

ly considers what other scholars have made of this or that episode, confrontation or discovery. Desmond's camera is almost always just behind Huxley's shoulder.

Cynics might suggest that cine theory is suitable only for tabloid biographies and romantic novels (or films): that it is the dominant technique of the recent biographies of Nancy Reagan and the Princess of Wales. Nevertheless, the technique works here for Desmond, for two reasons. One is simply his integrity. He stays close to his sources so that almost every paragraph in the whole volume contains one or more quotations, mostly from Huxley's correspondence. These give his narrative the immediacy that the cine theory requires. Huxley had execrable handwriting but a wonderful way with words. Desmond deserves a prize merely for taking Huxley on.

The extent of the archival remains (more than 5,000 letters in the Huxley Archive at Imperial College, London) is the second reason why Desmond could write the kind of biography he has. It would be impossible to do the same for George Busk, W. B. Carpenter or some of Huxley's other close friends. It might even be difficult for Richard Owen, whose papers were carefully weeded by his grandson. Desmond, the silent cameraman, never offers us his reflections on gaps (deliberate or accidental) in the Huxley Archive.

Despite the fullness of his sources, Desmond occasionally slips into the novelist's mode, even in the very opening paragraph of the book:

The lanky 15-year-old sidled down fetid alleys, past gin palaces and dance halls. Sailors hung out of windows, the gaiety of their boozy whores belying the squalor around them. The boy's predatory looks and patched clothes seemed in keeping. But his black eyes betrayed a horror at the sights: ten crammed into a room, babies diseased from erupting cesspits, the uncoffined dead gnawed by rats. The scenes would scar him for life.

This is powerfully evocative, almost certainly poetically true and maybe even literally correct. We can never be sure. Here, as elsewhere, Desmond the cameraman becomes Desmond the director. He asks, therefore, for a lot of trust. It is amply rewarded. The flesh-and-blood Huxley who emerges from this book is eminently believable, more fascinating in his own right than he could ever be simply as Darwin's Bulldog. Indeed, in many ways, Huxley is a more appropriate character for Desmond's sensibilities than the rich, remote, neurotic Darwin. We are told on the second page (and subsequently reminded several times) that Huxley was born over a butcher's shop. He was a self-made man, surrounded by free-falling relatives, forced to scrimp and borrow his



Black-eyed Tom in 1846.

way through medical school at Charing Cross Hospital, London, unable to afford the complete set of examinations that could have led to a career as a consulting surgeon. Instead, he chose the even thornier path: to become a professional scientist. Unlike many upwardly mobile individuals (a recent British prime minister springs to mind), Huxley never turned mean, never ceased to be indignant that a rich country could permit so many of its citizens to remain poor.

There are many good things in Desmond's book. Two in particular stand out. The first is his reconstruction of Huxley's years as assistant surgeon on HMS *Rattlesnake*. Almost as long (40,000 miles, and two months short of four years) as Darwin's *Beagle* trek, this voyage was the making of Huxley. It committed him to science, established his reputation and taught him to love, even if his marriage had to wait another four years. No one has ever charted Huxley's experiences so fully, or shown how formative they were.

Desmond's second outstanding achievement is to document the sea-change of public opinion between about 1855 and 1870. The *Origin of Species* provided a turning point, of course, but looking through Huxley's rather than Darwin's eyes provides a broader vision. In those years, professional secular science was established in Britain. Huxley's generation came to maturity. He, John Tyndall, George Busk, Edward Franklin, Joseph Hooker, William Flower, John Lubbock and others of like mind found themselves in positions of power within the British scientific establishment, and with friends in high places in government. Huxley's was not simply a fight *Für Darwin*; it was a

battle on behalf of the social and intellectual value of scientific enquiry. The military metaphors were Huxley's.

Historians have often revelled in the irony that Darwin's Bulldog never really appreciated the explanatory power of natural selection, and took almost a decade even to value Darwin's ideas on genealogical taxonomy. Desmond deftly handles Huxley's relationship to Darwin by showing that, for Huxley, the stakes were higher than the contents of any one book, no matter how great.

In 1869, Huxley was elected president of the British Association for the Advancement of Science. Desmond takes him to his 1870 presidential address and, then, without explanation, leaves him. There is not a single word on the last 25 years of his eventful life, nor any hint of a second volume. The camera simply runs out of film. We are thus deprived of the American tour, the continuing educational activities, the presidency of the Royal Society, the altercation with Prime Minister William Gladstone and the remarkable Romanes lecture. At least 1870 catches Huxley's intimate involvement with the foundation of a new weekly journal. "What a glorious title, *Nature*. It is more than cosmos. More than Universe". The words were not Huxley's, but they could have been. □

*W. F. Bynum is in the Wellcome Institute for the History of Medicine, 183 Euston Road, London NW1 2BE, UK.*

## Sociological searchlights

John Ziman

**Handbook of Science and Technology Studies.** Edited by Sheila Jasanoff, Gerald E. Markle, James C. Peterson and Trevor Pinch. SAGE: 1994. Pp. 820. \$85, £65.

It was not until the 1960s that people interested in studying science began to realize that it was, above all, a social institution. Turning away from philosophy towards sociology, they opened up a vast new field of research. The annual meetings of the Society for Social Studies of Science ('4S'), which was founded about 20 years ago, are now the marketplace for a bewildering variety of academic wares. In 1988, the society set up a committee to prepare this comprehensive guide to their products. Here, in a pumpkin rather than a nutshell, is what STS — science and technology studies — is supposed to be about.

This fat volume is best read as a collection of 28 well informed local surveys of a

widely dispersed research field. Even when writing in pairs, the 41 contributors are too much themselves to conform to an orderly overall scheme. Chapters that are excellent in their own right take off in various directions, and are not cross-referenced. The earnest editorial effort to relocate them on a general map is no more successful than usual in such works.

The subject as a whole is its own best map. In everyday discourse, science and technology are merged into a single entity with conventionally distinct aspects. One can guess pretty well what will be covered in chapters with titles such as "Women and Scientific Careers", "Science and the Media", "Science as Intellectual Property" and "Science, Technology and the Military". Taken separately, each of the various chapters is a thoughtful and authoritative overview of the sort of thing that is said on such a topic at a 4S meeting. Taken together, they cover reasonably completely those parts of the STS area that happen to be well represented at such meetings.

Unfortunately, this leaves unstudied many of the most important aspects of science and technology. The key word in 4S is "social", yet sociological searchlights are not directed into the relevant institutions. Universities, libraries, learned societies and publishing houses are taken for granted, or castigated, rather than coolly scrutinized.

Sensitive social practices such as peer review are treated as politically suspect rather than, say, functionally expedient.

The social 'interests' that are said to motivate scientific research and technological development lack personal or economic dimensions. Three separate chapters of concern about the obstacles to research careers for women are not embedded in the general social psychology of science as a profession. School science is dismissed perfunctorily, with no mention of the educational interpretation of STS as science, technology and society.

The historical component of STS is often considered to be an independent discipline. In any case, it is too diffuse and bulky to have been summarized in this handbook. That is no excuse for ignoring today's changes in the way in which scientific research is performed. There can be little sense in any study of science or technology that fails to take account of the transformation of laboratory and lecture-room life, right down the line, by new policy agendas, more demanding funding arrangements, increasing teamwork and networking, heavier instrumentation, and other manifestations of the "collectivization" of what was traditionally an individualistic culture. How is it that 'Big Science' does not get any index entries? In the global dimension, surely it is significant that they order such matters very differently in France, Germany, Russia, Japan — or Indonesia, or Costa Rica.

These inadequacies might be acceptable if the disconnected pragmatic map were implicitly unified by a deep principle. But Michel Callon, in his brilliant introductory survey of "Four Models for the

Dynamics of Science", rejects the possibility of formulating such a principle. This postmodern distrust of 'foundationalism' must be right. Science and technology are too protean to be represented by some simplified model purporting to rest solidly on metaphysical bedrock. STS is a field where the fruits of a hundred flowers should be gathered.

The contributors are of one mind only in sharing the notion that everything to do with science and technology is 'socially constructed'. Liberally interpreted, this is a truism. More narrowly, it reminds us to look closely into the interpersonal, organizational and cultural factors that shape the making and use of knowledge. Those factors are extraordinarily rich, amazingly diverse and provocatively puzzling. We lack a general theory covering all human thought and practice. The social elements can enter only piecemeal in our attempts to understand a variety of different contexts of thought or action. Sometimes we can make sense of a situation by using one mode of social interpretation, such as economic metaphor; at other times quite a different mode of social being is involved, such as linguistic participation in a shared life world.

Callon's warning against dogmatism is tacitly ignored. In spite of radical aspirations, highbrow pretensions — and much very stimulating research — the STS community has sharply limited the scope of its constructive imagination. On the fundamentalist wing, the devotees of SSK — the self-styled sociology of scientific knowledge — not only discount the research claims of the scientists; they also spurn insights and critiques from 'non-social' disciplines such as analytical philosophy, evolutionary biology or cognitive psychology. In this way they disengage themselves from some of the most insistent issues of scientific practice and policy. The liberating notion that knowledge is socially constructed has degenerated into an incantation that sweeps the perennial problems of epistemology, ethics and historical change under a pliable carpet of cultural relativism. No wonder that most thoughtful natural and social scientists are neither amused nor enlightened by such intellectual caprices.

Science and technology are much too serious to be left to scientists and technologists. Independent studies of science and technology are an imperative political, industrial, social, cultural and scholarly need. This handbook is designed to attend to this need, but does so only very partially. There is much, much more still to be done. □

*John Ziman, emeritus professor of physics at the University of Bristol, is at 27 Little London Green, Oakley, Aylesbury, Buckinghamshire HP18 9QL, UK.*

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