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Document 1: 'Journal declines to retract fish research paper despite fraud finding', adapted from *Science*, February 2023
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SUJET A (SYNTHESE)

Document 1: 'Journal declines to retract fish research paper despite fraud finding'

The Proceedings of the Royal Society B: Biological Sciences says it will not retract a paper on anemone fish behavior even though a lengthy university investigation found it was made up.

An independent investigative panel at the University of Delaware (UD) concluded last year in a draft report that "discrepancies and issues" with the 2016 study "constitute fabrication." But the journal said in an editor's note on 1 February that its own investigation did not turn up enough evidence of fraud, in part because a correction by the authors had solved the paper's key problem.

Fish physiologist Timothy Clark of Deakin University, part of an international group of whistleblowers that found problems with the paper, calls the decision "infuriating."

The paper, authored by marine ecologists Danielle Dixson of UD and Anna Scott of Southern Cross University in Australia, is one of 22 studies published between 2008 and 2018 that Clark and his fellow whistleblowers have claimed are fraudulent. The complaint focused in particular on Dixson and Philip Munday, Dixson's Ph.D. supervisor at James Cook University in Australia. Both have denied wrongdoing.

An independent panel at UD that investigated Dixson's work was "struck by a serial pattern of sloppiness, poor recordkeeping, copying and pasting within spreadsheets, [and] errors within many papers under investigation," according to a heavily redacted draft report obtained by Science. It also concluded that several papers involved research misconduct. UD said it has asked journals to retract three papers.

For one of those, published in Science in 2016, Dixson did not have enough time to carry out the massive number of experiments described in the paper, the panel wrote, and an Excel file purportedly containing the study's raw data contained more than 100 inexplicable duplications that showed it could not be real. Science retracted the paper in August 2022.

The Proceedings B paper suffered from similar timeline issues, according to the panel. The paper's conclusion—that anemone fish can "smell" whether coral reefs are bleached or healthy—was based on a series of experiments in which fish are placed in a laboratory apparatus called a choice flume that forces them to decide which direction to swim.

Dixson collected the data for the study, which involved some 1800 individual trials, each 9 minutes long, according to the draft report. If she used a single flume, completing the trials would have taken 22 12-hour days. But the paper said the experiments ran from 12 to 24 October 2014, a period of just 13 days. Scott

and Dixson posted a correction to the paper in July 2022, in which they said the experiments actually took place over 33 days, between 5 October and 7 November 2014.

One of the whistleblowers, Josefin Sundin of the Swedish University of Agricultural Sciences, says the journal appears to have been too credulous in running the correction. “Why would anyone run an experiment for 33 days but by mistake write the methods and data as if it was conducted during 12 days?” she asks. “That is a very large discrepancy.”

Along with the correction, Dixson and Scott also uploaded the raw data for the study, which had been missing even though the paper stated it was available online. That data set “raised a second set of issues,” according to the editor’s note. This apparently refers to an analysis of the Excel file by the whistleblowers showing that it suffered from some of the same problems as the one for the Science paper, including duplication of data across columns and numbers that did not add up correctly.

But the journal’s investigation found there were other possible explanations for any suspicious patterns, and that some problems with the data “are more likely the result of mistakes or poor data curation, and their correction would not change the conclusions,” according to the note.

Adapted from *Science*, February 2023

Document 2: ‘There’s far more scientific fraud than anyone wants to admit’

Scientific misconduct has enjoyed some limelight lately. The president of Stanford, Marc Tessier-Lavigne, resigned last month after a series of investigations exposed serious problems in his research; an independent review of Tessier-Lavigne’s work found no evidence that he falsified data himself but concluded that his research failed standards “of scientific rigor and process” and that he failed to correct the record on multiple occasions.

And in June it was revealed that a scholar at Harvard Business School, Francesca Gino, was accused of having falsified research about – wait for it – honesty.

Of course, scientific misconduct does not happen only at Stanford and Harvard. Of the nearly 5,500 retractions we catalogued in 2022, and the thousands of cases we have reported on since launching our watchdog website Retraction Watch in 2010, the vast majority involve researchers at institutions without anywhere near Stanford and Harvard’s pedigrees.

The number of retractions each year reflects about a tenth of a percent of the papers published in a given year – in other words, one in 1,000. Yet the figure has grown significantly from about 40 retractions in 2000, far outpacing growth in the annual volume of papers published.

Retractions have risen sharply in recent years for two main reasons: first, sleuthing, largely by volunteers who comb academic literature for anomalies, and, second, major publishers’ (belated) recognition that their business models have made them susceptible to paper mills – scientific chop shops that sell everything from authorships to entire manuscripts to researchers who need to publish lest they perish.

These researchers are required – sometimes in stark terms – to publish papers in order to earn and keep jobs or to be promoted. The governments of some countries have even offered cash bonuses for publishing in certain journals. Any surprise, then, that some scientists cheat?

The truth is that the number of retractions in 2022 – 5,500 – is almost definitely a vast undercount of how much misconduct and fraud exists. We estimate that at least 100,000 retractions should occur every year; some scientists and science journalists think the number should be even higher. (To be sure, not every retraction is the result of misconduct; about one in five involve cases of honest error.)

The lengths to which scientists go to fight allegations of fraud is part of the reason the rate of retraction is lower than it should be. They punish whistleblowing underlings, sometimes by blaming them for their misdeeds. They sue critics. Although they rarely prevail in court, the threat of such suits, and the cost of defending against them, exerts a chilling effect on those who would come forward.

Journals and publishers also fail to do their part, finding ways to ignore criticism of what they have published, leaving fatally flawed work unflagged. They let foxes guard the henhouse, by limiting critics to brief

letters to the editor that must be approved by the authors of the work being criticized. Other times, they delay corrections and retractions for years, or never get to them at all.

One of the main reasons scientists feel pressure to cut corners or fudge data is because funding rates are so low. The US National Institutes of Health last year approved about 20% of applications for new grants. And that's a marked increase from recent years.

Funding to detect and sanction fraud should be a reasonable fraction of the dollars being spent – instead of mere millions in a sea of tens of billions. Until publishing papers is decoupled from earning funding and employment, however, it's difficult to imagine how much will change.

Adapted from *The Guardian* Wed 9 Aug 2023

Document 3: ' "I lose sleep at night": Experts fight to expose science fraud in Australia'

A leading scientist behind a bid to track scientific fraud and misconduct in Australia hopes it will shine a light on the issue.

Online tool Retractions Australia is tracking scientific papers that have been retracted – or pulled – by peer-reviewed journals.

It is backed by leading research institute Neuroscience Research Australia and already has about 500 entries drawn from a database maintained by the US-based Centre for Scientific Integrity

Retractions and scientific misconduct, once thought to be extremely rare, have come into sharp focus over the past decade as scientists have discovered more cases.

Ivermectin gained prominence as a treatment for COVID-19 based on a large number of fraudulent studies, some researchers argue.

One estimate suggests about one in every 50 published papers has evidence of deliberate manipulation; other scientists have even gone as far as claiming "most published research findings are false".

Professor Simon Gandevia, deputy director of Neuroscience Research Australia and one of Australia's most senior scientists, founded Retractions Australia after having increasingly strong concerns about the direction of the country's research establishment.

"I thought I was part of a river that was going in the right direction. But it is totally clear now there are major forces that are distorting all that. I lose sleep at night," he said.

The new project was welcomed by the Association of Australian Medical Research Institutes on Monday. "Research integrity is the cornerstone of ensuring quality scientific work," a spokeswoman said. "The Australian public are now able to see with more reliability when scientists review work, which will help them understand the lengths scientists will go to to constantly verify and validate results."

Rather than making innovative breakthroughs, modern scientific careers tend to depend more on publishing papers in scientific journals – a process nicknamed "publish or perish".

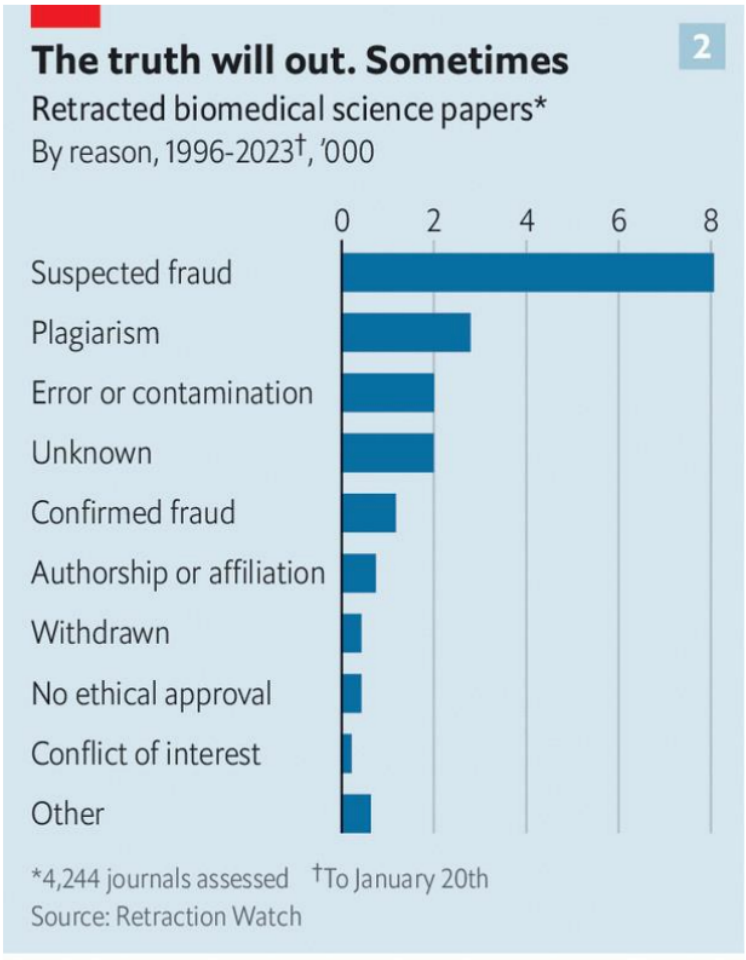
That encourages researchers to pump out studies and push the boundaries of accuracy.

In recent years, a thriving "paper mill" industry has also taken hold in certain countries, allowing academics to pay to be listed as an author on a paper.

In Australia, research misconduct is policed by a scientist's own institution – creating an incentive for things to be swept under the rug.

Adapted from *The Sydney Morning Herald*, June 27, 2023

Document 4: From *The Economist*, Feb 22nd 2023



SUJET B (ESSAY)

En réagissant aux arguments de cet éditorial, le candidat rédigera un texte d'opinion de 600 mots :

'Bad science: When "breakthrough research" turns out to be fraudulent'

One case involving stem cells occurred in the past year with Haruko Obokata, a young cell biologist at the Riken research institute in Japan

It is in the nature of scientists to argue over the evidence for or against any important breakthrough. Sometimes announcements made in good faith do not stand up to detailed scrutiny, namely the replication of the research by other experts.

On other occasions, scientists can be duped by the misconduct of their own colleagues prepared to cherry-pick favourable data to suit their conclusions, or, even worse, to fabricate data and commit outright scientific fraud – the most heinous crime in science.

One of the best examples of fraudulent research in recent years was the work on the cloning of human embryos by the South Korean researcher Hwang Woo-Suk of Seoul National University who announced in two scientific studies published in 2004 and 2005 that he had isolated human embryonic stem cells.

It turned out that he had faked many of the results and that he had engaged in dubious ethical practices in obtaining the human eggs needed for the research. He was eventually charged and found guilty of embezzlement and bioethical violations.

Another case involving stem cells occurred in the past year with Haruko Obokata, a young cell biologist at the Riken research institute in Japan. Dr Obokata claimed, with her Japanese and American colleagues, to have created stem cells by bathing ordinary blood or skin cells in a weak acid solution.

She called the technique “stimulus-triggered acquisition of pluripotency” (STAP) and it promised to revolutionise medicine as it offered the hope of creating therapeutic stem cells from a patient’s own skin or blood with a simple, cheap technique that could be performed in any well-equipped lab.

Unfortunately, it was shown that the scientific research paper contained errors and other scientists were unable to replicate the findings, leading to a complete retraction of the research. Dr Obokata, however, continues to believe that the technique works and is still trying to replicate her own findings.

Replication is of course at the heart of science. When chemists Stanley Pons and Martin Fleischmann announced in 1989 that they had achieved nuclear fusion at room temperatures – so-called “cold fusion” – physicists everywhere wanted to reproduce the findings. Nuclear fusion, which powers the Sun, was only thought to occur at extremely high temperatures. If it could occur at room temperatures it would open the door to cheap, unlimited and clean energy.

It was too good to be true because it turned out not to be true. No-one has been able to demonstrate cold fusion as described by Pons and Fleischmann

Sometimes a scientific announcement is made that chimes with a bigger philosophical significance. In 1996, for instance, Nasa announced that it had found evidence of fossilised mini-microbes in a piece of a meteorite from Mars, which fell to Earth 13,000 years ago and was discovered in Antarctica in 1984.

The clear implication was that life had existed on Mars and that we on Earth were “not alone” in the Universe. “If this discovery is confirmed, it will surely be one of the most stunning insights into our universe that science has ever uncovered,” said President Bill Clinton on the day of the announcement on 7 August 1996.

The trouble, once again, was that the discovery could not be confirmed by other researchers. It may have been a bad day for the idea of extra-terrestrial life, but it was a triumph for the scientific method.

Steve Conor, *The Independent*, Friday 25 July, 2014