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Scientific Broadcasting as a Social Responsibility? John Maynard Smith on Radio and Television in the 1960s and 1970s

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Abstract

John Maynard Smith (1920-2004) was one of Britain's most eminent evolutionary biologists. For over forty years, from 1954 onwards, he also regularly appeared on radio and television. He primarily acted as a scientific expert on biology, but in the late 1960s and 1970s he often spoke on the implications of science (biology and more generally) for society. Through four case studies, this paper analyses Maynard Smith's scientific broadcasting against developments within the BBC as well as the relation between science and society in Britain. It finds that while Maynard Smith acknowledged and accepted increasing mediation through the BBC and its producers, he stayed publicly and privately critical of both format and content decisions in his reflections on the science—media relationship. At the same time, we find that over a decade before the 1985 report by the Royal Society on the public understanding of science, Maynard Smith came to think of engagement with the public via the media as scientist's responsibility.

I. Introduction

'All very very best with your t.v. work.. it is fine', wrote the editor of an international poetry magazine to John Maynard Smith after his 1967 *What is Life?* episode on DNA and evolution.[1] By then, one of Britain's most eminent evolutionary biologists was a veteran science communicator with over ten years of experience: a popular science article from 1953 and his first book on *The Theory of Evolution* (1958) had established him as a scientist who could not only do science but successfully communicate it to non-specialists too.[2] Already in 1954, Maynard Smith had crossed the line from written

communication to spoken communication on radio and television. An early-career scientist – he had only graduated four years earlier – he proved to be a powerful broadcaster and eloquent champion for evolution and science who, throughout and alongside his career as a research scientist, continuously used the different media – written and spoken – to address and communicate with non-specialists. As noted by the University of Sussex when awarding Maynard Smith a science doctorate, *honoris causa*,

> He excels as a communicator, being that rare phenomenon – a scientist who can make science comprehensible to a wider audience. And it is this skill that has made his face so familiar to audiences of the BBC's "Horizon" programme, his credibility as a media man no doubt being enhanced by his uncanny likeness to every child's vision of the ideal professor.[3]

Written popular science is increasingly studied and the earlier emphasis on the nineteenth century is now carried over into the twentieth century. This new attention to more recent decades necessitates increased study of non-print media for science communication: the radio, television, and the internet. As Jane Gregory and Steve Miller noted, '[a]lthough scientists and science writers achieved commercial success and popular acclaim with books and articles, their readerships were tiny compared to the audiences for science broadcasts.'[4] There are several general histories of broadcasting in Britain, although historical approaches to media studies in general are lacking.[5] Scientific broadcasting specifically is still a largely unstudied area in radio and television studies as well as histories, but as a number of recent in-depth studies shows, it is not an understudied area. Arne Schirrmacher has worked on science broadcasting in the Weimar Republic, Marcel LaFollett has published on the American context, and Jean-Baptiste Gouyon has discussed the relation between science and filmmaking.[6] Tim Boon and Allan Jones focus on scientific broadcasting in Great Britain, writing about scientific documentaries in film and television, *Horizon,* and more broadly about the BBC's science broadcasting from the beginnings of the BBC, usually going up to the late 1960s.[7] Scientific radio

broadcasts of the early twentieth century, on the other hand, have 'received little attention, despite helping to shape British understanding of science', as Neil Morley notes in his study of the biologist H. Munro Fox FRS (1889-1967) and his popular science.[8] For the mid-twentieth century we can look at Jared Keller's recent dissertation "A Scientific Impresario" (2017), which admirably addresses science on BBC radio between 1945 and 1970 by tracing the career of the producer Archibald (Archie) Clow.[9]

The following microhistory of John Maynard Smith's broadcasting activities will do three things. First, it continues the efforts to look at mid-twentieth century popular science, focussing on the 1960s and 1970s. But second, it will shift the focus from the BBC and its science programmers to a scientist's point of view, following the example of Morley and Paul Merchant, who has recently published on scientists broadcasting and writing about science and religion in the 1980s, drawing on oral histories.[10] It thus elucidates how scientists as broadcasters both conformed to developments internal to the BBC and critically reflected on their relationship with the media. Finally, the focus on one scientist's broadcasting activities allows the article to look at both radio and, to a lesser degree, television. Four case studies will thus reveal that Maynard Smith acknowledged and accepted increasing mediation through the BBC and its producers because radio and television were important outlets for his conviction to communicate science to non-specialists. Nonetheless, he stayed publicly and privately critical of both format and content decisions in his reflections on the science—media relationship.

II. Becoming a broadcaster (1954) – *Who Knows?* (1960)

John Maynard Smith FRS (1920-2004), winner of the 1999 Crafoord Prize (biology's equivalent to the Nobel Prize) and more, was one of the most influential British evolutionary biologists of the second half of the twentieth century. After a few years at University College London (UCL), he spent most of his fifty-year long career at the University of Sussex, where he was founding dean of the School of Biological Sciences in 1965. Maynard Smith worked on a number of problems but today is best-known for introducing evolutionary game theory and evolutionarily stable strategies in the 1970s.[11]

In 1954, he was working at UCL's zoology department with J.B.S. Haldane and Helen Spurway. Peter Medawar had offered him as job as a lecturer, and it was through Medawar that he met Archibald Clow, producer of scientific broadcasts at the BBC. 'You may remember,' Clow wrote to Maynard Smith, that they talked about his research in genetics. 'I am now looking for some new topics for Science Survey and would be very pleased if you would come over and have coffee or tea with me some time and explore the possibilities in this subject with me.'[12] Maynard Smith would go on to write a script for and deliver a talk on "Mules, Maize and Mongrels", thus entering the world of science broadcasting one year after publishing his first popular science article.'[13] The contact with Clow proved to be a fruitful one: in 1959 – after two more appearances and with already ongoing preparations for a three-part school broadcast on 'Looking alike' – Clow asked Maynard Smith to appear on his panel show *Who Knows?*[14] The programme had been on air since 1956 and designed for a general audience. It 'developed into one of the highest-rated series on BBC radio'.[15] The *Radio Times* advertised it as follows:

> Sam Pollock puts listeners' questions to a panel of scientists […]. What has been in the papers recently? Russian biologists sacked: cosmic rays interrupt radio again: a new flat TV tube: jet planes approach the heat barrier: the path of the Earth's first artificial satellite.
>
> More information about such events, and what scientists themselves think about them, will be heard in the answers given to questions about science, technology, and so on, sent in by listeners.[16]

Maynard Smith first appeared in an episode broadcast on 8 January 1960 and last in July 1967.[17] In that period (possibly including repeats), listeners could have heard him answering their questions 39 times, ample time for Maynard Smith to establish himself as a public intellectual. His expertise as a scientist was asked for, but at the same time he was talking about science in relation to current, not necessarily specifically scientific, affairs – 'what has been in the papers recently'? While he could prepare his answers beforehand, Maynard Smith thus gathered a substantial amount of experience

in speaking freely into a microphone on a variety of topics, while staying close to roles he was already used to: the teacher and lecturer.[18] This role would change over time, however, as the BBC established itself and the producers professionalised. Could, and indeed, should you achieve a translation of the lecture hall onto the airwaves? As Jones has noted,

> [p]utting a scientist before a microphone did not by itself constitute science broadcasting. The broadcasting professional had to frame the broadcast through advice, encouragement, advocacy of particular styles of presentation, and other editorial input.[19]

While scientists were the experts on the content, producers were the experts on the medium and its processes. So while scientists may have preferred the format of lectures and talks, producers were more aware of the possibilities and limits of television and radio as spaces for science communication.[20] Thus, as Keller notes, towards the end of the 1960s the BBC began to shift from the original straight talk format, in which scientists would write and present their own programmes, to increasing mediation through the producer. The interview format is one example of the scientists' increasingly being contributors rather than creators. This shift reflected, first, the establishment of the BBC and second, a growing critical awareness of science in the British public.[21] (*Who Knows?* was still very much an informative programme; in fact, Clow found that listeners 'placed a much higher premium on information' rather than entertainment.[22] The programmed last aired in 1967.[23]) As Aubrey Singer, head of the Features and Science Programmes department since 1963, said in a 1966 lecture, '[b]roadcasting not only affects but is affected by the climate of opinion.'[24] Audiences therefore needed to be taken into account. Even more important was the fact that producers,

> because they are working continuously in the field, are creative and conscientious journalists who can anticipate and fairly reflect what is of sufficient importance to make good television and who are aware of reactions to past programs.[25]

Thus they were better placed at suggesting topics than scientists. Equally important, 'the televising of science is a process of *television*, subject to the principles of programme structure, and the demands

of dramatic form.'[26] After all, science often does not lend itself to depiction on television – much of it happens inside scientists' heads or involves particles too small or objects too far away to capture on film (at least until more recently).[27] Scientific broadcasting therefore needs to balance content and medium. An even stronger claim was made by José van Dijck, namely that the medium constructs the content: 'science documentaries [are] a form of "visual thinking" or of "picturizing science". We do not illustrate science with images, we construct images and deploy media technologies to "think" science.'[28] Constructivism is a more recent idea in relation to science, but representation – and misrepresentation – have been on scientists' minds since the early days of broadcasting. 'The most bitterly argued controversies in which scientists have found themselves in recent months have been over the editing of film,' noted scientist turned producer R.W. Reid in 1969: scientists were afraid of misrepresentation by the media.[29]

This fear of misrepresentation increased with the amount of mediation through the BBC and the shifts in format Keller mentions. Maynard Smith had started broadcasting when straight talks were still the standard of scientific programming. He was generally more positive about and comfortable with science on the radio than on television and wondered if it may be easier to talk into a microphone than to a camera or if 'radio producers have been more willing to look for scientists'.[30] Radio producers had had more time and experience in establishing formats and programmes than television producers had. They also did not face 'the big challenge for television producers and scientists […] to reconcile the inherent unruliness of science with the laws of visualization enforced by a medium primarily valued for its ability to entertain a large audience with moving images.'[31] Yet over the course of Maynard Smith's involvement with the BBC, the emphasis shifted from radio to television. This meant that from the mid-1960s onwards, 'it was television personnel like Singer who were setting the tone' rather than 'radio personnel like Clow who had set the tone for science broadcasting […] throughout the first years of the post-war period'.[32] Maynard Smith kept mostly within his comfort zone on the radio but did not neglect television as a medium: in total, he appeared just over one hundred times.[33]

He was particularly active in the 1960s. The majority of appearances was on *Who Knows?*, which allowed Maynard Smith to choose which questions to answer and thus how much preparation he was willing to put in. That he was continuously asked by producers to contribute is not a surprise given the amount of positive feedback from reviewers and audiences.[34] Paul Ferris, for instance, once wrote that Maynard Smith had given 'a painless account of some of the molecular biologist's dogmas and anti-dogmas.'[35] A man who cited 'talking' has one of two hobbies (the other was gardening), Maynard Smith even did so without a script, recording his contribution in two ten-minute bursts: afterwards the producer was torn between pride at his speaker's virtuosity and annoyance at the fact that no one would know it was off the cuff.[36]

Two points not to be ignored when considering Maynard Smith's media presence are first, his initial geographical proximity to any London-based studios, which helped with regular appearances. Second, broadcasting provided some (irregular) additional income. The records at the BBC Written Archives Centre indicate that he was paid 18 guineas, later 20 guineas, per *Who Knows?* episode in the 1960s.[37] Maynard Smith's personal records of fees and royalties between 1973 and 2002 exist too but over such a long period of time they are difficult to interpret in terms of actual income.[38] Overall however, when weighed against the amount of and time for preparation that went into any broadcasts by Maynard Smith beforehand, the renumeration was most likely an additional, but not the main, motivation for doing science broadcasts. Indeed, Maynard Smith eventually pointed out he needed to take a step back after accepting the deanship at Sussex because he would be increasingly busy.[39] He had taken up that position in 1965 – ironically the year in which he most appeared on the BBC. He stayed committed to *Who Knows?* however, until the programme folded in 1967.

Who Knows? and his other earliest broadcasts were Maynard Smith's introduction to broadcasting, all allowing him a high degree of control over content: he either wrote the complete script or chose which questions to answer on the panel. This aligns with Keller's analysis that originally, 'scientists enjoyed a great deal of control over the framing and delivery of science programming on BBC radio.'[40] But, as Keller as well as Boon and Jones have pointed out and as the following case studies

show, by the 1960s this control was shifting towards BBC staff rather than scientists. The decrease in Maynard Smith's broadcasts was in part due to other commitments, but he also developed a critical view of the direction in which the BBC was taking science broadcasting. His contributions changed from unmediated to mediated, from self-controlled to BBC-controlled, and he came to dislike the impotence of the interviewee and the blurring of fact and fiction in documentaries. '[I]nterviews, news-style reports, and documentaries […] placed broadcasters in a position to mediate science and scientists by explaining, contextualizing, and summarizing what scientists said'.[41] As mentioned above, this shift was partly due to increasingly critical attitudes towards science, and to the fact that broadcasters increasingly considered themselves as professionals, recognising that there were processes behind good radio and television that had less to do with the content and more with the medium.[42] Maynard Smith adapted to these changes but not without pointing out to broadcasters when he was unhappy with their decisions. His later broadcasting career is thus an example of the changes and trends outlined by Boon, Jones and Keller but it must be seen in the context of Maynard Smith's own critical reflections, uttered privately and publicly, about the ethical responsibilities of both the broadcaster and the scientist towards the public.

III. 'Biological Backlash' (1967)

Can we see any reflection of the shifting priorities within the BBC towards more mediation of and more critical programmes on science in John Maynard Smith's broadcasts? Maynard Smith once said that he preferred to talk about science itself, that is, about scientific ideas and methods rather than the consequences of science. 'Many scientific discoveries do have effects on human beings and these can sometimes be quite interesting to discuss,' he conceded when producer Mick Rhodes asked his opinion on a new radio series, but

> discussions about the effects on human beings of advances in biology (for example, artificial insemination) have about as much to do with science as discussions about royalties do with English literature.[43]

Rhodes had specified that '[a]ny subject that includes people is intrinsically of greater interest than one which leaves us out'.[44] Looking more closely, however, only a few of Maynard Smith's broadcasts are discussions of scientific content and method *only*. His earliest, scripted talks were most fully under his control and are the closest to this preference of his.[45] On *Who Knows?*, he could still choose which questions to answer and how, although he was constrained by the kind of questions that were sent in. Moving into the late 1960s, Maynard Smith increasingly appeared as an interviewee on programmes discussing social implications of science, some of which, he eventually agreed with Rhodes, 'could be interesting' even if they are 'not really science'.[46] Thus he was one of ten leading British biologists interviewed by science journalist Gerald Leach for 'Biological Backlash', a four-part radio documentary produced by Rhodes. In Maynard Smith's archive, correspondence concerning this series follows immediately after the above exchange on what kind of new series might be worthwhile, and Maynard Smith's dismissal of programmes that are less concerned with science itself and more with its effects. Maynard Smith did link research to the question of consequences and discussed these both in programmes and in related essays. A year previously, he had in fact been interviewed about the control of birth and death, and in 1969, he was going to talk about 'The conscience of the scientist' (see below); the *Horizon* episode "Pesticides and posterity" (1964) addressed questions similar to Maynard Smith's broadcasts of 1967 and 1969: 'the scientific and moral aspects' as well as environmental and long-term consequences of research into and the use of chemicals.[47] The difference between these programmes is that in all, except for 'The conscience of the scientist', Maynard Smith was an interviewee, mediated by BBC personnel. They confirm Keller's observations about the BBC's shifts from the point of view of one of the scientists working with them.

'Biological Backlash' (broadcast in March 1967) covered four themes: "Impact on environment", "Impact on man", "Avoiding action", and "Dreams and goals".[48] Next to Maynard Smith, Leach interviewed W. H. Thorpe, Alex Comfort, Joseph Hutchinson, John Kendrew, Palmer Newbould, J.W.S. Pringle, C.H. Waddington, J.N. Morris and Donald Broadbent.[49] All interviews were pre-recorded for the series, a method of which Maynard Smith grew to be sceptical: 'In fact, it doesn't much matter

what you say when interviewed for a television programme,' he would remark in 1983, 'unless you have the strength of mind to insist on being interviewed live. The producer usually films about fifteen minutes, and uses one.'[50] This remark echoes the scientist turned producer Reid's remark, quoted above: that scientists and producers were not seeing eye to eye on the broadcasting process of editing, fearing to be quoted out of context or to otherwise be misrepresented. 'Biological Backlash' is one of the early examples of increasingly mediated scientists and of the producer overruling the scientist in what is interesting and in how to present it, and it put into practice Rhodes' argument for humans and scientific consequences over Maynard Smith's preference for ideas. Audience research reports – which were based on questionnaires sent out to a panel of viewers, who gave 'a mark out of a ten […], averaged out to a percentage' – show that the average ratings for each episode were 70, 67, 66 and 73 respectively.[51] All of these were above the average for programmes, known as the Reaction or Appreciation Index, on the Third Programme of the previous year, which had been 62. '[T]he Commentators praised the speakers for speaking lucidly and expertly, without using jargon or being patronising, but mostly the programme for its subject matter.[52]

The subject matter and style of 'Biological Backlash' exemplified the BBC's shifting concerns in science broadcasting as well as Rhodes' approach to it:

> The point of many of Rhodes' programmes was not to simply blame science for the problems of the 1960s […]. In fact, many of Rhodes' programmes that were critical of science nevertheless also looked to science and scientists for answers.[53]

Hired by Rhodes, Leach chose extracts from his interviews which he then linked and framed with short interludes, either transitioning from one sub-theme to the next or from one speaker to another. He thus created a narrative and set the tone, summarised views and drew conclusions; he is the mediator between the scientists and the audience. 'Leach was quite literally taking over the communication of science from scientists.'[54] While Leach was in control of the framing, he still relied on his subjects' expertise. In terms of content, each scientist talked about the theme from this professional

point of view, as zoologists, physicians, ecologists or psychologists. But there were also comments on larger, social issues – and these were often instigated by Leach. Thus in the second half of episode 3, "Avoiding action", Leach moved to the relationship between science and government, and the role of the former in the latter.

> If society won't call for biological advice sufficiently, isn't it up to biologists, and other scientists, and technologists to force advice on us? [...] To act as a front line early warning system and solution-finding system for progress I put this challenge to several biologists and got, on the whole, rather pessimistic answers.[55]

The three biologists whose extracts were chosen to comment were Maynard Smith, Thorpe, a zoologist and ethologist, and Kendrew, a biochemist and crystallographer. The latter two in particular talked about a lack of science-government dialogue. Kendrew, 1962 Nobel Laureate and a member of the Council for Scientific Policy, did not have much hope in scientists branching out from their specialisms to talk about something else because for most scientists this would equal 'selling their souls.'[56] And while in America scientists seemed involved in advising policymakers through committee work, in Britain

> one's always up against the difficulty, with any kind of scientific advisory operation which is mounted, of finding the people to it: people who think it's worth doing; people who have any kind of experience or interest in it; you find yourself always going round the same little gang.[57]

Thorpe commented that American-style Technological Assessment Boards were desirable, if they worked. Organisations like the Royal Society already advised the government, and biologists were more fairly presented now than before. But at the same time, looking at the number of committees, out of over sixty less than a dozen dealt with biological issues. If humans were to 'survive in any kind of dignified way' this imbalance needed to be addressed.[58]

Maynard Smith who, in terms of science, was asked by Leach to discuss antibiotics and radiation as well as chemicals in foodstuffs and environmental biology, also moved beyond his specific scientific topics. At one point, Leach asked 'if it wasn't a prime duty for all scientists to spell out as clearly as possible the implications of their work.'[59] Maynard Smith agreed, but pointed out that for most scientists, this was not at the forefront of their minds when doing science: 'Perhaps I could digress [...] and simply talk for a moment about what scientists do think about their duties.' These duties are different to the ones other, older, professions have. Whereas the Hippocratic Oath, for example, is in place to protect the patient, scientists' ethics 'are concerned to defend ourselves as scientists. You know, you don't tell lies, you don't pinch other people's ideas, you don't publish results which are not reliable.' But, Maynard Smith continued, '[t]here is no comparable set of ethical principles in science concerned with our effects upon the general public.'[60]

Moreover, scientists focused on immediate research problems rather than consequences because they could not be sure to solve the set problems: 'It is, in a sense an excuse, and not a very strong excuse – the only excuse I have for not really spending an awful lot of time, other than a kind of science fictional kind of imagining, wondering about what would happen if one found a cure for ageing – my real excuse for this is that I don't really expect to find a cure for ageing.'[61] (Over the past few decades, the field of ethical technology assessment (ETA) has made use of scenarios – Maynard Smith's 'science fictional kind of imagining' – exactly in order to determine, as much as possible, any possible hard and soft outcomes of newly developed science and technology so as to avoid (negative) unintended consequences.[62]) Leach then asked if scientists ought to consider their topic of research more carefully, or to choose something 'which is of social value'. Here Maynard Smith was less willing to agree, although he conceded that 'at least we might have an ethic about not deliberately choosing research which is likely to be lethal.' More important for Maynard Smith was that science ought to be an open and international business – when that is given, science is at its best.[63]

Thus, Maynard Smith did talk both about ideas and people. While the details or methods of science are less prominent, the question about responsibility and codes of conduct in and for science and

scientists are clearly something Maynard Smith thought about and considered important. How much becomes clear in another broadcast: "The conscience of the scientist" (1969), our next case-study. But 'Biological Backlash' also exemplifies one more thing: a good interviewer who could establish rapport with their interviewees and a good relationship between producer and scientist can prevent (or at least ameliorate) misgivings in scientists about mediation. Further correspondence concerning 'Biological Backlash' shows that after the interview, Rhodes wrote to Maynard Smith once more. He had been fascinated by the conversation between Leach and him and it would be a shame not to use all the material. Rhodes asked if Maynard Smith would agree to his interview being a broadcast in itself.[64] Maynard Smith did agree – but asked to see a full transcript first. 'I am sure I said a number of extremely stupid things to Leach on the assumption that he would remove the most stupid of them'.[65] Maynard Smith relied on Leach, trusting him to mediate without misrepresenting what had been said. After reading the transcript, Maynard Smith remarked that he was 'horrified to see what I said under the influence of drink but I suppose it is only fair to let it stand.' He extended the trust from Leach to Rhodes, requesting one sub-clause to be cut but leaving the rest to his digression.[66] The complete interview was broadcast 18 October 1967, entitled "A geneticist's view".[67]

IV. "The Conscience of the Scientist" & the BSSRS (1969)

"The conscience of the scientist" was broadcast on 7 July 1969 and does two things: in terms of format, it is an example of the original mode of presenting science on the radio – a straight talk, pre-recorded on 20 May 1969.[68] There is no questioning by an interviewer, no mediation by the BBC. In terms of content, however, it reflects the more critical, reflective attitude towards science. It does so from *within* science, giving Maynard Smith's perspective which was originally aimed at fellow scientists. At the same time, a comparison of the script to that of "A geneticist's view" shows that many points of the 1969 talk are extensions, even intensifications, of the 1967 interview. Maynard Smith picked up on things he and Leach had discussed in terms of the consequences of science, intended and unintended, and whether scientists had a responsibility towards society with regards to these consequences and their work more generally.

For Maynard Smith, science is fundamentally driven by curiosity and the sense of satisfaction one gets from solving a problem. But doing science for science's sake had become difficult to argue in the light of developments during and after World War II: because of often unintended or unforeseeable consequences, a view was emerging that scientists should perhaps 'be rather more responsible about what they do'.[69] While he had been hedging in the interview with Leach, Maynard Smith now asserted that scientists do in fact have a special responsibility towards the public, they do need a code of conduct, and they do need to be publicly and politically active – whether they like it or not. The answer to the problem of unknown consequences cannot be to stop doing science, however, as consequences might be either harmful or beneficial. It also cannot be to shift responsibility to the government or society alone: 'No other profession would accept this argument.'[70] A scientist's responsibility lies in accepting first, 'that the consequences of scientific research are not individual but public' and second, that they 'give rise to political problems, and that these political problems are unlikely to be solved unless scientists play their part in solving them'.[71] In other words, knowledge means responsibility, and scientists needed to acknowledge this, share their knowledge (for instance on advisory boards, like Maynard Smith had done in the 1950s), and generally leave their labs to engage with society.[72]

How come Maynard Smith gave a pre-recorded talk on this topic, rather than discussing it in an interview or on a panel, like he had some of the issues with Leach? "The conscience of the scientist" grew out of a talk he had already delivered elsewhere: at the inaugural meeting of the British Society for Social Responsibility in Science, BSSRS for short (and 'Bisrus' to some of their friends).[73] The society's formation was a reaction to the shifting attitudes towards science, the same that informed the BBC's increasingly reflective attitude towards science: 'In 1969 growing awareness that science not only provided benefits but also created severe problems led to the formation of the Brit. Soc. Soc. Resp.'[74] The meeting took place on 19 April 1969 at the Royal Society 'to the congratulations of most witnesses (Nature excepted)'.[75] Earlier in 1969, Maynard Smith had been one of many scientists whom Nobel Laureate Maurice Wilkins approached in a circular letter. Wilkins was looking for sup-

port in founding an organisation 'to examine the moral + social issues involved in scientific research + education'.[76] Among the scientists contacted were J.D. Bernal, Sir Lawrence Bragg, Francis Crick, Sir Julian Huxley, Sir Peter Medawar and Max Perutz as well as 'Others, not FRS'.[77] As of 2 April 1969, Wilkins and his five co-authors (C.F. Powell, M. Pollock, R.L. Smith, D.H. Butt and S. Rose) had received 78 letters of support, Maynard Smith's among them.[78] Maynard Smith's talk shows why: his views aligned clearly with the aims of the BSSRS: 'to keep an eye on what goes on in the backrooms of science'; 'sponsored secret research[] should not become as rife in Britain as in the United States'; 'the idea of knowledge for its own sake as justification for doing scientific research must be examined very critically'.[79] Internally, however, there was a sense of disappointments with the speeches as a whole, given a 'lack of concrete activity' which was blamed on 'not enough briefing'.[80] Maynard Smith's later, actual, involvement seems to have been limited too. Although he tentatively agreed to be a full-time member of the society's Science Advisory Board, he makes no appearance on the list of attendees for the first meeting.[81]

Ritchie Calder, science correspondent with the *Daily Herald*, dubbed the scientists involved in the founding of the BSSRS "scientific hippies", but not negatively.[82] Rather, he was glad 'the initiative had been taken by the younger scientists.'[83] In addition, the BSSRS promised to be a British equivalent to the Pugwash movement, although the society felt 'that P. was not very active, had little appeal, and little cash.'[84] But the long-term effects and radicalism of the BSSRS, which folded in the early 1990s, are sometimes debated as well. In fact, in its early years, the society was 'reasonably establishment' with members 'following in a long tradition of socialist scientists'.[85] Scientists like the crystallographer J.D. Bernal (whom Maynard Smith knew, even if not well) had been attracted to socialism; indeed, Bernal became the personification of "red science" whose ideas were 'initially very influential in wartime and post-war Britain'.[86] According to Bernal, research 'was to be carried on for the "benefit of humanity as a whole",' which required a reorganisation of the 'structure, funding and management of science in the capitalist economies'.[87] Jacob Bronowski, a mathematician and historian, even

argued for the 'moral superiority of science', insisting that 'science and scientists were the standard-bearers of truth'.[88]

Britain's history of left-leaning scientists, politically active in the 1930s, continued in the BSSRS. The new generation had the blessing of the older one, some of whom wrote in support to Wilkins and the other founders'.[89] American visitors to the UK in the 1970s voiced their wonder at this situation, some positively, others critically. Joe Hanlon described the BSSRS as 'part of the establishment, effectively, it's the left edge of the establishment. That was very weird. It was absolutely wonderful.'[90] Richard C. Lewontin, while he agreed with the sentiment, felt that it made BSSRS ineffective:

> I have never been anywhere where Marxism is so respectable as Britain. Half of the people in the University of Sussex over the age of 40 are former members of the CP [Communist Party]. The Student Union representing every student on the Campus is 100% Marxist as far as I can tell from its meetings. Yet the left is in bad shape because it is so respectable. I have the feeling that it is 100% "radical chic." There is virtually no attempt to do real agitation if it involves the slightest bit of unpleasantness. The most they will do is make a polite demonstration in front of the US Embassy, and I do mean polite.[91]

Lewontin was a biologist who stayed at Sussex's School of Biological Sciences. The school's dean, since its foundation in 1965, was of course none other than John Maynard Smith.

Public engagement and 'public understanding of science' as such started after World War II, and the British left felt that 'society was to decide the direction, means and outputs of science'. At the same time, however, this perspective was still 'tinged with elitism, in that it put scientists as the source of information and opinion about science, and envisioned them gaining positions of power through the public affirmation they sought to generate through public communication'.[92] Maynard Smith and the BSSRS's views thus predate some of the points on the 'public understanding of science' movement addressed in the Royal Society's 1985 report which too 'asked for more science in the mass media

and urged scientists to improve their communications skills and to consider public communication as a duty'.[93]

V. 'The Lysenko Affair' (1974)

So far we have seen Maynard Smith in three roles on BBC radio: as a panellist (*Who Knows?*), interviewee ('Biological Backlash') and independent speaker ("The conscience of the scientist"). From focussing on science itself, these broadcasts moved into the political, discussing social implications of science. They thus mirror the BBC's general trend to be critical of science rather than simply providing a platform for scientists. It is time to see if and how this translates to Maynard Smith's television work, given the difference in format and his preference for radio.

Maynard Smith had been doing television work in addition to his involvement with BBC radio since the mid-1960s. He was particularly involved with *Horizon.* 'The idea for *Horizon* arose in the context of a review of scientific programming',[94] and coincided with the BBC starting its new channel, BBC2.[95] 'BBC 2 must appeal to a broad majority of the audience, but we must make the nature of this appeal new, different, and exciting.'[96] There was to be a focus on "culture" (with the danger of elitism never far away): literature, art, and music, but the programmes also included the sciences and social sciences.[97] *Horizon* therefore set out 'to present science as *a culture* – as a field of human achievement and endeavour as lively, varied and rewarding as any other'.[98] Science should be presented the same way as other human activities, and *Horizon* be a programme on "ideas", 'communicat[ing] to people in other fields'.[99] The picture of science that was to be presented was 'derived from BBC Television itself', not building on academic disciplines like the history of science.[100] The level of content was to be 'at or a little above the Scientific American level' – something Maynard Smith was familiar with, writing for the magazine *New Scientist*[101]

The pilot, produced in 1963*,* featured a short film profiling John Maynard Smith.[102] The pilot itself was not received well by the programme director and never aired. But Maynard Smith had made enough of an impression to be called back for the second *Horizon* episode that did air, "Pesticides

and Posterity" (1964). Despite some negative press on this episode *Horizon* persevered and had screened over 1,100 editions by its fifty-year anniversary in 2014.[103] Maynard Smith returned to examine "Genes in Action" in 1966; both 1960s episodes involve discussion of the implications of, first, the use of pesticides and second, of genetic research.[104] In the 1970s, Maynard Smith was involved in three further episodes: "The First Ten Years" (1974), "The Lysenko Affair" (1974), and "The Selfish Gene" (1976). The BBC Archives hold files on some of these episodes, but (apart from the "Selfish Gene" script) Maynard Smith only kept correspondence related to "The Lysenko Affair".[105] Even though least involved in this particular episode – the producer thanked him for advising, but he did not make the credits – it was the most personal for Maynard Smith.[106] In fact, the episode's subject, the Lysenko Affair, was pivotal in Maynard Smith's own political and scientific beliefs.

The drama-documentary, first broadcast on 30 December 1974, charts the rise of Trofim Denisovich Lysenko, a Soviet agrobiologist who rejected Mendelian genetics and preferred a form of Lamarckian inheritance of acquired characters, called Michurinism. Maynard Smith had been a genetics student in the late 1940s, and at the peak of the Lysenko affair, '[t]he idea of the inheritance of acquired characters did not seem to me obviously false: indeed, I was prejudiced in its favour' (and he did some research in that direction).[107] The reason lay in his own Marxist past, as

> [t]here is something deeply undialectical about a gene that influences development, but is itself unaffected. I therefore do not think that those Marxist philosophers who supported Lysenko were merely jumping on a bandwagon, although doubtless some were. If they sincerely believed that Marxism was a good guide to scientific practice – and I certainly thought that in 1948 – then they were right to support Lysenko.[108]

A Party member since 1939, Maynard Smith – like other British Marxists at the time – had dismissed gulags as capitalist propaganda. But he was trained in Mendelian genetics, and after a few experiments which disproved Lamarckian inheritance as suggested by Lysenko, he was no longer sympathetic to the direction Soviet science was taking. In fact, Lysenko eventually was 'the crack in the dyke' for Maynard Smith's belief in and involvement with communism.[109] 'I can remember to this

day,' he recalled in 1997, 'reading the 1948 book about the proceedings of the Lenin Academy of Agricultural Sciences or something, and being absolutely horrified.'[110] At that moment, the Party officially endorsed a science he knew to be false.

The *Horizon* episode opens with a re-enactment of Lysenko's speech given at this meeting of the Lenin Academy of Agricultural Sciences. Close-ups of Lysenko (played by Terrence Hardiman) are intercut with scenes depicting the ripping up and burning of genetics books and the destruction of laboratories by uniformed men. As the speech ends, we see the assembled academicians rising and applauding Lysenko, while the narrator explains that, 'In 1948, with these words, the study of the science of genetics officially ceased in Soviet Russia.' For the next hour, re-enactments, or dramatisations, are mixed with historical footage of Soviet farmers, Stalin, World War II, and Soviet industrialisation and collectivisation. The script interweaves the dialogue during the dramatisations with the narrator's voice-over explanations. The episode shows the lead-up to the 1948 meeting, chronicling Lysenko's beginnings and career, his interactions with Nikolay Ivanovich Vavilov (a Soviet geneticist who defended Mendelism against Lysenko and died in a Soviet prison camp in 1943), as well as the larger issues of Russia's problems with feeding its large population, Nazi Germany invading and Nazi scientists leading to an association of genetics with eugenics and fascism. It then comes full circle by dramatising in more detail the 1948 meeting, closing with Lysenko's speech and more footage of lab-destroying and book-burning soldiers. The closing words are spoken over a pile of burning books in a dark barn or stable and a closing door, shutting out the light: 'Lysenko's biology became the official dogma. Tragically, it lasted until 1965. But the consequences for the agricultural sciences are still apparent today.'

"The Lysenko Affair" thus dramatised a recent episode of scientific and political importance. The hybrid of factual and fictionalised presentation chosen by writer John Wiles and producer Peter Jones tells an effective story, and historical documentaries like this have their origins in Britain.[111] Classically, a narrator would dominate, and archival footage be used as illustration. In the 1970s, these forms of (re)presenting history on television were 'replaced largely by more entertaining forms' like inclu-

sion of oral history interviews (which we do not have in "The Lysenko Affair") or fictionalisations of events (which we do have).[112] But the format raises several questions about the perception of history and in how far "fact" can be differentiated from "fiction". For Maynard Smith, this was worrying given the importance of the Lysenko Affair for him personally and the science of genetics and science/politics interaction more generally.[113] He voiced his concerns about the blurring of fact and fiction to Jones, writing that although he felt that they had 'got the spirit of the thing about right,' he was

> not very happy about dramatized reconstructions about issues as controversial as this one. The audience have a right to know which remarks were actually made and which have been invented. My impression was that you had kept less close to the available written sources than you might have done.[114]

Maynard Smith wondered if he could be sent the script to check it against the source material. Particularly, he was thinking about the 1948 meeting – since transcripts existed for this meeting, there was no excuse for not using them.[115] Jones' reply is reminiscent of Singer's principles of science broadcasting: 'priority must be given to the medium rather than to scientific pedantry.'[116] Jones too established effectiveness and engagement value of a programme over literal accuracy. He agreed with Maynard Smith that dramatisation of the past is 'a particularly difficult question' that 'certainly worries me'. There were guidelines but discussion within the BBC had been inconclusive. (The Documentary and Magazines Department had actually closed down in 1955.[117]) Jones trusted in the audiences' ability to realise parts were dramatised and thus to an extent fictionalised: 'after all, no record can exist of many of the private conversations portrayed'. He ensured Maynard Smith, however, that even those scenes were based on research in an attempt to be as *authentic*, if not accurate, as possible. Importantly, and certainly for Maynard Smith – who was put at ease by Jones' letter – was the following point. The hybrid of presentation modes was particularly effective for science documentaries and in portraying the activities of science.

> I do not know whether you will agree with this but most conventional science documentaries can deal quite well with an idea or a concept sometimes very well, but it can only rarely communicate what doing science is like in a particular political or historical climate.[118]

Science is not always straightforwardly translatable from the lab or office. Science documentaries employing dramatisation can be said to both illustrate and construct science (the same goes for historical documentaries, and in the case of "The Lysenko Affair" we are dealing with both science and history).[119] While documentaries aim at presenting reality, they are 'a Janus-face genre, at the same time evidence and artifice'.[120] Maynard Smith's complaint about blurring the lines between fact and fiction in re-enactments echoes that directed at producers when they first started using these new ways of visualisation. The BBC continued to use dramatisations in its documentaries however, and increased their use and staged scenes after 1980, greatly 'expand[ing] the creative possibilities of producers and directors'. At the same time, re-enactments 'were almost invariably paired off with the authoritative expository mode, often voiced through a reminiscing scientist.'[121]

Overall, "The Lysenko Affair" is less directly connected to the idea of science communication being a scientist's social responsibility. But it highlights a related responsibility, one on which scientist and producer disagreed as we have already seen in the case of the radio with 'Biological Backlash': whether content or medium takes precedence. On a topic as politically and scientifically charged as the Lysenko Affair, Maynard Smith – who had lived through it – felt that scientific and historical accuracy need to be the priority. The public had a right to know "what really happened". But Jones asserted that in (scientific) documentaries, authenticity is more important than accuracy. His professional expertise as producer overrides Maynard Smith's as a geneticist. Almost a decade after Aubrey Singer's lecture on science broadcasting, his principles still held.

VI. Conclusion

As Morley notes, we must not treat scientists' non-specialist communications as being of less value than their specialist outputs.[122] Some scientists, like Munro Fox, 'successfully juggled the two activi-

ties', rather than letting one take over the other, as happened, for instance, with Sir Julian Huxley or Sir John Arthur Thompson, whose research output diminished as their non-specialist work increased.[123] John Maynard Smith was equally exceptional in maintaining both a highly successful research career and being a public intellectual who regularly appeared on radio and television.

Our four case studies show that Maynard Smith's involvement in science broadcasting confirms points raised by Boon, Jones and Keller about internal BBC developments towards increasing mediation and the establishment of the producer's professional expertise over the content expertise of scientists. Maynard Smith too changed from being the creator of his own content in the very first broadcasts to being primarily (though not exclusively) a contributor from the late 1960s onwards. In terms of content, his work changed from more straightforward exposition of scientific ideas to discussion of science and society relationships. While initially critical of focusing more on science's social implications than science's ideas, he came to discuss both. In fact, he carried some of these ideas over into his support for the British Society for Social Responsibility in Science, which tried to address the same shifts in attitudes towards science from within science that the BBC was meeting in its shift to more science-critical programming. At the same time that Maynard Smith reflected on the science and society relationship he also reflected on the science and media relationship, staying critical both publicly and privately. Given his conviction that scientists needed to speak about their work, it is not surprising that he submitted to the BBC's mediation – it was an important platform for speaking to non-specialists – but he could not shake off his preference for accuracy over authenticity in science broadcasting.

Further microhistories like the above from scientists' points of view of science broadcasting, differences between radio and television and long-term trends will help establish scientists' motivations more broadly. Paul Merchant's oral histories, for example, indicate that

> [t]he desire to communicate beyond science seems to have been more strongly connected to their own experience than to a concern for the experience of others. [...] there is very little talk of duty or interest in public understanding in these interviews.[124]

In Maynard Smith, we have seen the opposite: a focus on explaining science and it being a scientist's social responsibilities. He returned to radio and television time and again, still speaking about and being interviewed about the big and small questions of evolution, genetics and science until a few years before his death in 2004.

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[1] Ken Geering to John Maynard Smith, 5 December 1967. John Maynard Smith Archive, The British Library (subsequently JMSA) Add MS 86765.

[2] John Maynard Smith, *The Theory of Evolution.* Harmondsworth: Penguin, 1958. For an analysis of the book in relation to popular science, see Helen Piel, 'Complicating the story of popular science: John Maynard Smith's "little Penguin" on *The Theory of Evolution*', *Journal of the History of Biology* (2019) 52, pp. 371-390.

[3] Presentation address, 12 July 1988. JMSA Add MS 86760.

[4] Jane Gregory and Steve Miller, *Science in Public. Communication, Culture, and Credibility*. New York and London: Plenum Trade, p. 41.

[5] e.g. Burton Paulu, *Television and Radio in the United Kingdom.* Minneapolis: University of Minnestoa Press, 1981. Andrew Crisell, *Understanding Radio. Second edition*. London & New York: Routledge, 2002; Asa Brigg,

The History of Broadcasting in the United Kingdom, 5 volumes. Oxford: Oxford University Press, 1961-1995; James Curran and Jean Seaton, *Power without Responsibility. The Press and Broadcasting in Britain. Seventh edition*. London & New York: Routledge, 2010. For the lack of historical studies, see Michael Pickering, 'The devaluation of history in media studies', in Martin Conboy and John Steel (eds), *The Routledge Companion to British Media History,* London and New York: Routledge, pp. 9-18.

[6] Arne Schirrmacher, 'State-controlled multimedia education for all? Science programs in early German radio', *Science and Education* (2010) 21*,* pp. 381-401. Marcel LaFollette, *Science on the Air: Popularizers and Personalities on Radio and Early Television*. Chicago: University of Chicago Press, 2008; Marcel LaFollette, *Science on American Television. A History.* Chicago: University of Chicago Press, 2012. Jean-Baptiste Gouyon, 'Science and film-making', *Public Understanding of Science* (2016) 25, pp. 17-30.

[7] Timothy Boon, *Films of Fact. A History of Science in Documentary Films and Television.* London and New York: Wallflower Press, 2008; Timothy Boon, 'British science documentaries: transitions from film to television', *Journal of British Cinema and Television* (2013) 10, pp. 475-497; Timothy Boon, 'Formal conventions in British science television, 1955-1965', *Nova Època* (2014) 7, pp. 51-69; Timothy Boon, '"The televising of science is a process of television": establishing Horizon, 1962-1967', *British Journal for the History of Science* (2015) 48, pp. 87-121; Timothy Boon, '"Programmes of real cultural significance": BBC2, the sciences and the arts in the mid-1960s', *Journal of British Cinema and Television* (2017) 14, pp. 324-343. Allan Jones, *Speaking of science. BBC science broadcasting and its critics, 1923-1964*. UCL: PhD thesis, 2010; Allan Jones, 'Mary Adams and the producer's role in early BBC science broadcasts', *Public Understanding of Science* (2011) 21, pp. 968-983; Allan Jones, 'Clogging the machinery: the BBC's experiment in science coordination, 1949-1953', *Media History* (2013) 19, pp. 436-449; Allan Jones, 'Elite science and the BBC: a 1950s contest of ownership', *British Journal for the History of Science* (2014) 47, pp. 701-723; Allan Jones, 'Exceptionalism and the broadcasting of science', *Journal of Science Communication* (2017) 16, pp.1-11.

[8] Neil J. Morley, 'Munro Fox and the public promotion of biology in the mid-twentieth century', *Archives of Natural History* (2019), pp. 88-104, p. 89.

[9] Jared R. Keller, *A scientific impresario. Archie Clow, science communication and BBC radio, 1945-1970.* Imperial College of Science, Technology and Medicine: PhD thesis, 2017.

[10] Paul Merchant, 'Particular popular science: British scientists writing, speaking and broadcasting on science and religion from the 1980s', *Notes Rec.* (2018) 72, pp. 365-381.

[11] Brian Charlesworth and Paul Harvey, 'John Maynard Smith', *Biographical Memoirs of Fellows of the Royal Society* (2005) 51, pp. 254-265.

[12] Archibald Clow to John Maynard Smith, 15 September 1954. BBC Written Archives Centre (subsequently BBC WAC) RCONT1, John Maynard Smith Contributor File I.

[13] John Maynard Smith, 'Birds as aeroplanes', *New Biology* (1953) 14, pp. 64-81.

[14] Archibald Clow to John Maynard Smith, 1 December 1959. BBC WAC RCONT1, John Maynard Smith Contributor File I.

[15] Keller, op. cit. (9), p. 198.

[16] 'Who knows?', *Radio Times* (1957) 1694, p. 25. Pollock was later replaced by G.P. Wells.

[17] *Radio Times* (1960) 1886, p. 50 and *Radio Times* (1967) 2278, p. 38.

[18] cf. Keller, op. cit. (9), pp. 179-202 on the development and format of *Who Knows?*

[19] Jones 2010, op. cit. (7), p. 108.

[20] Timothy Boon and Jean-Baptiste Gouyon, 'The origins and practice of science on British television', in Martin Conboy and John Steel (eds.), *The Routledge Companion to British Media History*. London and New York: Routledge, 2014, pp. 470-483, p. 473.

[21] Keller, op. cit. (9), p. 257.

[22] Keller, op. cit. (9), p. 194.

[23] Keller, op. cit. (9), p. 35.

[24] Aubrey Singer, 'Science broadcasting in Britain', *Science* (1966) 154, pp. 743-745, p. 743.

[25] Singer, op. cit. (24), p. 744.

[26] Singer, op. cit. (24), p. 744.

[27] Gregory and Miller, op. cit. (4), p. 122.

[28] José van Dijck, 'Picturizing science. The science documentary as multimedia spectacle', *International Journal of Cultural Studies* (2006) 9, pp. 5-24, p. 20.

[29] R.W. Reid, 'Television producer and scientist', *Nature* (1969) 223, pp. 455-458, p. 457.

[30] John Maynard Smith, 'Science and media' (1983), reproduced in *Did Darwin Get it Right?,* London [etc.]: Penguin, 1993, p. 29.

[31] van Dijck, op. cit. (28), p. 7.

[32] Keller, op. cit. (9), p. 264.

[33] This approximation is based on the listings in the BBC Genome project (http://genome.ch.bbc.co.uk), a record of the *Radio Times* from 1923 to 2009. The number may be slightly inflated, although I have tried to unpick all the repeats from the original broadcasts.

[34] JMSA Add MS 86765 contains several letters of viewers congratulating Maynard Smith on programmes, and showing genuine interest in the content by asking questions.

[35] Paul Ferris, 'Sound Waves. Keeping science pure', *The Observer*, 1964, p. 23.

[36] 'Maynard Smith, Prof. John'. *WHO'S WHO & WHO WAS WHO.* Retrieved 17 October 2018, from http://www.ukwhoswho.com/view/10.1093/ww/9780199540891.001.0001/ww-9780199540884-e-27114

[37] BBC WAC RCONT1, John Maynard Smith Contributor File I, and RCONT12, John Maynard Smith Contributor File II.

[38] JMSA Add MS 86831.

[39] John Maynard Smith to Archibald Clow, 19 July 1965 and John Maynard Smith to Mick Rhodes, 13 December 1966. BBC WAC RCONT12, John Maynard Smith Contributor File II.

[40] Keller, op. cit. (9), p. 268.

[41] Keller, op. cit. (9), p. 257.

[42] Keller, op. cit. (9), Boon 2008, op. cit. (7), Jones 2010, op. cit. (7).

[43] John Maynard Smith to Mick Rhodes, 2 November 1965. JMSA Add MS 86765.

[44] Mick Rhodes to John Maynard Smith, 27 October 1965. JMSA Add MS 86765.

[45] These appear to be, from the titles and brief descriptions in the *Radio Times*: 'Mules, Maize and Mongrels' (1954), the 'Looking alike' three-part series (1960), 'Jigsaws and Penny-Whistles' (1963), 'Information' (1964), 'DNA and Evolution' (1967), and the outlier, 'Cheese' (1997) – which appears to have discussed bacteria. 'Scientific knowledge and the way to find it' and 'The scientific interpretation of evidence', two of his three talks for

the *Christianity and the Natural Sciences* series (1965), were concerned with scientific methods (cf. JMSA Add MS 86606.

[46] The article discussed the feasibility and desirability of eugenics. The science is discussed only insofar as it is necessary to understand the larger arguments around what applied eugenics might mean for human society, whether or not it would be 'worth bothering' and what biologists should do about it.

[47] John Maynard Smith, Robert McKenzie and Erskine Childers (interviewers), 'Talking of things to come', *The Listener* (1966) 1924. 'Horizon: Pesticides and Prosperity [sic].' *Radio Times* (1964) 2116, p. 13.

[48] Mick Rhodes to John Maynard Smith, 3 March 1967. JMSA Add MS 86765.

[49] cf. *Radio Times* (1967) *2260*, p. 38; *2261*, p. 42; *2262*, p. 50 and *2263*, p. 50.

[50] Maynard Smith 1983, op. cit. (30), p. 28.

[51] Alexandra Lawrie, 'Who's listening to modernism? BBC Features and audience response', *Media History* (2018) 24, pp. 239-251, p. 239f. Audience Research Report, Biological Backlash, 4. Dreams and goals. 14 April 1967. BBC WAC R9/6/183, LR/67/418.

[52] Audience Research Report, Biological Backlash, 4. Dreams and goals. 14 April 1967. BBC WAC R9/6/183, LR/67/418. See also Keller, op. cit. (9), p. 238ff.

[53] Keller, op. cit. (9), p. 236.

[54] Keller, op. cit. (9), p. 239.

[55] Leach 1967, "Avoiding Action", p. 7. JMSA Add MS 86765.

[56] Kendrew 1967, "Avoiding Action", p. 8. JMSA Add MS 86765.

[57] Kendrew 1967, "Avoiding Action", p. 11. JMSA Add MS 86765.

[58] Thorpe and Leach 1967, "Avoiding Action", p. 12f. JMSA Add MS 86765.

[59] Leach 1967, "Avoiding Action", p. 8. JMSA Add MS 86765.

[60] Maynard Smith 1967, "Avoiding Action", p. 8f. JMSA Add MS 86765.

[61] Maynard Smith 1967, "Avoiding Action", p. 9. JMSA Add MS 86765.

[62] e.g. Marianne Boenink, Tsjalling Swierstra and Dirk Stemerding, 'Anticipating the interaction between technology and morality: A scenario study of experimenting with humans in bionanotechnology', *Studies in Ethics, Law, and Technology* (2010) 4, pp. 1-38. Hard outcomes or impacts refer to anything quantifiable, whereas soft

impacts are less easy to determine: 'the way technology influences, for example, the distribution of social roles and responsibilities, moral norms and values, or identities.'

[63] 'Out of the air' 1967, p. 606.

[64] Mick Rhodes to John Maynard Smith, 3 February 1967. JMSA Add Ms 86765.

[65] John Maynard Smith to Mick Rhodes, 6 February 1967. JMSA Add MS 86765.

[66] John Maynard Smith to Mick Rhodes, 22 September 1967. JMSA Add MS 86765.

[67] *Radio Times* (1967) 2292, p. 38.

[68] Maynard Smith, "The conscience of the scientist", script. BBC WAC TLN 21 TC 1612. The broadcast, based on a speech (see below), has been published in *The Listener,* cf. John Maynard Smith, 'The conscience of the scientist', *The Listener* (1969) 2106, pp. 178-180. It was so successful that it was repeated, the producer informed Maynard Smith in his thank you letter. Laurie John to John Maynard Smith, 22 July 1969. BBC WAC RCONT12, John Maynard Smith Contributor File III.

[69] Maynard Smith 1969, op. cit. (68), p. 178.

[70] Maynard Smith 1969, op. cit. (68), p. 179.

[71] Maynard Smith 1969, op. cit. (68), p. 180.

[72] Maynard Smith 1969, op. cit. (68), p. 180.

[73] Alice Bell, 'The scientific revolution that wasn't. The British Society for Social Responsibility in Science', *Radical History Review* (2017) 127, pp. 149-172, p. 149. John Maynard Smith to Contracts Department, Talks, 26 June 1969. BBC WAC RCONT12, John Maynard Smith Contributor File III.

[74] Undated notes, likely 1969. Maurice Wilkins Papers, Kings College London (subsequently MWP), KPP178/11/1/4

[75] Jonathan Rosenhead, 'The BSSRS: three years on. *New Scientist* (20 April 1972), pp. 134-136, p. 134. Also see Anonymous, 'More about Social Responsibility', *Nature* (1969a) 221, p. 1190.

[76] Patrick Baldwin to Maurice Wilkins, 19 February (undated). MWP KPP178/11/1/2.

[77] FRSs to whom Wilkins's et al letter sent 19-21 February 1969; Others, not FRS to whom letter has been sent. MWP KPP178/11/1/2.

[78] Anonymous 1969a, op. cit. (75), p. 1190. Letters of support to Wilkins et al letter. MWP KPP178/11/1/2.

[79] Wilkinson, 'Scientists draw up code of ethics for Brave New World'. MWP KPP178/11/1/2. Anonymous, 'Public and private responsibility', *Nature* (1969b) 222, p. 320. Maurice Wilkins to Anthony Wedgwood Benn, 19 June 1969. MWP KPP178/11/1/2.

[80] Minutes of SSRS Committee, 23 April 1969. MWP KPP178/11/1/4.

[81] Committee Meeting, 25 June 1969 and "To all members of the Science Advisory Board", 6 January 1970. MWP KPP178/11/1/4.

[82] Dave Muddiman, 'Red information scientist: the information career of J.D. Bernal', *Journal of Documentation* (2003) 59, pp. 387-409, p. 393.

[83] Richie Calder, 'Scientific hippies', *New Statesman* (2 May 1969), pp. 617-618, p. 617.

[84] The society still '[d]ecided to maintain good relations and seek invitations to P. seminars', however. Minutes of SSRS Committee Meeting, 7 May (no year). MWP KPP178/11/1/4. The Pugwash Conferences on Science and World Affairs emerged in the 1950s, drawing on Bertrand Russell and Albert Einstein's manifesto on the nuclear threat. In 1995, the Nobel Peace Prize was awarded to Pugwash and its co-founder, Sir Joseph Rotblat. ('About Pugwash' (n.d.), retrieved 25 August 2018 from https://pugwash.org/about-pugwash/).

[85] Bell, op. cit. (73), p. 152. Among the original letters of support were also several Nobel Laureates, a majority of FRS, a Lord and a DBE as well as OBEs.

[86] *Bernal and the Social Function of Science*, lecture by Chris Freeman filmed at the University of Sussex, 1997. The Vega Science Trust. Retrieved 14 May 2019 from http://vega.org.uk/video/programme/86. Muddiman, op. cit. (82), p. 388.

[87] Muddiman, op. cit. (82), p. 391 (citing Bernal 1939)

[88] Ralph Desmarais, 'Jacob Bronowski: a humanist intellectual for an atomic age, 1946-1956', *The British Journal for the History of Science* (2012) 45, pp. 573-589, p. 574.

[89] E.g. J.D. Bernal, Joseph and Dorothy Needham, Lancelot Hogben and Sir Julian Huxley, who had been active in the Social Relations of Science movement or were part of what Gary Werskey has termed the 'Visible College'. See. Robert E. Filner, 'The Social Relations of Science Movement (SRS) and J. B. S. Haldane', *Science & Society* (1977) 41, pp. 303-16 and Gary Werskey, *The Visible College: A Collective Biography of British Scientists and Socialists of the 1930s.* London: Free Association Books, 1978. Cf. Letters of support to Wilkins et al letter (as at 2 April 1969). MWP KPP178/11/1/2.

[90] Cited in Bell, op. cit. (73), p. 166.

[91] Cited in Bell, op. cit. (73), p. 165f.

[92] Jane Gregory and Simon Jay Lock, 'The evolution of "public understanding of science": public engagement as a tool of science policy in the UK', *Sociology Compass* (2008) 2, pp. 1252-1265, p. 1253.

[93] Gregory and Lock, op. cit. (92), p. 1254.

[94] Boon 2015, op. cit. (7), p. 90.

[95] Boon 2017, op. cit. (7).

[96] Peacock 1963, cited in Boon 2017 op. cit. (7), p. 327f.

[97] Boon 2017, op. cit. (7), p. 327f.

[98] Leach 1964, cited in Boon 2017, op. cit. (7), p. 330.

[99] Boon 2015, op. cit. (7), p. 103. Short 1964, cited in Boon 2015, op. cit. (7), p. 102.

[100] Boon 2017, op. cit. (7), p. 331.

[101] Singer 1959, cited in Boon 2015, op. cit. (7), p. 97.

[102] Boon 2015, op. cit. (7), p. 100.

[103] Watt, 'Foreign TV Reviews – Horizon', *Variety* (1964) 235, p. 30. Boon 2015, op. cit. (7), p. 87.

[104] *Radio Times* (1966) 2225, p. 15.

[105] BBC WAC T63/74/1 First Ten Years and T63/109/1 Selfish Gene. JMSA Add MS 86765.

[106] Peter Jones to John Maynard Smith, 31 December 1974. JMSA Add MS 86765.

[107] John Maynard Smith, 'J. B. S. Haldane', in Sahotra Sarkar (ed.), *The Founders of Evolutionary Genetics,* Dordrecht: Kluwer Academic Publishers, 1992, pp. 37-51, p. 49.

[108] John Maynard Smith 1992, op. cit. (107), p. 49.

[109] John Maynard Smith 1992, op. cit. (107), p. 49; see also JMSA Add MS 86817.

[110] John Maynard Smith and Richard Dawkins 1997, https://www.webofstories.com/play/john.maynard.smith/17 . He ultimately left the Party after the invasion of Hungary in 1956.

[111] Tobias Ebbrecht, 'Docudramatizing history on TV. German and British docudrama and historical event television in the memorial year 2005', *European Journal of Cultural Studies* (2007) 10, p. 36.

[112] Ebbrecht, op. cit. (111), pp. 35-53. See also Boon 2008, op. cit. (7) and Boon 2013, op. cit. (7) on British science documentaries.

[113] For literature on the Lysenko Affair, see for example Zhores Medvedev, *The Rise and Fall of T.D. Lysenko*, New York: Columbia University Press, 1969; David Joravsky, *The Lysenko Affair*, Cambridge, MA: Harvard University Press, 1970; Greta Jones, 'British scientists, Lysenko and the Cold War', *Economy and Society* (1979) 8, pp. 26-58; Diane B. Paul, 'A war on two fronts: J. B. S. Haldane and the response to Lysenkoism in Britain', *Journal of the History of Biology* (1983) 16, pp. 1-37; Oren S. Harman, 'C.D. Darlington and the British and American reaction to Lysenko and the Soviet conception of science', *Journal of the History of Biology* (2003) 36, pp. 309-352; Nils Roll-Hansen, *The Lysenko Effect: The Politics of Science*. Amherst, NY: Humanity Books, 2005; Mikuláš Teich, 'Haldane and Lysenko revisited', *Journal of the History of Biology* (2007) 40, pp. 557-563; Audra J. Wolfe, 'What does it mean to go public? The American response to Lysenkoism, reconsidered', *Historical Studies in the Natural Sciences* (2010) 40, pp. 48-78; and William deJong-Lambert, *The Cold War Politics of Genetic Research. An Introduction to the Lysenko Affair*, Dordrecht: Springer, 2012. Gary Werskey, *The Visible College: A Collective Biography of British Scientists and Socialists of the 1930s*. London: Free Association Books, 1978 also devotes a section to it.

[114] John Maynard Smith to Peter Jones, 6 January 1975. JMSA Add MS 86765.

[115] John Maynard Smith to Peter Jones, 10 February 1975. JMSA Add MS 86765.

[116] Singer, op. cit. (24), p. 744.

[117] Boon 2013, op. cit. (7), p. 477.

[118] Peter Jones to John Maynard Smith, 28 January 1975. JMSA Add MS 86765.

[119] van Dijck, op. cit. (28), p. 14.

[120] Corner 1996 referenced in Jean-Baptiste Gouyon, 'Science and film-making', *Public Understanding of Science* (2016) 25, pp. 17-30, p. 18.

[121] van Dijck, op. cit. (28), p. 10. Maynard Smith saw potential dangers in the voice-over as a method of presentation as well. He feared that it rendered scientists invisible as people. Cf. Maynard Smith 1983, op. cit. (30), p.26. and T. Beardsley, 'Scientists to be seen and heard', *Nature* (1983) 305, p. 6

[122] Morley, op. cit. (8), p. 89.

[123] Morley, op. cit. (8), p. 98.

[124] Merchant, op. cit. (10), p. 377.