

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](mailto:mole@biologists.com), and may be published in forthcoming issues.



## When conflicted becomes corrupted

Dear Uncle Mole,

I hope this found you enjoying the summer sunshine instead of the vagaries of fog, hail, torrential downpours and the occasional tornado warning that seemed to blight spring in my corner of the world. It was so overcast with so much drizzling that I think I stopped producing Vitamin D entirely. Unfortunately, on our first real day of summer I was so excited to see the sun that I spent too much time laying out on the lawn catching up on my journal reading. My glow, eventually faded to the pink aura of a slightly toasted Molette instead of the ghostly glow of the Lab Rat. But I reached equilibrium soon enough.

But, I digress: I've been meaning to dash off a note about your recent discussion of conflicts in the lab (see *J. Cell Sci.* **124**, 1361-1362 and *J. Cell Sci.* **124**, 1605-1606). So true, Uncle Mole, so true – as scientists we can't avoid the inevitable conflict of interest of wanting (dare I say needing?) our project to work or our hypothesis to be correct. Or our worth as an investigator validated to peers, tenure committees, maybe even ourselves. I've never really thought about it like that before, but I guess the act of doing research is itself a biased undertaking if the outcome of the experiment matters to the person conducting it.

I've been pondering this a lot of late, mostly because I'm facing one of those critical junctures where the choices I make about what to study and with whom to study it will carry over to shape the rest of my career. Like most of

us pulled into the whirlwind of life as an investigator, it was my curiosity that first got me hooked. It's been a long time since I decided that telomeres are one of the coolest things ever – and I am gratified that the Nobel Committee eventually agreed with my teenaged self – but I still find molecular biology pretty darn fascinating. More than anything, I hope to look back one day and say that something I did made a mole-sized difference. And that's Avogadro's mole, by the way – I don't need to win a Nobel Prize and I don't need to be famous. I just want my work to have mattered, whether by mountain or by molehill is fine with me. It's a good thing to be reminded of the potential conflicts of interest this sentiment creates.

But here's what really scares me now: what about the conflict that crosses the line into corruption? I'd like to think that this doesn't happen, that scientists are noble and trustworthy and too worried about the good of mankind or the mysteries of the universe to do something dodgy. Unfortunately, the data tell a different story. I'm a glass-half-full kind of character, so I have to believe that the majority of my colleagues possess some intellectual integrity and aren't fudging their data. But I also can't ignore the reality that some – and more than just a handful – have crossed that line. Remember the stem cell fraud from the Korean lab or the professor from Vermont who faked his way into so many journals that physicians started changing recommendations about hormone replacement therapy for their patients? It's easy to dismiss a few cases as bad apples, but it doesn't take much internet sleuthing to discover that this trend is not an isolated one. The unfortunate truth is that scientists are just like everyone else: some of us cheat and some of us lie.

In fact, a 2009 study evaluating published surveys that had questioned scientists about their own behavior as well as that observed in colleagues tells an interesting story. The manuscript was published in *PLoS ONE* and reports that 2% of scientists admit to having falsified, fabricated or modified data themselves (<http://www.plosone.org/article/info:doi/10.1371/journal.pone.0005738>). That's one in fifty. I don't know how many people are in your department, Uncle Mole, but if you believe those numbers that means people I know (and like) and with whom I talk about data over coffee breaks or commiserate during sunny summer weekends spent working are scientific frauds at least some of the time. What can one even think about that? I have trouble finding the words and that's a rare thing for me. Perhaps even more interesting, however, is what the pool of queried scientists reported about their colleagues: 14% of those who responded

claimed that they had themselves observed fraud or fabrication, while a whopping 72% admitted to having witnessed 'questionable' behavior not otherwise considered direct fraud. One can debate the validity of these studies or the accuracy of surveys asking about such sensitive issues – we are scientists and we are supposed to think critically, after all – but I think the bottom line is that we may have just as much of an integrity issue as the politicians.

I've been working a lot of long hours lately, so I've had plenty of time to mull over this dichotomy. I even started doing some side research on the matter while my experiments were incubating. This isn't the kind of hypothesis-driven study I ever planned to do, but let me tell you, there are some interesting trends to the information I've uncovered. First of all, famous people have been involved in situations in which fraud was alleged and papers were retracted. Without naming names, let's just say that scientists of the strata who give keynote addresses at international meetings or who run large research institutes or who have won Nobel Prizes have been pulled into situations in which the truth, the whole truth, and nothing but the truth wasn't exactly being told. (As a corollary, however, sometimes people who are on papers that were retracted had nothing to do with the fudging of data to begin with.) Second, some really big scandals – the kinds of lies my Grandpa used to call 'whoppers' – have happened at some rather prestigious places. In fact, it almost seems like the fraud that gets caught always involves some combination of a cutting edge area of investigation, a prestigious institution or a rising star in the field. And finally, it doesn't seem to matter what branch of research one considers: there will be a saga of false or fudged data. The physicists might not be able to understand what the physicians are doing (and vice versa), but from subatomic particles to people, there are important research studies that, in the end, have turned out to be worth less than the paper they're printed on.

So where does this leave those of us who went into science to make a difference? It's rather distressing, actually. The good news is that I don't think the horrifying bits are the end of the story. My timer just went off so I've got to run – alas, there's some DNA that needs my attention – but I'll be back in a moment. Hold that thought, Uncle Mole, and enjoy a cup of tea in the meantime (except, of course, that you don't drink tea). And for now, I must say that sometimes the simple truth sounds better in Latin: *veritas vos liberabit*.

Until next time,  
Molette

*Dear Molette incorruptible,*

*I am so very happy to hear from you! I'm glad the sun is finally coming out, but do remember to use your sun block – when you get to be my age, in a century or so, you'll be glad you did.*

*So anyway, I'm thrilled that my musings on conflicts have gotten you thinking, and what deep thoughts they are. Terribly important thoughts. And I hope you won't mind if I throw in my own two cents (a penny for each of my own thoughts, though I can't promise they are worth it!). But here goes.*

*First, yes, I know about the results of the semi-famous (or infamous) poll, and while these findings should give us pause, I'm not convinced that they say what they mean to say. Let's start with the 2% who admit to "fabricating, falsifying, or modifying data". It's the "or" that is the problem here. I very strongly suspect that no one who is sufficiently twisted to actually fabricate and/or falsify data would have the interest, inclination or the self-awareness to admit to these crimes, even to themselves; I therefore regard these as admitted 'modifiers' of data. And modification can very well include leaving out something that was hard to explain (especially if such omission did not alter the conclusions, but instead raised some new issue that requires extensive additional work to understand). Our confessors might feel guilty of such a thing, although we might not regard it as a crime. Sure, I'm being a Pollyanna, but while there are certainly folks who fake it (and I doubt that they are even 0.002%, or at least, I very much hope so), I don't think they bother to answer surveys. Perhaps these folks are just feeling a bit guilty about not showing the top part of the gel that had the huge smear on it.*

*But the bigger problem comes with the 72% who have witnessed questionable activity, right? I'm not so sure. I may decide to include a co-author whose contribution was to suggest the experiments that opened the way to our publication – perhaps to the chagrin of another author who doesn't want to share the credit. Or I may decide not to include a result that was too inconclusive to warrant discussion (even if it might have supported my argument). And you might feel that these are questionable activities, since we haven't very carefully said what 'questionable' means.*

*But regardless of the survey, we know the real problem – there is such a thing as the corruption you allude to, and what we very much want to know is how prevalent it is. Yes, like you, this makes my skin crawl. I find it hard to believe that there are "scientists" who have so little regard for this enterprise that they will take the hollow success that comes of cheating and play it out for all they feel it is worth. We all know people like this (or we suspect that they are like this) –*

people we would not believe if they came in soaking wet and declared that it was raining outside. Ick.

I've talked about this before, but the fact is, I don't know what to do about it except to decide for myself what I will take on faith (and from whom). The alternative, the 0.001% solution (if you will let me be optimistic here), is to punish all scientists for the assumed (or even proven) transgressions of the very few. Form committees at our institutions that exist for the purpose of evaluating raw data that has gone into each manuscript we submit, for example. Such committees, and some of those who occupy them, will come to exist for their own purpose, questioning everything we do until we just can't do it at all.

If you doubt this, or feel I'm being too easy on the problem, let's look at an interesting (to me) example. Many years ago there was a quite famous case involving a famous scientist who was a co-author on a paper that was held to be fraudulent. After a great deal of evidence had been 'leaked' to the scientific community, it was well known that the work was completely discredited. The senior scientist (not the famous one, who was never really implicated but was

well raked over very hot coals) was banned from doing any research for many years, and we put it behind us. But later, when the furor died down a bit, the student who had actually done the work (and was also never implicated in any fraud) went through the trouble of carefully repeating the study, and showed that the results were fully reproducible, as he had always insisted was the case. And – this is the very sad part – nobody seemed to care. It was published in a rather low-impact journal and received no response at all. While it was lurid, hot news, this was considered extremely important work that had damaged the entire scientific enterprise, but in the end, no one seemed to care about whether or not it was actually true.

Which finally brings me to my point. There is a lot of professional jealousy out here, and for good reason. Some people seem to be very successful at this business, but most are not (or not especially so) and many of us would love a chance to take a poke at the successful ones, hinting that they are selecting, modifying or even fabricating their data or, at least, that they aren't nearly as good as they seem to be. Beware this. We all know how few of our fellow students ever got a chance to be independent scientists,

let alone even moderately successful ones. There are a lot of very bitter people around. Don't be one of them.

All I can do and – if I can suggest – all you can do, is to do the very best you can to tell each story you unravel, each bit of a glimpse into what we hope is reality, as honestly as possible. The good bits will be picked up by others, who will see that you were right (or almost right) and we can rejoice in our fortune.

And Molette, let me say I'm enormously proud of you for worrying about this, and doing the right thing, every time: being incorruptible. Stay alert, and don't believe everything you read. But we'll continue to make real progress by honest effort, and those of us who feel as you do will recognize each other in the fray. It's worth it.

See you when you get back – I can't wait to hear more of your ideas.

Love,  
Uncle Mole

**Molette**

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