The race to the bottom and the route to the top

Academic labs can be difficult places to work — but why is that the case and what can be done to address the issues that lead to harmful working environments?

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In some ways, the basic model of science has not changed for several hundred years. Hard-wired into our culture is the image of the obsessive scientific genius — working all hours in their lab to the exclusion of outside influences to find the solution to their problem.

Increasingly, however, scientists do not work as individuals — they manage, or are part of, ever larger teams[1]. In academic research, these teams are based in research institutes and universities, which act as the employer, but in reality, scientists are often just left to get on with managing their team. In this way, the senior scientist sets the culture of their lab.

Remarkably, although team management is effectively delegated to senior scientists, most receive little — if any — training. Indeed, it is common for senior scientists to complain bitterly about aspects of the job such as administration and meetings that 'take them away' from their own science. They often view training courses in a similar way, and refuse to go on them, even if they could potentially enhance their ability to manage a diverse research team. Instead, they claim to know best what is required for success in their field, and hence how to train the next generation.

Unfortunately, in some cases, this results in lab management practices that have changed little over the past century, with supervisors often using the model they themselves experienced. This can lead to toxic working cultures — as detailed in the recently published results of a major survey commissioned by Wellcome[2] — with researchers complaining of a pressurized, insecure and competitive working environment. Problems range from bullying and harassment through to the expectations of long hours, limitations on vacation time and a continuous pressure for results, providing little scope for creative thought or innovation.

This culture is highly challenging to most, especially those who require an effective work–life balance to thrive, with quality downtime enabling maximal effectiveness in the workplace. It is particularly toxic to those with responsibilities outside of work and can be fatal to their careers. Scientists who must care for children, elderly parents or sick partners find the expectations of long hours especially difficult to manage. Given that in wider society these responsibilities often still mostly fall to women, the impact of this on women's career progression is obvious[3].

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This prevailing culture feeds a negative health cycle for all scientists. Working extended hours for long periods of time under pressure to obtain results is notoriously bad for mental health. Once poor mental health strikes, the inability to keep up with a punishing schedule of long working days, lab meetings and targets, and a lack of integrated support within the culture, often means that these individuals are eventually lost to science.

In reality, of course, productivity should be key — long hours are pointless if they are not productive. But in the absence of training, or the time to reflect on the best managerial strategies to achieve productivity, some scientists simply ensure their teams work 'hard', using their position of authority to achieve this if needed. Bullying and harassment can still often go unchecked in this setting — with the abuse of power and systematic humiliation and shaming of junior researchers to exert control[4].

More subtly, some supervisors simply state an expectation for long working hours and weeks, set group meetings at antisocial times, e-mail their team members at all hours of the day and night, refuse reasonable vacation requests, or insist researchers sign in and out of labs, keeping an open register. These practices still go on in some recently established research groups — clearly the scientific culture is still broken.

It is not always explicit group leadership or 'rules from the top' that cause problems. Sometimes there are emergent group cultures, in which those perceived to not work hard are excluded by the rest of the group. Indeed, such 'ingroup' cultures[5] are a considerable problem that requires active management. In addition to reinforcing a high-pressure work culture, they can also lead to those who are 'different' struggling to feel included, adversely affecting those of different ethnicities, ages, sexualities, disabilities and so on.

Of course, there are also, increasingly, supervisors who do consider their management styles, and do an outstanding job of supporting their groups. These empathic leaders spend time getting the best out of each co-worker, ensuring their problems are listened to, and strengths harnessed. The problem is that the wider scientific culture does not always reward this kind of highly engaged, personalized, group leadership. Instead, it is the

'mega-groups' that are generally viewed by scientific culture as reflecting 'success', even though less personal contact is an inevitable result. Interestingly, a recent study has indicated that smaller teams tend to be more disruptive[6], and in scientific terms, it is disruption that leads to the biggest breakthroughs.

The race to the bottom

When discussing the 'over-work culture' on Twitter, I have often been told individuals have every right to work as hard as they want. It is suggested that these individuals are 'passionate' or 'love their jobs', often with the unspoken assumption that those who don't want to put in the hours just don't care as much about science. Individual freedom for research scientists to work as they wish is indeed hard to argue against, but in modern teams, the behaviour of individuals now impacts on all of those around them. It is also worth asking whether this would be acceptable in other jobs.

How would we feel about a surgeon operating unpaid because they are 'passionate' about helping their patients? Would we be comfortable with an airline pilot that worked two shifts back-to-back because they 'love their job'?

In other workplaces, this would be seen as unacceptable exploitation. As consumers, we would feel ethically conflicted about it. But even worse, in many cases it would be wholly unsafe — exhaustion and exploitation lead to accidents. Scientific laboratory work is a high-risk occupation where small errors can lead to serious personal injury and risk to those nearby[7]. Cultures of overwork are dangerous both in terms of laboratory safety and the mental health of employees — managers are directly responsible. Furthermore, it seems possible that part of the rise in research misconduct, and even scientific fraud[8], is a result of metric-driven expectations and highly pressurized working conditions.

Even for a principal investigator who does not work in a laboratory, of course they have the freedom to spend their spare time on work if they wish, but it is important that this behaviour is not set as a benchmark for the way in which all scientists should be performing. It is even more vital that such individuals do not consciously, or unconsciously, imprint this as an expected model of working on the teams of early-career researchers they manage.

In other workplaces, unions typically protect the rights of employees, ensuring exploitation is unacceptable, and enhancing safety. In the absence of such protection, there is the risk of a race to the bottom, with a poorly paid workforce, in a difficult, unsafe, pressurized working environment, leading to accidents and producing work of dubious quality. Why should it be different in science?

The PhD students and postdoctoral researchers that make up the majority of research teams are mostly non-unionized and often have no advocates. Furthermore, the atomized management culture in which they work makes effective organization difficult — different research groups in the same institute can have hugely divergent cultures. Individual principal investigators hold disproportionate power over their research teams, often in unwritten, non-contractual ways, making it difficult to get to grips with bad practice.

The casualization of the research workforce[9] is also highly problematic. With many contracts being only one or two years in length, postdoctoral researchers know that if they do not please their supervisor by conforming to, or helping enforce, group cultures, then their chances of a contract renewal, or a strong recommendation for a job elsewhere, are slim. Furthermore, casualization removes the incentive for postdocs to organize or advocate for their rights, because they know they are in a strictly temporary position. Compounding these problems, early-career researchers are usually at the stage of their lives where they may want to start a family. Casualization makes this difficult and there can be a lack of support from supervisors or systems for researchers who make this choice. This problem again particularly affects women.

The highly competitive nature of science means that some younger scientists put up with the race to the bottom in the hope that it will help them navigate a route to the top. Many are prepared to work absurdly hard in the large team of a famous scientist because it is seen as an established route to success. Senior scientists are happy to accept this, and in many cases encourage it, as they directly benefit. For short periods of time, working these long hours can even be productive. The problems for this group of researchers only emerge in the longer term, in terms of adverse impacts on mental health and risk of burnout. One study shows increasing adverse effects as working hours increase beyond 40 hours per week[10]. Meanwhile, the outgroups, who are just unable to work to such a punishing schedule, are excluded, in spite of how talented they may be and how much they may have to offer.

Ultimately, these problems mean that those that survive the system will look very much like the last generation of scientists — predominantly white, socioeconomically advantaged males, who can best navigate the temporary contracts and ingroups. Many will go on to have a partner prepared to support them and pick up the majority of family responsibilities. In this way, the scientific workforce will continue to fail in terms of inclusion and diversity.

The route to the top

In reality, what science really needs is diverse, productive scientists — diverse in terms of representation, but also in terms of scientific ideas and outlook. How do we change though? How do we encourage science to move away from such an entrenched model?

One practical way to address some problems is through health and safety initiatives[11]. Health and safety must go beyond personal protective equipment and risk assessments and address cultural risks. To some extent in the United Kingdom, the concept of normal working hours is now standard, with lone-working outside them being severely limited on health and safety grounds. This can lead to changes in research culture without necessarily adversely impacting on productivity. It is also worth noting that industrial research is a long way ahead of academic health and safety culture.

Scientists must also be prepared to build inclusive cultures. This could involve, for example, all early-career researchers having 'second supervisors', independent of the group leader. This can empower young scientists to report bad workplace practice, bullying and harassment in confidence, with the knowledge that action will be taken. This is particularly important given that academic bullies often leave no trace[12]. Senior management must also be prepared to step in and prevent abusive workplace cultures, irrespective of how many grants, prizes and accolades the supervisor may have won[13]. This is vital in changing the status quo.

We should also think about what we value as scientific success. We should abandon trying to use metrics to predict success, and accept that it can appear in many different forms and at different times in an individual's career[14].

Most fundamentally, and in the longer term, when recruiting the next generation of academic principal investigators, we must move away from a model that forms snap judgements based on scientific background, 'parentage' or papers published and citations gained, and focus instead directly on the qualities and ideas of the candidates themselves. We should evaluate applicants for academic jobs based on their proposed research, the way in which they would train a team of scientists and their ability to teach and inspire. In my opinion, candidates' track

records should not be considered until after a shortlist has been drawn up and should even then only be used to give an indication of whether they can actually deliver against the promise in their proposals. This would hopefully make us prioritize different things, beneficial to the whole enterprise of science: creativity, diversity of thought, management skills, communication and engagement.

If the route to the top changes, along with the view of what a successful scientist is, this may change some of the incentives in the system, and encourage all scientists to change their behaviour. It is hoped that a more diverse group of leading scientists will go on to build a science that respects different ways of working, and listens to all voices — generating the space and support for a wider range of scientific ideas and giving scientific progress even more chance of success. ❐

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