

Citizen Science and Contemporary Publishing

With the creation of vast data sets in contemporary science, there is a need for a new army of volunteers to help classify and analyse the information. The [Zooniverse](#) platform now has over one million participants who contribute to projects from astrophysics to climate science. Significant discoveries have already been made by these volunteers in the field of astronomy and publications have resulted. At the same time, the digital revolution, and open-access publishing, are set to create significant change scientific communication and exchange. How will these two trends interact with each other?

Clues to how we can begin answering this question can be found in the historical record. In the nineteenth century the scientific community was not well defined. Gentlemen natural philosophers and working class naturalists rubbed shoulders in a range of botanical, entomological and meteorological projects. The annual rainfall survey, to take one example, was the 'big science' of its day. The results of such large scale projects were recorded in scientific journals, but also in a much more heterogeneous range of publications including yearbooks and yearly reports, science digests and reviews and self published pamphlets and circulars. These prior trends in participation and communication in science are not direct equivalents of today's developments. They might, none the less, act as a storehouse of apt attitudes and ideals with which to explore, and form, new trends.

Genetics, Plant Breeding & Agriculture

In the first years of the 20th Century a small group of geneticists - including William Bateson and Rowland Biffen - created a technological system for improving seed and agriculture. "[Agricultural Science and the Emergence of a Mendelian System in Britain 1880-1930](#)", focuses on these efforts to create new

and useful, agricultural organisms which would, Biffen hoped, revolutionise farming practice in Britain and the colonies. Following this aspect of early genetic work reveals clearly that genetics, from the discipline's emergence, has always been thought of as a tool for effecting change in the human-built world. Interestingly, given the publicly-funded nature of their work, and a lack of formal intellectual property rights in plants, geneticists were keenly aware of the need to establish the value of their novel varieties. They sought to evidence the value of their work through systems of display and award established by previous generations of plant breeders.

Geneticists positioned themselves with science and against tradition, utilised public and private funding for their research, engaging in big science and private enterprise; science and technology. They studied heredity and they bred plants. They worked in many places; fields, laboratories, universities and governments and in many countries in Britain, Europe, the United States and in Britain's empire; Australia, India, Trinidad, Kenya and South Africa. In many ways the activities of early geneticists mimicked the systematic work of their electrical forebears a generation earlier in creating large technological structures (Hughes 1985).

On one level the dehistoricised gene (Berry 2014) was a high-modern tool used by geneticists seeking to professionalise (Palladino 2002); to claim their place in universities and government, the two ruling institutions of British interwar statism. At the same time, and despite the problems it posed for their theories, Biffen and his colleagues genuinely sought to aid agriculture (Olby XXXX). They were concerned with deterioration and underutilisation and posed their own solutions of development and civilisation. Geneticists in the first years of the discipline were troubled with the problems of the nineteenth century and they

sought to use genetics as a way to recapture a golden age for agriculture and Britain.

Food Security & Intellectual Property

Food is not equally distributed around the world; thousands starve to death every day, while millions go to sleep hungry every night. As you read these two sentences, someone will have died of hunger. In an increasingly integrated and globalized world, these are problems we share. At first glance intellectual property and food security might not seem to have a great deal to do with each other. Indeed, the increasing use of intellectual property to monetize innovations - especially those in the biosciences - might seem to be a hindrance to making sure everyone in the world has access to enough food of the right type. However, these are two areas that share a longstanding relationship. In historical conceptualisations of the patent bargain justification for the social value of intellectual property, inventors benefited from limited monopolies over their inventions, while society – at the other end of the bargain – benefited from the invention’s disclosure. Intellectual property under this rubric was thought of as a means of encouraging inventions which benefitted society. Accordingly, in several periods and places intellectual property systems were tweaked in various ways to encourage innovations that would make food more readily available and of a better quality.

In the 19th Century the US Patent Office disseminated hundreds of thousands of seeds free of charge to farmers in order to foster agricultural development.

In many countries food and food processing are excluded from patentable subject matter. The relationship has also flowed in the other direction: many believe that increasingly strong intellectual property offered by gene patents have resulted in a concentration of the seed industry. Larger companies - better able to utilise such intellectual property - have bought up their competitors leaving much of the world's seed in the hands of a few companies.

Genetic Resources, Ownership and Sharing

In recent years, talk of resources has come to be bogged down, unhelpfully, by talk of the commons. For this we have ecologist and doom-monger Garrett Hardin's tragedy of the commons thesis to blame (Hardin 1968). As legal scholars Anupam Chander and Madhavi Sunder (2004) point out, this is a debate whose terms have been defined by Hardin. Proponents of Hardin's thesis claim that top-down regulation or, preferably, privatisation are the only ways to avoid over-exploitation of the commons. Arguing against this view, liberal legal scholars and progressive social scientists have sought to uncover communal patterns of commons management as well as highlighting the problems of privatisation (especially in Russia, see Ostrom et al. 1999). Where tragedists see a free for all, their opponents point to intricate, bottom-up, social systems of management and the dangers of corporate and government raiding. These views are, however, also trapped in commons talk, denying resources their pre-history; side-lining the extent to which they were not only managed but created and owned.

These are categories over which we could usefully be more precise and, furthermore, historical. There is a growing awareness of the roles of indigenous people in the construction of valuable resources and their ownership in non-

commercial systems (see for example Darrell Posey's ethnoecological studies on Amazonia, Posey 2002; Eric Wolf's revisionist environmental anthropology, Wolf 2001; William Balée's historical ecology research, Balée 1994; or Courtney Fullilove's work on moral, family and gender economies relating to plant genetic material, Fullilove 2011). What remains to be uncovered is the symmetrical construction of such resources as 'natural', and 'un-owned'. The ratification of the FAO's 1983 International Undertaking on Plant Genetic Resources, the 1992 Convention on Biological Diversity, the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture and, most recently, the decisions and recommendations reached at Nagoya, Japan in 2010, viewed in this light, are the threads of a contested process of naturalisation.