

Writing up the past

John Cairns

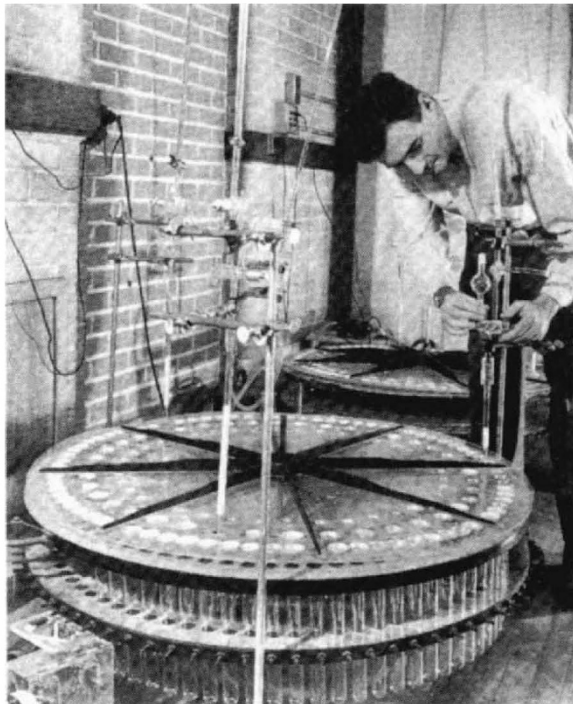
The Strands of Life: The Science of DNA and the Art of Education. By Robert L. Sinsheimer. University of California Press: 1994. Pp. 318. \$30.

As Soutar wrote in *The Diaries of a Dying Man*, "We wish to be remembered even when none remain who looked upon our face; and, having gone from all touch, we trust that memory may, as it were, keep our unseen presence within the borders of day". Couple that with the chance of being paid to write your autobiography and the urge becomes irresistible.

The Sloan Foundation has commissioned autobiographies from several scientists in the hope of encouraging public understanding of science, and Sinsheimer's is the latest in the series. He was trained in physics and chemistry at the Massachusetts Institute of Technology (MIT) and spent the war years working on radar. When the war ended, he returned to MIT and worked on developing ways of measuring the absorption spectra of nucleic acids. As this was before the structure of DNA had been worked out, he was from the outset in a perfect position to record the momentous discoveries of molecular biology. After MIT, he went to Iowa State College and then to the California Institute of Technology, where he studied the small bacteriophage ϕ X174. Finally, after a few years as chairman of biology at Caltech, he became chancellor of the riot-torn Santa Cruz campus of the University of California and was, for a while, an outspoken opponent of genetic engineering. Undoubtedly he has lived in exciting times.

His story seems to have been a long series of successes. As he himself says, he was marked from the beginning as having considerable talents. Schoolwork, he writes, was ridiculously easy. In his first school, he was top even though he was the youngest in the class, and he was the highest-ranking male in his high-school graduating class. As the result of his training at MIT, his approach to biology has been "more quantitative, more analytically rigorous, more unrelentingly reductionist, perhaps more imaginative as to the ever-expanding potentials of ever-new techniques". In the physics department at Iowa State College, he studied the frequency of dinucleotides in DNA and claims to have been considering the possibility that DNA might have two strands held together by base-pairing before the structure had been published.

Sinsheimer once wrote that it was Max Delbrück who suggested that he should work on ϕ X174, and this was to be his major contribution to science. The virus has several claims to fame. It provided the first example of a single-stranded DNA molecule. Furthermore, the molecule is in the form of a circle. Sinsheimer says single-strandedness and circularity posed a conundrum. "If Watson and Crick were right, how could this DNA repro-



Sinsheimer in the lab at Iowa State College, 1951.

duce or even code?" He then goes on to say that the DNA was eventually shown to be converted to a double-stranded molecule from which single strands are made and packaged into virus particles. The DNA of ϕ X174 hit the news when Goulian, Kornberg and Sinsheimer reported that they had succeeded in replicating it *in vitro*, and this achievement was given a lot of publicity as a way of defending the National Institutes of Health from political attacks. Finally, the entire sequence of ϕ X174 DNA was determined by Sanger and this showed, among other things, that two genes that Sinsheimer's group had had difficulty in mapping were examples of a new phenomenon, overlapping genes.

Perhaps because this is an autobiography rather than a history of science, Sinsheimer does not mention other people's contributions to the story. Luckily, I

am not subject to this restraint. The Tessmans were, I think, the first to suggest that viruses such as ϕ X174 contain single-stranded DNA; Jacob, Wollman and Hayes were the first to suggest that some DNA molecules could be circular; many features of ϕ X174 replication, including the idea of a 'rolling circle', were worked out by Gilbert and Dressler; and others had already reported the preparation of functional transforming DNA and infectious RNA *in vitro*.

At the age of 57, Sinsheimer became chancellor at Santa Cruz, and roughly half of his autobiography is concerned with the ten years he spent there. To become head of a bankrupt university that has got through three heads in three years is to undertake a difficult assignment (this is the occasion for the only joke in the book,

which is his description of meeting a student who said she made a habit of coming to each year's reception for freshmen because she liked meeting the new chancellor). I know from personal experience how hard it is to convey to others the full horror of situations like this. Outsiders cannot be expected to be interested in accounts of life on the cliff edge of insolvency. So I will not comment on his chancellorship at Santa Cruz, poised on the San Andreas fault. More accessible are his accounts of trying to raise support for the construction of a very large telescope and, when that failed, trying to make Santa Cruz the centre for the effort to sequence the human genome. In each case, the foundations that might have supported these ventures did not want to be involved, perhaps because he was not backed up by the other leaders within the University of California. But he must feel some satisfaction from knowing that each project is now under

way, in an even more expensive form than he had proposed. Finally, in the last chapter, which takes its title "We Happy Few" from Shakespeare's *Henry V*, Sinsheimer discusses what it is about science that separates it from other human endeavours and assesses his own contributions. The subtitle is "Ending Well".

Sinsheimer's autobiography made me realize how hard life is for those who believe they are, and always have to be, the best at everything. Perhaps he should have followed the example of Henry V, who spent his youth in reckless dissipation so that the world would not expect too much of him when he moved from being prince to king. □

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