

suggests a mechanism involving the development of small craters along lines of weakness. Finally, the main conclusions are summarized.

The authors leave the reader in no doubt as to the bias of their views, and in fairness it must be stressed that, if the most important references given are consulted (for example, those given at the end of Chapter six), a fair cross section of opinion will be encountered. Despite the specific points mentioned here, in general the book is very well documented, particularly as it deals with so many individual types of feature. It represents a readable and wide ranging introduction to this field for both the amateur astronomer interested in the interpretation of observations and the scientist wishing to get up to date with lunar geology.

L. WILSON

## VACCINE, WITH CARE

### The Hazards of Immunization

(Based on University of London Heath Clark Lectures, 1966.) By Graham Wilson. Pp. x+324. (London: The Athlone Press, University of London, 1967. Distributed by Constable and Co. Ltd.) 45s. net.

THERE are few who have the depth of knowledge or even the courage to attempt to present the hazards of immunization. Many of the data have appeared over a long period in many journals and reports, but to assemble these facts in an interesting, balanced, and unbiased account is most difficult. Sir Graham Wilson has succeeded in his task and the medical world is the richer for this book based on four Heath Clark lectures given at the University of London in November 1966.

The hazards have been divided into (a) accidents occurring during production and administration of the vaccines and (b) complications arising in the vaccinees.

The accidents are concerned mainly in association with new prophylactics and they are dealt with in seven chapters on faulty production. Of the accidents considered under the title "Inherent Toxicity", by far the greatest number have occurred as a result of inadequate toxoiding of toxin, or the use of toxin-antitoxin mixtures now considered to be dangerous and discontinued. Also considered under this heading are the failures to kill pathogenic viruses and the use of a living virus inadequately attenuated. The conclusions drawn from the findings of the accident enquiries are of great value, and it is interesting to note that, weight for weight, man is at least as susceptible as a guinea-pig to diphtheria toxin. Equally important is the observation that diphtheria toxin must remain in tissues for a long time, where it may not be neutralized by anti-toxins, and late symptoms may develop. Examples are given of the appearance of a foreign toxin in an antitoxin, the use of an incorrect culture for vaccine production, and the contamination of the final product with both bacteria and viruses. It is some comfort, however, to know that such accidents occurred before the modern methods of production and control became effective.

Having dealt with the production of vaccines, Sir Graham considers the accidents that occur during reconstitution and administration. These largely result from the use of contaminated equipment, much of which is eliminated by the use of sterile packed and disposable apparatus. In spite of all these modern developments, however, as recently as 1966 local abscesses caused by *Streptococcus pyogenes* type 12 occurred in one clinic after giving sterile DTP vaccine. The same streptococcus was isolated from the nose and throat of the doctor and nurse attending the clinic as well as from the scissors used to open the sterile packs.

Allergic manifestations occurring in the vaccinees are a much more difficult problem and no fewer than seven chapters are devoted to this aspect. Local allergy, serum sickness, encephalomyelitis, neuroparalysis and general

anaphylaxis occurring after the administration of prophylactics are all mentioned. The abnormal sensitivity of the patient has not been overlooked and skin complications of smallpox vaccine, local or generalized tuberculosis, occurring after BCG or vole bacillus vaccines or tuberculin, as well as complex reactions to other vaccines, are recorded.

Sir Graham has been particularly careful to draw attention to the potential dangers of all vaccination procedures and to put them in their right perspective. In this respect the dangers associated with immunization, using both established and new vaccines, are discussed and the need for continuous surveillance is emphasized.

There is no doubt that all physicians will wish to read this book, which should also find a place in the permanent records of all libraries. It is a unique collection of data superbly assembled.

F. T. PERKINS

## CANCER PREVENTION

### Prevention of Cancer—Pointers from Epidemiology

By Richard Doll. (The Rock Carling Fellowship, 1967.) Pp. 143. (London: The Nuffield Provincial Hospitals Trust, 1967.) 7s. 6d. net.

SINCE the first investigation by Hirsch in 1883, much information has been accumulating about the distribution of cancer in human communities in different geographical areas and with different occupations. From the information which we have already, maps can be constructed to show the relative incidence of a particular type of cancer; a map in this book illustrates clearly that cancer of the oesophagus is about two hundred times more frequent in the northern regions of the Caspian than in Holland; another shows a gradient in the incidence of stomach cancer, high in Russia, decreasing in Europe, the eastern states of the USA, but rising again in the western regions.

The subject of cancer epidemiology is the study of the relationship between the environment and the incidence of the disease. The task is not to establish only a relationship between cause and effect, but to test by various methods whether the relationship is a true one, and whether the suspected agent is directly or indirectly implicated in the causation of cancer. Can statistical evidence alone be acceptable as definite proof of a cause-effect relationship; and how far can the experimental data obtained in animals be extrapolated to man? These problems are discussed with great objectivity in the book being reviewed. Dr Doll, besides putting forward definite conclusions, draws attention to the difficulties which may arise in collecting and analysing relevant information and describes some of the pitfalls of epidemiological studies. Dr Doll is one of those to whom we owe the critical application of epidemiological principles to the incidence of leukaemia and lung cancer—revealing some causes of both of these malignant diseases. Because of his experience and scientific knowledge he is particularly well suited to argue the value of studies which concern the possible relationship between cancer incidence and environmental agents. Some of these agents (radiation, cigarette smoking, asbestos, benzene,  $\beta$ -naphthylamine) and the way by which information relating to them has been evaluated are well described. Attention has been paid to the often voiced question: why does one person develop cancer while another exposed to the same environmental hazard escapes such a fate? Is there a genetically determined susceptibility? Doll examines the evidence available from twin studies and states that in the aetiology of common types of cancer the environment is more important than the genotic component.

Doll's book merits serious consideration by all who are concerned with cancer and human well-being. According to him almost 40 per cent of cancer deaths in men and 10 per cent in women can be prevented because we know the cause. We are still ignorant of the cellular mechanism which transforms a normal cell into a cancer cell,