MICROPLASTICS

BfR

WHAT DOES SCIENCE SAY?

THE BFR SCIENCE COMIC

'PLASTIC' ORIGINALLY SIMPLY MEANT 'PLIABLE AND EASY TO SHAPE'.
ONLY LATER DID IT BECOME A TERM FOR MATERIALS WE TODAY CALL POLYMERS ...

ULRICH BECK Weltrisiko-gesellschaft

50

THE FIRST SYNTHETIC POLYMER WAS INVENTED IN 1869 BY JOHN WESLEY HYATT. A NEW YORK COMPANY OFFERED $10,000 FOR AN ALTERNATIVE TO IVORY ...

WOW! INTERESTING!

THE NEW YORK TIMES

MY BILLIARD BALLS - PURE IVORY!

GOOD BREAK!

BY USING COTTON CELLULOSE AND CAMPHOR, HYATT DISCOVERED A MOULDABLE PLASTIC THAT COULD IMITATE NATURAL SUBSTANCES LIKE TORTOISE SHELL AND IVORY.

CAMPHOR

HIS DISCOVERY WAS CONSIDERED REVOLUTIONARY AND WAS ADVERTISED AS 'SALVATION OF THE ENVIRONMENT'.

PLASTIC is BETTER THAN IVORY

FINALLY!

WE ARE SAVED!

TODAY, WE SEE THINGS DIFFERENTLY. WE NOW KNOW THAT PLASTICS IN THE ENVIRONMENT ARE DEGRADED VERY SLOWLY AND INCOMPLETELY.

OVER TIME, PLASTIC BREAKS DOWN INTO MANY SMALL PARTICLES;

+++ MICROPLASTICS +++

WHAT DOES SCIENCE SAY?

50

MICROPLASTICS ARE DEFINED AS SMALL **PLASTIC PARTICLES** OF VARIOUS ORIGINS, SIZES, AND SHAPES ...

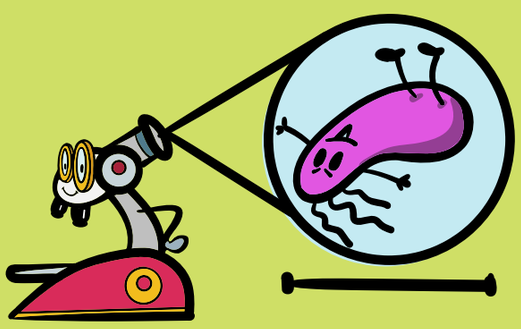
... THERE IS NO **CONSENSUS** ABOUT **SIZE** YET, BUT DEFINITIONS TYPICALLY RANGE BETWEEN 0.001 MILLIMETRES (MM) TO 5 MM.

EMILIA, YOU'RE TURNING **YELLOW!**

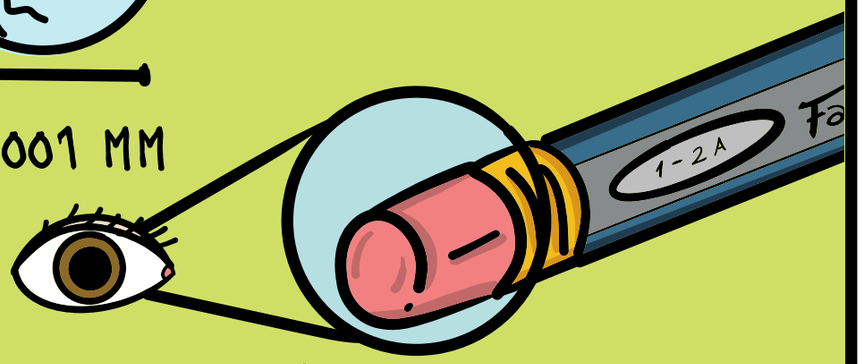
NO WORRIES, IT'S JUST A **FEELING** ...

HOW CAN WE BETTER UNDERSTAND THESE **VAST DIFFERENCES** IN **SIZE?**

EXAMPLES OF THE SIZE RANGE FOR MICROPLASTICS;



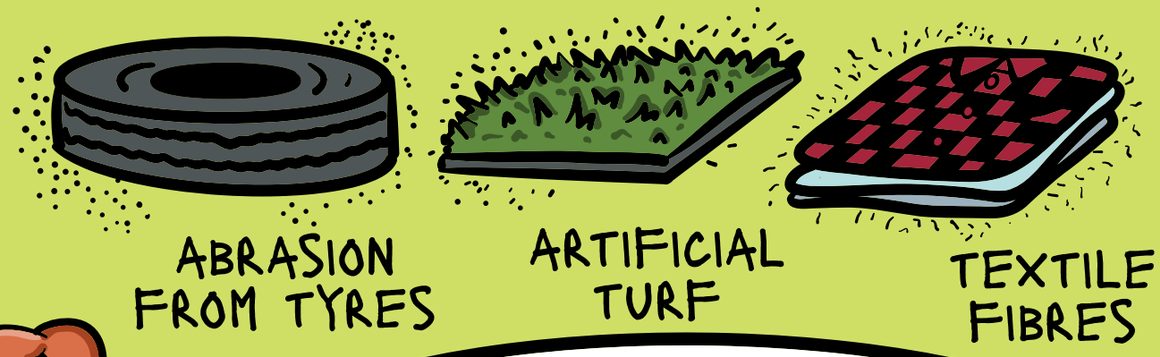
E. COLI; 0,001 MM



PENCIL ERASER; 5 MM

PARTICLES CONSIDERED MICROPLASTICS RANGE FROM "**INVISIBLE**" TO "VISIBLE TO THE **NAKED EYE**".

THESE ARE THE SOURCES OF MICROPLASTICS;



ABRASION FROM TYRES

ARTIFICIAL TURF

TEXTILE FIBRES

MICROPLASTICS ARE PRODUCED DURING THE **MANUFACTURE** AND **USE** OF VARIOUS PRODUCTS.

BOTTLES

BAGS

PACKAGING

MICRO-PLASTICS ALSO ARISE FROM **RUBBISH.**

AND HOW DO MICROPLASTICS ENTER INTO THE ENVIRONMENT?

WASHINGS, FOR EXAMPLE; THE ABRASION FROM CLOTHING WITH PLASTIC FIBRES GETS INTO THE WATER THROUGH WASHING. WATER TREATMENT DOESN'T COMPLETELY FILTER THOSE PARTICLES OUT OF THE WATER, SO THEY RETURN TO THE NATURAL WATER CYCLE, FOR INSTANCE THROUGH AGRICULTURE.

OTHER EXAMPLES ARE THE DEGRADATION OF PLASTIC PRODUCTS IN NATURE OR TYRE ABRASION.

WAIT A MINUTE, IF MICROPLASTICS ARE IN THE ENVIRONMENT, CAN THEY END UP IN FOOD?

WATER TREATMENT

WHAT WE KNOW SO FAR; MICROPLASTICS ARE GENERALLY TOO LARGE TO DISTRIBUTE THROUGHOUT THE BODY AND ARE TYPICALLY SIMPLY EXCRETED.

AND WHAT ABOUT NANOPLASTICS? THOSE ARE EVEN SMALLER, RIGHT?

NANOPLASTICS ARE PARTICLES BETWEEN 1 NANOMETRE AND 100 NANOMETRES.

THE TIP OF A PENCIL MEASURES 1 MM. IF YOU WERE TO PUT 1 MILLION PARTICLES IN THAT TIP, EACH ONE WOULD BE 1 NANOMETRE.

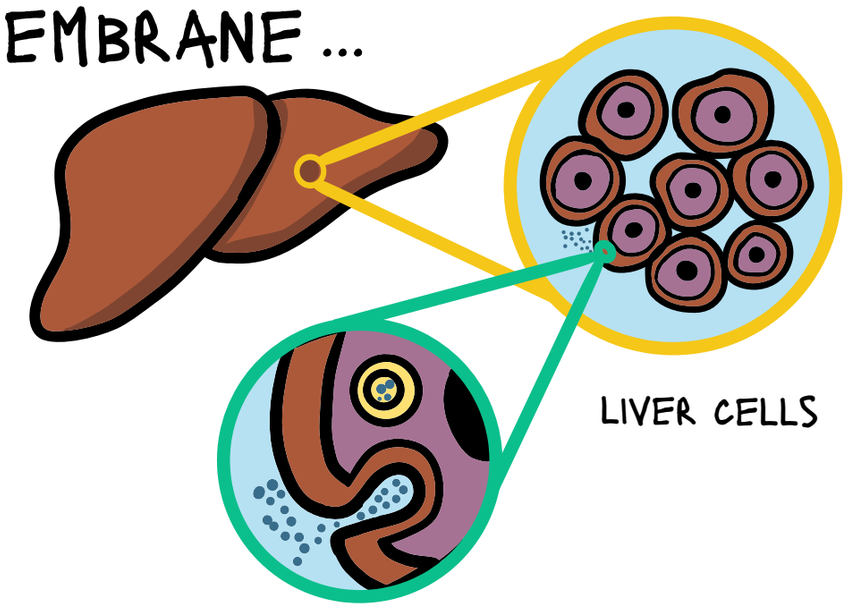
OMG!

INTESTINAL CELLS ARE NOT DAMAGED BY NANOPLASTICS.

AHA?!

THE BFR HAS INVESTIGATED 'IN VITRO' HOW NANOPLASTICS AFFECT CELLS. THIS WAS A LABORATORY-BASED STUDY, WE CANNOT YET SAY HOW AN ACTUAL BODY WOULD REACT.

IN THE LIVER, THE PARTICLES CAN BE ENGULFED BY BEING ENCIRCLED BY THE CELL MEMBRANE ...



+++ WE CALL THIS ENDOCYTOSIS +++ HOWEVER, NO DAMAGING EFFECTS WERE OBSERVED HERE EITHER.

ARE YOU PERSONALLY CONCERNED ABOUT MICROPLASTICS!?

CURRENTLY, THIS ISSUE IS **ALL OVER THE MEDIA** AND ON EVERYONE'S MIND ...

INDEED! AND THE **RESULTS** OF ANOTHER **BFR SURVEY** ON RISK PERCEPTION SHOW THAT **CONCERN** ABOUT **+++ MICROPLASTICS +++** IS INCREASING.

BFR SURVEY OVER 8 YEARS

WHEN PEOPLE WERE ASKED HOW WELL INFORMED THEY FELT ABOUT MICROPLASTICS IN FOOD,

36%

SAID THAT THEY WERE **NOT WELL INFORMED** OR HAD NEVER HEARD OF THIS ISSUE.

*SOURCE: BFR CONSUMER MONITOR 2017 / 2019 / 2025
NUMBER OF RESPONDENTS: 2017: 1,023 / 2019: 1,011 / 2025: 1,003
GERMAN SPEAKING POPULATION: AGED 14 YEARS AND OVER
IN PRIVATE HOUSEHOLDS IN GERMANY

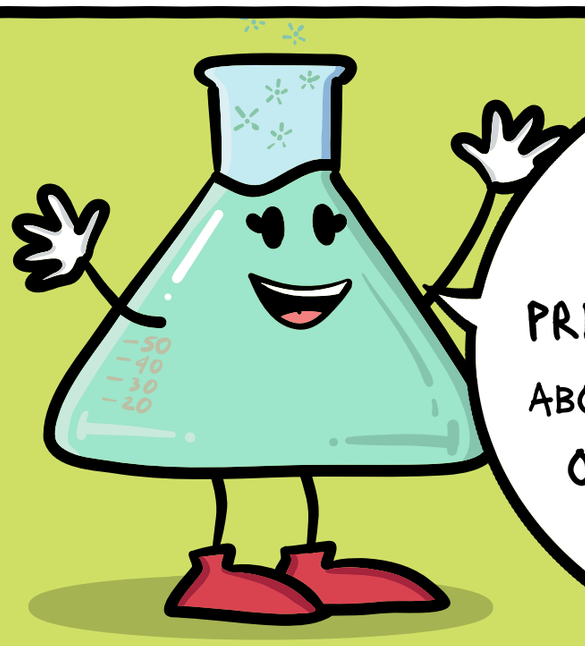
DESPITE THE GAPS IN OUR KNOWLEDGE, THERE ARE ALREADY ENOUGH DATA TO START THINKING ABOUT REGULATIONS FOR MICROPLASTICS.

LOOK! THERE ARE STILL TWO DATA LOADS LEFT TO EVALUATE!!!

SCIENTIFIC DATA

+++ MICROBEADS +++ IN COSMETICS, E.G. IN BODY SCRUBS, HAVE BEEN BANNED IN THE EU SINCE 2023.

THE SALE OF MICROPLASTICS, INCLUDING +++ PLASTIC GLITTER +++ ON THEIR OWN OR AS ADDITIVES IN PRODUCTS (E.G. CRAFT KITS, TOYS, ETC.) HAS ALSO BEEN FORBIDDEN.

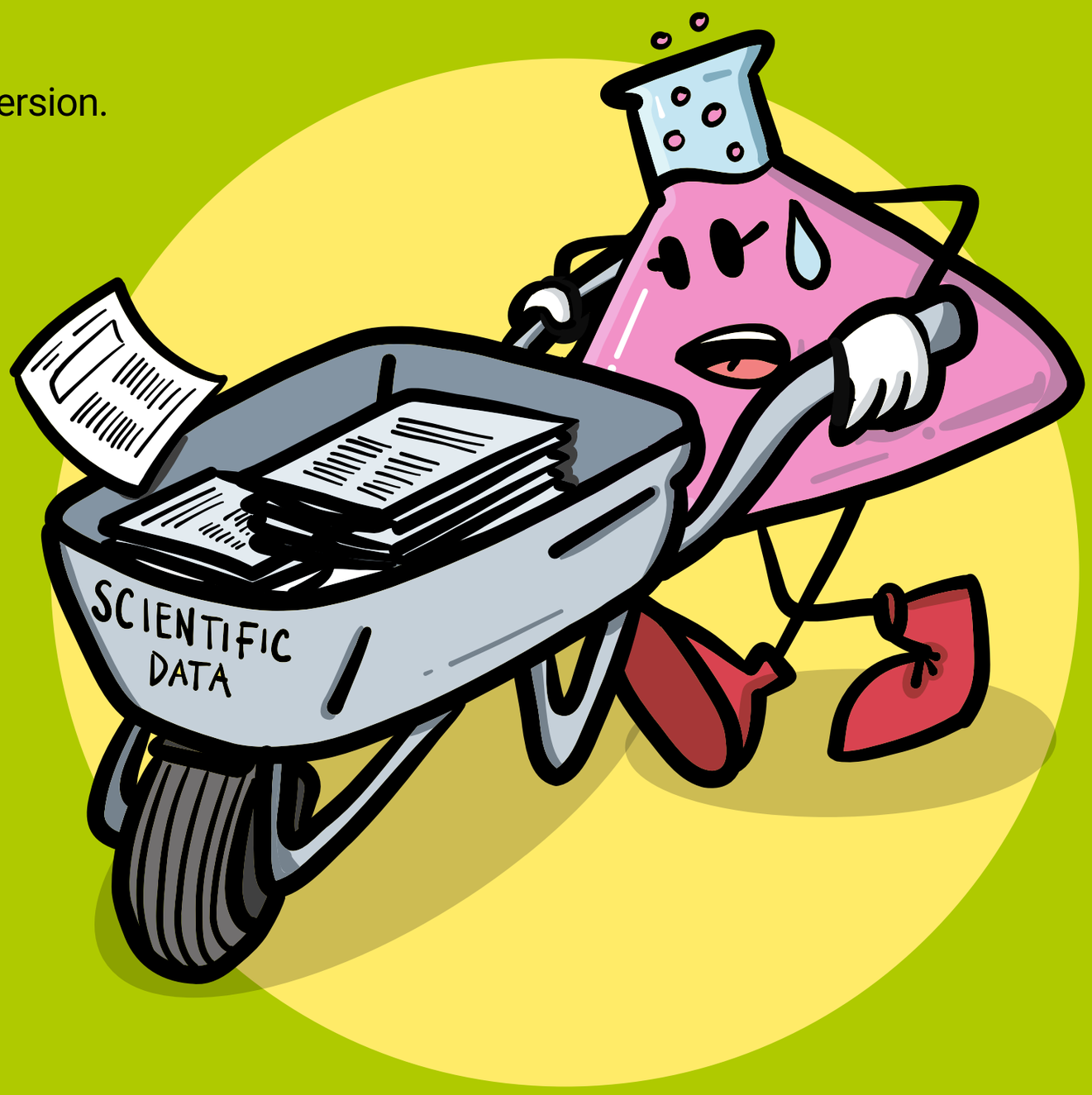


THESE RESTRICTIONS ARE EXPECTED TO PREVENT THE RELEASE OF ABOUT 500,000 TONNES OF MICROPLASTICS OVER A PERIOD OF 20 YEARS.

MORE RESEARCH IS NEEDED TO IDENTIFY THE HEALTH RISKS OF MICRO- AND NANOPLASTICS.

MORE INFORMATION: WWW.BFR.BUND.DE/EN

This text version is a translation of the original German text which is the only legally binding version.



Legal notice

Publisher:
German Federal Institute for Risk Assessment

Max-Dohrn-Straße 8-10
10589 Berlin, Germany
T +49 30 18412-0
F +49 30 18412-99099
bfr@bfr.bund.de
bfr.bund.de/en

Institution under public law
Represented by the President Professor Dr Dr Dr h. c. Andreas Hensel
Supervisory Authority: German Federal Ministry of Agriculture, Food and Regional Identity
Responsible according to the German Press Law: Dr Suzan Fiack
VAT ID No. DE 165 893 448

ISSN: 3053-9013 (Online) | 3053-9072 (Print)
DOI: 10.17590/20250527-105328-0

Status: September 2025

—

About the BfR
The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the German Federal Ministry of Agriculture, Food and Regional Identity (BMLEH). It protects people's health preventively in the fields of public health and veterinary public health. The BfR provides advice to the Federal Government as well as the Federal States (‘Laender’) on questions related to food, feed, chemical and product safety. The BfR conducts its own research on topics closely related to its assessment tasks.

BfR | Identifying Risks – Protecting Health