BOOK REVIEWS

The Cancer Field

Racing to the Beginning of the Road. The Search for the Origin of Cancer. ROBERT A. WEINBERG. Crown, New York, 1996. xvi, 271 pp., illus. $27.50 or C$38.50. ISBN 0-517-59118-9.

Robert Weinberg is one of the leading experimentalists in molecular cancer biology. His book will make this complex field understandable for a wide range of readers, even though the non-specialist may not follow all the details. Like James Watson's *Double Helix*, Weinberg's book is a highly personal story that succeeds in transmitting a great deal of scientific information. The narrative is richly interspersed with amusing anecdotes about the great and the not so great. It conveys the excitement of discovery and the stresses of competition. It portrays the special features of the cancer field with the sinusoid oscillations of optimism and pessimism, the changing fashions, the rapidly surfacing and disappearing bandwagons, and the black-and-white pronouncements of some leading researchers who want to keep their colleagues on "the track" they happen to believe in. The field is a notorious roller coaster. It requires strong personalities.

Weinberg describes the discoveries of his group in accurate detail, and with more than customary modesty. The biases of the greatest are handled with critical affection. They include the Teutonic arrogance of Otto Warburg while promulgating his "solution of the cancer problem" and the hubris of the panvirologists who believed that all cancers are caused by viruses and who succeeded in casting their spell, at least temporarily, even on such a great and modest scientist as Peyton Rous, prompting him to throw out the mutational theory of cancer as categorically as viral carcinogenesis had been thrown out during the preceding decades. We see how the equally great founder of mouse cancer genetics, C. C. Little, sells his soul to the tobacco industry, and we follow the tragic fate of Sol Spiegelman, one of the fathers of modern molecular biology, described with equal doses of admiration, compassionate empathy, and relentless criticism. The unavoidable fanfares that accompany this field are exemplified by the statement of the *New York Times* in 1964 that the cancer problem was about to be solved and by the highly respected journal *Nature's* offer of its services for the quick advertisement of new discoveries after the publication of the *ras* mutations in 1982, in obvious expectation of decisive findings. We see how the vast but misguided enthusiasm around tumor virology in the '60s and the expected discovery of many human tumor viruses generated a white elephant, Building 41 at the National Institutes of Health, and how the inflated balloon suddenly collapsed, but not before hatching the cuckoo egg, the cellular oncogenes. Cancer biology became respectable, and the cell biologist took the driver's seat while the panvirologists quietly faded out.

The discoveries of the Weinberg group, from the successful tumor DNA transfection experiments through the unprecedented identification of the *ras* oncogene mutations and up to the cloning of the retinoblastoma gene, well deserve the space they get. In contrast, I would have preferred to read much less about a number of spectacular fraud stories. Some of the ephemeral "hypotheses" based on "experiments" that have never been performed are shown in detail, with figures, circuitry, and all. Not that they are not entertaining, but they show nothing beyond the principle that only some people can be fooled and only for some of the time. In the aftermath of the recent collapse of misconceived attempts to police scientific research by lay authority, they may at least illustrate that the self-cleansing of the scientific community is the only reliable safeguard against these spectacular but fortunately quite rare forms of mischief.

Some areas such as tumor immunology, angiogenesis, and research on invasion and metastasis are given less attention than they deserve. The same is true for the strongly reduced but highly vital residue of viral oncology that is mentioned but not properly explored and explained. It is particularly surprising that the book fails to deal in depth with the remarkable convergent evolution of the DNA tumor viruses whose transforming proteins were shown to cancel the function of the two most prominent tumor suppressor proteins, Rb and p53. This experiment of nature goes a long way in proving that the two suppressor proteins play pivotal roles in the control of cell growth and division and are not merely a few among many equally or more important regulators. Before this discovery, it could have been thought that cancer biologists have overemphasized the significance of the two paradigmatic suppressor proteins, reasoning on the basis of the early evidence that has filtered down through the tortuous routes of unexpected but startling findings. Viruses don't read the literature and are immune to such mistakes.

I would also have liked to see more detail on the role of the now numerous tumor suppressor proteins in cell cycle regulation, particularly since Weinberg has been one of the main contributors and protagonists of this field. It would have added more complexity, but the author is known for his ability to deal with that, as is also apparent from this book.

These are very minor complaints that do not detract from the fact that Weinberg has written an authentic, informative, and thoroughly enjoyable book about the momentous scientific developments to which he has so richly contributed.

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Evolutionary Issues

Molecular Zoology. Advances, Strategies, and Protocols. JOAN D. FERRARIS and STEPHEN R. PALUMBI, Eds. Wiley-Liss, New York, 1996. xxxii, 580 pp., illus., $89.95 or £70, ISBN 0-471-14449-5; paper, $45 or £34.95, ISBN 0-471-14461-4. From a symposium, St. Louis, MO, Jan. 1995.

Biology is based on observation and comparison, and, as in any scientific discipline, advances are made through the proposal of new theories and the discovery of new facts. Charles Darwin's theories of organic evolution, especially those related to common descent and modification through natural selection, unified the biological sciences, and recent discoveries in biology have verified and elaborated those theories. Genetics (Mendelian genetics and theoretical population genetics), molecular biology, and developmental biology have clarified the principles and rules governing the genetic basis of change, and advances in population biology and phylogenetic systematics have heightened understanding of the genetic structure of populations, speciation, and the phylogeny of organisms.

Although recent discoveries in biology have helped clarify many of the issues Dar-