My Life in Genetics

An Interview with Professor Greg Radick, Vice President of the Adelphi Genetics Forum

Greg Radick

You originally studied history at Rutgers University, in your home state of New Jersey. What first drew you to studying the history of science in general and genetics in particular?

When I started at Rutgers in 1988, I was equally drawn to science and the humanities. I decided for the humanities mainly because of the terrible teaching on the Calculus 101 course I took, though I hoped that by majoring in history I could nevertheless keep my options as wide open as possible. At that time, I wasn't aware of something called "history of science," and some-

how or other I ended up not taking any courses taught by members of staff whom I later discovered to be well-known historians of science and technology. But in an idiosyncratic way I kept bumping up against the subject: in a reading course in sociology classics where I was assigned Thomas Kuhn's *The Structure of Scientific Revolutions* (1962); in a quantum-physics-for-poets enrichment seminar that used an amazing survey textbook, *Introduction to Concepts and Theories in Physical Science* by Gerald Holton and Stephen Brush (1973); and in a course on the history of the indigenous peoples of the Americas taught by a remarkable teacher with a remarkable name, Calvin Luther Martin, who, in a way that captivated me, made vivid the differences between Western and indigenous "thoughtworlds," with their radically different conceptions of history, knowledge, nature, humankind's place in the grand scheme, and so on.

This fitfully fed appetite for science got stronger thanks to the reading and pondering I did in the two years after I graduated from Rutgers in 1992, during time off from a very enjoyable job as an English teacher at a secondary school in Prague. I was especially enthralled by the work of Stephen Jay Gould, George Steiner (a literary critic who chastised humanists for their ignorance of science and mathematics) and Oliver Sacks, whom I read mainly in marvellous pieces he published in *The New York Review of Books*, which was on sale in my favourite bookshop in Prague.

Reckoning that the way to bring science into my life in a full-time way was to go to medical school, I went back to Rutgers for a year to study all of the science and mathematics that I needed in order to pass the US medical school entrance exam. I started with Calculus 102 (which was well taught, and which I loved), followed by the first-year courses in physics, biology, chemistry and organic chemistry. Intellectually I was over the moon, and was convinced

I was now on the right path. But by then I had an English girlfriend (now my wife) who had a contract to be a trainee solicitor at a law firm in Cambridge, so I got hold of Cambridge University's catalogue of master's degrees to see if I could maybe find something to occupy me for a year before I made the medical-school plunge. That was where I first saw the words "history and philosophy of science." I'd had no idea that there was a name for the sort of thinking about science which, if I was honest with myself, I preferred to the doing of science, let alone that you could study it as a degree. That turned out to be a life-changing moment of discovery. Happily, I got admitted to the Cambridge MPhil in History and Philosophy of Science in 1995; and though I went on to take (and do pretty well on) the medical school exam as career insurance, I was able to stay on at Cambridge for the PhD, eventually writing a thesis that became the basis for my first book, *The Simian Tongue: The Long Debate about Animal Language* (2007).

As for the history of genetics, my first engagements with it were as a teacher: initially as a tutor on the Cambridge second-year survey course in the history of science; and then, more extensively, as a substitute lecturer for a third-year course on "Darwinism, Genetics, and Social Science," taught by the sociologist Martin Richards. It was while searching for images to illustrate my lecture on the 1900 rediscovery of Mendel and its aftermath that I first encountered a photograph that became very important for me. Published in February 1902 at the end of a searing critique of Mendel's paper by the Oxford biologist and Mendelism critic W. F. R. Weldon, it shows – contrary to Mendel – garden peas whose colours form a green-to-yellow spectrum. Right away I sensed that there was something here worth pursuing further. In 2000, as I was finishing up my PhD, I brought a copy of Weldon's photograph with me to a job talk at Leeds

for a lecturing position in its wonderful Division of History and Philosophy of Science, by way of indicating the direction of my future research. I had the immense good fortune not only to get the job but to inherit the historian of biology Robert Olby's old course on the history of genetics, enabling me to continue learning by teaching.

By 2012, when I gave an inaugural lecture after my promotion to a professorship at Leeds, I had figured out in a general way what I wanted to say about Weldon and the controversy over Mendelism, and I used the lecture to set out the themes of the book I hoped to write. Especially fascinating to me was the contrast in the visions for the science of inheritance between the Mendelians, who emphasized the centrality of either/or character binaries caused by nothing but allele combinations "for" those characters (think of Punnett squares), and Weldon, who instead emphasized characters that are conspicuously variable depending on differences in internal and external environments. Completing the research and the writing took me another ten years, but I got there in the end: *Disputed Inheritance: The Battle over Mendel and the Future of Biology* – with Weldon's pea-spectrum photograph on the cover – came out in 2023.

What are your main areas of study at present?

Genetics and its history continue to loom large. One ambition I've had for a long while is to publish a scholarly edition of the "Theory of Inheritance" manuscript that Weldon was working on when he died unexpectedly in 1906. Now that *Disputed Inheritance* has piqued curiosity in that manuscript, and in Weldon more generally, I think it's high time to bring that project to fruition, which I hope to do with several history-of-science and scientific collaborators. A

different but no less Weldonian collaborative project also coming to fruition is an experimental study of genetics pedagogy led by the educational psychologist Brian Donovan, the biologist-educator Michelle Smith and me. Thanks to National Science Foundation funding, we've been able to push to the next level of rigour work begun at Leeds over ten years ago looking at the impact on university students of translating those Weldonian emphases on variability and environments to the introductory genetics classroom, in particular on students' ability to learn about genetics without picking up the misleading and pernicious notion that DNA is destiny.

In my own right, I've got a number of talks lined up that will give me a chance to develop further my claim in *Disputed Inheritance* – not original to me, but I've got my own take on it – that molecular knowledge about inheritance owes little to distinctively Mendelian knowledge, in that the former would have emerged with or without a prior Mendelian heyday. Especially on my mind right now, however, is my text for the 2025 JBS Haldane Lecture, which I'm deeply honoured to have been awarded by the Genetics Society, and which I'll be delivering in Cambridge in June.

Beyond the history of genetics, I'm very pleased to be working with Leeds colleagues and students, current and former, on a volume meant for the general reader and giving permanent form to a public lecture series we put on back in 2016 and 2017 called "History and Philosophy of Science in 20 Objects," featuring objects from our Museum of the History of Science, Technology and Medicine, including an X-ray camera used in the 1930s at Leeds to take the first X-ray crystallographic photos of DNA. (The research was done in the textile physicist William Astbury's lab by Florence Bell, the Leeds counterpart to Rosalind Franklin.) And I have quite a few other writing projects in various stages on the go, including a chapter I'm finishing up for a handbook on "integrated history and

philosophy of science" about counterfactual history of science.

From the beginnings of my studies in history of science I've been intrigued by the ways in which the authority of scientific knowledge is bound up with the notion of its inevitability – with, that is, its reputation for transcending the accidents of personality and, more generally, the accidents of human history, so that, no matter the historical particulars around a discovery or invention, in a deep way they don't really seem to matter, in that the discovery or invention would have come about anyway given other histories, with different personnel, circumstances and so on. No less intriguing to me has been the related puzzle of how we make plausibility judgements one way or other about claims as to what might have been in the scientific past.

To return to the Leeds experiment in teaching Weldonian genetics: I got the idea for it as a way of assessing the counterfactual potential of that manuscript that Weldon never lived to complete and publish. What if this ordinarily robust forty-six-year-old had survived pneumonia in spring of 1906 and then gone on to finish and publish that manuscript, in which, more fully than he had managed anywhere else, he set out the theoretical and empirical case for treating context dependency in hereditary characters as the rule rather than, as per Mendelism, the exception? It occurred to me that an indirect way of answering the question was to try to teach introductory genetics as if the curriculum had emerged from the Weldonian past that never was but might have been – a curriculum which, in line with Weldon's views, anchored students on examples in where the modifying role of environments was unmissable.

To my permanent amazement, I got a grant which then enabled a small team of us to give it a go. What we found was that, whereas students at the end of the standard start-with-Mendel

course on average were as deterministic in their attitudes towards genes as they were before teaching – in other words, that nothing learned in between had disabused them of the notion that DNA is destiny – students who'd taken the Weldonian course were on average less deterministic about genes. At least among the genetics educators I spend time with, that's a win: the more you know about genetics, the less confident you should be that you can read off phenotype from genotype.

It has been a thrill to see how the Leeds experiment has fired the creative imaginations of biologists and biology educators when it comes to exploring new options for teaching genetics in the present. But a major element of the thrill for me is the link with the initial ambition to improve the evidence base for judging an old but unrealized option in the scientific past. In that spirit, my handbook chapter is very much conceived as a how-to guide, by way of encouraging readers to "go there" in raising their own counterfactual questions about the history of science and in bringing evidence to bear in trying to answer them.

You're a member of the Board of Trustees of the Science Museum Group. What does this involve?

The role has two aspects. One is inward-facing, and mainly involves working with the other trustees to serve as a "critical friend" to the Director and other members of the executive team in the running of this enormous and extraordinary institution, comprising five museums – the Science Museum in London, the National Science and Industry Museum in Manchester, the National Science and Media Museum in Bradford, the National Railway Museum in York, and Locomotion in Shildon – plus the newly opened Science and Innovation Park near Swindon. The other aspect is outward-facing and amounts to acting as a sort of am-

bassador in helping the Group achieve its goals, in fund-raising but also in other areas.

As the sole historian of science at board level, I'm especially keen to fly the flag for the Group's extensive collections of historic objects, books and archival documents, as assets in presenting science in the public galleries and exhibitions but also as potential foci for research by my fellow historians. I was involved for a while in the Royal Society's Lisa Jardine grant scheme, which has been a great success in recent years in animating research on the Royal Society's collections by funding extended visits from early-career historians from Britain and beyond; and I would love to see something comparable for the Science Museum Group. So, if anyone reading this is minded to be philanthropically generous along these lines, do get in touch!

On what roles do you think the Adelphi Genetics Forum should concentrate?

In line with the recent name change, the Forum has identified a very important as well as distinctive niche for itself in supporting public discussion and scholarly research on the past, present and future of genetics, so I'm very much cheering on the organisation and its current priorities, including of course the publication and dissemination of this *Review*.

I'm also really pleased to lead the recently founded Working Group on the History of Eugenics, where I've been working with Shirley Hodgson and Marius Turda to help continue what we see as the organization's honourable tradition, begun back in Galton Institute days, of extending that support to discussion and scholarship on the history of eugenics. At our suggestion, the Forum recently made freely available the scans of three outstanding Gal-

ton Institute volumes from the late 1990s and early 2000s on the intertwined histories of genetics, eugenics and social Darwinism, and the positive response I've received from the history-of-science community indicates that our efforts along these lines are really appreciated.

Tell us something about yourself that isn't widely known

Although my undergraduate major at Rutgers was in history, my minor was in music, and I now play bass – my main instrument (though I can get around a little on piano and guitar) – in a jazz collective with fellow amateurs in Ilkley, the town where I live in the north of England. I'm not anything like as good a musician as I should be after forty-plus years of playing and even some formal study. But practice helps, and hope springs eternal…

Gregory Radick

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