

Mair, who lacked the vigour or charisma of the other two. Janet is shown as a successful public figure in her own right, yet entirely lovable to and loved by her children and by both her husbands. Will and Janet were a formidable duo in his time at the war ministries and at the London School of Economics. The author clearly wishes to expunge aspersions of arrogance and bureaucratic dominance at the LSE but he does not succeed entirely. As one who had only two casual meetings with Will 35 years ago I cannot judge this, but J S Fulton's eulogy in Westminster Abbey is a convincing endorsement of David's view.

In retrospect it may not be very important to elucidate those relationships, and the interest in this book derives from personalities rather than public achievements. Will took part in many outdoor pursuits, especially hill walking, and used his guests at Avebury mercilessly in manual labour. The Mair family joined in all this and first Janet's daughter then Janet

herself were his hostess at Oxford. Yet both Janet and Will were somewhat unworldly in their enthusiastic adoption of a style of living in his constituency that had to be reduced quickly when they moved to Newton Aycliffe during his chairmanship of the new town corporation. They were strangely surprised and resentful when that office ended with Will in his 70s. The closing years at Oxford were less happy and both needed periods in the Acland. Yet they worked on and at 82 Will still undertook a 200-mile drive to help a friend. The book is well worth reading in its own right and not for any connection with the NHS: it is written in a style that will make that a pleasure and not a duty to the memory of one of the most important contributors to the development of British society in this century.

Shared Enthusiasm: the Story of Lord and Lady Beveridge. Philip Beveridge Mair. (Pp 157; £7.95.) Ascent Books. 1982.

Cash and credit in developing drugs

J W HOWIE

In his perceptive foreword to this excellent and necessary book Sir Edward Abraham writes that the author, a distinguished American chemist, will scarcely expect that all who read his book "will purr with approval of the contents of every page, for on some of his topics there may never be a final word." This is certainly true; so too is the judgment that the book is eminently readable and throws light on exciting and hitherto unfamiliar facets of the penicillin saga.

Among the non-purring readers of the book will be those who recall with approval A J Balfour's generous view that it is remarkable what you can accomplish if you do not worry about who gets the credit. In Sheehan's account there is much worrying about many aspects of this very matter—namely, cash and credit—but it is a topic on which some rational balanced perspectives are certainly desirable, and may now be possible.

Most will agree that the Nobel prize committee of 1945 reached the right conclusion when it divided the medical award equally among Fleming, Florey, and Chain. Sheehan's cited evidence clearly refutes Chain's allegation that Fleming did not even recognise the importance of his discovery until the day, 11 years later, when he came to visit Florey's laboratories at Oxford.

Developments on both sides of the Atlantic

It is also true that British recollections about the wartime development of penicillin have often tended to undervalue the prodigious American effort to produce penicillin quickly, in quantity, and in therapeutically usable form. At the time of Florey's clinical trials important research was already under way in the United States. On October 15 1940, for example, Dr Aaron Alston injected a patient at Columbia-Presbyterian Hospital in New York with penicillin; and there were others. When Florey and Heatley went to America in 1941—war conditions in Britain had made industrial development of penicillin an impossibility—they visited a few centres at which penicillin was being studied. Most importantly they went to the Northern Regional Research Laboratories at Peoria, Illinois, where Heatley remained for a period of collaborative work on how best to produce penicillin on a large scale by cultural methods. Important progress on deep-culture methods was made.

A devastating fire on 28 November 1942 at the Coconut Grove

night-club in Boston caused at least 500 deaths; there would have been many more but for the careful and obviously successful use of penicillin, still in very short supply and still in its pre-clinical experimental stages. This clear evidence of penicillin's usefulness confirmed Florey's urgent pressures for action and also provided the necessary stimulus for a unique effort of collaboration that mobilised the best available resources of research and production in both America and Britain. Much of the work was treated as a military secret, and much of the information about progress received rather uncertain and often delayed circulation: thus many discoveries were made independently on both sides of the Atlantic and gave rise to competing claims for priority. Thanks to unique agreements among the workers, commercial firms, and government agencies, exchanges of information were improved and all questions of patent rights postponed until after the war. This ensured maximum collaboration between the Office of Scientific Research and Development in America, through its Committee on Medical Research, and the Medical Research Council in Britain. These in turn brought in all the available commercial and military resources required to ensure the best possible use of penicillin in the war. The dramatic improvements in the prevention of infection in war wounds and in the treatment of venereal disease need no retelling.

Personal conquest

The really tempting prize, which stimulated many research workers, was the possibility of producing penicillin by an acceptable chemical synthesis. The small size of the penicillin molecule suggested that the task might not be too difficult, and more than 1000 chemists in 39 major laboratories in Britain and the United States took up the challenge, especially after the war ended in 1945. The problem was not solved quickly, however, and Sheehan alone persisted despite many frustrations and failures. He was indeed prepared to devote the whole of his remaining scientific career to this work. He secured a tenured post as a professor of chemistry at the Massachusetts Institute of Technology and went to work without regard to the possibility of failure. At last, in 1956-7 he succeeded. Chapters 4 and 5 of his book give details of the chemical procedures and scientific reasoning that finally identified the steps necessary to protect the

β -lactam ring in the early stages of the chemical reaction and the role of carbodiimides in closing it at the end. For non-chemists these chapters make hard reading, but they must induce respect and admiration for Sheehan's various insights and inspired guesses as well as for his indomitable persistence.

This "conquest of penicillin" in 1957 was followed by an incredible legal battle, which lasted until 1980, when the patent rights were at last awarded to Sheehan. This unhappy account of a miserable wrangle is redeemed only by Sheehan's generous epilogue in which he examined faithfully and fairly the problems set for society by the healthy blurring of the distinctions between pure and applied science and the need to share both cash and credit in an equitable and realistic way. There are more good questions than ready answers.

Remaining problems

It may cost up to £40 million to develop a compound; patent protection is necessary, therefore, to reward a firm for taking

on the task. Much important preparation and early development work may, however, be done in university laboratories. Secret research, necessary for patent protection, is anathema to good academics, partly on ethical grounds but also because their careers depend on good open publications. How are rewards to be apportioned in an equitable manner? Who contributed what? Who financed what? Who stands to gain what? Who owns what? These difficult questions may still be easier to answer than those involving "should" and "should not." Ethical as well as legal judgments are needed. The public, through the universities, often indirectly finances commercial research. How should the public's due share of reward be ascertained and apportioned? The answers are not easily formulated.

"As we learn more about how penicillins work, we will perhaps finally solve the two most pressing problems in current penicillin research—microbial resistance and patient allergy." So writes Sheehan in his epilogue. We are in his debt.

The Enchanted Ring: the Untold Story of Penicillin. John C Sheehan. (Pp 224; £10.50.) MIT Press. 1982.

Nineteenth-century German doctor

IRVINE LOUDON

Adolf Kussmaul (1822-1902) was one of the many who made German pathology supreme in the mid-nineteenth century. He was the first to describe periarteritis nodosa, progressive bulbar paralysis, and the air-hunger of diabetic coma. He met, inter al, the two Naegeles, Schoenlein, Schwann, Hebra, Rokitansky, Semmelweiss, Henle, and Virchow and he held the post of professor at Heidelberg, Erlangen, Freiburg, and Strasbourg. He also wrote poetry and these memoirs of his early life, described by Garrison as "one of the best of medical autobiographies." Here it is, in English, and it is difficult to convey its curious character or know how much of the oddity is due to the translation. The anecdotes are often inconsequential, and sometimes bizarre or even incomprehensible. The poetry, scattered through the book, appears to have been translated with warm fellow-feeling by his Glaswegian contemporary, William McGonagall (1825-1902). Lofty and humane sentiments are superimposed on a curiously disturbing undercurrent of violent cruelty, neither condoned nor often condemned, which sends a slight shiver down the spine. His first schoolmaster, a near illiterate ex-cavalryman, shouted at the boys about the glories of galloping through the clover and fruit of the peasants, swords drawn, and burning their miserable huts; when his daughter married a peasant, the schoolmaster slew him with a pitchfork.

Kussmaul recalls his own childhood trauma because an umlaut over the "u" makes it mean "kiss-mouth." The ladies hooted in derision, though he explained at length that in old German the name means "good and courageous one." Was he serious or joking? It is a question that constantly recurs. At Heidelberg the students wore caps with distinctive ribbons, smoked pipes so large that the bowl rested on the ground, drank gallons of beer and smashed the furniture, and fought duels (20 000 recorded by the "duel-doctor" in 24 years) in which they cut pieces off each other's faces; dogs were banned for eating the chopped-off noses. Kussmaul was taught dermatology by Hebra, who, discussing effusions of blood under the skin—purpura, vibices and ecchymoses—said "the

most beautiful examples" could be seen every Saturday morning at the nearby barracks when the provost-sergeant regularly flogged the lower ranks, because "with the Poles and Slovaks there just is no other way."

When Kussmaul became a country doctor, "which requires strong weather-beaten men," he retained his passionate interest in pathology, persistently bullying a young reluctant village cabinet-maker until he is allowed to carry out a necropsy on his wife to prove she died of typhoid: village folk could be so backward and ignorant that way. In the very next anecdote the "community officer" asks him to perform a necropsy on his daughter as soon as she dies. She had tuberculous peritonitis at the age of 16 "and the *entire community*" (my italics) "was curious to find out what was in the maiden's swollen abdomen." This time, Kussmaul protested at the premature request and the girl unexpectedly recovered; his sole comment is that he would have looked rather silly if he had promised to satisfy the community's curiosity. Anecdotes of eccentric doctors abound, their eccentricities off-beat and often sinister: Dr Brodhag (they don't make them like him today), who, in a revolution, leapt on a stage swinging a scythe, shouting "God punish me, if you want to achieve your freedom, get hold of scythes!": Rokitansky, who carried out 30 000 necropsies and was so completely silent that when he once crept up on Kussmaul in the mortuary to say "nice weather today" he nearly scared him to death: the teacher whose lectures were read out of a book on the seat of a chair while his forehead rested on the back of the chair and the audience slept. Often the reader's mind feels slightly unhinged and the memoirs seem to be the script of a film by Bunuel. But they are essential reading for students of nineteenth-century German medicine and will appeal to those addicted to the bizarre.

Memoirs of an Old Physician. Adolf Kussmaul. Translated from the German. (Pp 352; \$30.) Amerind Publishing Company. 1981.