

101 things (give or take) to do with a physiology qualification

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Seventeen years ago, I related how I managed to help use an unhappy and unsuccessful experience in a large biosciences organisation to establish a rather smaller one. This small company has turned out to be much more rewarding for both myself and a few others.

'How many people work here?' is of course a frequently asked question for people in my current situation. I can admit to there now being 20-odd people in our little outfit now – and some of us are very odd as I rather like to say – but that's because we all like to do interesting things that just also happen to make us a reasonable living! That of course is one of the advantages of being a smaller and fully independent organisation, since we can do things 'our' way. For more about us, both past and present, our website www.cairn-research.co.uk can tell you more than you ever wanted to know, especially the 'President's Log' section (yes that's me), linked directly to our homepage.

But this particular article isn't directly about my company. Rather, it's intended to be a more general one about non-academic opportunities for physiologists – or to broaden it out still further, opportunities for people whose interests include physiology – as I think such people are in a much better position to make a useful contribution in other walks in life than they may realise. And on a more personal level, it's also a potential source of advice to people who have the misfortune to be the kind of professional misfit that I am! Here the basic advice is very simple indeed – don't try to hammer yourself into a round hole when you can actually *make* a square one, both for yourself and perhaps a few other similarly-shaped pegs. If enough of us do this, perhaps it will be the round ones that will no longer fit, so please don't be scared to have a go. And in any case, square pegs and holes are a more efficient use of space than their circular counterparts!

Electronics and physiology

Part of my mis-fitting has been that my personal interests happen to include electronics, but as a discipline it does arguably have similarities with at least some aspects of physiology, and I have found that to be generally insightful (although in the past some others have perhaps found it to be inciteful!), as I hope the following flight of fancy will start to make clear. Suppose a group of scientists from different disciplines are confronted with a completely unfamiliar piece of electronic equipment – how would they all investigate it? The physicists might bombard it with subatomic particles to see if they could create any new ones, the chemists might douse it with a series of increasingly noxious reagents to see if they could extract any previously unknown substances from it, and of course the biochemists and molecular biologists would smash it up into very small pieces which they would then try to individually isolate. And what would the physiologists do? They would switch the thing on and try to work out what it actually does!

Of course, for a full understanding of the system under investigation, some sensible combination of approaches is required, so this is in no way to denigrate those other disciplines. In engineering terms, at least in how I have described them here, those other approaches are all 'bottom up', whereas physiology tends to be 'top down', and the goal of course is somehow to get them to meet in the middle. It's just that my feeling is that in the overall scheme of things, the contribution that the 'top down' approach can and should make is often underestimated, so it is here that I see the greatest alternative career opportunities for physiologists, in whatever walk of life these may be, and whether you feel a misfit or not!

At this point, I'm going to see if I can broaden things out a little. As you have no doubt by now guessed, my misfit problem is ultimately because I am one of those people who find it essential to *do* things, but such behaviour in the wrong environment (whether academic or commercial) may not win you any friends.

Of course, in either environment one has to come up with 'results', but my personal experience is that the required processes can be very unpopular, and at worst not even understood – very much a case of 'Stop breaking all those eggs, and get on with making my omelette!' I all-too-well remember once making myself something of a pariah by stinking out a whole building while attempting an 'initiative-driven' chemical synthesis, which I then had to abandon. I was doing it in a fume hood, but it turned out that the people who had designed the then new building had put the air intakes right next to the fume hood extracts. So here's one piece of practical advice right now – whatever your career plans, don't work in a new building if you can possibly avoid it. At least wait until its teeth have come through, so to speak!

Motivation

In general, I think that people who are motivated by 'doing stuff' are going to be much happier – and of course more productive – if they are working in a smaller organisation than in a larger one. In particular, people are much more likely to have more of a team spirit there. If somewhere gets too big, people can be so obsessed with doing 'their' jobs that they can make the organisation less effective as a whole. A good personal example of that was the day I had an idea that would not just secure the future of that research lab, but would also make the world a better place for everyone, and I was so eager to start work on it that I was caught *speeding on the site access road* by no less a person than the *head* of the vast safety and security department! I was so embarrassed by the no-uncertain-terms dressing down I received for this misdemeanour that I forgot what the idea was, so a few years later the whole site had to close. Ok, so I exaggerate a little, but I did have an idea, I did basically forget it, and he was perhaps not quite the sort of person we would have taken on at Cairn! It was a very frustrating place to work, but on the other hand it did instil in me the importance of keeping any traces of that sort of problem out of our little organisation as it grows.



Resources and research grants

To do things, you need resources too, of course, and in academia, this means getting research grants! However, it seems to me that in order to be successful on that front, you really do benefit from being in one of the more 'prestigious', and hence generally 'bigger' institutions. All very good for the ego maybe, but is that what you really want? Worse, in order to keep a lab together, you'll probably have to spend so much time on grant applications and all the other paperwork that such positions entail, that before long you're having to leave the 'doing' stuff entirely to others – is *that* what you want?

I'm sure there will never be any shortage of people willing to kill their grandmothers (although hopefully not in a literal sense) to take on such positions and work in such environments, and a good thing too! Like it or not, that's the way a lot of science gets done nowadays, and if I could think of a much better one, I would be the first to scream it from the rooftops. But at the risk of being burnt at the stake for saying so, I'm not sure that the most creative people should even seek such positions. With luck, the creativity will come from the people passing through, just as long as the boss has the wit to permit it! If not, then the boss is less likely to get further funding, so at least there's a reasonable chance of the overall process being self-correcting over time.

So yes, by all means go to such places for a while (but choose your boss with care!), but then what? My point is that if you're a bit like me, then to use a physiologist's type of skills and approaches in a less than purely physiological environment might suit you rather better! You might enjoy being at companies like Cairn rather more than you thought, so why not consider this? In reality I think the opportunities are much broader than just looking out for directly physiology-related positions, so if you have any flair for creativity, then I suggest you use that creativity to think up some interesting possibilities for yourself! In my opinion it's the physiological approach to things that may

give you the edge. From my own interests and experience I would say that there isn't that much difference between pulling something apart to see how it works, and putting something new together once you understand how the individual pieces work. In fact, a physiological background might give you a better insight into the sort of mistakes you should avoid, such as the vertebrate eye with its photoreceptors all plugged in the wrong way round – our designs can be 'sensible' rather than merely 'intelligent'!

But what about the 'resources' problem? In particular, do you really need massive resources to do interesting things? That was the mistake I made way back then, as I was sufficiently conceited to think that the combination of 'their' money and 'my' ideas would be a winner, whereas it was actually the other way round! So, in order to get Cairn off the ground without any outside investors (a key goal that has fully delivered the expected benefits), I had to learn how to do things in an economical way. By keeping costs down and thinking for the longer term, we've managed to end up with our own premises on our own farm, and we're currently finishing off a nice new building there in order to continue our steady expansion.

Large buildings are often poor value

In fact, perhaps the biggest 'discovery' I've made in Cairn is that you don't need nearly as many resources as you may think to 'get things done'. By the time this heresy is in print, an even greater heresy in the form of a comparison between Cairn's new building and a certain 'other' research building currently nearing completion in Central London should be available as a blog from me on the Cairn website. The difference in scale may be vast, but the difference in cost is bigger still. For example, we don't have a multilevel basement, because our site is big enough for everything to be above ground, we don't need vibration isolation because the nearest roads and railways are a safe distance away, and we don't have a cavernous atrium because we decided not to. In fact, because our building is a wood-clad one (which was a condition of

being given the permission) out in the country, it is perhaps more redolent of Bletchley Park, where those people did all their wonderful things from a few hastily-erected garden sheds. Is there a moral here somewhere, I wonder? Never mind how impressive the infrastructure may be, just make sure that the working environment lets you get on with the job!

I think this goes for *experimental* resources too, and here I venture to say that there are possible lessons for everyone, wherever they are working or decide to work, be it academia, industry, or wherever else. In particular, the increasing trend towards 'centralised facilities' looks good on paper, and hence to the growing legions of pen-wielding administrators and accountants who have been steadily securing their bridgeheads into the previously hallowed halls of academia in recent years, but in practice I'm not so sure. Of course, such facilities can make sense sometimes (after all, it's not as if every particle physicist can have their own collider). But if you can only get access to 'the confocal microscope' for a couple of hours on a Thursday, then there's not much more you can do with it other than binging your (probably by now dead) samples under it for a quick look. Cairn's customers tend to be a pretty ingenious lot, and we see those of them who can get away with it modifying equipment in a variety of ways in order to do rather more 'interesting' things with it, but then it has to be 'theirs'. If you start drilling holes in shared equipment, you're very quickly going to upset other users, not to mention the priest-like figures who may be charged with guarding these sacred relics. You're much more likely to do genuinely innovative work with humbler equipment that's under your own control, so do check the skips regularly. You may find last year's model lurking there for the taking, it having been thrown out to make space for the latest communal behemoth!

At this point I see an approaching army of incensed administrators, clearly intending to consign *me* to a skip if only they could, so to avoid unnecessary bloodshed I think it best to bring proceedings to an abrupt conclusion!