



John Marburger was the longest-running head of the US Office of Science and Technology Policy.

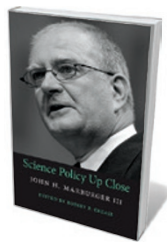
## SCIENCE POLICY

# From Brookhaven to Bush

Peter Gluckman finds US presidential science adviser John Marburger's posthumous collection enigmatic.

The complex interfaces between science, society and public policy have evolved considerably over recent decades. The late John Marburger, US President George W. Bush's science adviser from 2001 to 2009, was a transitional and somewhat controversial figure within that time. Across his career, the mood was moving from the unquestioned acceptance of public expenditure on science that had prevailed after the Second World War to greater public interest in the value and societal implications of science — and greater political debate about the role and findings of science.

In his stint as director of Brookhaven National Laboratory in Upton, New York, from 1998 to 2001, Marburger emerged as an insightful intermediary between the scientific community and society. Yet when US science needed those very skills during the Bush era, Marburger seemed strangely silent, at least in public. Nor does this posthumous collection of his writing, *Science*



## Science Policy Up Close

JOHN H. MARBURGER III; EDITED BY ROBERT P. CREASE  
Harvard University Press: 2015.

*Policy Up Close*, reveal his thinking. Its editor, Robert Crease, maintains the silence on this apparent paradox.

But the science-policy nexus has two different faces. Policy advice for science uses levers (such as tax credits for research and development) to influence the national science and innovation ecosystem, most often with economic development as a primary goal. This is distinct from science advice seeking to ensure that public policy is broadly informed by the best available evidence. Generally, both functions are vested in the same office — in the United States, that is the Office of Science and Technology Policy (OSTP). But when Marburger held the combined

posts of presidential science adviser and OSTP director, evidence-informed policy formation was apparently not a priority; and in *Science Policy Up Close*, he does not clarify whether this was by his choice or the administration's directive. Given that the Bush era revealed how vulnerable science can be in the face of organized vested interests such as the oil industry, this omission is frustrating.

Yet Marburger, a physicist, recognized the importance of achieving social licence for technology. This is seen clearly in his work at Brookhaven. In 1997, the lab had discovered a radioactive leak from a storage tank. Marburger realized that it was crucial to involve the local community in discussions. He writes about how — thrown into crisis-management mode over the public's perception of risk at the site — he developed a signature approach to helping stakeholders to see others' views. Similarly, when asking scientists to be accountable for the tax dollars they spend, Marburger was perhaps ahead of his time. His definition of accountability largely excluded scientists' broader contributions to society, but this issue was a theme during his years at the OSTP, and coincided with a governmental turn towards greater investment logic and applying evaluation metrics in managing public science.

In the book, however, Marburger does not address a headline issue of the Bush years — the public shift from trust in science to concerns over the government's treatment of scientific evidence. His only defence is that he chose not to “waste energy” dealing with “controversies that were not in his power to influence”. That he reveals nothing of his own views on issues such as climate change or stem-cell research leaves an uncomfortable vacuum.

Our only window into his thinking is his set of annual addresses to the American Association for the Advancement of Science (AAAS) Forum on Science and Technology Policy, made while he was science adviser and reproduced in the book. In these, Marburger revealed what he felt were the key science-policy issues: scientific-workforce development and scientific immigration in the wake of the terrorist attacks of 11 September 2001; the relative place of funding for discovery science versus directed funding; and approaches to prioritization when national budget appropriations are made.

It was only in 2004 that he seemed to comment on the role of science advice in developing public policy, after the non-profit Union of Concerned Scientists (UCS) issued a statement on ‘Restoring Scientific Integrity to Federal Policy Making’. Marburger's AAAS address that year was a well-scripted riposte to accusations that the Bush administration was ‘anti-science’, stating that

“President Bush believes policy should be made with the best and most complete information”. Although ‘information’ does not necessarily mean ‘evidence’, that speech remains historically significant as an early instance of the closer relationship between science, society and policy that we know today. (Chris Mooney’s 2005 *The Republican War on Science* (Basic Books) offers a very different interpretation of the events surrounding the UCS declaration.)

Marburger’s policy comfort zone was clearly the meticulous analysis of the science and innovation ecosystem to better inform the appropriations process. His call for a new “science of science policy” — defining the metrics for evaluating the inputs and outputs of a public science system — is an important legacy that has helped to embed the concept in the government vernacular. That powerful focus on appropriations might have been a strategic way to promote evidence-informed public policy more broadly; but Marburger does not make that claim. It is one thing to support the production of evidence, and quite another to help it to find its way to the corridors of policy. Perhaps Marburger’s contribution was in supporting the supply of scientific knowledge, without concerning himself with the more complex business of developing the government’s appetite for its systematic use.

*Science Policy Up Close* leaves the impression that Marburger might have had more to say had he been able to finish the book himself. Only the concluding essay offers a hint of his thoughts about the broader role of science in public policy and what he perceived as science’s lack of privilege in the seat of US governance.

More than a decade after the UCS declaration, the favoured tactic for dealing with ‘inconvenient truths’ is perhaps less often about discrediting the science, and more often about acknowledging the evidence and placing it among the many legitimate inputs into policy and decision-making. But there is some way to go: although the science-policy nexus is maturing and becoming more nuanced, the challenges and loneliness of intermediary roles such as Marburger’s remain. ■

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## HISTORY OF CHEMISTRY

# Words into gold

**Philip Ball** finds much wrestling with ideas in alchemists’ scribbled-over texts.

The sixteenth-century physician and alchemist Paracelsus claimed, “Not even a dog killer can learn his trade from books, but only from experience.” As later ‘experimental philosophers’ turned alchemy into chemistry, they retained this affectation: in the seventeenth century, Robert Boyle is said to have claimed that he had learnt “more from men, real experiments, and his laboratory ... than from books”.

Such comments seem to imply that alchemy and the transitional discipline of ‘chymistry’ were all about bench-top graft, in contrast to the medieval tradition of seeking knowledge in the library. Yet in most paintings of alchemists at work in the sixteenth and seventeenth centuries, books are ostentatiously on show. Apparatus lies unheeded or broken while the alchemist pores over a text, papers sometimes cascading in comic profusion from desk to floor. In these images, books matter very much indeed: they seem to be where the real secrets lie.

This vexed relationship is examined in *Books of Secrets*, an exhibition at the Chemical Heritage Foundation (CHF) in Philadelphia, Pennsylvania. Juxtaposing fifteenth-century alchemical books and manuscripts recently acquired by the CHF with its extensive collection of paintings of alchemists at their labours, the exhibition explores this early literature of proto-science, and what it was for.

Alchemical books varied significantly. Some were esoteric treatises, all cryptic diagrams and encoded instructions for conducting ‘rubification’ and other chemical procedures. Others were cheaply printed or hastily copied compilations of miscellaneous recipes for dyes, soaps and medicines. Both were apt to be marketed as ‘books of secrets’. The term seems to promise forbidden, mystical insights, but could also simply mean tricks of the trade.

The new acquisitions, originally part of the Bibliotheca Philosophica Hermetica in Amsterdam, include both

**Books of Secrets: Writing and Reading Alchemy**  
Chemical Heritage Foundation, Philadelphia, Pennsylvania.  
Until 4 September.



This alchemical manual may have become soot-smearred over a furnace.

handwritten and printed documents, some attributed (often spuriously) to famous alchemists including Raymond Lull and Petrus Bonus. They reveal the character and functions of the literary culture of nascent chemical science from the Renaissance to the early Enlightenment.

The books were evidently well used. The pages of one fifteenth-century compilation arrived covered in dirt — or perhaps soot, from being read over a smoky furnace. The CHF’s curator of rare books, James Voelkel, persuaded conservator Rebecca Smyrl to avoid cleaning the pages: the ‘dirt’ may be a remnant of experiments. “It could be something someone was trying to turn into gold,” says Smyrl.

To peruse these books is to glimpse a lively dialogue between author and reader. Despite the volumes’ costliness, some have words or passages crossed out or altered. In one sixteenth-century handwritten work, comments are squeezed into every corner of the margins: it is as much lab notebook as reference source.

On this evidence, the painters had it right, even if their depictions of alchemists often owed more to convention than observation. This band of proto-scientists engaged intimately with the words on the page. The text was not sacred, but it was indispensable. ■

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