On the beam

O. S. Heavens

The Laser in America 1950–1970. By Joan Lisa Bromberg. *MIT Press: 1991. Pp.310. $30, £26.95.*

THE period leading up to the production of the first working laser in 1960 by Theodore Maiman was one of frantic excitement for all groups involved. Tongue-in-cheek forecasts that lasers would be operating at "3.15 p.m. on such and such a date" were liable to be taken seriously.

It is ironic that around this time, graduates with even a modest grounding in optics were in short supply. The Columbia Radiation Laboratory could provide the latest hardware for microwave experiments, but a convex lens was hard to find. Optics had indeed become unfashionable in the physics curricula of universities, a decline that probably began even before the Second World War. Maxwell had 'done' optics at the end of the preceding century. It had become a case of "no new fundamental particle, no Nobel Prize".

At the same time, however, journals began to be filled with articles proposing how a laser might be built, often with diagrams showing scant respect for the rules that a light ray had to obey when traversing an optical system. There is more than a suspicion that the rejection by *Physical Review Letters* of Maiman's article describing the first working laser may have been due to its being misread as "another God damn laser proposal" rather than the landmark account that it proved to be. Not that the excitement was quite over at that point. The ruby was a pulsed laser: we still needed a continuous-wave model. Thus the first gas laser. Then we needed a semiconductor laser, which produced another thrilling race (with a strong gallic input). Then a tunable laser. And so on.

With the successful operation of the first few lasers, the number of new laser transitions increased explosively. Gone was the excitement of wondering if the next meeting of researchers would include the announcement of a new type of laser. Soon it was a matter of how many new ones would appear, then merely a listing of the next hundred or two, most of which were doomed never to be of any further interest.

In *The Laser in America*, Bromberg deals with the period leading up to the laser's invention as well as the subsequent decade of developments. She traces the way in which a remarkably small number of possible lasers eventually won out, tempting one to speculate on whether the present scene would be much different if by chance others had been chosen. Would the helium–neon laser still reign supreme as a general laboratory tool if, for example, comparable effort had gone into designing a laser better matched to the maximum of the eye's sensitivity? Some proposed lasers, including Charles Townes and Arthur Schawlow's original potassium laser, have never worked. Others worked often without being clearly understood and were eventually forgotten.

Bromberg concentrates mainly on the factual side of the events of the period, which were confined mostly to the United States. The physics involved is discussed with both clarity and accuracy. She shows brilliantly how the laser and its developments markedly influenced many areas of post-war American policies, affecting education, research planning, the relation between large and small companies and much more. The sad but not uncommon controversies over "who thought of it first?" are reported without comment. It might be said that these were irrelevant in view of the explicit statement of the idea in a paper by Fabrikant that predates all the other claims. The question is raised (not for the first time) of why, given that the fundamentals of stimulated emission were first described in 1917 and that results were explained in these terms in 1932, it took until the sixth decade of the century for the maser and laser to appear. I believe that few will agree with Dunskaya's view that "the concept of stimulated emission was not fully understood in the earlier period". The same view was expressed in many early discussions for the concept of coherence. Although not understood by some participants of conferences, such concepts were quite clearly set out and discussed long before the laser era.

The book is a delightful read and will be enjoyed by anyone with a passing interest in the history of the laser. Even for those not fortunate enough to have been involved in the early work, it will evoke much of the excitement of a period unique in the discovery and development of this remarkable device, whose value is in no way diminished by its current use in the supermarket checkout. □

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■ The rapid progress of laser science is attested to by the publication of three new books: *Lasers in Chemistry* by David L. Andrews (2nd edn, Springer, £22 (pbk)); *Laser Interaction and Related Plasma Phenomena Vol. 9* edited by H. Hora and G. H. Miley (workshop proceedings) (Plenum, $150); and *Optical Lasers and Amplifiers* edited by P. W. France (Blackie, £69). □

Tales of old

Thomas B. L. Kirkwood

The Biology of Life Span. By Leonid Gavrilov and Natalia Gavrilova. *Harwood Academic: 1991. Pp.385. $120, £62.*
Evolutionary Biology of Aging. By Michael Rose. *Oxford University Press: 1991. Pp.221. £28, $35.*
Biology of Aging. By Robert Arking. *Prentice Hall: 1991. Pp.420. £51.35, $66.25.*

ONE of Aristotle's many claims to fame is as the great grandaddy of gerontological science. "It is not clear whether in animals or plants universally it is a single or diverse cause that makes some to be long-lived, others short-lived." Thus mused Aristotle some 23 centuries ago in his *De Longitudine et Brevitate Vitae*. It is still a good question today, highlighting the core issues with which gerontology has grappled for so long.

The Biology of Life Span is a spirited plea that for too long the quantitative analysis of life span has been done both badly and not enough. As an updated translation of a work originally published five years ago in Russian, it provides a window into the extensive Soviet literature on ageing. It is also an optimistic book, describing with evident pride the Soviet Ministry of Health's special scientific programme on "extension of life". The specific thrust of Gavrilov and Gavrilova's argument is that an underexploited richness of information lies scattered in the literature on demography and biology, which if read the right way could have answered many key questions of gerontology "some thirty years" ago. An appendix gives references to good-quality, published life-tables for as many species as Gavrilov and Gavrilova could discover.

There is interesting material examining the secular trends in human mortality, particularly the changing differences in survival between women and men, and exploring comparative aspects of life-span distributions. Later, the authors press for using reliability theory as a model for ageing. This idea is not a bad one, although it has been around for some time and needs to be carried through into carefully designed experiments. I found a bit tedious the extended discussion on whether life-span distributions really fit the normal distribution, and whether a species such as our own actually has a maximum life span. A modest dose of biostatistical common sense could have cut this discussion short.

A welcome addition to the bookshelf is *Evolutionary Biology of Aging*, which forcefully champions the relevance of