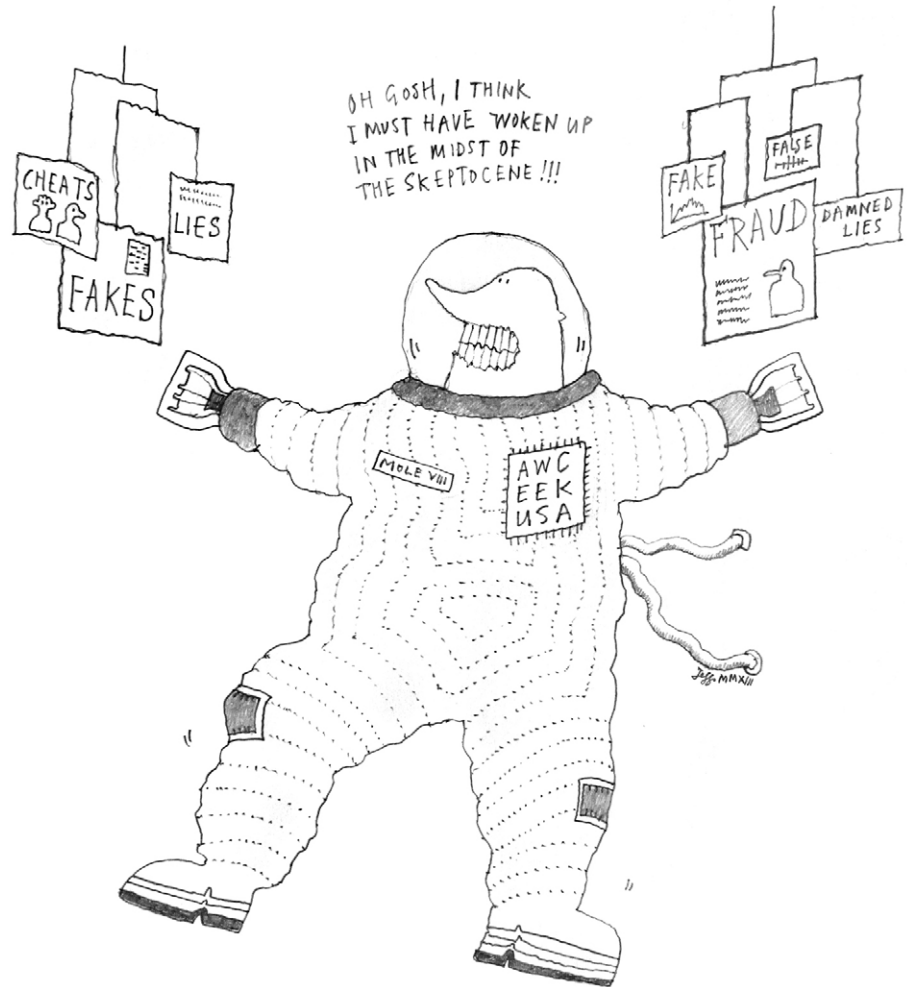


An occasional column, in which Mole and other characters share their views on various aspects of life-science research. Correspondence for Mole and his friends can be sent to mole@biologists.com, and may be published in forthcoming issues.



The end of science

December 15, 2214. Thursday.

Many of us, including perhaps the readers of this column (Mole VIII, dating back over two hundred years to the very first Mole, whoever he was), were not surprised today by the report via Mindnet of a decision of the most recent meeting of the Associated World Congress in Eek, Alaska (previously held in Muck Town, Alabama, before Muck Town, Alabama was buried in muck). This was, of course, the decision to withdraw support for the fledgling efforts to initiate a 'research effort' in something called 'biomedical science'. It was doomed from the start.

It might be useful to review the history of the concept of biomedical science, what it once was, and how it came to an end more than a century ago. Most of those reading this will be disappointed that I am not giving my usual gardening and cooking advice, but instead embarking on what amounts to a history lesson; however, for

those who carry on to the conclusion, I will, of course, include one of my recipes.

Once, long ago, when there were 'nations' (these were essentially business ventures that got badly out of hand; think of them as poorly run corporations), many of them engaged in an activity, publicly funded, of biomedical research. Basically, curious individuals would spend much of their lives learning about, and then working on, problems relating to how the body actually works and how this information could be applied to correcting diseases that arise as a consequence of the workings either going wrong with time or coming under assault by outside influences. As a result of this effort, there are claims that many people had life spans of up to eight or more decades (rather than the forty years we know today to be the average). The claims are, of course, ridiculous, but likely result from the application of 'math'.

What these individuals would do is ask a question, pose a possible answer, and then

do an 'experiment' – basically a test of the answer. This was, apparently, a sophisticated process that was sufficiently difficult that often several people would work on it, and much experience was necessary, not only to design the experiment, conduct it, and extract results, but also to analyze these results. If the experiment showed them that the answer was possibly correct, or that a different answer was suggested, they would do it some more, and if it worked, they would ask another question and the process would continue. When enough of these experiments (in the investigators' opinions) were completed, they would assemble these into a 'paper', which they would then submit to 'journals' in hopes that other people would 'read' them. Before that could happen, several other experts on the question would examine the results, and reject them, demanding that they do many more experiments. Eventually, though, the paper would be printed on paper and distributed to more of these experts. In time, the printed material was replaced by electronic media that was distributed by the 'internet' (basically, a Mindnet, but using machines). This, in turn, led to 'progress' and often the problems were, apparently, 'solved'.

I know it will sound bizarre, but people did this as a profession, this biomedical science thing. Their careers depended on the dissemination of the information they had discovered, and the successful 'publication' of this information would often dictate their status in the community of their peers. And that's where the problem started (but not why it ended, oh no).

Inevitably, as we all know, there were cheaters. There are always cheaters. Of the millions of these publications that were put out, a tiny number of them were simply fabrications. Lies. The people putting the information out there, rather than conducting and reporting their experiments, simply made up the results. This was a very rare occurrence, but it happened, and usually these liars were found out, often by the people they worked with. When that happened, they were punished, but somehow they weren't physically beaten or killed, as appropriate as that might have been.

But the cheaters didn't do as much damage as we might have expected. If they reported something that nobody else could use (because it was a lie, and didn't actually work) the information they put

out was usually ignored, at least after a while. Yes, punishing the cheaters was a moral imperative, but the damage could only go so far – the process of science was self-correcting, in time.

Part of this self-correction was a group effort to find the inaccuracies, honest mistakes, and misrepresentations that were being disseminated. The rise of the internet facilitated this effort, and many attempts were made to correct these errors. All to the benefit of the endeavor. When pointed out, the researchers responsible would do their best to fix the problems, or were exposed as cheaters. And as a result, things improved. For a while.

But the fact that this was a profession had another consequence – many of those who wanted to do it found that it was just too hard, and some of them became very bitter. For a long time, such bitter individuals had to find something else to do, but the bitterness remained. And one thing that made them particularly angry was the fact that some of the cheaters appeared to be getting away with it, having careers (however empty of value) that allowed them to mix with the society that the bitter ones found themselves excluded from.

But the machine internet gave them tools to have their revenge. They could point out where in the published information there were things that 'looked iffy'. Not necessarily wrong, or faked, or even misrepresented, but just a bit off. Maybe. Or they sincerely were directing their energies to routing out genuine fakery; it didn't matter that this occurred in less than 0.001 percent of the publications – it was better to question everything than to allow one bit of fakery to persist. A '0.001 percent solution'. Places on the internet multiplied, with names like 'Science Fakes'. And anyone could put up pictures with circles and arrows and a sarcastic paragraph for each one explaining what each one was.

Now, scientists, those who actually did science (not the vigilantes who posted these, for the most part), were naturally skeptical people who doubted everything they were told, except, it seems, they didn't much doubt the integrity of the people who put up the pictures with the circles and arrows and the sarcastic paragraphs for each one explaining what each one was. They needed to check each one out.

So the scientists who had published the original information had to stop what they

were doing and go back to find all of their original findings to show everyone that they hadn't been cheating.

One example illustrates the problem. Professor Platypus was well known to be a careful, utterly meticulous scientist whose work was regularly reproduced and whose findings were highly valued by the community. But, inevitably, one of his papers came under attack on 'Science Fake'. There was a picture with circles and arrows and a sarcastic paragraph explaining it. His institution launched an investigation. But Professor P happened to have the original, despite it being many years old (he said he was just wildly lucky) and he could easily show that the claims were outrageous and he was fully vindicated. He posted it on 'Science Fake,' and was congratulated on his response. Whereupon another anonymous post pointed to another paper that, in the poster's poxy opinion, 'didn't look right'. We do not know if Professor Platypus stopped looking at the site at that point, or if he spent his remaining years looking for those original results rather than doing more science.

You see, if someone couldn't find the original materials (which were often many years old) they were presumed to be fibbing. Even if others had shown that their discoveries were correct. So they became bitter, and stopped doing science. And instead, they spent their time looking for things they could put up on the 'Science Fake' websites, showing pictures with circles and arrows and sarcastic paragraphs for each one explaining what each one was.

Soon, there were very few scientists left. And then fewer. Public confidence for publicly funded research disappeared. The only research that was done any more was kept secret and in the corporations. And while this gave us many new package designs for the sale of established drugs, the actual idea of 'doing science', of making discoveries to share with a community of interested and devoted researchers, dwindled, and finally, vanished. It only took one of their long generations for this to happen.

When the World Congress (in Eek, not Muck Town) first proposed that it might be time to begin doing science again, the Mindnet was immediately filled with charges that this would not be possible. And they were right. They showed us in pictures, with circles and arrows, and those wonderfully sarcastic paragraphs for each

one, explaining what each one was. Silly idea, really.

By the way, as near as I can tell, the original Mole (my namesake) was not mentioned on any of the 'Science Fake' sites. He continued to do and publish his work, although it isn't clear that anything much ever came of it. But maybe it did, and everyone just forgot that he did it, and he was satisfied with that. He apparently

died happy, and continued to have faith in the scientific enterprise. He was, of course, misguided.

Oh, and here's the promised recipe:

Science Stew

Take any scientific paper and carefully extract the figures. Point out that the error bars look similar between two graphs. Point out that the backgrounds look 'too

clean' or that there's a smudge on one edge. Make fun of everything else. Cast doubt. If anyone criticizes you, do the same for their papers. Mix well. Serve cold. Enjoy with a glass of schadenfraude.

Mole VIII

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