



# PERTURBANT FLUIDS

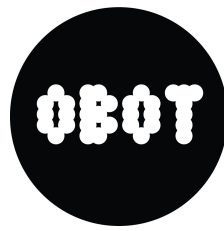
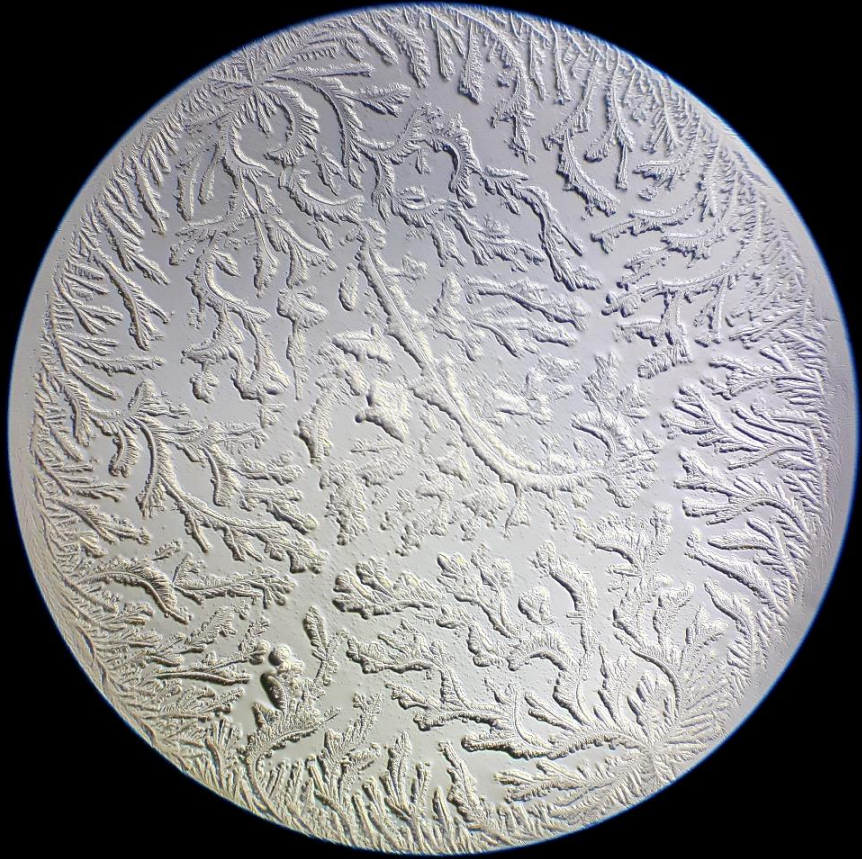
By OBOT with Zoe Romano



**Our Bodies Our Technologies**  
a project by Maddalena Fragnito and Zoe Romano

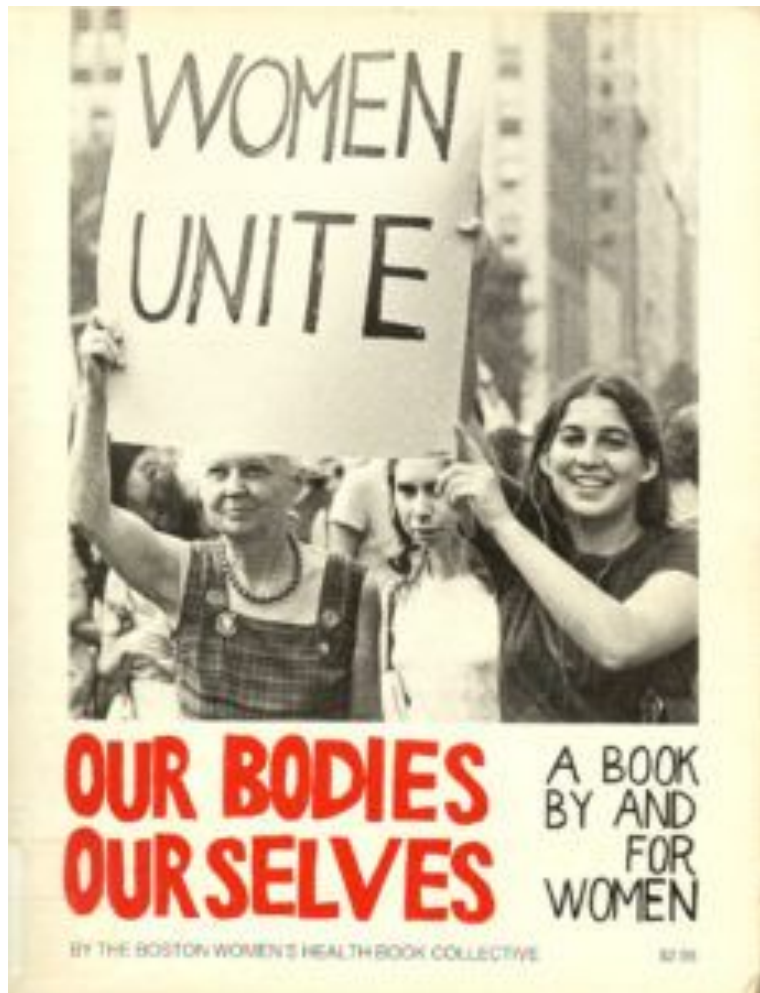
..Our Bodies Our Tech is a nomadic wetlab ~ We work on science and technology from a transfeminist queer perspective ~ We look for ways to lower the barriers to research, production and scientific knowledge ~ We seek new forms to access tools, protocols and data by promoting co-research practices..

->> [obot.pubpub.org](http://obot.pubpub.org)



We are experimenting with  
questioning as a  
collaborative practice of  
radical pedagogy.

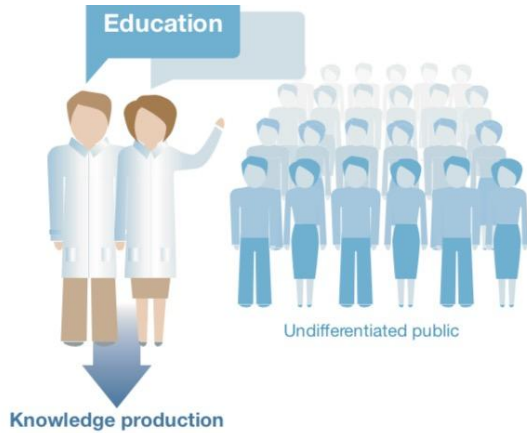
We think research as a  
collective device  
for social transformation



"We weren't encouraged to ask questions, but to depend on the so-called experts,"

"Not having a say in our own health care frustrated and angered us. We didn't have the information we needed, so we decided to find it on our own."

Nancy Miriam Hawley

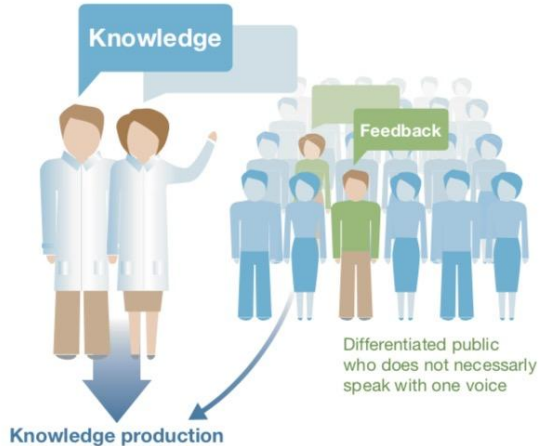


### DEFICIT MODEL

- Uni-directional discourse
- Knowledge produced by scientists only
- Justification for this position: knowledge deficit of citizens
- Also known as "Public Education Model" [3]

There is a tendency in the scientific community to think that citizens suffer from a **deficit of knowledge** and are incapable of grasping the complexity of science. As such, scientists believe that the public are in need of education.

The 'public debate' model considers that non-scientific **knowledge from citizens is enriching** for the definition of research challenges and the application of scientific knowledge.



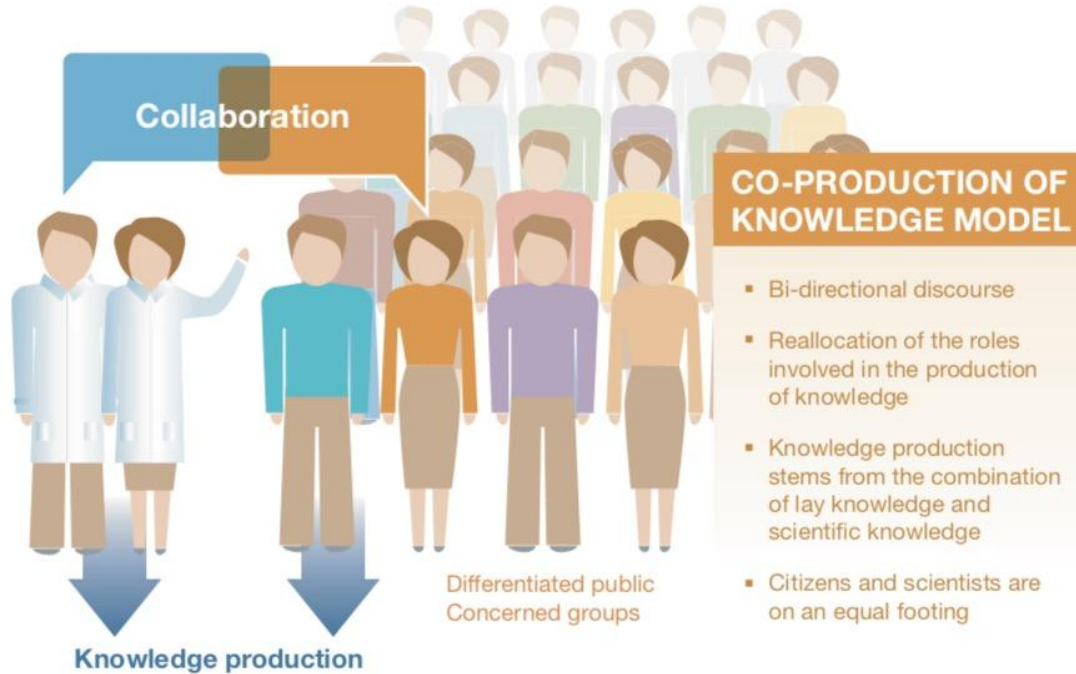
### PUBLIC DEBATE MODEL

- Bi-directional discourse
- Reallocation, among citizens and scientists, of the opportunity to speak
- Knowledge is produced by scientists but enriched by citizens' point of view
- Citizens can express their opinions in the public sphere

Thinking outside the "knowledge deficit" box

doi: [10.15252/embr.201438590](https://doi.org/10.15252/embr.201438590)

# Situated Knowledge production



The 'co-production of knowledge' thinks that citizens have both pertinent experience and competence to participate in defining **social and technological issues** and that they should be involved in forming 'research collectives' and producing legitimate knowledge.

2020/2021  
space setup in Milan

2020  
residency in  
Barcelona



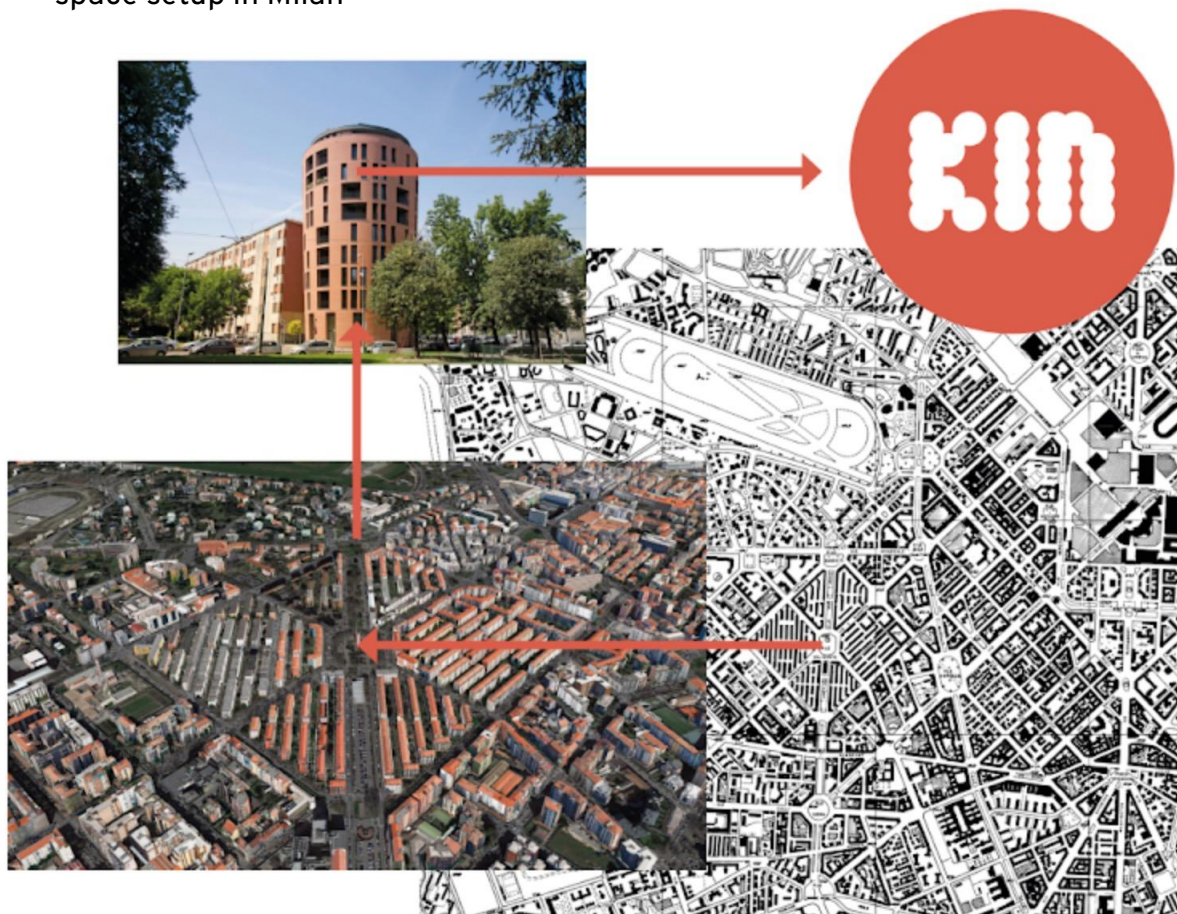
**HANGAR.**  
**ORG**  
centre/producció/reerca/arts.visuals.

2021  
workshop &  
exhibition in  
Hamburg

**MK&G**

Museum  
für Kunst  
& Gewerbe  
Hamburg

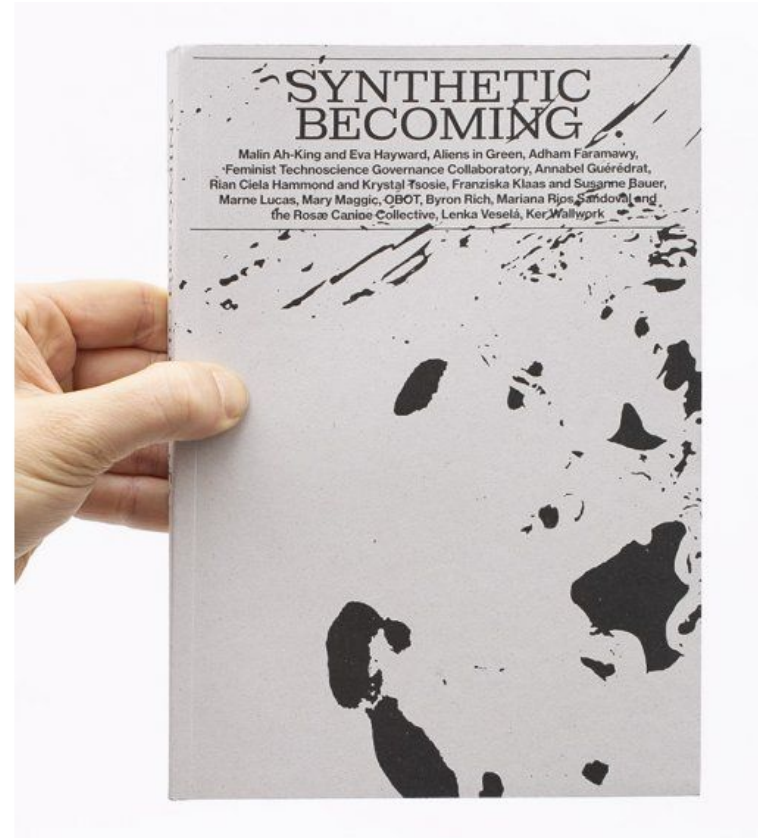
<http://kinlab.it>

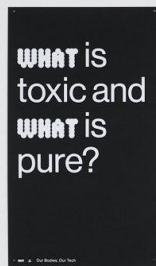
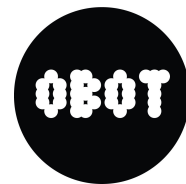


## 2021 Catalogue



## December 2022 Book





03



Galerie, FAVU

Brno, Czech Republic



# GOSH

Gathering for Open  
Science Hardware

October 2022 [GOSH](#)

sabato 29 ottobre 2022

# MICROSCAPES

[obot.pubpub.org](http://obot.pubpub.org)

curato da **OBOT** ospitato da **KINLAB**

supportato da  **GOSH**  
Gathering for Open  
Science Hardware







December 2022

Experimental laboratory of  
sensorial onomaturgy



# Previous work



2016-2017

- Health & Care
- Prototyping & Pilot
- Mapping & Supporting



**DIGITAL  
SOCIAL  
INNOVATION**



Milan's Makerspace

2018-2019

# Opening technologies for smart communities

Empowerment happens when individuals and collectives can acquire awareness, skills and opportunities to develop knowledge, self-sufficiency and achieve inclusion in **decision-making processes**

Da alcuni anni a chiunque voglia presentare un progetto di ricerca in ambito europeo, viene chiesto di rispettare i principi della Ricerca e Innovazione Responsabile (RRI), anticipando i possibili impatti e spiegando come le attività proposte produrranno un'innovazione "socialmente desiderabile e accettabile".

Apertura della scienza, riflessività, coinvolgimento pubblico, etica, prospettiva di genere, sostenibilità, giustizia sociale, sono alcune delle traiettorie che dovrebbero ispirare la ricerca "responsabile".

Ma cosa è la RRI per i ricercatori? È l'ennesimo vincolo burocratico cui devono sottoporre la propria attività o può essere un'occasione per ripensare il modo e il senso di fare ricerca oggi?

"Scienziati in affanno?" esplora i vari significati di questo approccio complesso, attraverso le sue componenti teoriche e le riflessioni maturate nell'ambito di alcune pratiche di ricerca fuori e dentro l'accademia e il contesto della politica comunitaria.



Declinare la responsabilità nelle pratiche: riflessioni dentro e fuori la RRI

## Fablab e Makerspace: co-costruire l'innovazione fuori dall'accademia

Zoe Romano

WeMake, Milano<sup>1</sup>

DOI: 10.26324/2018RRICNRBOOK15

fablab open care  
open science makerspace  
co-design  
citizenscience opensource

Mary Anning ha vissuto nella prima metà dell'800, trascorrendo molta parte del suo tempo a raccogliere fossili sulle spiagge di Lyme Regis, in Inghilterra. Le coste di Dorset, la contea di cui fa parte la cittadina, sono parte della Costa Giurassica, chiamata così da quando è diventata sito Unesco patrimonio dell'umanità proprio perché i suoi terreni coprono un periodo storico di circa 185 milioni di anni e sono ricchi di reperti archeologici che hanno contribuito allo sviluppo della paleontologia contemporanea. Mary Anning è da molti considerata la prima *citizen scientist* della storia e le sue vicende, raccontate in un libro intitolato *The Fossil Hunter* (Cacciatrice di fossili), ci mostrano come, nonostante fosse completamente autodidatta e al

A causa delle sue origini non altolocate, della poca istruzione, del genere femminile che rappresentava, e nonostante avesse una grande conoscenza della geologia e dell'anatomia, costruite sul campo nella pratica quotidiana della raccolta dei fossili, non fu mai accettata nel contesto della scienza vittoriana, in una società che ancora non prevedeva il voto né tantomeno la frequentazione universitaria alle donne. Solo quasi cento anni dopo, dal 1904, la Geological Society ha iniziato ad accettare le donne tra i suoi membri.

Bisognerà aspettare altri cento anni ed arrivare fino al 2005 per vedere un cambiamento più radicale, e assistere all'apertura e democratizzazione di tali pratiche nel contesto dei *maker*.

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# Social tech / Civic tech

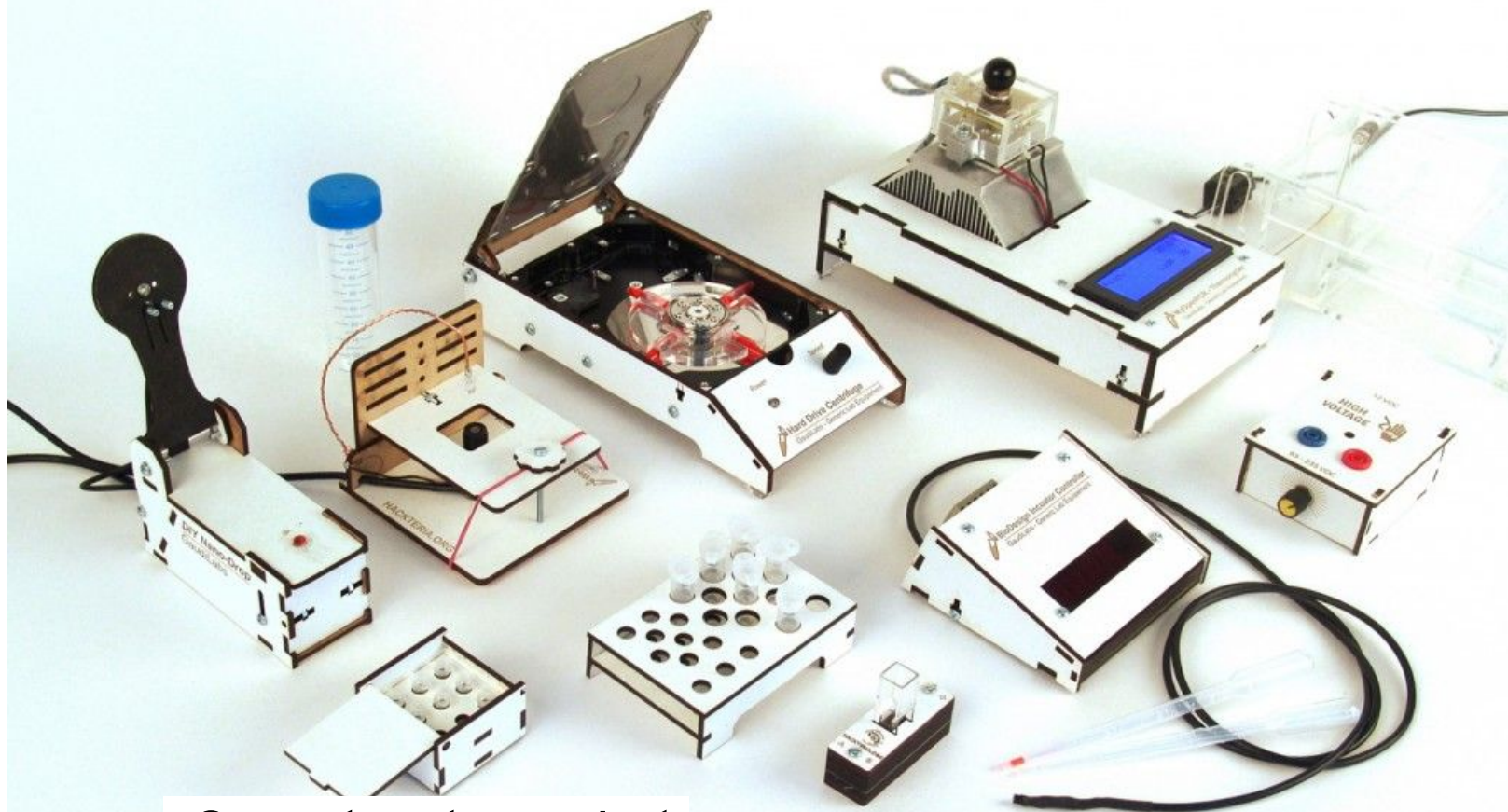
Fablab and Makerspace are spaces of activation and transformation where digital manufacturing technologies are socialized, becoming the tools around which different communities interact to build the world we want to inhabit through a collective path between online and offline, creating bridges of virtuous relationship between the world of research and citizens.

The National Research Council is the largest research council in Italy. As a public organisation, its remit is to support scientific and technological research. Founded in 1923.

Approfondisci  
<http://doi.irea.cnr.it>







Open hardware Lab



# OPEN SOURCE MEDICAL DEVICES

## A VISUAL GUIDE FOR MAKERS

An introduction to the regulations to design, commercialize and distribute an open source medical device in EU

### STEP ONE

#### UNDERSTAND WHAT YOU ARE RELEASING

Are you developing a hardware device or a digital fabricated solution to solve a challenge in the field of health and care? Not all the solutions need to be certified as medical devices. Identify which scenario your solution belongs to.

##### SCENARIO A

Your solution is a functioning DIY prototype. People can access the documentation to potentially produce and use it for themselves, to test, improve or study it.

##### SCENARIO B

Your solution can be personalized and produced in a fab/lab or a makerspace to support real people's needs.

##### SCENARIO C

Your solution is a hack of an existing object or medical device.

##### SCENARIO D

You are self-producing a solution for one person, or a few people, who will get it directly from you to use it in their daily life.

##### SCENARIO E

Your solution can be potentially mass produced or manufactured in small scale and distributed by a third party, like a non profit organization, a tech for good company or by your future social enterprise.

YOU PROJECT NEEDS THE CERTIFICATION !

#### WHAT SHOULD YOU DO?

Document the solution clearly and do not forget to add some information regarding what it should be improved to make it more stable.

SEE EXAMPLES ON CAREABLES.ORG

Do not forget to add information about the safety and the results of testing sessions into the documentation. Make people aware about possible risks when using the solution.

Make people aware that the hacked version of a medical device is not suitable for all.

SEE INITIATIVE HACKABILITY.IT

You are responsible for your designs. Reflect on how to avoid risks for the people.

Be sure that the requirements for the EU regulation compliance are considered in the design and development process of your solution.

GO TO STEP TWO

### STEP TWO

#### UNDERSTAND THE MEDICAL PURPOSE

To start the certification procedure you should identify what category your medical device belongs to. Look at the following medical purposes to work out what type of medical device you are working with.

The guide aims to provide communities with easy-to-read documentation that accompanies step-by-step from a prototype of an open care device, to a product that can be compliant with regulations and, therefore, ready to enter the market.

EN and IT



Què és un wetlab?

Un laboratori humit

Un laboratori mullat

Un laboratori de fluids

Un laboratori de fluxos

Un laboratori enganxós

Un laboratori llardós

Un laboratori amarat

Un laboratori brut

Un laboratori regalimant

HANGAR.  
ORG

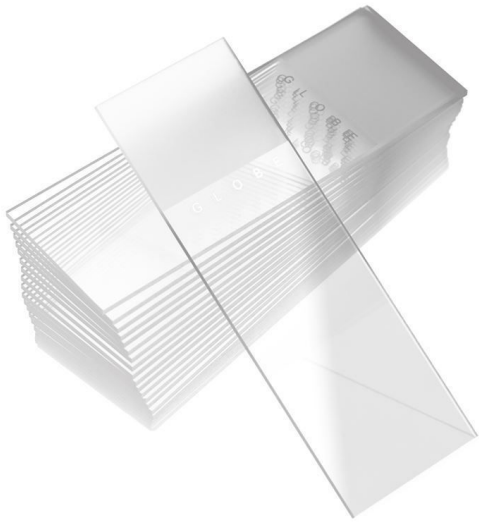
I AM  
ALREADY  
WET  
LAB



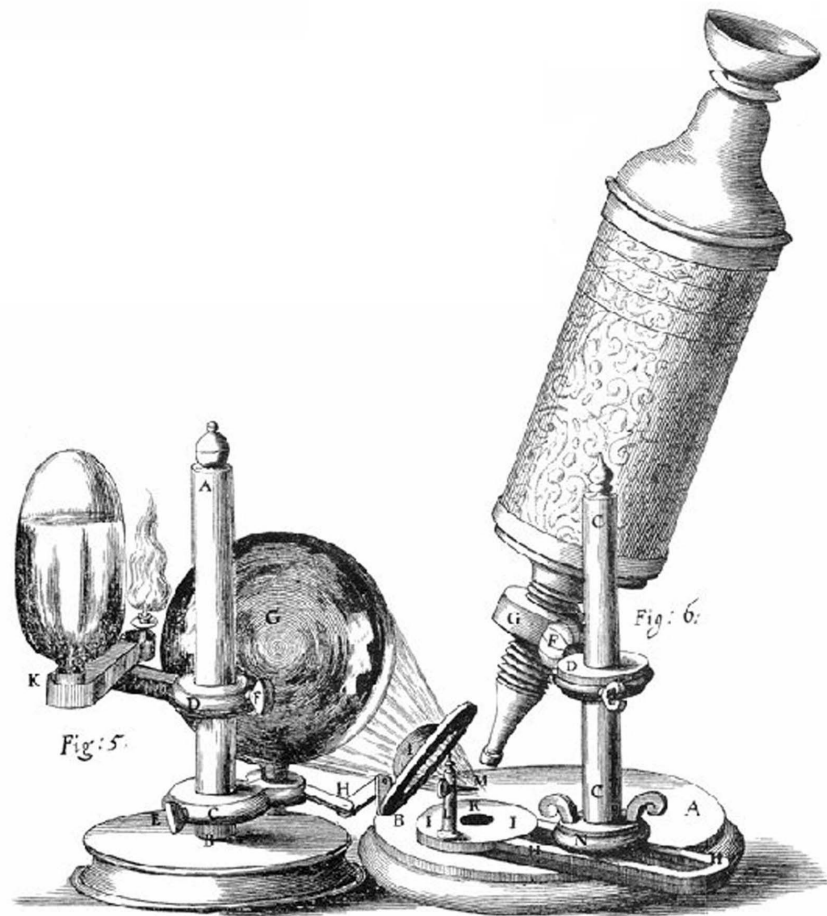
KNOWING THE TOOLS

Microscope - Slide - Pipette - Centrifuge -

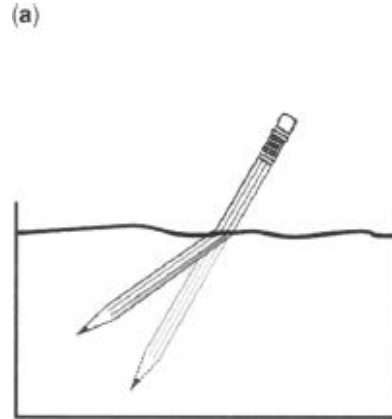
# TOOLS



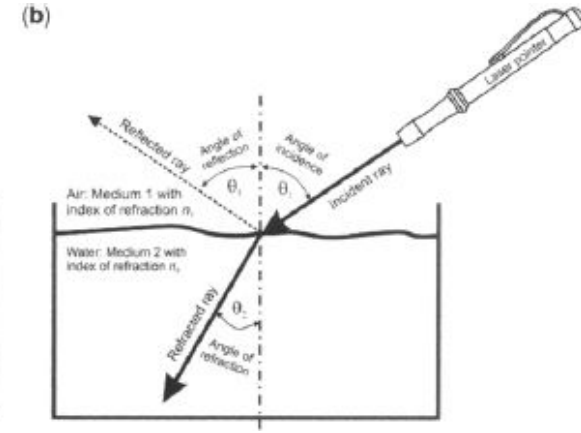
A bit  
of history



# Tolomeo

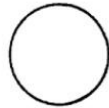
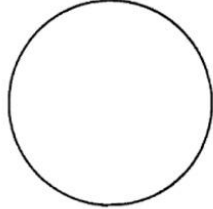
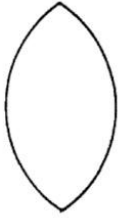
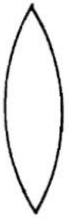
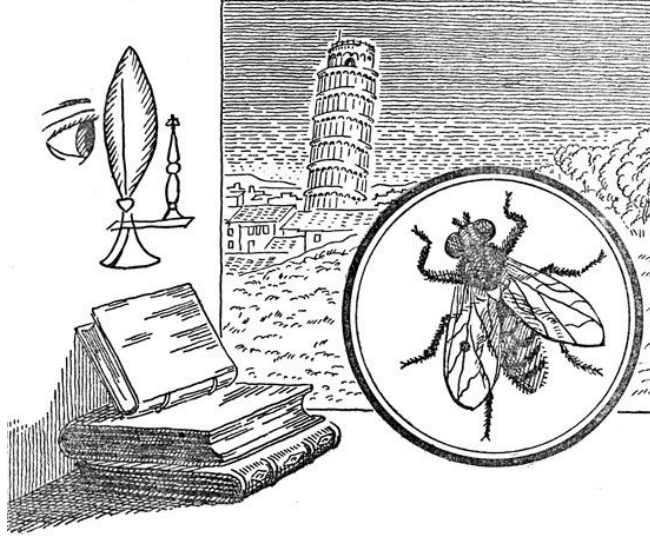
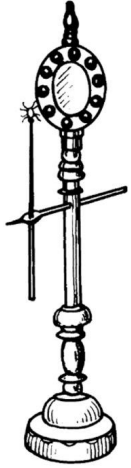


circa 100–165 D.C.



refraction

# Vitra pulicaria and occhiolino



# MICROGRAPHIA:

OR SOME

Physiological Descriptions

OF

## MINUTE BODIES

MADE BY

MAGNIFYING GLASSES.

WITH

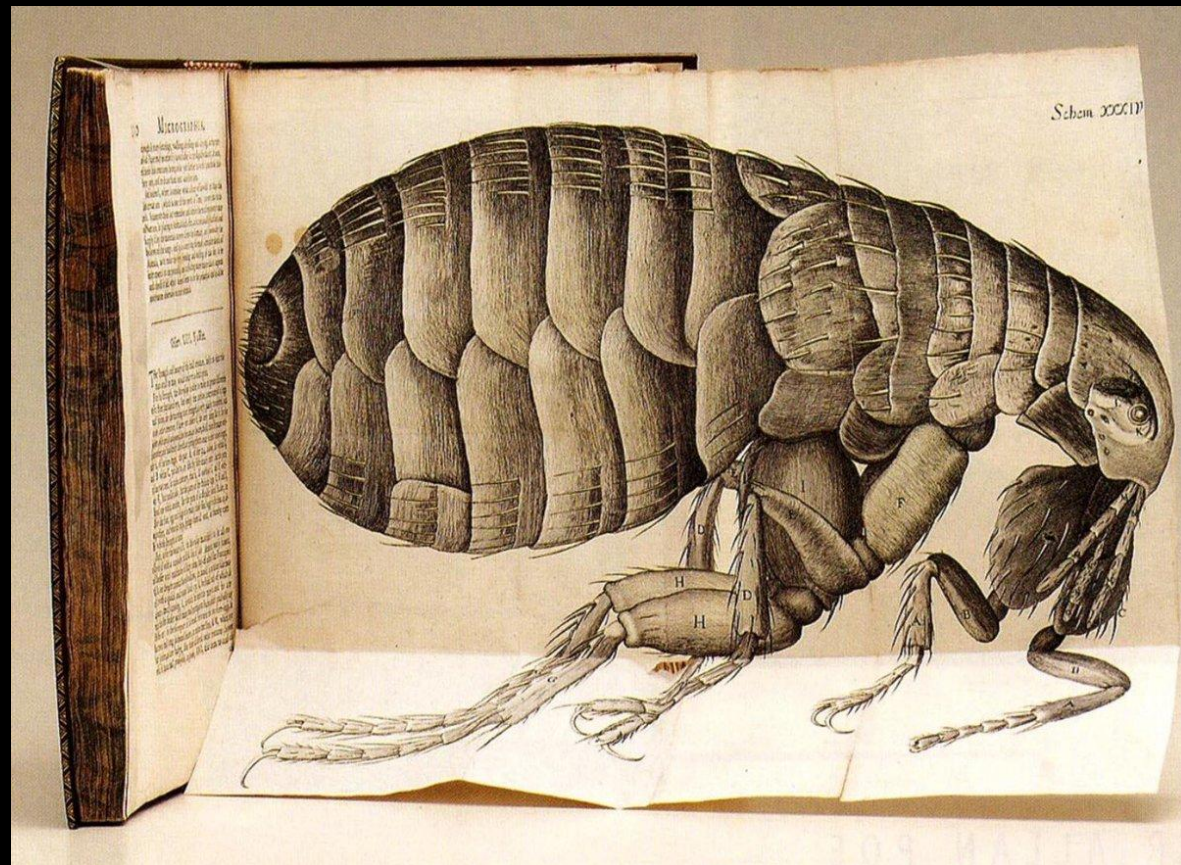
OBSERVATIONS and INQUIRIES thereupon.

By *R. HOOKE*, Fellow of the *ROYAL SOCIETY*.

*Non possis oculo quantum contendere Linceus,  
Non tamen idcirco contemnas Lippus inungi. Horat. Ep. lib. 1.*



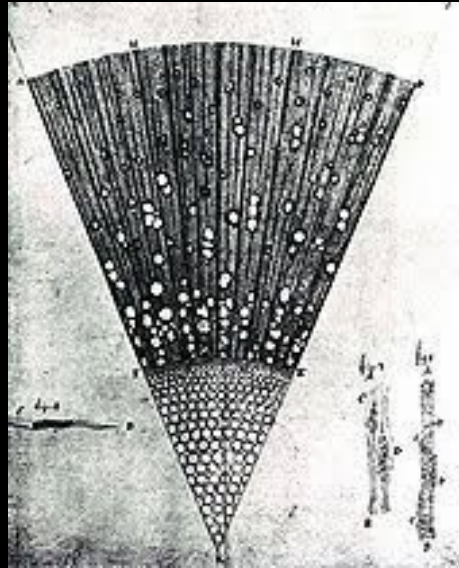
LONDON, Printed by *Jo. Martyn*, and *Jo. Allestry*, Printers to the  
*ROYAL SOCIETY*, and are to be sold at their Shop at the Bell in  
*S. Paul's Church-yard. MDC LXV.*



Royal Society Publication 1664  
Plague in London 1665  
Flea -> Plague 1898

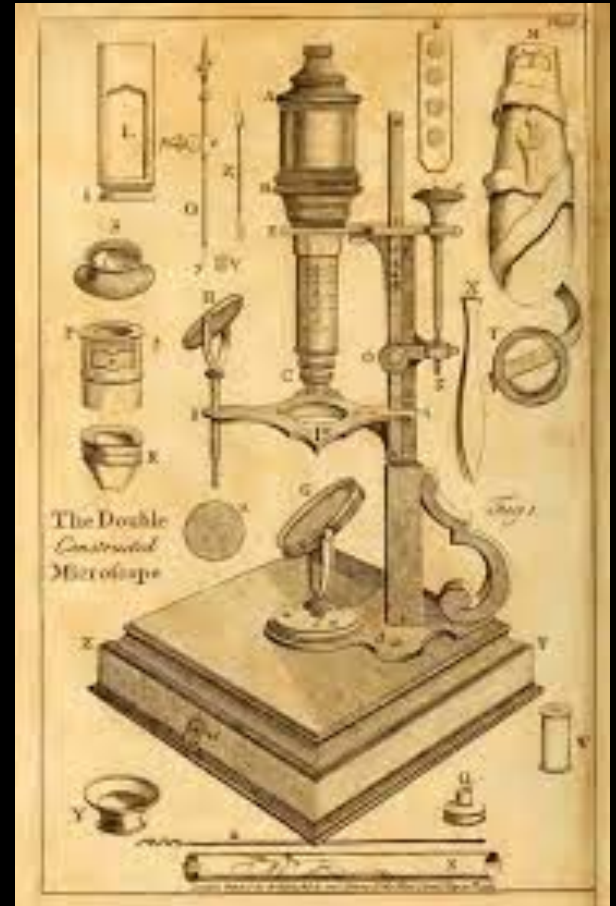
**Robert Hooke**

**1635 - 1703**



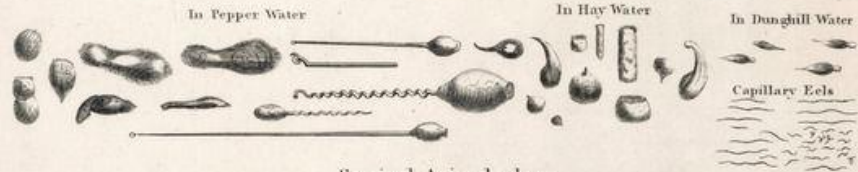
Antoni van Leeuwenhoek

1632 - 1723

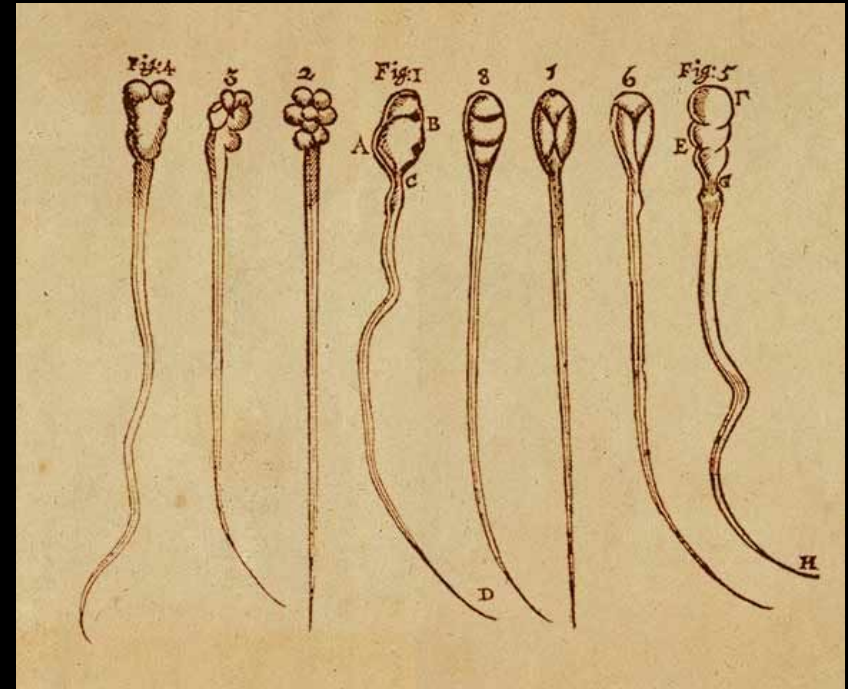
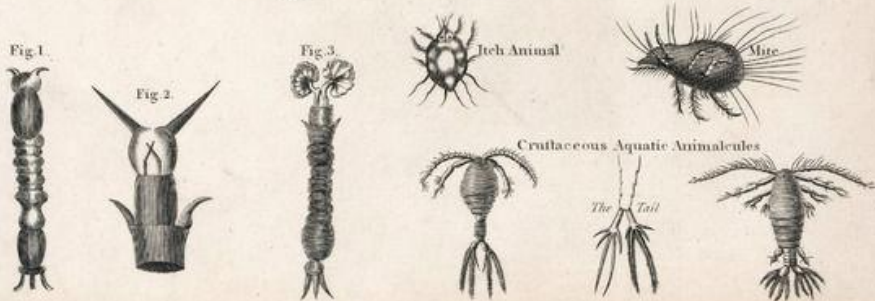
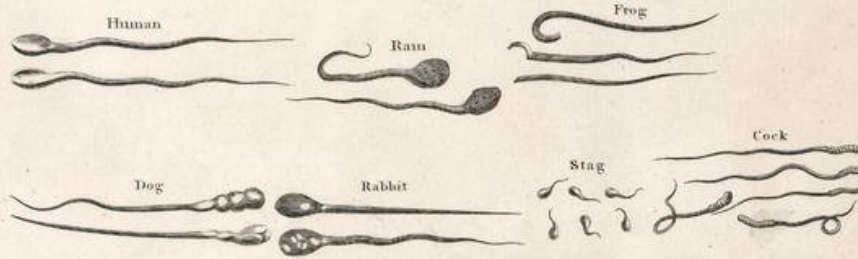


## ANIMALCULES.

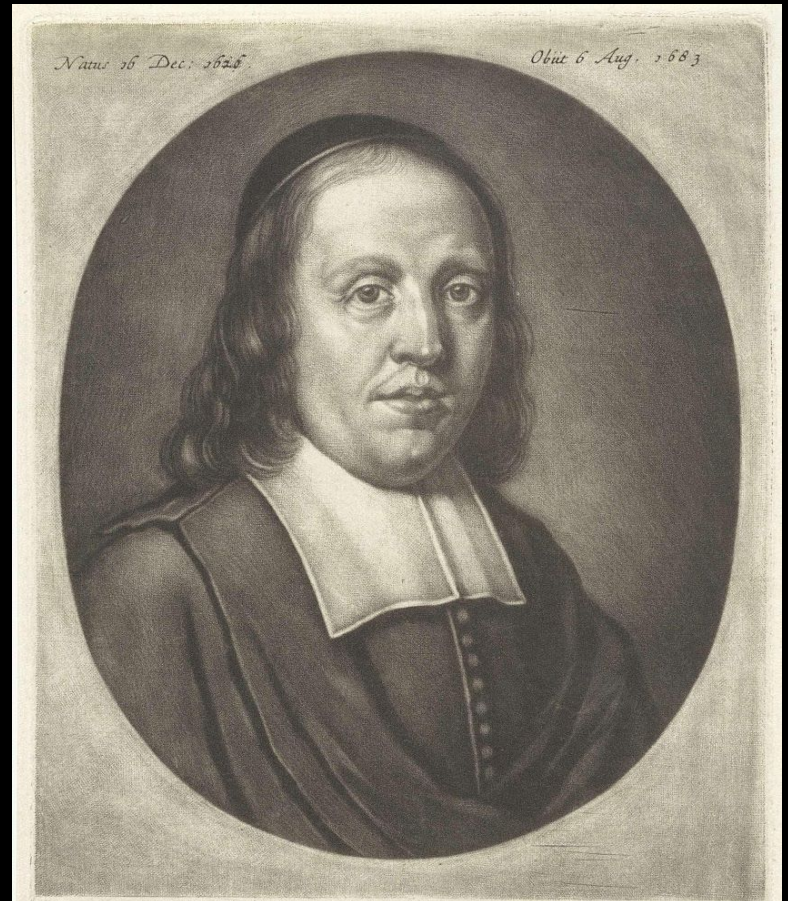
Animalcula infusoria.



### Seminal Animalcules.



## Antoni van Leeuwenhoek



**Nicolaas Hartsoeker 1656-1725**



MARGARET DUTCHESS OF NEWCASTLE.

Coming from a wealthy family, she owned several microscopes and was not shy about criticizing the work of the members of the Royal Society.

She was the first woman to visit the Royal Society and scared them.

“Artificial instruments seemed to distort the very reality they were designed to reveal  
Cavendish's motivation is important: she was not arguing against scientific enquiry per se; rather, she was deeply troubled by the uncritical enthusiasm for enquiry based on artifice.”

<https://royalsocietypublishing.org/doi/10.1098/rsnr.2014.0015>

**Margaret Cavendish -  
1623 - 1673**



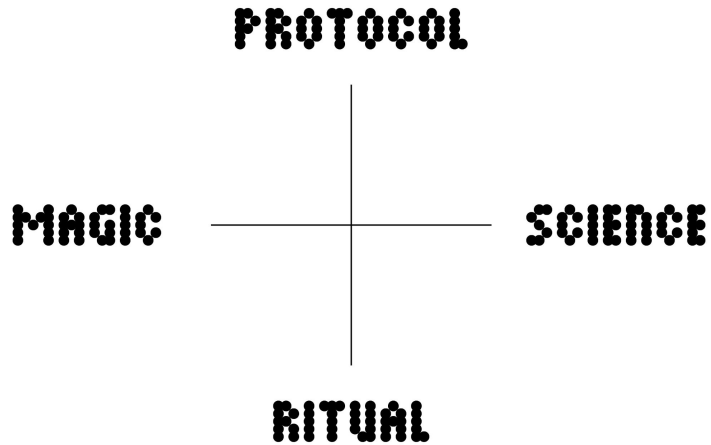
# KNOWING THE PROCESS

## Protocols

# WHAT IS A PROTOCOL

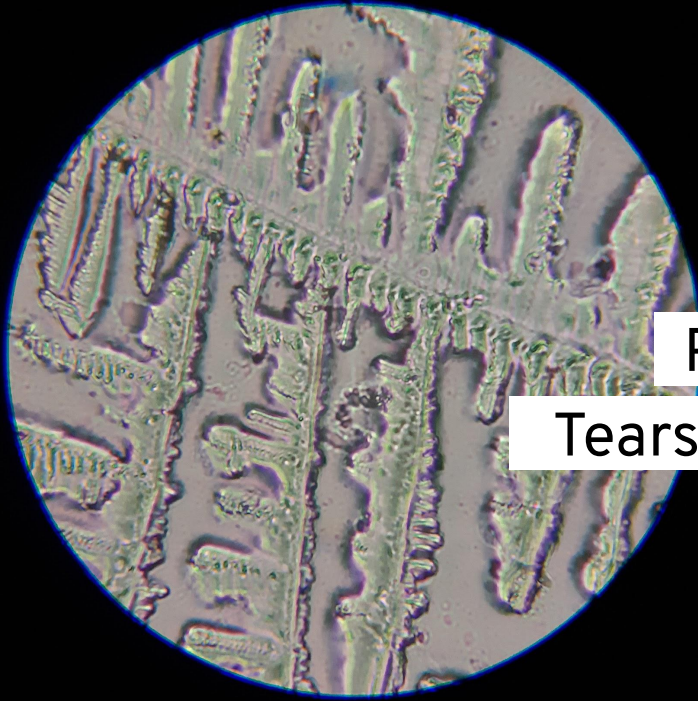
In natural and social science research, a protocol is most commonly a **predefined procedural method** in the design and implementation of an **experiment**.

Protocols are written whenever it is desirable to **standardize a laboratory method** to ensure successful **replication** of results by others in the same laboratory or by other laboratories.

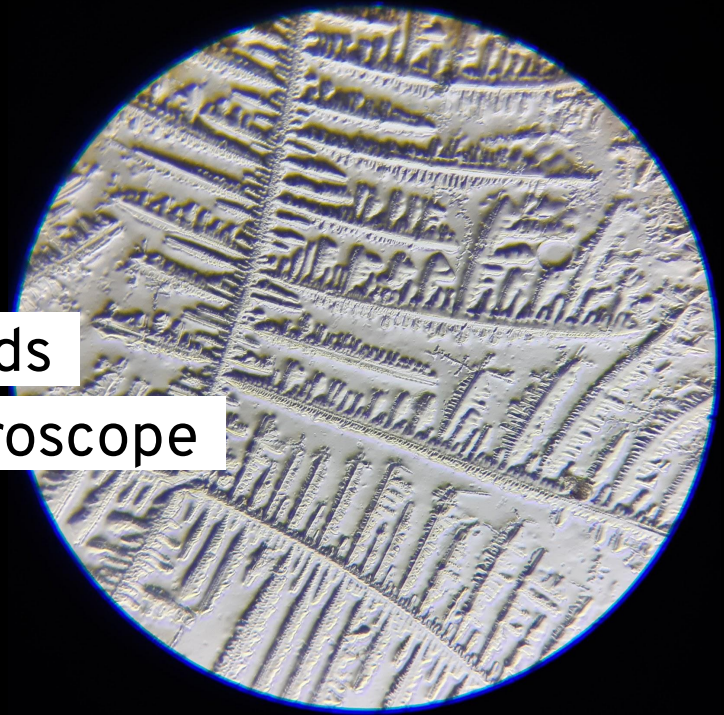


These ancient healers believed that supernatural forces caused disease and that a special priest or medicine man was required to rid those afflicted of these unseen yet potentially lethal forces.

The origins of medicine and magic are entwined.



Perturbant Fluids  
Tears under the Microscope







Tears  
in the last 200 years

# Timeline

- 1791      The first report on the crystallization in vitro was published by French scientists Antoin-François de Fourcroy and Louis-Nicolas Vauquelin. The solid residue of **desiccated tear** was determined to be cubic crystals with the same properties as sea salt.
- 1946      150 years later gynecologist **Papanicolaou** rediscovered the same phenomenon in the vaginal and cervix uterine mucus studied a vaginal smear, observed the **ferning phenomenon** in the **cervix mucus**, and **proposed using the arborization pattern to identify the ovulation period**

# Timeline

- 1955 Solé, an Austrian scientist, reported that a little drop of blood serum, cerebrospinal fluid, milk, aqueous humor, or tear, if dried in a normal room environment produces a crystallized picture, which he called a **stagogramm**, from the Greek *stagón* (drop) and *grámma* (picture)
- 1984 **Rolando**, from Italy, designed a practical classification of four types of ferning, according to their density

# Tears - sampling



1. **Basal** tears are always in our eyes to serve the purpose of lubricating, nourishing and protecting the eyes.
2. **Reflex** tears are those that form to protect our eyes from irritants including wind, smoke, tear gas, etc. They wash away debris when it enters the eyes and help fight bacteria to prevent infections.
3. **Emotional** tears are those that are produced as a result of different types of emotions.

# Tears: a cocktail of components

Tear comprises **98.2%** water, the entire focus of tear diagnostics is on the remaining 2%

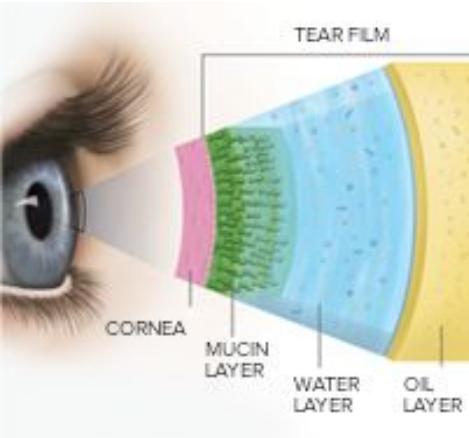
Human tear fluid is a complex mixture containing over **1500** solute proteins, lipids, electrolytes, mucins, metabolites, hormones and foreign substances.

The tear film is a thin fluid layer *3  $\mu\text{m}$  thick* and *3  $\mu\text{l}$*  in volume that covers the outer mucosal surfaces of the eye

**Many proteins belong to the immune system**, involved in immune response, in inflammatory response; defence against pathogens.



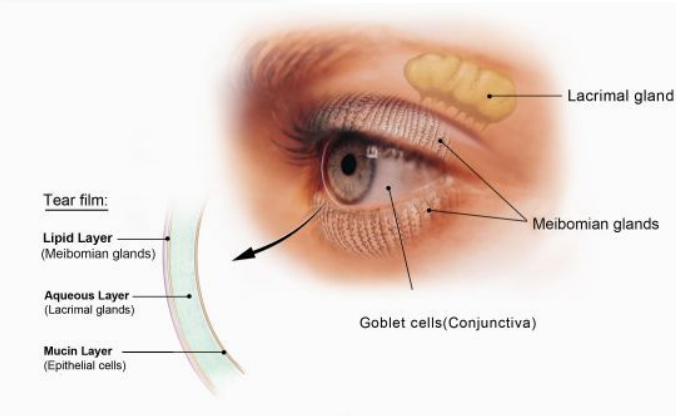
# Tears - layers



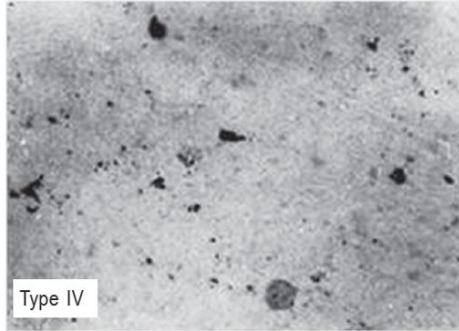
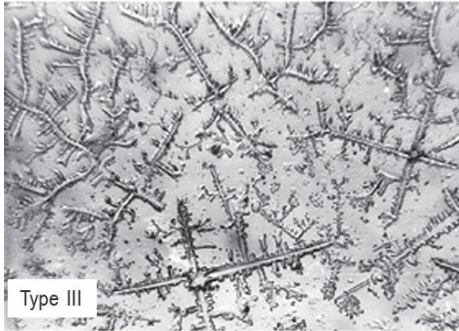
**1. External lipid layer:** The main role of this outermost layer (50–100 nm thick) is to reduce evaporation of our natural tears and keep tears from spilling out of the eye (Meibomian glands).

**2. Middle aqueous layer:** This middle layer is comprised of water and aids in lubricating the eye, washing away particles, preventing infection and providing oxygen and nutrients to the underlying corneal tissue. (Lacrimal Glands)

**3. Inner mucin layer:** allows the watery layer to spread evenly over the surface of the eye along with acting as an anchor to hold the tear film in place thanks to its hydrophilic glyco-proteins.



# Rolando's Classification



## **Type I**

compact ferning without intermediate spaces;

## **Type II**

noncompact ferning, fewer arborizations, and some spaces among fernings;

## **Type III**

scarce and small fernings, separated by abundant amorphous spaces, including amorphous mucin conglomerates;

## **Type IV**

no fernings or crystallization.

Types I and II are normal. Types III and IV express increasing grades of hypertonicity of tears

# Tear's Zones

Tear microdesiccates display 4 distinctive morphological domains

## **Zone I**

it's a lipid-rich structure

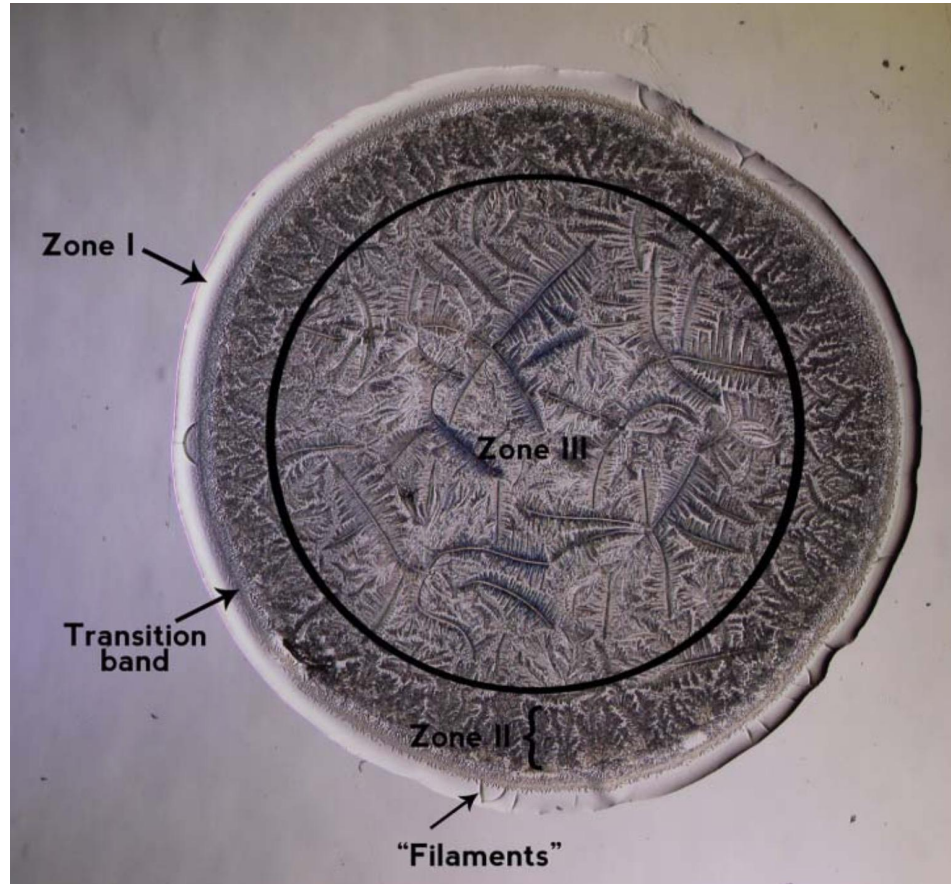
## **Zone II**

consists of a regular mass of fern-shaped or leaf-shaped crystalloids emerging centripetally from regularly spaced points near zone I

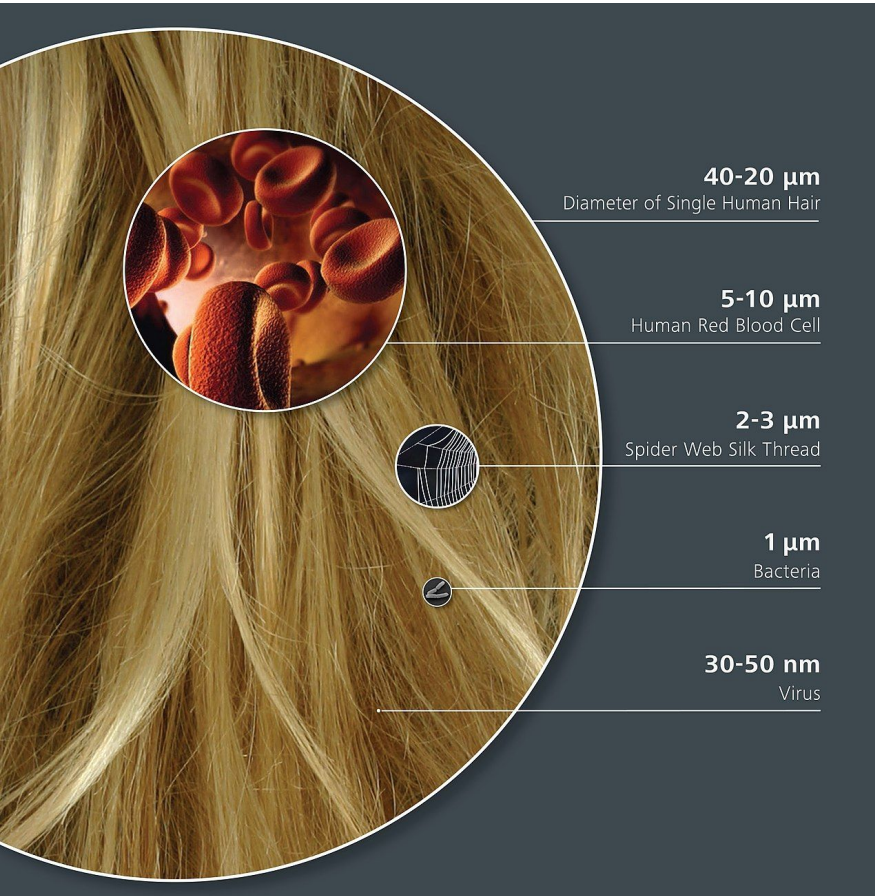
## **Zone III**

the centermost part of the micro-desiccate where fern-like structures differing in robustness, length, and branching can be typically seen

Transition band



# Micro measurements



1  $\mu\text{m}$  = 1 micrometer or micron

1mm = 1000 micrometer

1 nm = 1 nanometer

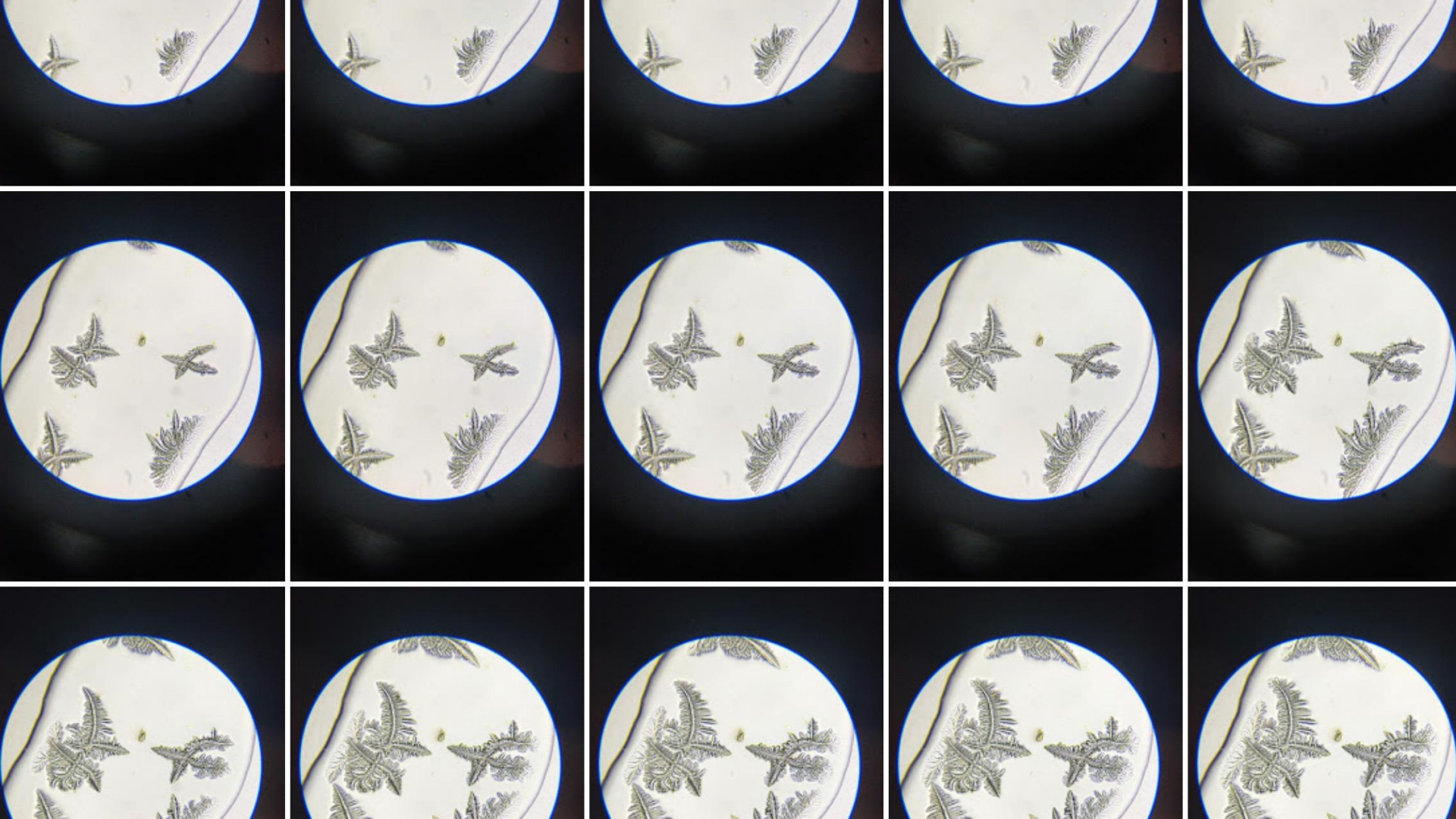
1 nm = 1000  $\mu\text{m}$

1  $\mu\text{l}$  = 1 microliter

1ml = 1000 microliter

# Protocol

- Step 1- divide in groups and test the use of microscope setting up our mobile phone on 3d printed holder (try to take pictures and use timelapse function - set camera with hi-resolution)
- Step 2 - Collect tear sample
- 
- Step 3 - Put 1 $\mu$ l of tear on slide using graduated Pipette
- Step 4 - Record cristallisation with timelapse and take some pictures
- Step 5 - repeat for each member of your group
- Step 6 - compare media and find differences using parameters on Tear Zones and Rolando classification



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89 following

Our Bodies Our Tech

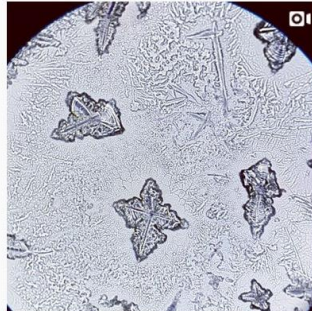
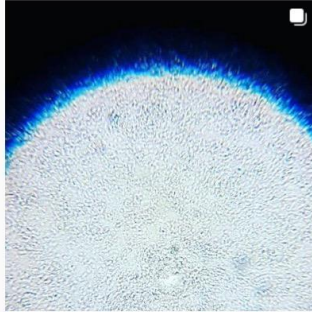
[linktr.ee/ourbodiesourtech](https://linktr.ee/ourbodiesourtech)

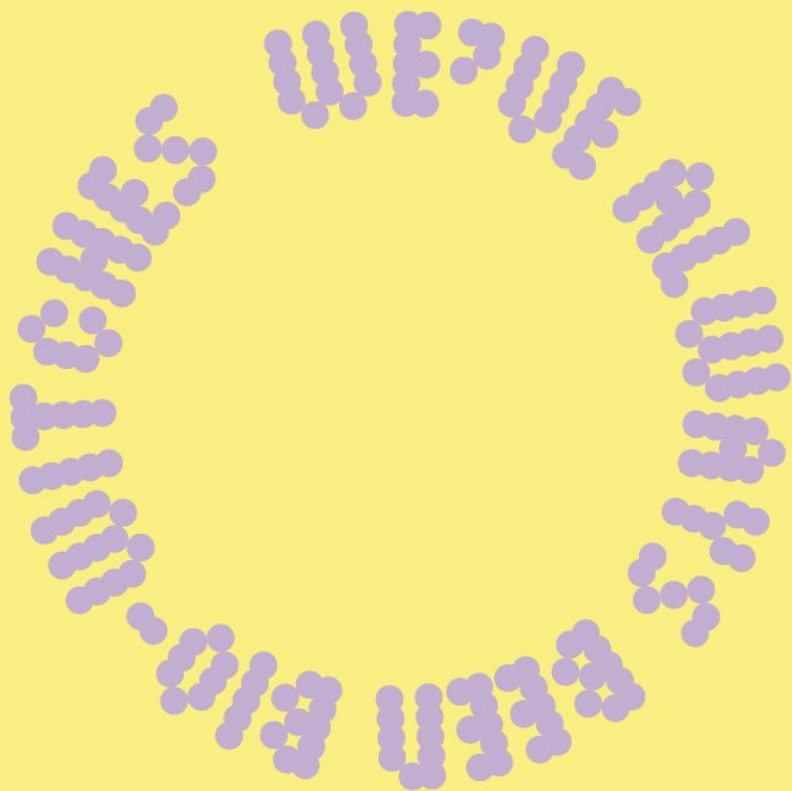
POSTS

IGTV

SAVED

TAGGED





GRAZIE  
GRACIAS  
GRÀCIES  
THANK YOU

@\_obot\_  
@\_zoescope\_

kinlab.it  
zoeromano.eu