

The charity shop

Earlier today, I took a short trip to a charity shop, to donate some materials from my late mother's house for resale. The charity concerned, which I will not name lest I cause any embarrassment, has been supporting the work of a member of my laboratory for a few years now: that is one reason that I chose that particular establishment, amongst the choice of charity shops to be found along Edinburgh's Clerk Street, not far from the lab itself.

The place was beautifully organized, with books, ornaments and clothing displayed as well as they would be in a commercial place, and a window display chosen well to tempt the influx of new university students that will arrive in a week's time. The all-volunteer staff were well-dressed, polite, and exuded an air of quiet, caring competence. They dealt with my donated articles carefully and professionally, thanked me very politely, and quickly summarized the use to which the proceeds of the sale would be put. In short, everything was as perfect as it could be – and I left feeling perfectly terrible.

It was clear to see how hard these volunteers work for every penny raised, how much care they take about what they do, and how they speak to the public. It was also clear that the people working there, and probably the other donors, place enormous trust in the ability of the medical scientists they find to use the hard-won resources wisely, and they think that these scientists are striding step by certain step to a cure aroundover the horizon. I did not identify myself as one of the people they support: another time, I would happily discuss our work but they had already said such wonderful things about the scientists they support that I could not possibly have admitted to being one without appearing to be asking for this adulation to be directed personally to me. To say I am not worthy of it is to make the understatement of the year: I hope my colleagues who are also funded by the charity will not be offended by my saying that I don't think that any of us are.

Surrounded by the goods of the shop, my mind could not help making calculations. If they sold 100 CDs or paperback books, or 25 hardback books, or 10 dresses, that would pay for one small tube of antibody... like the one we ordered and found not to be suitable after all, last week. If they sold everything that I could see in the shop, they would probably cover the costs of that member of staff for about 6 months. Maybe the six months in which the small breakthrough in tissue engineering

finally came, but more probably one of the other six-month periods, in which nothing seemed to work and all we had to show for the effort was an improved understanding of what not to do. I see people working hard in the lab every day - and many nights - but we don't often see the army of people working so, so hard to keep the whole enterprise afloat. And, when signing off another order for a thousand pounds' worth of reagents, I don't often see the mountains of second-hand coats, or books, or electrical applicants, and all of the hours of cleaning and shelf-stacking, that that hastily signed order represents.

Should I send folks in the lab to these shops, for the same experience? I don't know. In some ways, it seems as if we absolutely need to understand the sacrifices made by those who support our work, and what it really costs. But on the other hand, I am right now feeling scared of spending anything on that grant – scared of our running any experiment that we are not certain will work. I know, though, in my head if not my heart, that spending money only on what is guaranteed to work is the surest recipe for making no progress at all, for it is in taking risks, where we do not quite know what we are doing but an idea really seems worth a try, that we have our best chance of a really valuable discovery.

It would be an interesting exercise to go through the papers of, say, five years in the life of a successful lab, and make a quick estimate of how much money it would take to perform the successful experiments actually described in the lab's published papers (including salary costs for the hours at the bench). Then to compare this figures with the amount of money (including staff time) actually used by the lab in the same period. For the kinds of studies that apply a very well-known technique to a new problem, for example sequencing a known gene in a new animal, or performing routine blood biochemistry in a drug trial, it may be that the figures are a close match. For much 'blue skies' research, though, the cost of the published experiments will be a small fraction of what the lab actually spent, because most of the time, effort and materials went on the approaches that did *not* work. Jeremiah Colman once quipped that he made his fortune not from the mustard that people ate, but from the mustard they left behind on their plates. It's a similar thing – funders of research pay rather little for the breakthrough experiment; they pay a great deal for the blundering about trying to find the right direction.

This fact of scientific life makes the process of applying for funds awkward. In theory, the resources requested should match the experiments planned, but in reality they have to be adequate to cover

the fact that the planned experiment does not work properly and more experiments have to be done to isolate the problem, and to design the required improvement. This is not incompetence – it is something deep in the nature of research: if we could be sure what would happen when we try something, it would not be research. Fortunately, scientists on grant panels understand the problem only too well, and allow for it, but I don't know how well it is understood outside. The gap between the image those noble volunteers have of us, and the all-too-fallible reality, is a large one. It feels dishonest to leave things as they are, and I am already thinking about how I might introduce this topic in a suitable public engagement event. I do not, of course, want to create an impression that we gratuitously waste the funds for which they work so hard – that would be false too. Rather, I would like to explain the faltering nature of research, and why it costs so much, and why it is very hard to predict how long will be the road from where we are now to a patient enjoying the fruits of all of our labours. If any readers have already gained experience of this, I would be delighted to receive their advice!

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