MARGARET HILDA THATCHER

13 October 1925 - 8 April 2013

Elected FRS 1983

BY JON AGAR*

A politician of global stature in the late twentieth century, Margaret Thatcher (née Roberts) studied chemistry at Oxford University during the Second World War and worked as an industrial scientist in the late 1940s and early 1950s. Entering Parliament in 1959, she served as Secretary of State for Education and Science under Edward Heath in the early 1970s. In 1979 she became not only the United Kingdom's first female Prime Minister but also the first with such a scientific background. Elected a Fellow of the Royal Society in 1983, under Statute 12, she oversaw significant changes in science policy and her administration faced many major political issues which depended on scientific advice, notably the AIDS crisis, biomedical uses of human embryos, decisions over civil and military nuclear projects, acid rain, and climate change.

EARLY LIFE

Margaret was born in the Lincolnshire town of Grantham, daughter of Alfred and Beatrice Roberts. She had one older sister, Muriel. The family lived over their grocers' shop; her father had an active civic life, serving as a local Independent councillor, lay Methodist preacher, school governor and, between 1945 and 1946, town mayor. The family values were of self help, hard work, self reliance, duty before pleasure (Cannadine 2017). Margaret attended Huntingtower Road County Elementary School from the age of five, and, aged ten, won a scholarship to attend the fee-paying grammar school, Kesteven and Grantham Girls' School (Campbell 2000). While she also enjoyed history, by age 16 Margaret Roberts' best subject was chemistry, one that suited her practical, methodical manner and was taught by an inspiring teacher, a Miss Kay. The Thatcher archives, held at Churchill College, Cambridge, contains a notebook on 'qualitative chemistry' dating from 1942, her lower sixth form year, in which Margaret has written out 'confirmatory tests for metals and acid radicals' in neat handwriting (1).

OXFORD

In late 1942, aged only seventeen, Margaret Roberts sat for a scholarship to Somerville College, Oxford. While she narrowly missed the scholarship, she was offered a delayed place for October 1944. In the event she was able to start her university chemistry degree a year early, in October 1943. Thatcher's biographers agree that she spent increasing amount of time and energy at university on politics, being particularly active in the Oxford University Conservative Association (the Union, at the time, barred women). They also tend to repeat two assessments of Margaret, the science student, from senior Oxford women scientists, Janet Vaughan and Dorothy Hodgkin. Vaughan, a haematologist, had organised blood transfusion services in London and assisted the medical care of inmates at Belsen, when she became Principal of Somerville College in 1945, a post

she would hold for over twenty years. How well she got to know the young chemistry undergraduate, given her intense work, is unclear. However Vaughan, four decades later, recalled Margaret Roberts as a 'perfectly adequate chemist. I mean nobody thought anything of her. She was a perfectly good second-class chemist, a beta chemist' (Young and Sloman 1986, Young 1989, Campbell 2000, Moore 2013).

The relationship with Hodgkin was deeper, although not without tensions. 'I came to rate her as good', said Hodgkin, 'One could always rely on her producing a sensible, well-read essay' (Young and Sloman 1986, Young 1989, Campbell 2000, Moore 2013). According to her biographer, Charles Moore (2013), Thatcher 'felt an enormous respect for Mrs Hodgkin'. Indeed, she would keep in contact with the Nobel-prize-winning x-ray crystallographer, corresponding into the 1980s. In her memoirs, Thatcher (2) described Hodgkin as 'ever-helpful', 'a brilliant scientist and a gifted teacher', and she had a picture of Hodgkin installed at Number 10 Downing Street (Gamble 2014). Hodgkin, in contrast, could be openly critical of Thatcher's politics. (The relationship has been the subject of a radio play, Adam Ganz's *The Chemistry Between Them*, 2014, and is discussed in Georgina Ferry's 1998 biography of Hodgkin.) While she could have received an unclassified Oxford degree after three years, Margaret Roberts decided to try for a classified BSc with honours, a choice which meant that she would stay for a further, fourth year and conduct research. Her thesis was supervised by Hodgkin, who directed her to work with one of Hodgkin's research assistants, a Jewish refugee scientist, Gerhard Schmidt, on the structure of the antibacterial peptide gramicidin S (Moore 2013). The work made some progress, although the full structure was not determined until many years later. 'I did not see Gerhard Schmidt again until some fifteen years later when I went to visit the Weizmann institute', Thatcher recollected, 'I walked through the laboratories and there I met Gerhard Schmidt who had completed the structure on gramicidin S which had turned out to be much more complicated that we first thought' (3).

EARLY CAREER IN INDUSTRIAL SCIENCE AND POLITICS

Margaret Roberts finished her Oxford undergraduate degree in 1947. She might have turned to law or sought a role in politics, but she did not, or at least not immediately. Instead she took two posts within industrial science, first within the Essex company BX Plastics and, second, as a food chemist in the innovative J. Lyons & Company based in Hammersmith, London. Her working experience as an industrial scientist, even more so than her Batchelor in Science degree, distinguishes her as an extreme rarity among high-achieving British politicians. Not only would she later draw upon her chemistry to help her understand some of the policy challenges facing her, but she also knew what science in practice was like, and therefore did not have to, as many other politicians do, rely on what others say about how science works.

Little is known about Margaret Roberts' stint at BX Plastics. The firm itself had its origins in East London in the late nineteenth century when 'xylonite' (hence BX – British Xylonite) was a rival new plastic to Bakelite. By mid-century BX Plastics had moved further east, to Manningtree (where the labs and offices were) outside Colchester (where Margaret found digs). Our main source is Thatcher's own memoirs:

> It had been understood when we originally discussed the position that it would involve my being in effect Personal Assistant to the Research and Development Director. I had been looking forward to this because it would allow me to get to know more of how the company as a whole operated and also use the talents I have, over and above my knowledge of

> chemistry. But on my arrival it was decided that there was not enough to do in that capacity and so I found myself donning my white coat again and immersing myself in the wonderful world of plastics. (2)

Life changed for Margaret Roberts in three, significant and connected ways in 1950. She was selected as a parliamentary candidate for the Dartford constituency; this was a safe Labour seat but was the first serious step on her formal political career. During the process she met a local businessman, Denis Thatcher, who soon proposed marriage. They would marry in December 1951 at Wesley's Chapel, City Road, London, and henceforth Margaret Roberts would be Margaret Thatcher. Finally, her political and personal ambitions meant leaving the relative isolation of Essex for London, and she sought and found a new job: food research chemist at J. Lyons and Company. Biographers often repeat the line that her work was testing the quality of cake fillings and ice cream (Young 1989, Cannadine 2017), but she herself noted that her work 'had a stronger theoretical side … which made it more satisfying than my position at BX had been' (2) (Campbell 2000). The appealing story that Thatcher was involved in the invention of soft, low-quality ice cream, which has circulated since the 1980s at least, has, as yet, no direct empirical confirmation, and is indeed unlikely given the timeline of the innovation.

At Lyons, Thatcher (then still Roberts) was co-author of her sole scientific paper, 'The saponification of α-monostearin in a monolayer' in the *Journal of the Science of Food and Agriculture* in September 1951 (4). The journal had been launched the year before by the Society of Chemical Industry. Her co-author was Hans Helmut Gunter Jellinek (1917-1986), head of the section of physical chemistry at Lyons. The Jellinek family, Lutheran converts from Judaism, had been forced to flee Danzig and Nazi Nuremburg laws when Hans was in his twenties (Kerker 1987). He completed doctorates at Imperial College in 1942 and Clare College, Cambridge (matriculation 1941, PhD 1945), before joining Lyons. His post-Lyons career took him to Australia, the United States and Canada where he eventually settled at Clarkson University. His later work focussed on liquidlike layers on ice surfaces, significant for the understanding of topics from the icing of helicopter blades to the movement of glaciers. Jellinek and Roberts' paper concerned saponification (the formation of soap by a base acting on fats), comparing the process on surfaces of alkali with the process in bulk, of α-monostearin (glycerol monostearate), a substance that has widespread uses including as an emulsifier, stabiliser and preservative in foods, a lubricant for textiles and plastics, and in the preparation of cosmetics. The interest at Lyons was presumably in the food science applications (perhaps even in the emulsification of ice creams!), and it could also be the case that Roberts applied some of her knowledge from her BX plastics research.

Margaret Roberts stood in the Dartford constituency in the general elections of February 1950 and October 1951. Her campaign included photographs of her wearing the scientists' uniform of a white lab coat, working with chemistry glassware, taken either at BX Plastics or Lyons. She was young – indeed the youngest Conservative candidate standing – and her identification as a scientist perhaps leant maturity and prestige. While she lost, she reduced the Labour majorities in the constituency significantly and she was seen as a rising talent. The newly married Margaret Thatcher decided to leave industrial science, read for the bar (soon joining Lincoln's Inn as a barrister) and, with Denis, started a family. Twins, Carol and Mark, were born in August 1953. In the general election of October 1959, Margaret Thatcher stood in the safe Conservative seat of Finchley, and held it, comfortably, with an increased majority. She held the seat until her elevation to the House of Lords in 1992, as MP, minister and prime minister.

SECRETARY OF STATE FOR EDUCATION AND SCIENCE

Harold Macmillan appointed Margaret Thatcher to her first, lowly ministerial post, as Parliamentary Secretary to the Minister of Pensions, in October 1961. The role had no connection to science. Between 1964 and 1970, the Conservative party was in opposition, as Harold Wilson's Labour administration rode to power on the back of rhetoric about a new Britain that supposedly would be forged in the 'white heat' of technological revolution. In 1970 the new Conservative prime minister, Edward Heath, confirmed Thatcher as his Secretary of State for Education and Science (she had held the shadow position). While Heath had not made the appointment on the basis of her experience, she herself considered it significant. 'When I went to the Ministry of Education of Science', Thatcher later recalled, 'I must say I was so very glad that I had had, not merely a science degree, but practice in industry, in pure research, so that one, in fact, did have a scientific background' (5).

Thatcher's time at the Department of Education was difficult but formative. In the public memory the move to cut the provision of free milk to schoolchildren – earning her the rhyming epithet 'milk snatcher' – was perhaps most long held. But it would also be, as one biographer notes, 'her only experience of heading a government department before she became Prime Minister' (Campbell 2000). She intervened to save the Open University against critics, and in general successfully battled with the Treasury to increase public spending in areas of her department's responsibilities. 'Her determination and energy earned her the respect of her civil servants', says Cannadine (2017), 'but not their affection'. Indeed the feeling was mutual: Thatcher thought that the civil servants, especially her permanent secretary, undermined her.

This pattern, of Thatcher being both able to defend the established interests of the Department of Education but also suspicious of civil servants' advice, is an important context for perhaps the most significant moment of science policy decision-making during her tenure as Secretary of State for Education and Science. In the mid to late 1960s, under Harold Wilson, the machinery of science advice to government had been shaken up. The Science and Technology Act (1965) created a Science Research Council (SRC), Natural Environment Research Council (NERC) and Social Science Research Council (SSRC); a Council for Science Policy (CSP) advised Thatcher's department; and a Ministry of Technology (soon absorbing the Ministry of Aviation) formed with its own Advisory Council on Technology. At the time these changes were regarded as momentous, although in retrospective the system looks little different from what it replaced: the old Department of Scientific and Industrial Research, with its own advisory systems, government research establishments and support for industrial research associations. The Department of Education and Science, and the Royal Society, were largely content with the result. Fellows of the Royal Society, for example, were well represented on the advisory committees. Under Heath, a further inquiry on 'The future of the research council system', by the chair of the CSP, Lord Dainton, also promised only incremental change.

The report, however, made by Lord Rothschild on 'The organisation and management of government R&D' and published in 1971 in a green paper alongside Dainton's (1971) was, potentially, much more disruptive. Even though it was prompted by concerns about a relatively minor branch of government science funding (the Agricultural Research Council), and Rothschild's proposals only addressed how government departments supported research and development (R&D), the language used pointed towards a new way of thinking. Rothschild proposed a 'customer-contractor' principle: customers (government departments) should state their needs and contractors (research organisations) should perform the paid work. At heart it was orientating public science to be responsive to a customer, in the first instance a branch of government, but in a way and using language that would later invite privatisation. It was immediately controversial. Alan Hodgkin,

President of the Royal Society, commented that 'any country which has a reasonably satisfactory method of supporting science should think very carefully before dismantling it', while the Royal Society's formal response called Rothschild's idea 'a misleading oversimplification' (Collins 2016).

A crucial meeting at 10 Downing Street in April 1971, held when Dainton and Rothschild's proposals were first circulating in Whitehall, clarify our understanding of Rothschild's aims and also reveal Thatcher's developing way of thinking about science policy. It was a very select and high-level gathering. Present were the Prime Minister (Heath), Lord Rothschild, the minister responsible fr science (Thatcher), the Head of the Home Civil Service (Sir William Armstrong) and the Principal Private Secretary to the Prime Minister (Robert Armstrong). Thatcher reported that the CSP and the Royal Society (and the same was true of her own department) considered that the research system had been already 'thoroughly reviewed', and these organisations 'felt that the system was now working better than it had ever worked before' (TNA PREM 15/408). Rothschild however insisted that 'in his view fundamental research should be concentrated with the Scientific Research Council' while 'the rest (leaving aside a small quantity of fundamental research) being applied research [should be] commissioned and if necessary paid for by consumer departments'. In marvellously tactful minute-taking (by Robert Armstrong), Thatcher's change in convictions were recorded:

> In discussion it was recognised that this would be fundamentally different from the present system. The Secretary of State said she did not object to a fundamental change, so long as its implications were fully worked out… The logical conclusion appeared to be that the Agricultural Research Council, the Medical Research Council and the Natural Environment Research Council would become organisations dealing primarily with applied research.

The episode is significant for three reasons. First, it shows Thatcher agreeing with Rothschild about the 'customer-contractor' principle and that the status quo should be broken. Second, she went against what her department, the Royal Society and her science advisors wanted. Her short career as an industrial scientist perhaps meant that she saw 'applied science' differently and more positively. Third, as I have discussed elsewhere, it was a 'concrete and early moment when Thatcher chose the market as an alternative to established models of resource allocation' (Agar 2011). In practice, the Rothschild reforms were only slowly and patchily implemented (the Medical Research Council in particular fought them tooth and nail).

On 30 November 1972, Margaret Thatcher gave a speech proposing the toast at the Royal Society's anniversary dinner. She reminded the President and fellows that the Royal Society had long been a recipient of government funds while retaining independence, and noted the long service given of offering the government advice on scientific matters. Turning to the aftermath of the Dainton and Rothschild reports, she acknowledged, albeit diplomatically, the heat of the argument, and (referencing the unadorned communication style promoted by the Society since its inception) the blunt language used:

> We have just had a prolonged national debate in which Fellows of the Society in particular have not been slow to declare their minds on the mechanisms whereby the public support of scientific research may more faithfully reflect the involvement of Government… Well, I must confess, Mr President, that when the Royal Society delivered its views on reports its comments were not short, although one could have described some of them as being in fairly primitive language (6).

By following her reminder of the long history of interconnections between Royal Society and Government, with this acknowledgement of differences, she was able to make her point, that the Rothschild reforms should be seen as continuity of relations, not revolution:

> And so the Royal Society, in taking part in the new involvement of Government science in perhaps a slight increased amount of effort towards the applied sciences, is only carrying on the traditions which are really a part of its history.

The consolatory tone continued with praise for the Society's international work, and a statement of continued support for fundamental science as the font of later ''great economic and social utility'. Replying to Thatcher's speech and toast, the President, Alan Hodgkin, conceded that 'the past year … has been quite rough for senior scientists and scientific administrators'. He also looked back into the Society's history and attempted (in what reads now as patronising and sexist, but was then presumably gallant) to summarise Thatcher's unique position as senior politician, woman and scientist:

> I don't believe [Charles II] would have been at all surprised to find that our principal guest was a Secretary of State. … But I believe that Charles would have been startled to see that science, which he never took seriously, required the attentions of a senior Minister and that the Minister in question was female, as well as being a scientist herself. I am afraid that Charles might not have approved the appointment of a woman since he did not look primarily for intellectual qualities in the opposite sex. But I am sure that he would have given his thorough approval to the improvement in the aesthetic and decorative qualities of our dinner which our Secretary's presence confers. Mrs Thatcher, we greatly appreciate the kind things you have said about us and are very glad that the important office that you hold is in the hands of someone who cares about science. It is common knowledge that you have been a strong voice for maintaining the science budget and we are grateful to you and your colleagues for support (6).

It is perhaps surprising that neither Thatcher nor Hodgkin referred to the imminent entry of the United Kingdom into the European Economic Community despite addressing international issues. It was Edward Heath's achievement, but soon his administration was derailed by inflation, strikes, and the Oil Crisis. Calling an election for February 1974, asking the question 'Who governs Britain?', the electorate decided not Heath. Thatcher was again in opposition. In close conversation with the ideologue Keith Joseph, Thatcher began to question some of the consensus politics of post-war Conservativism, reaching towards the new approach, encouraging free-markets and opposing state intervention, that would soon be called Thatcherism. When Joseph's own challenge to Heath as party leader faltered, Thatcher stepped in. A ballot of Conservative MPs in February 1975 narrowly favoured Thatcher. Heath resigned and Thatcher became leader of the Conservative Party.

PRIME MINISTER

> Thatcher: People turn round to me and say, look, you're the first woman Prime Minister at Number 10. I turn round and say I'm the first science Prime Minister at Number 10.
>
> Cape: Um, That's right.
>
> Thatcher: That doesn't half shake them (7).

When the Conservatives won the general election held on the 4th of May, 1979, Margaret Thatcher became the first UK prime minister with a science degree and experience as a working scientist. She would face many issues that depended on scientific advice, oversaw significant changes in science policy, and faced considerable opposition from scientists angered by cuts in public spending that affected universities in particular. In 1983, Thatcher was, controversially, elected as a Fellow of the Royal Society.

Within her first fortnight as prime minister, Thatcher was asked by the Cabinet Secretary, John Hunt, how she wanted to organise science matters under her administration. She confirmed the appointment of a junior minister in the Department of Education and Science, Neil Macfarlane, as responsible for 'the science side of things', but also insisted that she herself would take an unprecedented role: 'I will answer questions on science if need be' (8). Advice would be channelled to her via the Government Chief Scientific Adviser, of which she had three consecutively: John Ashworth (then in the Central Policy Review Staff), the metallurgist and industrialist Robin Nicholson (1983-1985), and John Fairclough, who had worked at IBM(UK), from 1985. Also significant were the work and leadership of the Advisory Council for Applied Research and Development (ACARD), largely representing industrial science, and the Advisory Board of the Research Councils (ABRC), largely representing academic science. During this period, until the end of the Cold War, the UK spent over £3 billion annually on research and development (shy of 3% of GDP), of which government spending was about £2 billion, half of which was military R&D. Finally, and significantly, decisions on science would also be shaped by the input of the Number 10 Policy Unit, the source of many 'Thatcherite' views in the 1980s.

Reducing public expenditure was one Thatcherite aim. The 1979 election manifesto of the Conservative party had stated that 'enlarging the role of the state' had diminished 'the role of the individual' and 'crippled enterprise', while 'reduction of waste, bureaucracy and over-government' would 'yield substantial savings' (9). Science was not mentioned. But when the major cuts began, especially following the 1981 Budget, science was affected. Even though research council funding was somewhat protected, the dual-support system of universities, in which facilities for research were maintained through the university block grant, which was savaged, meant that academic science suffered. The result was anger and plummeting morale. The most visible protest would come in 1985 with the launch of Save British Science (now CaSE, the Campaign for Science and Engineering). On 13 January 1986, readers of *The Times* opened their newspaper to read an urgent call to arms:

> British science is in crisis: opportunities are missed, scientists emigrate, whole areas of research are in jeopardy. The Government's support for research is declining, falling further behind that of our main industrial competitors in Europe… There is no excuse: rescue requires a rise in expenditure… (Save British Science, 1986)

Such specific worries about science, alongside wider anger on the political left at the effects of Thatcher's policies, not least rising unemployment, provides the context for the controversy over Thatcher's election as a Fellow of the Royal Society in 1983 (formally admitted 9 January 1984). She was elected under Statute 12, which allows new fellows to be nominated if they have rendered conspicuous service to science or whose fellowship would be a signal benefit to the Society. Half of the UK's prime ministers since 1945 had been elected fellows since 1945 (including Winston Churchill, and, with more dissent, Harold Wilson), but, as Collins (2016) puts it in his history of the Royal Society since 1960, 'Mrs Thatcher was a divisive figure: some Fellows regarded her as the saviour of the nation, others the opposite'. On 30 June, 1983, a majority of a fractious meeting of 100 Fellows (of the then 968) voted in favour. In September, 44 Fellows signed a letter of protest to

the President of the Royal Society, Andrew Huxley. The Society's reply was that 'In terms of Mrs Thatcher's election there is really nothing to discuss. It has taken place and she is now a Fellow', adding that the 'only way of removing a Fellow was if he or she harms the Society's name' (reported in Anon 1983). While the Royal Society awarded Margaret Thatcher her Fellowship, her own university, Oxford, denied her an honorary degree in 1985.

The Statute 12 criteria, of 'service to science' and 'signal benefits to the Society', would be tested in May 1986 when the new President of Royal Society, the chemist George Porter, lobbied Margaret Thatcher. The episode illustrates the process, possibilities and limits of Royal Society influence on government in the Thatcher years. Porter had lunch with Lord Rothschild, during which he mentioned a couple of ideas in which, he thought, Thatcher might take a personal interest. Thatcher found space in her diary the following week. Meanwhile, Thatcher's private secretary had a word with Porter and wrote up notes on the ideas, placing them in Thatcher's overnight box of papers. One concerned increased merit awards for top scientists to discourage them from emigrating. The other sought to increase the Royal Society's influence, pitched as a partial solution to the ongoing malaise in British science:

> Proposal for a national advisory council for science
>
> Sir George believes there is a fairly general feeling amongst scientists that their representation at senior levels in Government is inadequate. The Royal Society do not however go along with the Labour proposal for a Minister for Science … but that there is a need for a new committee of 10 scientists or so (not drawn from the chairmen of research councils and so on but to sit as independents). The council would be chaired by you. The Chief Scientific Adviser and his office would provide the secretariat. The Royal Society would be willing to help in any way it could. The idea would be that the committee would act as an independent source of scientific advice but that it would also be able to field criticism from, e.g. the Save British Science movement (TNA PREM 19/1933)

Thatcher's advisers, including her private secretary and the Chief Scientific Adviser, John Fairclough, suggested rejecting the idea, since it would overlap with existing advisory machinery, although vaguer 'closer cooperation between the Royal Society and Government' might be encouraged ('As a Fellow yourself', noted her private secretary, 'you would welcome that'). At the meeting itself, Thatcher was noncommittal, although she asked for more details. Porter was briefly, and falsely, cheered by Thatcher's comment that the money involved might be 'peanuts' (as had to be clarified she used the phrase to refer to the negligible likely impact of the merit award scheme). Thatcher's handwritten notes on the papers state 'I agree that we must pursue the idea no further'; adding that perhaps 'the most important immediate thing is to find a role for the FRS – possibly by putting the President ex officio on some scientific committee' (10). Fairclough argued against, saying *ex officio* roles on ACARD, for example, had been recently denied to the TUC and would, if breached, be sought by other organisations, such as the Fellowship of Engineering (now Royal Academy of Engineering). Overall, the episode demonstrates that the Royal Society had limited windows of direct access to Thatcher, in which policy changes could be pitched but fairly easily resisted.

In matters of policy, a useful distinction can be made between "policy-for-science", the decisions taken to shape science funding and organisation, and "science-in-policy", the decisions taken on issues that had a major science component. Thatcher's approach to policy-for-science was guided by core political commitments: the aim to reduce public expenditure and what she saw as undue interference by the state, an admiration and preference for the individual, especially the entrepreneurial individual, over larger organisations, and long-held admiration for pure science. Yet

for the first half of her tenure as prime minister she continued the policies for science that she had inherited. These included, in what amounted to an industrial strategy, large-scale support through public funds for innovation in what were seen as high-technology growth areas of the economy. The Alvey programme, for example, a £350 million investment in advanced information technology which began in 1984, was a continuation of previous approaches. Defence R&D, in effect, was also large scale publicly-funded investment in industry.

There were therefore a tension between policy practice and Thatcherite commitments. Such tension could, and did, express itself as anger. Thatcher, in the early to mid-1980s was bitingly sarcastic about big, government-funded (and European) projects such as CERN, even if it was conducting basic science. UK withdrawal from CERN would be seriously considered in 1984. At a meeting of ministers in October 1983 (and recall that 1983 was a year of spectacular success for CERN, with its discovery of the W and Z bosons), Thatcher had said

> The Science Vote and the Research Councils have been protected for 10 years, but have done nothing to manage their cash limits. There has been no real shift towards useful science and money is still lavished on grand but useless projects such as CERN. At the same time other nations have benefited from our science because our University scientists are too toffee-nosed to get involved in applications, We can no longer afford to do science for prestige, it must be science for economic benefit (11).

Thatcher, in this outburst about academic scientists, almost certainly had in mind an episode that deeply angered her, one that she frequently cited. In 1980 she had visited Cambridge University and was told the story of the non-patenting of monoclonal antibodies, an invention lucratively exploited around the world. She took this case as her paradigmatic example of the failure of scientists to act as individual entrepreneurs (Agar 2019). The first response was symbolic: Thatcher hosted a reception at Number 10 Downing Street for small-scale inventors to highlight the obstacles to investment that faced. Reflecting on the event in a speech she asked 'What did I learn? Well first, attitudes in some quarters really do have to change', before singling out her ideal type, the scientist-inventor-entrepreneur:

> We have a long way to go before we will be giving proper recognition to our inventors. Of course scientific excellence is admirable, but so is engineering competence and technological capability. So is founding a new successful business and creating a lot of wealth.
>
> But most to be admired are those rare, gifted persons who can do all of this. The supercilious attitude that some sections of our society had towards our engineers and entrepreneurs was always a ridiculous affectation, now it is positively dangerous (12)

Second, to liberate these types, there was deregulation and privatisation. A very early privatisation, even before the flagship policy was extended to telecommunications, gas, and electricity, of the Radiochemical Centre to form Amersham International plc, was of a science-based organisation. The National Research and Development Corporation, which held patents in a public fund, was eventually privatised in reduced form as the British Technology Group, plc, and university scientists were further encouraged to exploit patentable discoveries, an American trend well underway since the commercialisation of the life sciences seen in the new biotechnology of the 1970s.

Finally, policy-for-science was decisively changed in 1986-1987, largely due to Thatcher taking advice on science policy from the ideological Number 10 Policy Unit rather from her more traditional science advisers (Agar 2019). As George Guise, of the Number 10 Policy Unit, successfully argued,

risk-averse businesses must be made to invest in R&D by cutting publicly-funded programmes supporting near-market research. The obverse of the argument was that government should generously fund basic science, now branded as 'curiosity-driven' science, the ultimate, if long-term, source of wealth (Agar 2017). This abrupt ditching of industrial strategy, perhaps because it privileged basic research, was not criticised by the bodies that otherwise had a charter to protect science, the Royal Society and Save British Science.

Meanwhile, Thatcher's administration was faced with many "science-in-policy" issues: the HIV/AIDS pandemic, public concerns over research with embryos, decisions over nuclear waste and new nuclear power stations, the release of radioactive materials (quantities of which rained down over Cumbria) from the fire at the Chernobyl in 1986, the United States' Strategic Defense Initiative, nature conservation, acid rain, threats to the ozone layer over the Antarctic, and climate change, amongst many. In some of these issues, Thatcher's education and experience as a scientist mattered, while in others her personal or political values came to the fore.

The world, and Thatcher, became aware that there was a new and devastating disease emerging in 1981. Competing scientists established that Acquired Immune Deficiency Syndrome, as it was named in 1982, was caused by a virus. Government funding went into disease surveillance, research into the virus, and messaging to health professionals and public. Thatcher was kept informed, was briefed by the chair of the Expert Advisory Group on AIDS, and occasionally asked to see scientific papers on the subject. Nevertheless, Thatcher's sought to intervene in 1986 when she objected to details on "risky sex" in government-led information campaigns placed in newspapers, and again, in 1989, to a survey of sexual behaviour that the Economic and Social Research Council proposed to conduct. Such empirical social science, necessary as it might be to frame AIDS policies, did not justify, in her view, the intrusion into privacy (Agar 2019).

Likewise, on the question of whether to allow experimentation on human embryos, perhaps the science-based issue that took most time in Parliament during the 1980s, Thatcher's personal contribution was to express disquiet based on personal morals. Historians, notably Wilson (2014), have linked the rise of bioethics to Conservative, and indeed neoliberal, values and beliefs, including the need for 'professions to be exposed to outside scrutiny to make them publicly accountable'. Notably the selection of Mary Warnock to chair the investigation into the use of human embryos was significant: her views on individual autonomy chimed with Thatcher's belief that "choice is the essence of ethics" (Wilson 2014, Agar 2019). The *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (the Warnock report), delivered in 1984 had chapters on artificial insemination, in vitro fertilisation (IVF), egg and embryo donation, surrogacy, sex selection, the freezing and storage of eggs, embryos and semen, and the regulation of scientific research, as well as over sixty recommendations. Thatcher's influence, beyond approving the inquiry and Warnock as chair, was minimal, although she did later intervene to insist that genetic engineering of embryos 'should be forbidden' (13). Warnock's most general recommendation was that a statutory regulating and licensing body should be set up to advise and grant licenses for research, a body with substantial lay representation. The Human Fertility and Embryology Authority was finally established in 1990-1991, after Thatcher's final term as prime minister, and is regarded as a policy success.

In other areas of science-in-policy, Thatcher's scientific background was of more significance. In the case of the Strategic Defense Initiative, President Ronald Reagan's bold, even unfeasible, proposal for a space-based comprehensive shield against ballistic nuclear missiles, Thatcher (1993) later recalled that it was 'one of those areas in which only a grasp of the scientific concepts involved allows the right decisions to be made', and her private secretary (Powell 2005) summarised her response being: 'As a scientist I shall understand this better than any of my ministers and therefore I

am the one the Americans should be talking to'. In practice the development of the British science policy response to SDI was led by Michael Heseltine (Agar 2019).

Acid rain was another issue combining scientific, political and international aspects in the 1980s. The phenomenon of acidification of rainfall particularly affected the Scandinavian countries downwind of Western Europe, especially the UK's coal power stations. The technical fixes, such as flue gas desulphurisation or more nuclear plants, were expensive. Furthermore, uncertainties in the scientific evidence were exaggerated by industrial interests. In September 1983, the Royal Society (alongside its sister academies in Norway and Sweden), acting as an honest broker, announced a collaborative programme of research, funded by the National Coal Board and the Central Electricity Generating Board (CEGB). Nevertheless, the key political decisions on acid rain were taken before this research was complete. In May 1984 Thatcher hosted a series of meetings at Chequers on acid rain, and subsequently asked to see the atmospheric chemistry equations (Agar 2019), and on 19 June 1984 agreed a UK policy to take to European negotiations. Over the next few years, during these negotiations, Thatcher's scientific background again became an interesting and perhaps significant tool for diplomacy. Norwegian politicians certainly thought she could be won over to their view by an appeal to science. Kåre Willoch, Prime Minister of Norway, addressed her as 'FRS, MP'. His successor, Gro Harlem Brundtland, went further. As Lord Marshall, the chair of CEGB and a forthright advocate of nuclear power, reported, writing to Thatcher in July 1986:

> She was proud of the fact that <u>you both had scientific training</u> before entering politics and said that "we scientists must stick together and set an example to other people [the underlining is in Thatcher's own blue pen] (quoted in Agar 2019).

Thatcher approved the flue gas desulphurisation, previously deemed to expensive, soon after.

Finally, the leading role Thatcher took on two further international science-in-policy issues may prove to be of the most historical importance. Both involved the global effects of the release of industrial gases into the atmosphere. The first, the revelation in 1985 of damage to the ozone layer above the Antarctic, while alarming, was relatively easily solved following the agreement of the Montreal Protocol in 1987 since the gases responsible, chlorofluorocarbons, had relatively niche uses and alternatives were available. The second, climate change through the release of greenhouse gases, was far more intractable.

It was not inevitable that Thatcher, in the late 1980s, became the most prominent politician on the world stage calling for action on climate change. A government report on 'Climatic change' had been prepared and was ready to be published in 1979, but Thatcher at that stage was said to regard publication with 'coolness' (Agar 2015); in her first meeting with her Chief Scientific Adviser she had reacted 'incredulously, "Are you telling me I should worry about the weather?"', when he raised the issue (Campbell 2003). Her support for swift action on the ozone hole, along with its model of international remedial action, was partly due to the contribution made by the British Antarctic Survey, now high in Thatcher's esteem after the Falklands War. The ozone hole issue was one reason for a spike in public concern for environmental issues around 1987 (the Green party had its best ever level of support in national polls), another contingent reason why Thatcher might look for an environmental issue to lead on. But lead she did. Her 1988 speech to the Royal Society is significant in many ways – the first half outlined the new policy for science formulated in 1986-1987, and she discussed the ozone hole and acid rain – but especially for the prominence given to climate change: 'we have unwittingly begun a massive experiment with the system of this planet itself' (15). The need for international action was reiterated on the world stage, not least in a speech on the

environment to the United Nations in 1989: 'It is mankind and his activities which are changing the environment of our planet in damaging and dangerous ways' (16).

LADY THATCHER AND RETIREMENT

Even in her last year as Prime Minister there were hints that her commitment to the science, and the need for action on climate change, were wavering. At a further speech to the Royal Society, in March 1990, on the occasion of the completion of the acid rain research, she said:

> I think that most of us accept this diagnosis [of anthropogenic climate change] yet hardly had I got back [from the United Nations] when I found that there are researchers who argue—and some were quoted in our newspapers last week—that temperature changes over the last hundred years have less to do with man-made greenhouse effect than with changes in solar activity, something over which we have no control at all (17).

In November 1990 Thatcher was challenged for leadership of the Conservative Party and resigned. She was ennobled as Baroness Thatcher and entered the House of Lords in 1992. Isolated from sound scientific advice, she would reverse her stance on climate change, expressed for example in her 2002 book *Statecraft*, her views aligning with those of her former Chancellor of the Exchequer, Nigel Lawson, a lobbyist for climate change denial. Margaret Thatcher died in 2013.

Margaret Thatcher's enduring legacy for science is mixed. The changes in policy for science introduced around 1987, with its reluctance to support near-market research with public funds, restrained what could be pursued in terms of industrial strategy. On the other hand, there is no doubt that her brief but serious championing of the need for action on climate change was influential on the world stage. Furthermore, she, at the time of writing, is the only past prime minister of the United Kingdom to be trained as, and experienced the working life of, a scientist.

References to other authors

Agar, J. 2011 'Thatcher, scientist', Notes and Records of the Royal Society 65, Issue 3 published:25 May 2011 https://doi.org/10.1098/rsnr.2010.0096

Agar, J (2015) '"Future forecast – changeable and probably getting worse": the UK government's early response to anthropogenic climate change', *Twentieth Century British History* (28), pp. 602-628.

Agar, J. 2017. 'Wilkins–Bernal–Medawar lecture. The curious history of curiosity-driven research', *Notes and Records of the Royal Society of London* 71, pp. 409–429.

Agar, J. 2019. *Science Policy under Thatcher*, London: UCL Press.

Anon, 'Royal Society faces protest over Thatcher', *The Times*, 24 September 1983, p. 4.

Campbell, J. 2000 *Margaret Thatcher, Volume One: the Grocer's Daughter*, London: Jonathan Cape.

Campbell, J 2003 *Margaret Thatcher, Volume Two: the Iron Lady*, London: Jonathan Cape.

Cannadine, D. 2017 *Margaret Thatcher: a life and legacy*, Oxford: Oxford University Press.

Collins, P. 2016 *The Royal Society and the Promotion of Science since 1960*, Cambridge: Cambridge University Press.

Ferry, G. 1998 *Dorothy Hodgkin: a life*, London: Granta Books, 1998

Gamble, J 2014 'When Hodgkin met Thatcher', *Nature* (16 October 2014) 514, p. 304.

Kerker, M. 1987 'In memoriam: Hans Jellinek (1917-1986) *Journal of Colloid and Interface Science* 116(2), pp. 604-605.

Moore, C. 2013 *Margaret Thatcher: the authorized biography, volume one: not for turning*, London: Allen Lane

Powell, C. 2005 in Michael Kandiah and Gillian Staerk, The British Response to SDI, Witness Seminar held in Chancellor's Hall, Senate House, University of London, 9 July 2003. London: Centre for Contemporary British History.

Save British Science, *The Times*, 13 January 1986, p. 5.

TNA PREM 15/408. Robert Armstrong, 'Note for the record', 21 April 1971.

TNA PREM 19/1933. Addison to Thatcher, 28 May 1986.

Wilson, D. 2014 *The Making of British Bioethics*, Manchester: Manchester University Press.

Young, H. 1989. *One of us: a biography of Margaret Thatcher*, London: Macmilllan.

Young, H. and Sloman 1986. *The Thatcher phenomenon*, London: BBC.

(1) 'Qualitative chemistry', 1942. School notebook. https://www.margaretthatcher.org/document/109908

(2) *The path to power*. London: HarperCollins, 1995.

(3) Speech at Weizmann Institute's 50th Anniversary Dinner, 6 March 1985. https://www.margaretthatcher.org/document/105985

(4) Jellinek, H.H.G. and Roberts, M.H 1951 'The saponification of α-monostearin in a monolayer' J. Sci. Food. Agric. 2, (September 1951), pp. 391-394.

(5) Speech to the Chemical Society and the Royal Institute of Chemistry (honorary fellowship), 24 October 1979. https://www.margaretthatcher.org/document/104152

(6) 'Anniversary dinner 1972', 1973. *Notes and Records of the Royal Society of London* 28(1), pp. 1-9.

(7) Remarks launching campaign to encourage girls to take up science. Stephen Cape, BBC, reporting. 25 July 1984.

(8) Handwritten note on TNA PREM 19/241, Hunt to Thatcher, 16 May 1979.

(9) Conservative Party, *Conservative General Election Manifesto 1979*. Forward by Margaret Thatcher, https://www.margaretthatcher.org/document/110858

(10) Handwritten note on TNA PREM 19/1933. Fairclough to Addison, undated (July 1986).

(11) Words reported as Thatcher's by her Chief Scientific Adviser, Robin Nicholson. TNA ED 273/111, Nicholson to Hancock, 24 October 1983.

(12) Speech to Parliamentary and Scientific Committee, 25 February 1981. https://www.margaretthatcher.org/document/104575

(13) Handwritten note on TNA PREM 19/2345. Newton to Whitelaw, undated (April 1987).

(14) *Downing Street Years*, London: HarperCollins, 1993.

(15) Speech to the Royal Society, Fishmongers' Hall, City of London, 27 September 1988. https://www.margaretthatcher.org/document/107346

(16) Speech to United Nations General Assembly (Global Environment), 8 November 1989. https://www.margaretthatcher.org/document/107817

(17) Speech to Royal Society Dinner (marking end of Surface Water Acidification Programme), 22 March 1990. https://www.margaretthatcher.org/document/108046