

Writers Aloud

Episode 435

RLF INTRODUCTION: Hello and welcome. You're listening to *Writers Aloud*, a podcast brought to you by writers for the Royal Literary Fund in London.

Hello and welcome to episode 435 of *Writers Aloud*. In this episode, Brian Clegg speaks with Caroline Sanderson about how he brought together his parallel passions for writing and for science; explains why we can all claim to be descended from royalty; and describes the sense of wonder that he believes is integral to science writing.

Caroline Sanderson: Best known as a popular science writer, Brian Clegg is the author of more than forty books and a wealth of articles for a wide range of publications, including the *Wall Street Journal*, *Nature*, *The Times* and *The Observer*. Twice longlisted for the Royal Society Prize for Science books, a majority of his work focuses on physics and maths. But he's also often written about the impact of science on everyday life, 'We don't just need the science', he says, 'we need translators, which is where people like me, science writers, come in'.

Brian, it's interesting and somewhat unusual this role you have as a communicator of science. It's a bit betwixt and between, isn't it, because, as you've often said, you're not a scientist, but you know a lot more about science than the average lay reader?

Brian Clegg: That's right, and I studied science at university and I love science. But to be honest, I realised by the end of my time at university, I was not going to be a working scientist. My maths wasn't good enough

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to be a theoretician, and my practical skills – when I nearly burnt down the lab one Christmas – suggested that I probably wasn't going to be an experimental scientist either.

And I worked in industry for quite a while, but I've always loved writing as well. You know, from being a child and making my own comics and all that kind of thing, I was writing a novel on the train to school when I was fifteen, or whatever. And it took me a long time to realise that bringing those two together would be something that not only I could do well, hopefully, but also would be something valuable. Because science is so important to our everyday lives. More obviously than ever, I think, since the COVID pandemic. But it's not always easy to get your head around. So, as you say, acting as a translator and interpreter I think can be a very useful role.

Caroline Sanderson: It's a very skilled thing, I think, being a science writer. How do you get the pitch just right between under- and over-explaining a difficult concept? I've been reading your book, *Infinity: The Quest to Think the Unthinkable*, and I'm just about keeping up, but I can see how much thought has gone into the pitch of that.

Brian Clegg: In some ways it's better for me if I'm writing about something I'm not too expert in, because then I know myself where a lot of the pitfalls are, because I actually struggle until I've read through it in detail. So that can help, but also, getting into the context for me is what helps.

So, you remember your science books from school or whatever, it was all about what the science itself is. But what popular science can do is bring in context in terms of history and also people. It helps you, I think, relate to the science, if you can read a bit more about the people who have been involved. And there's always a danger that you get into the sort of 'expert' position where everything is pinned on one or two individuals.

And the fact is, science has always been something that's built from

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generation to generation. But even so, I think getting that personal nature and that historical context really does help get over some of the more complex issues.

Caroline Sanderson: So, I'm interested in how your skills and your enthusiasm as a writer came together with your love of science?

Brian Clegg: My father was an industrial chemist, he didn't go to university, he started as a lab assistant and worked his way up. And the company he worked in was involved in developing fabric conditioner. And when I was young, I remember my father coming home with jars full of strange green glop to put in the washing machine, some of which didn't produce ideal results.

But yes, that kind of exposure to the interface, if you like, between science and everyday life, I'm sure must have had an influence. But at the same time, I did always, as I say, love writing. I don't think it's quite so much the case now, but when I was at school, by the time you got into the sixth form, you had to go either in a science stream or an arts stream. You couldn't do both.

My ideal, I think, probably would have been to have done English and science, but I wasn't allowed to. And writing, as I say, did continue, I did write in the background anyway. And when I was working at British Airways, which I did for seventeen years as my only real job, I started writing for computer magazines because I was involved in computers quite a lot then.

I *think* it started because one of the magazines actually asked me to review this interesting new product called Excel, and nobody knew what it was going to be about. And from that I then thought, *Oh I like this, I like this writing business*, and started sending off things to magazines, and it gradually took over my life really.

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Caroline Sanderson: You referred earlier to the fact that during the pandemic, we've been confronted really with the vital way in which science can impact every single one of us. And one might also say, given that we're recording this on a day of record-breaking high temperatures, an understanding of climate science, not least from our politicians, is becoming ever more vital.

You've been a full-time writer for more than twenty years. Do you feel that the value of what you do is becoming more evident or more urgent maybe even?

Brian Clegg: I certainly see an urgency, it's not enough, I think, to have an emotional response to things like the environment, you have to understand the science behind it. We think of the temperatures rising at the moment, as you say, understanding climate change is a bigger picture, and we need to get our heads around quite a lot of different aspects of science to be able to understand that.

Particularly, I suspect, because a lot of our, dare I say, a lot of our politicians probably come from not scientific backgrounds. They typically, they come from an arts or politics background in terms of their degree; they can struggle particularly. I almost feel we ought to have a resident science writer in the House of Commons to explain to the politicians what it's all about.

Caroline Sanderson: Oh, wouldn't that be great? Yes, no more dodgy headlines!

Brian Clegg: I wouldn't guarantee that.

Caroline Sanderson: Well, one thing your books can do is challenge the instances of pseudoscience. You have a book called *Lightning Often Strikes Twice: The 50 Biggest Misconceptions in Science*. And flicking through that you know, some of them were not misconceptions for me, but others were. So it shows how, how prevalent these are.

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And reading your book, *What Do You Think You Are? The Science of What Makes You, You*, I read that with great interest and I love the way that you debunk our current obsession for ancestry and the DNA testing that is all the rage, which purports to tell us who we are. And TV programmes that tell celebrities they're descended from royalty, for example.

Brian Clegg: It's not so much with that one that it's a misconception, in fact, these people *are* descended from royalty, it's just that it makes it sound like something special. And the fact is, I can guarantee that you are descended from royalty. I can guarantee that anybody is descended from royalty, simply because of the way that family trees work.

Because every time you go back a generation, you double the number of people that are directly in your line. And because of that, as you go back through the generations, if you imagined a family tree just growing backwards with more and more people in it, you quite quickly get to a state where there are many more people in that family tree than have ever existed, it looks like.

The reason being that actually, that we start to get loads and loads of overlaps. And you can work out statistically, if you go back a certain number of generations, anyone who has living descendants, first of all, you will find, say, all in Europe, will have descendants from this person. You go further, anyone in the world.

So it's just opening up a little bit, the facts over and above the emotional side. And it's not to take away the emotion. You know, there's this classic thing going all the way back to things like, Keats and 'Lamia', where he accuses Newton of unweaving the rainbow by explaining it.

I don't think science does unweave the rainbow, I think we still can see the beauty, we can still enjoy it, but we add an extra layer of understanding, and the two together, I think, is much more fun than just having one or the other.

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Caroline Sanderson: So I mentioned your book, *What Do You Think You Are?* and I love the challenge that you set yourself in this book...we talk about popular science writing, we talk about you as a popular science writer, but actually a book like that, it's multidisciplinary about what makes each of us a unique individual.

There's physics in there, biology, genetics, some psychology, philosophy, evolutionary science. But also there's a chapter about our creativity as people and how that makes us unique. Is this a sort of blended challenge, is that something you particularly relish?

Brian Clegg: Absolutely, that's why I think being a science writer is actually a better job than being a real scientist, because we can be butterflies who flit around the bits that interest us. And being able to write a book like that I think is a bit of a privilege because, a) because I'm learning stuff, some of that stuff I didn't know before I researched it, but also because you get to look at all these different aspects that are of interest to you; psychology, I've always found fascinating. In fact I've several times cursed my tutor when I was at university in the first year, we had to choose a fourth topic because we did four topics in the first year, and I wanted to do psychology, and he was involved in crystalline state, which was a big thing at the time, and persuaded me to do that. And I always really regretted it, because I think psychology is a fascinating topic, partly, frankly, because sometimes it gets it so wrong, but that's a different issue.

But yeah, I think it's just nice to be able to see across different areas, see how they interact. And in the end, you know, we're not all about our genes and we're not all about the physics of how we operate, we are complex organisms. I think a lot of modern science is discovering the importance of complexity and the way that different systems interact with each other, different parts of our bodies interact, different parts of our brain, the way it acts. So having that pulling-it-all-together view, that holistic view, I think is really valuable but also it's very enjoyable for me to do.

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Caroline Sanderson: And I also feel like you set yourself an equal if not greater challenge with the book I mentioned earlier about infinity, which is subtitled, *The Quest to Think The Unthinkable*. Now that's got to be a challenge if there ever was one?

Brian Clegg: Yeah, and whenever you speak about infinity, big comes into it inevitably. And for me the inspiration really, initially, was when I was at school, we had a brilliant maths teacher and he was one who was prepared to go into more detail than you might expect.

And he was talking about frogs leaping on a lily pond from lily pad to pad, and how you could imagine if it jumped, say, a certain distance, and then half that distance, and then half that distance again, how it could actually jump an infinite set of times and still only travel a small distance, because each time you half it, as you add it all together, it only adds up to a small number.

And I found that totally incomprehensible at the time and he was very kind and actually went through it in some detail with me, and that started really a background interest in the concept of infinity. And I think actually, quite a lot of children, they do have that, you go to a primary school, ask them to count, the bigger and bigger they get, *five million, ten million, infinity!* kind of thing...this idea of something that just goes on forever is fascinating.

And as you say, this is a good example of where the history is really important, that you do have to go back to ancient times. Or for that matter, say to Galileo, he writes about infinity in a really quite entertaining way. In fact, compared with Newton, frankly, Galileo was a brilliant writer, he was a popular science writer, pretty much. And he talks about infinity and how, for instance, you can add stuff to infinity and it's still the same size. And you can divide things up into smaller and smaller pieces. And have one thing made up of an infinite set of infinite small pieces.

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And all sorts of things like that, in a way that is really quite entertaining. So again, it's getting the balance, it's getting the context, and hopefully getting that right. Bringing in the people, you know, so the people who have been involved in the maths of infinity, some of whom, according to rumour, went mad as a result of trying to work it all out. So it's just one of those topics I think that has a lot going for it.

Caroline Sanderson: Does it get any more challenging than that to explain?

Brian Clegg: Yes!

Caroline Sanderson: What's the most challenging, when you're writing for a lay audience, where does it get *really* challenging, rocket science, which is actually I'm told, very simple?

Brian Clegg: Yeah, rocket science is very straightforward, really. And, some of the things that are straightforward are quite surprising. So for instance, the Special Theory of Relativity, as soon as you mention relativity, people think, this is heavily complex. And the General Theory, which is the bit that explains gravity, is mathematically complex.

But the Special Theory, the sort of maths you do when you're fifteen at school, that's enough, all you need. It's basically a bit of Pythagoras, and you're pretty much there. To be able to show, for instance, that you can time-travel effectively. In fact, that's something that quite excites me about the way we teach science in schools. I do think, instead of teaching physics by starting with the basics of forces and electricity and stuff, it'd be much more interesting, I think, to bring in something like relativity, which isn't covered at all in GCSE.

And you can do that with the maths you've got, but it is more exciting because you can talk about time-travel and all that kind of stuff. Where it does get complex, I think, is where the mathematics is really what it's all about. So a lot of modern physics is driven from the maths. And although

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we can talk of illustrations, things that give a feel for it — if you think about something like the Higgs Boson that was in the news a lot in 2012, explaining that realistically requires a lot of maths.

And the examples everybody gives of it is actually pretty much fiction. It's illustrative fiction that sort of gives you a feel, but you just can't understand it without the maths. And you have to accept that there are aspects of modern physics you're never going to make it without having that mathematical background. I mean, I can't do the maths, frankly, so I can't expect anybody else to.

Caroline Sanderson: So who are some of your favourite science explainers, ancient, modern, the great communicators, would you say?

Brian Clegg: In terms of ancient, as I mentioned, Galileo is surprisingly readable. I would really recommend his book, *Two New Sciences*, which is his sort of general physics book, as opposed to the one about the Earth going around the Sun. But in terms of more modern science writers the one I think who started me was probably Simon Singh.

I remember the first...I think it was probably the first popular science book I ever read was his, well it's actually maths of course, the one on Fermat's Last Theorem, which I think I picked up on one of those rotating little bookshelf things on a cross-channel ferry, desperate to find a book to read.

And I was just fascinated because of the way he does the storytelling, he brings in the details of both the modern and ancient, if you like. So the original things that Fermat was doing, but also when Andrew Wiles actually did crack it eventually, this quite unusual person pulling those two things together, I think was very effective.

And from then on, lots of other science writers, some like John Gribbin, who've written many, many excellent titles. And I enjoy reading popular

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science in fact, as well as writing the books myself, I do review quite a lot of popular science titles. I have a popular science review blog, *popularscience.co.uk*, where I review those books. And it's just something I still do enjoy, and particularly being able to go, again, beyond my particular field, something like Nick Lane, for instance, who writes in biology.

There's some really excellent books out there. A couple of the books that have done really well in sales, I think particularly of Stephen Hawking's book, actually aren't that good as popular science if I'm honest.

The Brief History of Time – I may be controversial in saying this – but actually isn't a great book. And quite a lot of people infamously bought it, read about ten pages and then put it on the shelves.

Caroline Sanderson: They sort of aspired to get their heads around it, didn't they, because it sold so brilliantly? But actually, because he's such a compelling figure I guess as well.

Brian Clegg: Yeah, indeed. He was a great scientist, but as a book, it's not a great book. There are so many really good popular science books out there. I do hope/wish more people would give them a try.

Caroline Sanderson: Do you think the kind of nonfiction you write rarely receives its due in terms of the imagination and creativity that goes into it? I know that reading science fiction is very important in your journey to becoming a writer. So, what's the mix of all that in terms of, fact, the evidence, and then the imagination, the creativity?

Brian Clegg: Yeah, that's absolutely true about science fiction, which I also got from my father, who was an enthusiast as well. I think the thing about science fiction, it has a bad press in some ways because it's so easy to stereotype it, you know, as being about aliens with ray guns in space or whatever. But in reality, what science fiction is about is people. It's about how people experience different worlds and even just very small changes to our own world.

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So some of the best science fiction is in a world that's very similar to our own, but slightly different in some way because of some new technology, or some new way of seeing the world around us. And I think that kind of fiction can be really good at opening your mind. I know plenty of scientists who say they've been inspired by science fiction, that reading science fiction or just watching something like *Star Trek* or whatever, has, in their past, really pushed them in a new direction, made them think of something different.

So it's imagination, it's seeing the world in a slightly different way, which I think is what science fiction does, and in the end what science does, because science is about expanding our view, about opening up the way we look at things. I've always very much valued creativity, in fact, when I left my day job, between doing that and becoming a full time writer, I did do training in creativity for companies.

Something I started doing when I was working at British Airways. And creativity is something that we sometimes misunderstand. I think a great example would be if you were to compare, say, a ballet dancer and a policeman. Which is the more creative job? And the reflex answer to that is it's the ballet dancer.

But actually the ballet dancer just does what they're told, there's very little creativity in being a ballet dancer. The police person is actually out there on the street having to respond to things, having to come up with solutions. It's actually a much more creative role than being a ballet dancer.

And I think creativity is absolutely central, for instance, to science itself, scientists are themselves creative, but also to be able to put across these complex concepts and make them approachable. You have to think of different ways of doing it. So for instance, at the moment, I'm just working on a book where I want to talk about things out in space.

So things like supernovas and new galaxies, or whatever, and I'm putting

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that in the context of being on a space liner, so being out there, out in space, taking the tour, the really grand tour.

Caroline Sanderson: Like on a cruise, in space?

Brian Clegg: Absolutely. Yes. And just thinking of ways to get to the science, to make it more approachable, I think you do need quite a bit of creativity, it is really important.

We have this blinkered idea, you know, creativity is *just* about the arts, *of course* it's absolutely crucial to the arts, but it's also crucial to making decisions, to running a business, to writing any kind of book. It is central to what makes us human, I'd suggest, is being creative.

Caroline Sanderson: Do we need closer kinship between sciences and the arts?

Brian Clegg: I'd say absolutely, you know, it's not as bad as it once was. The old idea of the two cultures, that goes back to the late fifties or thereabouts. And the point made then was that there are very few scientists, for instance, who won't have seen a Shakespeare play, but there are very few people from an arts background who would have any idea what the Second Law of Thermodynamics, which is absolutely central to the way the universe works, is.

And I think it's slightly weakened, that thing, and also the aspect of it where, if you like, the arts people look down on the scientists, I think was true back then in the fifties/sixties. I don't think that is the case to the same degree but I think even so, there is more separation than there should be; each side can benefit from the other.

And even thinking about it as 'sides' in a way is almost unfair. You know, in the sense that we know very well that people like Einstein, say, was quite a decent violinist. There are plenty of people in the sciences who

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partake in the arts in different ways. And there are some artists certainly who have an interest in science and have involved it in their arts.

But I think there is still a bit of a separation. We could look wider when we're thinking about people's backgrounds and bring together more of these different sides. In the end, again, it's what popular science is all about really, that it is kind of an art in a way, but focused on a scientific subject.

Caroline Sanderson: When I think, and your books prompted me to do this, when you think back to the ancient, I guess, philosophers — they would have described themselves as, rather than scientists. And the sense of wonder that they had when they looked around them and tried to work out how the world worked, or even how we work as an animal. There's such a sense of wonder in that, isn't there, and I wonder to what extent you think science writing is about wonder?

Brian Clegg: I think it absolutely is, and one of my favourite things to do is to go and give talks in schools. And if you go and give a talk to a junior school, say, ten-year-olds, eleven-year-olds, *everybody* is excited about science. I quite often do a talk in junior schools where I'm talking about where the atoms in your body come from. The fact they're not new, they've been around for a long time.

And when I mention that there definitely are atoms in their bodies that have been in dinosaurs, there's always this big intake of breath, they really are excited by it, and it's across the board. And they get to senior school, and get to about thirteen, and suddenly it's not cool anymore to be interested and excited by stuff.

And we lose so many people at that point. And I really think we need to think more about how we can carry on getting that sense of excitement. Because people like me, and working scientists, so both science writers and working scientists, I think, have kept that sense of wonder. It's that kind of slightly childlike view of the world, I suppose, where you are still amazed.

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We just had a new patio laid outside and some of the stones have got fossils in them, and I just find that lovely and amazing. It's just little things about the world around you that can always amaze you. And I think it comes back again to this thing, it's not about unweaving the rainbow, it's about adding something extra.

The way you look at the world, you know, I can look out and I see a beautiful tree, but also I can think about the *amazing* science that's going on in those leaves, as they use light to generate energy in the tree and produce growth or whatever. It's going beyond just what you see to get some extra excitement, some extra wonder, as you say, from the science.

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RLF outro: That was Brian Clegg in conversation with Caroline Sanderson. You can find out more about Brian on his website, *brianclegg.net*. And that concludes episode 435, which was recorded by Caroline Sanderson and produced by Kona Macphee. Coming up in 'How I Write', we hear about the relative merits of pen versus computer, the role stationery can play in planning, and some of the pros and cons of writing software.

We hope you'll join us.

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