

**Distilled: Lessons from a life in science with Prof.
Jamie Davies, part 2 (S01E04)
Not Another Science Podcast
October 14th, 2020**

Introduction

[Tom Edwick] Yeah. OK, so I just should I just start?

[Helena Cornu] Yup, go for it.

[Tom] Sweet! Hello, and welcome to Not Another Science Podcast. I'm Tom.

[Helena] And I'm Helena!

Intro music starts.

[Helena] So Tom, tell us about this episode. What's happening?

[Tom] OK, so on today's episode, we're back with the man, the myth, the legend: Professor Jamie Davies. Here's the Professor of Experimental Anatomy at the University of Edinburgh, and we've had him on a couple of episodes now. One back in our coronavirus miniseries where we were talking about the database that him in his lab set up, focused on drug targets that could tackle Covid, and also in our last episode we were just chatting about science, life, everything like that. This episode we're back with the remainder of our conversation talking about all sorts. He accidentally created the first biological database on the Internet.

[Helena] I think it's a testament to how lovely, and how interesting he is that this is now our third episode about him.

[Tom] Yeah, yeah exactly. He's earned it.

[Helena] Absolutely!

[Tom] But yeah, so he's had a really interesting career in academics. He also started his own journal – dedicated research journal – which is quite cool, that he edited for a long time, so we had a little chat about that. And he also had some very lovely and sage words of wisdom for people who are maybe struggling a little bit with, you know, impostor syndrome. So yeah, good chat, great chat.

[Helena] Was there a favourite part of the conversation for you?

[Tom] Honestly, it's just really nice finding someone who also has a terrible memory. So if he managed to take that and create the first biological database on the Internet because he's got a terrible memory, then I feel like I could do so much. For all those people with terrible memory out there..

[Helena] There is hope.

[Tom] There is hope for you!

Intro music ends.

[Tom] Just before we dive in, we have a new sponsor on the podcast which is very exciting. This podcast is sponsored by Greiner BioOne, supplying laboratory, diagnostic, and medical products to research institutions, higher education, the NHS, and others across the UK. For details of the full product range, visit www.gbo.com.

Main

[Prof. Jamie Davies] So a fact that everybody knows about me is that I have a terrible memory. I always did. And when I was a postdoc working on kidneys, it was the era that people were just starting to publish gene expression patterns and protein expression patterns in tissues. I'm that ancient!

And remembering that was a problem, so I started to make Word processed tables, you know, sort of lots of columns on the table of different parts of the kidney, the rows on the table would be these genes in alphabetical order, and just ticks and crosses. And I just did that as an aide-memoire for myself and then in meetings when people come and visit the lab, I'd get the tables out for a conversation and "Ooh, can I have a copy?"

So eventually I had this thing of doing the tables, putting them in envelopes once a month or so, and sending around to about 20 different labs. And getting little thank you postcards in return.

And I read.. For various, semi-legal reasons I've been on the Internet since the 70s. And somebody had said that in CERN, there was an interesting idea that somebody called the worldwide something or other, of having pages that could be linked by hyperlinks, but not just within a computer, but from computer to computer, which was the new.. Hyperlinking things happened before, but only within.

And I thought, well, this would save an awful lot of messing about with the photocopier. I'll - I mean, I'm sure this World Wide Web thing will probably be gone in a year - but as long as it's around, I'll give it a try. So I found out how to write a web page and wrote the tables into web pages. It was so early, there were no pictures of browsers. There was an old browser called Lynx that ran on Unix and it was text only. And I did this and told my usual people: "Look. This is how you get onto the web and this is how you look at the tables." So I started to update it like that.

So this is only a couple of months after the web started, so it was... By complete accident, this turned out to be the first biological database on the web. And you know this is just a post doc who has a terrible memory. But for some weird reason... And I kept that going, but it meant that I got this weird reputation - completely undeserved - for knowing something about databases, when actually this is just a load of tables, and knowing a lot about the Web, which of course I didn't.

And in the US, the National Institutes of Health wanted a program for having a huge database about kidney development, and because I was already doing this, they took the unusual step of funding a non-US lab to be looking after this. So in collaboration with Duncan Davidson and Richard Baldock in IGMM (which is down at the Western General site), we put together a proposal to do all of this and ran this database, called GUDMAP, right up until Trump decided that money was staying in America. The project is still going, but now it's set in California.

So we'd done this big kidney development database called GUDMAP, and Tony knew about this - Tony Harmar - and we'd had chats about databases because he'd been interested in starting a pharmacology and he'd come to me to chat about that, way way in the beginning. So we'd have coffee-type conversations and very sadly he realised, he was diagnosed with a terminal brain tumour. And he came to me to ask... He had a grant to run his group, and could I look after the group doing the pharmacology database, until the end of the grant. And so of course I said yes. And I got... I went to the meetings, got to know them and realised that what they were doing was absolutely fabulous, and actually, I shouldn't be thinking of looking after these people until the end of a grant, I should be thinking of getting some more money and really pushing to build it up, and to keep Tony's memory going through it all. We have

the Tony Harmar Memorial Lecture, and the annual meetings around all this and so forth.

So that's what happened. And Wellcome Trust were very generous about funding an extension {doing} immunopharmacology, which of course suddenly now in the Covid crisis has become incredibly important: an overblown immune response is one of the reasons that people die.

[Tom] I think it's really cool that Professor Davies decided to push on with the database, and has kept it running. The Guide to Pharmacology database has actually been really useful in the wake of Covid, as Jamie and his team curated a specific section of the database that contained a list of all the possible drugs and drug targets that could be used to treat the disease. We covered all this in episode 3 of our coronavirus mini-series, so go and check it out if you're interested.

Professor Davies also mentioned there how an overactive immune response is one of the reasons that people can die from Covid, and we covered this in episode 1 of our coronavirus mini-series, where we learned about what makes some people more susceptible to disease than others. It's another sweet episode, so go and have a cheeky listen.

[Jamie] And then we have extensions to malaria, we've just teamed up with Antibiotic Research UK to have information on antibiotic resistance and so forth, so this is steadily growing.

So that's the story. So there never was... You know some years, I was sitting in these pharmacology meetings with my LadyBird book of {...}, trying, 'cause I'd never been to a pharmacology lecture in my life at the time, so desperately trying to catch up. And everybody, these amazing, world-class pharmacologists, or people who were research leaders of the big name drug companies, were so patient and so nice to me, explaining what they were doing. I was expecting utter impatience, but no, they were... I had these amazing kind of pharmacology tutorials from some of the leading drug developers in the world, just over coffee or over dinner. {...} It's been an amazing little journey. And the team are wonderful, the team of curators and developers. Which is good, because I absolutely rely on their abilities.

[Tom] I guess something that has become apparent from our chat is that so much of science relies on understanding where you don't necessarily understand something very well, and not being afraid to go and just ask the right person, or...

[Jamie] Yes!

[Tom] ...something like that.

[Jamie] I mean I suppose... It's funny, one of the things I notice teaching undergraduates, and even graduate students sometimes, is that they're really afraid to say "I don't know," and are upset by not knowing. And maybe because I had that late conversion to developmental biology, so I've always been playing catch-up. Apart from the one biology of cells course, I wasn't going to all of the other biological courses, I was doing physics and physical chemistry and things. So I was constantly playing catch-up from then on. For most undergraduate teaching, I've been asked to teach stuff I know nothing about until somebody says "Oh, can you do this set of lectures?" and "Oh! Right." So it sort of feels natural... The problem isn't to be expected to know stuff. I mean, think of the size of the library. That's just a vast repository of stuff we don't know. There's not point in being bothered when you don't know something, the idea is just to enjoy finding out, and sometimes to realise that outsiders can sometimes ask questions which turn out to be useful.

And I see the same thing, working with those guys I was talking about in Europe, the botanist and the cyberneticist. The questions they ask me about my system are really smart questions that I don't think of myself, 'cause I'm too {...}.

[Tom] Yeah.

[Jamie] And they're kind enough to say reciprocal things, that my blundering around in the dark questions about their fields, occasionally, they think: "Oh, actually, that's quite a good one."

So I think... There's a terrible myth that scientists are supposed to be sort of all-knowing. And no, we're

blunderers around in the dark. I think that's much more to do with it, than knowing. It's being happy with uncertainty, happy with ways of finding out, and really not being embarrassed to say: "I haven't the faintest clue what's going on."

[Tom] Yeah, and I think it's interesting what you say about people who aren't in the same field asking the basic questions that end up being the really smart questions.

[Jamie] One of the reasons I like teaching actually... I enjoy teaching anyway, but having... Undergraduates are fantastic at asking questions I've forgotten how to ask. They're fantastic at looking excited at stuff, and reminding me actually, this is amazing! "Thank you, undergraduate, you're right." It's just... Yeah, actually, on a dull February day, it can be such a lift.

I think as well, a lot of people talk in academia about impostor syndrome, where people wonder... They think, well, they're surrounded by all these clever people and somehow, they shouldn't be there and "What happens if I get found out?" And I think one of the things that's... Nobody believes you when you say this, but the antidote to it, it isn't to think that you're clever or something, it's to realise nobody else knows what the heck they're doing either. And then you realise you're not an impostor, you're just another person who doesn't really know what they're doing, but is doing the best they can. And that's how we all are, really.

[Tom] I think that will be very comforting to a lot of the listeners.

[Jamie] But it's true. A lot of science is like that: if we knew what we were doing, it wouldn't be research. It's a simple point, but a lot of people forget that and they get really stressed that they've no idea what's going on. Well, that's the idea of research.

[Tom] Yeah, and the best stuff will come from not having a clue. You know, you might have a terrible memory from gene expression and then end up creating an international database.

I wanted to talk about how science is moving so quickly at the moment, and it throws up these issues with how we do science traditionally. A big thing is the proper citation of work from databases of gene expression, from drug targets and stuff like that. So I wondered if you could talk about your collaboration with Peter, is it Buneman?...

[Jamie] Yes, yes.

[Tom] ... on ensuring that people get cited properly from your databases.

[Jamie] Yes. So the problem here – it's exactly as you said – it's that it's easy to cite a database as a thing, but the database can be massive, have literally tens of thousands, maybe millions of entries. So giving credit to the person who wrote the database – me and my colleagues – would not be right for a piece of information that was discovered by a person working in South Africa on a drug or whatever. And Peter Buneman's been interested in this problem – he's a brilliant specialist in databases and in informatics generally – and he's been in the game for a long time and has been bothered by this for a long time. We've been, we've had many discussions about how you can cite specific parts of databases properly.

For all of this to work, we wanted the citations to be picked up by things like Scholar Google, so that all of the... I mean, I really hate this world, but there are automatic ways that computer programs will search scientific literature and see who's published what and how many times it's been cited, and give them some brownie points according to all of this, and {that's how} you get these numbers like h-indices and things, which are misleading nonsense, but that's just the way the world is. So we wanted to make it so that people would get credit for contributing to a database because these machines would at least detect that they'd done so. And the library worked with us to create what's effectively a new electronic journal, but it's a journal to which no-one can directly contribute. Instead, each set of database entries – and that may be a single entry but typically, the people who help us put the database together are giving us information on a whole family of molecules – so each set

of that, there'll be a kind of abstract from the database entry which can be produced by machine, and the set of authors, and the citable entry for all of this, and then a link straight back to the database, and then a link to all of the information that they drew on in order to make the data entry. And importantly, the Google-type scrapers that are looking through the whole world of science will pick those up, because it is a genuine journal, run from Edinburgh, and everything is correct about it. The odd thing is that you can't actually send in a paper to it. And that's a very interesting solution to a problem. All of the credit for the idea goes to Peter, and for the implementation to him and Simon Harding, the developer. I've been in part of the conversations and part of the writing, but really, they deserve all of the credit.

[Tom] Do you hope that it's something that's going to be picked up by all these other databases, and put to use?

[Jamie] I think... Yeah, I think, partly as long as we're in the world of people putting together silly metrics for scientists, then it is important.

One of the problems of databases is that they die, when there's lack of funding. Even if the actual database is left on a server somewhere, as everybody knows people are constantly updating standards of the Web, and updating operating systems, and eventually any piece of old software won't run on the new version of something and it's dead. The problem is vast amounts of work can get lost. Having exported things like PDFs, which presumably will live for a very long time, of the contents of databases, it won't be as easy to use as the database, but at least the information is there and it's not lost. Every two years we generate a special issue of the British Journal of Pharmacology, which is full of an abstract, I mean it contains nothing but an abstract of our database. So at least there's a kind of backup in the libraries of the world of our database every two years, whatever happens. And I think these citable abstract things also form part of that: they move some of the data offline so it isn't lost all together.

But I'd love it if the world would just grow up and stop coming to these silly metrics for scientists, and actually

if you're trying to interview somebody, or shortlisting them for an interview, don't look at a metric, read their papers. Rather than just: "Oh, this guy's got an h-index of 38, but she's got one of 47, so let's employ her." For ridiculous reasons, connected to the database actually, my own h-index is stupidly high, and lots of people in my lab are now listed in this Web of Science 0.1% most cited scientists in the world list, and that's why I feel completely able to say this is absolute nonsense. And we're there because of the number of times people cite entities in our database from other papers. We're not there because of people doing normal citations. But it just highlights how silly these numbers are.

[Tom] It's something that's always confused me, looking at journal power scores and stuff like that, not really understanding where that number comes from, it just seems like such an arbitrary value.

[Jamie] I mean, of course there's an algorithm to generate it, but it doesn't tell you very much about an individual paper. I think the much more interesting graph, I've forgotten where this is published but it's pinned to a noticeboard near my lab, where somebody plotted the fraction of papers that are retracted – not just corrected by fully retracted, either fraudulent or just so bad they had to go – against the impact factor for the journal. It is very close to a straight line.¹ So New England Journal of Medicine, Nature, that bunch have a high rate of retraction, whereas Journal of Anatomy and those sorts almost nothing. Presumably because if you're going to make a fraud, there's no point in doing it for a minor journal. *Laughs*

But either way I think it's a comment about not worshipping particular journals because of their covers.

[Tom] So my next question to Professor Davies was about the research journal that he helped to launch, but I absolutely butchered the pronunciation in the interview, so I'm just going to do a little intro here. So yeah, Professor Davies launched a journal, it's called

¹ [Figure 1 from Retracted Science and the Retraction Index \(Infection and Immunity\)](#): Correlation between impact factor and retraction index. The 2010 journal impact factor is plotted against the retraction index as a measure of the frequency of retracted articles from 2001 to 2010 (see text for details).

Organogenesis, and it's a place for scientists to publish research on the development of organs, hence the name. The "organo" bit comes from the focus on organs, and "genesis" of course means creation. So "Organogenesis" is just the creation of organs.

[Jamie] I was editor for eight years, which is... That's two terms and then I stepped down from that. It was great fun to do, but by the time the eight years was up, stepping down with relief.

It was great fun launching a new journal, fortunately just before these days of predatory nonsense journals. I think it would be incredibly hard to launch a new journal now. And it was fun to do, but took a lot of time.

[Tom] Yeah, I mean how do you go about setting up a new journal? What is that process like?

[Jamie] Well, it was an established publisher who came to me to ask if I'd edit it - that's Ron Mandis. So for me, it was agreeing a scope for the journal, finding a good editorial board, and that's partly people you can trust to do a good job, and that's partly people whose names are well-known enough that it's clear this is not, this journal is serious.

And then, for the very beginning, really you have to... I mean nowadays this of course has changed it's reputation entirely, but back then, it wasn't a dodgy thing to do to be writing to people to say "Here's a new journal, and this is what we're trying to do, and if you've got any data that would fall into this, it would be great if you could come to us, but we don't have an impact factor yet." We're asking people, actually to do a bit of a high-risk thing. On the other hand, they know that, although of course everything has to be scientifically sound, the threshold of how exciting it is will be lower for the first issues, because you're not going to get the most exciting stuff sent to a journal which isn't going to appear on PubMed for two years. So that bit, the first couple of years, is always a bit rocky. Do you have enough really good material to fill the issues? So fortunately we did, we were only publishing quarterly back then. And then, as people start to see things that are in that journal, then the momentum starts to build and the whole...

People start sending things and, there's a kind of... You cross a barrier, and then suddenly, you become somewhere that people want to publish, and then everything gets... Easier in the sense of not being worrying about will we have enough to fill an issue, but on the other hand of course, then the whole business of sending things out for review, and dealing with all of that stuff, takes more and more of an overhead of time.

The other thing I'd never expected is the extraordinary things that get sent to journals. The number of creationist proofs that I had sent to me, and some of them on {...} paper, sent physically through the post, that had obviously been sent to journal after journal after journal. Or, you know, there was one really amazing piece of work, which... The trouble is, the author would think I'm being insulting saying this, I know because he's threatened to take me to court over not publishing, but it's actually I think a work of amazing science fiction. I mean that in a kind of respectful way. Effectively, it was imagining development working a completely different way, as a mechanical field in the egg, driving differentiation. And it was a kind of scientific fantasy. If the premises were correct, everything would have held together, and I thought it was absolutely brilliant for that, but it wasn't science, it was a piece of creation. A sort of very scientific art. And unfortunately, he got extremely stroppy when we wouldn't publish, threatening court action and all sorts. And I used it. Eventually I used the... I got permission, I mean finally we kind of settled down a bit, in the way we were writing to each other, and I got his permission to use it in a finals exam. No sorry, the author put in on the Web, so I gave a link to the Web. And the idea was to read this, and then to give the shortest evidence-based argument that would refute that this is really the case, from what people knew of developmental biology. And it was a really interesting exam to mark, and I think the students actually found it quite a surprising question, but an interesting one to do, 'cause it really makes you think.

So that was the most interesting crazy thing that was sent, but there were lots of creationist tracts and just all sorts of things. Or bizarre papers on subjects like

theology or astrophysics, and I was going "What the ! What?" *laughs* Nobody warned me that happens.

[Tom] Yeah! I mean are there any other surprising things that you learned, that you didn't realise would happen through getting involved in a new journal?

[Jamie] One surprising thing – I suppose I sort of knew about this because I'd been a victim of it – but that referees can be so rude. And as an editor, I would sometimes... I would always pass on the referees comments, but my covering letter would often be apologising for the tone of them. Or sometimes I'd write back to the referee and say: "Please could you rephrase that? The point stands, but there is no need to be rude. Do not comment on the intelligence of the scientist."

And then the other thing that was interesting is... You know, I think editors ought to play an active role. They ought to read reviews and think carefully. And something which has always annoyed me as an author, but I could see it so much more clearly as an editor, is the way that some referees just add loads of work which is not needed. To be slightly silly about this, let's say that somebody had published a really good paper about how mice hop, and one referee says: "That's really fascinating! Now tell me about rabbits." We don't need the rabbits for paper on how mice hop. And there were so many examples of that. I mean of course, normally molecular, but I just wanted to give a clear example.

[Tom] Yeah.

[Jamie] And as an editor I always thought it was my job to say: "Actually, no. These points, from referee 1, you must answer, because they're about the robustness of the work. All of this stuff that's extra, no, by all means just say no." And I think a good editor's job is to do that. We've all been victims of reviewers where the editor hasn't filtered out that way.

[Tom] It seems like a very frustrating process.

[Jamie] Yes. The other thing that surprised me was the... robust language of some authors when they were writing

back. There's a normal kind of standard of professional communication I always expected would be maintained.
Laughs.

[Tom] Quickly {...}

[Jamie] I wonder if alcohol was involved, sometimes the replies were very late at night.

[Tom] Yeah, I supposed it's... You like to think that research is this sterilised thing that happens, it's very objective, but it's human beings doing this at the end of the day...

[Jamie] Yeah.

[Tom] ... and they put a lot of themselves into the work.

I've only got one more question for you, you'll be glad to know. What are the worst and best things about your job?

[Jamie] Oh gosh. That's a really interesting question. It's really difficult to think of a worst thing about a research job. It's when you are working with a really talented young scientist, a postdoc for example, and they've put their all into a project and they're doing really well, and you've both put your all into a grant application that follows it up, and it doesn't get funded. And it's not just what it does to the project, it's the way it's kind of messing up their career trajectory. I'm very lucky: a lot of the people who work for me have got PI positions of their own and they're doing fine, but this has happened. And I think that's always the worst. And, when I haven't written a grant for a specific person, I can kind of shrug when it's not funded. But when it's for a specific person, that's when it hurts.

The best... It's some combination of discovering something, or realising something for the first time, or seeing the face of a student or colleague who's just done that. I don't know which is the best of those two, but that excitement of just that first time the penny drops, or the first time you see something. When you go from: "That's weird!" down a microscope to suddenly "Oooh!". And suddenly the weird thing... The penny drops.

Outro

Outro music starts

[Tom] Once again, a massive thank you to Jamie Davies for coming on the podcast. He was so generous with his time and we had a really, really nice conversation back in April, and managed to stretch it to three episodes, so I think that's pretty cool. If you want to, go and check out his research, go and check out his blog, on his lab website. That's super interesting, all about life in science, we'll pop the link in the show notes.

[Helena] This podcast is brought to you by the Edinburgh University Science Magazine. In each episode we explore fascinating themes and ideas, talk to awesome researchers about their work, and find out about the science being done by our very own staff and students here at the university.

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[Tom] This episode was edited by my partner in crime, Helena Cornu.

[Helena] That's me!

[Tom] The podcast logo was designed by EUSci chief editor, Apple Chew, and the awesome podcast cover art was designed by Heather Jones, our social media and marketing genius. The intro music is an edited version of Funkorama, and the outro music is an edited version of Funk Game Loop, both by Kevin Macleod.

I've been your host, Tom Edwick. Until next time, keep it science.

Outro music ends

Post-credits shenanigans

[Helena] Here are some choice outtakes from our recording of this episode. Caution, this is where we earn our explicit rating.

[Helena] 'Cause you are technically the host, I just...
Butt in.

Tom laughs

[Helena] Alright, let's do this outro, then we can chat some more.

[Tom] Let's smash it. This episode was edited by my partner in crime, Helena Cornu.

[Helena] That's me!

[Tom] The podcast... Oh, oh sorry!

Both laugh

[Tom] That's great, that's good. Okay. I'm going again.

Helena laughs

[Tom] ... dropping in. Okay, let's do this thing.

[Helena] Yes, okay.

[Tom] Alright. I'm going. Once again, massive thank yous to... Oh, not "thank yous". God, alright.

Helena laughs

[Tom] This is a nightmare.

They both laugh

[Helena] Okay.

[Tom] One of these days, alright. This podcast is sponsored by Greiner Bio One, supplying laboratory, diagnostic and medical products to research insti... Oh fucked it. Absolutely fucked it.

Helena laughs

[Tom] From the top!