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JOURNAL OF THE NEW ZEALAND ASSOCIATION OF BACTERIOLOGISTS

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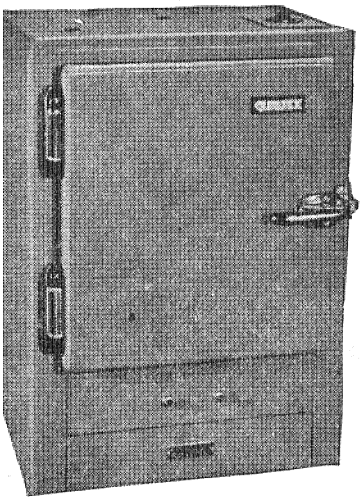

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CANCER CHEMOTHERAPY?

Cancer research has recently entered a new and promising phase which may ultimately produce a successful chemotherapy for cancer. This hope is expressed by C. P. Rhoads of the Sloan Kettering Institute for Cancer Research in a recent article in Science (Vol. 119, p. 77). This new phase is the study of substances which injure selectively by virtue of biochemical specificities of the target cells. This selective effect may well be truly specific cancer chemotherapy, now in its earliest inception.

The chemical 6-mercaptopurine represents the first step in the production of substances with selective antineoplastic action in man. This compound is the result of a vast research programme commenced in 1946 in the Sloan Kettering Institute and carried on later in conjunction with other institutes.

Many advances in medical science have resulted from empiric study, the most notable being that of the chemotherapy of bacterial disease. Knowledge of the mechanism of the effect was of secondary consideration. Cancer is obviously a problem of extreme complexity and experimental methods available do not lend themselves to empiric study. For instance tumour cells have been until recently impossible to cultivate outside the body.

Studies in nucleic acid matabolism has of recent years led to the conclusion that desoxynucleic acid (DNA) from different cells may have a different chemical constitution. Methods of defining nucleic acid composition are at the present time unsatisfactory but good evidence exists that there are differences. The heterogeneity of DNA is essential if chemotherapy of cancer is to be a practical possibility. Outlining the sequence of events, Rhoads points out that the original demonstration was the classic one that pure DNA prepared from type III virulent capsulated pneumococci would transform the offspring of type II avirulent unencapsulated pneumococci into encapsulated forms from which the DNA had been derived. Furthermore this transformation was a permanent and heritable characteristic. Clearly the DNA capable of transforming pneumococci was different from that present in the organism which was transformed. Further evidence on the heterogeneity of DNA has become available in recent years and it seems to be established beyond reasonable doubt.

A further step in the process occurred when it was shown that the uptake of adenine in the formation of DNA is strikingly different for different types of cells of the same species. The ability to selectively kill mutant bacteria by withholding from the medium a purine required by the mutant but not by the original parent forms, is well established. The analogy to normal and neoplastic tissue is obvious.

A number of modifications of known or presumed precursors of nucleic acid have been prepared and studied. One of these 2, 6 diaminopurine is injurious in tissue culture for certain neoplastic cells of animals while having little effect on normal tissue. It is also active (*in vivo*) by prolonging the survival time of mice with certain types of experimental leukaemia. As Rhoads points out these results surmount a particularly difficult hurdle to cancer chemotherapy, namely, the widespread conviction that selective destruction of cancer cells as compared with normal cells is impossible, since both have a common origin. It appears the road to cancer chemotherapy is open though it may be a long and arduous one.

Undoubtedly different neoplasms will exhibit different specicities and a number of chemical substances or analogues will be necessary. In the not too distant future the hospital laboratories may be testing the effect of different chemical substances on cancer cells grown in tissue culture, just as different antibiotics are tested against bacteria at the present time.

SOME DISEASES OF ANIMALS COMMUNICABLE TO MAN:

Dr. S. Jamieson

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The material selected for inclusion in this paper has been chosen for the purpose of emphasizing the apparent increasing instances of infection from animals to humans, and to further emphasize the need for collaboration between all engaged in the diagnosis and control of disease whether in animals or humans. Intentionally, I have made no reference to Tuberculosis, Brucellosis and Cowpox, because these conditions are well recognized dangers to the public health and legislative measures exist in most communities for the prevention of their spread.

Today, for reason which can only be speculative, bacterial infection from animals to man shows a greater diversity and importance than was appreciated say some twenty-five years ago. It might be safe to say that in this field bacterial species are evincing a flexibility of pathogenicity and accommodation to environmental changes which cannot be ignored.

It is not unusual in a paper of this nature to attempt to classify the various animal infections into groups, depending upon whether they are primarily animal diseases or if the animal is merely a passive carrier of bacterial species which are pathogenic to humans. This in my opinion, frequently confuses the general picture of animal diseases communicable to men. I propose therefore, today, to discuss these diseases under the following simple headings:—

1. Bacterial diseases.
2. Virus diseases.

1. BACTERIAL DISEASES:

(*a*) *Leptospirosis*:

Not so many years ago Leptospirosis of animals was regarded as being mainly a disease of dogs and rats and that infection to humans was being mainly confined to miners and pit-workers whose occupation brought them into contact with the latter animals in circumstances which resulted in infection. Today, Leptospirosis is a well-recognized disease of cattle, sheep, pigs and horses, in many parts of the world, and outbreaks of the disease occurs with increasing frequency in young cattle in the Dominion. This disease is not a scheduled disease and consequently accurate incidence figures are not available. However, Ensor and McClure (1953) reported infection of cattle by L.pomona on 76 farms, and drew attention to the increased suspected incidence of infection in humans. Of 15 suspected infected humans, 8 gave positive agglutination titres to L.pomona. The infection in cattle is generally manifest in the young animal by the usual symptom of rigor associated with bacterial infection and a haemoglobinuria, but may be associated with abortion in adult cattle.

It is not invariably fatal. The disease frequently appears to respond well to penicillin therapy. Beyond these facts little is known in this country concerning the epidemiology of the disease.

Such investigations as have been made suggest that the pig may be a carrier of infection, and that recently purchased animals could have brought the disease to the premises. Suspected cases in humans increase in number. It is worth noting here that Dietrich (1953) investigating L.pomona and L.mitis infections in Europe, believes that they are pathogenic to dogs, and that Keller (1952) was of the opinion that penicillin failed to rid the tissues completely of Leptospira. In a country like New Zealand with its rich and varied wild-life population, and the proximity with which domestic and wild animals live to humans, it appears to me that Leptospirosis is an urgent problem calling for immediate investigation by combined teams of bacteriologists, and clinicians in the veterinary and human spheres. One can pose many questions in this disease none of which can be satisfactorily answered. By what routes does

infection take place? Can infection be water-borne? What part do rats and other rodents, play in the spread of infection? Is the disease purely an occupational hazard confined to farmers, butchers, fishmongers, or are there other methods of spread which may prove eventually to be particularly harmful to the human population?

(*b*) *Anthrax*:

This is probably one of the better known diseases of animals communicable to man. Much has been written of it, but nevertheless I believe that its inclusion in this paper is justified because of the many sources of human infection which are possible.

Anthrax is world-wide in its occurrence. At the present time on account of preventive vaccination, the disease is not so prevalent in European countries as it was some fifty years ago. It is still endemic, however, in East Asia.

In New Zealand, Anthrax in animals is sporadic in its occurence. This, however, does not necessarily reduce the chances of human infection because the sporadic nature of the outbreak in animals has a sporific effect upon the awareness of the disease. The chances of Anthrax existing for some time before a diagnosis is made are much greater, and consequently the hazards of human infection increased. It is of interest that in cattle, the simple bacteriological technique of examining peripheral blood stained with Polychrome Methylene blue still remains the most satisfactory method of rapid diagnosis.

Anthrax is a notifiable disease in New Zealand and when it does occur the spread of the disease is prevented by vaccination of the in-contact animals and disinfection of the contaminated areas with destruction of the infected carcases by burning. Anthrax in animals is usually characterised by sudden death and this is so symptomatic of the disease that in the United Kingdom all domestic animals which die suddenly are treated as being suspected cases of Anthrax. This is a most useful piece of legislation in that it prevents the opening of Anthrax carcases. Thereby denying the presence of free oxygen to the bacilli and of course preventing the development of the highly resistant spore.

Human infection with Anthrax is essentially an occupational disease at the present time. The development of efficient methods of sterilisation of bristles has removed the dangers of infection from shaving brushes and other similar materials used by humans. It should, however, be noted that instances of infection in humans, unassociated in their way of life with animals still occur from infection with fertilizers of animal origin.

(*c*) *Salmonellosis*:

The members of the group Salmonella are probably responsible for the largest proportion of outbreaks of disease in humans

of animal origin. Because the members of this group are widely distributed in nature the disease is usually of the food poisoning type. Salmonellosis occurs in cattle, sheep, pigs and poultry, and therefore the opportunity for infection in humans is not inconsiderable. The literature on this subject is extensive and fairly well known, but the variety of methods by which the human can be affected are not so well known. Fortunately human Salmonellosis of animal origin is not always fatal and indeed the mortality rate is usually small. The methods by which humans become infected however, ensures that a large number generally become ill. For instance Gordon (1940) records an outbreak of Salmonellosis on a duck farm, which killed nearly a third of over fifty-thousand birds. Fifty-two human cases of Salmonellosis occurred due to the consumption of rice pudding made with infected duck eggs. Within recent years the widespread occurrence of members of the Salmonella group as the causative agents of specific disease in cattle has become recognized. For instance Murdoch and Gordon (1953) examined 1000 samples collected at random from apparently healthy cattle at Belfast abbatoirs. 8.6% of these samples contained S. dublin with a batch incidence in 51 batches of 60.8%. The fact that apparently healthy cattle are now known to excrete live Salmonella in the faeces and the consequent danger of contamination of milk raises the whole problem of Salmonellosis to one of primary importance to humans. The problem is made no easier by the spread of this disease by rats and rodents. Rodent infection should always be remembered in tracing an outbreak of Salmonellosis.

Animal Salmonellosis undoubtedly occurs in New Zealand. The extent of the disease is not known but is such that imperfect cooking of food should be avoided.

Of passing interest is the report by Carter and Weir (1952) of the isolation of S. paratyphi -B from a dog and the recovery of the organism from each of its owners, a family of four.

(*d*) *Actinomycosis*:

In animals Actinomycosis is a general name applied to the clinical effects resulting from infection by either Antinomyces bovis or Actinobacillus lignieresi. The disease is fairly prevalent in cattle in New Zealand and is a notifiable disease. In cattle the disease is characterised by purulent granulomatous lesions which frequently affects the tissues of the head and neck but may occur in any part of the body.

In humans the disease is not of frequent occurrence. Human actinobacillosis is rare but whether the human subject can be infected with Actinomyces bovis directly from animals is doubtful. The opinion has been expressed that Actinomyces bovis frequently lives a saprophytic existence in the tonsillar crypts of humans and

becomes parasitic when transported to other tissues. Since it is believed that the infective agent usually enters the tissues when trauma of the buccal mucosa occurs the incidence of the disease in humans does not necessarily bear a corelation with the incidence in animals. Some workers have drawn attention to the higher incidence of the disease in humans living in an agricultural environment than in town-dwellers. It is probable that the real correlation is that the opportunity to chew straws and suck grasses is greater and more tempting in a rural environment. At any rate, instances do occur when Act. israeli has been isolated from bovine lesions and it is likely that some cases of human Actomycosis are caused by Act. bovis.

(e) Ringworm:

Ringworm of cattle is a common disease. Because it apparently causes little systemic disturbance and has a tendency to spontaneously disappear during good nutrition little attention is given to its control. The causative agent is usually a member of the Trichiphton group. The disease is frequently transmitted to humans, but whether or not the infection is thenceforth spread from human to human is not known. Perhaps the most serious form of ringworm infections transmitted from animals to humans arises from outbreaks of the disease in such animals as dogs and cats. Infection from these animals appears to spread extensively from human to human. Cruickshank (1953) states that where Microsporium canis infection is endemic that the spread from child to child is rapid and can cause 70-80% of infection.

(f) Anaerobic Infections:

Anaerobic infections of animals with members of the gas-gangrene group of bacteria are common. The sheep is particularly susceptible to such disease as Black leg; Entrotoxaemia and Infectious Necrotic Hepatitis which are seasonally recurrent. However, there is little evidence to indicate that direct transmission of these infections occurs. An explanation of this may be that members of the group Clostridium multiply in tissues generally in the presence of a kataphylactic agent, so that transmission of these infections to humans is dependentt upon the existence of extraneous factors.

Nevertheless Cl. welchii and Cl. oedematiens are frequently inhabitants of the digestive tracts of ruminants so these animals are a constant reservoir for the maintenance of these species.

Cl. oedematiens is widely distributed in animal species and has been recorded in all domestic animals, and Peining (1932-33) records the organism in swans, and the existence of latent spores of the organism has been demonstrated in the livers of wild rabbits and crows (Jamieson 1949).

One presumes that many humans, particularly those associated with animals will exhibit in their tissues latent spores of clostridial species. It would be interesting to know the extent of this phenomenon in New Zealand.

The existence of clostridial infections in animals has assumed increasing importance to the human because of the recent findings of Hobbs et al (1953). These workers report the association of feebly toxogenic Cl. welchii in outbreaks of mild food poisoning. Infection was almost invariably caused by meat which has been boiled, steamed, braised, stewed or imperfectly roasted, allowed to cool slowly and eaten the next day. They stress the need for refrigeration of meat not intended for immediate consumption.

Botulism is a well recognized disease of animals and has been reported in horses and cattle. It does not appear to occur in animals in New Zealand. The customary vehicle of botulism in humans is usually fish or fish protein. Cl. botulinum type E has been isolated from the intestinal contents of sturgeon and river perch. Recently, Dolman (1953) described an outbreak of the disease in human being due to type E toxin as a result of ingesting pickled trout. So far as is known Cl. botulinum intoxication has not occurred in the Dominion, but the possibility of its importation should not be overlooked and it would be an interesting study to probe the intestinal contents of snapper, kahawai and trevalli, found around our river estuaries.

(g) Miscellaneous Infections:

When the current literature is perused one cannot resist the impression that bacterial species are being isolated in circumstances and situations which must prove annoying to the writer of textbooks on the subject. Indeed, the adoption of a loose-leaf system of construction would be an advantageous innovation.

For example, Buntain and Field (1953) report Klebsiella infection causing bovine mastitis with subsequent severe respiratory disease in calves associated with the adult animals. Lewis (1953) describes a fatal case of septicaemia and meningitis in a human in the U.S.A. due to Past. septicum.

Within the last decade Erysipelothrix rhusipathiae apparently has departed from its porcine environment and is well-established as the infective agent in polyarthritis in lambs. Its apparent saprophytic existence on the spines and surface slime of fish was not so well-known. The utilisation of whale and seal meat during the war years produced a new human clinical entity called "whale finger" or "seal finger" — the culprit E. rhusipathiae (Hilebrand (1953).

Corynebacterium diptheriae in animals appears to be rare, nevertheless, Hull (1941) cites four cases of diphtheria epidemics in which cows showed teat lesions from which C. diphtheriae was

recovered. There does not appear to be any recorded case of bovine mastitis caused by C. diphtheriae and it is presumed that since the organism has a tendency to localise at the nidus of infection that the danger of contaminated milk is not great. It is generally believed that Group B haemolytic streptococci associated with the causation of bovine mastitis are either non-pathogenic or of low pathogenity to humans. However, numerous instances of udder infection with Group A Streptococcus pyogenes are recorded and undoubtedly milk may as a result of infection of the cow with human pathogenic Streptococci, or contamination of the milk itself with these organisms, produce septic sore throat or Scarlet fever in humans.

2. VIRUS DISEASES:

(*a*) *Psittacosis*:

The disease is of topical interest because of its recent occurrence in the Dominion. Originally, the virus of the disease was thought to be harboured only by Psittacine birds. To date, the virus has been isolated from a wide range of avian species, including pheasants, canaries, grouse, linnets, seagulls, finches, pigeons, ducks and even the domestic hen. It does not require much imagination to visualise the rapidity with which the virus could spread in this country. The virus is highly infectious and consequently the chances of spread of the disease to humans is extremely high. This is aggravated by the fact that the clinical syndrome in birds is not pathogenomic and can be probably best described as "the bird becomes sick and dies". That description, of course, is applicable to the majority of avian syndromes. Again, examination post mortem is not helpful since the microscopic changes can be variable. Highly suspicious cases usually show diarrhoea and soiling of the feathers with an average duration of illness of 48 hours. The typical gross changes are enlargement of the liver and spleen with dry fibrinous peritonitis.

It would appear that New Zealand has effectively dealt with its outbreak of Psittacosis but every worker in human and veterinary medicine should be vigilant and conscious of this disease. The disease has been controlled in the Dominion, whether the virus has been overcome is another matter.

(*b*) *Q Fever*:

Q fever was described first as a clinical entity by Derrick (1937) when investigating an obscure febrile complaint affecting abattoir workers in Brisbane. The casual agent was subsequently isolated and identified as a Rickettsiae by Burnet and Freeman (1937) and was Rickettsiae burneti. Although morphologically similar to other Rickettsiae it was found to be filterable, produces

no soluble antigen and fails to produce the rash found with other Rickettsical diseases. Consequently its designation was changed to Coxiella burneti.

Today the disease occurs in most parts of the world. The high incidence of the disease amongst workers in abattoirs, meat packing station, gave an early indication of the association of the disease in humans with the handling of livestock and livestock products. As the evidence of the widespread occurrence of the disease accumulated the dairy cow became No. 1 suspect as the source of human infection. It became apparent that naturally infected cows have a chronic and symptomless infection of the udder and that C. burneti are shed in the milk over long periods. Since then the infective agent has been found in the milk of goats and sheep, and in the faeces and naso-pharyngeal discharges of sheep so that the organism is widely dispersed in dust. It is of interest also to note that pasteurisation of milk did not completely destroy C. burneti.

So far as is known New Zealand appears to be in the unique position of being free of this disease. Caughey (1949) failed to find evidence of the existence of the disease in seriological studies of 11 abattoir workers in Auckland and in 12 dairy farmers in the Maungaturoto district. Salisbury (1953) in a review of the disease reports the demonstration of Rickettsiae in the foetal membranes from a milch goat which had aborted twin kids while being held in quarantine on Somes Island. Agglutination reactions to the goat's serum was positive in dilutions 1.10; 1.30; and 1.00; to "Q" fever.

In view of the small extent, serological investigation have been made to-date in the Dominion, and the importance of this disease in human populations, it would be of interest to have a combined survey on a wide field of both cattle and humans.

It is not possible in a paper of this kind to deal extensively with the virus disease communicable from animals to men, but it is worthy of note that infection of humans with the virus of Foot-and-Mouth disease is not unknown. Holm (1950) reports the isolation of type O Foot-and-Mouth disease virus from a case of human stomatitis and conjunctivitis, although the pathogencity of the virus is to humans extremely low as indicated by the U.S.A. experiences as cited by Hull, when smallpox vaccine infected with Foot-and-Mouth disease virus was widely used with no untoward results. In Scotland sporadic cases of human infection with the Louping-Ill virus occur. It is not known whether the disease is transmitted to men by the bite of the sheep-tick, but the symptoms are generally severe and although not usually fatal. Recently Bienfit (1953) has suggested that because of the similarity of giant cell formation in dung tissue in dogs infected with Distemper virus and in atypical pneumonia in humans that Distemper virus may be responsible for the latter condition.

In conclusion, I think it becomes apparent that bacteriologically, the fate of "homo sapiens" is evitably linked with that of the birds of the air and the beasts of the field. Because of the labours of bacteriologists the outlook of administrators and the public at large has come at least partly to appreciate the need for community hygiene.

Bacteriologists have changed their own outlook. The isolation, for instance of B. anthracis from the crops of two normally healthy sparrows by Shrewsbury and Berson (1952) provokes scarcely a ripple—bacteriologically. Pathogens, living as saprophytes, in odd situations no longer provoke surprise.

New Zealand appears to me to be a unique country, in that it is apparently free from many of the bacterial and viral diseases encountered elsewhere. How long this will continue no bacteriologist would venture to say. It may be the explanation why there are so few bacteriologists and bacteriological units in the country. In my opinion they are dangerously few. In spite of antibiotic therapy, even perhaps because of it, bacteriologists are still the preservers of the public health and the "back room boys" of early accurate diagnosis. I have had occasion to seek the recorded type of bacteriological information which is very necessary to field investigation. For instance, it is important to know the incidence of avian tuberculosis in cattle if measures for the control of bovine tuberculosis are to be effective. Where can I find this information? Where can tubercle bacilli be typed without causing a nervous breakdown to the few bacteriologists working in the Dominion? One of the difficulties of writing this paper has been that the word "apparent" predominates. It predominates because so much of our information is belief rather than proven fact. Bacteriological diagnosis and the teaching of bacteriology stands on its own feet in most other countries, so it should be in this Dominion. Here the potentialities are great for the rapid spread of bacterial and viral diseases of animals and men. I believe that the Dominion could with ease double the number of bacteriologists presently employed within its shores, if disease in animals and humans is to be effectively controlled. The extent of the disease Leptospirosis and Salmonellosis in animals and the dangers which may result to the public health from the infective agents of the diseases justify the expansion of the Dominion's bacteriological services, and demand immediate investigation.

Finally, it is obvious that the control of infectious disease in animals and humans must be a collaborative effort. It demands the combined experience and knowledge of the bacteriologist, clinician, and field worker, whether trained in veterinary or human medicine.

THE HOSPITAL BACTERIOLOGIST

(An address given by Dr. L. Sefton, Pathologist, Wanganui Hospital, to the Ninth Annual Conference of Hospital Bacteriologists.)

It is a very great pleasure indeed for me to see you all gathered together here in Wanganui from all parts of New Zealand and I feel very privileged to be able to deliver to you this opening address.

You as Bacteriologists and I as a Clinical Pathologist belong to professions which are very closely related, and which in many respects may be regarded as almost identical. We have certain common problems which stem from our rather haphazard origin and from the rapid growth which has taken place in laboratory practice over the last few years. In each case our origins have been of an academic nature. Pathologists and Bacteriologists did not exist in the middle of the last century. During the latter half of that century the development of histological technique made possible the microscopical study of tissue in disease and gave birth to the science of pathology.

The discovery that bacteria were the cause of many diseases was the start of a large amount of research work devoted to demonstrating the bacterial cause of numerous different diseases. Thus pathology and bacteriology before 1900 were essentially research techniques and it was only about the time of the first world war that it gradually came to be realised that the sciences of pathology and bacteriology might be applied to the diagnosis of disease in addition to research into its cause. The discovery of microtechniques in biochemistry about the 1930 period brought research biochemists into the field of study of disease and since then many workers, especially King at Postgraduate Medical School at Hammersmith have adapted these microtechniques to diagnosis. Haematology was at first an offshoot of pathology, but with the large development of blood transfusion work during the war and the widespread research in coagulation problems which took place about the same time, there developed a group of people who devoted themselves exclusively to the practice of haematology.

Thus the various aspects of laboratory practice as employed today arose separately and have become welded together in our hospital laboratories. This welding together is not, however, complete and in several of the teaching hospitals in England the separate subsections of clinical pathology exist in separate departments and work quite independently This can create some great difficulties. When I was a House Physician it was my duty to send separate specimens of C.S.F. to each of the departments of pathology, bacteriology, and biochemistry, so that they could

carry out the cell count, cultures, and chemical estimations respectively. Not a very satisfactory system. Perhaps it was even less satisfactory when in the investigation of a coagulation disorder the pathologists counted the platelets, the bacteriologists determined the clotting time, and the biochemists carried out the prothrombin estimation, all without any mutual consultation!

These difficulties do not of course exist in the average laboratory in New Zealand which is a single unit, but nevertheless, there is always present the danger that hospital laboratory practice will be divided again into those original subsections—a tendency which is particularly likely in the larger laboratories.

I think it very advantageous that from time to time bacteriologists and pathologists from all over New Zealand should hold their conferences in small laboratories such as this, because in many ways this laboratory represents an ideal organisation in that being of limited size people working in each of its separate sections are able to be familiar with what is going on in the other sections and are able to maintain a considerable degree of contact with the patients will be lost, the service becoming impersonal and restricted to the examination of specimens passed through a hatch. Economically I know it is not possible, but it would nevertheless be ideal if in a large hospital there were several small laboratories each serving one group of wards—an arrangement which is found sometimes in America and which works very satisfactorily.

Perhaps even more dangerous than splitting a laboratory into separate watertight compartments is the splitting of laboratory personnel into various categories of subspecialists. This occurs if qualifications are taken in subspecialties, as is the case in England, where it is customary for a general examination in all branches of laboratory practice to be taken at the intermediate level, but from then on for examinations to be in subsections of clinical pathology only. It is particularly advantageous that in New Zealand the certificate of proficiency in laboratory practice should be an all-round examination in all branches of laboratory work. The hospital bacteriologist, despite his title, should be a general practitioner, as it were, in the full range of clinical pathology.

This is of course not quite so satisfactory from the point of view of status—it means that he will be compared unfavourably with the academic bacteriologist who must know more about bacteriology; or on the other hand with the academic biochemist who must know more about biochemistry; and it is always a little difficult to argue that one's particular recommendation is that one has a general knowledge of a wide range of subjects. You know the old saying—"Jack of all trades; master of none." Nevertheless I think the general laboratory bacteriologist has a good

status, the key to which lies in his relationship with the patient. Hospital laboratory work differs from all other types of laboratory work in that it is laboratory practice applied to patients and the hospital bacteriologist's claim to high status is that he understands how the various tests may be applied to patients from the point of view of diagnosis, and how to use them to the patient's best advantage.

To do this needs a good understanding of human physiology in health and disease. Not knowledge to the degree required in a doctor, but nevertheless extensive knowledge. In England some study of human physiology is required from the laboratory technician, and it would be profitable if something similar were also required here. A good grounding in fundamentals of this sort make the understanding of laboratory work very much easier. Other fundamentals too are important, and a knowledge of chemistry, particularly physical chemistry, and of physics, particularly heat and optics, is of very great value to laboratory workers.

A feature of laboratory work which must be apparent to all is the rapid growth which has taken place in recent years. As I have explained, haematology and biochemistry are comparatively recent developments and are responsible to a large extent for the increase in laboratory work which has taken place since the war. Medicine is progressively becoming more scientific, and the more scientific its methods become, the greater will be the place occupied by the laboratory in the practice of it. These recent developments have brought with them a change in the balance of the work carried out in the laboratory. Before the war bacteriology and morbid histology were all important, and biochemistry and haematology played comparatively small parts. Now the reverse obtains. Professor Sir Lionel Whitby, writing in the British Medical Journal in 1950 in an article on "Fifty Years of Clinical Pathology" stated that morbid anatomy and bacteriology are declining sciences which are being ousted in importance by haematology and biochemistry. In view of our titles of pathologists and bacteriologists this is perhaps unfortunate, but nevertheless we must face the facts and adapt ourselves to the new needs of the patients. It would be regrettable if we tried artificially to preserve the importance of bacteriology and morbid anatomy for the sake of a name.

The growth in importance of biochemistry and haematology is of course recognised, but not perhaps as adequately as it might be. One has only to look at the intermediate syllabus of the certificate of proficiency to realise this. The syllabus is grossly overloaded with bacteriology, gives rather inadequate attention to haematology, and almost completely ignores biochemistry. The intermediate examination is of course only the beginning; it covers

only the early part of the training in hospital laboratory practice. Should we not, however, tackle right at the outset those sections of the work which are possibly of more importance now, and certainly will be in the future, namely haematology and biochemistry? Much of the intermediate examination is devoted to fundamentals such as the making of media and sterilisation techniques—quite important perhaps, but in view of the declining importance of bacteriology and the growing importance of biochemistry, it might be better if the main fundamentals studied were the basic principles of chemistry about which the average laboratory worker is usually so lamentably ignorant. To keep in step with the changed order of importance of the various sections of laboratory work the syllabus for the examinations in bacteriology needs revision. You are probably aware that this is to be carried out. I hope very much that this revision will be an imaginative one.

The old limited techniques of hospital laboratory practice used to provide information of help in the diagnosis of patients, but not nearly to the extent of that provided by those more newly developed. Development of techniques which are of greater value to the patient has enormously increased the importance of laboratory work so that clinicians are coming to lean more and more on the laboratory. One result of this has been that they are so dependent on the laboratory that very often they find that they need help, not just at the laboratory's convenience, but right away. This has meant that the conception of a laboratory working only from nine till five is no longer an adequate one. Laboratory service has to cover twenty-four hours of the day, and seven days a week. The older techniques were not of very great value in emergency cases, but many of the newer ones are, with the result that the amount of emergency pathology carried out has increased enormously in the last few years. This creates very great administrative problems, particularly in small laboratories such as ours. I personally would like to see some change in the hospital employment regulations which would better reward persons providing this out-of-hour service. The present regulations provide for occasional call work (which was all that was envisaged when they were laid down), but not for the very frequent night and weekend calls which are the rule today.

The growing range of laboratory tests and the increasing complexity of many of them means that laboratory work is steadily becoming more difficult. It is the duty of pathologists and bacteriologists to keep pace with these developments. Maintaining pace with progress is the duty of all professional people, and I know that bacteriologists in New Zealand take pride in the fact that they are not technicians, but professional workers. One of the pleasures of working as a pathologist in New Zealand is the high

status enjoyed by the profession of bacteriology here. I think this is due to the recognition of the profession at an early stage by governmental authority, and by the wise regulations which were laid down many years ago to establish and preserve a good professional status. While we are here in Wanganui I think it perhaps appropriate to refer to the good work done by our Mr. Buxton in the early days of your Association and in its relations with the Health Department.

In England, hospital laboratory technicians do not enjoy such a good status. I think the reasons for this are that they had great difficulty in getting official recognition, that they have never insisted on a very high standard of general education for entry into the profession, that their examination system is deficient in that it encourages early sub-specialisation, and finally that salary conditions are poor. You will no doubt be very surprised to learn that the chief technician in a large laboratory can get only just over £700 per year, and that the subordinate fully qualified technicians normally get only about £600.

I have referred to the need for keeping pace with progress. One of the main advantages of a conference such as this is that it makes it easy for laboratory workers, especially those in the small centres, to keep in touch with the latest developments. Not only will they learn much from the excellent programme of papers which has been prepared, but they will pick up a great deal of immense value from the informal conversations which are one of a conference's most valuable features. The wide scattering of laboratories throughout the country makes contact with one's colleagues somewhat difficult to obtain, and the holding of these meetings does a lot to fill the need for such contact.

The gathering together of so many hospital bacteriologists from all parts of the country will draw the attention of the public to the wide extent of hospital bacteriology, and to the ever-growing importance of the profession in the community. In conversation with friends I often find that the work I do in the hospital as pathologist is misunderstood, and I dare say you probably find the same. Perhaps not the least advantage of a conference such as this is that the publicity it will receive will instruct the public in the importance a hospital laboratory, and will perhaps give them a better idea of its functions, and of the value it is to them.

I am sure this conference is going to be a very valuable one. I hope you will all enjoy it, and go home from it with increased interest in your work, and renewed enthusiasm for it.

RETIREMENT OF MR. E. L. F. BUXTON

In January of next year Mr. E. L. F. Buxton will retire after twenty-six years from the position of Bacteriologist to the Wanganui Hospital Board. Born in Christchurch in 1899, Mr. Buxton attended the New Brighton Primary School and the West Christchurch District High School. In 1915 he joined the Department of Agriculture as a clerical cadet, but early in 1917 transferred to the Veterinary Laboratory at Wallaceville. Shortly after his return from World War I, he was accepted as a Bacteriological Trainee at the Wellington Hospital and obtained the Certificate of Proficiency in Clinical Pathology and Bacteriology in 1923 and a portion of a B.Sc. In 1924 he was sent to the Department of Health Laboratory in Auckland as senior relieving assistant, and later was made a member of the permanent staff. In 1928 he was appointed first bacteriologist to the Wanganui Hospital Board and has remained there ever since.

The formation of the N.Z. Association of Bacteriologists was largely due to Mr. Buxton, and he was appointed chairman of the Provisional Committee which convened the first annual conference nine years' ago. He was elected first President — a position he held for three years. Since that time he has been Vice President and was the Association's first Life Member. He has served on a number of committees including the salary advisory committee, and carried out a sickness and salary survey of laboratory workers. He sought the introduction of the Intermediate Examination and was appointed first bacteriologist examiner. His last official duty was as chairman of the Committee which organised the 1954 Conference.

We wish Mr. Buxton a long and happy retirement or to be more correct, semi retirement, as he intends to carry out work on the preparation of antibiotic products for use against diseases in stock. We are sure he will also maintain a lively interest in the affairs of the Association.

AN ENGLISH Laboratory Technician interested chiefly in Bacteriology and Haematology seeks a position in a N.Z. Hospital Laboratory. For further information apply to G. W. McKinley, Waipukurau Hospital.

CONFERENCE, 1954 — WANGANUI

THE PRESIDENT, Mr. D. Whillans, expressed his pleasure that the Conference was being held in Wanganui for the first time, and hoped that much good work would be done during the two days ahead. He then introduced Mr. Simpson, Chairman of the Wanganui Hospital Board, a member of the Western Districts Sanatorium Committee, and an ex-executive member of the Hospital Boards Association.

MR. SIMPSON, in welcoming delegates to Wanganui said that many laboratory workers were known to him by name, as he was a member of the Salaries Grading Committee and he expressed the hope that Association members benefited thereby. He trusted we would have a good Conference and enjoy our stay in Wanganui.

THE PRESIDENT thanked Mr. Simpson, and then called on Dr. Widdowson, Medical Superintendent, Wanganui Hospital Board, to open Conference.

DR. WIDDOWSON, in the course of his remarks, said that he was astounded at the growth there had been in Laboratory Services since the days when he was a house-surgeon at Christchurch. In those days there was a visiting Pathologist and Bacteriologist who never seemed to come near the hospital and two-house-surgeons had to attempt laboratory work with varying results. Eighteen years ago, he recalled that Mr. Buxton had one assistant, and commandeered any available room that was vacant, and "he has not lost any ability in this direction." Dr. Widdowson considered that laboratory work had become exceedingly complex, and will continue to increase in importance. It gave him great pleasure to declare Conference 1954 open.

THE PRESIDENT suitably replied, and then called on Dr. Sefton, Pathologist, Wanganui Hospital to deliver the addresss to delegates. Dr. Sefton gave a most interesting and well prepared address, which contained much to interest all Association members and provoke much thought, and the address is printed in full elsewhere.

THE PRESIDENT thanked Dr. Sefton for a most thoughtful address. Many important points were raised, and they would be remembered by the Association in our deliberations.

The following attended Conference 1954.

Messrs. Whillians, Auckland; Buxton, Wanganui; McKinley, Waipukurau; Reeve, Palmerston Nth.; Patterson, Auckland; Buxton, Jnr., Oamaru; Sloan, Auckland; Callaghan, Auckland; Walsh, Auckland; Murphy, Auckland; Donnell, Auckland; Schwass, Wellington; Horner, Wellington; Parker, Wellington; Till, Christchurch; Thompson, Invercargill; Adamson, Christchurch; Samuel, Dunedin; Dixon, Nelson; Meads, New Plymouth; Mrs. Taylor, Christchurch; Misses Whelan, Wellington; White, Ashburton; Lindsay, Masterton; Curtiss, Christchurch; Sewell, Timaru; Johnstone, Hamilton; Snowdon, Hawera; Grey, New Plymouth; Messrs. Ronald, Whangarei; Barry, Hamilton; George, Rotorua; Smith, Hamilton; Ellison, Wellington; Ekdahl, Gisborne; Rankin, Napier; Carroll, Hastings; Hutchings, Palmerston North; Barrington, Wairoa; Misses Saxby, Napier; Kynoch, Waipukurau; Messrs. Shepperd, Thames; Scott, Thames; Misses Tong, Wanganui; Jackson, Wanganui; Allen, Wanganui; Wilkinson, Wanganui; Messrs. Harker, Wanganui; Lyon, Wanganui; Misses Burtt, Wanganui; Scott, Auckland; Phibbs, Westport; Reid, Auckland; Wylie, Tauranga.

Written apologies were received from:

Sister Mary Paula (Mater Misericordiae, Auckland); Sister Mary Killian (Mater Misericordiae, Auckland), Miss Mary Woolley (Mater Misericordiae, Auckland), Messrs. Austin (Medical School, Dunedin), Murray (Christchurch), Saunders (New Plymouth), Ward (Timaru),

Bloore (Blenheim); Peddie (Upper Hutt); Rush-Munro (Auckland), Josland (Wellington).

The President in his remarks to Conference, noted that the Council was gradually changing, and he welcomed the fact that the original members of the Council were gradually retiring from office and new blood was being introduced. The President-elect, Mr. McKinley, would be the only remaining member of the original Council of 1945, the year the Association was formed.

The Association had progressed rapidly, a lot had been accomplished, and he warned that there may be a danger of the Association resting on its achievements. There could be no standing still—we either went forward, or we would go back.

The Association must not lose sight of its professional aspirations, and he considered that salaries and conditions of work were no longer the important factor they had been at the time of the formation of the Association.

Interest in laboratory work was paramount, and he trusted the Association would foster this interest.

PROXIES. Mr. Ellison was authorised to cast proxy votes on behalf of: Messrs. Pierard and Olive.

MINUTES OF CONFERENCE 1953. These were published in the "Journal" and were taken as read.

The minutes were confirmed without discussion.
(Meads — Till).

THE ANNUAL REPORT was presented by the Hon. Secretary, and was adopted. (McKinley — E. Buxton).

THE BALANCE SHEET was presented by the Hon. Treasurer and was adopted. (Patterson — Ellison).

ELECTION OF OFFICERS 1954-55.

Hon. Secretary, M. Donnell; *Hon. Treasurer,* R. Patterson; *Members of President,* G. W. McKinley; *Vice-Presidents,* D. Adamson, A. Samuel; *Hon. Secretary,* M. Donnel; *Hon. Treasurer,* R. Patterson; *Members of Council,* H. Bloore, L. Reynolds, M. Rush-Munro, Miss P. Scott.

MOVED: That the ballot papers be destroyed. (Meade — Ellison).

THE HON. SECRETARY reviewed the activities of the Association during the past year for the information of delegates. The year, although a busy one from a domestic point of view, had been quiet so far as our dealings with such bodies as the Department of Health, the Pathological Society, and the Salaries Advisory Committee were concerned.

THE PRESIDENT explained to Conference the basis of selection of representatives from the Association who attended the lecture given by H.R.H. the Duke of Edinburgh in January, 1954.

MR. ELLISON moved "that the Association place on record its appreciation of the services to the Association of Mr. Whillans, retiring President, and Mr. McKinley, Hon. Secretary for the past five years."
(Ellison — Hutchings).

MR. PATTERSON said that 2nd January should be a Public Holiday, and should be so designated in Hospital Employment Regulations. There was considerable discussion on this point, with opinion fairly evenly divided for and against.

THE PRESIDENT explained that this had been discussed previously, and the Association had included such a request in submissions to the Salaries Advisory Committee. It had been refused, and he considered that it would be futile to pursue the matter. Discussion then lapsed.

MR. ELLISON then introduced a matter, for discussion only, on behalf of Mr. Pierard, who submitted:

"That the office of President of the Association shall be held for one year only."

As this would entail alteration to the Constitution, the submission is ade as a notice of motion for the next General Meeting of the Associa-ɔn and members of the Association may consider the matter during the ːar.

MR. HORNER raised the question of representation Conferences, and ked if there was any fixed proportion laid down by the Department of ealth.

A number of delegates gave the ruling of their Boards on this matter, ıd delegates were advised to read Hospital Circular Letter No. 1954/33. his would no doubt be available for perusal if a request was made to the ːcretaries of Boards.

R. SLOAN asked if there was a reduction in Junior Subscriptions for ırt of a year. "That this be left in the hands of Council."
(Ellison — Sloan).

R. MURPHY (Editor) asked for a ruling on the price to be charged r back numbers of the "Journal." This was left in the hands of the ditor to decide.

R. SAMUEL asked if we should not have a nomination form, with a mple "Biographical Sketch," for the election of Council.

No action was taken.

The question of the final examination and a higher examination was scussed at length, and very many delegates expressed their opinions. The ːneral opinion was against any reduction of the existing 5 years course r the qualifying examination and Conference considered that the Inter-ediate Examination must be retained.

R. ELLISON moved

"That a special committee with power to act be set up by the Council of the Association to carry out with due discretion such recommendations from the 1954 Conference relating to the Intermediate, Senior, and proposed higher examinations, and to meet the standing Committee of the N.Z. Society of Pathologists in any relevant discussions." (Ellison — Curtiss).

he following recommendation to Council from the 1954 Conference, sub-ıtted by Miss Curtiss, was approved.

) That the present time interval system of examination be maintained.
?) That the Syllabus for the final examination be revised, brought up-to-date, and be of a higher standard.
) That there be more than one written paper, so that each section of clinical laboratory work may be given equal attention at the examination.

ONORARIA: Approved at the same rates as last year.
(Ellison — Till).

ONFERENCE 1955. AT NAPIER.

UBSCRIPTION RATE: "To remain unchanged."
(Patterson — Schwass).

HE PRESIDENT thanked all those people who had helped to make ɔnference a success, and the Hon. Secretary was instructed to write itable letters of thanks to all persons who had assisted in any way.

The Chairman of the Conference Committee detailed those to whom e Association was indebted.

R. RANKIN wished Mr. E. Buxton well in his impending retirement, d said that the Association would be forever indebted to him for all his ɔod work, especially in the early years.

R. RANKIN then spoke of the sterling work of Mr. Whillans, the tiring President, who had been a tower of strength to the Association.

It was moved:
"That Mr. D. Whillans be elected a Life Member."
(Samuel — Rankin).

Mr. Whillans and Mr. Buxton were accorded musical honours, and each suitably replied. It was a fitting exit for two Officers who have served the Association faithfully over a long period of time.

Conference then proceeded to the most important section of our activities, namely, the paper, addresses, and demonstrations as detailed in the official programme and listed below:

Dr. C. N. D. Taylor, Medical Officer of Health for Wanganui, Manawatu and Hawke's Bay District. "Fluoridation of Water."

Miss P. B. Scott and Mr. D. Whillans, Auckland. "The Preparation of Freeze-Dried Typing Sera."

Dr. C. P. Powles, Medical Officer of the Duncan Hospital for Poliomyelitis, Wanganui. "Virus Studies in Poliomyelitis."

Mr. A. M. Murphy, Auckland. "Laboratory Diagnosis of Poliomyelitis."

Mr. H. E. Hutchings, Palmerston North. "A Thalassemia Minor with red cell inclusion bodies."

Dr. S. Jamieson, Govt. Veterinarian: late Senior Lecturer in Bacteriology, Aberdeen Medical School. "Human Infections of Animal Origin."

Mr. J. P. Walsh, Auckland. "A Comparison of Two Media used in the Cultivation of M.tuberculosis."

Mr. D. H. Adamson, Christchurch "Streptococcal Sore Throats."

Mr. A. Samuel, Dunedin. "Concentration Methods and other experiments with Microfilariae."

The firms displaying equipment at the Trade Display were:
A. M. SATTERTHWAITE & Co. Ltd.
VISUAL EDUCATION (N.Z.) Ltd.
SALMOND & SPRAGGON Ltd.
WATSON VICTOR Ltd.
IMPERIAL CHEMICAL INDUSTRIES (N.Z.) Ltd.
GEO. W. WILTON & Co. Ltd.
PFIZER Pharmaceutical Products.
REICHERT Equipment.
CROOKES Transfusion Solutions and BIOLAB Vaccines.
Medical, Surgical and other Scientific Equipment.
Pharmaceutical Products, etc.
COOK'S Microscopes and other Laboratory Equipment.

FINAL EXAMINATION IN HOSPITAL LABORATORY PRACTICE

WRITTEN PAPER — Monday 6th Sept., 1954. 9 a.m. — 12 noon.

Please answer all four questions.

1. Write short concise notes on the following:
   (a) Acid phosphatase determination of blood.
   (b) Beer's Law.
   (c) Protein free filtrate of blood.
   (d) Reducing substances in urine.
2. What laboratory tests would you use in the diagnosis of a patient suspected of suffering from haemolytic anaemia? Give principles on which tests are based but not actual technical details.
3. Discuss the basis of the classifications of the Streptococci.

4. Write briefly on the following:
   (a) Methods of typing of tubercle bacilli.
   (b) Laboratory diagnosis of the Actinomyces.
   (c) Laboratory investigations to be carried out in a suspected case of anthrax.

PRACTICAL A — Monday 6th Sept., 1954. 2 p.m. — 5 p.m.

Notes:
   (1) Attempt all questions.
   (2) Write brief notes on all steps performed showing clearly your method and how results were obtained.
   (3) Write all questions on a separate sheet of paper, identifying each sheet with your examination number.

1. Identify the Salmonella supplied, and as far as is possible, work out its antigenic formula. Antigenic tables are supplied. (*S. derby*)
2. Perform the ABO and Rh typing of the blood provided. (*A.B. D poss.*)
3. Estimate the blood sugar on the specimen provided. (110 *mgm*/100 *ml*)
4. Identify the parasites in the "spots" provided.

(a) *Microfilaria larvae* (b) *Plasmodium vivax* (*mature trophozoite*) (c) *Giardia lamblia* (d) *Trypanosome lewisi in rat blood* (e) *Ascaris ova* (f) *M. canis culture* (g) *E. granulosis* (*scolices*) (h) *E. vermicularis* (*female*) (i) *Pubic louse* (j) *N. americanus.*

PRACTICAL B — Tuesday 7th Sept., 1954, 9 a.m. — 12 noon.

5. Examine the blood films A, B, D and E, moving them around as necessary and comment on the outstanding features.
   Do a differential count of film B.

(a) *Microsphaerocytes* (b) *Eosinophilia* 60 *p.c.* (c) *Normo and erythroblasts* (d) *Lymphatic leukaemia.*

6. Examine the stained films C and F, stating what organism is present. (*Actinomyces, Pasturella pestis*)
7. Cut a paraffin section from one of the blocks provided and stain H and E.
8. Finish off question 1.
9. Test specimen of faeces provided for occult blood. Give the significance of your findings. (*Weak Positive*)
10. What organism is in this liquid culture medium? (*Leptospira*).

ORALS:

Dr. Hills:
Zoning phenomena; steam sterilisation; sending of virus material to laboratory; Wassermann reaction; mutation; hapten; gene; lysogenesis; phage; ultraviolet tube; sintered glass plates; actidione; symbiosis.

Dr. Somerville:
Pipettes to deliver and contain; seitz pads; sintered glass filters; Babcock tube; phase objectives; asparagine; saccharrimeter; skin test solutions and nib; Chamberland filter; photoelectric cell; reflecting prism for projection; incubator capsule; tachometer; camel hair brush.

We congratulate the following successful candidates:—

Miss J. Crawshaw, Auckland; Sister Mary Paula, Auckland; J. Carter, Auckland; K. Reeve, Palmerston North; C. Masters, Auckland.

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