



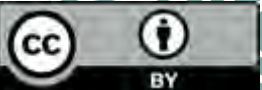
[http://olivierlg.info/
LIRIMA21](http://olivierlg.info/LIRIMA21)

“Truth isn’t truth”: *Research integrity for a responsible Science*

Olivier Le Gall, CoFIS

(French Advisory Board for Research Integrity)

LIRIMA webinar, 30Jun21



Truth or post-truth?

→ *"Truth isn't truth" (R. Giuliani, CNN, 19Aug18)*



Science is not an opinion!

→ Well... then let's prove it...

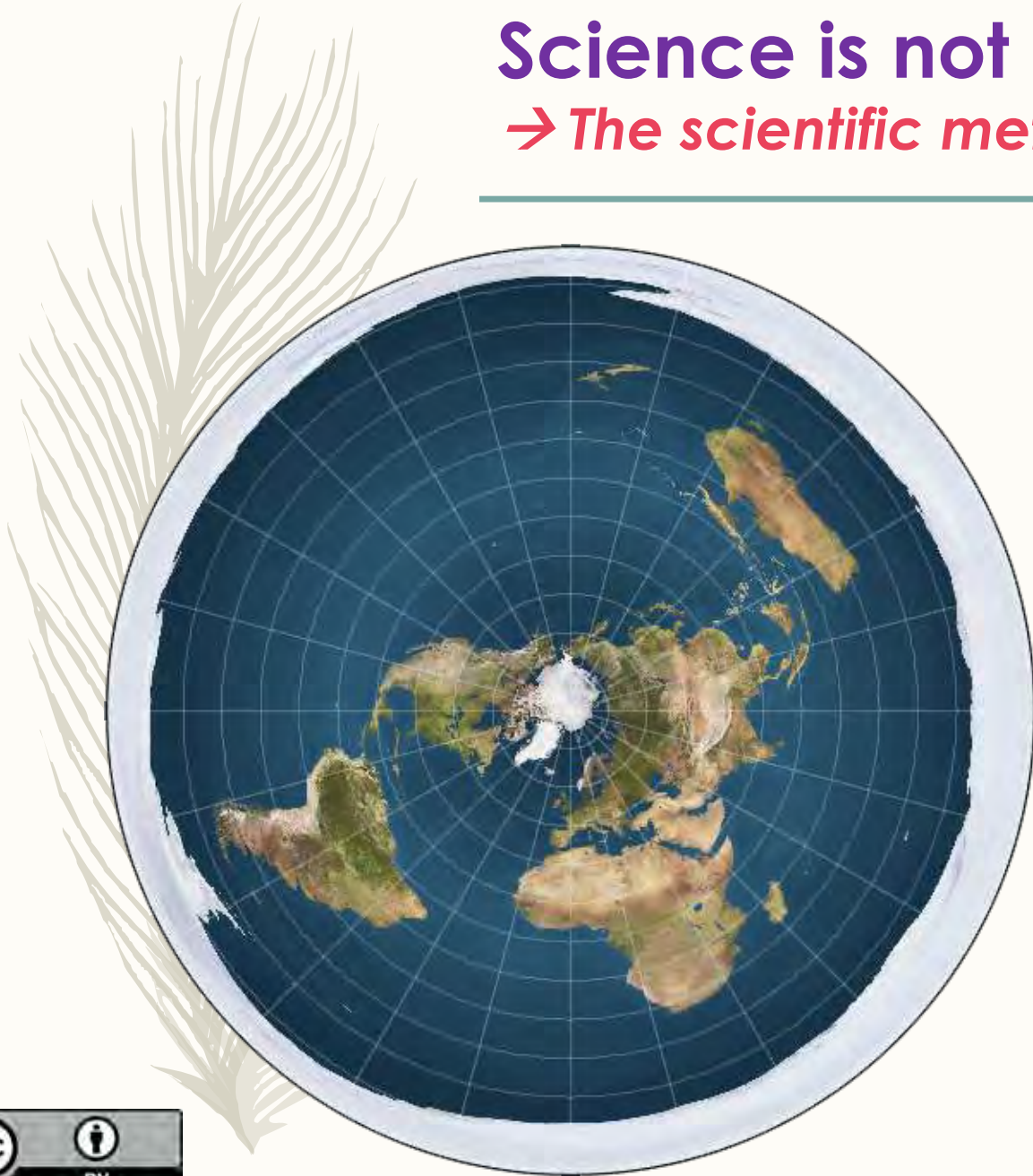


If we expect to be respected, then let's start with being respectable



Science is not an opinion

→ *The scientific method goes beyond first evidence*



Google trends, 30Jun21



Research vs. Science

→ Integrity of the sci. method is the catalyst of Knowledge

how can

a researcher



© Luke Dawson via theinertia.com

!⚠ these images have been manipulated

be

a scientist ???



Santa Barbara Historical Society

If we expect to be respected,
then let's start with being respectable

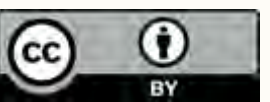
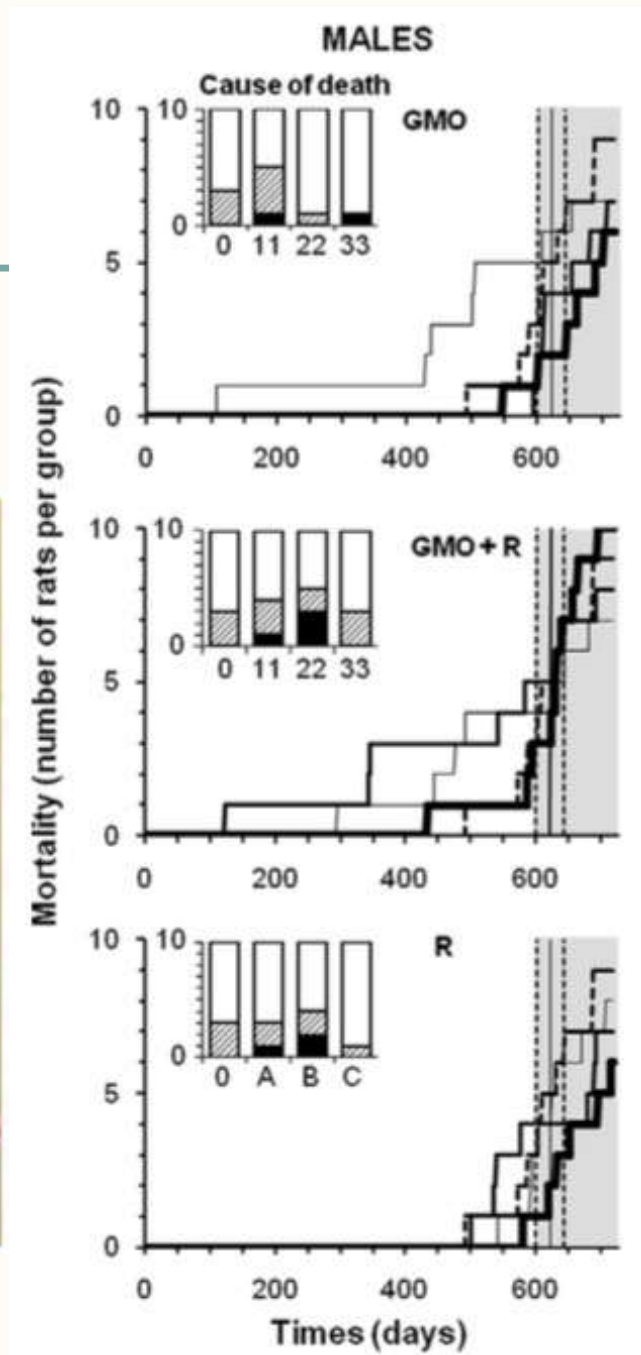
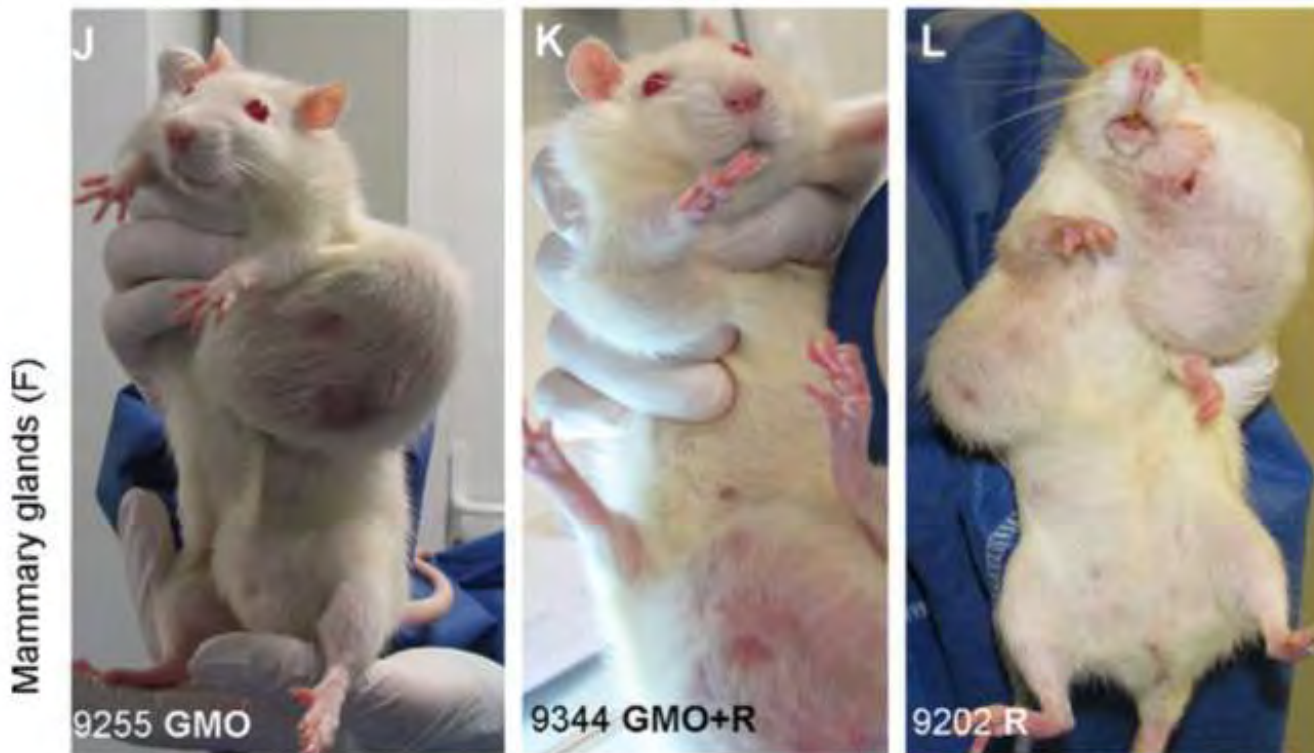
Hey! We've got Peer Review!





But hey... Don't we have peer-review?!?

→ *We do; the best we can; still fallible*

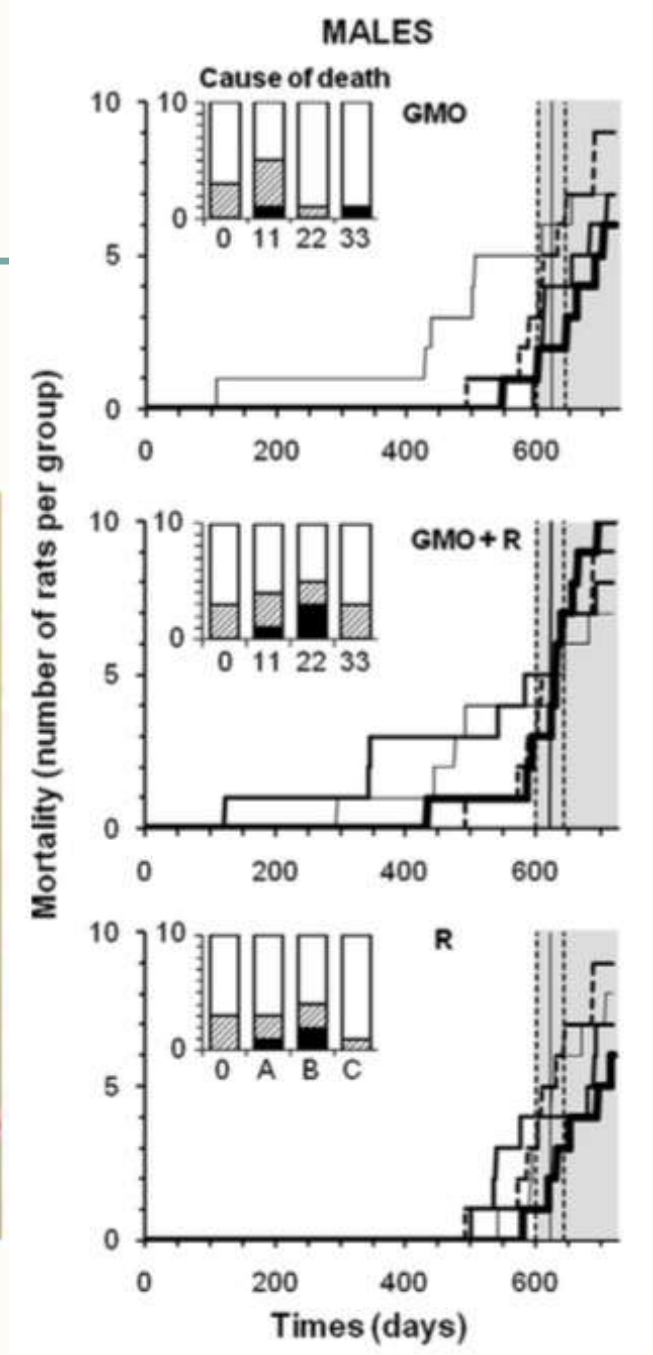




But hey...
 Don't we have peer-review?!?
 → We do; the best we can; still fallible



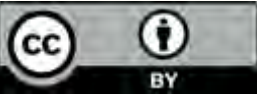
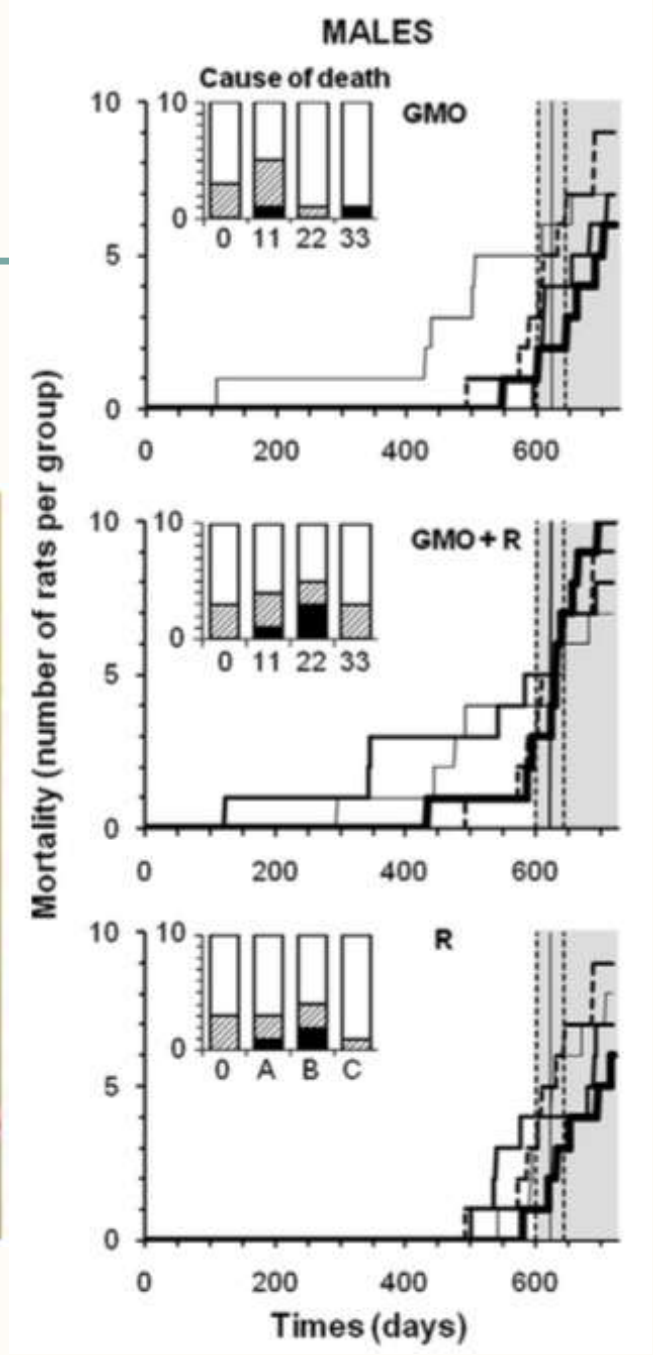
Mammary glands (F)





But hey... Don't we have peer-review?!?

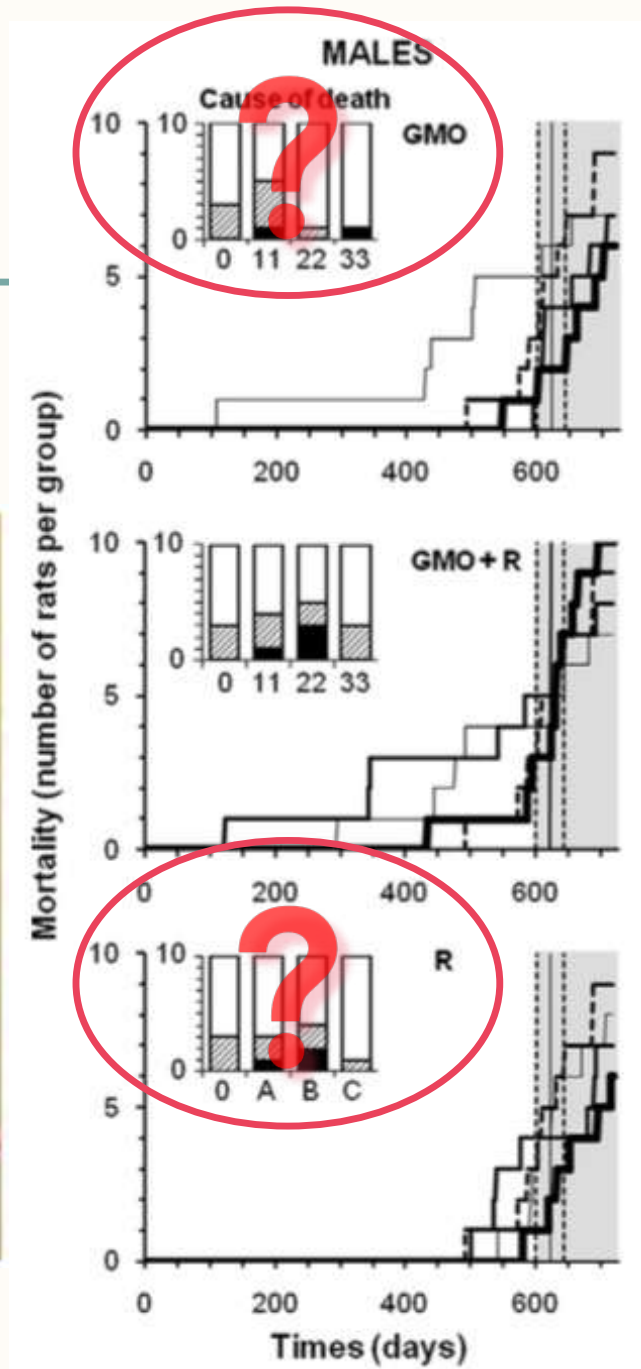
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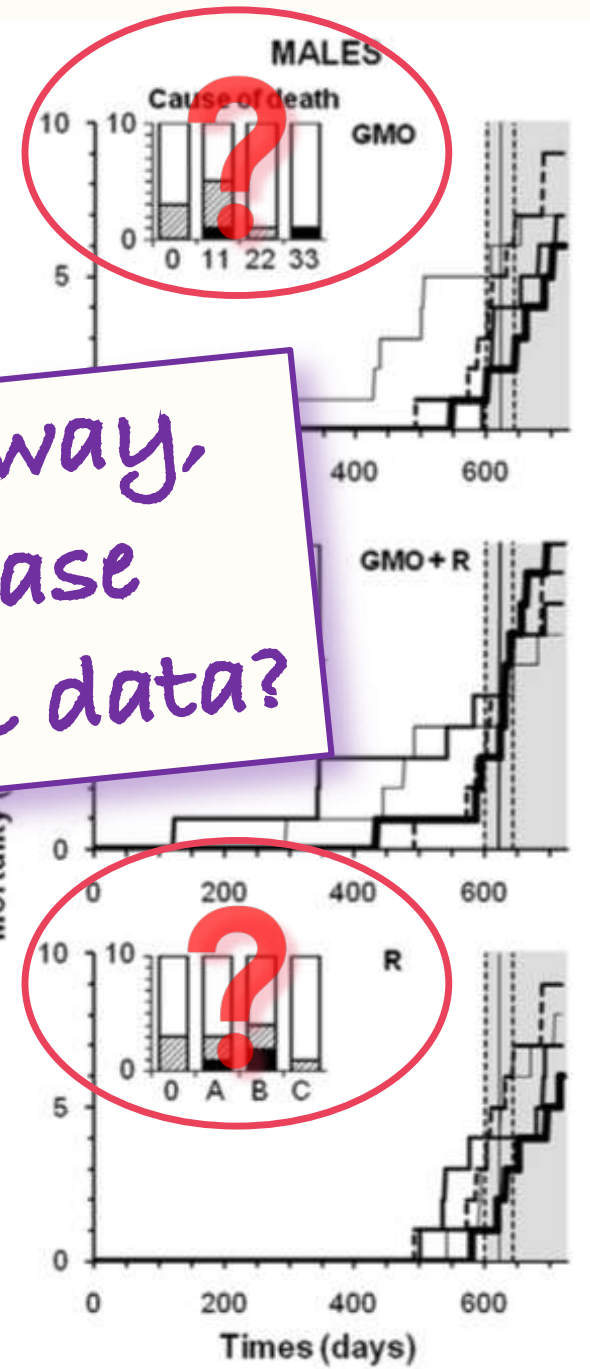


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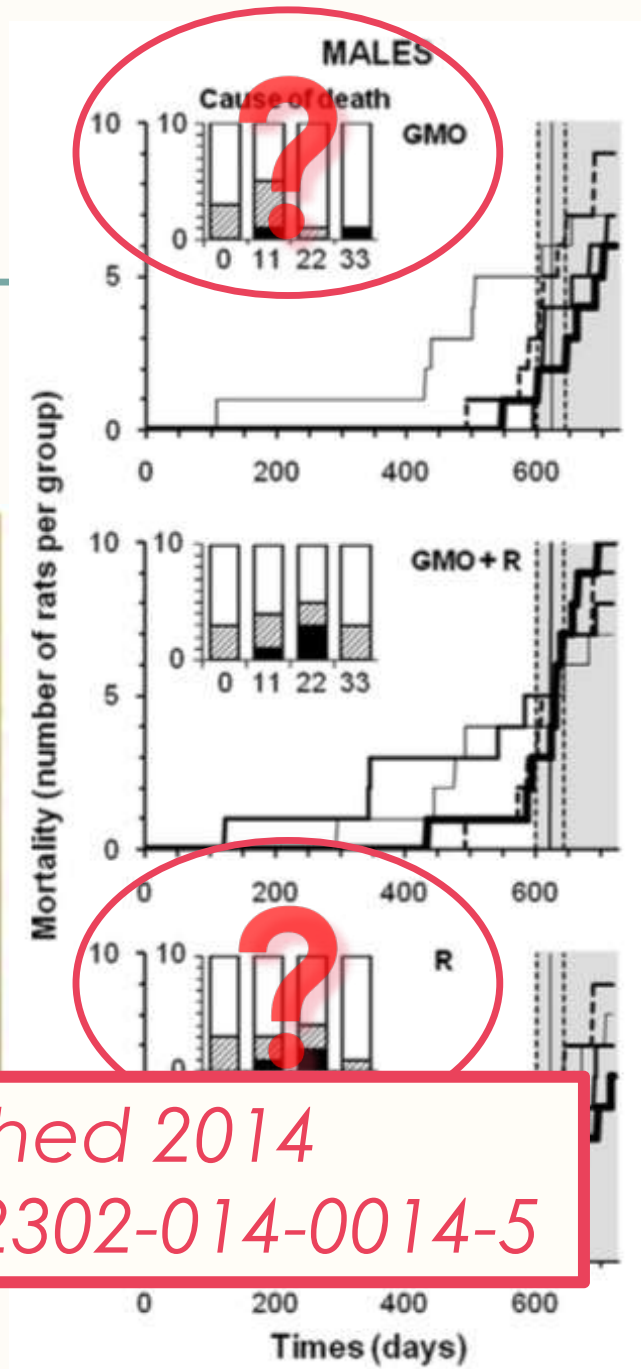
And by the way,
could I please
see the actual data?





But hey...
Don't we have peer-review?!?

→ We do; the best we can; still fallible



Re-published 2014
DOI:10.1186/s12302-014-0014-5



Peer review is fallible

- **The peer reviewers' task is not to re-do the work**
 - (Whose task is this, really?)
- **The editors**
 - The peers are not universal experts even in their field
 - The editors urge them to hurry
 - The editors do not request all comments to be eventually addressed
- **In any case, peer review will not detect**
 - Fabrication or falsification of data / results
 - Plagiarism and other types of inappropriate credit
 - Etc.
- **It is still the best quality check one can imagine!**
 - Although it can certainly be improved (more openness?)





What are we talking about?

Some definitions

Three pillars for a responsible research

→ often merged in the international arena



Scientific Integrity

Ethics

Deontology by "soft law"
→ Research integrity s.s.

Deontology by law
(e.g. France)

The questions raised by the continuous fit btw progresses in S&T, and societal evolutions

Highly cultural.
Must be discussed permanently.

→ All scientists

Mixed committees

The rules governing the practice of research

Quite universal.
Prevails as an unwritten professional code.

→ All scientists

Researchers

The control of public servant's independent action

LePors Bill (1983 rev. 2016):
"Le fonctionnaire exerce ses fonctions avec dignité, impartialité, intégrité et probité"

→ All Fr public servants

Lawyers

Three pillars for a responsible research

→ often merged in the international arena

A screenshot of the COPE (Committee on Publication Ethics) website. The page features a dark navigation bar with the COPE logo, menu items for 'Guidance', 'Member resources', and 'About COPE', and a search bar. The main content area has a large heading: 'Promoting integrity in scholarly research and its publication'. Below the heading is a short paragraph: 'COPE provides leadership in thinking on publication ethics and practical resources to educate and support members, and offers a professional voice in current debates.' A 'Read more' button is located below the paragraph. At the bottom of the screenshot, a table is partially visible with columns labeled 'Paper mills', 'researchers', and 'Lawyers'.

COPE

Guidance ▾ Member resources ▾ About COPE ▾

Search our website

Sign in

Committee on Publication Ethics – <https://publicationethics.org/>

Promoting integrity in scholarly research and its publication

COPE provides leadership in thinking on publication ethics and practical resources to educate and support members, and offers a professional voice in current debates.

Read more

M	Paper mills	researchers	Lawyers
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The European Code of Conduct for Research Integrity

→ <https://allea.org/code-of-conduct>



The European Code of Conduct for Research Integrity
REVISED EDITION

1. Principles



Good research practices are based on fundamental principles of research integrity. They guide researchers in their work as well as in their engagement with the practical, ethical and intellectual challenges inherent in research.

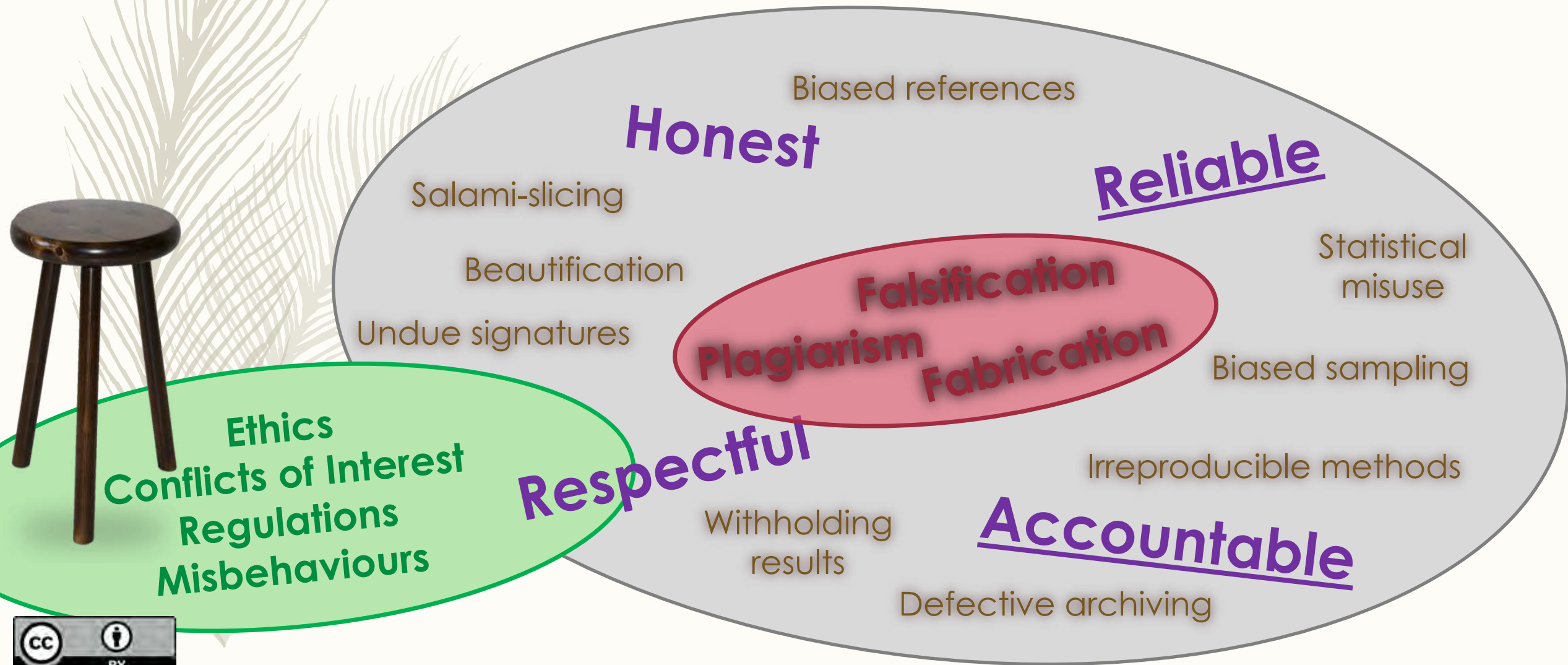
These principles are:

- **Reliability** in ensuring the quality of research, reflected in the design, the methodology, the analysis and the use of resources.
- **Honesty** in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair, full and unbiased way.
- **Respect** for colleagues, research participants, society, ecosystems, cultural heritage and the environment.
- **Accountability** for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts.

- 1st version: 2005
- Attempts a POSITIVE definition of Research Integrity
- One that covers all of Scientific Integrity
 - Research Integrity covers more specifically
 - Reliability
 - Accountability

There is more to integrity than an absence of lack of integrity

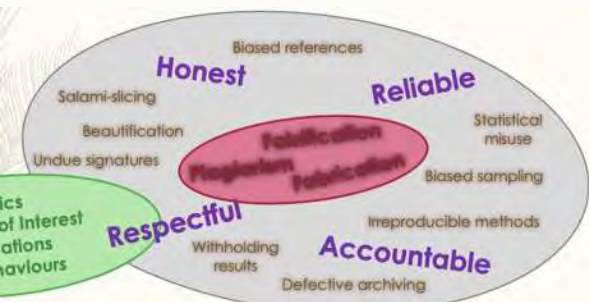
<https://allea.org/code-of-conduct>





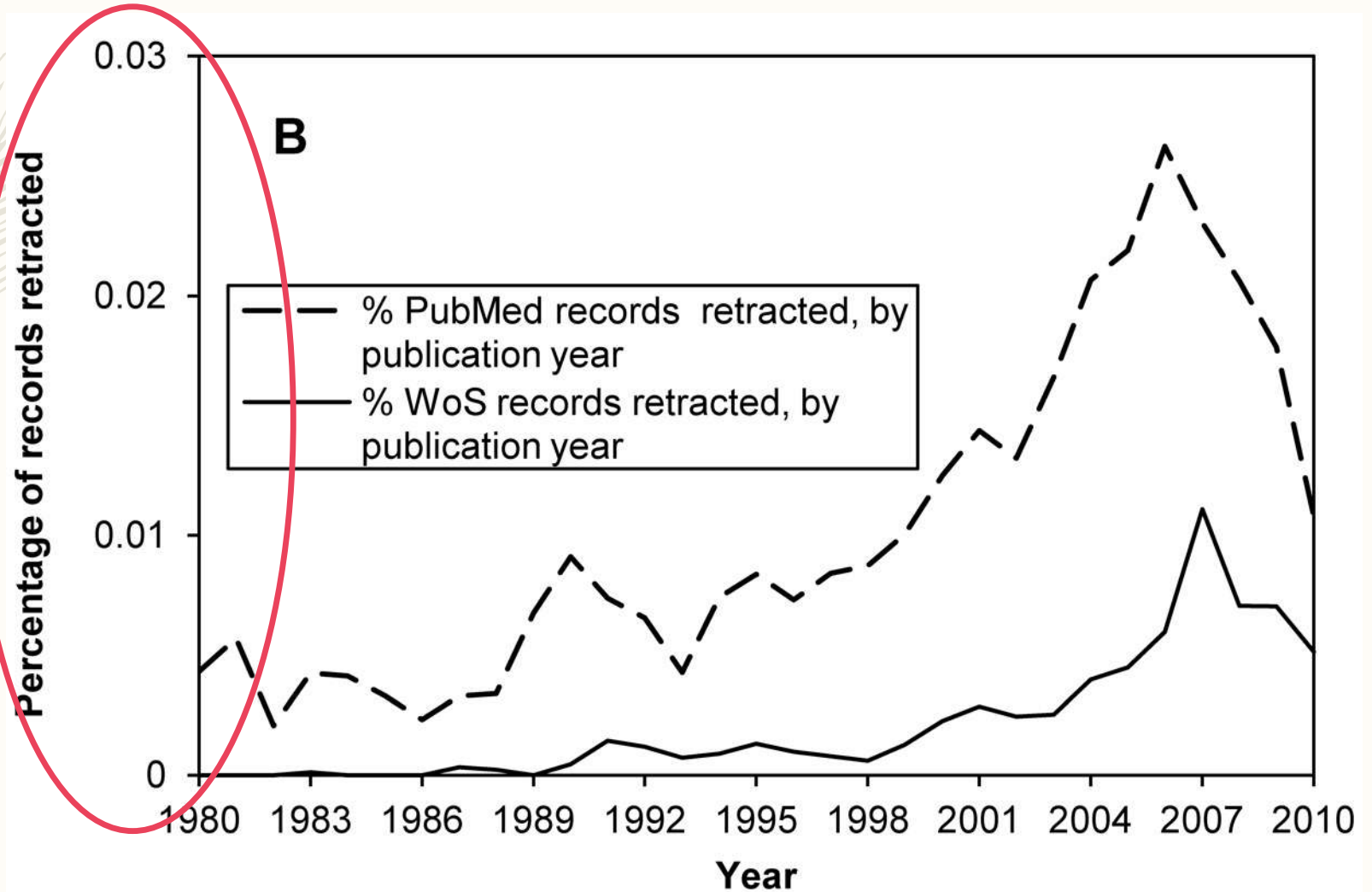
What are we talking about?

How common is this type of failure?



Confirmed fraud is rare

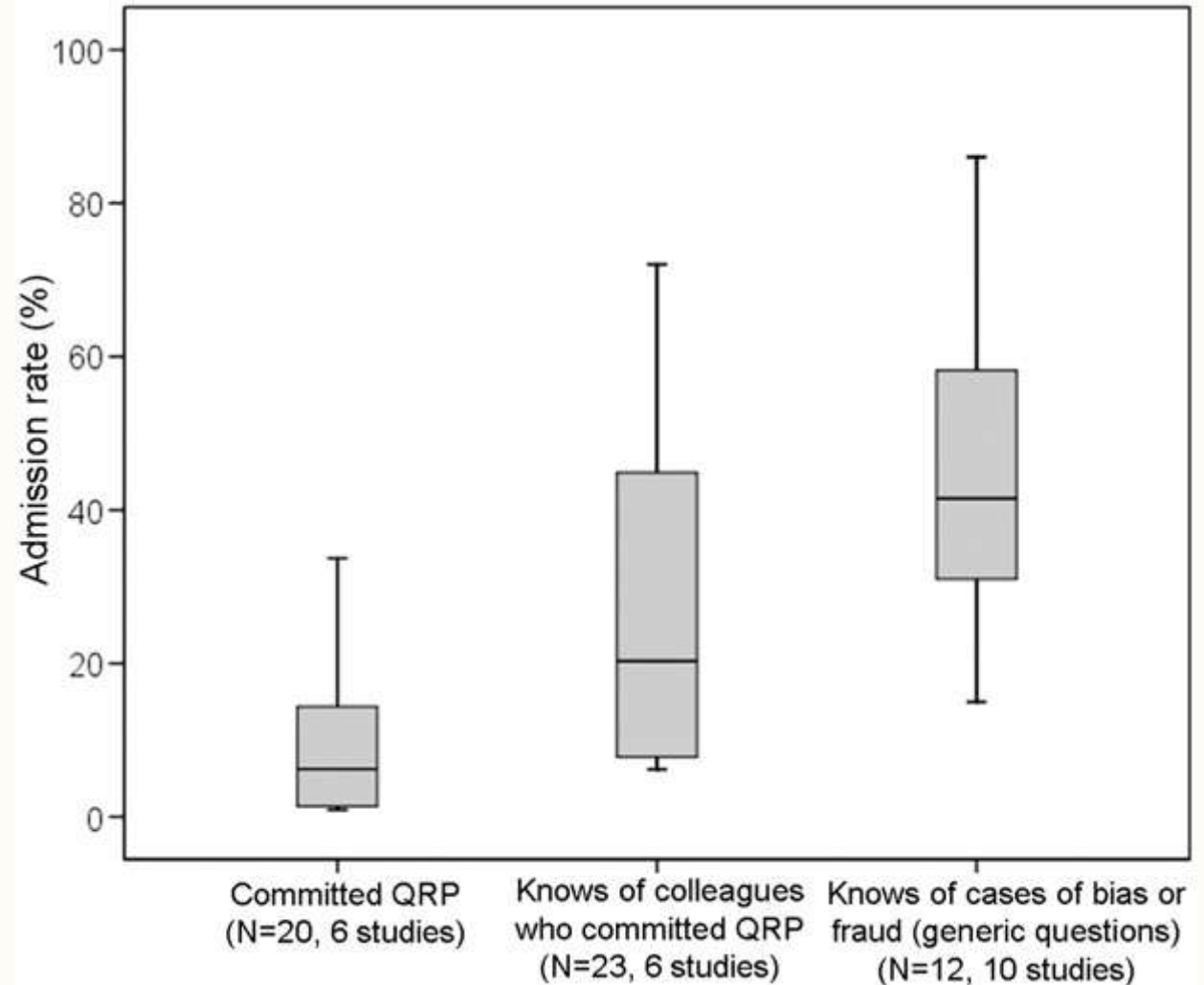
→ *less than one per mil*





Confirmed fraud is rare

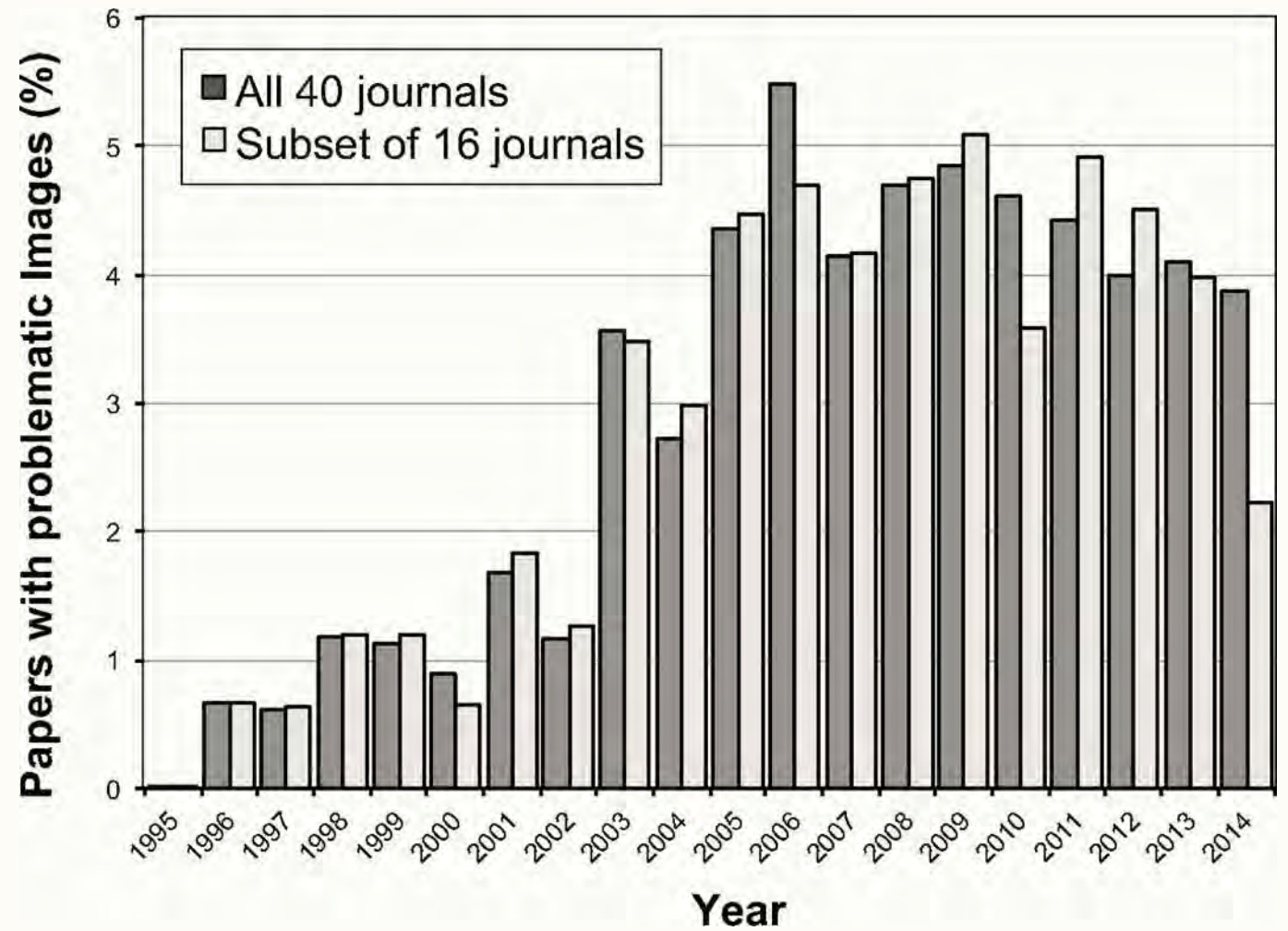
... but the size of the grey area is unknown





Confirmed fraud is rare

... but the size of the grey area is unknown



What are we talking about?

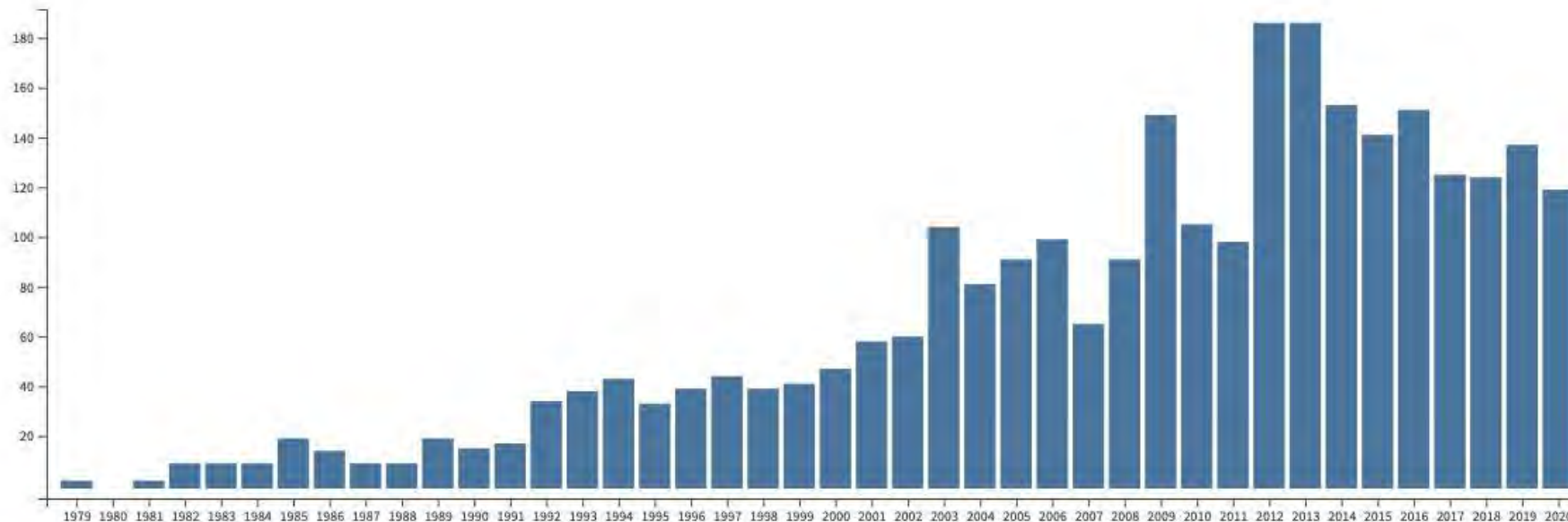
Exploring the diversity of misconducts





Some individuals are highly productive
 → or should one say “incredibly”?

Total Publications
2814 Analyze



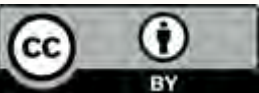
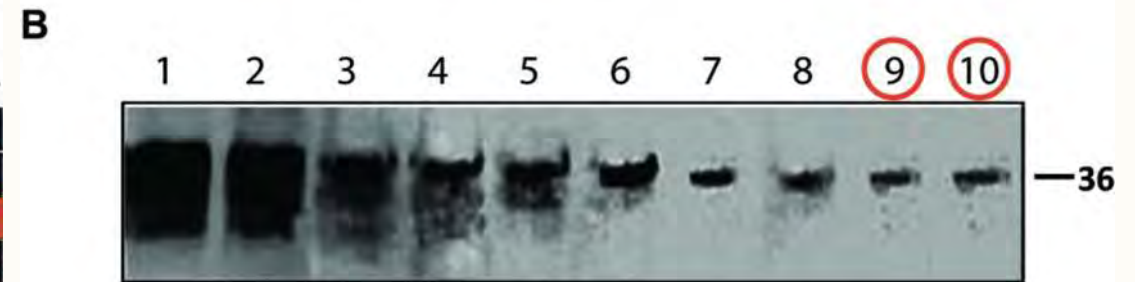
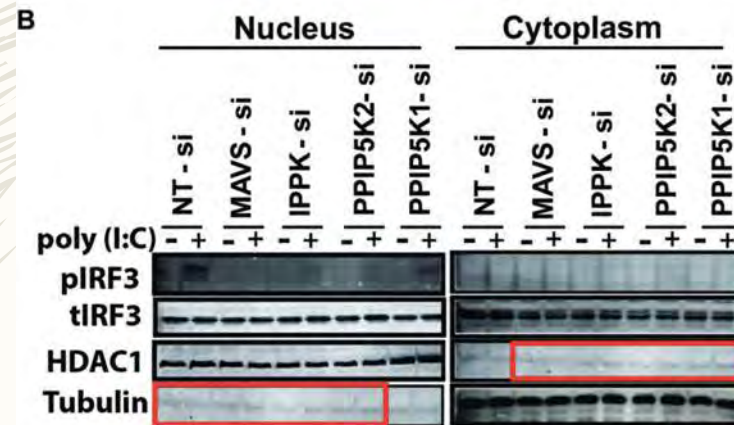
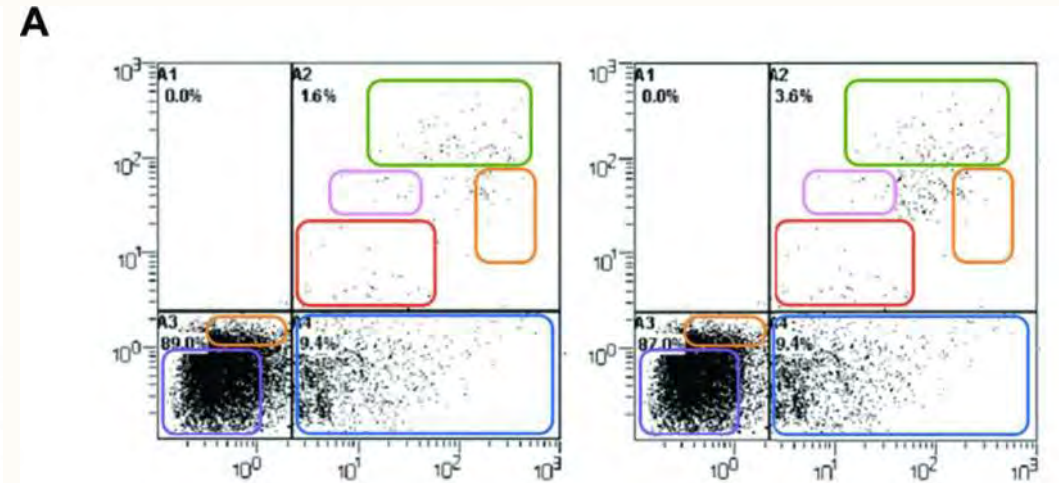
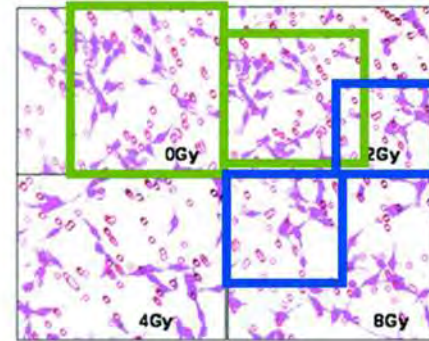
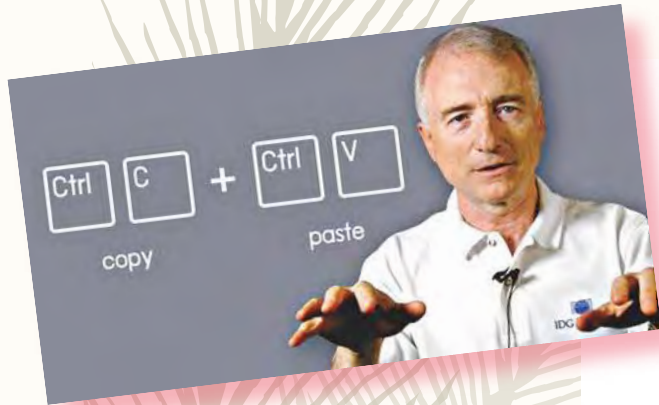
Source: Web of Science Nov20





But what was the intention of these authors?

→ To pay tribute to the late Larry Tesler?



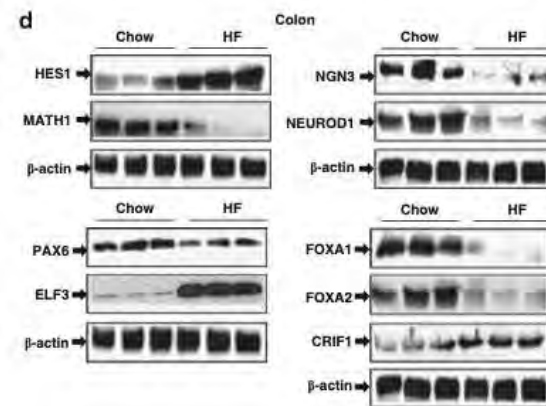
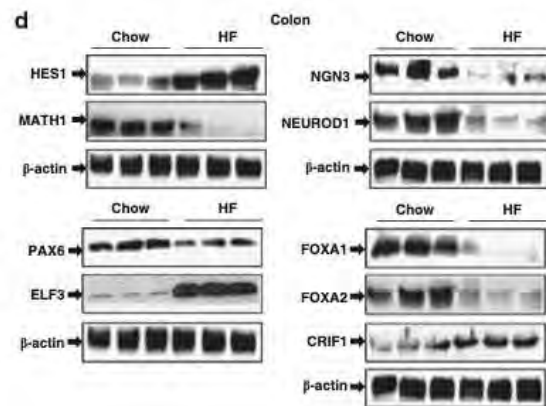
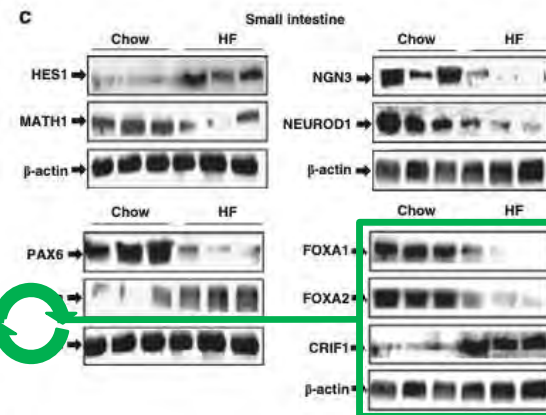
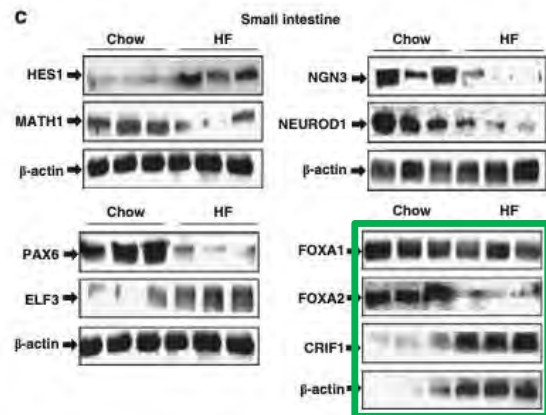


Figures **are** actual pieces of data

→ They must not represent some artist's view of the reality

Initial (Jan14)
Now offline

Erratum (Apr14)
Now offline





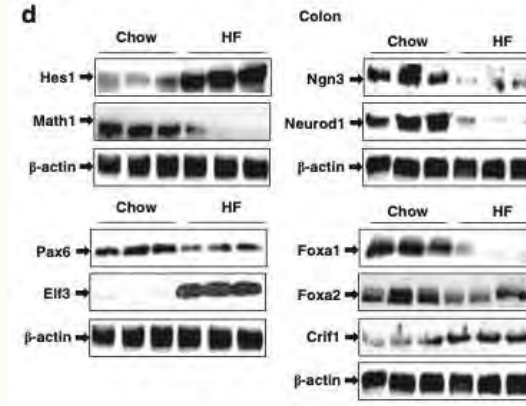
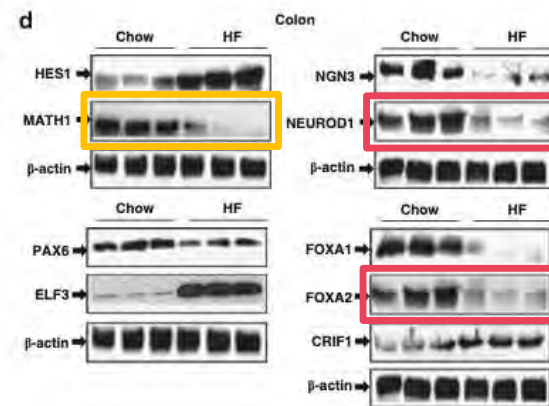
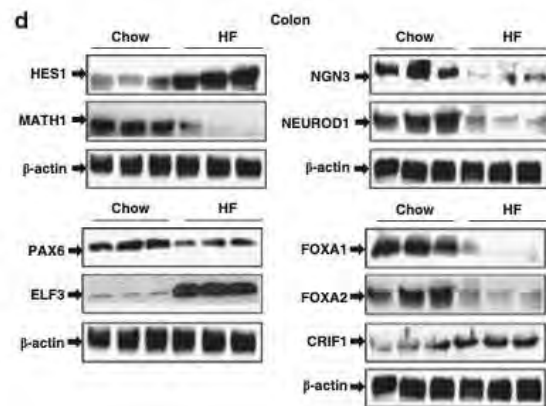
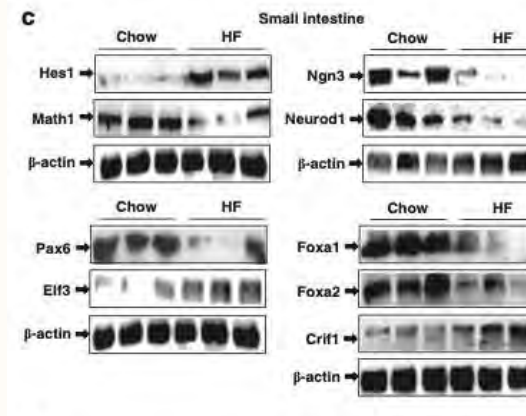
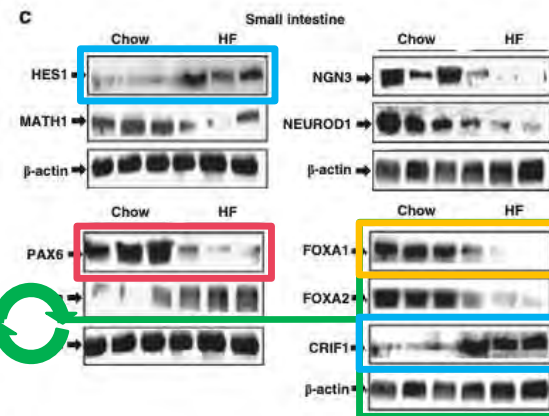
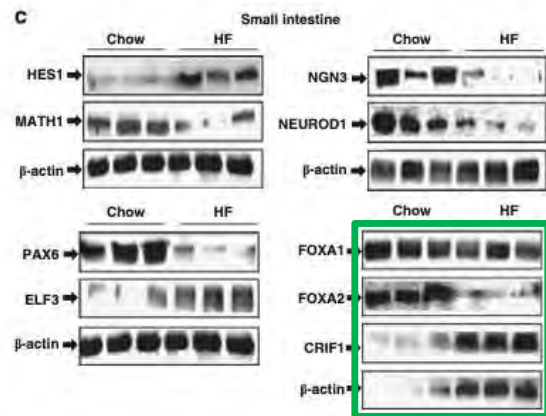
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Corrigendum (Nov14)
Online





Figures are actual pieces of data

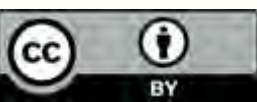
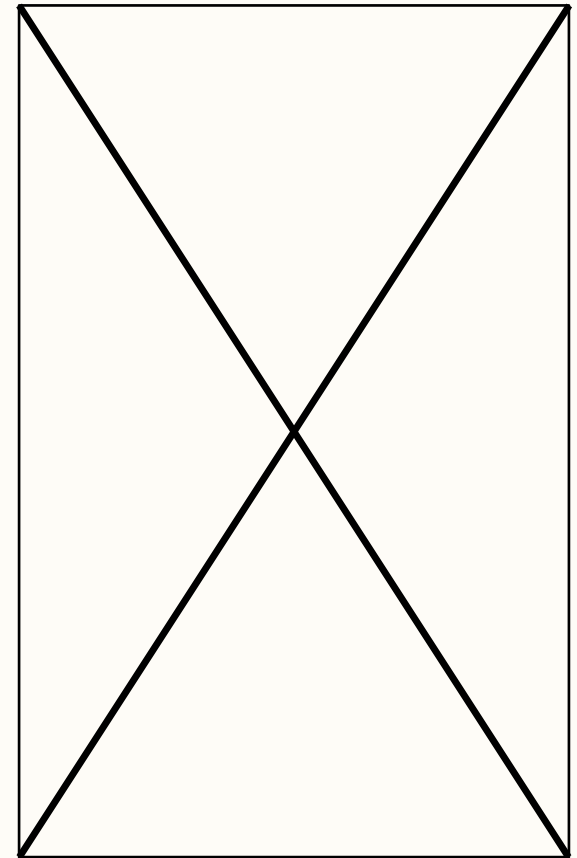
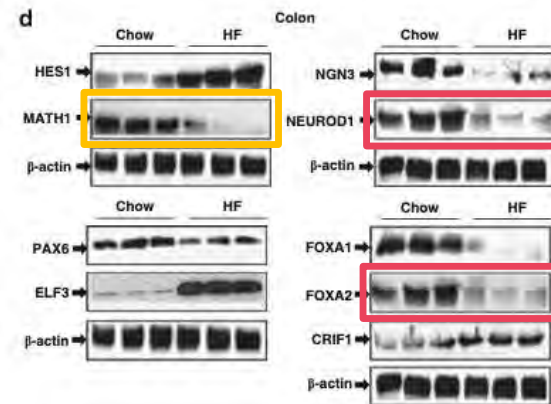
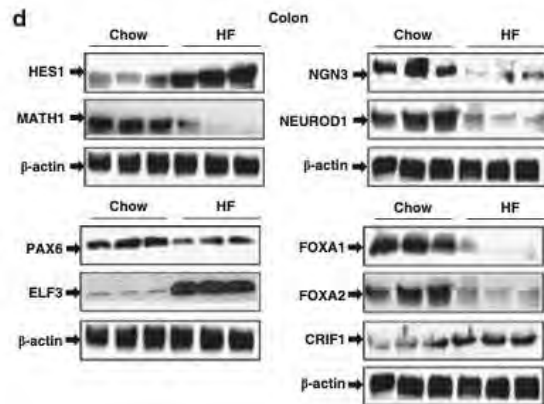
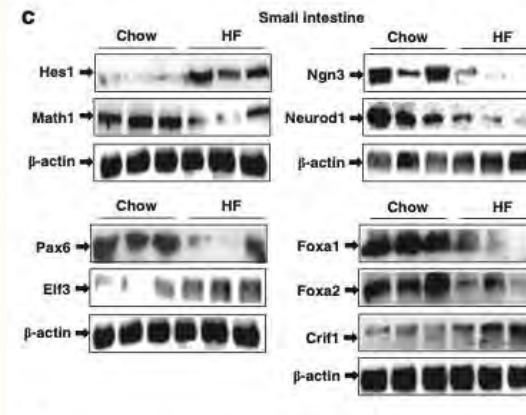
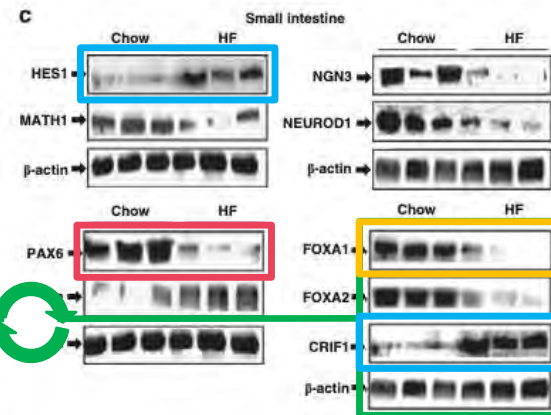
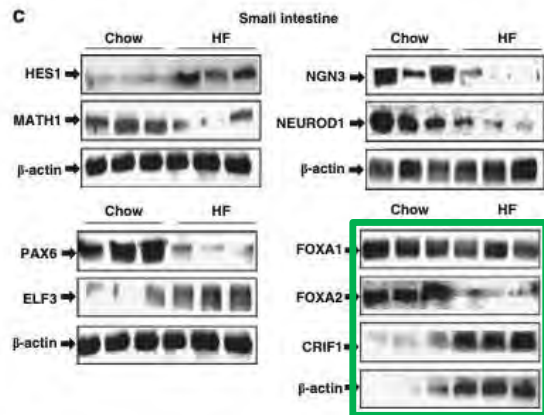
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Now offline

Erratum (Apr14)
Now offline

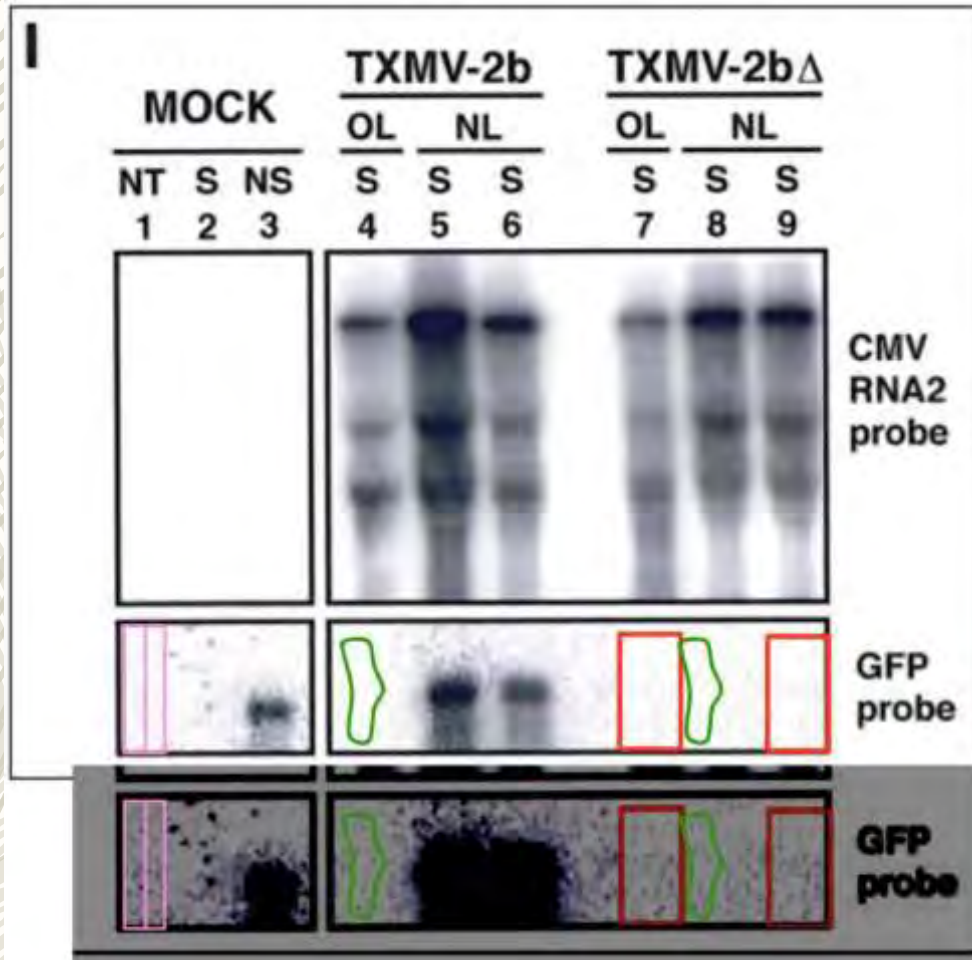
Corrigendum (Nov14)
Online

Retracted (Jul16)





(Seemingly) benign inappropriate manipulation... → But hard consequences!



Retraction notice

DOI [10.15252/emboj.201570030](https://doi.org/10.15252/emboj.201570030)

[...] The pixel pattern duplications originate from the incorrect use of image editing software to cover background marks. [...] It involves regions of Figures [...] 6I (TXMV-2bΔ GFP probe) that are required for assessment of the data.

The identification of 2b as a suppressor of silencing was a valid interpretation of the original experiments, but the original data are not available for correction and the authors accept that integrity of the scientific literature requires retraction of the article. The silencing suppressor role of 2b has been confirmed in different laboratories. The analysis of the HCPro silencing suppressor in this paper is unaffected by the duplications [...]



Guidelines for the appropriate use and manipulation of scientific digital images



Ethical guidelines for the appropriate use and manipulation of scientific digital images	
1.	Scientific digital images are data that can be compromised by inappropriate manipulations.
2.	Manipulation of digital images should only be performed on a copy of the unprocessed image data file (<i>Always keep the original data file safe and unchanged!</i>).
3.	Simple adjustments to the entire image are usually acceptable.
4.	Cropping an image is usually acceptable.
5.	Digital images that will be compared to one another should be acquired under identical conditions, and any post-acquisition image processing should also be identical.
6.	Manipulations that are specific to one area of an image and are not performed on other areas are questionable.
7.	Use of software filters to improve image quality is usually not recommended for biological images.
8.	Cloning or copying objects into a digital image, from other parts of the same image or from a different image, is very questionable.
9.	Intensity measurements should be performed on uniformly processed image data, and the data should be calibrated to a known standard.
10.	Avoid the use of <u>lossy</u> compression.
11.	Magnification and <u>resolution</u> are important.
12.	Be careful when changing the size (in pixels) of a digital image.

– Traceability:

- Manipulation of digital images should only be performed on a copy of the unprocessed image data file (*Always keep the original data file safe and unchanged!*)

– Reliability:

- Digital images that will be compared to one another should be acquired and processed under identical conditions
- Intensity measurements should be performed on uniformly processed image data, and the data should be calibrated to a known standard

– (Usually) acceptable:

- Simple adjustments to the entire image
- Cropping

– Questionable:

- Manipulations that are specific to one area of an image
- Use of software filters to improve image quality (compression, sharpness, etc.)
- Cloning or copying objects from other parts of the same image or from a different image





Tired with hypotheses ? [don't] Go Fishing!

→ <http://egap.org/content/go-fishing>

An Exact Fishy Test

Enter ten random numbers between 01 and 100

1	2
56	60
3	4
65	77
5	6
57	14
7	8
54	68
9	10
59	28

=ENT(99*ALEA()+1)

Unbelievable!

You chose the numbers 56 60 65 77 57 14 54 68 59 28

But these are clearly not random numbers. We can tell because random numbers do not contain patterns but the numbers you entered show a fairly obvious pattern.

Take another look at the sequence you put in. You will see that the number of exact multiples of '14' is: 3. But the 'expected number' from a random process is just 0.7. How odd is this pattern? Quite odd in fact. The probability that a truly random process would turn up numbers like this is just $p=0.02713$ (i.e. less than 3%).

Try again (with really random numbers this time)!

ps: you might think that if the p value calculated above is high (for example if it is greater than 12%) that this means that the numbers you chose are not all that odd; but in fact it means that the numbers are really particularly odd since the probability that the fishy test would produce a p values above 12%, when really random sequences are used, is low ($p<0.07$). For more on how to fish see [here](#).



Cure the $p < 0.05$ disease

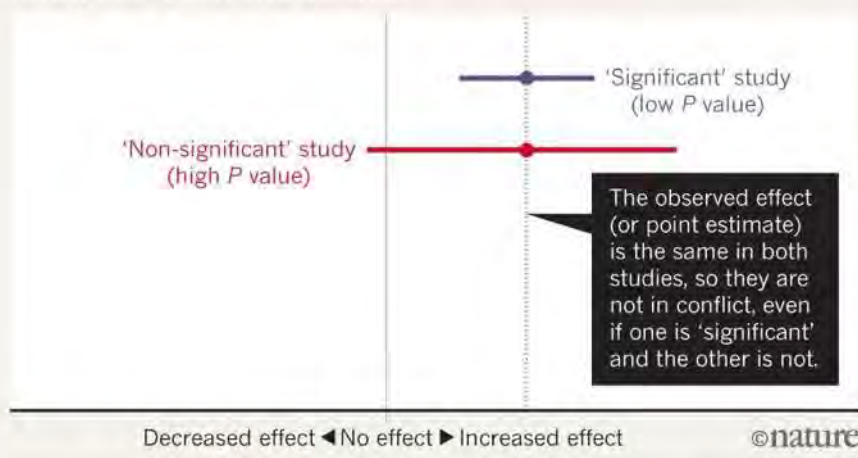
→ <https://github.com/GRousselet/talks/tree/master/19-bordeaux>

– discussion of binary outcomes within study and between studies

- “difference between A and B was significant ($p < 0.05$)”
- ($p = 0.07$) “borderline significant, approaching significance”...
- “A and B did not differ ($p > 0.05$)” (not significant...)

BEWARE FALSE CONCLUSIONS

Studies currently dubbed ‘statistically significant’ and ‘statistically non-significant’ need not be contradictory, and such designations might cause genuine effects to be dismissed.

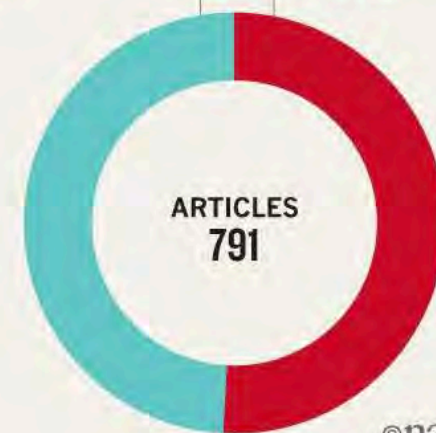


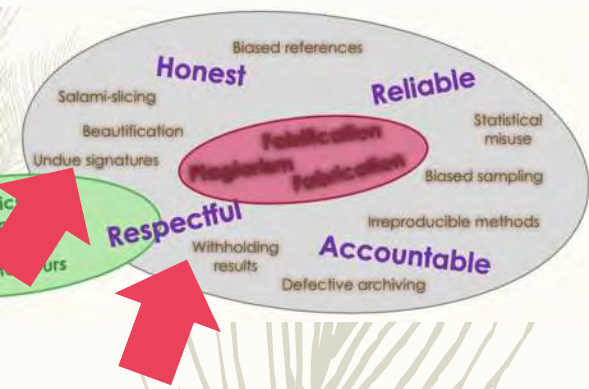
WRONG INTERPRETATIONS

An analysis of 791 articles across 5 journals* found that around half mistakenly assume non-significance means no effect.

*Data taken from: P. Schatz *et al. Arch. Clin. Neuropsychol.* **20**, 1053–1059 (2005); F. Fidler *et al. Conserv. Biol.* **20**, 1539–1544 (2006); R. Hoekstra *et al. Psychon. Bull. Rev.* **13**, 1033–1037 (2006); F. Bernardi *et al. Eur. Sociol. Rev.* **33**, 1–15 (2017).

Appropriately interpreted **49%**
Wrongly interpreted **51%**

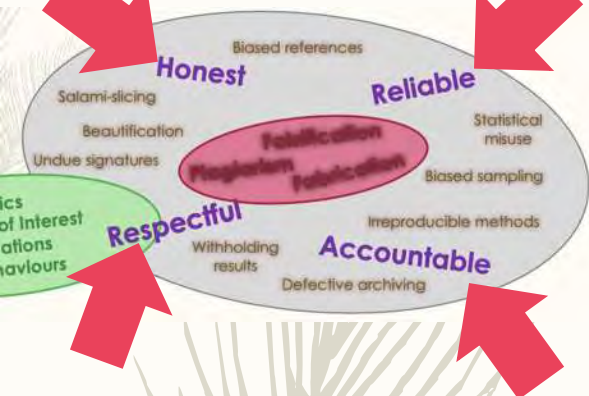




Authorship & credit: a quintessential issue

→ Actual practices may differ between disciplines

- **Every co-author must be ready to account for the entire paper**
 - Preferable to define rules in advance
 - Community guidelines may be useful at least as a shared reference
 - e.g. ICMJE's <https://rebrand.ly/authorship>
- **Practices differ**
 - Size
 - *Human sciences: often single authors (beware of plagiarism)*
 - *Physics: sometimes very big consortia (how can solidarity prevail?)*
 - Order
 - *Informatics: often alphabetical order (how to address individual credit)*
 - *Life sciences: each author's position has a meaning according to unwritten rules*
- **How to credit less formal contributions (research infrastructures?)**
 - See CReDiT, a contributor roles taxonomy, at <https://casrai.org/credit/>



Research integrity should not be a matter of opinion

→ <https://www.mediterranee-infection.com/contre-la-methode/>

MARSEILLE **13.02.2020**

**Jeudis de l'IHU
CONTRE LA MÉTHODE**

Unité de Recherche sur les Maladies Infectieuses Tropicales Emergentes
URMITE – UMR CNRS 7278, IRD 198, INSERM U1095

« Les méthodes mathématiques sont les vêtements des idées ».

Husserl

« ... ça sert à avoir raison »

1



They have been convicted of misconduct, and they say...

- ***“I did not do it”***
 - How dare you?
 - And besides, who are you to put me into this trouble?
- ***“My results have been reproduced by others”***
 - My community know how big a scientist I am
- ***“My published images are a representation of what I saw”***
 - A colony is a colony, a cell is a cell, a band is a band, a background is a background?
- ***“Put it back in context: at the time, everyone was doing so”***
 - That is... everyone in my immediate environment...
 - I learned from my benchmates, because my PI was absent...
- ***“F[...] the scientific method”***
 - It is unethical: quote “the parachute paradigm”
- ***“Yeah okay maybe I did it, but I intended to soon restore the truth”***

Exploring a diversity of misconducts

- **A continuum from pure fraud to almost normal behavior**
- **Motivated by various conditions**
 - Publish or perish
 - *Sometimes hierarchical injunctions (real or not)*
 - *Often social / community injunctions (hold the rank)*
 - Ease / quickness
 - *“More easy to grab controls from other figures than retrieve originals”*
 - Ignorance
 - *“I represented what I did usually see”*



**Which organization to promote
integrity?**

The French ecosystem

Research Integrity in France

– **Sep2010: A 1st report (JP Alix)**

– **Jan2015: the French Charter**

– Covers Scientific Integrity

– Ratified by institutions (8 → >60)

– A network of RI officers (4 → >136)

– Jun2016: a 2nd report (Corvol)

– Graduate schools

– Ministerial letter to all research operators

– **Mar2017: launch of the French Office for RI (OFIS)**

– **Apr2016: Revision of the LePors act**

– Restricts the Corvol report to Research Integrity *sensu stricto*

– **Mar2018: Deontology Committee of the Ministry for HE&R**

– **Dec2020: The research programming act for 2020-30**

– Research integrity enters the French law

France stays back ☹️



The French setup for RI

- **A significant focus on collective prevention / anticipation**

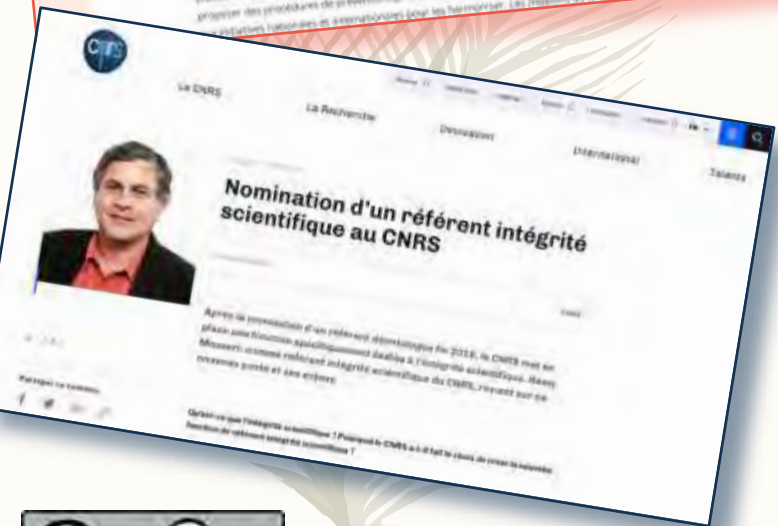
- Except [sometimes] plagiarism and perhaps some authorship matters, RI-related misconduct usually not amenable for lawyers
- *Usually no “victim”*
 - Except everybody... since knowledge is a common good
 - Except some colleagues in our “coopetition” system...
 - *(similar to doping in sports)*
- *This might change with the entry of RI in the French law*

The French setup for RI

- A significant focus on collective prevention / anticipation
- Two levels of action in the French set-up for RI
 - **Most of all**, ensure a shared culture of Integrity
 - Reference texts
 - Coherent with the international landscape
 - e.g. the European Code of Conduct for Research Integrity
 - Trainings
 - At all levels but at least (mandatory) for graduate studies
 - Seminars, etc.
 - Local, national, international
 - **Before all**, treat frauds properly
 - Clear and shared procedures...
 - ... and applied ones!

In the institutions

→ *sharing a culture, treating allegations*

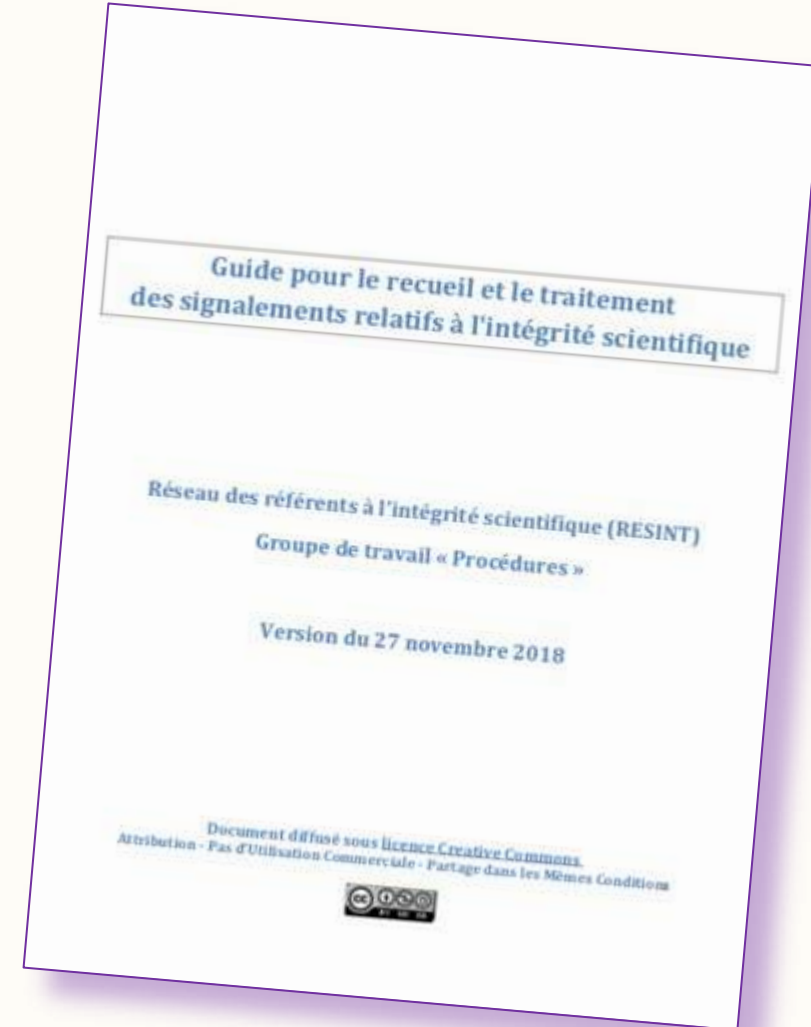


- **1999: Inserm pioneers**
 - A resource to prepare the French charter and help other institutions
 - Recently published: a guide to signatures of scientific publications
- **2015: the universities join the movement (CPU)**
- **2019: the colleges join as well (CDEFI)**
- **The funding agencies are coming**
 - Ex. ANR ratified the charter, relays its values, punishes frauds
- **2018: CNRS switches gear**
 - NB the COMETS has played a historical role
 - Connects three types of officers
 - Integrity → French Charter (Jan2015)
 - Whistleblower → « Sapin 2 » Act (Dec2016)
 - Deontologist → « Le Pors » Act (1983 revised 2016)

ResInt, the French network of RI officers

→ see <https://www.hceres.fr/en/liste-des-signataires-des-chartes-et-des-referents-integrite-scientifique>

- **~160 RI officers**
 - Universities & Clusters
 - Colleges
 - National research organizations
 - Agencies doing or financing research
- **Profile**
 - Recognized and respected scientists
- **Missions:**
 - Operate the institution's RI policy
 - *Incl. misconduct management*
 - Mutualize & harmonize policies
- **Produce references**



OFIS, the French Office for RI

→ to share the culture of research integrity



- **A resource for all**

- Researchers
- Teams
- Institutions

- **A board and a team**

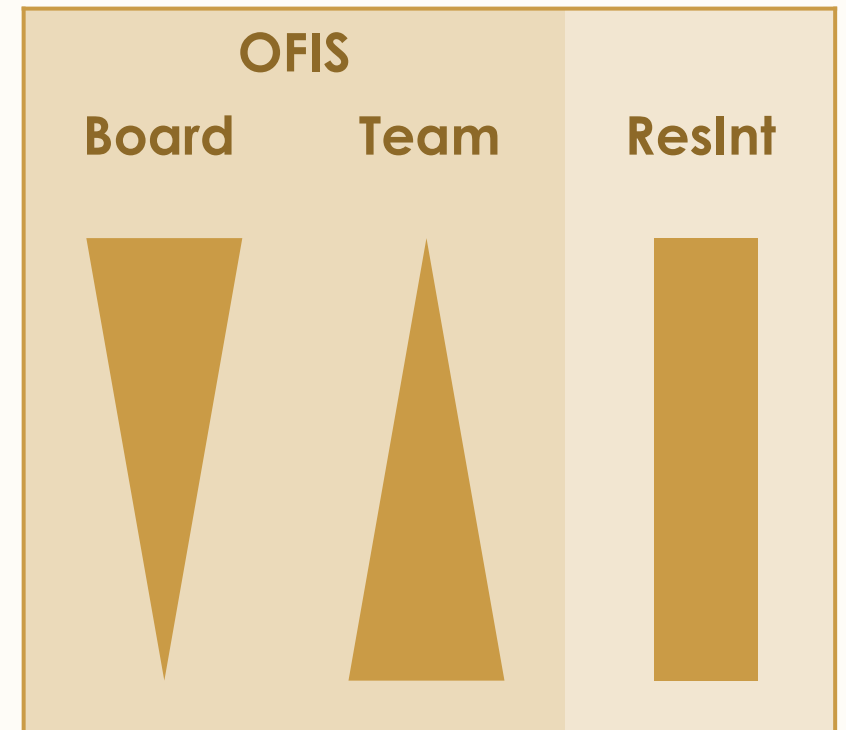
- **OFIS does**

- Prospective
- Observatory
- Coordination

- **OFIS does not**

- Process individual situations

<https://www.hceres.fr/integrite-scientifique>



2020: research integrity enters the French law

– A definition of research integrity

- An expectation: *Research works [...] respect the standards of RI aimed at guaranteeing its honesty and scientifically rigorous character and at consolidating the bond of trust with society*
- A definition: *RI contributes to guarantee the impartiality of research and the objectivity of its results*

– An obligation of means for the operators

- *They provide the conditions for meeting the RI requirements for the activities and work carried out within them. They put in place the necessary mechanisms to promote the values of the RI and encourage compliance with its requirements. [...] they keep the raw results of the scientific work carried out within them in order to allow their verification.*
- *They send every other year to [the ministry for research] and to [OFIS] a report on the actions undertaken within the [above] framework.*

– A mission for Hcéres (i.e. OFIS)

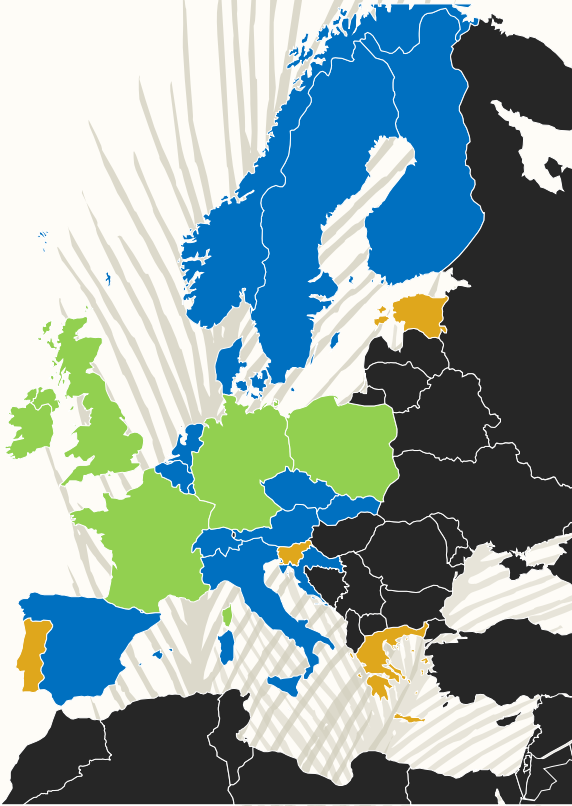
- To contribute to the definition of a national RI policy and promote the harmonization and mutualization of the practices of operators in this field
- To promote RI and make sure it is considered in the evaluation processes of research labs, higher education programs, research organizations, etc.

– An “Hippocrates oath” will be taken during the defense of PhDs



Is this the only possible setup?

→ *Certainly not!*



– e.g. among the 23 ENRIO members in 2019

- **14** have a national body in charge of investigations
 - AT, BE, CH, CZ, DK, ES, FI, HR, IT, LU, NL, NO, SE, SK
 - **5** have a national body with other missions (advice, promotion, training, mediation)
 - DE, EI, FR, PL, UK
 - **4** are on their way
 - ES, GR, PT, SL
 - (Only FR has introduced RI in its national law)
- ## – e.g. North-America
- **USA**: ORI (1992); NAS-EM (2017, Fostering integrity in research)
 - *Long-lasting proposal: to create a Research Integrity Advisory Board*
 - **Canada**: CNRC guidelines on RI policy (2018)

The French roadmap for RI

→ 18 short-mid-long term actions in 6 families

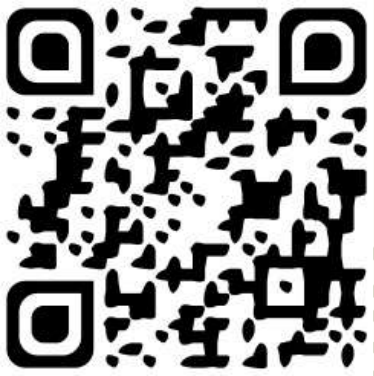
- [reminder] A significant focus on collective prevention / anticipation
- For a change in practices and cultural appropriation
 - **Harmonize processes:** reference documents, recommendations
 - **Mutualize returns of experience:** a shared referential of misconducts and good practices
 - **Education:** mutualize, innovate
 - **Promote the values of RI:** to speak about it
 - **Promote a research environment favoring integer science:** fair, adequate and transparent evaluation criteria
 - **Integrate the challenge of open science:** opportunities and risks of opening practices, data and publications

Concluding words



A few words to conclude

- **Science is (the archetype of) integrity**
 - Ensured by a long-proven approach: the integral application of the scientific method
- **However some situations questioned this evidence publicly**
 - And rightly so
- **Research Integrity**
 - Part of Scientific Integrity / distinct from Research Ethics
 - Carries a *positive* connotation
 - Is not the mere lack of absence of integrity (fraud)
- **Fraud is probably very rare**
 - But emergence of a kind of “industrialization”?
 - But a “grey area” of misconducts of unknown size, and very diverse
- **Renovation of basic processes of research are possible and needed**
 - Evaluation
 - Publication
 - Opening FAIR data
- **The French ecosystem has been organizing itself in the last years to face these challenges**
 - Still some way to go!



There is more to integrity than an absence of lack of integrity

<https://allea.org/code-of-conduct>

<http://olivierlg.info/LIRIMA21>



Ethics
Conflicts of Interest
Regulations
Misbehaviours

