CHAPTER 58

PATHOLOGY

THERE is in one sense little to write about clinical pathology *per se* in relation to everyday medical and surgical work during war, because it is inextricably woven into the fabric of modern medical practice. It is true that it is not always possible to have the pathologist available in forward areas, but his influence still pervades the work done there. The highest development of pathological and biochemical services was naturally in the army, with its large ramifications of land forces. From the beginning of training in the Middle East, fully equipped pathological departments were part of the establishment of hospitals, and mobile bacteriological laboratories also provided full services. Difficulties in supplies were for a time considerable, including a scarcity of guinea pigs in Palestine. Valuable experience was obtained there in tropical diseases, and when the scene shifted to the Pacific Islands, this branch of work became a major issue. Indeed when malaria became a daily or rather nightly hazard in the islands, and its diagnosis from dengue and other febrile diseases was necessary, medical officers in forward units, particularly field ambulances, underwent a special brief course in the microscopic recognition of the malarial parasite. This need was also felt in the navy and air force, and officers in these services were able to carry out the essential diagnostic work: in addition there were facilities for routine investigation in base units. Field's stain was adopted and its use became the standard method for detecting malarial parasites in thick blood films; it was supplied in diagnostic panniers for forward use. Giemsa and Leishman's stains and their solvent, methyl alcohol, were scarce, and were used with due economy only for special verification of types of parasites when thin films were necessary for this purpose.

The morbid anatomy of disease was closely studied in the field. Even where facilities for post-mortem examinations were not adequate, these were always carried out if in any way possible. Histological examinations of tissues were also made, and the material thus obtained was, in appropriate instances, sent to the base for further expert opinion. The importance of this work was great, and a high standard was maintained. Hospitals even in semi-forward areas often carried out tissue studies of definite value. In order that legal complications might not hamper medical officers in performing autopsies a special regulation, No. 37 of the *National Security Act,* was gazetted giving a qualified commissioned medical officer of the armed forces power to perform a post-mortem examination on request by a coroner of any state or territory, and to sign any necessary certificate of death.

The actual work carried out in the field in pathology and biochemistry may be divided into several categories as follows:

1. In forward units, ships and other isolated installations essential pathological services could be performed with simple material, stains and a microscope.
2. In field ambulances a special diagnostic pannier was provided to enable the differential diagnosis of dysentery and malaria to be made. As these units frequently had to hold considerable numbers of men this was an important function. The work was greatly helped by the attachment of a sergeant technician to each field ambulance.
3. Mobile bacteriological laboratories were provided which used specially designed trailers fitted as a laboratory on wheels. Not a few growing pains disturbed the early days of these trailers, which had to be structurally sound as well as scientifically compact. They survived such indignities as being bogged in training camps in Australia, and being thought doubtfully roadworthy and not always waterproof. They were in fact of very high value and brought pathological services to units such as casualty clearing stations working as hospitals. In the islands the position was different, as mobility there was largely a matter of thinking in terms of air transport, roads being few and impracticable. Mobile laboratories were very useful for special investigations in Australia on occasion. A mobile pathological laboratory was designed by members of the R.A.A.F., so contrived that the equipment necessary for all ordinary work fitted into boxes for ease of transport.
4. Pathological and biochemical services were provided for general hospitals on an adequate scale. The whole range of work was covered and by consultation between physician or surgeon and pathologist most problems could be answered. The amount of routine work was often so great that less important tests were rationed; even in civilian practice the clinician who asks for a test does not always realise the amount of work necessary for its performance.
5. Pathological work was carried out in civil hospitals for the Services, in Government laboratories, in University departments and research institutes. The ultimate solution of some important problems was effected in this way. Unusual demands which could not be met by service installations, particularly at the beginning of the war, were met by voluntary help by these departments.
6. Research was carried out in civilian research institutes throughout Australia practically continuously during the war, and, as occasion offered, by service pathologists also. At the special medical research unit established by the Australian Army at Cairns work of a high order was carried out on malaria. The pathological work necessary in this research demanded great experience and technical skill, in fact the basis of the work was entomological, pathological and biochemical.

Help was given by the National Health and Medical Research Council in planning and subsidising wartime medical research, and much valuable work was also carried out by the Council for Scientific and Industrial

Research (now the Commonwealth Scientific and Industrial Research Organisation). The School of Public Health and Tropical Medicine within the Sydney University rendered almost full-time war service in many fields, acting as court of appeal through its experts in difficult questions, and training hundreds of Allied medical officers in tropical medicine. This school, like other schools of pathology, helped also to train pathologists and technicians who were invaluable during the war. One of the reproaches which medical educationalists could have justly levelled at the community in general at the beginning of the war was that so little encouragement had been given to young medical men and women to adopt pathology as a career that the war found the Australian medical profession unable to supply enough pathologists. This need was supplied by the provision of special courses of intensive training by which pathologists could be trained in a few months. There was no delusion that these schools represented a full standard training, but they played their part in enabling keen and able junior officers to be equipped for the needs of hospitals in the field. Experienced laboratory technicians were scarce also, and more were trained, though it takes time to train a good technician.

The great demands of the growing forces required for the defence of Australia and the war in the Pacific made a vast expansion of pathological services necessary. After the return of most of the A.I.F. to Australia this manifold expansion began; it played an important part in achieving an even higher standard of efficiency in all the medical services. In the early war period experienced clinical pathologists engaged in full-time work with the armed forces were few. In fact the first two A.I.F. hospitals in the Middle East had as pathologists specialised research workers, though this probably had an excellent influence on this branch of the medical services in the field. Much of the expansion achieved in the Australian Army Medical Services was made possible by the use of women, even in forward areas, as pathologists and technicians. Details of establishments and administration are dealt with in another volume.

Without the help of the pathologists left to serve the civil community the work in base areas could not have been done. In out-patient departments attached to recruiting centres, in civil hospitals and in research institutes, a remarkable volume of work was carried out, much of it by part-time pathologists. Without the help of civil hospitals and their technical staffs rush jobs like that of performing blood type examinations on the members of the expeditionary force would have been impossible. The accuracy of that work and much other similar work done in the same way is proof of its quality.

Conferences of pathological experts from time to time decided matters of great importance for the services, helping to produce material, to test its efficacy, and to advise on methods such as immunisation designed to prevent disease. The text of this volume abounds in references to prophylactic and therapeutic work whose basis is pathological. The larger military areas coopted the services of University professors of pathology and bac-

teriology as part-time consultants: their help in deciding policy and in carrying out projects was invaluable. Similar help was obtained from members of staffs of chemistry departments, and valuable work was carried out on the synthesis of a number of drugs not previously made in Australia.

The Commonwealth Serum Laboratories at Royal Park, Melbourne, produced a practically complete range of biological products throughout the war, supplying the services and civil community. Important items were material for immunisation against various diseases, antigens and antisera for serological diagnostic work, therapeutic antisera and antitoxins, and notably penicillin. An army technical instruction laid down a schedule of items supplied by the Serum Laboratories which could be obtained on request: others required approval by the D.G.M.S. Dates of expiry of these products were carefully watched. A deadline date of two years was adopted as a general standard in a technical instruction, 10 per cent annual deterioration was otherwise allowed. Fortunately most agents were relatively stable if properly kept. The supply of biological preparations to pathological laboratories was to some extent rationed. This was necessary for two reasons, to conserve scanty and precious materials, and to avoid overloading of civilian staffs.

Certain diagnostic materials were not supplied, such as *Salmonella* agglutinating sera and living cultures. When these were required for identification purposes material was sent for tests at headquarters. Tests were standardised as far as possible: for example, one precipitation test was authorised for syphilis, the Kline test. Culture media were not supplied, as laboratories were expected to prepare their own, but limited quantities of dried media were available for laboratories without full facilities.

Outstanding work was done by the Walter and Eliza Hall Research Institute under Dr F. M. Burnet. Here research was carried out on the incidence of influenza and methods of immunisation, other virus diseases, such as poliomyelitis and psittacosis, rickettsial infections such as Q fever (which was found amongst Allied troops in Italy), scrub typhus and other varieties of typhus fever, anaerobic infections, purification of water, and non-specific urethritis. It was most unfortunate that the typhus research added another brilliant worker, Miss Dora Lush, to the already considerable list of scientists who have lost their lives in this work.

Many instances will be found throughout this volume of the work carried out on the pathology of disease during the war. It covers a wide range including tropical diseases, their diagnosis, epidemiology and pathology, routine and research work on the morphology and chemistry of blood and other body fluids, drug concentrations in body fluids, investigation and control of wound infections, general bacteriological work, parasitology and serology.

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