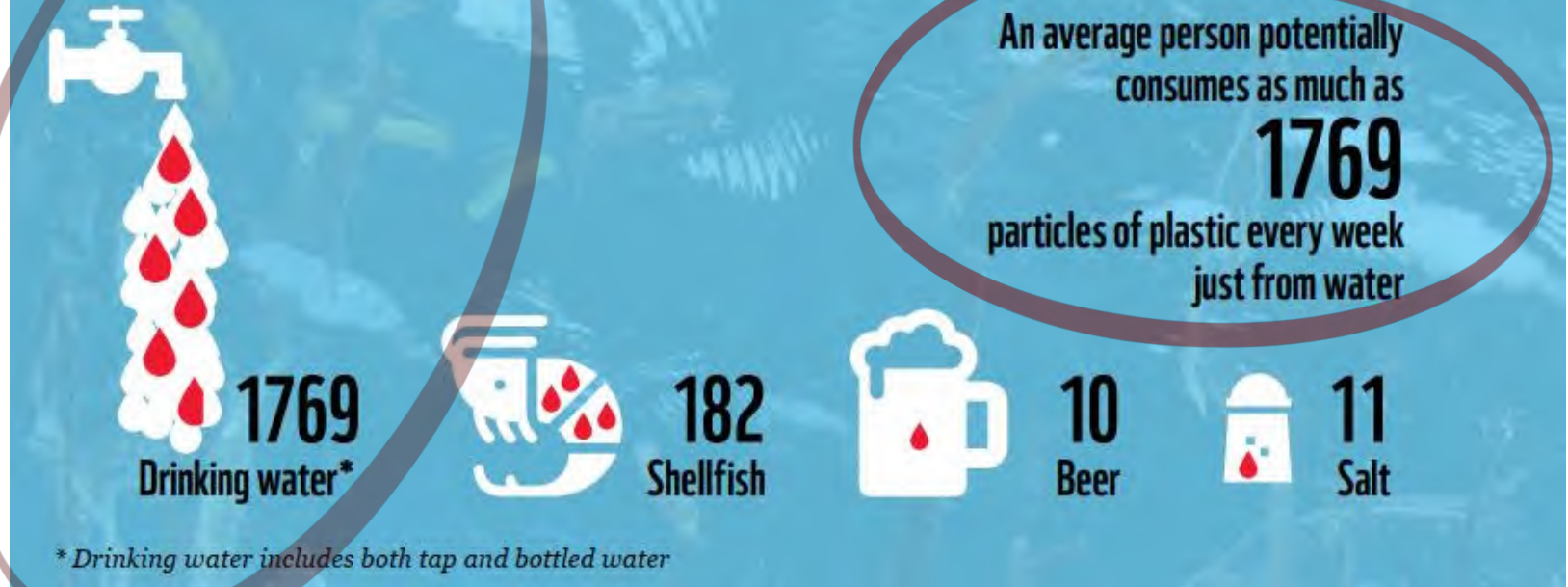
per meal

1/21 card = 240 mg



2.5 mg average particle to reach 5 grams.

Figure 2: Estimated microplastics ingested through consumption of common foods and beverages (particles (0-1mm) per week)





Contents lists available at ScienceDirect

Journal of Hazardous Materials

journal homepage: www.elsevier.com/locate/jhazmat

Research paper

Estimation of the mass of microplastics ingested – A pivotal first step towards human health risk assessment

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ARTICLE INFO

Keywords:

Exposure pathways
Human health
Ingestion
Microplastics
Plastic pollution
Risk

ABSTRACT

The ubiquitous presence of microplastics in the food web has been established. However, the mass of microplastics exposure to humans is not defined, impeding the human health risk assessment. Our objectives were to extract the data from the available evidence on the number and mass of microplastics from various sources, to determine the uncertainties in the existing data, to set future research directions, and derive a global average rate of microplastic ingestion to assist in the development of human health risk assessments and effective management and policy options. To enable the comparison of microplastics exposure across a range of sources, data extraction and standardization was coupled with the adoption of conservative assumptions. Following the analysis of data from fifty-nine publications, an average mass for individual microplastics in the 0–1 mm size range was calculated. Subsequently, we estimated that globally on average, humans may ingest 0.1–5 g of microplastics weekly through various exposure pathways. This was the first attempt to transform microplastic counts into a mass value relevant to human toxicology. The determination of an ingestion rate is fundamental to assess the human health risks of microplastic ingestion. These findings will contribute to future human health risk assessment frameworks.

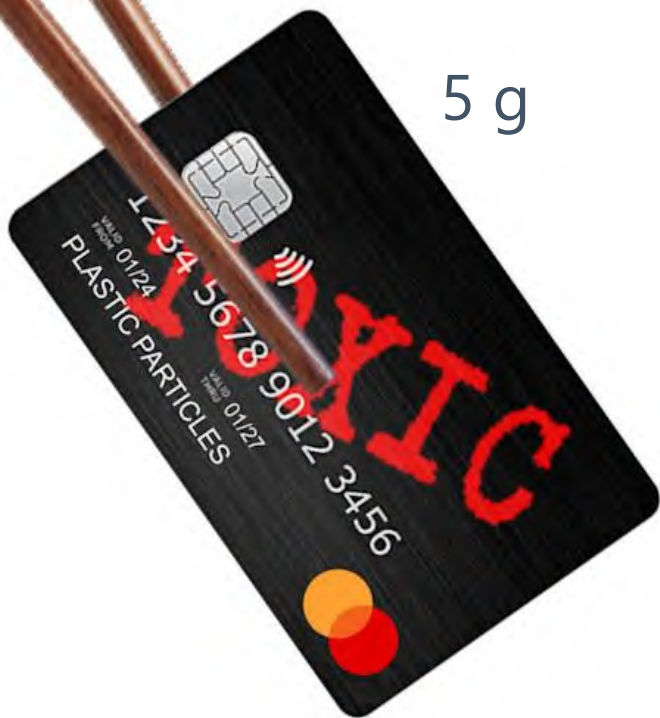
“humans may ingest 0.1–5 g of microplastics weekly through various exposure pathways”



Table 6

Summary of the annual average number of microplastics (particles) ingested (particles), and global average rate of microplastics ingested (g) per person per year.

Source of particles	ANMP _{ingested} (particles)	GARMi (0–1 mm) Scenario 1 (g)	GARMi (0–1 mm) Scenario 2 (g)	GARMi (0–1 mm) Scenario 3 (g)
Shellfish	9,445	26.4	0.0	0.0
Salt	565	1.6	7.4	14.2
Beer	523	1.46	0.3	0.5
Drinking water	91,994	257.5	0.0	0.0
Total (per year)	102,527	287.0	7.7	14.7
TOTAL (PER WEEK)	1,972	5.5	0.1	0.3



5 g

one model

0.1 g



0.02 credit cards worth

another model



an average person could be ingesting approximately 5 grams of plastic every week.



- got diameter wrong
 - weight even more wrong
- reported as if statistical when actually different models

wwfint.awsassets.panda.org/downloads/plastic_ingestion_web_spreads.pdf



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3 mg/particle



For PET, 1.6 mm
diameter particle

Observable

1769 particles/ 7L

253 particles/L



Calculated

~4.5 g/ 7L

~0.6 g/L

~1.5 mm diameter PET sphere

Average 2.5 mg particles.

Plastic microparticles,
0.65 grams consisting of
523 particles, in a liter of
water equaling the
concentration in order to
ingest 5 grams per week.
Such a high
concentration is easily
seen both in water and
upon drying. The particles
are cut from 1.5 mm
plastic monofilament.

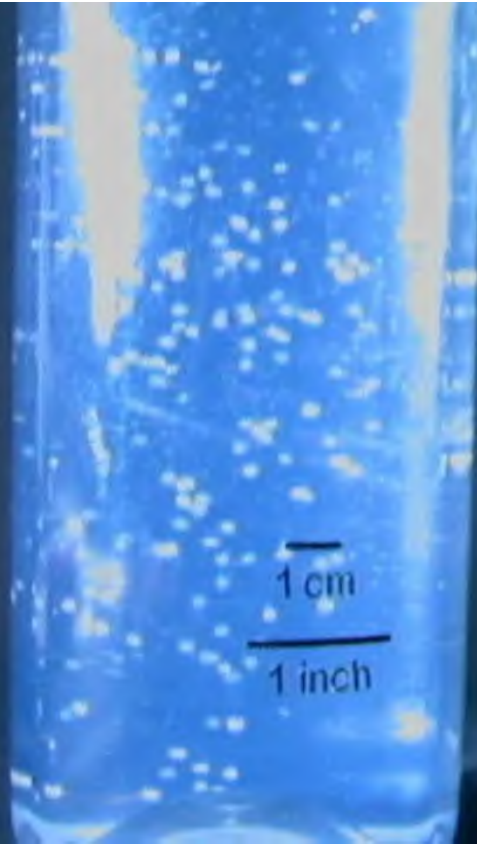


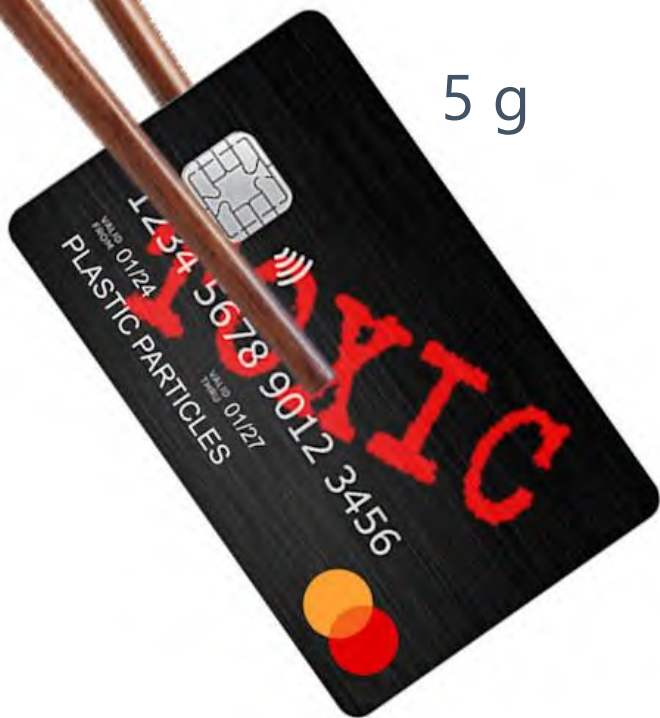




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5 g

one model

0.1 g



0.02 credit cards worth

another model



an average person could be ingesting approximately 5 grams of plastic every week.



Lifetime Accumulation of Microplastic in Children and Adults

Nur Hazimah Mohamed Nor,* Merel Kooi, Noël J. Diepens, and Albert A. Koelmans



Cite This: *Environ. Sci. Technol.* 2021, 55, 5084–5096



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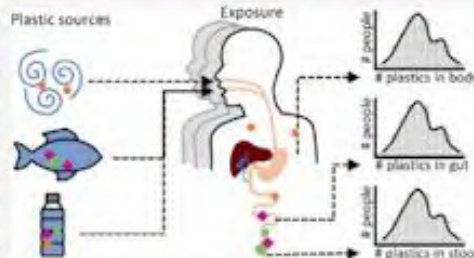


Article Recommendations



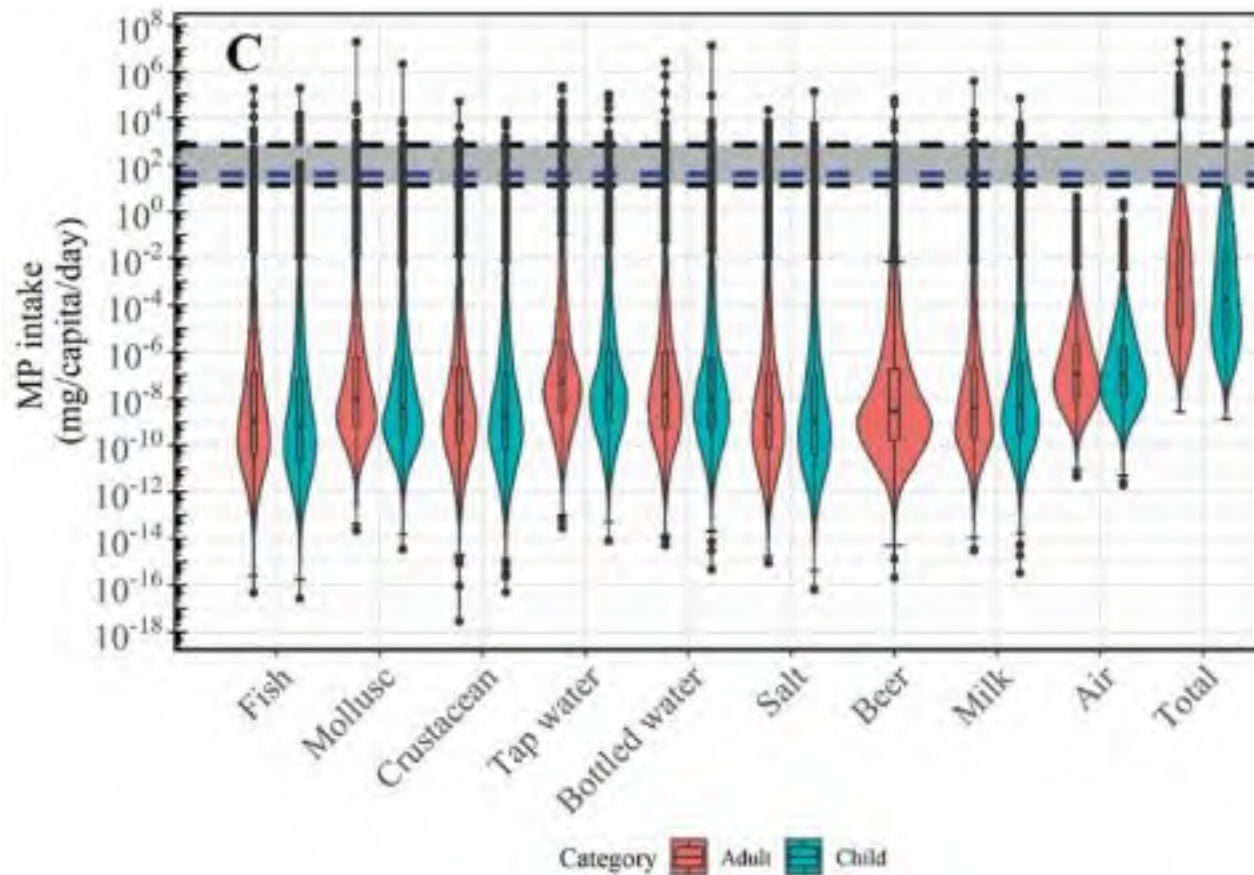
Supporting Information

ABSTRACT: Human exposure to microplastic is recognized as a global problem, but the uncertainty, variability, and lifetime accumulation are unresolved. We provide a probabilistic lifetime exposure model for children and adults, which accounts for intake via eight food types and inhalation, intestinal absorption, biliary excretion, and plastic-associated chemical exposure via a physiologically based pharmacokinetic submodel. The model probabilistically simulates microplastic concentrations in the gut, body tissue, and stool, the latter allowing validation against empirical data. Rescaling methods were used to ensure comparability between microplastic abundance data. Microplastic (1–5000 μm) median intake rates are 553 particles/capita/day (184 ng/capita/day) and 883 particles/capita/day (583 ng/capita/day) for children and adults, respectively. This intake can irreversibly accumulate to 8.32×10^3 (90% CI, 7.08×10^3 – 1.91×10^4) particles/capita or 6.4 (90% CI, 0.1 – 2.31×10^3) ng/capita for children until age 18, and up to 5.01×10^4 (90% CI, 5.25×10^3 – 9.33×10^4) particles/capita or 40.7 (90% CI, 0.8 – 9.85×10^3) ng/capita for adults until age 70 in the body tissue for 1–10 μm particles. Simulated microplastic concentrations in stool agree with empirical data. Chemical absorption from food and ingested microplastic of the nine intake media based on biphasic, reversible, and size-specific sorption kinetics, reveals that the contribution of microplastics to total chemical intake is small. The as-yet-unknown contributions of other food types are discussed in light of future research needs.



883 particles per person per day

583 ng/person/day





Bert Koelmans makes point that a week's ingestion is like a grain of salt between chopsticks – mere micrograms.



To Waste or Not to Waste: Questioning Potential Health Risks of Micro- and Nanoplastics with a Focus on Their Ingestion and Potential Carcinogenicity

Elisabeth S. Gruber¹ · Vanessa Stadlbauer^{2,3} · Verena Pichler⁴ · Katharina Resch-Fauster⁵ · Andrea Todorovic⁵ · Thomas C. Meisel⁶ · Sibylle Trawoeger⁷ · Oldamur Hollóczy⁸ · Suzanne D. Turner^{9,10} · Wolfgang Wadsak^{3,11} · A. Dick Vethaak^{12,13} · Lukas Kenner^{3,14,15,16} 

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Abstract

Micro- and nanoplastics (MNPs) are recognized as emerging contaminants, especially in food, with unknown health significance. MNPs passing through the gastrointestinal tract have been brought in context with disruption of the gut microbiome. Several molecular mechanisms have been described to facilitate tissue uptake of MNPs, which then are involved in local inflammatory and immune responses. Furthermore, MNPs can act as potential transporters (“vectors”) of contaminants and as chemosensitizers for toxic substances (“Trojan Horse effect”). In this review, we summarize current multidisciplinary knowledge of ingested MNPs and their potential adverse health effects. We discuss new insights into analytical and molecular modeling tools to help us better understand the local deposition and uptake of MNPs that might drive carcinogenic signaling. We present bioethical insights to basically re-consider the “culture of consumerism.” Finally, we map out prominent research questions in accordance with the Sustainable Development Goals of the United Nations.

Keywords Microplastic · Nanoplastic · Carcinogenesis · Human health · Bioethics issue



Translated into more imaginable numbers, on average we ingest five grams of MPs per week per person (roughly corresponding to the mass of a credit card).





MEDICAL UNIVERSITY
OF VIENNA

DEUTSCH

Menu

Health risk due to micro- and nanoplastics in food

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2022-03-24 — MEDICINE & SCIENCE



(Vienna,
24-03-2022) Five
grams of plastic
particles on aver-
age enter the hu-
man gastrointesti-
nal tract per person

Five grams
of plastic particles
on average enter
the human
gastrointestinal
tract per person
per week

www.meduniwien.ac.at/web/en/ueber-uns/news/default-0f889c8985-1/gesundheitsrisiko-durch-mikro-und-nanoplastik-in-lebensmitteln/



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Health risk due to micro- and nanoplastics in food

Date: March 24, 2022

Source: Medical University of Vienna

Summary: Five grams of plastic particles on average enter the human gastrointestinal tract per person per week. This is roughly equivalent to the weight of a credit card. Whether ingested micro- and nanoplastics pose a health risk is being investigated in numerous studies but is largely unknown to date. A research team has now summarized the current state of scientific knowledge.



Five grams
of plastic particles
on average enter
the human
gastrointestinal
tract per person
per week





NEW YORK POST

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LATEST ON **Page Six**



HEALTH

You're eating a credit card's worth of plastic a week — and it's killing your gut

By **Brooke Kato**

Published March 30, 2022 | Updated March 30, 2022, 4:47 p.m. ET



Newsweek 90

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scientific research

Junk Food and Tainted Water: People Ingest a Credit Card Worth of Nanoplastics Weekly, Study Says

Mar 31, 2022 at 5:09 PM EDT

Bottled water or tap?

How you answer that question could have some major implications for your long-term health, a new study into the health effects of ingested plastic particles shows.

That study also contained this startling fact: People are eating the equivalent of one plastic credit card every week in their diet. The plastic particles enter the human food chain through plastic waste contained in fish, sea salt and drinking water, the study shows.

Scientists say such nanoplastics disrupt the human gut bacteria and can lead to killer diseases like cancer and diabetes.

www.newsweek.com/junk-food-tainted-water-people-ingest-credit-card-worth-nanoplastics-weekly-study-says-1693970



TastingTable.

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COOK

You Probably Eat A Credit Card's Worth Of Plastic Every Week



BY GILLIE HOUSTON / UPDATED: OCT. 19, 2022 6:53 PM EST

www.tastingtable.com/1062298/you-probably-eat-a-credit-cards-worth-of-plastic-every-week/

November 2022

Journal of Hazardous Materials Letters 3 (2022) 100071

Contents lists available at ScienceDirect

Journal of Hazardous Materials Letters

journal homepage: www.sciencedirect.com/journal/journal-of-hazardous-materials-letters

ELSEVIER

Ingested microplastics: Do humans eat one credit card per week?

Martin Pletz

Designing Plastics and Composite Materials, Department of Polymer Engineering and Science, Montanuniversität Leoben, Austria

ARTICLE INFO

Keywords:

Microplastics
Size distribution
Ingestion
Human health

ABSTRACT

Ingested Microplastic (MP) particles can harm the human body. Estimations of the total mass of ingested MP particles correspond to 50 plastic bags per year (Bai et al., 2022), one credit card per week (Gruber et al., 2022), or a median value of 4.1 µg/week for adults (Mohamed Nor et al., 2021). The first two estimations are based on an analysis (Senathirajah et al., 2021) that predicts a total ingested mass of MP particles $m_{i,MP}$ of 0.1–5 g/week. This work revisits and evaluates this calculation and compares its results and methods to Mohamed Nor et al. (2021). Senathirajah combines data of averaged MP particle masses $\bar{m}_{MP}$ from papers that reported MP particle sizes and MP particle counts n_{MP} in shellfish, salt, beer, and water based on other papers that detected MP particles. Combined with the estimated weekly consumption of those consumables, they compute $m_{i,MP}$. This work raises some serious issues of Senathirajah in the way they combine data and they obtained particle sizes. It concludes that Senathirajah overestimates $m_{i,MP}$ by several orders of magnitude and that $m_{i,MP}$ can be considered as a rather irrelevant factor for the toxic effects of MP particles on the human body.

a human eats
a credit card
worth of MPs not
every week but
every 23
thousand years.

Sources, consequences, and control of nanoparticles and microplastics in the environment



A. Guhananthan^a, Aswin Kuttykattil^b, Thavamani Palanisami^b and Selvakumar Rajendran^{a,b}

^aDepartment of Nanobiotechnology, PSG Institute of Advanced Studies, Coimbatore, Tamil Nadu, India, ^bEnvironmental Plastic and Innovation Cluster (EPIC), Global Innovation Centre for Advanced Nanomaterials (GICAN), University of Newcastle, Callaghan, NSW, Australia

10.1 Introduction

Nanoparticles (NP) and microplastics (MPs) are the most recent anthropogenic contaminants which pose threat to the environment and health. Both NPs and MPs from various sources interact with water, air, and soil in a complex way affecting aquatic and terrestrial ecosystems (Fred-Ahmadu et al., 2020). Their bioaccumulation leads to, cytotoxicity, genotoxicity, organ failure, and sometimes death in living organisms. Nanoparticles can be classified into different types based on their origin (natural nanoparticles (NNPs) and engineered nanoparticles (ENPs)), dimension, size, and chemical composition (Ealia and Saravanakumar, 2017). Fig. 10.1 illustrates various sources of nanoparticles.



Senathirajah and Palanisami (2019) estimated that on average, humans may consume 5 g of MPs per week





Strategies to Reduce Risk and Mitigate Impacts of Disaster: Increasing Water Quality Resilience from Microplastics in the Water Supply System

Kala Senathirajah* and Thava Palanisami

Cite This: ACS EST Water 2023, 3, 2816–2834

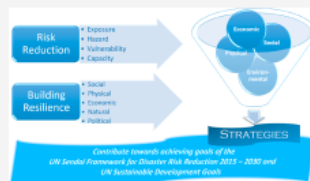
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ABSTRACT: Microplastics contaminating the water supply system qualifies as a disaster. This has major far-reaching implications, posing significant threats to economic growth and human livelihoods, as well as environmental and human health and well-being. Thus, we need to reduce the risk and mitigate against the effects of microplastics to build resilience and ensure continuity and efficiency of water supply system functions. To date, microplastics in the water supply cycle have not been considered in the context of disaster management. Hence, we provide an understanding of the disaster risk that microplastics pose using a conceptual mathematical framework. Additionally, we enhance understanding of the resilience of the social and physical infrastructure by highlighting hazards that people and infrastructure in the community face. Insights of the social, economic, and other human factors that make them vulnerable highlights capacities required to reduce risk and mitigate impacts. By evaluating the social and physical infrastructure resilience to microplastics in the water supply system and recommending multidisciplinary strategies to build resilience over time, we aim to catalyze action to address the problem. This will also contribute toward achieving targets of the Sendai Framework for Disaster Risk Reduction 2015–2030 and UN Sustainable Development Goals.



1. INTRODUCTION

Plastics are versatile, synthetic, widely used, persistent materials found in all aspects of our lives, in all sectors, and as pollution all around the globe. The plastic pollution crisis meets all criteria to qualify as a slow-onset disaster.¹ Microplastics are ubiquitous plastic fragments, spheres, fibers, filaments, and films, viz., plastic particles greater than 100 nm and less than 5 mm in size. Nanoplastics are particles less than 100 nm.² Microplastics have been detected in the air, water, and terrestrial environments, found from Mount Everest to the Marianna trench.³ Microplastics have been found in plants,⁴ animals, and humans,⁵ in human placenta,⁶ lungs, blood, and even breastmilk.⁷ A recent study estimated that we could be ingesting cumulatively 0.1 to 5 g of microplastics a week⁸ from a combination of sources, including from drinking water which is a fundamental need for survival. Microplastics have been detected in water supply sources, tap water, and bottled water around the world.^{9,10}

Microplastics contaminate the water supply system (WSS) due to numerous reasons, including the existing social systems' policies and consumptive behaviors, and limitations in treatment. The fate and transport of microplastics through the water supply cycle (WSC) are varied, and thus the timeframes and implications also range greatly depending on

the entry and exit points. For example, microplastics exiting via ingestion by a human has different implications to microplastics exiting via biosolids application for agriculture, although notably both instances impinge on the health and well-being of humans⁹ and ecosystems.¹⁰ The transport and fate of microplastics are a function of numerous factors including polymer type, size, shape, specific surface area, density, crystallinity, molecular structure, formation of biofilm and additives, among others. These also influence the vulnerability of the WSS and its sensitivity to the microplastic contamination.

Access to safe drinking water and wastewater services (W&WWS) are a human right^{11,12} and are essential to ensure health and well-being, good hygiene practices, economic prosperity, and minimize the spread of water borne diseases.¹³ There are many disruptive events that impact W&WWS. Key to the continuity of service is water quality (WQ). From a

Received: April 20, 2023
Revised: August 11, 2023
Accepted: August 14, 2023
Published: August 29, 2023



A recent study estimated that we could be ingesting cumulatively 0.1 to 5 g of microplastics a week



<https://pubs.acs.org/doi/abs/10.1021/acsestwater.3c00206>

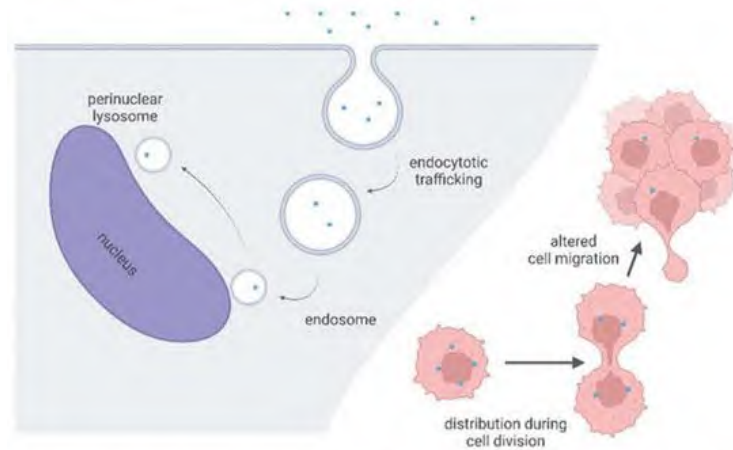


MARCH 6, 2024

Editors' notes

Micro- and nanoplastics in the body are passed on during cancer cell division, finds study

by Medical University of Vienna



Credit: *Chemosphere* (2024). DOI: 10.1016/j.chemosphere.2024.141463

“Plastic particles up to the weight of a credit card (approx. 5 grams) enter the gastrointestinal tract every week.”

Does it matter that 5 grams per week is wrong?



ELSEVIER



Research paper

Estimation of the mass of microplastics ingested – A pivotal first step towards human health risk assessment

Kala Senathirajah^a, Simon Attwood^b, Geetika Bhagwat^c, Maddison Carbery^c, Scott Thava Palanisami^{d,*}

^a Global Innovative Centre for Advanced Nanomaterials(GICAN), Faculty of Engineering and Built Environment, The University of Newcastle, Callaghan, Australia

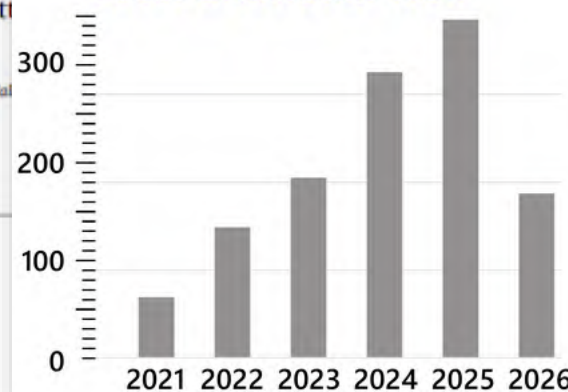
^b The World Wide Fund for Nature (WWF), 354 Tanglin Road, Singapore, Singapore

^c School of Environmental and Life Sciences, The University of Newcastle, Callaghan, NSW 2308, Australia

^d Department of Environmental Science, Macquarie University, Sydney, Australia



Total Citations: 1184





the equivalent of a credit card's worth of plastic
through the water we drink the food we eat and the

Streamed live on Apr 28, 2022

California Attorney General Rob Bonta makes a major announcement on the California Department of Justice's efforts to protect the environment from plastic pollution.



Research Paper

Microplastics are detected in human gallstones and have the ability to form large cholesterol-microplastic heteroaggregates

Deyu Zhang^{a,1}, Chang Wu^{a,1}, Yue Liu^{a,1}, Wanshun Li^{a,1}, Shiyu Li^a, Lisi Peng^a, Le Kang^a,
Saif Ullah^c, Zijun Gong^b, Zhaoshen Li^a, Dan Ding^{d,2} , Zhendong Jin^{a,2} ,
Haojie Huang^{a,2}

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<https://doi.org/10.1016/j.jhazmat.2024.133631>

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The World Wildlife Fund reported that adults consume more than 5 g of plastic each week on average.



WHO WE ARE

WHAT WE DO



OUR IMPACT

GET INVOLVED



Why UNDP is tackling the developmental dimensions of plastic pollution

The burdens disproportionately affect the vulnerable

JUNE 20, 2024



the average person could be ingesting a credit card worth of plastics, approximately five grams every week.



<https://yourplasticdiet.org/>



A credit card a week?

On average people could be ingesting around 5 grams of plastic every week, which is the equivalent weight of a credit card. Our study suggests people could be consuming on average over 100,000 microplastics every year. That's approximately 21 grams a month, just over 250 grams a year.

TAKE ACTION!



Microplastics are bad, but ignoring science is worse

www.rdworldonline.com/microplastics-are-bad-but-ignoring-science-is-worse/

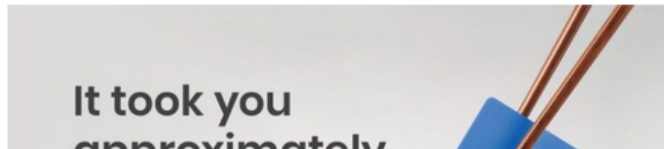
By Mark Jones | March 20, 2024



We all know that 98.6° F is human body temperature ... only it isn't. A new **study** reconfirms something extensively covered during the COVID pandemic: Normal human body temperature falls between 97.3° and 98.2° F — with 97.9° F as today's average.

And 5 grams per week is the amount of plastic every person consumes ... only it isn't. Like outdated body-temperature assertions, this 5-g value (widely reported in many science and news circles) is flawed. The difference is that data manipulation and memes didn't give us the 98.6° F value ... but they did help propel the 5-g-of-plastic assertion. It has shaken my faith in the scientific community.

Now, the world widely accepts the average person consumes 5 g of plastic per week — the weight of a credit card. Thanks to one now-quite-famous picture of a credit card



6TH CURVE IN THE ROAD: REMOVAL OF NANO AND MICROPLASTICS



Yellow Fluorescent PET 365 nm UV Light

<https://mjphd.net/sc/sc.php?003>

Start

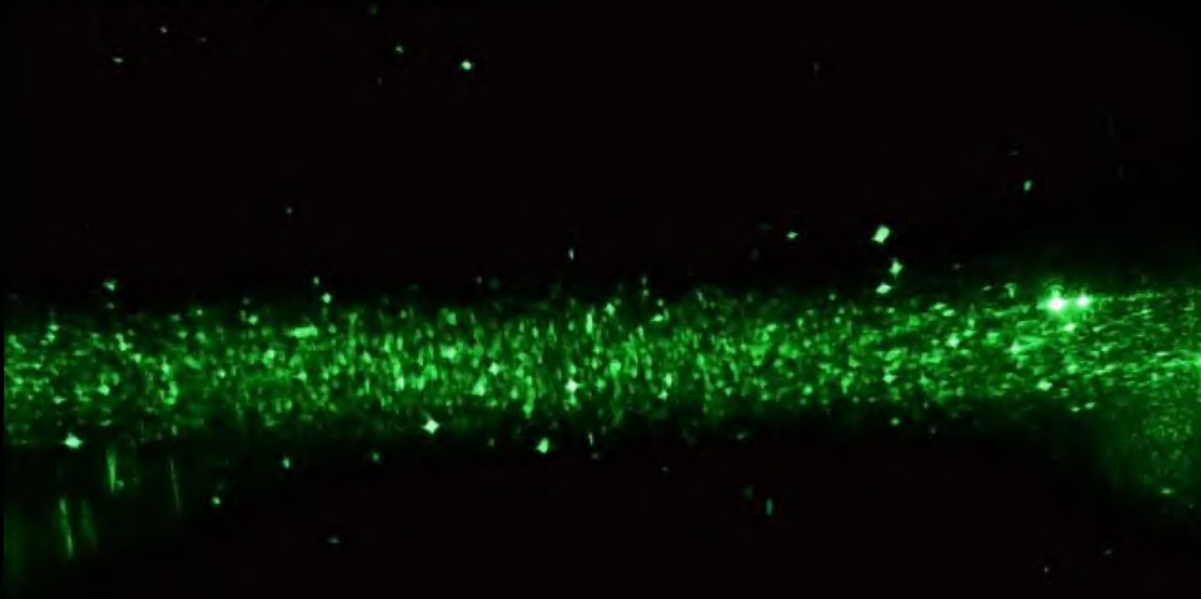
End

measure conc.

find plastic

find nothing

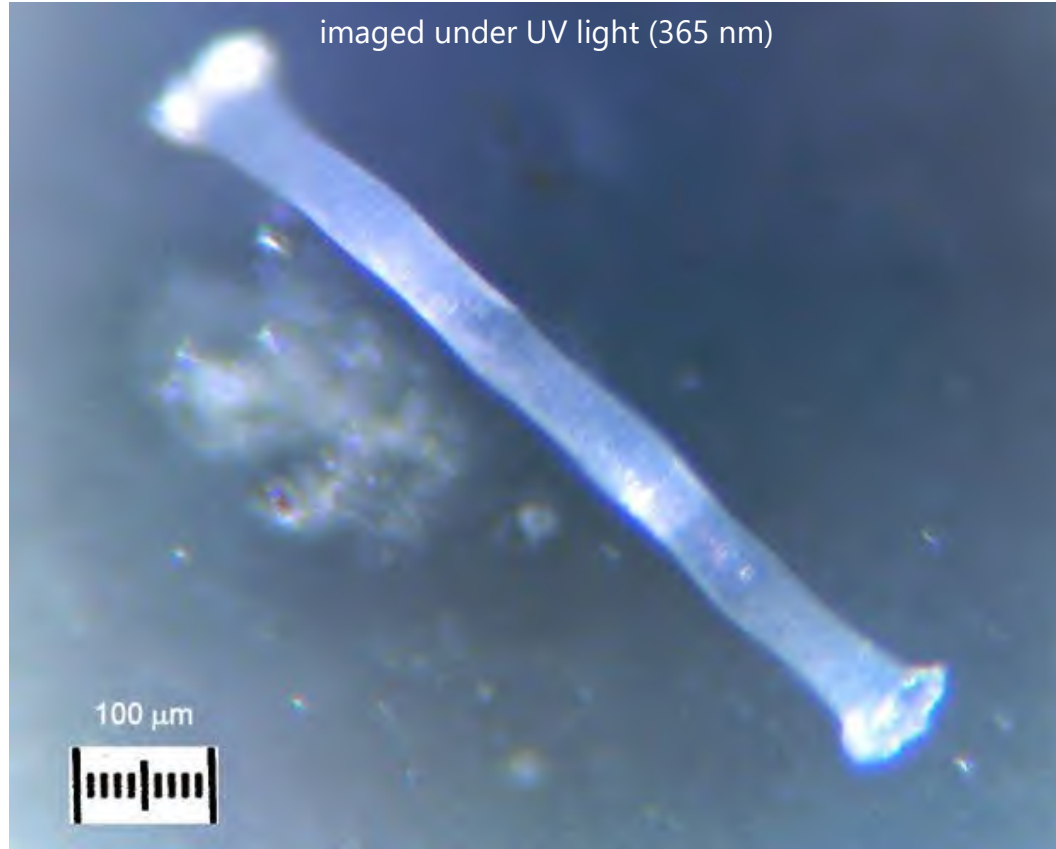
diluted particles



COMMERCIAL BOTTLED WATER



FROM COMMERCIAL BOTTLED WATER

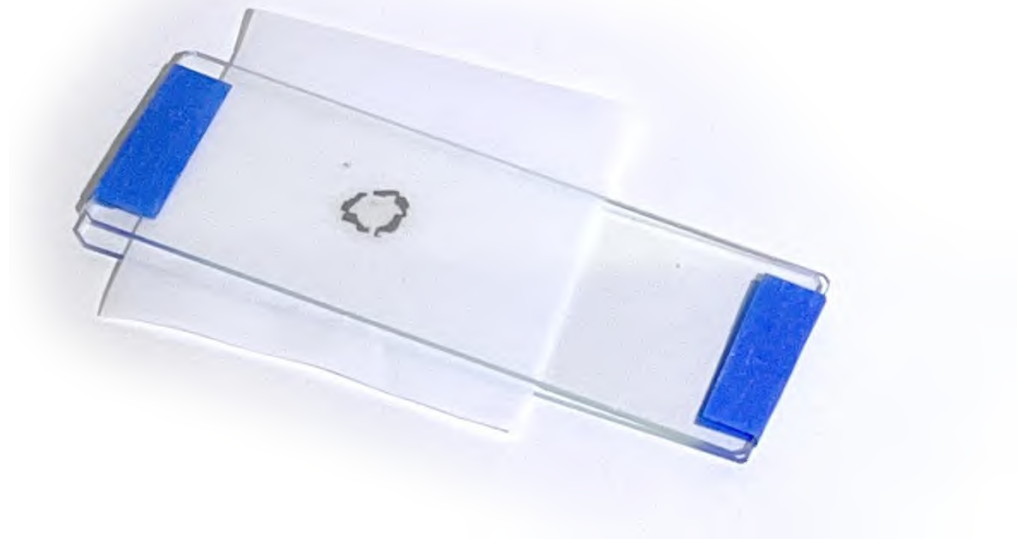


PATENT-PENDING METHOD TO REMOVE MICRO AND NANOPARTICLES









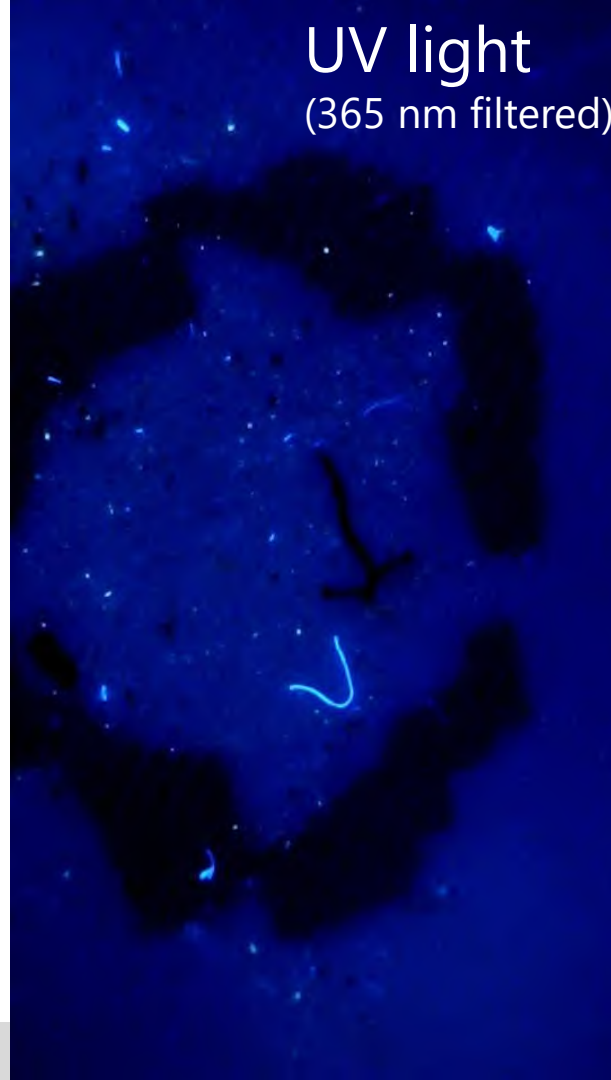


UV light
filter

visible light



UV light
(365 nm filtered)

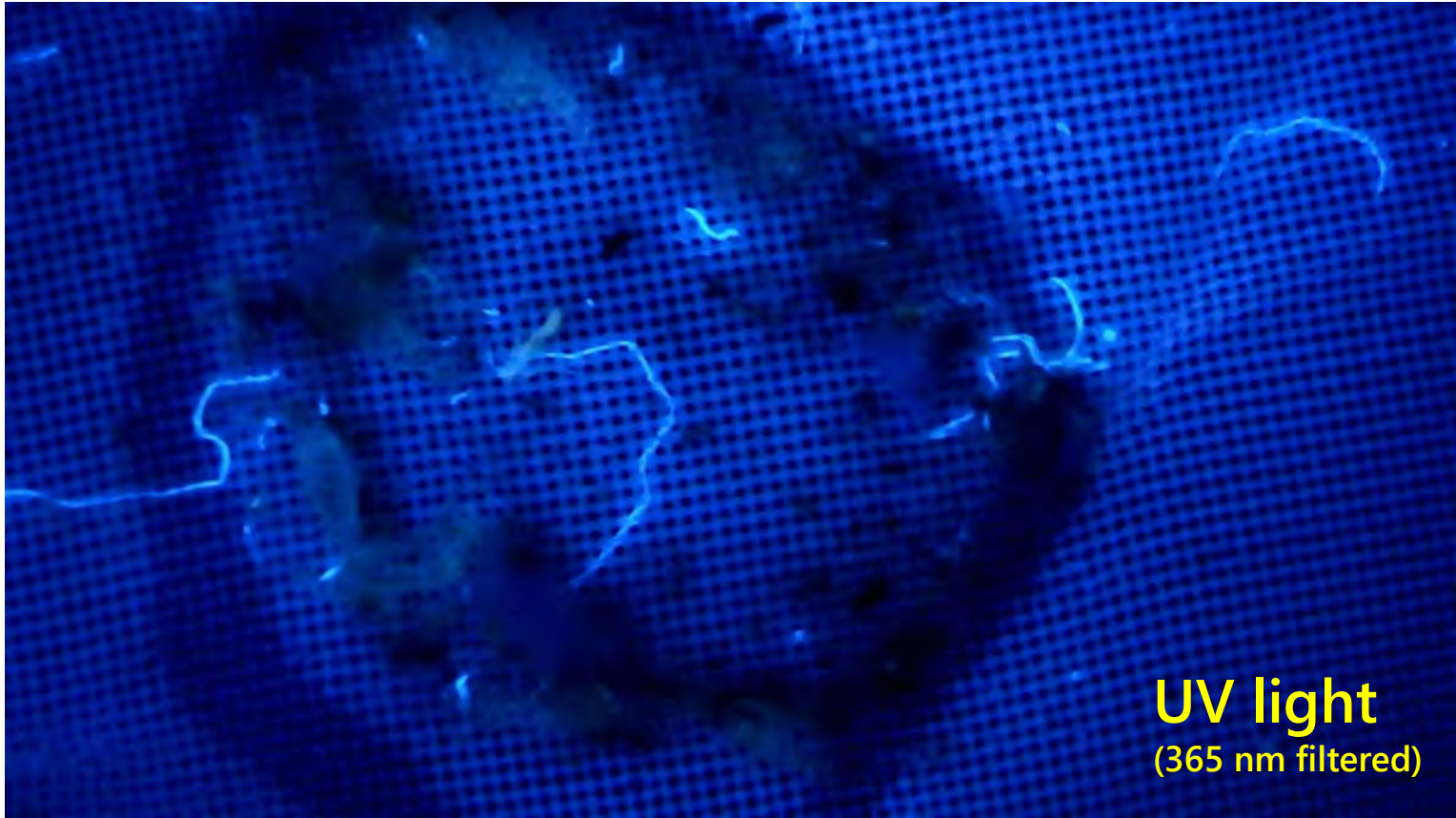


OBX OCEAN WATER



Visible

ble



UV light
(365 nm filtered)

OBX OCEAN WATER

ght
(filtered)



Overlay

8TH CURVE IN THE ROAD: PATENT APPLICATION



A hand holding a spoon with particles on it. The spoon is held by a hand, and the particles are visible on the surface of the spoon. The background is a blurred grey.

Captured Particles

13 March 2025



US 20260242249A1

(19) **United States**

(12) **Patent Application Publication**
Jones

(10) **Pub. No.: US 2026/0242249 A1**

(43) **Pub. Date: Aug. 20, 2026**

(54) **PLASTIC MICRO- AND NANOPARTICLE
REMOVAL PROCESS AND DEVICES**

(71) Applicant: **Mark Edward Jones**, Midland, MI
(US)

(72) Inventor: **Mark Edward Jones**, Midland, MI
(US)

(21) Appl. No.: **19/056,017**

(22) Filed: **Feb. 18, 2025**

Publication Classification

(51) **Int. Cl.**
C02F 1/28 (2023.01)
A23L 2/70 (2006.01)
A23L 2/80 (2006.01)
A23L 5/20 (2016.01)

C02F 1/26 (2023.01)

C02F 101/30 (2006.01)

(52) **U.S. Cl.**

CPC **C02F 1/285** (2013.01); **A23L 2/70**
(2013.01); **A23L 2/80** (2013.01); **A23L 5/23**
(2016.08); **A23L 5/273** (2016.08); **C02F 1/26**
(2013.01); **C02F 2101/30** (2013.01)

(57)

ABSTRACT

The invention describes removal of microparticles and nanoparticles of plastic from water, beverages and other water-based liquids using particle capturing solids and devices based on particle capturing solids. Particle capturing solids described include resilient thermoplastic polymers and lipophilic water-insoluble oils that are solids at room temperature. Devices are described that use particle capturing solids, facilitating easy introduction and retrieval from water, beverages and other water-based liquids.

9TH CURVE IN THE ROAD: MORE QUIXOTIC QUESTS





Picasso, 1955

PRESS ROOM

First-ever study finds cancer-causing chemicals in black plastic food-contact items sold in the U.S.

October 1, 2024



Highest levels of toxic flame retardants found in a spatula, sushi tray, and beaded necklace—likely the result of dirty plastic recycling

Toxic-Free Future urges the U.S. and states to ban poison plastics and harmful chemical additives through the Global Plastics Treaty and state policy

SEATTLE, WA — A new [peer-reviewed study](#) in *Chemosphere* finds, for the first-time, certain toxic chemicals in black plastic food-contact items sold in the United States. Led by scientists from Toxic-Free Future and Vrije Universiteit Amsterdam, [the testing uncovered](#) high levels of cancer-causing, hormone-disrupting flame retardant chemicals in a variety of household products made with black plastics including food serviceware, kitchen utensils, and toys.

Press Contact

Stephanie Stohler,
ssstohler@toxicfreefuture.org

To receive timely press releases and statements to your inbox, members of the media can request to be added to our press list.

“testing uncovered high levels of cancer-causing, hormone-disrupting flame retardants chemicals in a variety of household products made with black plastics..... Toxic flame retardant chemicals were found in 85% of analyzed products”

FR IN DURABLE GOODS



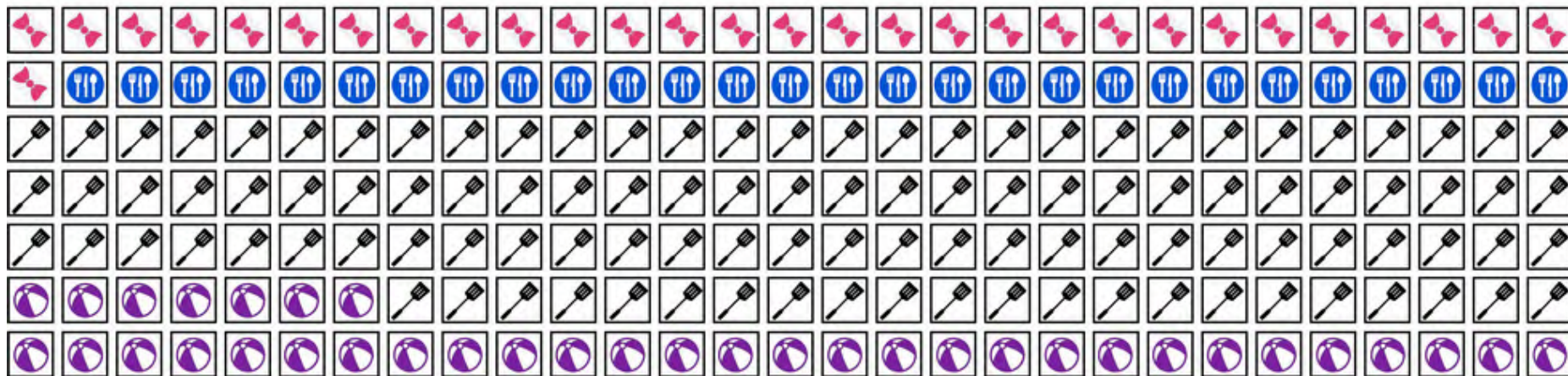
- flame retardants are used in engineering plastics for safety
- they will enter the recycle stream
- in human-touch applications, these materials are viewed as safe

source: midjourney.com

RISK OF EXPOSURE TO BROMINATED FLAME RETARDANTS



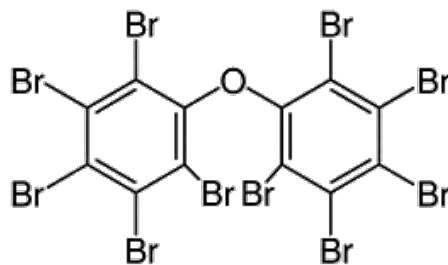
- measure concentration present in objects
- use correlation to estimate exposures
- compare exposure to some “safe” level, such as EPA reference dose



203 total items: 30 hair accessories, 28 food service, 36 toys, 109 kitchen items

RISK OF EXPOSURE TO BROMINATED FLAME RETARDANTS

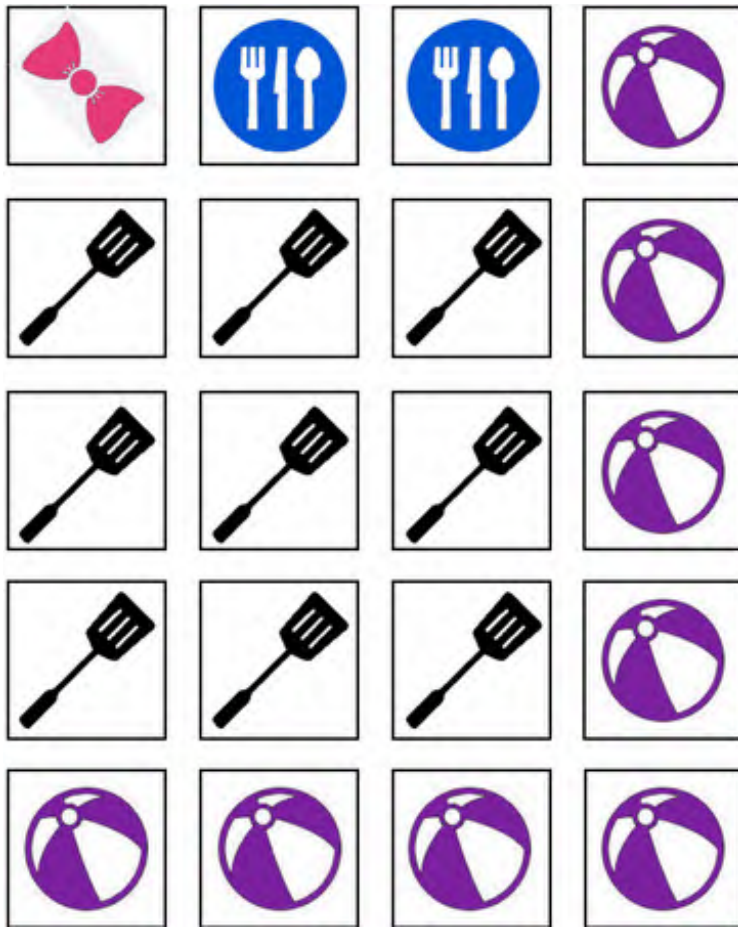
- BDE-209, one of the earliest banned flame retardants, became a focus



BDE-209

BDE-209 – decabromoether - commercialised in the 1970s. Now recognised as a hazardous and persistent pollutant under 2017 Stockholm Convention on Persistent Organic Pollutants meaning that treaty members must eliminate its production and use.





Compound-sensitive LC-MS method used to analyze compositions and concentrations present in 20 of the 203 items in the collected cohort, only those with highest Br levels measured by XRF.

Harmful flame retardants (FRs) used in electronics were found in **black plastic household products**—including toys and kitchen utensils—likely due to recycled content.

Presumed FR Source



TBBPA, BDE-209, 2,4,6-TBP, DBDPE, TTBP-TAZ, BDP, RDP, & TPHP are or have been intentionally used in electronics.



FRs Detected

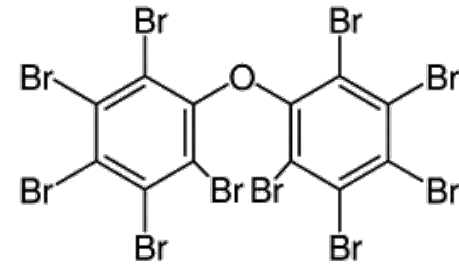
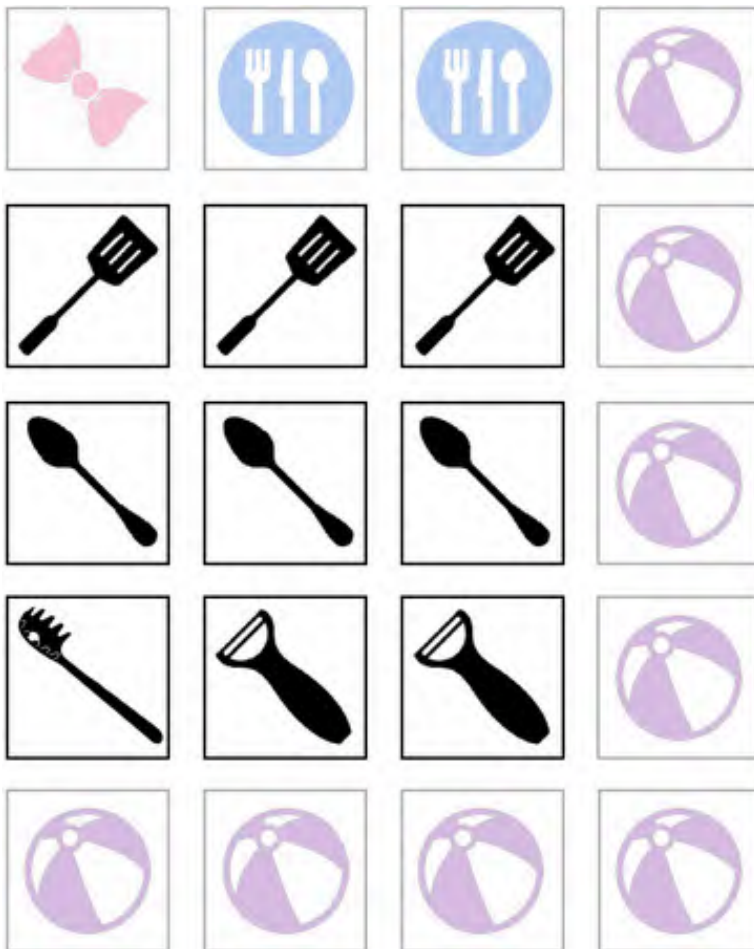


This study found Σ FR concentrations up to 22,790 mg/kg in food serviceware, hair accessories, kitchen utensils, and toys.

- 17 out of 20 products analyzed contained brominated and/or organophosphate FRs.
- Most frequently detected compounds included TBBPA, BDE-209, 2,4,6-TBP, RDP, BDP, and DBDPE.
- Items containing polymers used in electronics had significantly higher FR levels.

85%



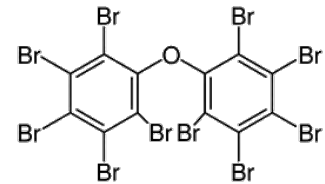
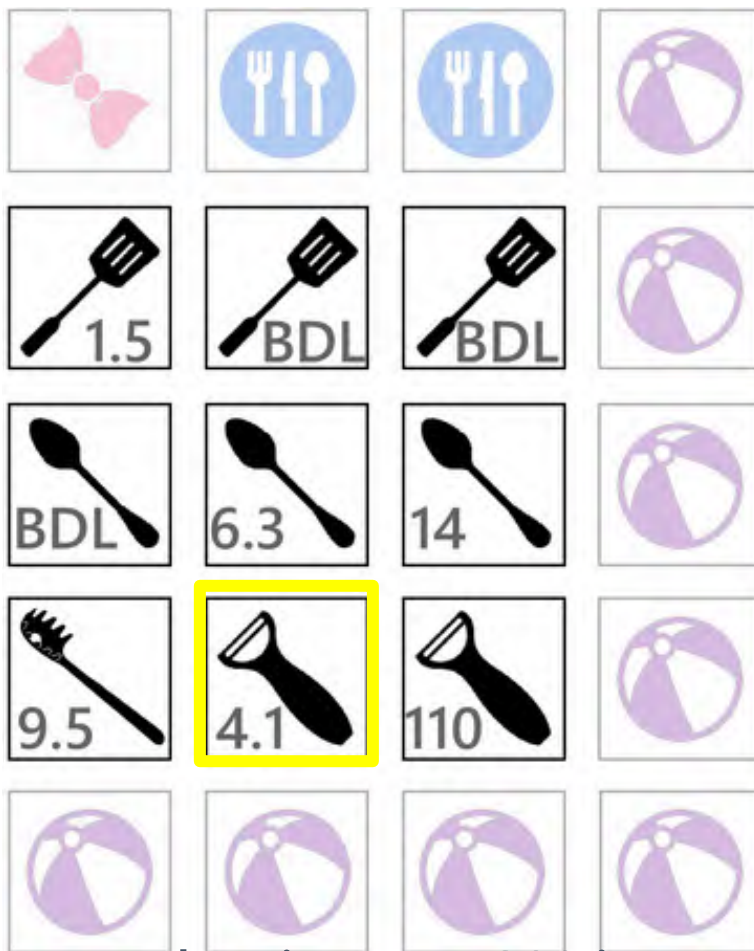


BDE-209

reported median value of
34.7 μ g/day for kitchen items

concluded too close to
~~42 μ g/day~~ EPA reference dose

correction 1 : 420 mg/day



BDE-209

reported median value of
34.7 $\mu\text{g}/\text{day}$

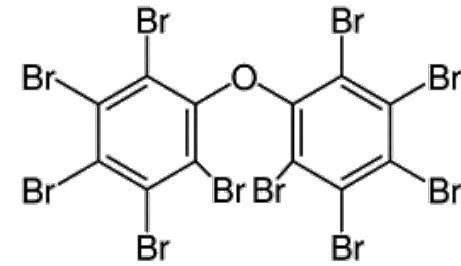
actual median 4.1 $\mu\text{g}/\text{day}$

average is 16 $\mu\text{g}/\text{day}$ (24
ignoring BDL)

reference dose is 420 $\mu\text{g}/\text{day}$

showing BDE-209 in ug/day

 2.4	 BDL	 380	 BDL
 1.5	 BDL	 BDL	 BDL
 BDL	 6.3	 14	 1.6
 9.5	 4.1	 110	 1.6
 57	 40	 28	 35



BDE-209

34.7 μ g/day is actually the average of all 20 measured samples with BDLs entered as zero

showing BDE-209 in ug/day

It Gets Worse

concentration  exposure

correlation from Kuang et al.

$$f(C) = E$$

$$E \propto C$$

for immersion in hot oil for 15 minutes

conclude simple touching creates no exposure

Kuang J, Abdallah MA, Harrad S. Brominated flame retardants in black plastic kitchen utensils: Concentrations and human exposure implications. *Science of The Total Environment*. 2018 Jan 1;610:1138-46. doi.org/10.1016/j.scitotenv.2017.08.173.

In Corrigendum 2, state they only sampled handles.

The KitchenAid spatula shown in the paper has a nylon blade and ABS handle.

average exposure ~ 0



ELSEVIER GUIDELINES FOR RETRACTION

- They have clear evidence that the findings are unreliable, either as a result of major error (e.g., miscalculation or experimental error), or as a result of fabrication (e.g., of data) or falsification (e.g., image manipulation).
- It constitutes plagiarism.
- The findings have previously been published elsewhere and the authors have failed to provide proper attribution to previous sources or disclosure to the editor, permission to republish, or justification (i.e. redundant publication).
- It contains material or data that the authors were not authorised to publish.
- Copyright has been infringed or there is some other serious legal issue (e.g., libel, breach of privacy).
- It reports unethical research and/or breaches Elsevier's publishing ethics policies regarding the conduct of research involving human participants and/or animals.
- There is evidence of compromised peer-review or systematic manipulation of the editorial process.
- There is evidence or material concerns of authorship being sold.
- There is evidence of citation manipulation.
- The author(s) failed to disclose a major competing interest (a conflict of interest) that, in the view of the editor, would have materially affected interpretations of the work or recommendations by editors and/or peer reviewers.
- There is evidence of any other breach of the journal's publishing policies and the editor has therefore lost confidence in the validity or integrity of the article.



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From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling

Chemosphere (2024) - 4 Comments

doi: 10.1016/j.chemosphere.2024.143319 issn: 0045-6535 pubmed: 39271080 issn: 1879-1298

Megan Liu ✓, Sicco H. Brandsma ✓, Erika Schreder ✓

#1 *Actinopolyspora biskrensis* comment accepted December 2024

Some concerns: <https://nationalpost.com/news/canada/black-plastic>

Correction apparently pending, although I'm not sure I agree with the author's statement:

"However, it is important to note that this does not impact our results," Liu told National Post. "The levels of flame retardants that we found in black plastic household items are still of high concern, and our recommendations remain the same."

Pull those black plastic spatulas out of the trash

<https://www.rdworldonline.com/pull-those-plastic-spatulas-out-of-the-trash/>

By Mark Jones, Ph.D. | January 23, 2025



2024 was the year of spatulageddon. Plastic spatulas were trashed due to reports of dangers lurking within. The journal article that raised concern contained an error, **an obvious error**. A **correction was made** but there is more to the story.

How a recycling study spawned spatula hysteria

The study causing spatulageddon is **"From e-waste to living space:**



[Adobe Stock]

From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling

Megan Liu ^a , Sicco H. Brandsma ^b, Erika Schreder ^a

<https://doi.org/10.1016/j.chemosphere.2024.143319>

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Refers to

[Response to the letter to the editor](#)

Chemosphere, Volume 385, September 2025, Pages 144547
Megan Liu, Sicco H. Brandsma, Erika Schreder

← paywalled

[Letter to the editor](#)

Chemosphere, Volume 385, September 2025, Pages 144542
Mark E. Jones

← paywalled

Referred to by

[Corrigendum to 'From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling'...](#)

Chemosphere, Available online 3 July 2025, Pages 144552
Megan Liu, Sicco H. Brandsma, Erika Schreder

[Corrigendum to 'From e-waste to living space: Flame retardants contaminating household items add to concern about plastic recycling'...](#)

Chemosphere, Volume 370, February 2025, Pages 143903
Megan Liu, Sicco H. Brandsma, Erika Schreder



where additives
could get into food

what was measured

Viral paper on black plastic kitchen utensils earns second correction

The authors of a paper that went viral with attention-grabbing headlines urging people to throw out their black plastic kitchen tools have corrected the work for a second time.



But a letter accompanying the correction suggests the latest update still fails “to completely correct the math and methodological errors present in the study,” according to **Mark Jones**, an industrial chemist and consultant who has been following the case. “The errors are sufficient to warrant a restating of the abstract, sections of the paper and conclusions, if not a retraction.”



MJPhD

10TH CURVE IN THE ROAD: ?





A widely reported fact about microplastic consumption is wrong.

Correction in the scientific literature is slow to correct public perception and the scientific literature.

Plastic particles are everywhere.



MJPHD.net

MJPhD