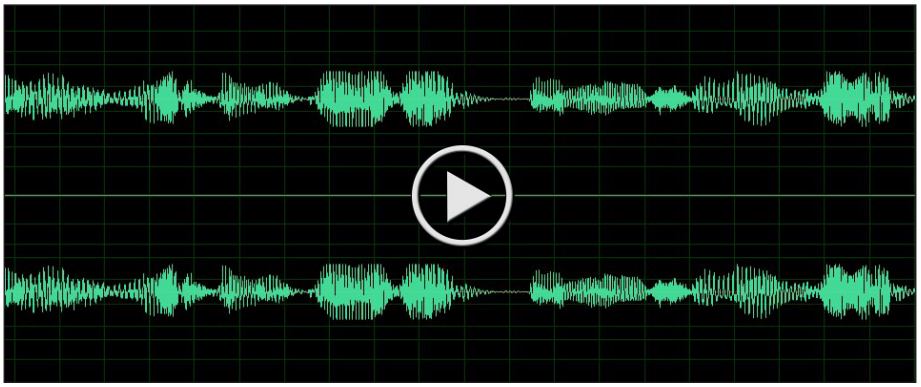
Citizen Science: Sally Shuttleworth and her Team Interviewed by Carolyn Burdett

Geoffrey Belknap, Carolyn Burdett, Gowan Dawson, Alison Moulds, and Sally Shuttleworth



Citizen Science: Sally Shuttleworth and her Team Interviewed by Carolyn Burdett. [https://soundcloud.com/birkbeck-podcasts/citizen-science-an-interview-with-carolyn-burdett-1]

Carolyn Burdett: My name is Carolyn Burdett and I'm the editor of *19*. I've been interested for many years in the way in which scientific ideas and literary culture cross-fertilized in the Victorian period. It's therefore a real delight to welcome today participants in an innovative and important project that's thinking about how the science of the nineteenth century illuminates scientific practice today. The project is called Constructing Scientific Communities: Citizen Science in the Nineteenth and Twenty-First Centuries and it's led by Sally Shuttleworth who is Professor of English Literature at St Anne's, University of Oxford. She's working (alongside other partners) with Professor Gowan Dawson of the University of Leicester.[1] Professors Shuttleworth and Dawson have come together before on a project about scientific periodicals in the nineteenth century and they will, I'm sure, be talking about this. One of the things we are interested in today is how our contemporary experience of the new possibilities — as well as challenges — being produced by digital technology has a counterpart in Victorian publishing transformations that helped shape the practice of nineteenth-century science. The same digital technologies also have profound implications

This transcript has been lightly edited to improve readability.

[1] All hyperlinks in this interview were accessed on 17 October 2015.

for how we know and what we know of the past. Both Sally and Gowan are authors of field-setting books about literature, culture, and science and their work will be well known to readers of *19*. Sally's on George Eliot, Charlotte Brontë, and child psychology; Gowan's on Darwin and respectability and soon on palaeontology. It's also a great pleasure to introduce Geoff Belknap, who is a post-doctoral research associate based at Leicester and the Natural History Museum, and who is an expert on illustrations in natural history periodicals; and Alison Moulds, who recently completed an MA in Victorian Studies here at Birkbeck and is now working on the Scientific Communities project as a PhD student focusing on medical writing and fiction. Thank you all for coming today.

Can we start by asking you to say a little about what the project is and how it came into existence?

Sally Shuttleworth: Shall I start?

Carolyn Burdett: Please do.

Sally Shuttleworth: The earlier project on which I worked with Gowan was called Science in the Nineteenth-Century Periodical, but in that instance we were looking at the role of science in the *general* periodical; what I am interested in doing now is looking at the vast explosion of *science* periodicals in the nineteenth century that are lying mouldering in libraries completely disregarded. People work on medicine in the *BMJ* (*British Medical Journal*) or the *Lancet*, but all the other medical periodicals do not attract scholarship — nor those in natural history from the local natural history societies — and so we were very interested in looking at the ways in which the periodicals functioned in the nineteenth century to create scientific communities between amateur and professional communities. When a call came from the AHRC for a project that looked at science or humanities working with contemporary scientists, it enabled us to bring our scholarship in conjunction with a colleague of mine at Oxford, Professor Chris Lintott, whom listeners might know as the presenter of The Sky at Night, and who has created a wonderful Citizen Science project which is online and open, and now has 1.3 million users across the world in various aspects of science. In discussions with him, we realized there were wonderful parallels between what he was attempting to do digitally in creating these communities of users and what was happening in the nineteenth century, so our project is a way of bringing the nineteenth and the twenty-first

centuries together with a hope that we will illuminate and aid the work of the twenty-first century.

Carolyn Burdett: My next question is a follow-up to that — it's about this notion of Citizen Science. Zooniverse, which is the Web portal of the Citizen Science Alliance, has been active since 2007 and the *OED*'s first dated citation for Citizen Science is 1989, but its others are all from 2000 on. So I can see that one of the aims of your project, as you've just explained, is to connect twenty-first century Citizen Science with the work of the nineteenth century, and I wanted to ask you to say a little bit more about how you understand this term Citizen Science, how you're putting it to work in the project? Does it have to be formulated in different ways in your work and does the project seek actively and consciously to so reformulate and, if so, in what sorts of ways?

Gowan Dawson: Citizen Science is a contemporary term and really relates to volunteer workers in science — that's the crucial aspect — these are people who are not paid, who voluntarily choose to do this. It's very much connected with new digital projects, particularly related to scientific areas with large data sets. So initially, with Zooniverse, the topic was astronomy, with incredibly large data sets. For us there's also another crucial aspect of Citizen Science and that's actually something that differentiates it, say, from mere popular science, the diffusion of authorized elite knowledge to supposedly passive and grateful publics. This is about volunteer workers in science who are producing real, genuine, elite, top-quality science and this, in part, is because of these very large data sets. The Zooniverse motto is 'The universe is too big to explore without you'. Chris Lintott, the other co-investigator on the project, always says that actually there was no philanthropic or altruistic motivation behind the formation of Zooniverse; it's that actually he wanted to do his own professional astronomy better and the only way of doing that was to bring on board a whole army of other people who are interested in the same things but who would work voluntarily.[2] So it's very much about having a large distributed community and at the heart of our project is the notion of a community who are participating and creating real, top-quality professional science. It's about a conjunction between what we have now in the twenty-first century — clearly defined communities of professional and what we would now call, I suppose, amateur or voluntary workers. Now those distinctions were different

[2] Chris Lintott is Principal Investigator on the Zooniverse project.

in the nineteenth century and we are very well aware that in using Citizen Science we're not using a nineteenth-century term. It's an anachronistic, retrospective term that we, in some ways, are seeking to relocate in the nineteenth century, but it's a kind of heuristic device and certainly as a historian, or as a cultural historian, one of the things using a contemporary notion of Citizen Science has led us to do is to look at how ordinary people contributed to and helped make the most fundamental and prominent aspects of science in the nineteenth century. One example we are very, very fond of is Darwin and his reading of science periodicals — the *Magazine of Natural History*, *Science-Gossip* — very quotidian, ordinary magazines. But actually, you can see if you read *On the Origin of Species* or even later works like *The Descent of Man*, how much information Darwin was taking from these journals, much of which was material, information, observations that were contributed by ordinary people: artisans, women sometimes, who were encouraged to write into the correspondence columns of these magazines. This is not merely passive popular science, this is stuff that Darwin was able to take and to use for his momentous theoretical breakthrough, which was very much based on that kind of ordinary science. And one of the things that working in conjunction with the people at Zooniverse has led us to do as historians is to think about the motivations of what we're labelling Citizen Science — or Citizen Scientists. At Zooniverse, they have to constantly think 'How are we going to keep our volunteers motivated? How are we going to make sure that they continue to do this work that is so necessary for our professional astronomy?'. And I think as historians we sometimes lose that sense of what motivates the historical actors that we look at and, by thinking about this from a contemporary perspective, it's enabled us to think about individual motivations of the historical lay participants.

Carolyn Burdett: Nineteenth-century scientific communities, as you've been suggesting in that answer, were shaped and organized by distinctive material practices such as the periodical on which both you and Sally have worked before. How do these material practices converge with or diverge from the scientific communities currently being shaped by twenty-first century forms of media?

Sally Shuttleworth: One of the issues we are trying to solve for the twenty-first century is how you create the interaction between the professional scientist and the user or participant in online projects. At the moment what is happening is that users are going online, they are going on Talk, which is a tool for them to exchange information,

but they are not connecting up with the professional scientists as much as they should. Whereas if you turn to the nineteenth century you can find, as Gowan was saying, Darwin writing in to the *Gardeners' Chronicle*, asking people to send in their information; or in many other periodicals, you can see major names alongside people we have never even heard of and all sorts of debates that are busily going on between different constituencies. And so what we are looking at is ways in which you could create that form of community again. For all the endless online tools, they are finding with the Zooniverse that something is still missing; and we're hoping to offer some illumination on that.

Gowan Dawson: Some sharp-eyed observers have noticed that there's a missing gap of the twentieth century in our project. We focus on the nineteenth and twenty-first centuries and there are material reasons for that. We have this idea of parallel information revolutions: so, in the early nineteenth century, there was a veritable explosion of periodical publishing, partly because of the steam printing press but also new distribution techniques, and cheaper paper, which made periodicals much more accessible, much cheaper. They could be produced in much larger numbers, and this enabled a far greater degree of citizen or lay participation in science. Ordinary people were able to read and purchase science periodicals and we feel that there is a similar material revolution going on in the twenty-first century with the Internet and other associated digital technologies, enabling the kind of citizen participation that Zooniverse has utilized. The parallels between the two really are very extraordinary and that's the reason for the twentieth-century-shaped hole in our project. Because, although interesting things were happening in the twentieth century, there was a sense in which the divide between the amateur and the professional in science was increasing in the main. We feel that there are material convergences between the nineteenth and the twenty-first century that are enabling those divisions to shrink again.

Carolyn Burdett: The next question I want to address to Geoff and to Alison. The nineteenth century saw, as Gowan's been saying, an explosion in scientific periodical publishing, so I want to ask about what kinds of archival initiatives the project involves and how they challenge or change our understanding of the nineteenth-century canon. Sally has already said a little about this: what are the particular issues of bringing materials into view in this new digital era, and what kinds of questions and challenges are there about issues of sustainability?

Geoffrey Belknap: I'm Geoff Belknap, post-doc on the project. The periodical as an archive is a big question that runs from Sally and Gowan's and many others' earlier work which feeds into this project. How can we think about this colossal increase in not just pages of periodicals but numbers and titles of discrete journals that start and then finish, or go on for years; how can we think of them as either cohesive or as separate groups; and, on top of that, how can we think of Citizen Scientists — or are they participants? Part of the answer to that, I think — what we're going to come out with at the end of this project — is that digital platforms, such as Zooniverse and the use of Citizen Scientists, can help us gain some incredibly detailed knowledge about what's in these periodicals in a way that we have never done before — and have never had a chance to do before. At the same time, we don't want to undermine the importance of the material objects themselves; we want to be able to have access to them, and to have a type of dual understanding of both the material objects themselves but also a digital, quantitative analysis of them. So, for myself, I get the fantastic opportunity to be working at the Natural History Museum which has, for natural history periodicals, one of the world's paramount collections, at least for the nineteenth century. It includes journals to do with natural history, but also local society journals and a whole range of them. I can sit in the office and go and collect them and bring them to my desk and look at them and go through them and see what kind of illustrations are popping up as I flip over the pages, which is of course one of the potential limitations of digital media, in that you can't navigate the objects in the same way that you can when you have them in front of you — you can't understand them, their size, their smell, how they operate as material objects that a reader would have understood.

Carolyn Burdett: Is there an example that you have for us of where you might have been surprised by something or learnt something that you think you only had through that material engagement?

Geoffrey Belknap: Sure. I was searching through the University of Leicester library early on in my post-doc and I gravitated to one of the best titles that we have, which is *Science-Gossip — Hardwicke's Science-Gossip*. As I was searching through, doing a cover-to-cover search, I found a pressed fern. You can't replicate that on the Internet, at least not in quite the same way. We haven't got full details yet, but I've been trying to understand what that fern is. I don't know if we'll ever get a full understanding of who put it there, but it definitely brings together the practices of collecting, of bringing other objects

into books, and underlines that books weren't just things that were read; they were things that people did stuff with. They moved them around, they pressed flowers in them, they kept them on their shelves and books consequently carry all of these different types of meanings. Sometimes that's lost on the Internet. At the same time, however, we're using digital platforms such as Zooniverse; we've taken the journal *Science-Gossip* and used that for the title of a website which we've developed with Zooniverse and the Biodiversity Heritage Library (BHL). We have taken the first five periodicals and their runs and put those all up online on a platform called Science Gossip where we're getting Citizen Scientists to log on and create related metadata. So, for instance, we're trying to understand how often illustrations occur in natural history periodicals, and in what form: I could try to count and analyse them on my own, but it's much better if we have Citizen Scientists, or a crowd, to help us figure out what they are. They bring information and often draw on their own knowledge about whether it's an example of local flora and what species is involved. The illustrations often have old names that are no longer in existence, but someone might know, or lost names might be attached in the text. We are getting them to do a number of different tasks where they tell the Biodiversity Heritage Library more about what kind of illustrations exist in their archive, and make it possible to search for them. But also, at the same time, they are creating information that is going to be useful for myself as a historian, and also hopefully other historians, who want to know more about how often illustrations occur, where they are placed in a periodical, what they relate to in the text, and how they relate to each other. So Citizen Science is really opening up an archive. It's expanding what is already a massive archive, but making it more knowable, more understandable.

Gowan Dawson: One could even see it as Citizen Humanities with the vast archive of Victorian periodicals as our big data set. And as Geoff was suggesting, in order to understand it properly as professional historians and literary critics, actually we need the contribution of volunteers as well.

Carolyn Burdett: Alison?

Alison Moulds: I very much agree with a lot of Geoff's observations from my experience of working with medical periodicals. I'm working with a collection at the Royal College of Surgeons of England and it's been a very exciting, but slightly formidable experience as

well. My previous engagement with medical periodicals as a genre had been quite sporadic. I turned sometimes to *BMJ* or the *Lancet* in my previous research but I'd never come into contact with so many periodicals, so that was a revelation for me, really. Getting to grips with such a vast collection has been a big learning curve, but I think — as Geoff said — it's balancing a methodical approach to working with them and keeping a good database of the different journals, but also enjoying the material aspects of them. Not always going in there with something specific in mind, but just being able to pull off different journals from the shelves and turn through them and come across articles that you didn't necessarily expect to find, or titles that are totally new to you. One of the interesting aspects of bringing these materials into view is discovering titles which aren't digitized and aren't easily accessible or searchable. Something like a title I came across — *The Doctor: A Medical Penny Magazine* — which was published in the 1830s and was written with a lay audience very much in mind, as well as a professional one. Just being able to bring new journals to light I think is a very exciting aspect of the project.

Sally Shuttleworth: I should note that we are also working with the Royal Society and their collections as well. We recently held a workshop in Oxford on working with medical periodicals and the experts there were saying that, in fact, only 1 per cent of the periodicals in the nineteenth century have been digitized, so people who believe that they are accessing all there is to access in fact are…

Carolyn Burdett: Not…

Sally Shuttleworth: No. So there is still very much a place for the physical objects and the wonders of rummaging on the shelves.

Carolyn Burdett: Yes, indeed! Can you say something about the division of labour in relation to the project, the aspects of what-we-all-do; how different roles and involvements have been decided upon and developed; how different skill sets have been identified and used; and whether there are distinctive intergenerational dynamics at work, and, if so, to what effect and with what sort of relationship to a changing technological world?

Sally Shuttleworth: Geoff, maybe you want to start us off?

Geoffrey Belknap: To answer the final question about what's distinctive intergenerationally: for me, it's a very collaborative

project to work on. There is an incredible number of people and an incredible span of knowledge base that's in the project in and of itself, and I would say the only intergenerational difference is that junior scholars, such as myself and my post-doctoral colleagues and PhD students, tend to do more of the social media management. That's also a skill set that we need — to be developing blogs and having active Twitter accounts — as having active social media is an aspect of engagement with others, and one of the really key aspects of the project as a whole: we are doing a lot of public engagement. For us, as junior scholars, social media is, I think, one of the ways for developing a strong skill set for that. In terms of what we all do, the way that the project is organized as a whole is quite clearly defined in that we have specific strands: we have the historical strand and we have the modern strand, and within these strands we all have specific projects. I'm the person who has expertise in illustrations in the nineteenth century, and in the history of natural history; my colleague at Oxford, Sally Frampton, has medical history periodical expertise together with Alison, and Berris Charnley, who is the third post-doc on the project, is a historian of genetics and agriculture, but also very interested in how communities have moved over time (so he is more of a twenty-first centuryist). And we also have developers from Zooniverse, who are working with Chris Lintott — Jim O'Donnell, for example, is a programmer who has developed our Citizen Science projects. So we bring a distinct set of skills for either historical or modern or computer-based or other forms of Citizen Science work. It might seem like a hodgepodge but it's actually quite organic, it seems. While we each have our own distinct fields, we're all working towards trying to understand what exactly a Citizen Scientist is, whether in a nineteenth-century version or a twenty-first century one; and what kind of media they are utilizing, whether it's a periodical or the Internet. These differences drive and motivate many of the questions that we are all trying to ask.

Sally Shuttleworth: We're also working with contemporary naturalists, both amateur and professional. We have a project which is run in conjunction with the Natural History Museum, which is Orchid Observer, working with the contemporary naturalist community, who in this instance have been involved in creating and designing the field study and experiment. We have citizens who are going out with cameras, taking pictures of the flowering orchids, which are then going to be analysed by Citizen Scientists online and, in addition, we are using the historical records from the Natural History Museum of when orchids flowered in order to explore the potentiality of climate

change. So you can see it's both a scientific project and a historical project and it works wonderfully well in terms of its interactions with the rest of the project.

Carolyn Burdett: One feels that's an example Darwin would have liked quite a lot.

Sally Shuttleworth: I think he would, yes.

Carolyn Burdett: Alison, how do these things confront you as a postgraduate student in your PhD?

Alison Moulds: I am aiming to pursue my individual PhD project, but within the wider framework of a project. Fellow PhD students say to me, 'Oh what's it like to be part of a bigger project?', and of course I've never done a PhD outside of that context. But I have a lot of freedom to explore my own research interests, so I'm looking at the way the doctor/patient relationship is imagined or theorized in writing by doctors, including in the medical journals. I'm very much working on that individual project, but also enjoy being part of the wider work as well, being able to get involved with some of the public engagement activities that are happening at the Royal College of Surgeons, helping to organize an exhibition as well — so lots of different opportunities that I get to be part of while doing my own individual research.

Gowan Dawson: I think one of the really interesting aspects of such a large and multi-institutional project is people from universities working with museum professionals who often have different backgrounds, different objectives, different ways of coming to something or understanding something, and it's proven enormously fruitful. Thinking intergenerationally is crucial: for the new generation of scholars, for the post-docs, and for the PhD students, public engagement and the impact aspect of research is going to become increasingly important in terms of one's CV and getting jobs. It seems to me that people on this project are being incredibly well set up with the skills for that world and, a lot of the time, that is achieved through working with museums. In terms of finding or identifying particular skill sets we had a wonderful example of this late last year, when we were asked by the AHRC to contribute to the Being Human Festival, the first national festival of the humanities; and Geoff and I thought 'Okay what are we going to do with this?', and we decided on an

event at the University of Leicester library about public participation in science in the Victorian period, but also now. And Geoff revealed an amazing skill in acting and dressed up as a Victorian science lecturer and gave just the most stupendous magic lantern show. We borrowed a magic lantern from the Natural History Museum and also a number of artefacts. This is one of the first times that they had undertaken this form of arrangement with a university so they were finding out new things about what they can do with their collections, just as we were finding out new things about what we can do as academics. I'm afraid I chickened out — I came dressed as a contemporary academic, that was my costume for the day — but Geoff and our PhD student on the project, the counterpart to Alison, Matthew Wale and a couple of other people, came top hatted; Geoff had mutton chops. It was a great example of academics having to develop really good skills of public engagement. Public engagement isn't just something that you do on the side: you actually have to think about it and do it well in order to engage the public and I think that's something that is coming out really well in this project.

Carolyn Burdett: I like the sound of that as a transferable skill.

Gowan Dawson: Hopefully, yes.

Carolyn Burdett: Can you give some more examples of your most exciting instances so far of the parallels or tensions or contradictions between the nineteenth and the twenty-first centuries?

Sally Shuttleworth: I've found myself, to my surprise, working on meteorology in the nineteenth century because I became very interested in the rainfall observers, particularly someone called G. J. Symons who organized a wonderful volunteer network of rainfall observers. So by the end — he started in the 1860s — by 1900 he'd worked his way up to over three thousand people who every day were taking their readings, sending in all sorts of measurements, etc., and he also ran a monthly journal and an annual report and in his editorials he often speculates as to how the network is functioning. He has a wonderful passage where he says, 'Well why do they do it, why are they going out in all weathers? Why?'. And he decides that it is because they really want to participate in the future of science and that they see themselves contributing to something that will last for future generations, as in fact has proved to be the case, because this is now fundamental data for climate change science. But, interestingly,

the Zooniverse, in parallel with this, had been doing research into why their citizens choose to participate and, in fact, there is a project that has been funded — I think it's by the Engineering Science Council — to explore the economic motivations. They are starting with this model of the rational actor: why would anybody bother to give their time to looking at whales or identifying penguins? And the answers there are virtually identical: that people nowadays are contributing not because they want any reward but because they really love the idea of being able to contribute to science as it develops. Apparently, if they know that a project has actually come to an end, that the classifications they supply will not be of use to science, they have no interest in continuing to provide data — they want to know that they are contributing. It's very interesting.

Carolyn Burdett: It's a lovely example of how the form of the project has been shaping your research interests and driving them in new ways.

Sally Shuttleworth: Yes.

Geoffrey Belknap: For myself, one of the most interesting, and one of the most difficult things in this project, was the historical question: 'Can we think about and use all these different contemporary terms that sometimes work, and sometimes don't work, for the non-professional in the nineteenth century?'. Because the nineteenth century has such a different way of thinking about who is a professional — this is a period when we're getting the professionalization of the sciences — so it's a complicated relationship between who is amateur and who is professional. Interestingly, something similar is happening now: we have a reversal of who is becoming amateur and who is becoming professional. But as a historian coming into this project — how can I think about amateurs in the nineteenth century without breaking these boundaries, without breaking my historical need to really put people in boxes. One of the most interesting things that's come out for me — as someone who likes to think about communications technologies, and how these collect people together, and how they give them a way to have a voice or to have a venue to communicate with each other — is that the periodical and the Internet, or the periodical and the Zooniverse platform or the chat room, have interesting parallels in terms of how they collect people together. For the amateur scientists or for the amateur naturalists in the nineteenth century, the correspondence columns in the periodical were really like writing letters to their friends. If you read these correspondence

columns you see just how much of a community was created there — that's one of the most interesting things we're doing on the project, thinking about what those communities are and how they are created. At the same time, if you create a Zooniverse platform such as Science Gossip, one of the side functions is to have what they call a Talk function, which is where the Citizen Scientist can take particular pages or things that they found on the website and bring them to this community space, where they can talk to other Citizen Scientists, and where they can create some very similar discussions to those which were happening in the nineteenth century. 'Can you find out more about this?'; 'what is this thing I'm really interested in?'; 'something is wrong here, can the people that organized this fix this?' — they are very similar questions. But there's also a way in which they're completely different things, that the media itself, the Internet, forms the community in a very different way. Those very forms of fluidity of a chat form versus the much more structured correspondence column answer, or give us different historical insights into, how communities can be formed through different media technologies. That's the most interesting thing for me.

Gowan Dawson: Of course, we've been talking about this open source tool called Talk that is absolutely central to Zooniverse, but one of the things that Chris [Lintott] and the other people from Zooniverse often tell us is that there is a resistance from the professional scientists who do not engage with it too much because it's so different from formal modes of academic publication. But, actually, really important intellectual work and astronomical discoveries are being made through this source. There is an issue here about the verbal, and Geoff mentioned our favourite periodical, which is *Hardwicke's Science-Gossip*, which of course very much foregrounds the verbal; and I think a lot of periodicals do this, so you have, for example, editors' table talk as a feature in periodicals. So this paradoxical reconstitution of the verbal on the printed page of the periodical provides a mode of informality that, it would appear, allows a lay community to get involved in science. So one of the things that we're talking to our Zooniverse partners about is the way in which nineteenth-century modes of periodical publication — and particularly thinking about that relationship between verbal and print form — could feed into some of the ways in which they present their work or allow the Citizen Scientist to engage with the professional scientist. Talking with Matthew [Wale], the PhD student who is working on periodicals that come out of the natural history societies that are spread across the country, what he's finding is that often it's the periodical

that starts first. Once the periodicals start publishing, people think, 'actually we should meet up you know.' Think of Benedict Anderson and his sense of the importance of print capitalism: it is magazines and periodicals that create that imagined community of the nation. Within Anderson's model of nationalism there are lots of communities of interest similarly centred around, and facilitated by, what we might call print capitalism, because crucially, most of the natural history journals and other science journals that we are looking at are commercial periodicals, which meant that often they wanted cheap copy and you don't get cheaper copy than correspondence columns, or people sending in their observations. That often helped them to break even, but it also would increase their readership and this was precisely the kind of material that Darwin liked best. So I think nowadays we call it a virtual community, but an imagined community from a periodical and a virtual community through the Internet are really crucial to the work that we do.

Carolyn Burdett: What of the modes of authority that were established — and what are the parallels today? I've been marking recently, as so many teachers will have been, and I've been noting where the first marker has criticized students for using inappropriate, Web-based sources. There's a more fluid sense of where authority resides and this is either feared or welcomed; but behind what kind of label do we have authority within the open spaces of the World Wide Web?

Gowan Dawson: I think in a way this comes back to the 'citizen' aspect of Citizen Science and why we're finding it such a germane term: a lot of what is seen as either the popular science or the rational recreation of the nineteenth century actually was politically rather oppressive. Organizations such as the Society for the Diffusion of Useful Knowledge were identified by political radicals as trying to use science as a way of silencing sedition — they have a lovely phrase about stuffing our mouths with kangaroos. If you get people to talk about ostensibly apolitical matters — kangaroos — then they are not going to talk about blasphemy, they are not going to talk about sedition. That was happening in the 1820s and 1830s; but then in response to Chartism, in the late 1840s and 1850s, the movement towards opening public museums with longer hours and popular science lectures began, so nineteenth-century popular science is absolutely intertwined with issues of authority and control as well. One of the interesting things about Citizen Science is that it has, certainly in the UK, a rather democratic tang. Talking with Americans, however,

Citizen Science has a very different set of connotations. It implies something rather drone-like because, of course, in the US everybody is automatically a citizen — it is the most basic entitlement that you have — whereas in the UK, officially, we are subjects. So it's an assertion of democratic rights, an assertion of individual identity and individual authority. It still has that democratic tang and I think we absolutely need to be alert to questions of authority and power — including the economic studies that Sally was alluding to. There's an interest in how to harness the free work that might be done, but also the sense that it will allow people to educate themselves and to become better citizens, to use that word. But I think at the same time there are other, less authoritative modes of Citizen Science that we can think about, creating personal empowerment as well. Certainly these issues are really crucial to both sides of the nineteenth-century and the twenty-first century aspects of the project.

Carolyn Burdett: Who have you imagined as end users of your project and how will it be used?

Sally Shuttleworth: Very ambitiously, I think is the answer. Certainly for nineteenth-century scholars and students — literary scholars, historians, and art historians. But I think perhaps we have been emboldened by working with a project that has 1.3 million current users to think 'What might be possible?' and so for our end users it's not just going to be scholars; it's also going to be everybody who uses the platform, the projects we set up on Zooniverse, which are going to be open to schoolchildren onwards. With that comes the potentiality, and I suppose this is our big dream, that we might transform the ways in which science is understood in its relationship to childhood and scholarly education. We are seeing tomorrow someone who is behind the creation of a scientific journal that is run entirely by schoolchildren. So there are possibilities and one of our great idealistic icons is the paper that was put into the Royal Society journal *Biology Letters*, 'Blackawton Bees', where a primary school was involved in an experiment and writing up of a paper which was accepted by a Royal Society journal — which to us shows what might be possible if you start opening up science. So we're hoping that it might impact not only on schoolchildren but their teachers and then, more broadly, on the scientific community. I have just attended a conference at the Royal Society on the future of scientific scholarly communication and it was very interesting because people there were saying, 'Yes, we have to accept that with the growth of big data we need help', and so Citizen Science is going to be part of the

fundamental process of science in the future and people have not really thought yet about what this means and how it might affect science within the university. So we're hoping that we will also be very much engaged in those coming debates. We're running a conference at the Royal Society in November which is going to address these issues. We want to have impact not only upon the way in which science is published now, but how it is thought about, and the whole scientific process. So yes, slightly ambitious.

Carolyn Burdett: Fascinating, that relation between the technology and scale and how scale is becoming something that's clearly changing what agendas might be and have to be.

Sally Shuttleworth: Yes.

Gowan Dawson: In the humanities there's a lot of discussion of 'big' humanities. I think we might also resist the idea of an end user. I'm thinking of the Science Gossip project that we have, where with digitized periodicals a key aspect is searchability, but illustrations are the one thing that we can't search, so the metadata is being provided by the volunteer participants, citizen humanities people — I don't want to call them citizen humanists as that doesn't really work. They are providing the metadata that enables illustrations to be searched. So rather than end users, which is a kind of one-way vector, we are also thinking about people who are participating in the construction of the intellectual material in the project.

Carolyn Burdett: Terrific. Jerome McGann, in his book *Radiant Textuality*, writes of 'experiments in failure'. Do you anticipate a type of failure that could be productive or good in some way in the project and, if so, what would that be?

Sally Shuttleworth: That's quite a difficult one. I suppose we've come across a slight form of failure initially in that the Orchids project has been so popular that we haven't produced enough photos for those who wish to analyse them.

Carolyn Burdett: Not enough orchids?

Sally Shuttleworth: Not enough people going out to take the pictures, but then it's to do with times and seasons. So it's a success

in one way, because instantly we've got this community, who are really, really keen to get going. So that's a form of limitation.

Carolyn Burdett: And that seems another scale issue, which is interesting, isn't it?

Sally Shuttleworth: It is, yes.

Gowan Dawson: Talking with our colleagues on Zooniverse, they are very, very interested in experiments in failure in that they are constantly pushing at the boundaries of what you can do with Citizen Science, and lots of projects that are suggested to them — they often have open calls — are of things that are quite arcane, quite difficult to do, but they will often take on, because they want to see what you can do, how far you can push this model of Citizen Science. Lots of institutions have what we would see as large-scale transcription projects and they are interested in whether this can be done through crowdsourcing. And because Zooniverse is so interested in the motivation of individual volunteers they sometimes are willing to take on projects that might potentially be — there's no other word for it — rather boring for the individual user. They are very interested in gaming technology and how you can fit an individual into a narrative and give them — the term that they use is 'Bacon' — enough bacon to draw them onto the next time or to keep coming back. And so they learn a lot through projects that don't work as well, and it means that the projects that come after that are improved and that sense of 'How do you keep a large body of people who don't have to do this, who can go and watch television, or go and do something else, like go to the pub, how do you keep them coming back and doing this?'. Part of their methodology and why they are so interesting in thinking about Citizen Science is embracing experiments in failure.

Carolyn Burdett: Finally I'm going to ask this question of Sally. If you had been offered two million pounds to spend on a research project of your choice, with no forms to fill in and no outcomes to report on, how would it differ from this one?

Sally Shuttleworth: If I had been offered two million I would have gone for a more boring project, because I would simply have said 'I want to do science periodicals in the nineteenth century'. But because the call specified that you had to work with contemporary scientists, it made me think more broadly, and I have to say

I'm delighted that I am, because nineteenth-century periodicals are just wonderful in and of themselves, and we all know that, but to work with Zooniverse and with contemporary scientists and with our partners in the Royal Society, the Natural History Museum, and the Royal College of Surgeons and all the diverse things we're doing, I find it utterly exhilarating. So I'm very pleased I wasn't simply given a carte blanche, but actually had to conform to criteria that were set by others.

Carolyn Burdett: Well, I have to say from the evidence of the last hour's conversation, I can absolutely see why you've said that and I would like to say in turn a huge thank you to all of you: Sally, Gowan, Alison, and Geoff, for talking to us about Constructing Scientific Communities: Citizen Science in the Nineteenth and Twenty-First Centuries.