

Citizen Science?

Rethinking Science and

Public Participation

Bruno J. Strasser

University of Geneva & Yale University

A hand holding a smartphone in the center of the frame. The phone's screen displays a landscape photograph of a valley with mountains in the distance under a cloudy sky. The background of the entire image is a blurred, real-world landscape matching the photo on the phone. Overlaid on the image is the text "Citizen science?" in a large, white, sans-serif font.

“Citizen science”?



© Profimedia

Chernobyl, 1985



© Igor Krostin, 1990

Chernobyl, 1986

Pr. Pierre PELLERIN

DIRECTEUR S.C.P.R.I. (protection
contre les rayonnements ionisants)

ina.fr

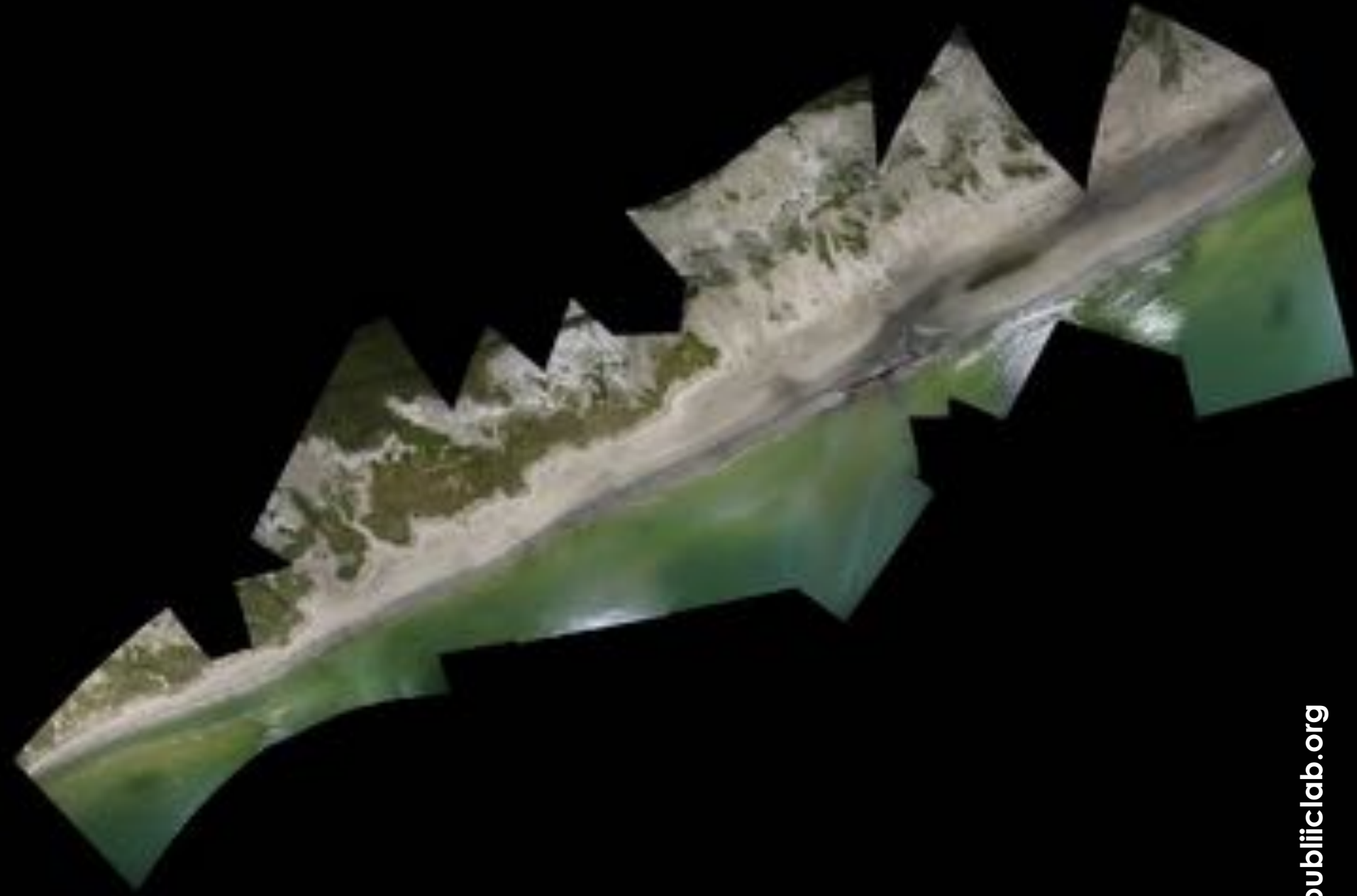












"participatory mapping"

publiclab.org

"tell a different story"

publiclab.org

empowering the citizen



**"the largest audience to ever
witness an inauguration,
period."**

Sean Spicer, White House press secretary,

NYT 21.1.2016



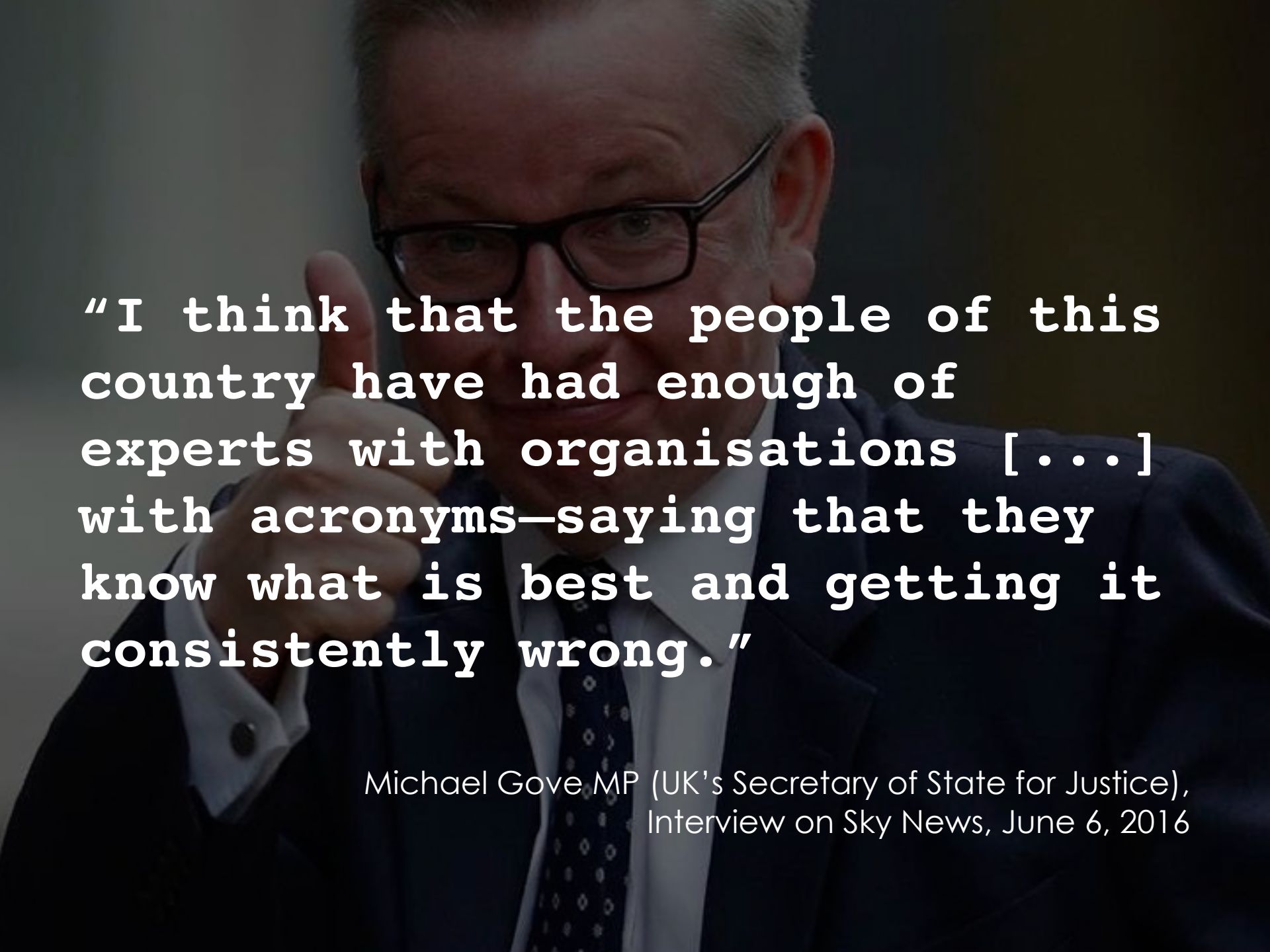
2009 Obama Inauguration
(Jewel Samad/AFP/Getty Images)



2017 Trump Inauguration
(Inaugural Committee)

"alternative facts"


**Kellyanne Conway,
White House counselor 22.1.2017**

A close-up photograph of Michael Gove, a man with glasses, wearing a dark suit, white shirt, and patterned tie. He is giving a thumbs-up gesture with his right hand. The background is dark and out of focus.

"I think that the people of this country have had enough of experts with organisations [...] with acronyms—saying that they know what is best and getting it consistently wrong."

Michael Gove MP (UK's Secretary of State for Justice),
Interview on Sky News, June 6, 2016



Dr. Ben Carson 

@RealBenCarson

 Follow

It is important to remember that amateurs built the Ark and it was the professionals that built the Titanic. [@my_ccu](#)

6:05 PM - 29 Oct 2015

  3,497  4,711



Citizen Sciences

@CitizenSciences

Follow



The Age of Populism is back: Will
[#citizenscience](#) speak the truth to power or
further undermine expert knowledge?

4:18 AM - 9 Nov 2016

Rise of "citizen science"?

a label?

A large, circular, multi-layered particle detector structure, likely a calorimeter or tracker, is shown in a laboratory setting. The structure is composed of many concentric rings of detector modules, with a central core. The surrounding area is filled with scaffolding, support structures, and various pieces of equipment, indicating a complex and large-scale scientific experiment. The word "computers" is overlaid in white text across the center of the image.

computers

**"Whether you are at home
or at work, you can help
experts by connecting your
computer to LHC@home"**

cds.cern.ch

The background is a complex mosaic of thousands of tiny, square images. Each small image contains abstract, colorful patterns in shades of green, brown, red, and yellow, creating a rich, textured visual field. The overall effect is that of a high-resolution, multi-colored grid.

analyzers

“people-powered research”

zooniverse.org

A group of four people are standing in a wooded area with bare trees and a light snow on the ground. They are all wearing winter jackets and hats. The person on the far left is wearing a dark jacket and a white hat, looking through binoculars. The person next to them is wearing a dark jacket and a dark hat, also looking through binoculars. The person in the center is wearing a green jacket and a yellow hat, looking through binoculars. The person on the far right is wearing a grey and white jacket and a dark hat, looking through binoculars. In the center, there is a camera on a tripod. The word "sensors" is written in white, lowercase letters across the middle of the image.

sensors

**"Global tools for
birders, critical data
for science"**

ebird.org



self-reporters

**"Donate your data,
for you, for others,
for good"**

patientslikeme.com

A group of four scientists in a laboratory setting. One scientist on the left is holding a pipette and looking up at it. The others are looking towards him with interest. The scene is dimly lit, with a window in the background showing a dark night sky. The word "makers" is overlaid in white text in the center of the image.

makers

**"Remember when science was
fun? At Genspace it still is."**

genspace.org

CIVIC-SCIENCE
DO-IT-YOURSELF
PARTICIPATORY-ACTION-RESEARCH
RESPONSIBLE-RESEARCH-AND-INNOVATION
AMATEUR-SCIENCE
OPEN-SCIENCE COMMUNITY-BASED-RESEARCH DIY
CROWDSOURCING VOLUNTEER-COMPUTING CITIZEN-CYBERSCIENCE
CITIZEN-SCIENCE
SCIENCE-2.0

OED (2014): "citizen science:
n. scientific *work* undertaken
by members of the *general*
public, often in collaboration
with or under the direction of
professional *scientists* and
scientific institutions"

scientists vs general public?

scientists vs amateurs?

scientists vs lay people? ?

place



Domestic Science?



SETI@home

The Search for Extraterrestrial Intelligence

User Profile:

RECOMMEND

[what is recommend?](#)

VOTE TO REJECT

[what is vote to reject?](#)



Country: United States Email:

Number of Results: 13097 CPU Time Per Result: 11 hr 41 min 28.6 sec

Last Result Time: Wed Mar 31 07:57:53 2004

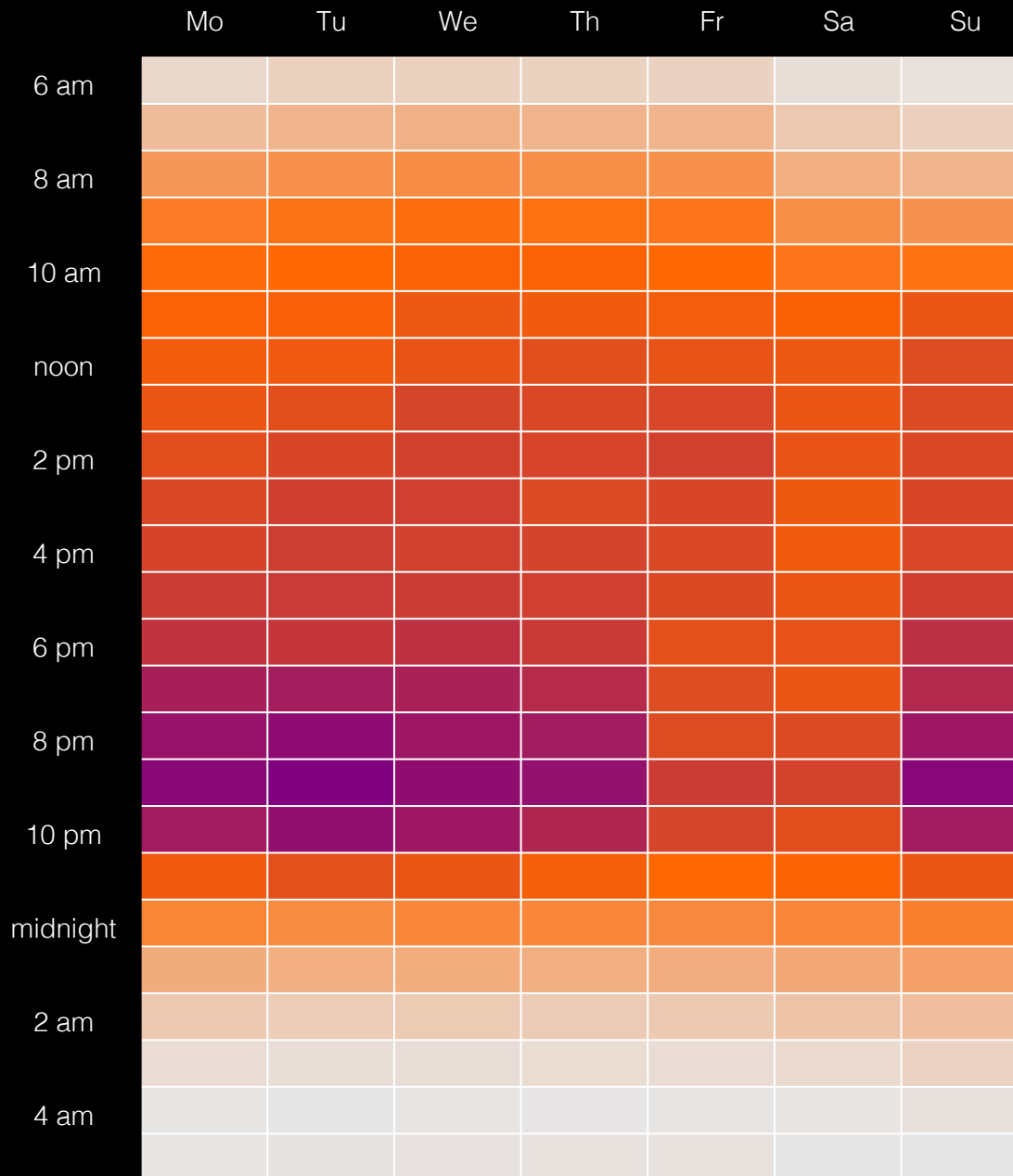
Date Registered: Fri May 14 20:46:31 1999



A hiker with a large backpack is shown from the side, leaning forward to examine a plant on a grassy hillside. The hiker is wearing a yellow t-shirt and dark shorts. The background features rolling green hills under a blue sky with scattered white clouds. The text "Leisure Science?" is overlaid in the center of the image in a white, sans-serif font.

Leisure Science?

Signup time on BOINC (n= 6,674,002)





Three promises

1) science

Algorithm discovery by protein folding game players

Firas Khatib^a, Seth Cooper^b, Michael D. Tyka^a, Kefan Xu^b, Ilya Makedon^b, Zoran Popović^b, David Baker^{a,c,1}, and Foldit Players

^aDepartment of Biochemistry; ^bDepartment of Computer Science and Engineering; and ^cHoward Hughes Medical Institute, University of Washington, Box 357370, Seattle, WA 98195

Contributed by David Baker, October 5, 2011 (sent for review June 29, 2011)

Foldit is a multiplayer online game in which players collaborate and compete to create accurate protein structure models. For specific hard problems, Foldit player solutions can in some cases outperform state-of-the-art computational methods. However, very little is known about how collaborative gameplay produces these results and whether Foldit player strategies can be formalized and structured so that they can be used by computers. To determine

As the players themselves understand their strategies better than anyone, we decided to allow them to codify their algorithms directly, rather than attempting to automatically learn approximations. We augmented standard Foldit play with the ability to create, edit, share, and rate gameplay macros, referred to as “recipes” within the Foldit game (10). In the game each player has their own “cookbook” of such recipes, from which they can

Monthly Notices

of the
ROYAL ASTRONOMICAL SOCIETY

MNRAS **448**, 3442–3454 (2015)



doi:10.1093/mnras/stv235

Galaxy Zoo: the effect of bar-driven fuelling on the presence of an active galactic nucleus in disc galaxies

Melanie A. Galloway,^{1★} Kyle W. Willett,¹ Lucy F. Fortson,¹ Carolin N. Cardamone,² Kevin Schawinski,³ Edmond Cheung,^{4,5} Chris J.Lintott,⁶ Karen L. Masters,^{7†} Thomas Melvin⁷ and Brooke D. Simmons⁶

¹*School of Physics and Astronomy, University of Minnesota, 116 Church St. SE, Minneapolis, MN 55455, USA*

²*Department of Science, Wheelock College, Boston, MA 02215, USA*

³*Medical Faculty, Department of Physics, ETH Zürich, Winterthurerstrasse 190, CH-8057 Zürich, Switzerland*

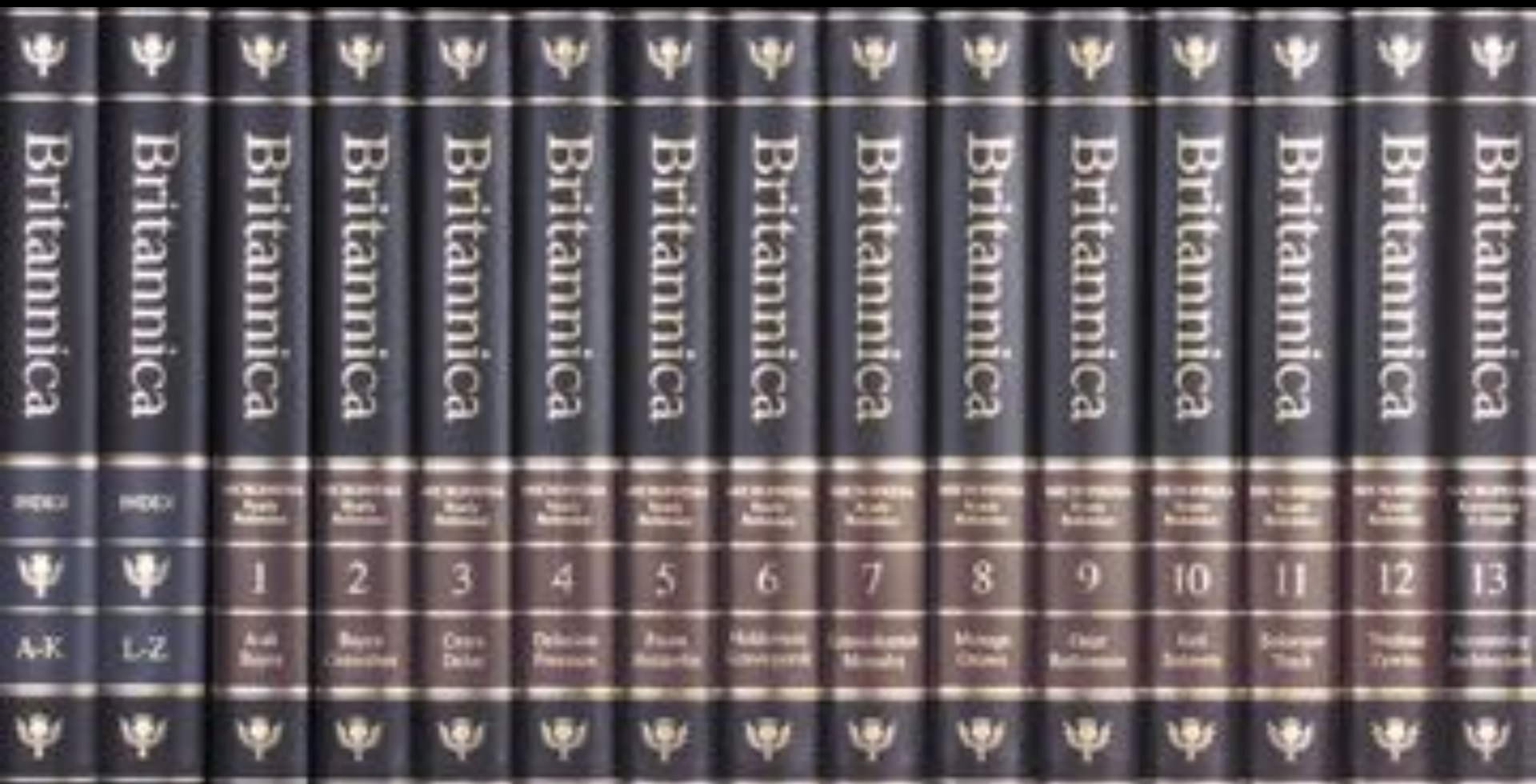
nature
genetics

A genome-wide association meta-analysis of self-reported allergy identifies shared and allergy-specific susceptibility loci

David A Hinds¹, George McMahon², Amy K Kiefer¹, Chuong B Do¹, Nicholas Eriksson¹, David M Evans³, Beate St Pourcain³, Susan M Ring³, Joanna L Mountain¹, Uta Francke¹, George Davey-Smith³, Nicholas J Timpson^{3,4} & Joyce Y Tung^{1,4}



Wiggins et al., 2011



new scientific questions?

different science?

"science by intuition"

**J. Marshall, "Victory for Crowdsourced
Biomolecule Design." *Nature*, January 22, 2012**

2) education

STEM workforce

nature of science

nature of scientific inquiry



OECD
P I S A

**"Over-educated,
under-employed."**

SETI@home user, 1999

3) democracy

**a) direct democracy
(by the people)?**

how many people?

Computers

BOINC; SETI Classic

Analyzers

Zooniverse; Foldit; Eterna; Eyewire

Observers

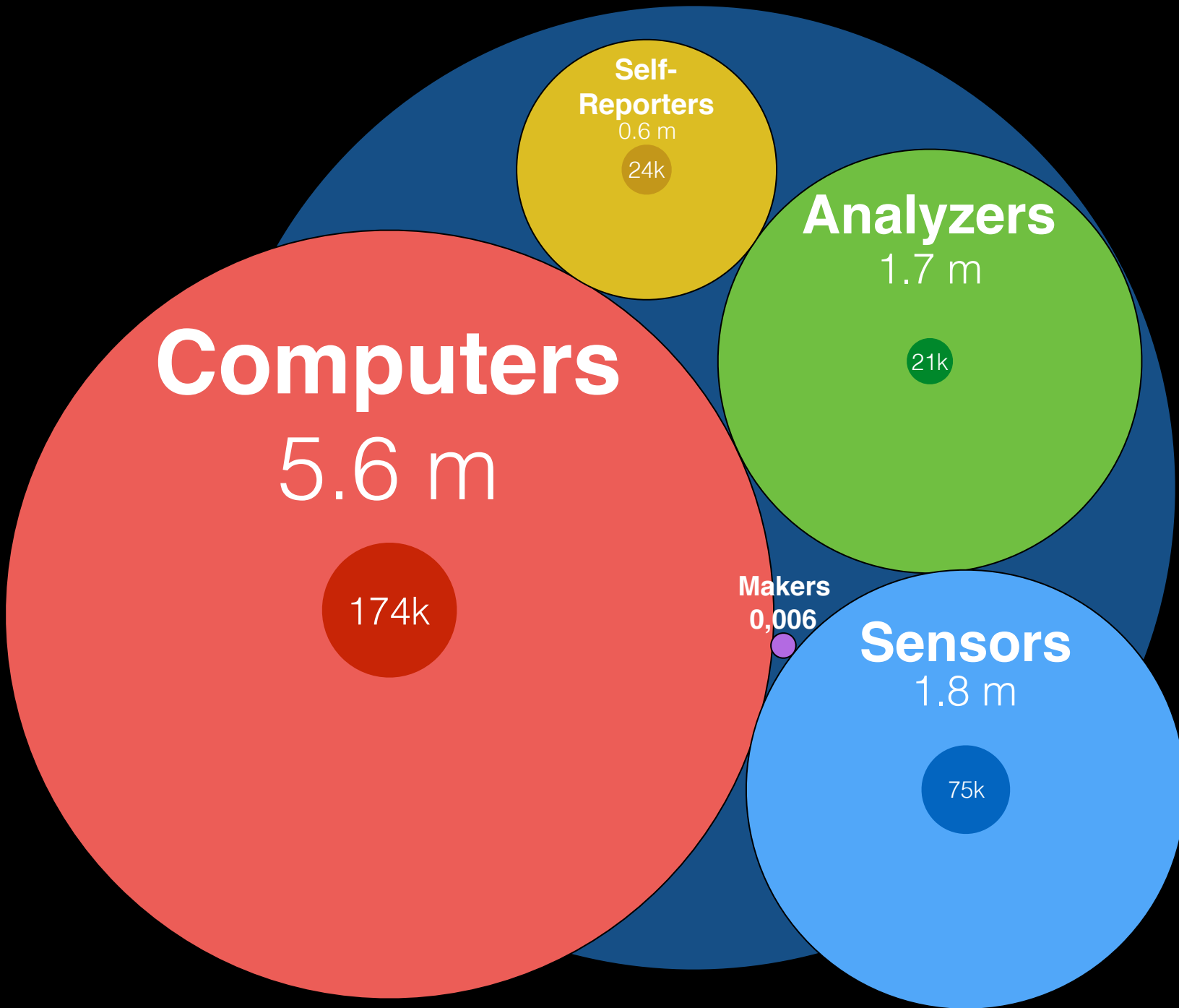
iNaturalist, eBird, OPAL

Self-Reporters

Patientslikeme, uBiome, CureTogether

Makers

DIYbio



**Science
Centres
10 m**

**Citizen
Scientists
0.2 m**

**Facebook
1,000 m**

demographics?

over-representation:

men

white

scientifically educated

science occupation

**b) representative democracy
(for the people)?**

public interest?

science!

techno-critique?

"it's not all that clear
that the world needs
more stuff"

D. Chachra, 2015.

"Why I Am Not a Maker." *The Atlantic*. 2015

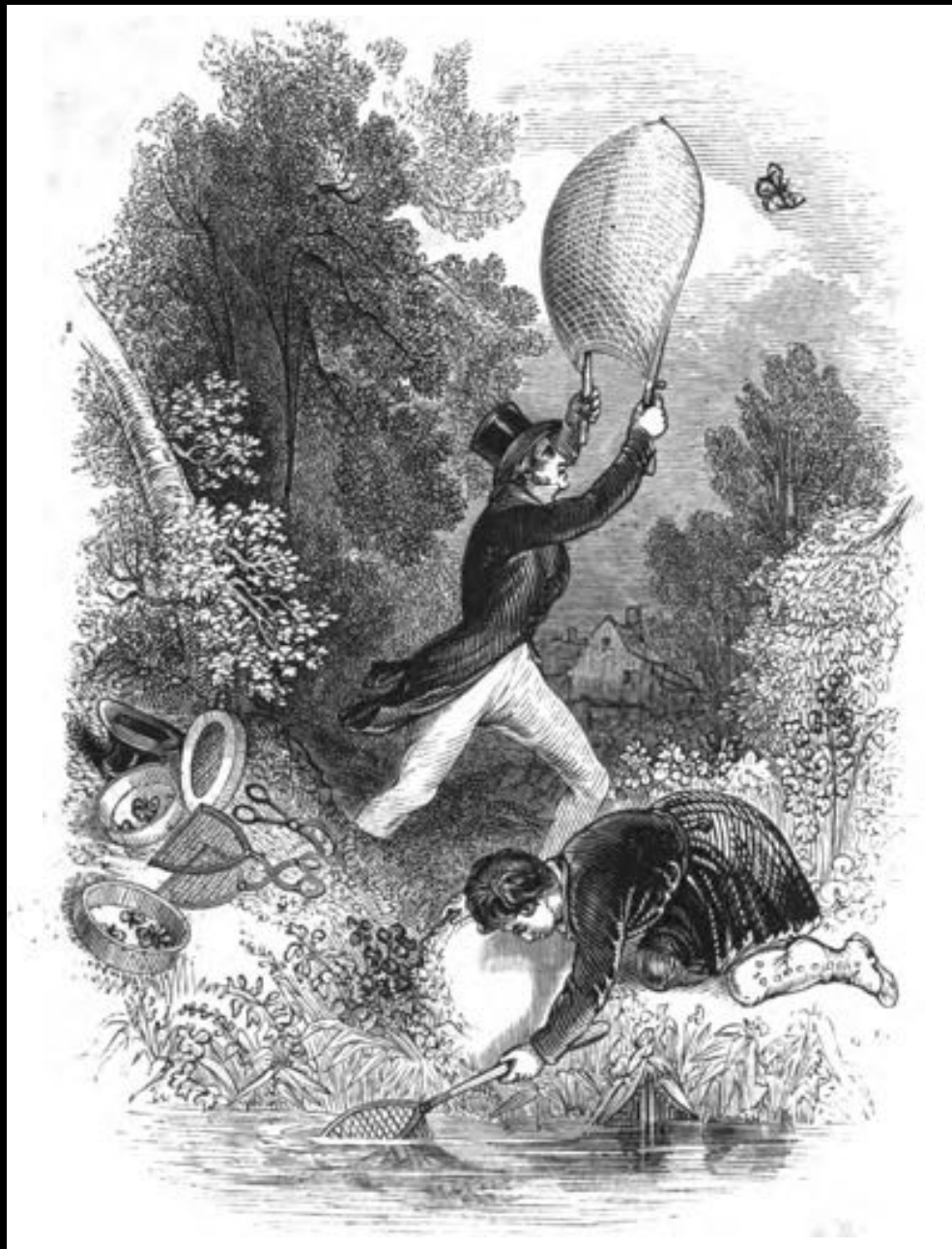


Modern Toss tote bag



Three stories

1) amateur naturalist



History of Insects, 1839

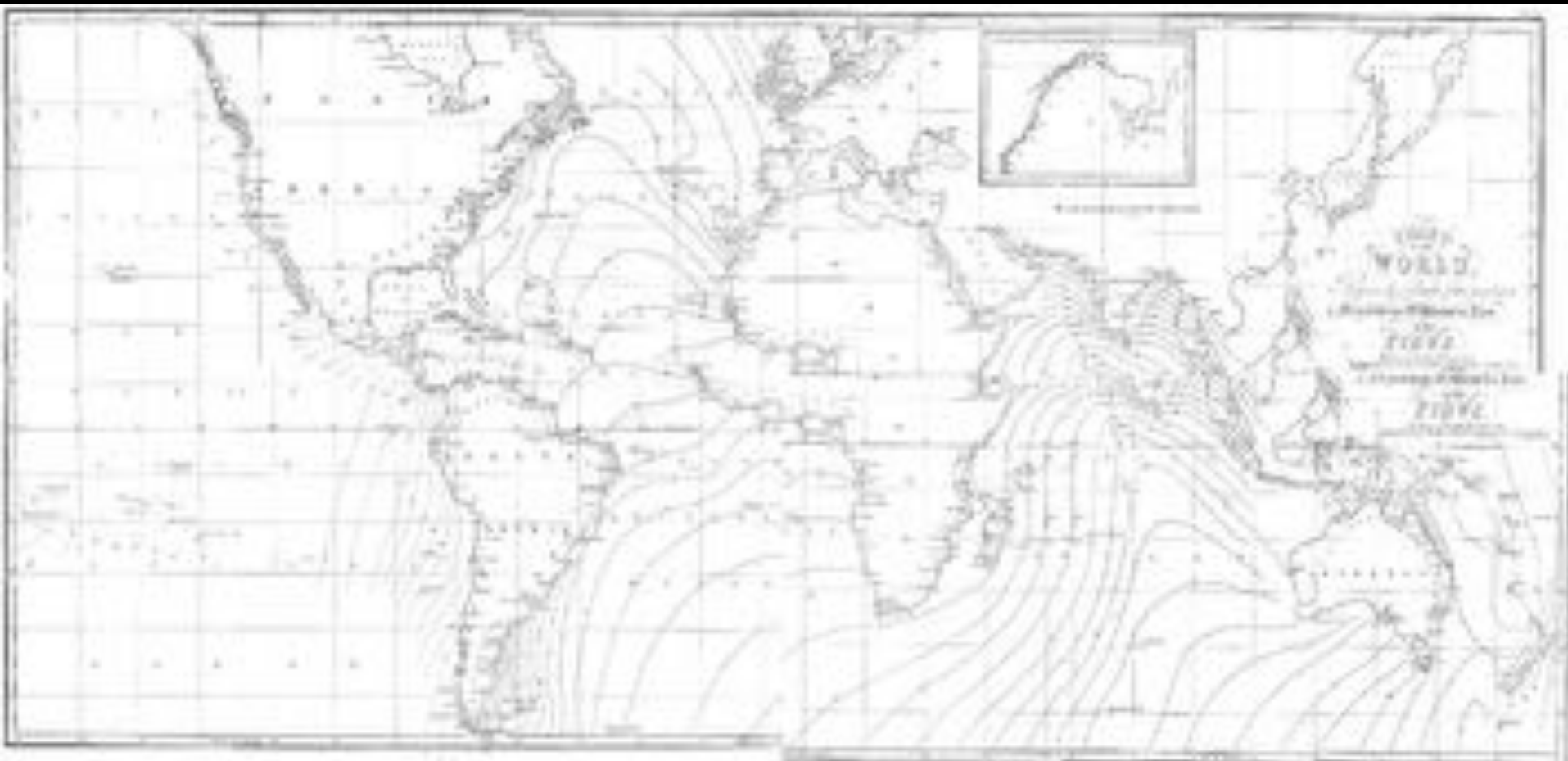


amateurs without

professionals?



Ferrante Imperato, *Dell'Historia Naturale*, 1599



W. Whewell, 1833. Essay towards a first approximation to a map of cotidal lines. *Philosophical Transactions of the Royal Society of London* 123: 147–236.



1833 Meteor Storm, Bible Readings for
the Home Circle, 1888



Illustrated London News, 1871





Antoine Lavoisier, *Composition of Air*, 1776

a part-time occupation

late 19th century:

professionalization of sciences

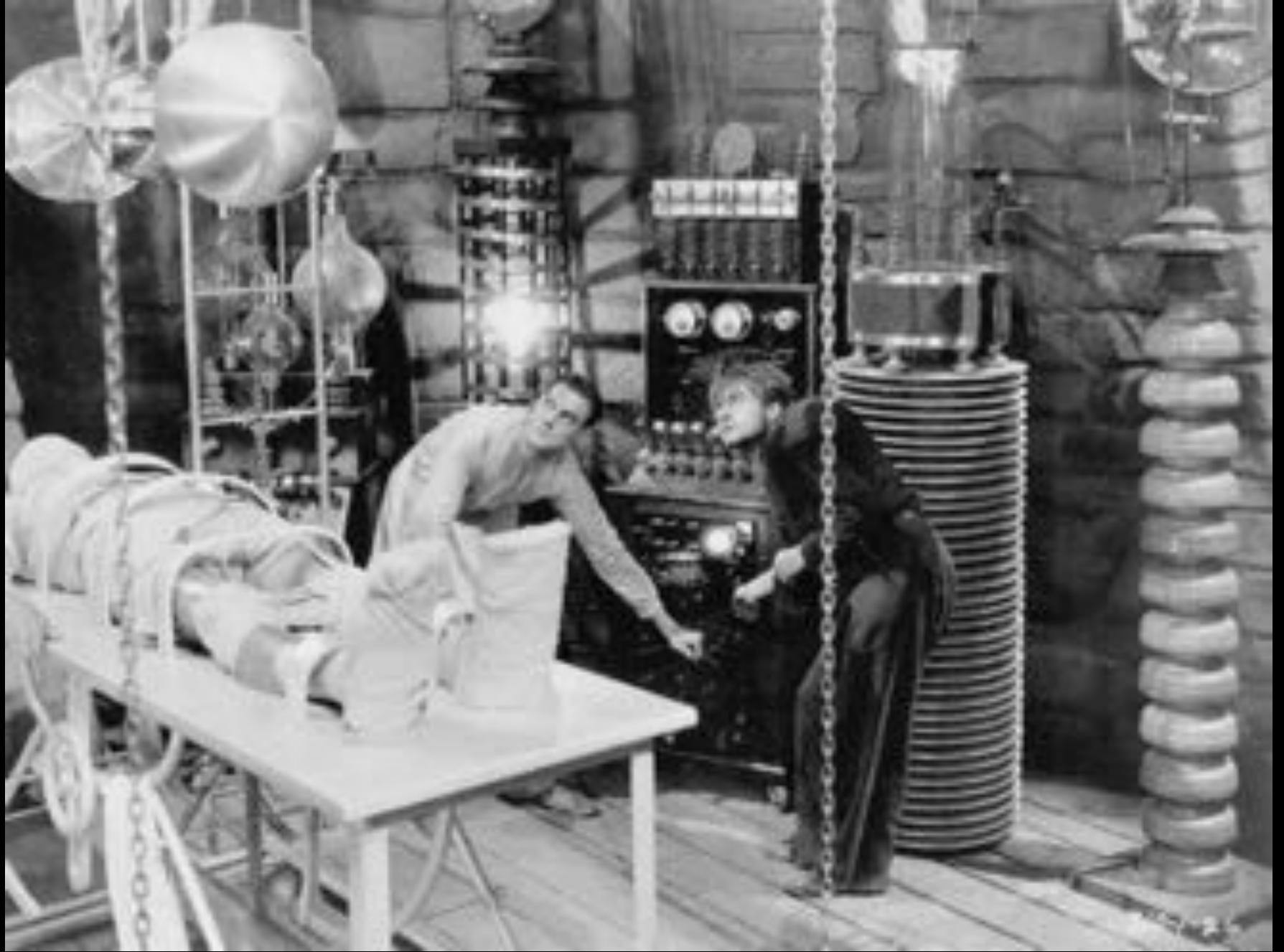
**"The era of the amateur
scientist is passing; science
must now be advanced by the
professional expert"**

Anon. *Popular Science*, Mar. 1902

co-creation of the

professional and the amateur

the "laboratory revolution"



Frankenstein, 1931



Arrowsmith, 1931

divide between

sciences and the public



Dr. Strangelove, 1964

**bridged (and sustained)
by science popularization**

POPULAR SCIENCE

MARCH

15 CENTS

POPULAR SCIENCE MONTHLY 1973

NOW
15¢



SEE PAGE 49

NEW INVENTIONS • MECHANICS • MONEY MAKING IDEAS

HOME WORKSHOP PLANS AND HINTS • 350 PICTURES

STRA
France et Colonies : 6 F.

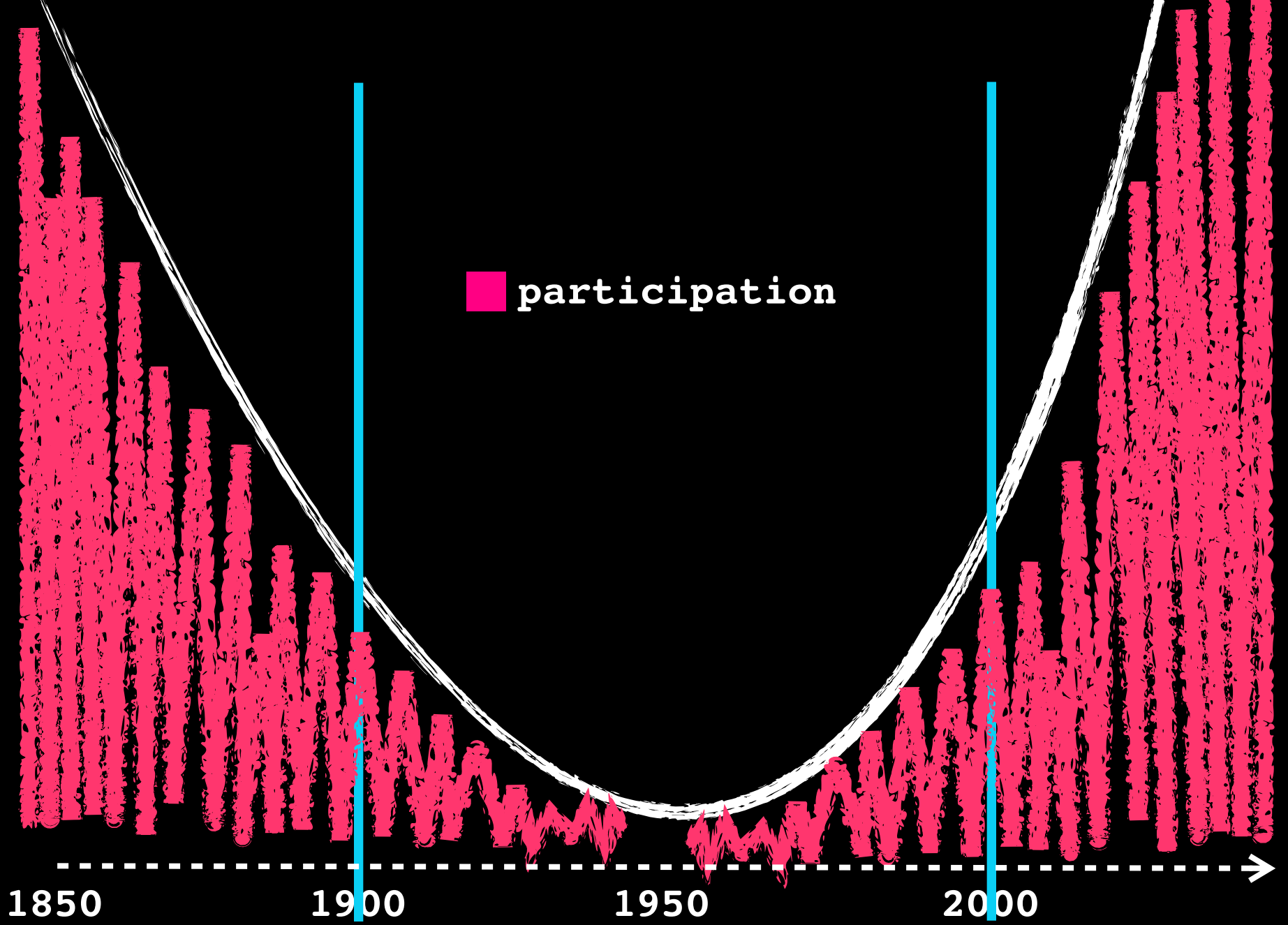
UN 6 ANS 47
N° 118 - Janvier 1937

LA SCIENCE ET LA VIE



"deficit model"

Michel Callon, 1998



■ participation

1850

1900

1950

2000

**exclusion of scientists
from society**

2) Radical science movements

SCIENCE FOR THE PEOPLE

504
VOL. 2
NO. 2



BI-MONTHLY PUBLICATION OF SCIENTISTS AND ENGINEERS
FOR SOCIAL AND POLITICAL ACTION - SESPA AUG. 1970



educating scientists

**engaging in deliberations
with citizens, not
production**

science *for* the people

not

science *by* the people

the "citizen scientist" was

a professional scientist

taking his civic responsibilities

"this new breed of citizen-scientist shall be continually aware that the scientific community must accept its appropriate share of the responsibility for the intelligent and successful resolution of the challenges facing the world."

"social movements"

"experiential knowledge"



NEW YORK
AUG

SISTER

25¢

LOS ANGELES WOMENS CENTER



THIS ISSUE: SELF-HELP HEALTH CARE

Sister, July 5, 1973



Black Community Survival Conference, March 30th, 1972.



Love Canal, 1960s



**"Privileging individual
experience over scientific
analysis allowed for a more
democratic, less
hierarchical approach to
learning about female
biology"**

**W. Kline, *Bodies of Knowledge: Sexuality, Reproduction,
and Women's Health in the Second Wave*, 2010**

3) Personal computers & the internet



Steve Wozniak and Steve Jobs, 1976



Christmas Bird Count (Audubon Science)



Pretoria, South Africa, 1962 (Smithsonian Institution)

conclusions

je participe
tu participes
il participe
nous participons
vous participerez
ils profitent



**"citizen science" as a tool
for governing the critique
of science?**

can
ure
CT
take
way
DISE

SCIENCE

GRAB
EM BY
THE DATA!



Show Me
The data

cheerleader for science?

empowering

epistemic justice

reduction of inequalities

place of science in democracy



A research project on how citizens produce scientific knowledge

How did lay citizens become involved in the production of scientific knowledge? Where does this movement fit in the broader history of public participation in science? How did the rise of the "amateur" redefine expertise in a democratic society? And who are these "citizen scientists" today? These are some of the questions we will address in this five-year interdisciplinary research project on the transformations of public participation in science.

[Next Colloquium](#)

[Tweets](#)



citizensciences.net

Team



Bruno L. Strasser

Assistant Professor



Dana Maly

Assistant



Elise Tancogne

Assistant



Gabriela A. Sanchez



Jérôme Bauxry



Patricia Silveira



SWISS NATIONAL SCIENCE FOUNDATION

Citizen Science?

Rethinking Science and

Public Participation

Bruno J. Strasser

University of Geneva & Yale University

citizensciences.net

[@citizensciences](https://twitter.com/citizensciences)