Report of the Commissioner of Public Health / Western Australia.

COMMISSIONER OF PUBLIC HEALTH

WESTERN AUSTRALIA

REPORT

FOR THE YEAR 1963

By Authority: ALEX. H. DAVIES, Government Printer

REPORT

OF THE

Commissioner of Public Health

for the year 1963

Presented to both Houses of Parliament

93420/2/65—700

The Honourable Ross Hutchinson, D.F.C., M.L.A.,

MINISTER FOR HEALTH

☆

Sir,

I have the honour to submit the Report of the Department of Public Health for the Year 1963.

WILLIAM SHARP DAVIDSON, M.B. Ch.B. D.P.H.,

Commissioner of Public Health.

CONTENTS

☆

ANNUAL REPORT, 1963

☆

To the Honourable the Minister for Health.

I have the honour to submit the report of the Department of Public Health for the year 1963.

It is regretted that because of the delay in obtaining several reports and because of pressure of work during a Parliamentary Session involving considerable Health legislation, this report is presented late in the year. However, although statistics have been confined to 1963 in the Report, some items concerning surveys and health matters referring to work done in 1964 have been included to prevent undue delay in their presentation.

VITAL STATISTICS

In 1963 the population rose from 755,259 to 773,235, an increase of 2·38 per cent.

The Birth Rate fell from 22·59 per 1,000 mean population to 22·36.

The Death Rate of 7·73 continues to be the lowest in Australia.

The Maternal Mortality Rate per 1,000 live births was 0·23, the lowest so far recorded.

Infant Mortality has fallen from 22·27 per 1,000 live births to 20·42, but still remains slightly higher than in the other States. The Stillbirth Rate, however, continues to fall and for 1963 was 10·2 per 1,000 total births.

LEGISLATION

The year 1963 was rather a sterile year as far as new Health legislation was concerned. Considerable time was spent in an abortive attempt to pass legislation to permit and require the fluoridation of water supplies.

An Act was passed to prevent the sale or purchase of Human Blood or Blood Products.

PUBLIC HEALTH LABORATORIES

As indicated in previous reports these laboratories not only provide a public health laboratory service but also a full laboratory service to a number of hospitals throughout the State.

The Director of Laboratories in his Report again draws attention to the increasing demand made on the laboratories by clinicians, resulting in a 44 per cent. increase in work measured in unit values. This increase is partly an increase in the number of tests requested, and partly an increase in the complexity of modern tests.

As usual, the question arises as to whether or not all this testing is really necessary. As Dr. Laurie indicates, it takes a few months before a new laboratory in the country is fully appreciated by local practitioners but, from then on, the volume of work rapidly increases. In our major hospitals clinicians refer specimens from their patients to the laboratory for confirmatory tests when their clinical acumen could quite rightly be expected to make an adequate diagnosis without the aid of the laboratory. The overworked, inadequately staffed, and under accommodated laboratory resents this as unnecessary testing. But is it so ? The clinician is in an unenviable position. If the laboratory did not exist, he is excused for relying on his clinical judgment, but if the laboratory and the specific test do exist, is he excused if he doesn't use them and something goes wrong ? He is like the captain of a ship who, although confident that by pure seamanship he can navigate his ship safely through the fog, yet dares not neglect the use of the radar which science has given him for the protection of his vessel.

Thus more and more the Art of Medicine gives way to the accuracies of Science, and yet Dr. Laurie draws our attention to the limitations in the scientific approach in the variation that may be expected between the results of different laboratory examiners. It appears that we are progressively reducing the margin of error in clinical evaluation by laboratory testing, but the era of complete accuracy is not yet with us. Science constantly reduces the margin of error, but the day of complete accuracy is probably the day when Achilles overhauls the Tortoise. Be that as it may, we are now in a fortunate age wherein the pathologist's main function is not with the dead, and how they died, but with the living and how they may be kept alive. We cannot, therefore, begrudge him the expense of an expanding establishment.

From time to time we adopt an attitude of complacency towards bacterial disease as if this was a thing of the past. Our post-war custom of eating commercially prepared food and dining from communal kitchens and sandwich bars has, however, stressed the importance of the need to continue with the stringent laws of hygiene and sanitation that were instrumental in removing epidemic infection from our society. The typhoid epidemic in Aberdeen is a clear warning in this respect, and the ever increasing ubiquity of salmonella is drawn attention to in Dr. Laurie's account of twenty-seven people eating cold chicken on a hot day, and twenty-four of them suffering from an infection of Salmonella Typhimurium. His remarks on the prevalence of salmonellae in egg pulp, from a plant which is well run and proprely supervised, again emphasizes the need for statutory requirement of pasteurisation of egg pulp throughout Australia, despite any old wife's tales that bakers and cake-makers may like to associate with such a process.

The atypical mycobacteria continue to increase in importance as Tubercle Bacteria succumb to modern therapy. The proportion of tubercle cases in 1963, caused by atypical bacteria, rose from the 1962 figure of 5 per cent., to 10 per cent. The work of Dr. Kovacs in this field has been given world recognition.

A large part of the increase in laboratory work has been concerned with cytological examinations for the detection of cancer of the lung and uterus. However debatable the economic value of mass surveys or examinations may be it seems, from the public health point of view, they are like the poor, with us and likely to remain with us and we must adjust our laboratory facilities to meet the demand.

The laboratory, under difficulties of space and staff, has to be complimented for its year's work and the scientific papers it has published, despite the weight of its routine responsibilities.

TUBERCULOSIS

In 1963 there were 13 deaths from Tuberculosis. This represents a death rate per 100,000 population of 1·7, by far the lowest ever recorded in this State, and should be compared with the 1950 figure of 128 deaths, and a death rate of 22·9. Notifications of new cases of pulmonary tuberculosis also fell to the record low of 27·9 per 100,000, as compared to the 1950 figure of 104·8, and the previous best in 1961 of 28·4.

The atypical mycobacteria increase in importance and of the 244 new cases of tuberculosis notified, 23 were persons suffering from atypical mycobacteria.

In the mining community the report is far from optimistic. Table 10 shows a most disquieting increase in silicosis, asbestosis and pulmonary tuberculosis in miners. This may be an inheritance from the past, but the continuance of the cause cannot be disproved by ignoring the possibility that improvements may be made in the care of the health of the miner. With this end in view the Department in 1964 created a new appointment in the Occupational Health Branch for a medical officer in charge of preventitive medicine in miners, and subsidised Dr. McNulty to obtain further information and study of the pneumoconioses in the United Kingdom and Europe. It is hoped that in the future the medical officer will be able to play a more active role in the prevention of disease than he has done in the past.

EPIDEMIOLOGY

Poliomyelitis

In 1963 the fourth dose of Salk vaccine was adopted as a routine vaccination requirement. The state of vaccination shows that 87 per cent. of the population under the age of 15 have had three or four doses of Salk vaccine. Over the age of 20, only 42 per cent. are so vaccinated. This state of vaccination, although sufficient to prevent epidemics, does allow the occasional case to arise.

Since vaccination started in 1956 there have been 24 cases of paralytic poliomyelitis, 18 in the non-vaccinated, and 6 in the vaccinated and partially vaccinated. Of these, 9 were over the age of 20 and, apart from one case who had one dose of vaccine, all were unvaccinated. If, therefore, we are concerned with the protection of individuals as well as the prevention of epidemics it is necessary to promote Salk vaccination in all age groups. It is possible, however, that the adoption of oral vaccine will render this unnecessary. The adoption of oral vaccine in Australia is at present largely dependent on the outcome of trials in Tasmania.

Trachoma

The problem of trachoma presents a challenge to our health and welfare services, insomuch as it is not only an indication of the facility with which infection is spread and disease remains uncured, it is also an indication of the sanitary state of the population. It is, therefore, a clear index of the unsatisfactory standard of living to which the aboriginals of this State are accustomed, and from which it is almost impossible to extricate them. It is, however, imperative for the sake of the general health and sanitation of the State that the native population is educated, and is extricated from its present unhygienic method of living. In the meantime we must endeavour to control trachoma as best we can.

Previous to 1963 our main form of attack was a reliance on long acting sulphonamides. These, in doses necessary to produce worthwhile cure rates, were dangerous to the extent that any form of blanket treatment was contraindicated. Reduced dosage to safe levels gave reduced cure rates, and the absence of blanket treatments meant early reinfection.

In 1963 a trial was made of intermittent local therapy with a 1 per cent. Achromycin oily ophthalmic suspension. This treatment is easily given and is free from hazard. The success of the treatment is recorded by Dr. Allen, and given sufficient staff to carry the treatment into all areas it is our hope that it will prove a major factor in the control of the disease.

Venereal Disease

The year 1963 showed a continuation of the rise in notifications, particularly in young persons that had been evident in the preceding years Our figures for 1964, however, suggest that the peak was probably reached in 1963 and, with a little optimism, we can look forward to a change for the better in fashion.

CHILD HEALTH SERVICES

Dr. Gibson, Supervisor of Infant Health, retired early in 1964. This Journal contains her last report after 18 years in the Public Service, and 8 years as Supervisor of Infant Health. It is necessary to read her report in detail to get some appreciation of the important part that the Child Health Services play in the welfare of the community, and the reliance placed upon them by parents and expectant parents. This branch of the Public Health Services has, since the days of Dr. Rita Stang, been imbued with an enthusiasm and an imagination which has led it to develop positive approaches to preventive medicine in many areas allied to, but not necessarily restricted to, Infant Health.

The Infant Health Sisters, under the supervision first of Dr. Stang and then Dr. Gibson, have not only concerned themselves with the care of infants, but have also adopted the pre-school child and have set out not only to educate mothers, but also future mothers and fathers, and to prepare themselves for this task they, the Sisters, have ever sought, and obtained, more and more education for themselves from various specialist sources so that now our Infant Health Sisters must be looked upon as belonging to one of the most highly trained branches of their profession. It is probably because of this inborn urge to educate themselves before they preach that they are regarded so highly in the community throughout the length and breadth of the State, and why 80 per cent. of infants born attend an Infant Health Centre.

To appreciate the work of this Section it is necessary to read Dr. Gibson's report.

The School Medical Service examined 55,463 children. The parents of 15,809 were notified of defects, and 4,878 were referred for medical attention.

The School Dental Service examined 8,259 children, and treated 5,280 of them.

Country Hospitals

The Principal Matron reports an improved position in the staffing of country hospitals, and associates this with the improvements that have taken place in these hospitals and in nurses' accommodation associated with them.

OCCUPATIONAL HEALTH

Pneumoconiosis, noise deafness, industrial dermatitis, and the education of pest control workers took up most of the time of Dr. McNulty who acted during the absence of Dr. Letham, who was on study leave obtaining a further post-graduate qualification.

The fact that four cases of silicosis and six of asbestosis occurred in non-mining industries indicates the need for proper dust control in industry, and the necessity for adequate medical supervision by suitably trained medical officers. To this end Dr. Letham has recently obtained the Diploma in Public Health from Sydney University and Dr. McNulty, who has transferred to the Occupational Health Branch, has obtained his Diploma of Industrial Hygiene in London.

LIBRARY

The work of the library increases not only in lending and borrowing, but also in the supply of technical information in the form of extracts and photocopies. The activity of the library reflects the intellectual activity of the Department and it is a healthy sign to see that the activity continues to grow and that the library plays its part as a stimulant and a source of information, not only to the Department but to many individuals and organisations outside the Department, and even outside the State.

MEDICAL PHYSICS

Mr. Barrie King, who recently returned from two years study leave in America where he obtained a Master of Science degree, reports on the Radiation Protection Services in the State. All radiation workers are now monitored by a film badge service run by this branch, and continuous records maintained of exposure readings. All radiation equipment is progressively being inspected and registered and, where appropriate, the suitability for licensing is determined.

The Radiological Advisory Council considers the reports prepared by this branch and determines suitability and conditions for the issue of such licences.

As indicated the Medical Physics branch also finds time to design and assist with new experimental equipment.

The Medical Physics branch has the main responsibility in seeing that this State maintains a position of radiation safety that is required by International Code or Convention.

MATERNAL MORTALITY COMMITTEE

During the year 1963, four maternal deaths occurred in Western Australia. All were investigated by the Committee. The total number of live births was 17,278, giving a maternal mortality rate of 0·23 per 1,000 live births. This is the lowest rate yet reached in this State since records were commenced in 1897.

Of the deaths, three were judged to be unavoidable, and one was considered to have been preventable if the patient had been in a major hospital. As it was she was dealt with as an emergency case in a small country hospital lacking the facilities and staff for adequate resuscitation. Of the three unavoidable cases, however, two could have been avoided if the patient had accepted proper medical care.

The lesson to be learnt from these investigations of the Committee is that, although our Maternal Death Rate is exceedingly low, we can still improve.

The findings of the Committee are distributed to all doctors in the State, the patient remaining anonymous. From the findings, lessons are learned and the lives of future mothers are further safeguarded.

FOOD AND DRUG ADVISORY COMMITTEE

The production, processing, packaging and storage of food have undergone such great advances in the past few years that it had necessitated constant review and adjustment of food legislation. In particular, the standards prescribed by the Food and Drug Regulations have needed extensive revision. The rapid development of food technology and the wider distribution of food from its source have required standards which were more stringent in their quality requirements and were uniform in their application throughout the Commonwealth.

The research and critical examination necessary for such legislation was obtained as a result of close co-operation between the Food Standards Committee and the Food Additives Committee of the National Health and Medical Research Council, the Food Technology Associations of Australia and the various State Food and Drug Advisory Committees.

So far, 32 regulations have been drafted or re-drafted and the discrepancies which existed between the various State food laws have been reduced to almost negligible proportions. During the current year, amendments to the following regulations were approved by the Food and Drug Advisory Committee on the recommendation of the National Health and Medical Research Council :—

Marzipan,
Malted milk powder,
Vitamins and minerals,
Skim milk,
Flavoured milks,
Lemon butter, fruit flavoured spread and fruit flavoured filling,
Cocoa and chocolate,
Sausage meat,
Fish and fish products,
Ice cream and ice cream mix.

The following food additives were approved :—

Sorbic acid in cheese wrappers,
Sulphur dioxide in cider and perry,
Cobalt in beer,
Diacetin in confectionery,
Potassium iodate in bread,
Calcium silicate, sodium (or sodium calcium) silico aluminate, magnesium carbonate, tricalcium phosphate and calcium hydroxy phosphate as free running agents in salt,
Phosphates in fish fillets and poultry.

The following additives were not approved :—

Saccharin in pickled onions,
Dyes in citrus fruits,
Oxytetracycline for the preservation of fish,
Salicylic acid as a preservative.

Permission was given for the use of water containing 200 ppm. of chlorine for the cooling of eviscerated poultry carcases.

The Committee also considered draft amendments for :—

Wet gluten,
Cheese,
Pickles.

PESTICIDE ADVISORY COMMITTEE

The Committee met six times during the year and considered 158 applications for the registration of pesticides.

Most of the labels submitted for approval required modification in one way or another ; only 47 were accepted without alteration.

Five applications were refused for the following reasons :—

No precautions or usage directions on the label	3
Recommended usage considered hazardous	2

The remaining applications were approved subject to labelling alterations. These labelling deficiencies were :—

Unsatisfactory antidote statements	29
Inadequate directions for usage	10
Misleading statements	23
Unsatisfactory letter size or colour contrast	14
Inadequate statement of precautions	25
Active ingredients not declared	7
Formula incomplete	3

Two pesticides were approved for use by experienced and qualified personnel only.

A large number of registrations were withdrawn because the products were no longer marketed. The number of pesticides now registered is 970.

Hormone Weedicides

These materials, while not highly toxic, are extremely persistent and several instances were reported where damage to plants had occurred from insecticides which had become contaminated by being stored with 2,4–D or 2,4,5–T weedicides or by the use of equipment previously used for the application of hormone weedicides.

To overcome this, it is required that the following warning notice should appear on all packages containing 2,4–D, 2,4,5–T or MCPA weedicides :—

Warning Statement.

1. This chemical is harmful to plants, particularly vines and tomatoes. Take precautions against spray drift and vapour movement.
2. Keep this container tightly sealed and do not store with seeds, fertilizers, other pesticides, etc.
3. Do not use container for other purposes.
4. Equipment that has been used for this chemical should not be used for the application of other materials to sensitive plants.

Sampling of Pesticides

Forty-two samples of pesticides were submitted for analysis to determine whether they were in conformity with their registered formulae.

Deficiencies were found in several dust preparations. These deficiencies were so marked in some instances that it was felt there must be some defect in the method employed in the formulation of these products. Inspection of the milling equipment confirmed this.

The problem was referred to the manufacturers who agreed to undertake closer supervision of their formulation procedures.

NATIVE SURVEYS

Surveys into the health of the natives were carried out at Cundeelee Mission by Dr. Allen in 1962 and 1963, and by Dr. Elphinstone in the Sandy Desert in 1964.

The purpose of these surveys was to establish the general state of nutrition of the native population living in primitive or near primitive conditions and the prevalence of disease, particularly infectious disease, present in that population.

The reports of Dr. Allen and Dr. Elphinstone make interesting reading. Dr. Allen's report refers to two visits to a Mission catering for a mixture of natives from the desert, and natives on the fringe of civilisation. Dr. Elphinstone's report deals with his second excursion into the Sandy Desert after an interval of six years. Those who read Dr. Elphinstone's report of his first excursion will note with interest that, where in the past his journey was curtailed by impassable sandhills, he now travels easily along roads where four-wheel drive is a luxury rather than a necessity.

Nutrition

In dealing with the state of nutrition of the desert native we are up against the insuperable difficulty of having no norm with which to compare him. If we use laboratory methods and seek to compare his haemoglobin, blood picture, serum proteins, Vit. B12 and Folic Acid levels with those in the general population, how do we know that the levels of the average city dweller are the best for an inhabitant of the Sandy Desert ? Can we say that a 14-stone native of a North-West port who takes a taxi to go half a mile is better nourished than his nine-stone counterpart in the desert who can out-distance a landrover over miles of spinifex, and end up less exhausted than the driver of that vehicle. Is the fat lubra in a North-West hospital, having difficulty with the birth of her child, better nourished than her thin sister in the desert who has her child behind a rock and goes hunting for witchety grubs next day ? What is malnutrition ? Is the pot-bellied youngster malnourished ? Or is he merely displaying a physiological reaction of adaptation to food which his young anatomy can only cope with by an acceptance of distention ? Dr. Elphinstone discusses this point. Be it as it may the clear clinical picture of malnutrition, kwashiorkor, beri-beri, rickets, scurvy, osteomalacia, anaemia, emaciation, are all conspicuous by their absence among desert natives, and our laboratory analysis of blood and serum gives no suggestion of deficiency.

The nutritional aspects of the blood and serum analysis of the 1964 survey show similar results to those of the 1957 expedition reported on by various writers in the Australian Medical Journal, 26th October, 1957.

Haemoglobin levels are consistently high and the blood picture frequently gives a high eosinophil count.

Serum proteins are also consistently high with the increase mainly in the globulin factor, many sera showing a reversed albumin/globulin ratio. There is, however, no decrease of albumin below critical levels.

Vit. B12 levels are again higher than would be consistent with levels in the white population. It is of considerable interest, however, to note that in this survey serum folate levels were estimated in 52 aboriginal bloods. The results are recorded elsewhere by R. E. Davis and A. Kelly. In the 52 sera, 30 when compared with levels in a caucasian population were folate deficient being below 2·5 mug/ml.

This picture of high haemoglobin, serum protein and Vit. B12 and low serum folate may reflect the influence of a diet relatively high in protein and low in fresh vegetable and liquid intake.

The desert native lives mainly on animals and lizards and flour ground from nuts and seeds. In a previous survey Elphinstone demonstrated the high protein content of these nuts and seeds.

The eosinophilia may also be part of the dietary pattern, as Drummond failed to demonstrate any extensive parasitic infestation.

If an attempt is made to correlate clinical phenomena or geographical distribution of these natives, with deviations in blood and sera analysis relative to nutrition, one fails to find any significant factor.

Infectious Disease

The spread of leprosy from the Northern Coastal areas to the hinterland has, so far, miraculously not taken place. Neither Allen nor Elphinstone found any indication. The main endemic infectious diseases are yaws and trachoma.

Treponemal Diseases

The majority of desert natives give serological evidence of suffering from, or having suffered from, a treponemal disease. The exact nature of this treponemal disease is debatable, but the following are its characteristics.

The more primitive natives with the least contact with civilisation have the highest positive serological index (50–60 per cent.). In such a population positives occur with considerable frequency in infants and young persons. Positive serological indications of treponemal infection decrease with contact with civilised living conditions, so that children become universally negative and positives remain only in a few adults. Indications of treponemal infection are, therefore, in inverse proportion to the habit of wearing clothes.

Indications of syphilis such as chancre, or chancre scars, gummata, stigmata of inherited syphilis, aortitis, G.P.I., and tabes dorsalis are conspicuous by their absence.

Children in the desert have frequently positive serological indications of treponemal infection, yet children may be negative when both their parents are positive.

Desert natives, particularly children, suffer from sores which resemble the primary sore of yaws ; these sores may be on any part of the body. Late manifestations of yaws seen in desert natives are—sabre tibia, osteitis or osteochondritis of frontal bone, vomer and phalanges and periarticular nodes.

It is clear then that the Treponemal infection of the desert native is not venereal syphilis, but some form of contact or insect borne Treponemal infection which has probably been endemic in the aboriginal since his arrival in Australia. It may, indeed, be the true descendant of the father and mother of all treponemes.

If it is not syphilis then is it endemic syphilis or yaws ?

It shows no typical contact chancre like endemic syphilis, and no frank framboesia like yaws. The absence of framboesia may be due to the dry climate of the desert. But even so, in the tropical rain belt of Australia, there is no evidence of the flamboyant framboesia that occurs in other tropical countries where yaws is endemic. It is probably true that the Australian aboriginal has his own form of yaws or endemic syphilis to which he has grown so accustomed that it generally causes him only temporary inconvenience, and only in a small minority of cases, permanent harm. For this disease Dr. Allen has resuscitated the name of ' Irkintja.' So to bijel, pinta, njovera, etc., we add irkintja and who knows, with the history and the isolation of the Australian aboriginal for thousands of years, that irkintja is not the father of all the treponemes.

A. E. Wilkinson of the London Hospital, M.R.C. Research Laboratories, to whom we are indebted for our T.P.I. reports, says—

> " The results in group A (desert) suggest a treponemal infection which is contracted in early childhood and may be associated with bone lesions in later life. This would be true of both yaws and endemic (non-venereal) syphilis, but yaws is supposed to flourish under humid, tropical conditions in contrast to the arid desert heat which I imagine prevails where these people live."

Gonococcal Complement Fixation Test

In contrast to the treponeme tests the G.C.F.T. positives increase in frequency as the natives collect in areas on the fringes of civilisation. In half-caste natives in ports and country towns gonorrhoea is not uncommon, but the positive G.C.F. tests in the bush native in remoter areas appears to have little connection with venereal disease. Positive tests are frequently found in children and in uninitiated young adults. Gonococcal urethral discharges are not seen. It would appear that the high G.C.F.T. rate is due to other Neisserian infections and the prevalence of purulent rhinitis in children in camps and missions may be associated with this. The gathering together of desert natives in large groups round missions, etc., facilitates the spread of non-venereal Neisserian disease but the wearing of clothes, which this approach to civilisation demands, reduces the spread of non-venereal treponemal infection.

HEALTH OF THE KIMBERLEY NATIVES

Dr. Elphinstone deals with the three main infectious diseases prevalent among the Kimberley natives, i.e., leprosy, trachoma and hookworm. These diseases are sporadically transmitted to the white population and, for the future welfare of the natives and the white population, must be eradicated or controlled before population expansion in that area makes the task more difficult.

Leprosy

From his report it is clear that Dr. Elphinstone now has the control of this disease well systematised, and we can look forward to a steady decline in fresh infections. There is little doubt that we have been too optimistic about cures in the past and it is obvious that our present drugs, although almost certain to control the disease in any individual, cannot guarantee a cure. Prolonged treatment is necessary and, because of the difficulty of follow-up and continuation of treatment after discharge from the Leprosarium, we are tending to keep patients longer in that institution than was our custom of a few years ago. There is, however, little reluctance on the part of the patient to submit to this incarceration, and the time spent in the Leprosarium is in many ways not unprofitable. Apart from receiving treatment for his disease the patient is forced to comply with a form of sanitary and hygienic living to which few have previously been accustomed. Children receive a school education, and adults are taught the various trades and chores that are necessary for the running of the institution. In addition a generous Commonwealth Government provides them with a monetary sickness benefit which they are educated to spend to advantage and, on discharge, receive the accumulated surplus in a lump sum. It can be safely said that, although we cannot practise the same rapid return to the community that we do with white patients in a more suitable environment, the native does not suffer in consequence.

Hookworm and Trachoma

The report on these diseases is, to say the least, disappointing. In spite of our constant activities in the treatment of these diseases we make little headway, indeed Dr. Elphinstone indicates that we are losing ground. The reasons are clear, neither of these diseases can be eradicated by treatment alone. Only a high standard of sanitary living can provide the break-through we require.

The accumulation of natives around towns, Missions and Stations facilitates the spread of these diseases and the absence of sanitary facilities, or the lack of knowledge in the proper use of these facilities, puts the native in greater danger of infection than he was subjected to while a nomad in the bush.

It is clear that our present policy of providing basic sanitary facilities for natives, and trying to educate them by example, is a policy that is totally inadequate, and a more objective policy of compulsory education in sanitary living is required for all age groups. A plan in this direction is under consideration but it will require the co-operation of not only the Health Department, Education Department, and Native Welfare Department, but also that of all persons in nominal charge of large groups of natives.

Sanitary living is not the aftermath of assimilation, it is a pre-requisite.

GENERAL SANITATION

An outline of the Department's activities is given in the Senior Inspector's report.

Fly and mosquito breeding received special attention.

Of 50,421 premises visited by inspectors and auxillary inspectors, 12,302 were found to be breeding flies. The most popular breeding grounds were lawn clippings and garden mulch, rubbish bins, poultry runs, and buried food, in that order.

Bowling clubs, golf courses and hospitals seem to have difficulty with the proper disposal of grass clippings.

This difficulty is shared with many householders, and a satisfactory solution is not always readily available.

Mosquito breeding along the Swan River has been reported on by Mr. Flood in an extensive survey which indicates that some 2,000 acres along the foreshores of the River require draining or reclaiming to remove mosquito breeding grounds.

An experiment was made in a limited area of the paper sack method of removal and disposal of rubbish.

The advantages of this method are—as rubbish does not require to be wrapped before placing in the bag, the bag holds considerably more rubbish than a bin. This is of great assistance to householders who find one binful a week is considerably below their rubbish producing capacity. If one bag is not sufficient, a second bag can be used and both can await the weekly collection. There is, therefore, no need for an extra collection. The bag and the lid mechanism to which it is attached prevents the ingress and egress of flies. The bag method is much easier on the dustman and it removes much of the loose paper nuisance at rubbish tips.

The disadvantage of the bag method is that the bag costs eightpence. To most of us this eightpence a week is eightpence well spent, but inevitably there will be objectors.

Our by-laws are being amended to allow this method of rubbish disposal to be introduced. It will then be up to local authorities to place the matter before their ratepayers.

Mr. Slattery's report on the experiment is published for the assistance of such local authorities.

HOSPITAL MORBIDITY STATISTICS

A tabulation of cases discharged in 1963 from the three main hospitals, Royal Perth Hospital, Princess Margaret Hospital for Children, and Fremantle Hospital, is given in the Appendix.

The figures are remarkably consistent with those in former years except that, strangely enough, despite claims of scarcity of beds and acute overcrowding, there were nearly 1,000 fewer cases discharged in 1963 to those discharged in 1962. The daily bed average in 1962 in the three hospitals was 981·5, and in 1963, 961·7. This fall in discharges and average daily bed occupancy is entirely due to a fall in the Royal Perth Hospital, as the other two hospitals showed slight increases.

The average length of stay in hospital altered little, 13·72 days in 1962, and 13·60 days in 1963.

Operation cases increased their bed occupancy from 48·37 per cent. of the total beds in 1962 to 50·61 per cent. in 1963. Accident cases also increased bed occupancy from 19·69 per cent. of total beds in 1962, to 20·91 per cent. in 1963. The figures, however, fluctuate slightly from year to year and over a four year period show little variation. A summary of the years 1960–1963 is given in the Appendix.

GERIATRICS

The importance of specialised care, and an organisation to deal with the sickness and infirmities of old age has been recognised by the Department and, in consequence, towards the end of 1963 a Geriatric Branch of the Department was inaugurated, and Dr. R. Lefroy was appointed Physician in Charge. Dr. Lefroy retains a part-time University appointment as Reader in Geriatrics and it is expected that this appointment will lead to the development of an organisation for the care of the aged along sound, scientific, humantarian and economic lines with benefit both to the aged, and to the community at large.

W. S. DAVIDSON, M.B., Ch.B., D.P.H.,
Commissioner of Public Health.

Appendix I

VITAL STATISTICS FOR WESTERN AUSTRALIA

	1961	1962	1963
Mean Population—			
Males	375,768	384,414	392,965
Females	361,599	370,845	380,270
Total	737,367	755,259	773,235
Births—			
Males	8,800	8,824	8,869
Females	8,278	8,240	8,421
Total	17,078	17,064	17,290
Birth rate per 1,000 of Mean Population	23·16	22·59	22·36
Deaths—			
Males	3,326	3,397	3,444
Females	2,403	2,413	2,532
Total	5,729	5,810	5,976
Death rate per 1,000 of Mean Population	7·77	7·69	7·73
Natural increase rate per 1,000 of Mean Population	15·39	14·90	14·63
Infant Mortality per 1,000—			
Live Births :			
Metropolitan Area	16·51	20·15	17·11
Rest of State	23·03	24·57	23·95
Whole State	19·67	22·27	20·42
Stillbirths :			
Metropolitan	121	111	90
Whole State	240	203	178
Stillbirth rate per 1,000 total births	13·9	11·8	10·2

Comparison of Infant Mortality and General Death Rate

Place	Infant Mortality			General Death Rate		
	1961	1962	1963	1961	1962	1963
New Zealand (a)	22·76	20·44	19·62	8·97	8·87	8·81
Western Australia	19·67	22·27	20·42	7·77	7·69	7·73
New South Wales	20·84	21·36	19·90	8·95	9·26	9·19
Victoria	17·80	18·50	18·92	8·39	8·64	8·81
Queensland	20·01	21·13	20·09	8·42	8·56	8·50
South Australia	20·00	19·15	18·67	8·06	8·32	8·13
Tasmania	16·81	20·69	17·94	7·89	7·99	7·74

(a) Includes Maoris.

Appendix II

PUBLIC HEALTH LABORATORY SERVICE

By Dr. W. Laurie

I.—ADMINISTRATION

General

There is no change in the functions of the service, namely, to provide a combined hospital and public health laboratory service.

Branch Laboratories

The empty spaces in the North-West are slowly being filled in. New laboratories are almost ready at Carnarvon and Port Hedland.

A new branch laboratory is now functioning at Claremont Hospital in Perth.

The problems of the branch laboratories remain the same, i.e., heavy and very varied demands on the willing laboratory staff with the senior men working long hours due to staff shortages at junior levels.

Accommodation

With the continuation year by year of the growth in volume and variety of work the lack of adequate accommodation in the central laboratories has now reached a stage where it is imperative to consider the building of a new laboratory big enough to house all the laboratory departments and related departments such as the State Medical Photography Department, and the Police Surgeon's Department. In the meantime, work is being carried on under considerable difficulty, with departments overcrowded and with some sections scattered in temporary accommodation in various parts of the metropolitan area. The present arrangements militate against laboratory efficiency and administrative efficiency.

Tours and Conferences

Dr. Kovacs has been on a seven-weeks study trip abroad mainly for the purpose of obtaining the newest developments in sensitivity testing and the differentiation of Mycobacteria. During this time he visited amongst others the following Institutes and Hospitals : The Medical Research Council and the Post-graduate Medical School, London ; the City Hospital, Edinburgh ; the Tuberculosis Reference Laboratory, Cardiff ; the Statens Serum Institute, and the Institute of General Pathology of the University of Copenhagen ; the Tuberculosis Section of the World Health Organisation, Geneva ; the Istituto Sieroterapeutico Milanese, Milan ; the Istituto Forlarini and the Istituto Superiore di Sanita, Rome.

Whilst staying in Rome, Dr. Kovacs took the opportunity to participate in the 17th International Tuberculosis Conference of the International Union against Tuberculosis where he took part in several discussions. During his trip he met many of the leading scientists in Tuberculosis Research.

Mr. Drummond, Principal Technologist, paid a brief visit to the United Kingdon in connection with a police case. While there he discussed blood techniques with Scotland Yard authorities and also V.D. serology techniques with the Whitechapel Clinic. One of the results of his visit has been the adoption here of the new additive method of blood grouping.

Working Hours

The system of working the laboratories from 0800 hours to 2200 hours daily, seven days a week, was originally begun to meet the obvious needs of the hospital patients but with the continued pressure on space this system has now to be worked as a method of easing congestion on working space.

Character of Work

The central laboratories were sited originally in the Perth Chest Hospital where much of the work was of a specialised but limited character. In May, 1963 the Perth Chest Hospital became the Sir Charles Gairdner Hospital, with conversion of half of the hospital beds to general medical and surgical work. This further accelerated the increase in volume and variety of the demands on the central laboratories, a process which will be continued with the building of 100 extra beds now planned for the Sir Charles Gairdner Hospital.

II.—STAFF

General

STAFF CHANGES—1963

(including Branch Laboratories)

Posts	Resignations	Recruitments	Remarks
Virologist	1	....	
Senior Technologist	1	....	
Technologist	5	6	
Laboratory Assistants	1	2	
Laboratory Attendants	8	15	Several for the Branch Laboratories.
Clerical	1	1	

The staff changes are summarised in the table shown above. The loss of Dr. Perret was particularly felt as she had proved a highly competent officer who had been with the laboratories since the opening of the virus laboratories some years previously.

Staff losses among junior technologists and laboratory assistants were heavy and underline a serious problem, namely the continuing loss of workers who have just reached a productive stage in their career after an extremely expensive and relatively unproductive period of training. Three of the five technologist resignations were female members of the staff resigning on marriage and the other two resignations were of young trained men proceeding overseas.

Health Problems

Laboratory workers are exposed to much greater risks of contracting certain infectious diseases than are other workers, e.g., the incidence of tuberculosis is reported to be eight times greater in laboratory workers than in workers in other industries. In spite of this and of the serious overcrowding in the laboratories, together with some over-working, the health of the staff is highly satisfactory on the whole, with a total of 451 days lost for sickness and accidents out of a total of 30,810 working days, i.e., a loss of 1·4% of total time. This is particularly satisfactory when analysis shows that 141 of the days lost were by five individuals each with a long illness. A much less satisfactory feature of the figures, however, is the unduly high amount of sickness among laboratory attendants, viz :

Registrars, etc., who	make	up	5%	of the	work	force,	account	for	5%	of days	lost by illness.
Senior Technologists	,,	,,	13%	,,	,,	,,	,,		6%	,,	,,	,,
Technologists	,,	,,	16%	,,	,,	,,	,,		19%	,,	,,	,,
Clerical Staff	,,	,,	8%	,,	,,	,,	,,		3%	,,	,,	,,
Laboratory Attendants		,,	52%	,,	,,	,,	,,		63%	,,	,,	,,

Much of this sickness in laboratory attendants is made up of short-term absenteeism in a relatively small proportion of this class of worker.

III.—WORK DONE, 1963

1. *General*

The work done during 1963 has been summarised in a series of tables to be found at the end of this report. A general summary is given in Tables IA (summary central laboratories) and IB (summary branch laboratories), and more detailed analyses of individual departments are then given in Tables II–VIII. The over-all pattern shows the same trends as in previous years, namely an increase in the volume of work in almost all departments, with a parallel increase in the multiplicity of tests : this latter characteristic is one more indication of the changed character of the hospital in which the central laboratories are situated.

As shown in Table IA, the number of tests carried out by the central laboratories rose by 20% in 1963 compared with 1962, whereas the unit values rose by 44%. This disproportion is due in large extent to the inclusion in 1963 for the first time of the unit values for the work done in the Virology Department. Table IA also shows that the only central laboratory to record a fall in work in 1963 was the Virology Department, indicating a lack of viral epidemics in 1963.

Table IB summarises the work of the branch laboratories and is discussed in further detail later in the Report.

2. *The Problem of Increasing Demand*

The last 20 years has seen a remarkable series of advances in laboratory investigations, the most remarkable being the large-scale introduction of enzyme testing. Indeed, the laboratory's prime function today is to aid in the preventing of patients from dying compared with its old morbid anatomy function of finding causes for the deaths of patients. Properly used, a laboratory can save much money and time for the patient and the hospital by providing speedy aids in diagnosis and treatment. However, in avoiding under-investigation, one all too easily drifts into over-investigation. In our 1962 Annual Report it was pointed out that the clinical hospital departments could not function without an out-patient department to screen off the less serious medical problems. A similar screening-off system for laboratories was the old clinical side-room, and it is essential that this be re-introduced for the sake of the younger practitioner as well as for the easing of the burden on the laboratories.

3. *Laboratory Costs*

In spite of the continuing rise in salaries, costs of materials, etc., the cost of our unit of work continues to fall largely because of continuing improvements in methods of work and to some extent because of the relative lessening of overhead charges compared with the total costs.

4. *Microbiology*

A. *General Bacteriology*

The work for the year is summarised in Table II, appendix. As is seen from the Tables, the work done increased by one-third over that done in the previous year.

Among points of interest are :—

(1) Investigation to decide the " normal " bacterial count of mid-stream urine. Apparently the figure suggested by Kass, 100,000 bacteria per ml., can reasonably be taken as indicating urinary tract infection, but investigations are continuing.

(2) An increase in gonorrhoea was evident in Western Australia as in other parts of the world. Culture results were very successful with the help of Stuart's transport medium. It must here be stressed that it is always necessary to carry out cultural confirmation of all Neisseria : to quote one example, gram-negative oxidase-positive diplococci were grown in a specimen from a patient : on these grounds this could have been diagnosed as gonorrhoea, but more exhaustive tests showed that the organism actually was the non-venereal Neisseria cattarhalis.

(3) Work commenced on Staphylococcus phage typing. It is of interest to note that with one exception all the 101 Staphylococcus aureus coagulase-positive strains were sensitive to Novobyocin.

(4) During the year the sensitivities of various organisms were tested against various antibiotics. The organisms so tested included E. coli, Pseudomonas pyocyanea, Proteus special, Enterococcus and K. aerogenes. The drugs tested and the results obtained are listed in Tables IIA, IIB, and IIC, appendix.

B. *Enterobacteriaceae Investigations*

The work also is summarised in Table II, Appendix : it shows little increase over the previous year's work. One food-poisoning epidemic was investigated during the year. The organism was found to be typhimurium and the vehicle of infection was cold chicken which had been prepared in the early morning of a hot summer's day : 27 people ate the chicken and Salmonella typhimurium was isolated from the faeces of 24.

Egg-pulp contamination by Salmonellae remains high. Of 174 random samples tested the over-all contamination, including Salmonella pullorum, was 31·6%, i.e., 55 samples. When S. pullorum contamination is excluded, the figure is 27·6% samples positive for Salmonella.

During the year a new modification of tetrathionate enrichment medium was introduced. This gives a much better yield of Salmonella than does the routine tetrathionate medium.

The description, number of strains, and sources of Salmonella serotypes are shown in Table IID in the Appendix.

Shigella : During the year 232 strains of Shigella were isolated : these strains showed much variation in their sensitivity patterns. It is essential always therefore to check each strain for drug sensitivity. The results of the testing are shown in Table IIE Appendix.

C. *Mycology*

Table II shows the remarkable increase in the work over the year. This steady increase in work indicates the increasing awareness among medical practitioners that a Mycology Department is now functioning. It is quite common to isolate fungi from specimens in which their presence had not been suspect : these fungi were mainly Candida, e.g. 94 vaginal swabs, 64 throat swabs, 51 wound swabs, etc. It is realised that in only a small proportion of such patients was the fungus responsible for the clinical condition.

During the year there were two cases of Cryptococcosis. In both cases the Cryptococcus neoformans was found in the cerebro-spinal fluid and both strains proved pathogenic to animals. These two samples came from the North of the State.

Dermatrophytes appear to be common in and around Perth. We have found the best results are obtained when the patient is referred to the Mycology Department for the skin scrapings to be done there, as the technique used in the collection of specimens is extremely important in recovering the pathogen from all but the most obvious cases. Most of the patients at present are referred by dermatologists.

Other work includes identification of cultures submitted by other laboratories. Among these this year were 2 isolates of Candida albicans recovered from the brains of new-born babies.

D. *Mycobacteria Investigations*

Table III, Appendix, summarises the work done in this Department during the year 1963. The routine work increased by only 5% but the experimental techniques increased by 26%. It is most important that these experimental methods be continued as it is improvements suggested by these experiments which account for the high and increasing rate of recoveries of positive cultures from the many samples submitted. During this year the main field of investigation was on the biochemical differentiation of the Mycobacteria species, especially the fast-growing Mycobacteria. Further comparative tests are also in progress on the value of the new processing method with N acetylcysteine introduced by Dubos et al. in Atlanta and Denver.

The most important progress during the year was the development of a new sampling medium for the culture of M. bovis. With this new medium a large reservoir of bovine tuberculosis has been found in the Northern Territory of Australia. The infection has been found in cattle stock as well as in wild buffalo and pigs. Table IIIA, Appendix, summarises the work to date.

The number of recoveries of unclassified mycobacteria is shown in Table IIIB. In all, 1,769 recoveries were made from 477 persons : since 1959 over 1,500 Battey strains have been cultured in our laboratories. During the year the mycobacterial " pseudo-tuberculosis " increased from 5% of cases to 10% of cases of tuberculosis and allied diseases.

In 1962-63 thirteen strains of M. kansasii were cultured : so far no clinical correlation can be found with these photochromogenic strains.

All Mycobacteria isolated in the laboratory are tested for sensitivity, with the direct drug sensitivity test (Middlebrook et al.) being done routinely on all microscopically-positive specimens. In all newly isolated strains of Mycobacteria the tube dilution test is also done, using Streptomycin, INH, PAS and Ethionamide. If requested by the clinician, further drugs are also tested. Streptomycin blood level estimations are done routinely. A most interesting finding was the low incidence (2·7%) of *primary* resistance in tuberculosis cases in Western Australia ; of the M. tuberculosis strains from newly-diagnosed patients 2·2% showed primary resistance to Streptomycin and 0·5% were resistant to PAS. These percentages are much lower than is the case elsewhere in Australia.

It is obvious that advances in the problems of the epidemiology of Battey disease can only now come from serological differentiation of strains and it is essential that this work, now newly begun, should be pushed ahead as fast as possible.

E. *Virology*

Table IV summarises the work of 1963. This Department shows a substantial decrease in work done in 1963 compared with 1962 : to some extent this is due to there being no large epidemics in 1963 and one other factor is the misuse of the laboratory facilities. Unfortunately, the complaints made in 1961 and 1962 reports still hold true, namely, " a substantial proportion of the work done was pointless . . . the only satisfactory method of proving whether or not a virus is responsible for an illness is to recover the virus and, at the same time, to show a significant rise in antibody titre against that virus in serum samples taken early and later in the illness . . . Only in a minority of cases did we receive the necessary specimens ".

Among the more interesting findings in 1963 was the recovery of Adenovirus type 3 from 12 patients between January and April. Most of the individuals affected had suffered from respiratory and gastro-intestinal complaints : 2 had symptoms suggestive of meningitis, and one was operated on for " appendicitis " which proved to be mesenteric adenitis. One other possible adenitis (no history given) also yielded an Adenovirus type 3 in June. During the year other Adenovirus infections identified included two patients with type 6 and one patient with Adenovirus type 7.

The recovery of enteroviruses in 1963 was lower than in 1962 : the 1963 recoveries were :—

Polio virus type 3	2 from children with paralysis
Coxsackie A untyped	5 sporadic cases (one later proved to be type 9)
Coxsackie B2	2
B3	1
B4	3, all in January
Echo untyped	3

During the year sera were also routinely tested for Coxsackie B antibodies : many patients did have low antibodies present, especially to Coxsackie B2 and B4, but the only cases in which it was possible to show rising titres were :—

B1 .... 1 case B2 .... 7 cases B3 .... 1 case
B4 .... 10 cases B5 .... 1 case

Other viruses isolated during the year include one REO virus, 3 haemadsorption viruses, and one mumps virus from a C.S. fluid.

5. *Biochemistry*

The work of the Biochemistry Department for the year 1963 is summarised in Table V, Appendix.

The work of this Department continues to increase in scope, complexity and quantity, with a 30% rise compared with 1962. It is in the Biochemistry Department that the pressure of space is greatest and where the introduction of clinical side-room testing would give some relief.

Polarographic and chromatographic equipment was set up during the year and an experimental period begun during which it is hoped to obtain firm indications as to what routine work could be taken over by this new type of equipment.

It is in the field of laboratory biochemistry that the pathologist and clinician find most difficulty in appreciating each other's needs and problems. To the clinician the Biochemistry Department is the one hospital laboratory section in which there is little or no error, and in which results are reproducable with a high degree of accuracy : this is not so. Indeed, the maintenance of good biochemistry work is the biggest single problem facing the pathologist today. This is a world-wide phenomenon. Many surveys have been carried out in recent years in which " unknown " samples were submitted for various tests to quite large numbers of laboratories thought to be highly efficient, and in every series the scatter of results above and below the true values is really quite high. In a summary of the findings in one such survey carried out by the Australian College of Pathologists it is concluded : " It has become increasingly evident that the causes of difference between laboratories are both numerous and varied. Analysis has shown how variations in methods, calculation errors, incorrect normal ranges, and the use of control sera may affect results but it is now realised that much of this plays only a small part. Perhaps the most important single cause is lack of awareness of the problems and difficulties which can influence the work of a laboratory."

6. *Haematology*

The work of this Department during 1963 is summarised in Table VI, Appendix. The work output rose 28% compared with that done in 1962. It is possibly true to say that if clinical side-rooms were available for initial screening of patients there would be a reduction of at least 20% in the work of the Haematology Department.

On the basis of parallel testing of different methods of carrying out prothrombin investigations, Quick's method is probably the best for routine use.

During the year one patient was found to have a very high level of naturally-occuring antibody to P factor in her blood and many pints of blood had to be checked before it was possible to obtain enough to transfuse her.

7. *Serology*

The work of the Serology Department has been summarised in Table 7, Appendix. It shows a 31% increase compared with that of 1962 and is twice as much as the work level in 1960. The main increases were in viral, hydatid and rheumatism tests.

In 1962 the Senior Technologist spent 9 months in the United Kingdom on study leave and during 1963 the great benefit of such a trip became evident in the much improved methods adopted following the United Kingdom visit : in viral serology we adopted the complement-fixing technique used in the Virus Laboratories, Glasgow, and closely resembling that used at Colindale, with plastic agglutination trays and

automatic pipettes. This proved highly satisfactory and a great time-saver. Of the complement-fixing antigens produced by the Virus Department, the most successful was the adenovirus one with an antigenicity superior to commercially produced preparations.

Other points of interest are :—

Hydatid Disease : In the second half of 1962 we began using an antigen prepared by the Commonwealth Serum Laboratories and a technique described by Bensted and Atkinson (*Lancet* 7/2/53). This combination proved most satisfactory.

Rheumatism tests : We have continued the parallel testing of latex beads versus red corpuscles as indicators and found that there is little to choose between them provided a tube method is used. The slide method of testing should be regarded only as an initial screening method.

Toxoplasmosis : In September, 1963 preliminary work began on the Toxoplasma Dye test using serum kindly supplied by Dr. Ludlam of Leeds, who also showed our Senior Technologist his methods during the United Kingdom visit. The chief initial difficulty, and one which persists, is to find a serum containing Accessory Factor. When it was felt that the test was running satisfactorily it was put into use in parallel with the complement-fixation method. Already we have shown as was to be expected, that Toxoplasmosis is not a rare disease in Western Australia.

Pregnancy tests : In November, 1963 we began doing Prognosticon tests in parallel with Toad tests. We found the first method unsuitable for serum testing and with urine testing we experienced a vibration problem. The investigation is still proceeding.

Medico-Legal : This work has doubled during the year ; one particular case was of such public importance that the Principal Technologist, Mr. Drummond, paid a special visit to the United Kingdom primarily to discuss blood techniques with the Scotland Yard authorities and also to take the opportunity of discussing certain venereal disease serology techniques with the authorities at the Whitechapel Clinic. From the Scotland Yard workers we learned the technique of the new additive method of blood grouping. This was adopted thereafter in Western Australia, thanks very largely to the supply of high-titre A, B, M and N antisera kindly supplied by Dr. Mourant of the Blood Group Reference Laboratory. We are also indebted to the North-East Area Forensic Laboratory, Harrogate, for methods of preparing anti-H lectin used now here with both the additive and absorption blood-grouping techniques. Following the trip overseas of Mr. Drummond, we have also been successful in increasing the sensitivity of the Florence Reagent for seminal stains. Grouping of such stains is now carried out routinely.

Venereal disease tests :

Syphilis : After Mr. Drummond's visit to the V.D. Reference Laboratory, London, we began using the Reiter Protein Antigen on the advice of Dr. Wilkinson. After one month's trial the test was adopted for routine use, replacing the Kahn and the Meinicke Clearing Reaction tests. In addition, the technique of the Wassermann Reaction was slightly modified.

Gonorrhoea : Efforts were made, and still are being made, to improve the gonococcal complement-fixation technique. This test is still of doubtful value because of the anti-complementary preparations of the antigen and its low antigenicity.

Surveys : A second group of bloods, 89 in number, was obtained from aborigines at the Cundeelee Mission. The sera so obtained were subsequently subjected to WR, Reiter, VDRL, and gonococcal C.F. tests. Similar tests were done on 253 sera collected from New Hebrides Islanders by Dr. Kirk of the Zoology Department, University of W.A..

8. *Department of Morbid Anatomy and Exfoliative Cytology*

The work of the Department during 1963 is summarised in Table VIII, Appendix.

Suitable working space remained the biggest problem in the Histopathology Department. At present the work is partly done in the Sir Charles Gairdner Hospital and partly in laboratories kindly lent by Hollywood Repatriation Hospital.

Shortage of staff is particularly serious with the work growing at a much faster pace than does the staff. Extra staff are needed in all departments including clerical assistants for the introduction of a new filing system.

Cases of Special Interest :

Include 2 cases of cat scratch disease, a boy of 13 years and a youth of 19 years ; a case of pulmonary torulosis ; a synovioma of the latissimus dorsi muscle in a man of 50 years, a very unusual site ; and 13 cases of Enterobius vermicularis infestation of the appendix, all in children. Two of the appendix specimens showed evidence of acute inflammation and in another appendix the worm had slightly penetrated into the wall of the appendix. In the remaining 10 specimens the worm or worms were present only in the lumen of the appendix, with no sign of inflammation in the walls. Apart from the hygienic significance of this infestation there appears to be a connection between mild clinical attacks of appendicitis and the presence of these worms.

The greatest increase in work was in exfoliative cytology which showed an increase of 173% over the previous year. Sputum specimens still provide the greatest number due largely to the channelling which began when this was a special chest hospital, but the number of cervical smears is increasing rapidly due to the wide publicity given to this work. As is the case with the Virus Laboratory, a significant part of our efforts is a waste of time due to the poor quality or insufficiency of the material supplied for examination. It is

expecially to be regretted that so many practitioners limit the specimens to one slide per patient. This one-slide technique is only justified in large-scale surveys and should never be used for the examination of patients who present with symptoms.

IV.—BRANCH LABORATORIES

The work of the Branch Laboratories during the year is summarised in Table IB, Appendix. With the exception of Bunbury Laboratory, the oldest and the largest branch laboratory, all laboratories show the same pattern, namely a rather quiet period for the first few months then a sharp and continued rise in work as the local practitioners appreciate the great importance of the laboratory facilities. Here again, the problem of staff is a serious one, with work growing at a far faster rate than does the staff, with resultant very heavy demands on the senior men in each laboratory, these men being available for emergency 24 hours a day seven days a week.

In September, 1963, a branch laboratory was opened at Claremont Mental Hospital, the largest hospital in the State, and already this laboratory has proved its value.

It is not possible easily to exaggerate the value of the branch laboratories to the public in general and to the individual patients in particular. Much credit is due to the senior technologists who have worked so hard and so long to make the laboratories the success they are.

V.—BLOOD TRANSFUSION SERVICES

In blood transfusion work in the country districts a happy relationship exists between the Red Cross Service and the Public Health Laboratory Services. Under this arrangement the Red Cross Blood Transfusion Service and its local workers are responsible for the maintenance of donor rolls, and for the taking and supplying of blood, while the Public Health branch laboratory staff assist this work by laboratory work such as estimating haemoglobin levels in donors, cross-matching of blood for transfusion, together with control of stored blood in areas with a blood bank. Dr. Brain, the Medical Director of Red Cross, kindly acts as adviser on matters of blood transfusion and visits the branch laboratories when opportunity affords.

VI.—RESEARCH

The research continues to be of a practical nature, e.g., the virus laboratories have begun routine testing of child patients admitted to hospital, and the investigation of sudden deaths in young children. This last has proved a difficult problem the world over ; in at least 50% of cases no cause is found for death. In one patient so investigated the sample of faeces showed a pure culture of Shigella organisms when tested by the Salmonella Reference Laboratory yet the patient had not had diarrhoea.

In the Tuberculosis Department work continues on the testing of new media : this is not usually regarded as dramatic or promising, yet with the introduction of new media by Dr. Kovacs it was possible to uncover a large reservoir of animal tuberculosis in the Northern Territories.

Investigations continue into the problems of coronary heart disease, supported by a grant in aid from the National Heart Foundation. Messrs. Boehringer have also given a grant towards the investigation of the disease in pigs.

VII.—PUBLICATIONS

During the year the following papers were published by members of the laboratory staff :—

(1) Dr. Kovacs published the following :—

" The Oxidase Reaction : A Rapid and Simple Method of Recognising Cholera Vibrios ". " The Lancet ", September 7, 1963, pp. 497–498.

(2) Dr. Laurie :—

(a) In collaboration with Dr. J. D. Woods, Assistant Physician, Fremantle Hospital, Fremantle.

(i) " Coronary Interarteriolar Anastomoses ". Am. Heart J., 6-5, (579–582)

(ii) " The Assessment of Cardiac Hypertrophy and Ischaemia ". M.J.A., 1 : 123 (123–126).

(iii)* " The Reliability of the Electrocardiogram in Myocardial Infarction ". " The Lancet ", ii, (265–269).

(iv) " Infarction (Ischaemic Fibrosis) in the Right Ventricle of the Heart ". *Acta Cardiol.*, T. XVIII, (399–411).

* Dr. W. G. Smith, Assistant Physician Superintendent, Sir Charles Gairdner Hospital, also collaborated in this paper.

(b) In collaboration with Dr. W. G. Smith and Miss Rose McAleer.
" Nocardiosis in Australia." A.M.J., 1963, 2 : (534–536).

(3) Miss Rose McAleer in collaboration with Dr. T. C. Anthony, Dermatologist.

" Chromoblastomycosis : Report of a Case in Western Australia ". Austr. J. Dermatology, Vol. 7, No. 1, June, 1963.

VIII.—ACKNOWLEDGMENTS

We are much indebted to colleagues in many parts of the world, expecially Dr. Koss of the Sloan-Kettering Institute, New York ; Dr. Wilkinson of the V.D. Reference Laboratory, London; and to the numbers of other colleagues who have made our staff so welcome and have taught them so much in their visits to the United Kingdom.

Nearer home we remain indebted to the Repatriation Department and to the Mental Health Service of Western Australia for much help.

Within the service everyone continues to work hard and uncomplainingly and I am much indebted to all members of the staff.

Table 1A

PUBLIC HEALTH LABORATORIES—CENTRAL LABORATORIES

SUMMARY OF WORK DONE—1963

Laboratory Sections	Source				1963 Total	1962 Total	1963 Increase
	State	Commonwealth	Gairdner Hospital	Others			
							%
Microbiology :							
Tests	37,269	5,456	9,241	1,084	53,050	39,574	34·1
Unit Values	334,079	36,595	62,069	7,168	439,911	357,078	23·2
Tuberculosis :							
Tests	8,040	37,586	....	....	45,626	36,155	26·2
Unit Values	62,351	245,537	....	....	307,888	219,849	40
Serology :							
Tests	45,271	4,588	32	1,765	51,656	42,741	20·9
Unit Values	250,230	28,325	430	18,780	297,765	226,763	31·3
Haematology :							
Tests	5,649	11,188	31,349	5,711	53,897	41,877	28·7
Unit Values	19,816	38,282	115,645	23,555	197,298	154,416	27·8
Biochemistry :							
Tests	2,634	4,576	10,524	1,523	19,257	14,472	33·1
Unit Values	24,753	50,650	86,599	17,331	179,333	137,819	30·1
Histopathology :							
Tests	9,826	2,357	3,990	4,674	20,847	18,000	15·8
Unit Values	146,949	27,459	37,159	51,910	263,477	174,417	51·1
Virology :							
Tests	23,642	....	....	....	23,642	30,309	....
Unit Values	147,616	....	....	....	147,616	....	....
Totals :							
Tests	132,331	65,751	55,136	14,757	267,975	223,128	20·0
Unit Values	985,794	426,848	301,902	118,744	1,833,288	1,270,342	44·3

NOTE.—The discrepancy between the percentage rise of tests (20%) compared with rise in unit values (44%) is largely explained by the inclusion of virology unit values this year for the first time.

Table 1B

PUBLIC HEALTH SATELLITE LABORATORIES—SUMMARY OF WORK DONE, 1963

	Albany	Bunbury	Derby	Geraldton	Narrogin	Northam	Wooroloo	Manjimup	Claremont	Total 1963	Total 1962	1963 Increase
												%
Bacteriology—												
Tests	9,711	4,086	1,956	2,132	1,727	2,061	2,024	1,295	203	25,195	20,304	24·1
Unit Values	19,010	74,767	19,754	21,877	10,464	9,635	12,072	7,771	1,321	176,671	....	....
Haematology—												
Tests	8,564	10,082	1,785	4,831	4,043	5,642	4,047	3,181	759	42,934	35,666	20·4
Unit Values	39,513	60,982	11,798	29,263	20,298	26,568	17,898	12,724	2,738	221,782	....	....
Biochemistry—												
Tests	1,736	2,742	156	2,216	1,484	1,017	1,656	569	239	11,815	9,691	22·0
Unit Values	13,182	24,753	1,422	15,675	11,539	6,677	7,501	3,981	2,111	86,841	....	....
Total—												
Tests	20,011	16,910	3,897	9,179	7,254	8,720	7,727	5,045	1,201	79,944	65,661	21·8
Unit Values	71,705	160,502	32,974	66,815	42,301	42,880	37,471	24,476	6,170	485,294	420,434	15·4
Increase, 1963—												
Tests	45·2%	2·4%	....	37·6%	4·6%	73·8%	9·1%	Opened, August 1962	Opened, September 1963			
Unit Values	30·4%	....	....	55·4%	29·5%	68·7%	20·4%					

Table II

GENERAL MICROBIOLOGY AND MYCOLOGY—WORK DONE 1963

Work Done	Source				1963 Total	1962 Total	1963 Increase
	State	Commonwealth	Gairdner Hospital	Others			
							%
General Bacteriology :							
Animal Inoculations	21	....	....	....	21	176	....
Blood Specimens	464	94	81	8	647	902	....
C.S.F. Specimens	32	2	23	18	75	94	....
Faeces Specimens	563	....	30	....	593	121	5
Foodstuffs : Fresh	398	....	....	....	398	241	65·1
Foodstuffs : Frozen or Tinned	15	....	....	....	15	53	....
Sensitivity Tests	6,073	1,093	1,946	289	9,401	6,481	45·1
Serous Effusions	15	72	205	16	308	296	4·1
Sputum	315	1,955	3,152	38	5,460	3,324	64·3
Swabs, All Sources	870	605	1,030	229	2,734	2,266	20·7
Urine Examinations	818	1,520	2,728	445	5,511	2,769	99·0
Vaginal Specimens	424	17	....	....	441	418	5·5
Venereal Diseases	3,009	36	....	....	3,045	1,712	77·9
Water	407	5	....	....	412	207	99·0
Others	2,035	57	46	41	2,179	1,749	24·6
Total :							
Tests	15,459	5,456	9,241	1,084	31,240	20,809	50·1
Unit Values	129,936	36,595	62,069	7,168	235,768	171,403	37·6
Water and Sewerage Surveys :							
Tests	7,067	....	....	....	7,067	7,528	....
Unit Values	70,670	....	....	....	70,670	72,916	....
Mycology Examinations :							
Tests	10,481	....	....	....	10,481	7,154	46·5
Unit Values	66,233	....	....	....	66,233	44,688	50·2
Salmonella :							
Animal Inoculations	....	....	....	....	....	....	....
Blood Specimens	....	....	....	....	....	....	....
Faeces Specimens	2,500	....	....	....	2,500	2,218	12·7
Foodstuffs : Fresh	478	....	....	....	478	865	....
Foodstuffs : Frozen or Tinned	613	....	....	....	613	440	39·3
Fertilisers	60	....	....	....	60	1	....
Sensitivities	282	....	....	....	282	185	52·4
Sputum	13	....	....	....	13	....	....
Others	316	....	....	....	316	374	....
Total :							
Tests	4,262	....	....	....	4,262	4,083	4·4
Unit Values	67,240	....	....	....	67,240	68,071	....
GRAND TOTAL :							
Tests	37,269	5,456	9,241	1,084	53,050	39,547	34·1
Unit Values	334,079	36,595	62,069	7,168	439,911	357,078	23·2

Table IIA

AMPICILLIN SENSITIVITY

Organism	Number of Strains	Sensitive	Resistant
E. coli	200	123 (61·5%)	77
Proteus sp.	129	121 (93·8%)	8
K. aerogenes	51	16 (31·3%)	35
Staphylococcus aureus	102	65 (63·7%)	37
Enterococcus	56	53 (94·6%)	3
Coliform	61	27 (44·3%)	34
B. anitratum	14	2 (14·3%)	12
Ps pyocyanea	119	0	119

Table IIB

SENSITIVITY PATTERN OF PSEUDOMONAS PYOCYANEA

NUMBER OF STRAINS TESTED : 119

Antibiotic	Number of Strains Sensitive	Number of Strains Resistant
Colymycin	117 (98·3%)	2
Polymyxin	116 (97·5%)	3
Streptomycin	71 (59·6%)	48
Kanamycin	104 (87·4%)	15
Ampicillin	0	119

Table IIC

ENTEROCOCCUS AND K. AEROGENES SENSITIVITIES TO TETRACYCLINES

NUMBER OF STRAINS TESTED : 234 AND 231 RESPECTIVELY

Chlorotetracycline	Oxytetracycline	Tetracycline	Enterococcus Number 234	K. aerogenes Number 231
+	+	+	143 (61·1%)	163 (70·5%)
—	—	—	47 (20·0%)	54 (23·3%)
+	+	—	20 (8·1%)	3 (1·3%)
+	—	—	17 (7·2%)	8 (3·4%)
+	—	+	6 (2·4%)	2 (0·86%)
—	+	—	1 (0·4%)	....
—	—	+	....	1 (0·4%)

Table IID

SALMONELLA SEROTYPES, 1963

Salmonella Serotype	Human Source			Other Sources						Total
	Cases	Faeces	Blood	Egg Pulp	Pet Meat	Meat Meal	Blood and Bone Fertiliser	Animal Glands	Strains for Serotyping	
Salmonella typhi	3	13	1	....	....	....	....	....	3	17
Salmonella paratyphi A	1	2	....	....	....	....	....	....	1	3
Salmonella paratyphi B	4	4	....	....	....	....	....	....	1	5
Salmonella typhimurium	48	60	....	12	2	....	1	3	14	92
Salmonella senftenberg	8	10	....	....	....	3	1	....	....	14
Salmonella muenchen	8	8	....	....	3	7	....	....	1	19
Salmonella wandsworth	4	5	....	....	....	....	....	....	1	6
Salmonella anatum	3	3	....	4	....	3	2	....	1	13
Salmonella poona	4	9	....	....	....	....	....	....	....	9
Salmonella orientalis	4	10	....	....	....	....	....	....	....	10
Salmonella chester	2	2	....	....	4	1	....	3	....	10
Salmonella oranienburg	2	2	....	3	....	3	....	....	....	8
Salmonella brisbane	2	2	....	....	....	....	....	....	....	2
Salmonella onderstepoort	2	2	....	....	....	....	....	....	....	2
Salmonella bovis morbificans	1	1	....	....	....	....	....	....	1	2
Salmonella jangwani	2	2	....	....	....	....	....	....	....	2
Salmonella orion	1	1	....	....	4	....	....	....	1	6
Salmonella newington	1	1	....	....	....	....	3	....	....	4
Salmonella potsdam	1	1	....	....	1	....	....	....	....	2
Salmonella fremantle	1	1	....	....	....	....	....	....	....	1
Salmonella tennessee	1	1	....	....	....	....	....	....	....	1
Salmonella champagne	1	1	....	....	....	....	....	....	....	1
Salmonella hvittingfoss	1	1	....	....	....	2	....	3	1	7
Salmonella enteritidis	1	1	....	....	1	....	....	....	1	3
Salmonella blukwa	1	1	....	....	....	....	....	....	....	1
Salmonella derby	....	....	....	42	....	....	....	....	....	42
Salmonella pullorum	....	....	....	23	....	....	....	....	....	23
Salmonella give	....	....	....	2	....	3	1	....	....	6
Salmonella brisbane	....	....	....	....	....	....	....	....	1	1
Salmonella cholerae suis	....	....	....	....	....	....	....	....	1	1
Salmonella adelaide	....	....	....	....	6	1	1	....	....	8
Salmonella newport	....	....	....	....	....	....	....	....	1	1
Number of Strains	....	144	1	86	21	23	9	9	29	322

Table IIE

SHIGELLA ISOLATIONS AND SENSITIVITY RESULTS, 1963

Shigella Strains	Number of Strains	Total Tested	Strains Sensitive									
			Streptomycin	Chlorotetracycline	Oxytetracycline	Tetracycline	Chloramphenicol	Polymyxin B	Neomycin	Furoxone	Sulphadiazine	Ampicillin
Shigella sonnei	78	68	63	68	68	64	66	65	67	68	14	12(13)*
Shigella flexneri I	66	57	15	31	28	25	15	48	57	57	11	19 (19)
Shigella flexneri II	66	63	38	47	45	45	44	57	63	63	1	15 (15)
Shigella flexneri III	1	1	....	....	....	....	....	1	1	1	....	1 (1)
Shigella flexneri X	1	1	....	....	....	....	....	1	1	1	....	1 (1)
Shigella flexneri Y	1	1	1	1	1	1	1	....	1	1	....	....
Shigella boydii II	19	18	8	13	9	8	12	16	17	18	6	4 (4)
Total	232	209										(53)

* The figures in brackets indicate the number of strains tested for Ampicillin.

Table III

MICROBIOLOGY—TUBERCULOSIS SECTION—EXAMINATIONS IN 1963

Type of Examinations		1963 Total	1962 Total	1963 Increase
				%
Sputum :				
Direct Smears	42			
Centrifuged Deposits	13,955			
Cultures	13,955	28,162	30,569	....
Direct Guinea Pig Inoculations	210			
Gastric Contents :				
Centrifuged Deposits	220			
Cultures	728	1,490	1,094	36·2
Direct Guinea Pig Inoculations	542			
Laryngeal Swabs :				
Centrifuged Deposits	17			
Cultures	17	44	35	25·1
Direct Guinea Pig Inoculations	10			
Pleural Fluids :				
Sulas	....			
Centrifuged Deposits	143	427	331	29·0
Cultures	143			
Direct Guinea Pig Inoculations	141			
Bronchial Lavage :				
Centrifuged Deposits	204			
Cultures	204	562	395	42·3
Direct Guinea Pig Inoculations	154			
Cerebral Spinal Fluid :				
Centrifuged Deposits	10			
Cultures	10	30	50	....
Direct Guinea Pig Inoculations	10			
Urine :				
Centrifuged Deposits	521			
Cultures	518	1,469	1,344	9·3
Direct Guinea Pig Inoculations	430			
Miscellaneous :				
Centrifuged Deposits	1,480			
Cultures	1,454	3,410	854	4
Direct Guinea Pig Inoculations	476			
Smears for M. Leprae	4			
Virulence Tests	....	165	88	87·5
Sensitivity Tests	....	2,046	1,395	46·7
Total Examinations	....	37,809	36,155	(4·6)
Tests for improvement work carried out during the year of 1963 : (60121 units)	....	7,817	....	....
Total	....	45,626	36,155	26·2

Table IIIA

Infection due to M. bovis in the Northern Territory of Australia, including the occurrence of "unclassified" mycobacteria in animal glands

Animal	Number of Glands	M. bovis	Percentage	Group II	Percentage	Group III	Percentage	Group IV	Percentage
Cattle	57	20	35	2 (1)	3·5	....	....	....	....
Buffalo	35	30	85·6	....	....	3 (1)	8·5	....	....
Pig	66	16	24·2	9 (5)	13·6	8 (1)	12·1	1 (1)	1·5

Figures reported in brackets indicate the occurrence of a second pathogen : M. bovis in the same gland.

Table IIIB

UNCLASSIFIED MYCOBACTERIA ISOLATED FROM 477 PERSONS (GROUP III : 353 PERSONS)

Specimen	1955–1956			1957–1958			1959–1960			1961			1962				1963				Total
	Group			Group			Group			Group			Group				Group				
	II	III	IV	II	III	IV	II	III	IV	II	III	IV	I	II	III	IV	I	II	III	IV	
Sputum	....	....	18	3	13	2	24	341	14	21	388	31	5	12	311	17	8	28	347	12	1595
Bronchial Lavage	....	....	....	....	....	....	....	12	1	....	....	1	....	....	1	2	....	....	....	....	17
Laryngeal Swabs	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	2
Gastric Contents	....	1	26	2	1	8	4	22	2	1	4	2	....	....	5	....	....	....	2	1	81
Pus	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Urine	....	....	4	....	....	....	....	5	1	2	....	....	....	....	2	....	....	....	2	....	16
Resected Lung Tissue	....	....	....	....	....	....	....	3	....	....	2	....	....	....	1	....	....	....	2	....	8
Lung Tissue }	....	....	....	....	....	....	....	8	....	....	7	....	....	....	11	....	....	....	2	....	28
Lymph Node } Taken at P.M.	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Bone Marrow }	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....	2
Faeces	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	4	....	5
Pleural Fluid	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	1
Gland	....	....	....	....	....	....	....	3	....	....	....	....	....	2	3	....	....	....	3	....	11
Seminal Fluid	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	1
Total	....	1	48	5	15	10	28	398	18	24	404	34	5	14	334	19	8	28	363	13	1,769
Grand Total			49			30			444			462				372				412	1,769 (Gr. III, 1,515)

Table IV

MICROBIOLOGY—VIRUS SECTION—WORK DONE, 1963

	State	C'wealth	Gairdner Hospital	Others	1963 Total	1962 Total	1963 Increase
							%
Preparation of inocula	560	....	....	....	560	780	....
Tissue culture	6,689	....	....	....	6,689	10,966	....
Egg inoculation	1,735	....	....	....	1,735	4,944	....
Animal inoculation	3,566	....	....	....	3,566	3,904	....
Neutralisation	8,468	....	....	....	8,468	4,435	90·9
Haemadsorption	309	....	....	....	309	738	....
Haemagglutination and inhibition	1,615	....	....	....	1,615	2,292	....
Sterility tests	422	....	....	....	422	877	....
Others	278	....	....	....	278	1,283	....
Total :							
Tests	23,642	....	....	....	23,642	30,309	....
Unit Values	147,616	....	....	....	147,616	....	....

Table V

BIOCHEMISTRY DEPARTMENT—WORK DONE 1963

Work Done	Source				1963 Total	1962 Total	1963 Increase
	State	Commonwealth	Gairdner Hospital	Others			
							%
Serum/Plasma Tests	2,211	3,764	7,662	1,402	15,039	10,859	38·5
C.S.F. Tests	48	8	60	57	173	171	1·1
Gastric Contents	1	....	9	....	10	18	....
Effusions	44	18	123	....	185	125	48·0
Urine Examinations	72	35	240	20	367	386	....
Metabolic Tests	12	9	40	4	65	72	....
Others (including blood collection)	246	742	2,390	40	3,418	2,841	20·3
Total—							
Tests	2,634	4,576	10,524	1,523	19,257	14,472	33·1
Unit Values	24,753	50,650	86,599	17,331	179,333	137,819	30·1

Table VI

HAEMATOLOGY DEPARTMENT—WORK DONE 1963

Tests Done	Source				1963 Total	1962 Total	1963 Increase
	State	Commonwealth	Gairdner Hospital	Others			
Red Cells—							%
Total levels	409	344	276	339	1,368	1,891	....
Haematocrit	490	1,213	3,384	445	5,532	3,587	54·2
Absolute Values	1,290	1,896	3,884	1,113	8,183	7,297	12·1
Sedimentation	410	956	2,311	346	4,023	2,860	40·7
Film Examination	490	1,168	3,284	386	5,328	3,493	52·5
Fragility Tests	1	....	3	....	4	7	....
Reticulocytes	3	15	296	1	315	184	71·2
Stipple Cells	....	1	1	....	2	....	....
Hb. Levels	496	1,213	3,373	452	5,534	4,185	32·2
White Cells—							
Total	487	1,259	3,401	390	5,177	3,329	55·5
Differential	474	1,256	3,029	343	5,102	3,237	57·6
L.E. Cells	10	20	55	3	88	89	....
Blood Grouping—							
Major	96	72	899	491	1,558	1,263	23·4
Minor	96	72	899	491	1,558	1,263	23·4
Compatibility	....	79	1,388	....	1,467	1,002	46·4
Rh Antibodies	59	18	2	418	497	352	41·2
Bone Marrow Examination	12	10	31	3	56	39	43·6
Coagulation Tests—							
Prothrombin Time	93	542	1,131	125	1,891	1,243	52·1
Bleeding Time	4	7	34	2	47	53	....
Clotting Time	4	19	42	3	68	58	17·2
Clot Retraction	4	6	29	1	40	17	135·3
Others (including Blood Collection)	721	1,022	3,957	359	6,059	6,428	....
Totals—							
Tests	5,649	11,188	31,349	5,711	53,897	41,877	28·7
Unit Values	19,816	38,282	115,645	23,555	197,298	154,416	27·8

Table VII

SEROLOGY DEPARTMENT—WORK DONE 1963

Work Done	Source				1963 Total	1962 Total	1963 Increase
	State	Commonwealth	Gairdner Hospital	Others			
							%
Treponemal Tests	25,138	2,113	....	....	27,251	23,345	16·7
Gonococcal Tests	2,401	298	....	....	2,699	2,590	4·2
Hydatid Tests	118	12	....	....	130	66	97·0
Bacterial Agglutinations	5,546	443	....	....	5,989	6,535	....
Rheumatic Tests	1,647	1,050	19	172	2,888	1,478	95·4
Leptospiral Tests	1,612	10	....	....	1,622	2,285	....
Viral, Rickettsial and Protozoal Tests	6,325	598	....	....	6,923	3,721	86·1
Hormone Tests	503	18	13	1,593	2,127	1,474	44·3
Medico-Legal Tests	1,450	....	....	....	1,450	714	103·1
Others	531	46	....	....	577	533	8·3
Totals—							
Tests	45,271	5,488	32	1,765	51,656	42,741	20·9
Unit Values	250,230	28,325	430	18,780	297,765	226,763	31·3

Table VIII

HISTOPATHOLOGY DEPARTMENT—WORK DONE 1963

Work Done	Source				1963 Total	1962 Total	1963 Increase
	State	Commonwealth	Gairdner Hospital	Others			
							%
Exfoliative Cytology	2,317	987	2,827	2,275	8,406	3,072	172·6
Autopsies	99	....	....	....	99	75	32·0
Biopsies (including sections C.I.B. P.M. and hearts)	6,687	1,362	1,129	2,381	11,559	14,069	....
Others	723	8	34	18	783	784	....
Total :							
Tests	9,826	2,357	3,990	4,674	20,847	18,000	15·83
Unit Values	146,949	27,459	37,159	51,910	263,477	174,417	51·1

Appendix III

TUBERCULOSIS CONTROL BRANCH

By Dr. F. G. B. Edwards

The main statistical table (Table 1) shows that notifications of pulmonary disease per 100,000 population, at 27·9, were slightly below the previous lowest figure (28·4) reached in 1961. Cases on the Register have declined by 115. The death rate (1·7) for all forms of the disease was at the lowest level ever recorded.

NOTIFICATIONS TO THE TUBERCULOSIS REGISTER

The 244 notifications were classified according to the form of disease and infecting organism as follows :—

Form	Human Tuberculosis	Bovine Tuberculosis	Atypical (anonymous) Mycobacteria
Pulmonary (adult type)	186	1	25 { Group II—2; Group III—22; Mixed I and III—1
Pulmonary (childhood type)	2	....	....
Pleurisy with effusion	2	....	....
Non-Pulmonary :			
Glands	12	....	4—All Group III
Urogenital	6	....	....
Bone and Joint	3	....	....
Miliary	1	....	....
Meningitis	1	....	....
Soft Tissue Abscess	1	....	....

There was a rise in the number of patients notified with progressive disease due to atypical mycobacteria, from five per cent. of total notifications in 1962 to 12 per cent. in 1963 ; out of the total 29 notified in 1963, 23 were new cases, and there were six re-notifications due to reactivation.

SOURCE OF NOTIFICATIONS

Graph No. 1 shows the position compared with that of the previous year. There was an increase in the proportion of cases discovered through Chest Clinic activity and Mass Compulsory Surveys, at the expense of private practitioners' figures. This was without doubt the result of more intensive follow-up of patients through clinic records and increased efforts to make mass compulsory community surveys as thorough as possible. Although the yield of cases originating from private practitioners is falling, the number of patients referred by them to the clinics has not shown any significant decrease. It is likely that this trend which is probably linked with the relatively high proportion of patients now being diagnosed with minimal symptomless tuberculosis, will continue.

STATE OF THE REGISTER

The Register was again completely audited, i.e., Register cards were checked against all case histories to ensure that proper follow-up had been carried out. As a result, 387 patients were removed from the Register, 63 on account of death, 15 having left the State, and 309 because they were considered sufficiently controlled. Table 4 shows the actual state of the Register at the end of the year.

DEATHS

The 13 classified tuberculosis deaths were caused by :—

Progressive pulmonary infection, due to—	
(a) M. Tuberculosis	4
(b) Atypical mycobacteria, Group III	1
Miliary tuberculosis	1
Cor pulmonale with extensive fibrosis due to old healed tuberculosis	7

PATIENTS REQUIRING RE-TREATMENT

Twenty-eight patients were admitted to hospital for re-treatment. Possible factors relevant to their breakdown were :—

(a) Previously had rest treatment only	2
(b) Previously treated with artificial pneumothorax only	4
(c) Inadequate chemotherapy previously prescribed with or without other treatment	13
(d) Failed to take drugs at home	4
(e) Severe concurrent disease (e.g., Ca. of lung)	2
(f) Too early discharge from hospital	1
(g) Previously had atypical disease	1
Total	27

It is significant that only one patient who broke down had had adequate chemotherapy by present-day standards. All those whose breakdown was ascribed to the prescribing of inadequate chemotherapy regimes had received their initial treatment in the 1950–55 period before the principle of two years continuous drugs was established.

Thirteen patients who had previously been on the Register without receiving treatment were re-notified and admitted to hospital as initial treatment cases.

TUBERCULOSIS IN CHILDREN

Thirteen, i.e., five per cent. of total notifications were in the 0–14 age group. These were due to—

Primary T.B.	1
Gland Infections	12

Cultures of Battey bacilli (atypical Group III) were obtained from glands in four of these young patients, but in none was M.T.B. isolated. It is probable that the great majority of caseating glands occurring in this State are due to atypical mycobacteria. These infections are always localized to one glandular group, and usually to a single gland, and rarely recur after surgical excision, which is the usual line of treatment. Acid-fast bacilli are almost invariably seen on microscopic examination of the excised gland, or on direct examination of a smear, but the organisms frequently cannot be cultured.

Child reactors to the Heaf gun test, amongst the non-B.C.G. vaccinated, ranged from 1·5 per cent. in the 0–4 age group to 13·5 per cent. in the 10–14 group. This is well above the expected levels considering the low notification rate and suggests a high incidence of cross sensitivity to other mycobacteria.

An extensive programme of simultaneous skin testing of school children with various antigens was continued during the year, in the hope that a consistent pattern will emerge which will enable us to estimate the true tuberculosis sensitivity rate in younger age groups.

MINING AREAS

There were 29 notifications (including two re-notifications and 21 bacillary positive cases) in the area supervised by the Kalgoorlie Chest Clinic. Two children had lymphadenitis and one a primary lesion. Seventeen miners were notified, 13 being complicated by silicosis, and one by mixed silicosis and asbestosis ; two miners had silicosis with Battey disease. Tuberculosis and new silicosis and asbestosis cases amongst miners showed increases over the previous year, and the need for continued close care of this high risk group is plain.

Only a small proportion of new entrants to the mining industry remain in it for long. Miners are an ageing population now mainly concentrated in the Kalgoorlie-Boulder area, and it is in these that nearly all tuberculosis cases appear. No sources of infection were discovered amongst contacts of new cases, suggesting that the disease is the result of endogenous reactivation, probably under the influence of silica. Unfortunately there is no evidence that aluminium therapy has a preventive effect in silicosis.

BACTERIOLOGY

Seventy-five per cent. of notified cases were bacillary positive on initial investigation.

Drug Resistance

Table 12 shows those patients whose organisms were found to be resistant to standard drugs—excluding atypical cases. Nineteen per cent. of all patients who produced positive cultures for M. Tuberculosis showed resistance to at least one drug. Ten were classed as chronic positive resistant and this was the sum total of chronic resistant patients in the State at the end of the year ; four of them were in hospital and the remaining six under close domiciliary supervision.

Five cases showed primary resistance—four to Streptomycin alone and one to P.A.S. alone. All converted on drug therapy without any difficulty. This was the first year in which primary resistance of any significance was noted.

SECOND LINE DRUGS IN THE TREATMENT OF PULMONARY TUBERCULOSIS

An analysis of the result of treatment of patients discharged from hospital during the year—excluding those with progressive atypical disease or non-pulmonary lesions—shows the following :—

The first group of 14 patients consisted of those receiving at least one second line drug as a substitute for a first line drug because of sensitivity reaction or side effects (usually Isoxyl as substitute for P.A.S.). In this group—

On admission, 11 were bacillary positive, three were negative.

On discharge, none were bacillary positive, 14 were negative.

It is possible, however, that the good results of treatment in this group were due to the remaining first line drugs used, not to Isoxyl.

The second group, also 14 patients, consisted of re-treatment cases, all bacillary positive and resistant on admission and who received at least one second line drug. At the time of discharge, three of these were bacillary positive, eight were negative ; three died in hospital while under treatment.

Isoxyl appears to be of doubtful value, and its use in initial treatment would be highly inadvisable.

ATYPICAL (ANONYMOUS) MYCOBACTERIA

Table 11 shows that a large number of isolations of these organisms are still being made. As already mentioned, 29 patients were notified as suffering from true atypical infection (23 new cases, six reactivated cases). The tendency is for patients with early progressive atypical disease to respond to first line drugs, even though the organisms which are persistently excreted are invariably fully resistant to these drugs. On the other hand, improvement could be largely due to hospitalization and rest. In selected cases, lung resection gives good results.

MASS COMPULSORY SURVEYS

Metropolitan

The third metropolitan compulsory survey was completed on 10th July, 1963. During 1963 the following areas were surveyed :—

City of Perth (Victoria Park and Carlisle Wards).

City of South Perth.

Shire of Belmont.

Shire of Canning.

Table 8 shows the result in terms of tuberculosis rates. The somewhat higher rate amongst those who attended for X-ray after being written to following electoral roll check is interesting although not necessarily significant. The overall rate of 0·52 per thousand films compares with the rate in the second metropolitan survey of 1957 (0·7 per thousand films) and the first survey in 1954 (1·4 per thousand films).

The total attendance represented an 83 per cent. cover of the population which was required to be X-rayed, i.e., all persons of 21 years of age and over. Most of the remaining 17 per cent. produced evidence of having had previous X-rays within the preceding 12 months.

Country

In July, survey of country areas was begun and was conducted on the same basis, i.e., continuous check of attenders against electoral rolls. The areas covered were :—

Town of Geraldton.

Shire of Geraldton-Greenough.

Shire of Chapman Valley.

Shire of Northampton.

Shire of Mullewa.

Shire of Irwin.

Town of Bunbury.

Shire of Dardanup.

Shire of Capel.

Shire of Busselton.

Shire of Harvey.

Shire of Gosnells.

Shire of Armadale-Kelmscott.

Shire of Kalamunda.

Shire of Mundaring.

The active tuberculosis rate to 31st December, 1963 (in a total of 41,000 persons attending) was 0·39 per thousand micro-films.

PERSONS BORN OUTSIDE AUSTRALIA

As in previous years, the notification rate in this group was more than twice as great as in the Australian born, and there was a rather high incidence amongst those of British, Italian, Polish and Yugoslav origin (Tables 5 and 6). British-born full fare passengers again contributed their quota of new notifications as shown in Table 7. A great deal of effort is being made to have as complete an X-ray cover of new arrivals as possible, although there are many difficulties in tracing these people to their West Australian addresses. Forty-seven per cent. of arrivals attended for X-ray, as against 24 per cent. in 1962, but no allowance has been made in these figures for a large number of returning Australians who were not designated as such in the passenger lists supplied to the Branch.

DOMICILIARY CHEMOTHERAPY

The visiting Sisters have graded patients having drugs at home as at 31st December, 1963, as follows :—

Reliable drug takers	185
Fair drug takers	45
Poor drug takers	15
Total	245

The usual difficulties in ensuring adequate drug therapy are encountered amongst these patients. None were started on domiciliary chemotherapy without a preliminary extended period of hospital treatment.

ADMISSIONS AND DISCHARGES

Admissions to and discharges from tuberculosis beds during the year (including Repatriation beds) were :—

	Admitted	Discharged
Investigation cases	386	344
Pulmonary disease—		
M. Tuberculosis	196	213
Atypical	30	25
Non-pulmonary disease	20	19
Total	632	601

These figures illustrate the extensive use of hospital beds for investigation of persons with suspicious lung shadows. This is convenient and even essential where patients live in the more inaccessible country areas, where special investigation would be impossible.

Investigation patients remain in hospital on an average for one month, those with minimal pulmonary tuberculosis for four months, moderate cases for six months, and advanced cases for over a year. One can thus at least be certain of adequate drug therapy over this period. As already indicated, very few patients have to be admitted for re-treatment after an extended initial period in hospital followed by adequate domiciliary therapy to a total of two years.

SUMMARY

The case rate has remained fairly constant for the last three years.

Progressive atypical disease has risen from 5 per cent. to 12 per cent. of the total cases.

The mortality rate is the lowest on record.

The notification rate in young children is very low, apart from mycobacterial gland infections, the majority of which are probably due to atypical bacilli.

The yield from Mass Compulsory Community Surveys continues to be about one for every 2,000 miniature films.

For the first time there has been a significant incidence of primary resistance, mainly to Streptomycin.

The incidence of tuberculosis amongst persons born outside Australia continues to be more than twice that in the Australian-born.

Pulmonary disease amongst miners will need careful watching.

Table 1

TUBERCULOSIS—MAIN STATISTICAL FIGURES

Year	Mean Population 1,000s.	Notifications				No. on Register (Pulm.) at 31st Dec.	No. on Register per 100,000 (Pulm.)	Number Receiving T.B. Allowance at 31st Dec.	Deaths			Death Rate per 100,000	
		Pulm. (incl. Pleural effus.)	Non-Pulm.	Total	Pulm. per 100,000				Pulm.	Non-Pulm.	Total	Pulm.	All Forms
1950	558	586	18	604	104·8	2,100	376	515	125	3	128	22·4	22·9
1951	580	467	37	504	80·4	2,402	413	474	76	6	82	13·1	14·1
1952	601	508	49	557	84·5	2,574	428	396	75	7	82	12·5	13·6
1953	621	378	34	412	60·6	2,762	445	361	43	3	46	6·9	7·4
1954	640	348	34	382	54·3	2,769	432	326	57	4	61	8·9	9·5
1955	659	413	39	452	62·7	2,965	450	330	31	2	33	4·7	5·0
1956	677	424	44	468	62·6	2,900	428	264	43	3	46	6·3	6·8
1957	692	332	32	364	47·9	2,786	403	198	36	1	37	5·2	5·3
1958	706	355	24	379	50·3	2,726	386	213	22	4	26	3·1	3·4
1959	726	320	34	354	44·1	2,684	369	182	24	....	24	3·3	3·3
1960	731	296	34	330	40·5	2,388	327	148	29	1	30	4·0	4·1
1961	737	209	41	250	28·4	1,349	183	89	18	1	19	2·4	2·6
1962	755	243	25	268	32·2	1,333	177	90	24	4	28	3·2	3·7
1963	773	216	28	244	27·9	1,218	158	92	13	....	13	1·7	1·7

Table 2

ANNUAL NOTIFICATIONS OF PULMONARY TUBERCULOSIS SHOWING STAGE OF DISEASE*

Year	Parenchymal Disease						Pleural Effusion		Total
	Minimal		Moderately Advanced		Advanced				
		%		%		%		%	
1952	122	24·0	275	54·1	101	19·9	10	2·0	508
1953	98	25·9	210	55·5	65	17·2	5	1·4	378
1954	96	27·6	178	51·1	74	21·3	....	....	348
1955	111	26·9	225	54·5	64	15·5	13	3·1	413
1956	127	38·0	217	51·1	72	17·0	8	1·9	424
1957	102	30·7	163	49·1	61	18·4	6	1·8	332
1958	91	25·6	187	52·7	72	20·3	5	1·4	355
1959	103	32·2	151	47·2	55	17·2	11	3·4	320
1960	89	30·1	144	48·6	49	16·6	14	4·7	296
1961	90	43·1	73	34·9	34	16·3	12	5·7	209
1962	117	48·1	84	34·6	36	14·8	6	2·5	243
1963	99	45·8	89	41·2	26	12·0	2	1·0	216

* Classified according to Diagnostic Standards N.T.A.

Table 3

TUBERCULOSIS NOTIFICATIONS FOR THE YEAR ENDED 31st DECEMBER, 1963

Showing Age, Sex, Form and Stage of Disease

Age Group	Males					Females					Persons					Total
	Pulmonary			Non-Pulm.	Pleur. Effus.	Pulmonary			Non-Pulm.	Pleur. Effus.	Pulmonary			Non-Pulm.	Pleur. Effus.	
	Min.	Mod.	Adv.			Min.	Mod.	Adv.			Min.	Mod.	Adv.			
0– 4	....	....	....	2	....	1*	....	....	6	....	1	....	....	8	....	9
5– 9	....	....	....	2	....	....	....	....	1	....	....	....	....	3	....	3
10–14	....	....	....	1	....	....	....	....	....	....	....	....	....	1	....	1
15–19	3	....	1	1	....	....	....	....	....	....	3	....	1	1	....	5
20–24	3	....	....	1	....	....	2	2	....	....	3	2	2	1	....	8
25–29	1	2	1	1	....	4*	3	1	....	....	5	5	2	1	....	13
30–34	3	7	1	1	1	2	2	....	2	....	5	9	1	3	1	19
35–39	11	5	....	....	....	2	2	1	1	1	13	7	1	1	1	23
40–44	11	6	2	....	....	1	2	....	....	....	12	8	2	....	....	22
45–49	5	2	2	1	....	2	1	1	....	....	7	3	3	1	....	14
50–54	14	6	....	1	....	....	3	1	1	....	14	9	1	2	....	26
55–59	13	9	1	1	....	3	1	....	1	....	16	10	1	2	....	29
60–64	8	4	4	....	....	....	2	....	1	....	8	6	4	1	....	19
65–69	5	8	1	....	....	....	2	1	....	....	5	10	2	....	....	17
70–74	4	9	....	....	....	1	....	....	1	....	5	9	....	1	....	15
75+	2	11	4	2	....	....	....	2	....	....	2	11	6	2	....	21
Total	83	69	17	14	1	16	20	9	14	1	99	89	26	28	2	244

* Includes 1 Primary.

Table 4

ANALYSIS OF REGISTER AS AT 31st DECEMBER, 1963

A. Pulmonary Tuberculosis
(excluding Pleural Effusions)

Activity	Number on Register according to original extent of lesions			Total
	Minimal	Moderate	Advanced	
Active	81	98	36	215
Quiescent—				
0–1 year	....	2	2	4
1–2 years	....	2	1	3
2–3 years	1	....	2	3
3–4 years	....	1	1	2
4–5 years	....	3	3	6
5+ years	....	1	....	1
Inactive—				
0–1 year	77	60	21	158
1–2 years	76	55	25	156
2–3 years	76	82	25	183
3–4 years	67	108	32	207
4–5 years	74	125	33	232
5+ years	1	10	7	18
Total	453	547	168	1,188

B. Pleural Effusions	30
C. Non-Pulmonary Tuberculosis	101
Total (all forms)	1,319

Table 5

WESTERN AUSTRALIA: TUBERCULOSIS INCIDENCE BY COUNTRY OF BIRTH, 1958–1963: MALES

Country of Birth	Population at June 30, 1961: Thousands (Census)	Incidence per Thousand Persons						Total Notifications, 1958–1963
		1958	1959	1960	1961	1962	1963	
United Kingdom and Republic of Ireland	44·4	1·53	0·89	1·00	0·92	0·93	0·66	265
Germany	2·7	....	....	0·74	0·74	0·37	....	5
Greece	2·3	3·33	1·36	0·45	0·87	0·87	0·43	16
Italy	14·9	1·18	1·00	1·51	1·01	0·91	0·70	92
Netherlands	6·2	0·71	0·17	0·17	0·16	0·64	0·31	13
Poland	2·8	1·72	2·76	1·79	2·50	0·33	1·85	31
Yugoslavia	3·6	2·72	2·94	2·85	1·39	1·08	1·58	44
Other European	5·7	1·90	0·17	0·86	1·40	1·05	0·70	35
Other Birthplaces	8·1	1·45	1·04	2·02	0·86	1·09	1·19	61
Total non-Australian-born	90·7	1·48	0·95	1·19	0·97	0·89	0·74	562
Australian-born*	284·8	0·51	0·62	0·49	0·30	0·37	0·34	750

* Full-blood aborigines excluded.

Table 6

WESTERN AUSTRALIA: TUBERCULOSIS INCIDENCE BY COUNTRY OF BIRTH, 1958–1963: FEMALES

Country of Birth	Population at June 30, 1961: Thousands (Census)	Incidence per Thousand Persons						Total Notifications, 1958–1963
		1958	1959	1960	1961	1962	1963	
United Kingdom and Republic of Ireland	38·9	0·57	0·47	0·41	0·23	0·29	0·31	88
Germany	2·9	0·71	0·36	....	0·34	....	0·34	5
Greece	1·8	0·62	0·59	....	0·55	0·52	0·50	5
Italy	10·3	0·48	0·55	0·31	0·68	0·27	0·26	25
Netherlands	5·0	....	0·22	0·21	....	0·39	....	4
Poland	1·9	1·00	2·63	0·53	0·53	0·56	....	10
Yugoslavia	2·3	0·50	0·95	0·45	....	1·67	1·60	12
Other European	4·0	0·51	1·25	1·50	0·75	0·73	....	19
Other Birthplaces	6·6	0·82	0·16	0·31	0·45	0·29	0·14	14
Total non-Australian-born	73·7	0·56	0·55	0·42	0·34	0·36	0·29	182
Australian-born*	287·4	0·25	0·21	0·19	0·16	0·16	0·13	313

* Full-blood aborigines excluded.

Table 7

SHOWING NOTIFICATIONS OF BRITISH FULL-FARE PAYING PASSENGERS

Year of Notification	Persons Notified				Total
	Within One Year of Arrival	One to Five Years after Arrival	Five to Ten Years after Arrival	More than Ten Years after Arrival	
1958	1	6	3	59	69
1959	4	1	6	32	43
1960	1	1	4	44	50
1961	2	2	3	35	42
1962	2	2	1	24	29
1963	2	....	1	13	16
Total	12	12	18	207	249

Table 8

THIRD MASS COMPULSORY METROPOLITAN SURVEY
(Complete Figures)

——	Persons X-rayed	Active Tuberculosis	Tuberculosis rate per 1,000 micro films	Carcinoma of Lung
Attended survey within the specified times	186,897	94	0·50	63
Attended later following electoral roll check	23,845	15	0·63	3
Total	210,742	109	0·52	66

Table 9

THIRD MASS COMPULSORY METROPOLITAN SURVEY, COMPLETE FIGURES, ACTIVE TUBERCULOSIS—NOTIFICATIONS

Age Group	Attended Survey within the Specified times	Attended later following electoral roll check
15–19	1	....
20–24	3	....
25–29	1	3
30–34	10	2
35–39	7	....
40–44	9	2
45–49	9	1
50–54	12	1
55–59	14	1
60–64	6	....
65–69	7	....
70–74	4	2
75+	11	3
Total	94	15

Table 10

SHOWING RESULTS OF PERIODICAL EXAMINATION OF MINE WORKERS

Year	Total No. of Examinations	Silicosis Cases Examined	New Cases of Silicosis	New Cases of Asbestosis	New Cases of Pulmonary Tuberculosis
1950	6,203	349	14	....	12
1951	5,721	305	13	....	12
1952	5,959	294	9	....	12
1953	5,312	356	80	....	3
1954	6,179	487	158	....	16
1955	5,506	497	70	....	5
1956	5,476	474	30	....	9
1957	4,811	483	34	....	10
1958	6,286	582	54	....	8
1959	7,269	569	71	....	10
1960	7,385	530	50	....	12
1961	7,882	551	57	4	7
1962	7,572	566	50	2	7
1963	7,504	676	188	5	17

Table 11

SHOWING PATIENTS FROM WHOM ATYPICAL (ANONYMOUS) MYCOBACTERIA WERE ISOLATED IN 1963

Runyon Group	Casual Isolations	Intermittent Isolations	Persistent Isolations		Total
			True Atypical Disease	Other	
I	....	....	....	....	....
II	7	....	2	....	9
III	56	....	26	3	85
IV	9	....	....	1	10
Mixed I and III	....	....	1	....	1
Total Patients	72	....	29	4	105

Table 12

SHOWING PATIENTS RESISTANT TO STANDARD DRUGS IN 1963
(Mycobacterium Tuberculosis only)

Resistant to	No. of Patients	Status at 31/12/63				
		Bacillary —ve	Bacillary +ve., still under treatment	Bacillary +ve., chronic resistant	Died from T.B.	Died from other causes
Streptomycin alone	6 (3·2%)	4	1	1	....	....
P.A.S. alone	1 (0·5%)	1	....	....	....	....
Isoniazid alone	3 (1·6%)	....	1	....	1	1
Two drugs	10 (5·4%)	1	2	3	1	3
Three drugs	15 (7·6%)	5	2	6	1	1
Total	35 (19·0%)	11	6	10	3	5

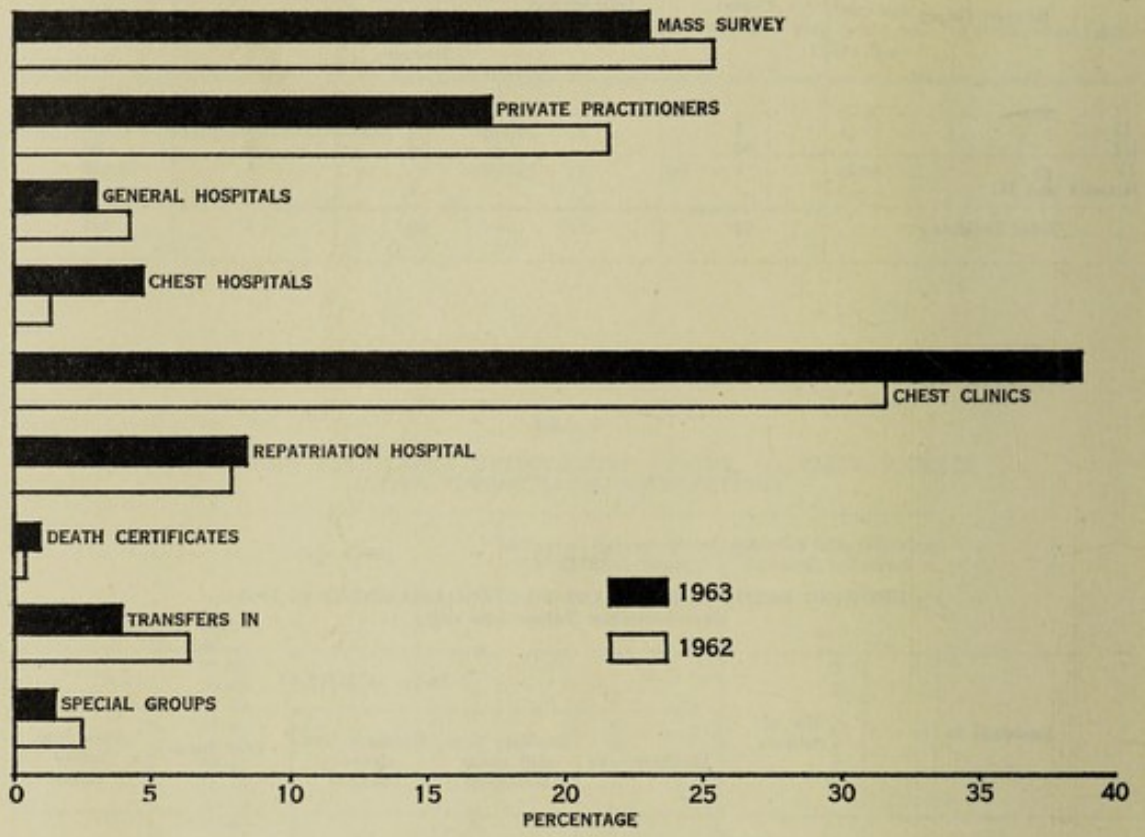
Table 13

SHOWING RESULTS OF TREATMENT OF PATIENTS WITH PROGRESSIVE ATYPICAL DISEASE

Treatment	Status at 31/12/63			Total
	Bacillary —ve	Bacillary +ve	Dead	
None	....	4	1	5
1st Line Drugs	3	3	....	6
2nd Line Drugs	1	3	....	4
Lung Resection	5	....	....	5
Gland Resection	3	....	....	3
Total	12	10	1	23

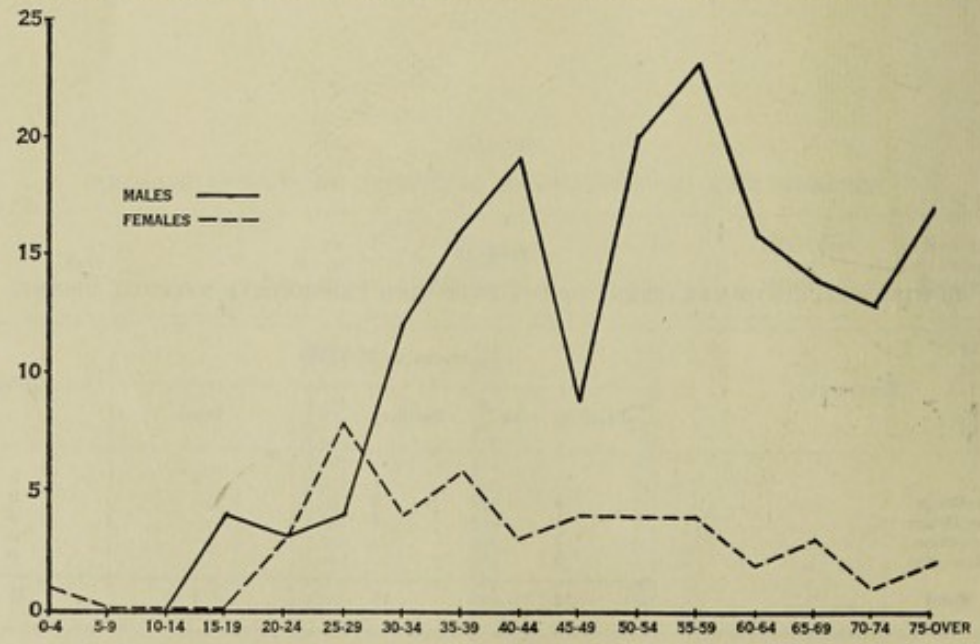
No. 1

GRAPH SHOWING THE SOURCE OF NOTIFICATION OF CASES OF PULMONARY TUBERCULOSIS AS PERCENTAGE OF TOTAL NOTIFICATIONS



No. 2

GRAPH SHOWING AGE DISTRUBUTION OF PULMONARY TUBERCULOSIS CASES NOTIFIED IN 1963



Western Australia

PULMONARY TUBERCULOSIS

Year	Population in 1,000s	Notifications Received	Incidence Rate per 100,000 Population	Deaths Registered	Mortality Rate per 100,000 Population
1911	287	259	90·2	190	66·2
1912	301	429	142·5	220	73·1
1913	313	424	135·5	206	65·8
1914	323	353	109·3	229	70·9
1915	321	336	104·7	233	72·6
1916	313	511	163·5	225	71·9
1917	306	464	151·6	217	70·9
1918	308	432	140·5	245	79·5
1919	320	467	145·9	289	91·6
1920	330	442	133·9	259	78·4
1921	334	424	126·9	277	82·9
1922	341	387	113·8	256	75·1
1923	351	361	102·8	216	61·5
1924	363	381	104·6	228	62·8
1925	373	403	108·4	259	69·4
1926	381	415	108·2	252	66·1
1927	392	409	104·3	231	56·4
1928	408	395	96·8	282	69·1
1929	421	400	95·0	245	53·4
1930	429	569	132·6	218	50·8
1931	432	372	86·1	223	51·6
1932	435	339	77·9	203	46·7
1933	439	295	67·2	207	47·2
1934	442	287	64·9	218	49·3
1935	447	270	60·4	210	47·0
1936	452	338	74·8	193	42·7
1937	457	239	53·0	172	37·6
1938	464	247	53·2	177	38·1
1939	470	202	43·0	179	38·1
1940	473	231	48·8	181	38·3
1941	474	154	32·5	185	39·0
1942	477	113	23·7	175	36·7
1943	477	273	57·3	144	30·2
1944	481	219	45·4	134	27·9
1945	488	271	55·5	149	30·5
1946	493	343	69·6	163	33·1
1947	502	372	74·0	128	25·4
1948	515	325	63·1	157	30·5
1949	533	499	93·6	123	23·1
1950	558	586	104·8	129	23·1
DEATH CLASSIFICATIONS ACCORDING TO 6TH (1948) INTERNATIONAL LIST.					
1950	558	586	104·8	125	22·4
1951	580	467	80·4	76	13·1
1952	601	508	84·5	75	12·5
1953	621	378	60·6	43	6·9
1954	640	348	54·3	57	8·9
1955	659	413	62·7	31	4·7
1956	677	424	62·6	43	6·3
1957	692	332	47·9	36	5·2
1958	706	355	50·3	22	3·1
1959	726	320	44·1	24	3·3
1960	731	296	40·5	29	4·0
1961	737	209	28·4	18	2·4
1962	755	243	32·2	24	3·2
1963	773	216	27·9	13	1·7

Appendix IV

Report of the Physician, Pulmonary Function Laboratory

By Dr. F. E. Heymanson

The total of the year's work continues to increase as in the past. The regular increment each year is shown graphically in Figures 1, 2 and 3. The table shows all procedures carried out during the twelve months.

The time appears now to have arrived when a re-appraisal of the operation and policy of this laboratory is necessary. Such a re-appraisal must be made within the limits of the broad purpose of a pulmonary function laboratory which may be defined as that of determining the type and degree of cardiopulmonary defect and establishing a functional pattern in the individual patient. Up to the present time, there has been a heavy emphasis on the respiratory aspect with only occasional and indirect contact with the more purely cardiac investigations. This is unfortunate and must be recognised as an artificial breaking-up of the natural unity and mutual dependence of heart and lung funtion. The clinician is well aware that heart and lung symptoms and signs go hand in hand and it is obvious that functional changes must be similarly joined.

With the foregoing in mind, a memorandum to the Board of the Sir Charles Gairdner Hospital recommended the acquisition of further equipment with the dual purpose of extending the range of available investigations and also making it possible in collaboration with Dr. W. G. Smith for the laboratory to function more effectively as a cardiopulmonary laboratory.

The memorandum also stated that " in a small laboratory with a correspondingly small staff, the main limiting factor in providing service is the speed with which a procedure may be carried out. Long procedures can only be carried out occasionally . . . . Since the inception of this laboratory, there has been a continuous increase in the work done and the number of available procedures." This has been possible largely as a result of an increasing technical efficiency developed by practice on the part of myself and my assistant, Mrs. B. Tweed. In effect, we have learned our job by doing it. This process has however about reached its limit and if the equipment mentioned above is acquired, an extra assistant will be necessary. In this connection, it is worth mentioning that up to the present time, all instrumental maintenance other than repair or modification has been carried out by my assistant and myself. This is time consuming, but until there is justification for a much larger establishment, I can see no reasonable alternative.

With growth of the State's population and a corresponding increase in medical facilities, it can be anticipated that the demand on the laboratory's services will enlarge proportionately. I do not anticipate a sudden change but rather a slow acceleration of the current increase. For the present, the recommendations referred to earlier should be sufficient.

In conclusion, I would like to express my appreciation of the happy relations existing with Dr. Elphick, Matron Anstey and all the members of the Sir Charles Gairdner Hospital.

Table 1

ALL INVESTIGATIONS FOR THE YEAR 1963

Spirometer tests	672
Estimation arterial blood oxygen saturation	53
Estimation arterial blood carbon dioxide tension	53
Estimation mixed venous carbon dioxide tension	27
Alveolar carbon dioxide tension	4
Measurement blood pressure with intra-arterial needle	4
Exercise electrocardiograms	12
Exercise tolerance test	1
Gas exchange estimation	48
Helium clearance	3
Out-patient positive pressure treatments	98

FIG. I

ALL TESTS

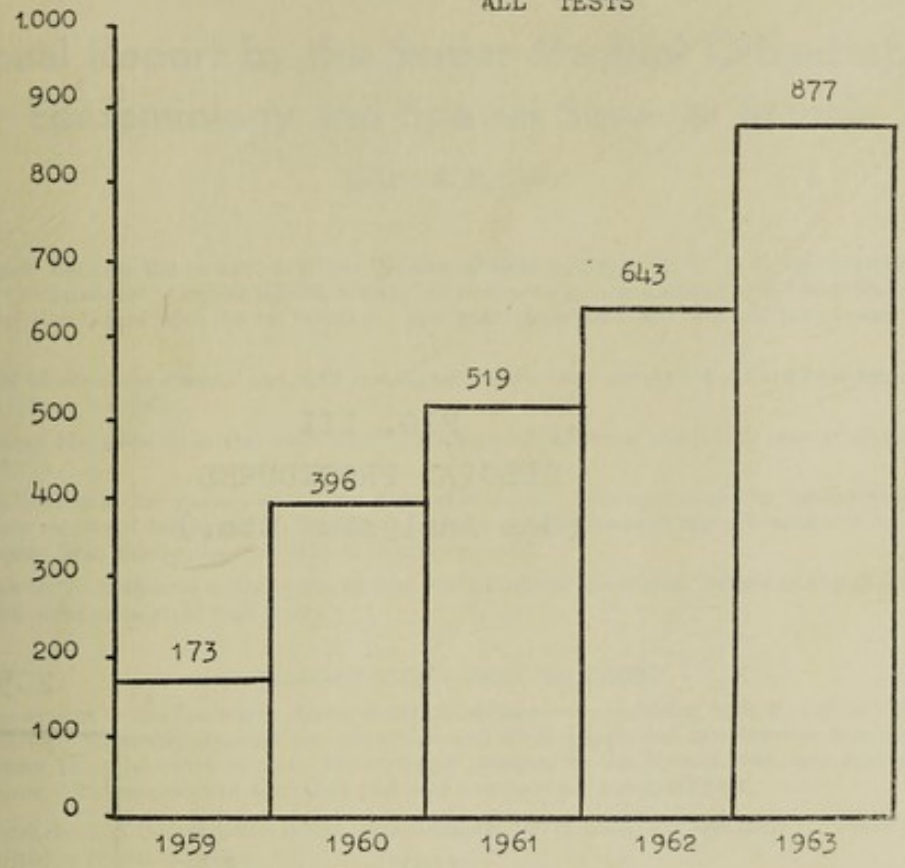


FIG. II

SPIROMETRIES

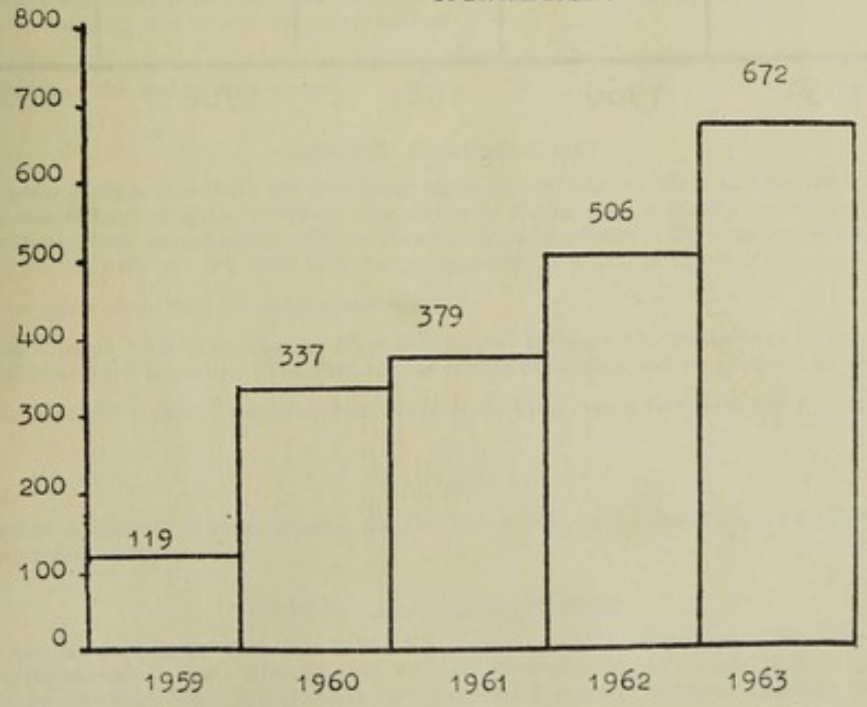
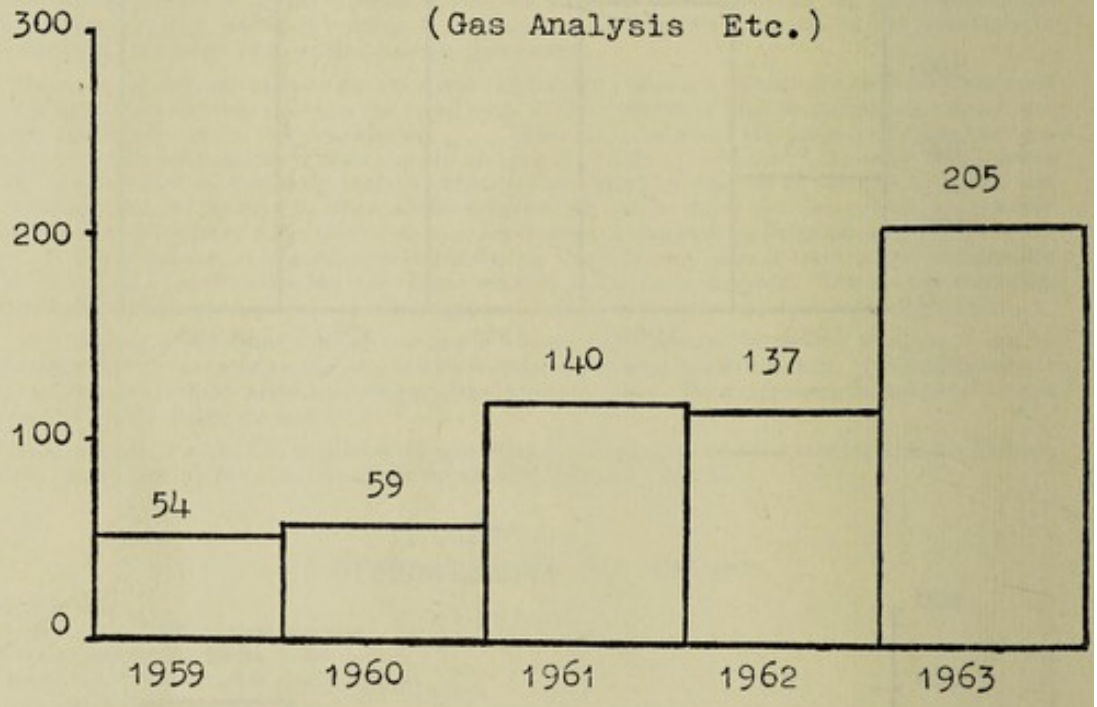


FIG. III

SPECIAL PROCEDURES

(Gas Analysis Etc.)



Appendix V

Annual Report by the Senior Medical Officer of the Epidemiology and Special Services Branch

By Dr. B. H. Lewis

This year has seen the promotion of the Director of Epidemiology, Dr. D. J. R. Snow, to the position of Deputy Commissioner of Public Health, leaving the section to be administered by a Senior Medical Officer but still in close liaison with the ex Director. The general purposes and work of the section remain as before.

Control of infectious diseases and their investigation have been carried out ; there have been no major epidemics during the year.

Infectious Hepatitis is on the wane and an epidemic of influenza which had been predicted did not materialise.

Eye infections in the country have been fewer than usual. This applies also in the native population where a new regime of treatment for Trachoma appears to have lessened the prevalence of other eye infections, apart from raising the cure rate of Trachoma itself.

Figures for Poliomyelitis in 1963 have further vindicated the use of Salk Vaccine in this State as shown in the table printed later in this report.

POLIOMYELITIS IMMUNISATION

The campaign to finalise fourth (booster) Salk injections was completed with a very high acceptance rate in schools. However, amongst the pre-school and adult population the response was not so good despite clinics being provided at some 160 strategic locations in the Metropolitan area during day and evening hours. The response at some 265 places of employment was gratifying.

The final result of the campaign is that approximately half of those who had three injections previously have now had a fourth injection.

The reason for this appears to be public apathy due to the recession in cases of Poliomyelitis.

During 1963 there were given 203,754 separate Salk injections bringing the grand total since commencement to 1,804,860 including 10,134 Quadruple injections in 1961.

A table showing the immunisation status of the population of Western Australia follows at the end of the report.

Regular monthly deliveries of Salk Vaccine to Medical Practitioners throughout the Metropolitan area were made and totalled 24,462 doses. Supplies were also sent by air as required to static clinics in the North-West and by rail to some country centres.

Tables showing the incidence of Poliomyelitis for the year and since the inception of Salk Immunisation are to be found at the end of the report.

GENERAL IMMUNISATION

Immunisations other than Salk are also being given at our Central Clinic and by the mobile clinics in isolated areas without resident Doctors. This service in the country is greatly appreciated by parents who can ensure the basic immunisation of their children against Diphtheria, Tetanus and Whooping Cough. It is also serving to raise the low level of Tetanus immunity in adults in the country.

Injections other than Salk for 1963 totalled 3,839.

Influenza Vaccine evaluation was carried a step further amongst 553 Public Service volunteers with the giving of their third injection. The final results of this evaluation will be available in August, 1964.

Sporadic cases of Typhoid, Paratyphoid and Diphtheria have been investigated and appropriate action taken.

MALARIA

In an effort to prevent Malaria entering the Ord River area, 86 personnel for the Ord River Project were examined and cleared.

PUBLIC SERVICE ENTRANTS

Nearly two hundred entrants to the Public Service underwent medical examinations at the Central Clinic during the absence on leave of the District Medical Officer who normally conducts these examinations.

Reports by Dr. Roy Allen on Trachoma and Venereal Disease in Western Australia follow.

ANNUAL SALK INJECTIONS SINCE 1st JULY, 1956, WHEN SALK VACCINATION BEGAN

Year	No. of Separate Injections
1956	224,466
1957	415,166
1958	273,017
1959	309,914
1960	140,590
1961	59,964*
1962	177,989
1963	203,754
Total	1,804,860

* Includes 10,134 Quadruple injections in 1961.

ANALYSIS OF NUMBERS OF SALK INJECTIONS

1st July, 1956, to 31st December, 1963

Age Group	4th Injection	3rd Injection	2nd Injection	1st Injection	Total Injections
Under 15 years	139,685	254,456	289,929	303,808	987,878
15 years and over	103,671	215,702	231,657	255,818	806,848
All Ages	243,356	470,158	521,586	559,626	1,794,726

In addition to the above total, 10,134 injections of Salk-containing Quadruple Vaccine were given in 1961, making the grand total of 1,804,860 separate injections in this State.

SALK VACCINATION STATUS, W.A.

Ages at Time of Vaccination, adjusted to 31st December, 1963

Age Group	Estimated Population, 31st December, 1963	Four Injections	Three Injections	Proportion of Population having received at least Three Injections
				%
0–4	87,196	17,519	66,601	88
5–9	85,955	56,491	15,586	84
10–14	82,007	59,713	5,985	80
Total, under 15	255,158	133,723	88,172	87
15–19	61,461	28,656	22,390	83
20 and over	467,488	80,977	116,240	42
Total, 15 and over	528,949	109,633	138,630	47
Total, All Ages	784,107	243,356	226,802	60

POLIOMYELITIS INCIDENCE

(Since Salk Vaccination began on 1st July, 1956)

Year	Not Vaccinated		Vaccinated		Total
	Non-Paralytic	Paralytic	Non-Paralytic	Paralytic	
1956	1	1	....	....	2
1957	....	3	....	....	3
1958	....	1	....	....	1
1959	....	2	....	3	5
1960	....	3	....	....	3
1961	....	2	....	....	2
1962	....	3	....	1	4
1963	....	3	....	2	5
Total	1	18	....	6*	25

* 1 dose 2
2 doses 1
3 doses 2
4 doses 1

POLIOMYELITIS INCIDENCE

(Since Salk Vaccination on 1 st July, 1965–*(continued)*

Case No.	Year	Sex	Age	Virus Type	Vaccination Status
1	1956	M.	24	....	Unvaccinated
2	1956	M.	28	....	Unvaccinated
3	1957	M.	7	....	Unvaccinated
4	1957	M.	10	....	Unvaccinated
5	1957	M.	23	....	Unvaccinated
6	1958	M.	40	....	Unvaccinated
7	1959	M.	2	III	3 doses (onset 3 days after third dose)
8	1959	M.	3/12	....	Unvaccinated
9	1959	M.	2	....	2 doses
10	1959	F.	3	....	1 dose
11	1959	M.	7	III	Unvaccinated
12	1960	M.	7/12	....	Unvaccinated
13	1960	M.	3	I	Unvaccinated
14	1960	M.	1½	I	Unvaccinated
15	1961	F.	2	I	Unvaccinated
16	1961	M.	3	III	Unvaccinated
17	1962	F.	41	I	Unvaccinated
18	1962	F.	3	III	3 doses (onset 2 years after third dose)
19	1962	F.	28	III	Unvaccinated
20	1962	M.	37	III	Unvaccinated
21	1963	M.	11	III	Unvaccinated
22	1963	F.	35	....	1 dose
23	1963	M.	2	III	Unvaccinated
24	1963	M.	5	? II	4 doses (onset 6 months after fourth dose)
25	1963	M.	26	? II	Unvaccinated

TRACHOMA

The campaign against Trachoma during 1963 was centred around the introduction and evaluation of the "Intermittent Local Therapy Regime" in this State which is reported separately.

With the adoption of this regime of treatment, the number of areas visited and individual natives examined shows a decrease when compared with previous years, as systematic re-visiting of each area is entailed.

Districts covered by the Trachoma Field Team during the year extended from Goomalling and Merredin in the North, to Albany in the South and included all main centres between these limits. One pleasing feature of the year's work has been the decrease in Trachoma activity over all age groups when compared with 1962 :—

Age Group	1962			1963		
	Number Examined	Number with Active Trachoma	Percentage with Active Trachoma	Number Examined	Number with Active Trachoma	Percentage with Active Trachoma
			%			%
0–4 years	1,422	1,159	81·5	718	493	68·7
5–9 years	1,728	1,194	69·1	679	405	59·6
10–14 years	1,209	457	37·8	414	114	27·5
Over 15 years	845	146	17·3	192	15	7·8
Total	5,204	2,956	56·8	2,003	1,027	51·3

Hence the Trachoma problem in this State still predominates amongst the younger natives and it is against these age groups that future campaigns should be directed.

Following the improved cure rate resulting from the "Intermittent Local Therapy Regime," it is hoped to increase the number of trained nursing personnel available for anti-Trachoma field work in the Southern half of the State from two to four, while the appointment of specially trained nurses to selected hospitals in Northern areas should help to lessen the incidence of Trachoma in these districts.

R. ALLEN,
Medical Officer, Epidemiology Branch.

TRACHOMA TREATMENT

(Report of a Trial based on Intermittent Local Therapy)

By Dr. R. Allen

Following overseas reports by the World Health Organization which describe successful trials of local antibiotic treatment used intermittently in its campaign against Trachoma, it was decided to conduct a small trial of this regime in Western Australia during 1963.

The areas selected for this trial were those surrounding the South-West centres of Gnowangerup, Katanning and Narrogin—previous figures having shown that native population and Trachoma activity were high in these districts.

The local antibiotic selected for use was 1 per cent. Achromycin Oily Ophthalmic Suspension, and the regime consisted on the installation of one drop of this suspension in each eye twice a day for four consecutive days, this course being repeated monthly for five cycles.

All camps, reserves and missions in the selected areas were visited by a team of two trained nursing Sisters, all available native people were examined, and those showing active Trachoma treated by the above regime, being re-visited each month. As well as this, all schools in the areas were visited, Trachoma sufferers diagnosed, and the treatment schedules explained to Headmasters, who volunteered in most cases to supervise the treatment of those children under their charge.

In all, 856 natives were examined in the three districts, of whom 402 showed signs of active Trachoma (47·0 per cent.). This activity varied very little from one area to another, and the higher incidence of infection was evident, as usual, in the younger age groups (*vide* Table 1).

Table 1

	0–4 Years	5–9 Years	10–14 Years	Over 14 Years	All Ages
GNOWANGERUP—					
Examined	84	100	68	40	292
Active	59	55	26	0	140
Percentage Active	70·2%	55·0%	38·2%	0%	47·9%
KATANNING—					
Examined	79	91	60	39	269
Active	50	59	18	7	134
Percentage Active	63·3%	64·8%	30·0%	17·9%	49·8%
NARROGIN—					
Examined	87	78	51	79	295
Active	60	52	13	3	128
Percentage Active	69·0%	66·7%	25·5%	3·8%	43·4%
ALL AREAS—					
Examined	250	269	179	158	856
Active	169	166	57	10	402
Percentage Active	67·6%	61·7%	31·8%	6·3%	47·0%

In addition to the above, visits were also made to smaller centres either on request from the local people, or to provide a more complete cover of the South-West district.

In the three main districts almost 90 per cent. of those persons with active Trachoma were treated by the new intermittent regime, while the remainder received oral Lederkyn according to the following schedule :—

	1st Day	2nd, 3rd, 4th and 5th Day
Adults	4 Tablets (2 Gm.)	2 Tablets (1 Gm.) each day
School Children	2 Tablets (1 Gm.)	1 Tablet (½ Gm.) each day
Pre-School children	1 Tablet (½ Gm.)	½ Tablet (¼ Gm.) each day

However, in the smaller centres, because of the inaccessibility of most of the cases, and lack of responsible supervision over treatment, only a few persons were able to receive the local Achromycin therapy, and the majority were given oral Lederkyn.

The treatment was carried out monthly from February to June inclusive, and then in December six months after the cessation of therapy, a follow-up survey was undertaken in all areas, when every native person available was examined regardless of whether treatment had been received or not.

In all, approximately 1,060 natives were examined during the initial visits in February. The total seen in December was 960, of whom 760 had been visited on both occasions. Hence the itinerant habits of the coloured groups, with the resulting difficulties in long term treatment and follow-up surveys amongst them is illustrated by the fact that during this period of ten months, 300 of the original number had moved out of the areas, while 200 others had moved in from different districts.

This report concerns those 760 persons who were diagnosed in February and re-checked in December.

They are divided into the following groups :—

Group 1.
323 cases—active Trachoma in February.
Received intermittent local Achromycin therapy.

Group 2.
94 cases—active Trachoma in February.
Received oral Lederkyn.

Group 3.
343 cases—no signs of active Trachoma in February.
Received no treatment.

Group 1

Of those 323 persons who showed signs of active Trachoma in February, and received Achromycin, 231 (71·5 per cent.) were healed when examined in December, and 92 were still active (51 of this number being classified as " slight activity " only).

Table 2 divides these numbers into age-groups, residential areas, and follow-up diagnoses :—

Table 2

DIAGNOSIS AT DECEMBER FOLLOW-UP

—	Gnowangerup		Katanning		Narrogin		Other Areas		Total		Cure Rate
Age Group	Active	Inactive	Active	Inactive	Active	Inactive	Active	Inactive	Active	Inactive	
											%
0–4 Years	15	30	22	23	21	25	0	1	58	79	57·7
5–9 Years	5	43	8	36	13	14	1	12	27	105	79·5
10–14 Years	5	18	0	13	1	3	0	8	6	42	87·5
Over 14 Years	0	1	0	4	1	0	0	0	1	5	83·3
All Ages	25	92	30	76	36	42	1	21	92	231	71·5
Cure Rate	78·6%		71·7%		53·8%		95·5%		71·5%		

Thus it may be seen that the cure rate resulting from this regime improves with the increasing age of the person, the least success being achieved in the pre-school age group.

Owing to the itinerant habits of the coloured people concerned, it was not possible to complete the full course of 40 treatments in many cases, and Table 3 illustrates that the proportion of cures increases with the number of treatments received :—

Table 3

DIAGNOSIS AT DECEMBER FOLLOW-UP

Number of Treatments Received	Gnowangerup		Katanning		Narrogin		Other Areas		Total		Cure Rate
	Active	Inactive	Active	Inactive	Active	Inactive	Active	Inactive	Active	Inactive	
											%
0–9	2	4	2	2	4	0	0	0	8	6	42·9
10–19....	0	3	0	2	8	7	0	0	8	12	60·0
20–29....	2	7	5	3	11	14	0	3	18	27	60·0
30–39....	13	40	10	36	9	17	0	6	32	99	75·6
40	8	38	13	33	4	4	1	12	26	87	77·0
Total	25	92	30	76	36	42	1	21	92	231	71·5
Cure Rate	78·6%		71·7%		53·8%		95·5%		71·5%		

The comparatively low cure rate for the Narrogin district may hence be explained by the larger number of persons who did not receive the full course of 40 treatments. This is well demonstrated in Table 4 which gives the average number of treatments per patient in each area, for comparison with the cure rate in that area :—

Table 4

—	Gnowangerup	Katanning	Narrogin	Other Areas	Total
Number of persons receiving treatment	117	106	78	22	323
Total number of treatments dispensed	4,213	3,766	2,060	820	10,859
Average number of treatments per person....	36·0	35·5	26·4	37·3	33·6
Cure rate for area	78·6%	71·7%	53·8%	95·5%	71·5%

Group 2

The 94 persons in this group treated by oral Lederkyn came from fourteen different centres—Williams, Mt. Barker, Boddington, Bannister, Narrogin, Katanning, Gnowangerup, Albany, Quindanning, Collie, Darkan, Wandering Mission, Cranbrook and Tambellup.

When re-visited in December, 53 of this 94 were found to be inactive, suggesting a cure rate of 56·4 per cent. As usual, the proportion of cures among pre-school children was lower than among other age groups :—

Table 5

DIAGNOSIS AT DECEMBER FOLLOW-UP

Age Group	Active	Inactive	Cure Rate
			%
0–4 Years	19	13	40·6
5–9 Years	18	26	59·1
10–14 Years	3	13	81·2
Over 14 Years	1	1	50·0
All Ages	41	53	56·4

Group 3

This group consisted of 343 persons who showed no signs of active Trachoma in February, and were diagnosed again during the follow-up visit in December.

From Table 6 it may be seen that 29 of the original number showed signs of active Trachoma in December, indicating either infection or re-infection between the two visits.

It is also noteworthy that there were no cases of re-infection over the age of 14 years, while the re-infection rate among the pre-school children (24·5 per cent.) was three times as high as the total rate (8·5 per cent.).

Table 6

DIAGNOSIS AT DECEMBER FOLLOW-UP

Age Group	Active	Inactive	Re-infection Rate
			%
0–4 Years	13	40	24·5
5–9 Years	10	104	8·8
10–14 Years	6	118	4·8
Over 14 Years	0	52	0%
All Ages	29	314	8·5%

Comments

(1) The cure rate from either of the treatment regimes is high when compared with previous years, when treatment was by Lederkyn alone. For example, the cure rate among 1,297 active cases treated in 1961 was 26·8 per cent. when re-examined in 1962.

Similarly the re-infection rate of 8·5 per cent. in the above trial is only a fraction of the corresponding rate in the past few years. Again taking 1961 as an example, the re-infection rate for 908 inactive cases seen during that year was 38·1 per cent. when re-examined in 1962.

The reason for this improvement is not clear, but possibly the fact that secondary eye infection have been kept at a minimum by widespread local treatment may have some relevancy. When it is realized that over 21,700 antibiotic eye drops were used in these areas, this fact must be taken into consideration. The Trachoma Sisters have both commented on the absence of conjunctivitis in these areas during their visits.

(2) Although this trial suggests that intermittent local therapy may be more effective against Trachoma than oral Lederkyn, practical difficulties arise if this regime is to be brought into widespread use.

For instance, re-treating each centre at monthly intervals for five visits places a marked limitation on the number of centres that can be visited each year. Also because treatment is carried out twice a day, each individual district to be treated must of necessity be small.

Repeated treatments place extra work and responsibility on school teachers who have undertaken to treat the children under their care—objections have already been raised in the past that a teacher's position does not include the duties of a nurse.

The nomadic tendencies of the people mainly affected by Trachoma makes continuity of treatment difficult when the course is extended to five months, and increases the likelihood of re-infection.

Many towns in this State would harbour only a few cases of active Trachoma, and obviously it would be impracticable for the Trachoma team to spend a total of five weeks in an area to treat perhaps a dozen cases—Lederkyn would have to remain the basis of treatment in areas such as these.

Summary

(1) Results of a clinical trial are given, in which a new regime for the treatment of Trachoma is used.

(2) The cure rate among 323 active cases treated by this regime was 71·5 per cent., the majority of those not cured being classified as "slight activity" only.

(3) The cure rate among 94 similar cases treated by a course of oral Lederkyn was 56·4 per cent.

(4) The effectiveness of the new regime is directly proportional to the number of treatments received.

(5) Re-infection among inactive cases of Trachoma who received no treatment was 8·5 per cent.

(6) Smallest cure rates, and greatest re-infection rates were found in the age groups of 0–4 years.

VENEREAL DISEASE

1963 revealed a persistence in the upward trend of Venereal Disease notifications in this State. As in other countries of the world, this is mainly produced by an increase in the incidence of Gonorrhoea, for although the number of cases of Syphilis increased from 16 in 1962 to 28 in 1963, the incidence of Syphilis remains less than one-twelfth that of Gonorrhoea. Chancroid and Granuloma inguinale, the other two notifiable Venereal Diseases, have not been reported for four years, and have ceased to be a source of worry.

The most disturbing feature of the 1963 notifications is the marked increase among the younger age groups, which may be illustrated by the fact that the percentage of reported cases among teenagers has shown a fourfold increase from 6 per cent. in 1958 to 24 per cent. this year, while persons between the ages of 15 and 24 are now responsible for 54 per cent. of all notifications.

During the year an informative pamphlet was prepared and forwarded to all general practitioners for use and distribution at their discretion, in an attempt to combat ignorance and any distorted impressions gleaned from inaccurate sources.

Attempts are continually being made to contact persons who have defaluted, and arrange for them to resume treatment, but here difficulties arise as evidenced by the fact that out of 112 absentees notified, only 54 were able to be traced, the remaining 58 having given false addresses or moved to another district.

Reported consorts who could be sources of infection are also contacted where possible, and arrangements made for investigations to be carried out. Here again only 12 out of the 23 reported contacts were able to be traced.

Free investigation and treatment of Venereal Disease is still available for both sexes at regular public clinics held at the Royal Perth and Fremantle Hospital, while the Department meets the cost of treating indigents in the country and also seamen.

R. ALLEN, M.B., B.S. (Adel.),
Medical Officer, Epidemiology Branch.

VENEREAL DISEASE, W.A., 1953–1963

Year	Gonorrhoea	Syphilis (All Types)	Granuloma (Inguinale)	Chancroid	Venereal Disease (All Forms)
1953	189	43	2	1	235
1954	188	21	1	2	212
1955	188	14	1	....	203
1956	188	12	....	....	200
1957	213	14	1	....	228
1958	148	5	....	1	154
1959	72	9	....	1	81
1960	87	6	....	....	93
1961	119	17	....	....	136
1962	283	16	....	....	299
1963	362	28	....	....	390
1953–1963	2,037	184	5	5	2,231

Years	Age Groups					
	15–19	20–24	25–29	30–34	35 and over	Age not stated
	%	%	%	%	%	%
1958	6	24	26	20	23	1
1959	7	25	15	19	32	2
1960	18	19	9	13	29	12
1961	10	30	17	18	22	3
1962	18	32	15	11	20	4
1963	24	30	13	11	21	1
1958–1963	14	27	16	15	24	4

(4)—93420

	Male			Female			Total		
	1961	1962	1963	1961	1962	1963	1961	1962	1963
Syphilis—									
Primary	5	4	6	1	2	6	6	6	12
Secondary	1	2	1	1	....	5	2	2	6
Tertiary	6	5	2	3	2	4	9	7	6
Congenital	....	....	1	....	1	3	....	1	4
Total Syphilis	12	11	10	5	5	18	17	16	28
Gonorrhoea	109	223	287	10	60	75	119	283	362
Granuloma	....	....	....	....	....	....	....	....	....
Chancroid	....	....	....	....	....	....	....	....	....
Grand Total	121	234	297	15	65	93	136	299	390

Appendix VI

Child Health Services

By Dr. Elizabeth M. Gibson

I have the honour to submit to you a report on the work done by the Infant Health Service, which includes the Pre-School Health Service in Centres, in Kindergartens and in co-operation with the General Practitioners.

In 1963 the number of birth notifications received by Infant Health Sisters at Centres was 15,420 and 85 per cent. of these babies attended Centres.

The number of notifications received by Correspondence was 588 and 69 per cent. of these Mothers participated in the Correspondence Scheme.

Centres Operating in the State in 1963

	Main Centres	Sub-Centres
Metropolitan	39	92
Country	28	211

Caravans—4

Two Caravans, No. 2 and No. 4, were replaced by new lighter, more compact vehicles, which seem to be very satisfactory.

New Buildings in 1963

None.

Under Construction in 1963

Esperance.
Harvey (Quarters).
West Mount Hawthorn.

Proposed New Buildings for 1964

Spencer's Park, Albany.
Karrinyup.
North Scarborough.
City Beach.
South Bentley.
Riverton.
Mosman Park.
Rossmoyne.
Lathlain Park.
Bunbury (to replace the old building now required by the Council for offices).

Infant Health Buildings

There are 146 good Infant Health Buildings in the State at present. Many buildings built in the early days are in sub-standard condition due to lack of funds for repairs and are not included in this number. Clinics are held in Chemists' shops, halls, etc., and these too are considered sub-standard and are not included.

Staff

Full-time Sisters—85.
Part-time Sisters—7.

Long Service Leave

Sister Cowper.
Sister Della Valle.

Retired

Sister F. Smith, Harvey, retired after 24 years' service.

Resigned

Sister Langley (returned to Victoria).
Sister Ebbesen (returned to Hospital duties).
Sister Ward (marriage).
Sister McGuiness (marriage).

Ngalia Trainees

4 Ngala trainees were appointed to the Staff during 1963.
There are now 13 Ngala trainees on the Staff.

Survey of Work Done at Infant Health Centres

Gross attendance at Centres	244,956
Individual attendances at Centres	32,049
Hospital visits by Centre Sisters	10,274
Hospital visits by part-time Hospital Visitor	8,761
First Home Visits	9,762
Subsequent visits	12,267
Ineffective visits	1,255
Advice by letter	401
Advice by telephone	10,178
Number of babies tested for phenylketonuria	12,546
Number of babies and toddlers referred to their doctor under the Pre-School Health Scheme	8,089

Students at Centres

Medical Students, Trainee Nurses from Royal Perth Hospital, Fremantle Hospital, King Edward Maternity Hospital and Sir Charles Gairdner Hospital made observation visits to Infant Health Centres and Infant Health Headquarters. Dietitians from Royal Perth Hospital School of Dietitians each do one week observation at the Subiaco Infant Health Centre. Post-Graduate Nurses from Princess Margaret Hospital and from Claremont Mental Hospital spend one morning during their Course at Infant Health Headquarters. Infant Health Trainees from Ngala spend two months in Infant Health Centres, one month in the town and one month in the country.

Beach Centres

The Centres at Bunbury, Busselton, Rockingham, Mandurah and Geraldton were kept open during the 1963 holiday season. Many women who are used to attending Centres in the City and were on beach holidays expressed their appreciation of this service.

Special Courses Taken by Infant Health Staff during 1963

Teaching Method at Technical College (long Course)—2 Sisters (both of whom gained Certificates).

Special lectures on teaching method given by a lecturer from Teachers' Training College at Infant Health Headquarters—9 Sisters.

Short Course in Sex Education—5 Sisters.

Health Education (8 lectures), Group Discussion (4 sessions)—24 Sisters.

Pre-School Course

This Course was taken by eight Sisters in 1963. It lasted for 10 weeks and all the Sisters gained their Certificates.

Report on Allawah Grove Clinic

Gross attendance	408
Babies under 1 year	282
Babies over 1 year	126
Individual babies under 1 year	11
Visiting babies	16

Seven babies were admitted to Princess Margaret Hospital :—

1 baby—failure to thrive.

3 babies—gastro-enteritis.

2 babies—otitis-media.

1 baby—bronchitis.

Polio and T.A. Clinics have been held during the year.

Working conditions are improved since the building has been extended.

On the whole the children seem to be reasonably well cared for and the Mothers appreciate the help given.

Projects at Infant Health Centres

Two projects were undertaken at Infant Health Centres in 1963.

Dr. Dugdale began a Nutritional Survey at four Centres.

Dr. Hockey began a Survey of Low Birth Weight and Premature Babies.

Both these projects will be continued in 1964.

Correspondence Section

There was a further increase in the work done by this Section in 1963. Especially noteworthy was the further increase in the response from new mothers invited to use this service.

In 1962 the response was 68 per cent. In 1963 the response was 69 per cent. This may be due to the fact that Mothercraft and Fathercraft teaching in schools, which was begun in 1955, has been greatly expanded in that time.

In 1963, 785 students were being taught, an increase of 70 over the 1962 numbers. Greater co-operation from teachers at outback schools is also a factor which helps in the smooth running of this expanding part of the Correspondence Service.

Sisters visiting the outback make a point of contacting the schools so that students participating in the course can become acquainted with the Sisters teaching them. Talks on health, hygiene and accident prevention are also given and appropriate films are shown and discussed during these visits.

During the year, 474 outback children both aboriginal and white who were at Point Peron Camp for outback children, visited the Centre, met the Sisters, were shown instructional films and participated in discussions on the films shown.

A total of 388 Expectant Mothers sought advice from the Correspondence Section either by letter or by visiting at the clinics held by the Sisters when they were travelling.

The work done by the Sisters in this Section is often very arduous. The Sisters travel all over the Eastern Goldfields, North-West and the Kimberleys as far North as Kalumburu, and as far East as the Warburton Mission. Conditions can be extremely trying especially when they travel by car as they frequently must do as there is no other means of transport to get them where their work lies. Much of the credit for the success of this Section must go to the Senior Sister, Sister M. Philbin, who has worked tirelessly for the betterment of conditions in the outback especially for the aboriginals and caste people.

The following places were visited by Correspondence Sisters during 1963 :—

South-West Area :
- Roelands Mission
- Gnowangerup Mission
- Marribank Mission
- Narrogin Native Reserve
- Popanyinning Native Reserve
- Wandering Mission

North Midlands :
- Calingiri
- Tardun Mission
- Mullewa
- Yalgoo
- Mogumber School
- Mogumber Mission
- New Norcia Mission

North-West and Kimberleys :
- Port Hedland
- Broome
- Cockatoo Island
- Koolan Island
- Derby
- Hall's Creek
- Moola Bulla Station
- Fitzroy Crossing
- Brooking Springs Station
- Gogo Station
- Wyndham
- Forrest River Mission
- Argyle Station
- Lissadell Station
- Kununurra
- Camballin
- Christmas Creek
- Balgo Mission
- Kalumburu Mission

Murchison :
- Mt. Magnet
- Nannine
- Meekatharra
- Cue

Warburton Ranges :
- Warburton Ranges Mission
- Cundeelee Mission

North-West Coastal :
- Shark Bay
- Roebourne
- Onslow

Murchison and Pilbara :
- Karalundi
- Doolgunna Station
- Walgun Station
- Roy Hill Station
- Ethel Creek Station
- Nullagine
- Marble Bar
- Wydgee Station
- Payne's Find
- Jigalong
- Weelaranna Station
- Three Rivers Station

Midlands Area :
- New Norcia
- Mogumber

Eastern Goldfields :
- Southern Cross
- Moorine Rock
- Yellowdine
- No. 7 Pump
- Woolgangie
- No. 8 Pump
- Kurrawang
- Coolgardie
- Coongarrie
- Menzies
- Kookynie
- Gwalia
- Mt. Ida
- Leonora
- Mt. Margaret
- Cosmo Newbery
- Laverton
- Albion Downs Station
- Leinster Downs Station
- Wiluna
- Wiluna Mission
- Yeelirrie Station
- Sandstone
- Youanmi Downs
- Payne's Find

During these trips contact is made with all native hospitals, missions and schools. If it can be managed school children's eyes are examined for Trachoma as well as the eyes of all other children seen during the trips. The following is a survey of the work done by the Sisters in the Correspondence Section of the Infant Health Service :—

SUMMARY OF WORK DONE BY CORRESPONDENCE SECTION

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Annual Figures
Birth Notifications Received	161	161	146	120	588
New Babies	115	165	180	191	651
Requests for Advice *re* Babies	1,191	1,412	1,729	1,641	5,973
Individual Babies	411	549	648	593	1,191
Pre-School—					
Requests for Advice *re*	126	279	438	218	1,061
Individual	113	230	408	193	856
Expectant Mothers—					
Advice *re*	69	84	110	125	388
Individual	38	54	65	55	150
Weight Centres—Attendances	755	807	1,034	1,154	3,750
Letters Received—					
Mothers	279	268	280	345	1,172
Others	207	217	243	180	847
School Children	735	3,159	3,640	3,260	10,794
School Children's Lessons	735	3,173	3,683	3,259	10,850
Letters Sent—					
Mothers	1,365	1,384	1,619	1,469	5,837
Others	479	378	517	373	1,747
School Children	590	1,720	2,002	2,255	6,567
School Children's Lessons	2,064	4,797	4,954	2,691	14,506
Country Visits made during year	2	3	4	1	10
Extra People Seen on Trips—Eyes, etc.	....	459	385	97	941
Infant Health Sister's Visits to Homes in Country	36	146	181	111	474
Infant Health Sister's Visits to Hospitals in Country	....	9	30	2	41
Mothercraft and Fathercraft Pupils Seen in Country	144	305	286	98	833
Number of Pupils doing Mothercraft and Fathercraft—					
Males	210	412	456	416	578
Females	39	103	151	150	180
					758
Visits to Centre—					
From Country :					
Babies	91	61	42	67	261
Pre-School	28	25	9	11	73
Expectant Mothers	2	3	1	4	10
School Children	195	2	147	130	474
School Teachers	30	3	2	24	59
Others—In connection with Correspondence Work :					
Students—Post Graduate and Trainees	86	80	139	226	531
Sundry	66	54	55	52	227
Lectures and Demonstrations, Films, etc.	Attend-ance	Attend-ance	Attend-ance	Attend-ance	Attend-ance
	696	1,558	678	511	3,443
	(13)	(25)	(18)	(13)	(69)
Groups shown over Centre (no Films or Lectures)	....	3	3	....	6
Lectures—Sister Attendances	18	30	48	38	134
Telephone Consultations (Country)—Inwards	51	22	21	20	114
Telephone Notifications *re* Country Babies	21	16	32	34	103
Phenylketonuria Tests (all Negative)	16	71	85	23	195

Mothercraft Section

The most prominent feature of the work in this Section has been the marked increase in the numbers of Expectant Parents attending classes on the physical care of the child and the increased number of Expectant Mothers attending daytime classes. These classes have been extended to the suburbs and seem to be appreciated. One local medical practitioner who holds Expectant Parents Classes in the course of his practice has requested that one lecture in each course be given by a Mothercraft Sister.

The total attendance of Expectant Parents at evening and daytime classes in 1963 was 890, an increase of over 500 for the year.

During the school holidays the Sisters do holiday relieving duty in Infant Health Centres.

Fortnightly T.V. Sessions were given on Channel 7 and broadcasts were given weekly.

The monthly four-day visit by a Mothercraft Sister to Carnarvon has been discontinued, the service having been taken over by a Sister from one of the two Geraldton Centres who visits two days fortnightly.

SUMMARY OF MOTHERCRAFT SECTION

	Number of Classes	Number of Lectures	Number of Pupils
Metropolitan Schools—			
High Schools	88	663	1,691
Private	13	113	365
Perth Technical College	5	37	90
Trainee Teachers :			
Perth Technical College	1	7	25
Kindergarten College	1	8	17
Sub-Total	108	828	2,188
Home Science Leaving Subject	23	88	415
Specials—			
High Schools, 2nd Year	6	3	120
Slow Learners	8	131	68
Home of Good Shepherd	3	31	36
Sub-Total	17	165	224
Organisations and Clubs—			
Junior Red Cross	1	8	34
Girls Friendly Society	1	1	25
Sub-Total	2	9	59
Total	150	1,090	2,886
Country Schools—			
Lectures were given in 40 Country Schools with the following results	52	411	859
Grand Total	202	1,501	3,745

Individual Group Lectures

	Number of Classes	Number of Lectures	Number of Pupils
Medical Students	6	6	38
Post-Graduate Nurses	3	3	25
Post-Graduate Trainee Sisters—N'gala	3	5	30
Chest Clinic	3	3	15
Post-Graduate P.M.H. Paediatric Nurses	2	3	41
Individual Lectures—			
Trainee Teachers, Public Health Sisters, Post-Graduate Nurses	....	5	15
Preliminary Training Schools—Royal Perth Hospital	7	13	168
Special Group—Commonwealth Rehabilitation Centre	1	1	20
Total	25	41	352

Summary of Parentcraft Classes

	Number of Lectures	Number of Pupils
Evening Classes } 16 Series {	71	350
Daytime Classes } 16 Series {	104	504
Individual Lectures	42	36
Total	217	890

Trans Train

During 1963, Sister Parnell who has been the Senior Sister on the train for several years requested a transfer to an Infant Health Centre in the country. Sister Beard was appointed in her place as Senior Train Sister.

Four trips were made during the year. On one trip Professor W. B. Macdonald and a senior medical student accompanied the Sisters and on another trip the Medical Supervisor of Infant Health accompanied the Sisters. School children were examined on both these trips.

On the May trip when the Medical Supervisor of Infant Health went across, the weather was very poor and there were frequent night stops as a result of which fewer school children than usual were seen. The balance of the number were examined by Professor Macdonald on the August trip.

A total of 164 school children were seen—81 in May and 83 in August.

A total of 1,543 people were seen on the Transline.

A total of 583 children under 5 years were seen by the Sisters.

A total of 564 doses of vaccine were administered, Salk, Triple Antigen, Tetanus Toxoid and C.D.T. being given.

Attendance at the Train was much higher than in 1962.

Pre-School Health

Kindergarten Section

The numbers of Kindergartens being established has increased to such an extent that it was found necessary for some help to be found for Dr. Roberts the Kindergarten Medical Officer. We were lucky to be able to obtain the services in a temporary capacity of two women doctors, one for the Mt. Barker-Albany-Kojonup area and one for the Geraldton area. As a result of this, less time was occupied in travelling to these outlying centres and Dr. Roberts was able to visit more centres. Dr. Roberts also held Pre-School clinics during the Pre-School Course so that Sisters taking the course would have some practice in testing eyes and ears before they began work in their own Centres.

Kindergarten Section Report

In Western Australia there are four types of pre-school centres. The age of the children attending these centres range from 3–5 years except in the Child Minding Centres and Institutions where the age range is from 2–5 years. All centres are visited by the pre-school medical team and the physical development is checked. Height and weight is recorded and external evidence of nutrition or malnutrition is noted. A general medical examination is conducted and hearing is tested with an audiometer. Eye testing is done with the E type chart. Another abnormality noted is recorded and parents notified as to the type of treatment required, that is medical attention, observation with possible medical attention if no improvement, home attention and dental attention. Parents are encouraged to be present at the time of the examination and to discuss medical problems with the doctor. If the parents are not interviewed by the doctor at the pre-school centre and the child requires medical attention, the pre-school Sister will visit the home and advise the parent personally of the recommendation made by the doctor and the reasons for doing so.

The type of pre-school centres and number of each type are as follows :—

	1962	1963
Kindergarten Union	60	68
Independent Committee	38	42
Private	22	21
Native Reserve	(none visited in this year)	9
Institutions	5	5
Child Mining Centres	9	7
Total Metropolitan Centres	97	96
Total Country Centres	37	56

Some of the metropolitan centres conducted by private individuals have closed and others opened. A similar situation is present with the child minding centres. Some conducted in the private home function for a short time and then close and others open.

There was an increase of 19 in the number of country centres. This is largely accounted for by the pre-school centres opening on the Native Reserve. In the year 1962 it was not possible to visit all country centres and in order to have as complete coverage as possible of the pre-school centres in the State, two part-time medical practitioners were engaged to conduct the medical inspection in the Geraldton and Albany districts. Dr. Patricia Hurse of Dongara examined the children in the Geraldton area and Dr. Margery Owens of Mount Barker examined the children in the Albany area.

No inspection is made of the pre-school centres in the North-West area of the State. There are indications of a greater number of these being opened and it is recommended that if there are sufficient numbers the Pre-School Medical Service should be extended to this area.

It is hoped to continue to have the assistance of Dr. Hurse and Dr. Owens in the year 1964 when an even greater number of country pre-school centres is expected to be opened.

Number of Children Examined

	1962	1963
Total number of children	3,759	4,343
Number examined at Geraldton	....	85
Number examined in Albany area	....	257
Number examined by Pre-School Medical Officer	....	4,001
Metropolitan children examined	....	2,882
Country children examined	....	1,461

The Number of Children Referred were—

Number notified	1,505
Medical attention	495
Home attention	321
Dental attention	840

Mothers Interviewed at the Pre-School Centres—763

Mothers are requested to discuss medical problems.

Parents of children requiring medical attention are interviewed either by doctor at kindergarten or sister at the home.

Home Visits Made by Sister—130

A follow-up visit is usually made by the Sister to ascertain whether medical attention has been sought and the result.

This is an important part of the Service as it keeps a check on the accuracy of the diagnosis and in certain cases prompts the parents to seek the necessary medical attention.

Dental Attention

Total number	840
Dental caries 3 or less teeth	561
Dental caries 4 or more teeth	178

Dental caries in molar teeth were the only cases referred for attention as the children are 5 years of age or less. No record was made of children with fillings and not requiring dental attention. Twenty per cent. of the children examined were referred for dental attention. If the children with teeth already filled had been included the number would have been greatly increased. This is an indication of the extent of dental caries among the pre-school children.

Dr. Hurse in her report on the kindergartens at Geraldton wrote—" One interesting point—I was amazed at the number of dental caries—there being many more children than those recorded, as they had mouths full of fillings."

Types of Conditions Referred

Upper respiratory infection and tonsillitis	179
Bronchitis	50
Otitis media	102
Defective hearing	77
Foreign body in ear	1
Defective vision	52
Squint	12
Eye infection	38
Trachoma	35
Heart	16
Speech defect	43
Undescended testicle	13
Hydrocoele	2
Spasticity	2
Pediculi of scalp	12
Impetigo	18
Ringworm	9

Special comment may be made of the number of children with moist chest sounds and diagnosed as bronchitis. The number of cases followed the measles and influenza epidemic.

The two spastic children were mild cases previously undiagnosed but diagnosis was later confirmed by child specialist.

Skin and hair hygiene of the children attending the pre-school centres is very good. The cases recorded of pediculi were native children attending the kindergarten on the Native Reserve.

Trachoma cases referred were children at the kindergartens on the Native Reserve. Ten of the twelve children attending the Moora Native Kindergarten were suffering from trachoma.

At Gnowangerup trachoma was present at the kindergarten for " white " children as well as the native children at the kindergarten on the Native Reserve.

A new service has been introduced for children attending kindergarten affiliated with the Kindergarten Union.

A speech therapist visits the kindergartens and checks all children with defective speech. Those requiring attention are referred for therapy, those due to the lack of maturity are advised accordingly.

Child Minding Centres and Some Institutions

Special comment is necessary on the Child Minding Centres and some institutions for the care of children. The physical needs of the child appear to be adequately met but the care of the child is left to people with no knowledge of the mental and emotional needs.

Future staffing of these establishments should consider this extremely important part of the child's development.

The kindergarten on the Native Reserves are conducted by various church groups and subsidised by the Native Affairs Department. Improvement is required in most cases in the toilets and ablution facilities.

Trachoma was diagnosed among these children also chronic otitis with copious purulent discharge. With the exception of three native children at Pinjarra and those attending Allawah Grove the native children were not immunised.

In this respect it seems necessary for greater medical attention than one visit by the pre-school medical officer.

Approach has been made to the Immunological Section of the Public Health for particular attention to the children on the Native Reserves. Native Affairs officers, kindergarten teachers and parents will need to co-operate to see the children get the medical attention required.

Close liaison is maintained between the Education Department and the Kindergarten Union and each year there appears to be an improvement in the Pre-School Centres.

Report of Pre-School Centres for Native Children

It has been found that very few native children on the Reserves visited have been immunised. The matter was discussed with Mr. Gare, Commissioner of Native Welfare and with Dr. Roberts, the Kindergarten Medical Officer. As a result of this the Immunisation Branch of the Public Health Department was contacted and an arrangement made to notify the Native Affairs officer for the district and also the Infant Health Sister about the impending visit of an Immunisation Unit to the district and they will endeavour to persuade the mothers to take their children to be immunised.

Report on Pre-School Centres in Native Reserves

This is a report on the conditions found at Native Reserves and a brief report on the health of the children.

Narrogin :

Thirteen children examined.
Accommodation is good, clean and attractive.
Equipment is up to the required standard.
Communal toilet.
Ablution facilities—three basins and paper towels.
Personal hygiene very good.
Medical conditions found :—Squint, 1 ; Ear Infection, 1.
No children immunised.

Katanning :

Six children examined.
Accommodation is good.
Equipment is good, a good variety of play material.
Communal toilet.
Ablution facilities—own towels.
Personal hygiene very good.
All mothers were interviewed and the children's health discussed.
Medical conditions found :—Ear Infection, 1.
No children immunised.

Pingelly :

Nine children examined.
Accommodation poor.
Equipment poor, lacking in quantity and variety.
Toilet facilities and ablution facilities not adequate.
Personal hygiene in most cases poor.
Medical conditions found :—Pediculi ; Impetigo ; Trachoma.
No children immunised.

Moora :

Twelve children examined.
Accommodation good. The kindergarten is attractive in appearance, with a good variety of good play material.
Toilet and ablution facilities are far below standard.
It is proposed to move the kindergarten to a site closer to the communal toilet and water.
Children's appearance clean and well cared for.
Medical conditions found :—Trachoma, 10 cases.
No children immunised.

Merredin :

Thirteen children examined.
Accommodation, room is adequate in size but in a poor state of repair. Condition of floor, not clean.
Basic furniture is lacking.
Very poor kindergarten equipment.
Communal toilet.
Medical conditions found :—Bronchitis ; Ear Infection ; Spastic child.
No children immunised.

Gnowangerup :

Examined by Dr. Margery Owen of Mt. Barker.

Her report is quoted :—

"Kindergarten is held in new amenities hut. Building is not fly-proofed and as the midday meal is prepared here for the children this is an urgent necessity. Children use the communal toilet block on the Reserve which is not satisfactory. If possible separate lavatories should be provided for essential toilet training for these children. There is no sink in the kitchen and no drainage—waste food and water is buried. Several children were under-nourished. Most children have not been immunised and this has been taken up with the Native Welfare Department. There was a high incidence of trachoma—some children had treatment earlier in the year from the Public Health Department team but looked as if they had either relapsed or had not cleared completely."

Pinjarra :

Eleven children examined.
Accommodation, a small hut. Kindergarten is usually conducted under the trees.
Equipment is only fair and needs improving.
No kitchen facilities.
No toilets.
Ablution facilities are not adequate.
Medical conditions found :—Undernourished, 2 ; Bronchitis, 1.

Northam, Brookton and Wagin were not visited in 1963.

There is evidence in several instances of chronic medical conditions such as discharging ears, trachoma, impetigo which should have attention and not wait until the pre-school medical inspection. It is suggested that the person in charge of the kindergarten should if these conditions become apparent or if medical attention is thought necessary, approach the parent or the Welfare Officer. I recommend a regular inspection of hair, skin, ears and eyes. To be socially acceptable the highest standard of personal hygiene must be taught and maintained.

Improvements are needed in all kindergartens in the toilet and ablution facilities. Small children at kindergarten should be toilet trained in preparation for school. This is impossible when communal toilets are used particularly if they are at some distance from the kindergarten.

The kindergarten should be as attractive as possible, very clean and well painted. There should be no lowering of standards because the kindergarten is on the Reserve.

Equipment in the kindergartens should be of a standard to provide the children with enjoyment and mental stimulation and education. It need not be expensive but it should be clean, suitable and attractive.

The co-operation of the mothers should be encouraged and it is suggested that if there is a kindergarten in the town, visits should be made when possible.

Immunisation of the children is very important. Approach has been made to the Public Health Department for the Van to visit the Reserve. It still will require the co-operation of the parents, the Native Welfare Officer and the Kindergarten teacher. It is to be hoped that the present position of "No Immunisation" will be rectified.

Pre-School Health Scheme (In conjunction with Family Doctor)

The numbers referred to their family doctors were :—

6 weeks	6,475
1 year	1,538
5 years	76

Although progress is being made in this work it is felt that there could be far better co-operation between the Infant Health Centres and the Family Doctor to make this Scheme even more successful.

Pre-School Clinics

Thirty-three Sisters are now holding Pre-School Clinics at their Centres. These are well attended, being run on the appointment system.

Annual Refresher Course

Refresher Course was held from November 25th to November 29th for all the Infant Health Sisters including those from Broome, Walpole and Esperance. An innovation in 1963 was the introduction of Discussion Groups. Although only one afternoon was given to Group Discussion it was felt by many of the Sisters that the individual Sister derived more benefit from this method than from a "lecture only" session. It is hoped to extend the Lecture-Group Discussion method to several sessions during the 1964 Refresher Course.

Library

The following publications were received in 1963 :—

Books and Pamphlets	17
Magazines	257

The Infant Health Service is greatly indebted to Dr. John Woolcott for the advice and help he has given not only with the library but with the revision of Infant Health Leaflets.

Visitors to Infant Health Headquarters during 1963

Professor T. Stapleton, Sydney.
Dr. B. M. Barcroft, London County Council.
Dr. E. H. Mair, Public Health Department, Hobart.
Dr. Donella Couborough, London.
Mrs. Ridgley, New York.
Miss Mathews, Health Visitor, England.

Thanks are Due to

The Lotteries Commission for continued help with Infant Health projects. No reasonable appeal to the Commissioners ever goes unanswered. Thanks are also due to Professor W. B. Macdonald and Dr. Ian Lewis for the help and sound advice given to the Infant Health Service during the year. Thanks too are due to the many lecturers who give so freely of their time to help with Pre-School Health Courses over the years. Without their co-operation these Courses could not have been run so successfully. We are also indebted to all those who lectured during the year on the first Friday mornings and at the Annual Refresher Course. The Kindergarten Training College, Marriage Guidance Council, Health Education, Lady Gowrie Centre and Education Department have all been most helpful and co-operative during 1963.

Very special thanks is due to Dr. John Woolcott for the handsome gift of a cine Kodak camera which he presented to Infant Health this year. This generous gift will be of inestimable value for research purposes on child development work which it is proposed will begin in 1964.

Since this will be my last report as Medical Supervisor of Infant Health I would like to place on record my appreciation of the unfailing loyalty and support which I have always been given by the Sisters in the Infant Health Service and particularly by the Senior Staff Members in charge of the various departments at Infant Health Headquarters. I would also like to put on record the valuable help given by the clerical staff whose excellent efforts adds greatly to the working efficiency of the Headquarter's team as a whole. Without the loyal support of an excellent Headquarter's Staff, the eight years I have spent as Medical Supervisor of Infant Health would not have been the happy and satisfying years which the last eight years have proved to be.

ELIZABETH M. GIBSON,
Medical Supervisor of Infant Health.

Appendix VII

School Medical Report

Many country schools are now up to date on a two year inspection schedule and all have been examined within three years.

A total number of 55,463 children were examined of whom 21,054 were in the country. The parents of 15,809 were notified of some defect or other, including dental defects, 4,878 were referred for medical attention. Table 11 shows a good response by the parents in obtaining this medical attention.

A total number of 77,055 children were examined for pediculosis (Table III) and the number notified as infected was 371. Re-visits to ensure that effective treatment has been carried out brought the total number of heads inspected up to 130,075.

The general health and nutrition of the children remain good.

Table I

School Medical Service

EXAMINATION OF METROPOLITAN AND COUNTRY SCHOOLS, 1963

—	Number Examined	Number Notified	Number Referred for Medical Attention	Number Referred for Home Attention and Observation	Number Requiring Dental Attention	Skin Complaints		Nutrition			Eyes Medical Attention	Tonsils Medical Attention
						Number	Per cent.	3	Under 3	Over 3		
Metropolitan Schools												
Boys	17,579	5,020	1,323	1,464	2,853	....	....	16,486	225	868	....	....
Girls	16,830	4,642	1,240	1,188	2,700	....	....	15,229	290	1,311	....	....
Total	34,409	9,662	2,563	2,652	5,553	1,253	3·64	31,715	515	2,179	1,254	94
Country Schools												
Boys	10,825	3,175	1,053	853	1,517	....	....	10,212	203	410	....	....
Girls	10,229	2,972	1,262	949	1,462	....	....	9,166	187	876	....	....
Total	21,054	6,147	2,315	1,802	2,979	965	4·58	19,378	390	1,286	971	45
State Total												
Boys	28,404	8,195	2,376	2,317	4,370	....	....	26,698	428	1,278	....	....
Girls	27,059	7,614	2,502	2,137	4,162	....	....	24,395	477	2,187	....	....
Total	55,463	15,809	4,878	4,454	8,532	2,218	4·00	51,093	905	3,465	2,225	139

Table II

HOME VISITS BY SCHOOL NURSES, 1963

Total Visits re Medical Attention	Received Attention	Promised Attention	Disinterested	Out or Left District	Visit to Cases Referred for Home Treatment	Parents Phoned or Called at Office
3,616	1,633	1,027	117	588	44	136

Country Area : 586 Visits made.

Table III

HYGIENE INSPECTIONS BY NURSES FOR PEDICULOSIS

	No. of Children Examined	Number Notified	Percentage
Metropolitan	53,948	152	·28
Country	23,107	219	·94
Total	77,055	371	·48

Including re-visits to above, a total number of 130,075 heads were examined or re-examined.

Appendix VIII

School Dental Services

By A. G. McKenna

STAFF

We commenced the year with five vacancies in our establishment of 15.

During the year there were two retirements while three new appointments were made (including two graduate bursars). We therefore had four vacancies at the end of the year.

NORTH-WEST

The population is growing rapidly and it is apparent that a permanent surgery manned by a dentist will soon have to be established at Wyndham. In order to relieve the pressure in the Kimberleys a man was engaged on a temporary basis to work for three months in Kununurra and Wyndham.

FIGURES FOR THE SCHOOL DENTAL SERVICE

Number of country schools visited	84
Number of metropolitan schools visited	6
Number of native missions visited	7
Number of orphanages visited	7
Number of children examined	8,259
Number of children treated	5,280
Number of children needing no treatment	2,370
Number of children who were to receive treatment by private dentists	144
Number of children whose parents ignored notices	465

Details of Treatment for Children

Silver amalgam fillings	7,622
Copper amalgam fillings	45
Cement fillings	105
Porcelain fillings	1,060
Silver nitrate treatments	480
Gold inlays	12
Pulp treatments	11
Prophylaxis	1,807
X-rays taken	96
Other conservative treatments	4,373
Extractions	7,115
Dentures and orthodontic appliances	19

North-West

The following work was done for people apart from children :—

Number of natives attending free of charge	329
Fillings for natives	26
Extractions for natives	495
Dentures for natives	11
Number of white free list patients (pensioners, missionaries, nursing sisters, etc.)	182
Fillings for white free list patients	128
Extractions for white free list patients	181
Dentures (new or repairs) for white free list patients	47
Number of paying patients (Derby and Port Hedland districts)	698
Fillings for paying patients	549
Extractions for paying patients	704
Dentures (acrylic) for paying patients	67
Dentures (metal) for paying patients	7
Denture repairs for paying patients	83
Gold inlays for paying patients	13
Prophylaxis for paying patients	71
Other treatments for paying patients	107
Fees debited	£2,359

A. G. McKENNA,
Senior Dental Officer.

Appendix IX

Report by the Principal Matron, Nursing Section

By Miss P. F. Lee

HOSPITAL STAFFING

It is reasonable to assume that the higher standard of hospital buildings, aids to nursing and staff accommodation, as well as more opportunities for staff to live away from the Hospital, have effected the staff situation, for most country hospitals during the greater part of the year, have been able to keep to their permitted staff establishments. Two other factors, which contribute to this, are financial incentives in the form of allowances and bonus and the improved sporting and social facilities developed in country areas over the past few years.

It is now extremely rare to hear nurses speak disparagingly of country nursing experience ; in fact, many regret their ignorance of country hospitals and country life and this points convincingly to the need for a period of rural nursing experience in the basic training of the nurse. It is fair to say that there are nurses who shrink from leaving the security of familiar conditions in city hospitals for the unknown and untried. The wider basic experience would show them how to adapt their skills gained in a more complex situation to the requirements of the hospital outside the metropolitan area. Not only this, there would be more leisure to know their patients and gain an understanding of community life.

SENIOR NURSING APPOINTMENTS

Miss E. M. McGrath, Dip. N./Admin., appointed Matron of the Swan District Hospital.

Miss M. V. Spencer, Sister Tutor Diploma, appointed Matron of the Albany Regional Hospital.

Miss K. D. Hawkins, Dip. N./Admin., transferred from the Collie District Hospital to the Northam District Hospital as Deputy Matron.

SCHOLARSHIPS AWARDED FOR POST-GRADUATE STUDY AT THE COLLEGE OF NURSING, AUSTRALIA, IN 1963

Nursing Administration Course

Miss F. Lovelock, Osborne Park Hospital.

Public Health Course

Miss N. G. Hook, Silver Chain Nursing Service.

Miss Lovelock, Dip.N./Admin., has returned to her former position as Deputy Matron of Osborne Park Hospital.

Miss Hook, Public Health Nursing Diploma, has returned to her position with the Silver Chain Nursing Service.

HOSPITAL INSPECTIONS

Routine inspections of Private Hospitals and Maternity Homes were carried out during the year.

Number of Inspections

" A " Class	19
" C " Class	143
Maternity Homes	19
Country Hospitals	64

A number of preliminary inspections were made, accompanied by a Health Inspector, to properties that were under consideration for conversion to " C " Class registration.

New " C " Class Hospitals Opened in 1963

Parkside Lodge, Richardson Street, South Perth :—Registered for 28 beds.

Sherwin Lodge, Rossmoyne :—Registered for 5 beds.

St. Vincents Daughters of Charity, Guildford :—Registered for 51 beds.

A number of " C " Class Hospitals have extended their registration by additions to the original building.

St. Lukes, Rokeby Road, Subiaco :—From 24 beds to 33 beds.

Martindale, Applecross :—From 13 beds to 20 beds.

Deva, Mt. Lawley :—From 17 beds to 22 beds.

Skye, Fremantle :—From 8 beds to 20 beds.

Corlei, Manning :—From 30 beds to 49 beds.

Braemar, East Fremantle :—From 18 beds to 27 beds.

Claudia Hicks, Bentley :—From 16 beds to 25 beds.

GOVERNMENT SCHOOL OF NURSING

The school under the administration of Miss E. E. Harler, Organizer of Nurse Training, and with Miss V. M. Hobbs as Principal Tutor, continues to function efficiently.

The affiliated hospitals at Kalgoorlie, Geraldton and Northam give the student nurses the best available experience from the material at their command.

The Kalgoorlie District Hospital has been fortunate in having the services of a qualified Tutor in Mr. H. E. Harris for the past two years. He is transferring to the Northam District Hospital as from the end of 1963.

Both the Northam and Geraldton Hospitals have not fared so well and the respective Matrons, Miss Bohan and Miss Crowley, have had the responsibility of conducting the training programme added to their normal duties.

NURSING AIDES

On looking back at my report submitted in 1959, it is disappointing to find that my expectation of an increase in the number of Nursing Aides available for employment, has not materialized. The results of a survey (see below) show that the number of nursing assistants employed remains high. There is a considerable waiting list for training and the education and other qualities of the girls presenting are of a better standard. With the registration of the Bunbury District Hospital as a Nursing Aide Training School early in 1964, the situation should be alleviated to some extent.

NURSING SURVEY CONDUCTED JUNE, 1963

Information was obtained from all Areas where Nurses were Employed in W.A. excepting Doctor's Surgeries

1	2	3	4	5	6	7	8	9	10	11
No. of Nurses with Basic General Certificate	No. of Nurses with Basic General and Post-Basic Midwifery Certificates (D.C.) (This category not to include those in Column 1)	No. of Nurses with Basic General, Post-Basic Midwifery and Infant Health Certificates (T.C.) (This category not to include those in column 1 and 2)	No. of Nurses with Basic (2 Year) Midwifery Certificate only	No. of Nurses with Basic Mental Certificate (3 Year) only	No. of Nurses with General and Mental Certificates (This category not to include those in Column 1 and 5)	No. of Trained Nursing Aides	No. of Trainee Nursing Aides	No. of Nurse Assistants Sunset, 106 Nursing Orderlies included in Nursing Assistants	Mother-craft	Total
1,209	687	283	23	89	11	422	186	1,248	45	4,203

No. of married Trained Nurses employed	724
No. of married Trained Nursing Aides employed	98
No. of married Nurse Assistants employed	446
	1,268

NURSING BURSARIES AS AT DECEMBER, 1963

—	1955	1956	1957	1958	1959	1960	1961	1962	1963	Total
Granted	45	40	67	52	60	73	64	71	74	476
Withdrawn—										
Before Training	9	8	14	13	11	11	11	2	1	80
During Training	6	6	16	4	6	2	4	....	....	44
After Training	16	13	14	....	....	....	....	....	....	43
Completed	13	7	1	....	....	....	....	....	....	21
Graduated Bursars still Nursing	....	6	22	28	4	1	....	....	....	61

Reason for Withdrawing

		1955	1956	1957	1958	1959	1960	1961	1962	1963	Total
1. Withdrew at School		2	2	4	3	2	4	5	2	1	25
2. To get Married	D.	3	1	3	....	3	1	1	....	....	12
	A.	9	5	9	1	....	....	....	....	....	24
3. Decided on Teaching	B.	4	3	5	3	....	2	....	....	....	17
	D.	1	1	1	....	1	1	....	....	....	5
4. Leaving the State	B.	....	1	1	2	1	1	....	....	....	6
	A.	5	4	4	....	....	....	....	....	....	13
5. Decided against Nursing	B.	3	1	1	3	8	2	....	....	....	18
	D.	....	....	5	2	....	....	3	....	....	10
6. Personal	....	....	1	2	2	1	1	....	....	....	7
	D.	2	3	....	2	....	....	5	....	....	10
	A.	2	4	5	....	....	....	....	....	....	11
7. Illness	B.	....	....	1	....	....	1	....	....	....	2
	D.	....	1	3	1	1	....	1	....	....	6
Total		....	....	....	....	....	....	....	....	....	166

B. = Before Training. D. = During Training. A. = After Training.

Period of Service Given by those Bursars who Withdrew

1 for 1 month
2 „ 3 months
1 „ 5 „
2 „ 6 „
3 „ 7 „
1 „ 8 „
2 „ 9 „
1 „ 10 „
6 „ 1 year
5 „ 1½ years
1 „ 1¾ „
3 „ 2 „
1 „ 2½ „
1 „ 2¾ „

Staff Nursing

1 for 5 months
10 „ 6 „
17 „ 12 „
1 „ 18 „

Country Service given by these Bursars :

35 completed 6 months
2 „ 1 year
2 „ 1½ years
and 10 are at present completing their first 6 months

Note : An additional 7 Bursars resigned after completing Training.

One other failed her finals and did not resit.

REPATRIATION HOSPITAL, HOLLYWOOD

The school is indebted to the Administratives of the hospital for making experience available to the student nurses. Although the second year students from Geraldton and Northam spend only two weeks at the hospital, they fit smoothly into the routine of the busier situation and gain a wide experience.

Two male nurses in training at the Repatriation General Hospital take the study blocks at the Government School of Nursing.

Recruitment

A considerable amount of literature is posted to meet the demands of enquirers. Many requests are answered by telephone and a number of school girls interviewed in the year. The need for higher general education as a basis for nursing, still requires publicity.

REFRESHER COURSE FOR NURSES

Refresher Week for Teaching Staff, Country Hospitals, 24th–28th June, 1963

All tutors were brought to Perth for this week and were in residence at the school. It would be an advantage if this type of " refresher " could be extended to tutors at regular intervals.

Rehabilitation Week for Trained Nurses Wishing to Return to Active Nursing

The facilities of the school residence and library were made available to the College of Nursing, Australia, W.A. State Committee, by the Minister for Health on two occasions, that is for 3rd–7th June and for 25th–29th November. These courses have proved to be most valuable and resulted in a number of trained nurses returning to work in either whole or part-time capacity in city and country hospitals.

It has become apparent that there is a great need for courses of study to be organized, not only for nurses who have been away from nursing, but for those who are employed. Many trained nurses are of necessity required to accept responsibility for which they are not prepared and in-service courses should be conducted in respect of all positions of responsibility. Basic training is not sufficient.

PHYLLIS F. LEE,
Principal Matron.

Appendix X

Division of Occupational Health

By Dr. J. McNulty

STAFF

During the absence of Dr. D. D. Letham from 1st March, 1963, till the end of the year, Dr. J. C. McNulty acted as Physician, Occupational Health.

Assisted by Sister M. Wilkinson, Dr. T. C. Anthony, Consulting Dermatologist, and Dr. D. A. Clements, Consulting Ear, Nose and Throat Specialist, continued their work on behalf of the Department.

Mr. W. H. Moyle continued his investigation into the handling of pesticides and the superintending of the work of pest control operators.

During the year Miss P. Lane, Secretary, left for England and was replaced by Miss M. Jenkin.

OCCUPATIONAL HAZARDS

1.—*The Pneumoconioses*

General

Dr. J. McNulty was appointed a member of a Parliamentary Committee of Enquiry into problems associated with Workers' Compensation for pneumoconiosis. This work extended through the latter half of the year and is the subject of a special report by Mr. N. Mews, Chairman of the Workers' Compensation Board.

Very close liaison was maintained with the Tuberculosis Control Branch and the Chest Clinic at Kalgoorlie, where various workers exposed to harmful dusts were X-rayed.

Silicosis

Four new cases of silicosis were diagnosed in workers in non-mining industries. A further new case of silicosis occurred in a foundry worker, and the occurrence of very extensive disease in a sand-blaster indicates the need for constant continued care in these industries.

A new case of silicosis in a brick and tile worker prompted an enquiry into the silica content of the clays. These clays have been regarded as relatively harmless, consisting mainly of silicates, so that conditions around the clay grinding machines were permitted to be rather more dusty than is desirable.

The Government Chemical Laboratories examined seven specimens of clay and found a free silica content of between 17 per cent. and 48 per cent.

The need for dust control in this industry is obvious.

Attention was also drawn to the growing practice of cutting bricks in buildings under construction with a carborundum disc. The free silica content of the brick is sometimes as high as 40 per cent. and in one instance, dust concentration in the breathing zone of the worker was 25,000 particles per cc.

Regulations (Scaffolding) will be made to ensure that workers using these machines have adequate respiratory protection.

Asbestosis

There were six new cases of asbestosis in non-mining industries in the metropolitan area. The dusty conditions which produced these asbestosis cases had been rectified.

A new method of spraying asbestos on ceilings during building construction exposes the workers to heavy concentrations of asbestos dust and adequate respiratory protection is essential.

2.—*Noise*

The Hearing Conservation Programmes already introduced have been continued and followed up by the Ear, Nose and Throat Consultant and assisted by the Occupational Health Sister. New employees have been examined and workers fitted with ear plugs.

With the assistance of the Commonwealth Acoustic Laboratory, noise has been suppressed wherever possible, but unless consultations take place before construction has commenced noise suppression and control at source is often impractical.

Audiometry has been carried out in a number of industries to assess the degree of industrial deafness.

Sister Wilkinson made a total of 52 follow-up visits to factories and Government Departments.

Unfortunately, worker co-operation in regard to Hearing Conservation is sometimes poor.

3.—*Dermatitis*

The Department had many enquiries about dermatitis in industry and a total of 96 cases of industrial dermatitis where workers' compensation was paid, were notified by the insurance companies.

Of the 96 cases reported, commonest causes were detergents, cement, miscellaneous chemicals and heat contact.

Twenty-six visits were made by Sister Wilkinson in company with Dr. Anthony, Consulting Dermatologist, to investigate on the job and give instructions in prevention. The plastics industry, in particular, has been studied closely, and surprisingly little trouble has been experienced with the use of epoxy resin, but a number of cases came to light towards the end of the year ; and it may be that there is a fairly lengthy interval between contact and the onset of sensitivity and more cases may be expected.

4.—*Pesticides and Fumigants*

During the year the activities of thirty commercial pest control firms were investigated with a view to ascertaining :—

(1) The chemicals in use and manner of application.

(2) The precautions taken for the protection of operators and others from contamination with pesticides.

From the investigation it was found that the main chemicals in use are the chlorinated hydrocarbons, dieldrin and aldrin. Arsenic trioxide powder is used by almost all companies, but small quantities only are handled. Liquid arsenic, though still in use, is gradually being replaced by other chemicals both in insect and weed control. It is of interest that the organic phosphate insecticides are not used extensively. In instances where they are used, the less toxic ones are being applied. No routine cholinesterase testing of employees has been undertaken. However, it is probable that the organic phosphates will be used on an increasing scale in the future and when it is considered necessary, cholinesterase tests will be recommended.

When circumstances appeared to be warrented, urinary arsenic tests on employees were carried out ; 27 tests gave results which ranged from 0·02 ppm. to 0·65 ppm.

The close contact with the pest control companies has enabled many recommendations to be made for the safe handling of the chemicals used, particularly in respect to protective clothing and respiratory equipment. In a number of instances, recommendations have been made for the substitution of the more hazardous insecticides for safer ones, and for modifications to equipment and procedures to reduce possible hazards.

In the fumigation field, the fumigant used most extensively is methyl bromide. A close check has been made on this work and operators given blood bromide tests. As a result of recommendations in respect to safety precautions and modifications to fumigation and aeration practices, conditions are now much safer. This has been reflected in the satisfactory blood bromide tests and tests of the air taken in work areas.

Although the companies have become more conscious of the hazards associated with the use of pesticides generally, more work is required in this field. Generally, the smaller firms are not well informed on the toxicities of chemicals available to them. For various reasons an employee may not know the name of the chemical being used and it is difficult to see how he can apply intelligently, or take, adequate precautions when he is unaware of the nature of the substance.

5.—*Lead*

Urinalysis for lead was carried out on 107 urines of 92 workers by the Government Chemical Laboratories. Although a number showed increased excretion rates, it was not necessary to recommend cessation of lead exposure.

An assay office worker in Kalgoorlie was diagnosed as suffering from lead poisoning. This appeared to be due to the use of temporary assay office accommodation because the previous building had been destroyed by fire. Repeat examinations of all assay office workers showed that the satisfactory state noted in 1961 was being maintained.

A pilot survey was conducted in association with Dr. D. Curnow, Biochemistry Department, Royal Perth Hospital, to attempt to correlate the content of urinary lead of △amino laevulinic acid and creatinine excretion, but it is too early to comment on the results.

6.—*Ionising Radiation*

Complaints regarding dusty conditions at the sands treatment plants in the South-West were received, but on investigation there did not appear to be any significant pneumoconiosis hazard. The silica is washed out and the material entering the plant is 94–96 per cent. heavy mineral, the particle size is fairly large.

Concern has been expressed in regard to the inhalation of radioactive particles of monazite and this will be investigated.

7.—*Toluene-di-isocyanate*

Four men pouring polyurethane foam in the construction of a cold room were overcome by TDI (toluene-di-isocyanate) ; one of them seriously. Recovery was uneventful and an investigation of its use in the refrigeration and insulating industries does not suggest that it is a problem. Estimation of TDI in air in a refrigerator factory gave levels below the maximum allowable concentration of 0·01 ppm. ; even at this level one of the technicians noticed some slight bronchospasm.

EDUCATION

During the year, lectures were given by the Acting Physician, Occupational Health, at Muresk College in association with Dr. Clements and Mr. Kenway, Commonwealth Acoustic Laboratory, on hazards with tractors.

Lectures were given by him at the Mount Lawley Technical School to applicants for the factory inspectorates ; to fifth year medical students on epoxy resin ; on industrial chest diseases to post-graduate students at the Sir Charles Gairdner Hospital ; and general lectures on Occupational Health to safety officers and nurses.

COMMITTEES

The committee meetings attended by the Acting Physician, Occupational Health, included those on industrial safety, agricultural safety, air pollution, uniform poisons and the parliamentary enquiry into problems associated with the pneumoconioses.

Appendix XI

Technical Information Service and Library

By J. F. Woolcott

The main event during the year was the separation from this library complex of the series of small libraries of the Sir Charles Gairdner (previously Perth Chest) Hospital which, under its Board, now controls entirely its library system. The separation of control, however, has not meant any cessation of co-operation as the figures below show. The Gairdner Hospital has access for routine circulation to eight of this library's journals and borrowed 15 other items from us during the year.

The statistics for the last five years indicate a steady increase in the number of journals received, growth in numbers being an average of 27 new subscriptions per year. Coupled with this has been a noted increase in the amount of material borrowed from other libraries especially from our staunch ally the Medical Library of W.A. To that library we give our most grateful thanks. We borrowed from it 310 items and lent it only 41 so that we are still fairly dependent on it for part of our intellectual sustenance.

The statistics show a slight drop in books received, an increase in journals taken, a slight increase in routine circulation of journals, a pronounced increase in both borrowing and lending, and a 21 per cent. increase in the number of items supplied as photocopies.

The detailed figures are as follows :—

Item	1959	1960	1961	1962	1963
General—					
Non-journal publications received	658	575	778	999	856
Additional journals received	21	34	24	32	24
Total journals received	335	369	393	425	449
Average monthly journal routing	300	528	616	667	674
Borrowing (excludes routine journals)—					
From all other libraries	275	352	420	308	474
From W.A. Libraries	242	343	380	268	429
From Medical Library of W.A.	168	248	295	193	310
From libraries outside W.A.	35	49	40	40	45
Lending (excludes routine journals)—					
All external loans	247	273	259	194	289
To Medical Library of W.A.	89	89	77	56	41
Number of organizations to whom loans made	21	27	21	24	24
Photocopies supplied	....	1,135	1,238	1,368	1,662

Books received into the library this year totalled 856. This is a reduction of 143 from last year but this reduction may not be particularly significant since the figure is not for material ordered or still not supplied but only for that actually received. The siting of these 856 books was as follows :—

Public Health Department Library	453
Hospitals (various)	104
Health Education Council	99
Public Health Laboratories	55
Satellite Laboratories	32
Government School of Nursing	27
Child Guidance Clinic	23
State X-Ray Laboratory	19
Nurses' Registration Board	18
Infant Health Service	12
Chest Clinic	6
School Medical Service	3
Gairdner Hospital	3
Virology Laboratory	2

Besides the extensive routing of journals made necessary by the physical separation of the various units of the Department journals are also routinely circulated to other libraries. This service involves 78 journals sent out as follows :—

Mental Health Services	15
Health Education Council	13
Medical Library of W.A.	12
Government Chemical Laboratories	11
Gairdner Hospital	8
King Edward Memorial Hospital	4
Department of Agriculture	3
School of Occupational Therapy	3

Registrar-General's Department	2
Perth City Council	2
Royal Perth Hospital	1
School for the Deaf	1
Pre-Clinical Library	1
Child Guidance Clinic	1
P. & C. Federation	1

It can thus be seen that a considerable amount of this library's material is made available to many other organisations in our community. In return we receive for routine circulation among our staff 29 journals from other libraries. Of these 27 are lent to us by the Medical Library while the University of Western Australia and the Department of Agriculture each lend one.

Besides this routine loaning of journals the library also lends books. Of the total of 289 such loans, 191 loans were to other libraries in W.A., 96 were to individuals and two were to libraries in other States. The libraries in W.A. to which such loans were made, and the number of loans, are :—

Medical Library	41
Government Chemical Laboratory	34
Perth Dental Hospital	25
Education Department	20
State Library	17
Department of Agriculture	17
Gairdner Hospital	15
Princess Margaret Hospital	8
Royal Perth Hospital	7
Mental Health Services	4
King Edward Memorial Hospital	3

Again the pattern of fairly wide usage of this library's resources is clear. But besides giving help we also seek it. We borrowed 474 items during the year, 45 from outside this State, and 429 from other libraries within it. Those to whom we owe most thanks for their aid were :—

Medical Library of W.A.	310
University of W.A.	47
Barr-Smith Library, Adelaide	24
State Library of W.A.	23
Department of Agriculture	19
Education Department	18
Baillieu Library, Melbourne	7
Government Chemical Laboratory	5

and to 17 other libraries for either one or two items.

Again this year the library received material from surplus disposal schemes and library exchange services. To those organisations from whom material was received go most grateful thanks.

This year it is a pleasure to record that time was found for a complete physical check of all periodical holdings. A detailed and accurate list of serials was prepared and up-to-date amendments forwarded to the C.S.I.R.O. for inclusion in the list of " Scientific Serials in Australian Libraries." It had been a matter of regret for some years that this library's holdings as shown in that important catalogue were seriously in error. As a library tool, this catalogue is so valuable to Australian libraries that every effort needs to be made to keep it as accurate as possible. This means willingness, work and time for the subscribing libraries and until this year the time was just not available.

Appendix XII

PHYSICS BRANCH

State X-Ray Laboratory

By B. E. King

INTRODUCTION

The State X-Ray Laboratory consists of a Medical Physics and an Engineering Division. This report is concerned with the Medical Physics Division which is responsible for administration of the Radioactive Substances Act and provision of Radiation Protection and Medical Physics Services.

1.—RADIOACTIVE SUBSTANCES ACT

During 1963 the Medical Physics Division of the Laboratory became fully responsible to the Radiological Advisory Council for the Administration of the Radioactive Substances Act and Regulations.

X-ray apparatus used by a medical practitioner or dentist solely for radiography of human beings is required to be registered. Users of fluoroscopic and other X-ray apparatus and radioactive substances are required to be licenced.

The following are details of licences and registrations pertaining to 1963.

Licences current at 31/12/63	148
New licences applications received	15
New licences granted	13
Licences terminated	3
Licences renewed—	
(a) Medical	84
(b) Non-Medical	22
Registration applications at 31/12/63—	
(a) Dental Surgeons	122
(b) Medical Practitioners	44

Licences are granted by the Minister for Health who is advised by the Radiological Advisory Council. The Council is advised in special areas of Medicine, Dentistry and Industry by advisory sub-committees.

Meetings were held during 1963 as follows :—

Radiological Advisory Council	2
Medical Advisory Sub-Committee	5
Dental Advisory Sub-Committee	1
Industrial Advisory Sub-Committee	0

As well as handling administrative aspects of the Radioactive Substances Act for the Council, the Laboratory provides the necessary technical services. These are covered in later parts of the report.

2.—LABORATORY SERVICES

(a) *Film Badge Monitoring Service*

The Laboratory commenced the monitoring service in 1957. The majority of radiation workers in the State utilise this service. A small number of institutions, mostly Commonwealth organisations, use the Commonwealth X-ray and Radium Laboratory's service.

In 1963, 6,034 personnel monitoring films were processed and the doses evaluated. At 31st December the number of persons monitored was 560, made up as follows :—

Medical—Hospitals, etc.	177
Medical—Private Practice	51
Medical—Radiologists	44
Medical—Chiropractors	6
Dental	252
Non-Medical	30

Towards the end of 1963 a record system was introduced whereby cumulative radiation doses received by all persons using film badges are maintained at the Laboratory. As well as facilitating surveillance of radiation exposure of each radiation worker, valuable information will result on trends of occupational exposure, and the contribution to the genetic dose to the population from occupational exposure.

(b) *Radiation Protection Services*

The Laboratory designs the protection for X-ray installations in Medical Department and most semi-government hospitals. Organisations proposing to use radioisotopes and X-ray equipment for research and teaching purposes also call on the Laboratory to design their facilities.

Requests were received throughout the year to investigate radiation hazards and to advise on radiation protection.

(c) *Inspection Services*

All personnel of the Physics Division and some personnel of the Engineering Division have been appointed Inspectors under the Radioactive Substances Act.

During 1963, 60 installations were inspected. The number of inspections is limited by the availability of staff concerned, and should desirably be far greater.

Many dentists and medical practitioners are not fully aware of the requirements of the Radioactive Substances Act which generally reflect the currently accepted international standards of radiation safety. A visit from an inspector, while it may serve to uncover a serious breach of the Act, more frequently acquaints the practitioner with modern standards and assists him to improve his installation.

(d) *Radiation Standards*

The Laboratory possesses a sub-standard X-ray dosemeter which was calibrated during the year against the Australian primary standard in Melbourne for X-rays up to 2·5 mm. Copper half value layer, and at the Royal Adelaide Hospital for 4 MeV X-rays.

This dosemeter is used as a standard for calibration of the Laboratory's radiation survey equipment, and also for the calibration of superficial therapy X-ray equipment.

(e) *Fallout Measurement*

Surveillance of rainwater, air and milk samples for radioactivity content was continued throughout the year. The presently available equipment does not permit the standard of surveillance to be as high as desirable.

(f) *Medical Physics Services*

Time available for devotion to this service has been severely limited.

A thermistor thermometer was developed to measure intra-ocular temperatures. This has permitted an ophthalmologist to carry out original research which was not previously possible. International interest has been aroused and enquiries received from a number of countries.

(g) *Staff*

At 31st December the Physics Division was staffed by three full-time officers, assisted from time to time by officers of the Engineering Division with whom a high level of co-operation continues. For the services of the Physics Division to be fully maintained in those areas where limitations imposed by staff availability have been referred to, a need for further staff can be anticipated in 1964.

(h) *General*

Lectures.—Lectures were given to the following organisations in 1963 :—

Australian Dental Association :
" Dental Film Processing Control."

Society of X-ray Technology :
1. " Radiation Control."
2. " High Energy Acceleration."

V.H.F. Group :
" Radioactivity."

Civil Defence.—Laboratory personnel assist the Civil Defence organisation's training programme by lecturing on Radiological Aspects of Civil Defence when requested.

Appendix XIII

Report of Maternal Mortality Committee of Western Australia for the Year 1963

By Professor Gordon King (Chairman)

During the year 1963 four maternal deaths occurred in Western Australia, all of which were investigated.

The total number of live births in 1963 was 17,278, giving a maternal mortality rate of 0·23 per thousand live births. This is the lowest rate yet recorded in this State since the keeping of detailed records was first commenced in 1897.

The four deaths are summarised in the following Table :—

Table No. 1

MATERNAL MORTALITY IN WESTERN AUSTRALIA, 1963

Case No.	*Cause of Death—*
1	Chronic Myocardial Degeneration.
2	Abortion with Sepsis.
3	Amniotic Fluid Embolism.
4	Ruptured Ectopic Pregnancy.

Maternal Mortality Rate = 0·23 per 1,000 live births.

Case No. 1

This was a very obese gravida 9, aged 37, who did not report for antenatal care until the 28th week of pregnancy. She was found to be suffering from a serious degree of Chronic Hypertensive Disease. In her 8th pregnancy (two years previously) she suffered a coronary occlusion during the second stage of labour, which was confirmed by electro-cardiogram. Following this, sterilisation on medical grounds was advised, but the patient refused this and discharged herself against advise. During her 9th pregnancy she received hypotensive therapy, but refused to come into hospital for treatment and frequently did not keep her antenatal appointments. When she came into labour her blood pressure was 200/130 mm.Hg. She was delivered spontaneously of a child weighing 7,320 gms. (16 lb. 2 oz.). On the 2nd day of the puerperium she had a single episode of anginal pain, but insisted on discharging herself on the 7th day and refused to undergo sterilisation. On the 30th day after delivery she was found dead on the floor by one of her children.

Postmortem examination showed a grossly enlarged heart (780 gms.) with small coronary arteries. The cause of death was given as chronic myocardial degeneration resulting from essential hypertension. The death was unavoidable, but the patient's condition was aggravated by continued refusal to accept or act on medical advice.

Case No. 2

This patient, a divorcee aged 30 years, was admitted to hospital complaining of inability to open her mouth and stiffness of the face and neck for the past 24 hours. She stated that eight days previously she had had an abortion at about the 10th week of pregnancy, following which there was severe pain in the abdomen with vaginal bleeding and purulent discharge. (No details other than these, were available). On admission a clinical diagnosis of tetanus was made. Fragments of acutely inflamed and necrotic placenta were removed from the uterine cavity, but only Clostridium Welchii was cultured from the swab. The clinical course of the disease was typical of tetanus, and the recurrent muscular spasms necessitated the performance of tracheostomy. In spite of treatment the patient died from increasing respiratory and cardiac embarrassment due to the tetanic spasms on the eighth day after admission to hospital (sixteen days after the abortion).

A postmortem examination yielded no further significant information, and the Committee decided that the death should be classified under Abortion (with sepsis), the actual cause being cardiac failure following respiratory embarrassment due to intra-uterine infection with the tetanus bacillus. There was no delay in diagnosis, and the death was unavoidable insofar as the hospital was concerned though suspicion remained as to the manner by which the infection was introduced.

Case No. 3

The third case was a 37 year old gravida 8 who received satisfactory antenatal care from the 8th week of pregnancy onward. She came into labour a week after term and delivery of a child weighing 9 lb. 12 oz. was completed in less than 5 hours. In spite of intravenous ergometrine given at the time of delivery of the anterior shoulder, the patient continued to bleed during the third stage of labour both before and after the delivery of the placenta. It was also noted that the blood was not clotting. The patient's condition deteriorated rapidly, with restlessness, cyanosis and shock, and in spite of transfusions of fibrinogen, serum, saline and blood, followed by internal cardiac massage, the patient died a little more than 2 hours after delivery.

Amniotic fluid embolism with associated hypofibrinogenaemeia was suspected on clinical grounds, and postmortem examination confirmed that this was the cause of death by yielding evidence of amniotic debris in the vessels of the lung. This was an unavoidable death.

Case No. 4

The last case was a recently married young woman of 19 who had transient episodes of lower abdominal pain for about 2 weeks before being admitted to a small country hospital with a provisional diagnosis of appendicitis. At operation the patient was found to have a ruptured tubal pregnancy with massive intra-abdominal haemorrhage. No blood was available for transfusion and the use of plasma was insufficient to prevent death. This death was classed as avoidable.

The educational value of the detailed enquiries into the causes of maternal death has been amply demonstrated during the three years that have elapsed since the establishment of the Maternal Mortality Committee. Opportunities have been taken of passing on the lessons to be learned from the sixteen deaths (see Table No. 2) that have been investigated during the period 1961 to 1963, to both graduate and undergraduate audiences. Furthermore, four brochures have been prepared for circulation to members of the medical profession on the following subjects :—

1. Puerperal and post-abortal infection.
2. The danger of using ergometrine in the presence of severe hypertension.
3. Anaesthesia in Obstetrical cases.
4. The use of auto-haemo-transfusion in the treatment of ruptured ectopic pregnancy.

Table No. 2

SUMMARY OF CAUSES OF MATERNAL DEATHS
DURING THE YEARS 1961–1962–1963

International List No.	*Obstetrical Causes*	*No. of Cases*
645	Ruptured Ectopic Pregnancy	1
651	Abortion with Sepsis	2
677	Rupture of Uterus	1
678	Amniotic Fluid Embolism	2
681	Puerperal Sepsis	3
684	Puerperal Pulmonary Embolism	1
685	Puerperal Eclampsia	1
	Non-Obstetric Causes	
	Anaesthesia	3
	Bacillary Dysentery	1
	Chronic Myocardial Degeneration	1
	Total	16

Average Maternal Mortality Rate = 0·31 per 1,000 live births.

The thanks of the Committee are due to the practitioners, obstetricians, physicians, and pathologists, whose co-operation has made the investigations possible.

Appendix XIV

Treponemal Investigation among Natives at Cundeelee Mission, 1962-63

By Dr. R. Allen

BACKGROUND

Late in 1962 advice was received from Yalata Mission in South Australia that several natives who had been under treatment there for Venereal Disease, had left to visit Cundeelee Mission in Western Australia. It was decided that a survey should be undertaken to ascertain the incidence of Venereal Disease there.

Cundeelee is situated 25 miles north of the small railway siding of Zanthus at the commencement of the Nullarbor Plain, and is thus approximately 150 road miles east of Kalgoorlie.

It lies in the south-west corner of the Great Victoria Desert in country that consists mainly of spinifex and low scrub. The average yearly rainfall is 7–8 inches, and the problem of finding a satisfactory supply of water in this area is as yet unsolved.

The Mission was founded in 1950, and its population varies from 150 to 270 natives depending on the season of the year, the number on " walkabout," and the proximity of the next corroboree.

The natives are primitive members of the widespread Wongi tribe, and originate from three separate districts :—

1. Approximately three-fifths come from desolate spinifex bush country to the north-east of Cundeelee in the southern portion of the Great Victoria Desert.
2. One-fifth are from the area between Kalgoorlie and Karonie, 50–100 miles west of the Mission.
3. One-fifth originate from the Ooldea district in South Australia, 400–500 miles east of Cundeelee.

METHOD

Members of the party were :—

Dr. R. Allen, Medical Officer, Epidemiology Branch, Public Health Department.

H. J. Brunning, Field Officer, Epidemiology Branch, Public Health Department.

J. Neal, Senior Technologist, Public Health Laboratories.

R. Atkinson, Welfare Officer, Native Welfare Department.

The vehicle used was a 2-ton Bedford single-unit van, usually kept for immunisation clinics, which proved ideal for a mobile laboratory, as it was fitted with ample storage space for equipment, as well as a seven cubic foot refrigerator.

The party left Perth on 9th December, 1962, arrived at Cundeelee Mission the following evening, and returned to Perth on 14th December, having spent two full working days at the Mission.

The following work routine was employed :—

1. The reason for the survey was briefly outlined to the tribal elders, and their consent obtained.
2. Individual adults were identified by Mission Staff, while names, approximate ages and geographical origin recorded.
3. Brief clinical examination by the medical officer, with particular attention directed to any evidence of yaws, leprosy or venereal disease.
4. 10–15 mls. of venous blood obtained by the technologist—usually from the median cubital vein. This blood was allowed to settle, centrifuged and the serum frozen.

Residual cells were also obtained. Haemoglobin estimations were carried out and blood films made.

In this manner 119 samples of blood from the natives were obtained (68 males and 51 females)—this representing over 90 per cent. of the adult population.

RESULTS

Clinically the general health of the natives was remarkably good. No cutaneous signs of yaws, leprosy or venereal disease were seen ; physique and nutrition appeared normal, while respiratory complaints and even rhinitis were rare.

SEROLOGY

The following table gives the results of the four serological tests carried out on the blood samples collected :—

Table A (1962)

Results	W.R.			KAHN			V.D.R.L.			G.C.F.T.		
	Sex		Total	Sex		Total	Sex		Total	Sex		Total
	M.	F.		M.	F.		M.	F.		M.	F.	
++	23	15	38	12	4	16	....	....	....	....	....	....
+	6	9	15	9	12	21	31	31	62	8	6	14
±	....	3	3	5	3	8	....	....	....	6	5	11
∓	4	5	9	6	10	16	....	....	....	....	....	....
=	34	18	52	36	22	58	37	20	57	53	39	92
Anti-Complementary	1	1	2	....	....	....	....	....	....	1	1	2

Table B shows the percentage of positive cases for each test (++ or +).

Table B (1962)

Test	Males			Females			Total		
	Total Examined	Total Positive	Percentage Positive	Total Examined	Total Positive	Percentage Positive	Total Examined	Total Positive	Percentage Positive
			%			%			%
W.R.	68	29	42·6	51	24	47·1	119	53	44·5
KAHN	68	21	30·9	51	16	31·4	119	37	31·1
V.D.R.L.	68	31	45·6	51	31	60·8	119	62	52·1
G.C.F.T.	68	8	11·8	51	6	11·8	119	14	11·8

The geographical origin of the natives is as follows :—

Spinifex desert country	66
South Australia	27
Kalgoorlie-Karonie	23
Warburton Ranges	3

The following table indicates marked differences in the serological results from natives of the three main areas :—

Table C (1962)

Test	Spinifex			South Australia			Kalgoorlie-Karonie		
	Total Examined	Total Positive	Percentage Positive	Total Examined	Total Positive	Percentage Positive	Total Examined	Total Positive	Percentage Positive
			%			%			%
W.R. ++ and +	66	44	66·7	27	3	11·1	23	5	21·7
KAHN ++ and +	66	30	45·4	27	1	3·7	23	5	21·7
V.D.R.L. +	66	49	74·2	27	4	14·8	23	6	26·1
G.C.F.T. + and +	66	7	10·6	27	10	37·0	23	7	30·4

HAEMATOLOGY

The results of the haemoglobin estimations show an absence of anaemia among the women, while those men with low haemoglobins were habitual blood-letters at ritual ceremonies :—

Males

Number tested 68
Average haemoglobin .... 14·5 gms. %
range .... –7·5–16·8 gms. %

Five men had levels below 10 gms. % and two others had levels between 10 and 11 gms. %.

Females

Number tested 51
Average haemoglobin .... 14·4 gms. %
range .... –12·3–16·8 gms. %

In view of the fact that almost 50 per cent. of the blood samples collected gave positive results to the above tests, a further survey was planned during 1963, and in December of that year Cundeelee Mission was again visited. Members of this party were :—

Dr. R. Allen, Medical Officer, Epidemiology Branch, Public Health Department.

J. Iveson, Senior Technologist, Public Health Laboratories.

M. Fogarty, Technician, Public Health Laboratories.

Transport equipment and methods were identical with those employed during the 1962 investigation, and 89 blood samples from the natives were obtained (49 males and 40 females).

The general health of the native population was again good, in spite of a severe influenza outbreak at the Mission seven weeks prior to our visit. A few cases of enteritis were being treated, and a few adult natives were suffering from respiratory tract infections.

Two mild cases of primary yaws were seen in adolescent youths, and one adult woman exhibited classical bilateral " boomerang " tibiae.

There was no evidence of leprosy or syphilis.

RESULTS

The following table gives the results of the four serological tests carried out on the blood samples collected :—

Table D (1963)

Results	W.R.			R.P.C.F.T.			V.D.R.L.			G.C.F.T.		
	Sex		Total	Sex		Total	Sex		Total	Sex		Total
	M.	F.		M.	F.		M.	F.		M.	F.	
++	26	23	49	32	22	54	....	....	....	....	....	....
+	1	1	2	2	1	3	30	27	57	11	12	23
±	2	....	2	1	2	3	....	....	....	5	1	6
∓	1	1	2	....	1	1	....	....	....	....	....	....
=	19	15	34	14	14	28	18	9	27	24	23	47
Not Tested	....	....	....	....	....	....	1	4	5	9	4	13
Total	49	40	89	49	40	89	49	40	89	49	40	89

Table E shows the percentage of positive cases for each test (++ or +).

Table E (1963)

Test	Males			Females			Total		
	Total Examined	Total Positive	Percentage Positive	Total Examined	Total Positive	Percentage Positive	Total Examined	Total Positive	Percentage Positive
			%			%			%
W.R.	49	27	55·1	40	24	60·0	89	51	57·3
R.P.C.F.T.	49	34	69·4	40	23	57·5	89	57	64·0
V.D.R.L.	48	30	62·5	36	27	75·0	84	57	67·9
G.C.F.T.	40	11	27·5	36	12	33·3	76	23	30·3

The unused parts of the samples were then forwarded to Professor Wilkinson in London, who had agreed to assist in the investigation. His results confirmed those obtained locally, and in addition were supported by the Treponemal Immobilisation Test and the Fluorescent Treponemal Antibody Test.

COMMENTARY

From the early part of the 19th Century there have been many reports from explorers, medical men, settlers, investigators, and other observers, stating that the Australian aborigine is riddled with " the loathsome disease Syphilis." Individual cases were described, and attempts were usually made to trace the origin of the disease to sailors or early Oriental visitors.

(1) However, in 1936, Hackett, after dealing with these old reports, remained convinced that the early writers were wrong in their diagnosis, and that the real disease was yaws, which he considered was already present in all native communities when Australia was discovered by Europeans.

(2) Two years later MacKay considered that the pathological lesions seen in 351 aboriginal bones were probably due to Syphilis, but admits that there was not sufficient knowledge of bony changes in yaws to make any definite decision concerning this disease.

Whatever the actual disease, it is evident that the natives have been sufferers from some affliction with both cutaneous and late systemic manifestations, which they know by the name of " irkintja," and even as recently as 1946 reports from the Protector of Natives at Cundeelee indicated that many natives in his area were suffering from " some form of venereal disease."

One outstanding feature of the recent surveys at Cundeelee Mission has been the high standard of general health of the natives there, with almost complete absence of cutaneous lesions or late bone and joint changes that could be ascribed to " irkintja." Also none of the children displayed any suspicion of congenital syphilitic manifestations.

This certainly does not correlate with the findings of 50–60 per cent. positive results to the Wassermann Reaction and other serological tests if these figures are taken to indicate widespread luetic infection.

Two theories are postulated as possible explanations for the high percentage of positive Wassermann Reactions among the native population :—

(1) The possibility of the presence of a non-venereal Treponemal infection with mild clinical manifestations, similar to bejel in the Euphrates Valley, pinta in Latin America, and njovera in Southern Rhodesia.

(2) Yaws is known to be capable of producing positive serological tests for Syphilis, but it is not known how long this positive reaction persists in either treated or untreated cases. If " irkintja " was in fact yaws, there must be many natives who have suffered from this disease in the past, and may still display the serological evidence.

Whatever the correct explanation for the high incidence of positive specific serological tests among the natives, it is evident that further investigatory work is required.

SUMMARY

An account is given of surveys in 1962 and 1963 at Cundeelee Mission in Western Australia. These surveys were undertaken to determine the incidence of positive serological tests for Syphilis among the native population in that area.

Results of the tests are given and their interpretation discussed.

REFERENCES

(1) HACKETT, C. J. (1936).—" A Critical Survey of some references to Syphilis and Yaws among the Australian Aborigines," Medical Journal Australian, Vol. 1, Page 732.

(2) MACKAY, C. V. (1938).—" Some Pathological Changes in Australian Aboriginal Bones," Medical Journal Australian, Vol. 2, Page 537.

Appendix XV

Health of Natives in the Sandy Desert of Western Australia, 1964

By Dr. J. J. Elphinstone

INTRODUCTION

In the centre of the State of Western Australia there is a desert of red sand which covers an area of 200,000 square miles, or a quarter of the whole State. The southern portion of the desert lying West of the Rawlinson Ranges was named Gibson's Desert by the explorer Giles.

In 1958, a combined Health Department and Native Welfare Department party spent two months looking for nomadic natives in Gibson's Desert and the neighbourhood of Lake Anec, Lake Hopkins and Lake Macdonald. That party found thirteen natives and the tracks of about as many more. It was considered that, even in good seasons, the country could not support more than a few small groups of natives.

Nevertheless, in the intervening years, there have been several highly-coloured reports of " lost tribes in the desert " who had, presumably, been missed by the Commonwealth patrol officers who know the Desert so well that they themselves are practically nomadic inhabitants.

The Commissioner of Public Health instructed that a Medical Officer and a Laboratory Technologist should join a Native Welfare Department party which was to leave Giles on 7th April, 1964, and, with the assistance of Commonwealth officers, search the Desert for natives.

The instructions received by the Public Health Department members of the party were to examine and report on the health of the natives and, of course, to treat any who were sick.

The main purpose, with which I was not officially concerned, was to offer the natives in the Desert the opportunity of being transported to Papunya Native Settlement in the Northern Territory. The natives were to have a free choice in the matter.

Although a few natives did elect to remain in the Desert for the present, it was a well-chosen time to suggest to them that life could be pleasanter elsewhere. There had been three unusually dry years in succession and game was very scarce.

The decision to offer the natives a move into a Settlement had already been taken and was not dependent on the Medical Officer's assessment of their health. Nevertheless, one felt that, from the medical point of view, the trip was worthwhile. There will not be many more opportunities for studying the health of natives in their natural surroundings.

Three Commonwealth patrol officers searched different areas of the Desert simultaneously for scattered groups of natives and brought them by truck to convenient points on the road, where the anthropologist and the medical team examined them. The anthropologist's command of the language was thus available to us.

The Western Australian party was in the Desert for twelve days (April 7 to 19) so that the tour was rather a hurried one. The area covered was about one-third of the Desert. The southern third, that is Gibson's Desert, had been fairly well covered in the past. The northern third we did not enter, and there is no up-to-date information about the natives there. Except for a brief visit to Well 35 on 10th April, 1964, we did not go north of 22° 30′ S.

Desert travel no longer presents any difficulty, provided one keeps to the roads, as we did. With low pressure tyres, four-wheel drive was seldom used, and then more for convenience than of necessity. There were no anxieties about fuel or water. Mr. Harmon had assured us that replenishments of both would be there when required, and they always were.

Members of the Western Australian party were :—

J. J. Harmon, District Officer, Native Welfare Department.

J. R. Taylor, Native Welfare Department.

J. J. Elphinstone, Medical Officer, Public Health Department.

A. F. Drummond, Principal Technologist, Public Health Laboratory Service.

R. Tonkinson, Anthropology Department, University of Western Australia.

C. Playford, Geologist.

The map shows the places where we examined natives :—

Pollock Hills. 22° 50′ S., 127° 35′ E.

On 8th and 18th April, 1964, 17 natives examined, Serial numbers 1 to 12, 44 to 48.

Taltiwarra Water Hole. 24° S., 125° 11′ E.

On 13th April, 1964, 13 natives examined, Serial numbers 13 to 25.

Jupiter Well. 22° 10′ S., 126° 16′ E.

On 15th April, 1964, 9 natives examined, Serial numbers 26 to 34.

Likel Water Hole. 22° 45′ S., 127° 5′ E.

On 17th April, 1964, 9 natives examined, Serial numbers 35 to 43.

(The co-ordinates given are only approximate.)

The Commonwealth patrol officers assured us that, in addition to the 48 natives brought to us, only a very few more were known to be in the area.

The natives we saw were bona fide desert nomads, who had never known any other way of life. But that they had never before seen a white man is difficult to believe. Even the most incurious natives must have been attracted by the noise and dust of vehicles on the roads and we know that some had visited the road-maker's camp.

The four groups of natives were widely separated. Those at Likel, Jupiter and Taltiwarra being, respectively, 33 miles, 85 miles and 170 miles from the group in the Pollock Hills.

Whether all four groups belonged to the same tribe was a question which we preferred to leave to the anthropologist. From the medical point of view, they were four racially similar family groups living widely apart in the same desert environment. Probably they met occasionally, by accident or design, and spread infection from one group to another.

Except for the notes on Yaws, the clinical observations on all four groups are presented together.

The results of Wassermann tests and Haemoglobin estimations have been borrowed from Mr. Drummond's Report, for correlation with clinical findings.

NUTRITION

The only completely satisfactory method of investigating the nutritional state of these natives would have been to live with them for a few months and observe what they ate. The alternative method of examining the natives, for signs of dietary deficiencies, has great limitations.

In the absence of signs of specific dietary deficiencies, it is very difficult to decide whether the nomadic native is properly nourished or not. His weight does not help us much, because we do not know what a normal desert native ought to weigh. An important, but sub-clinical, degree of vitamin, or protein, or mineral deficiency could be unsuspected on clinical examination.

We did weigh and measure these 48 natives but, for comparison, we have the records of only 95 similar natives seen in the Compton Hills area of the Desert and in the Dean Range in 1958. The numbers are still too small to be useful.

There were no clinical evidence of Vitamin deficiency.

No child showed any signs of Kwashiorkor.

Plasma Protein values are given in Mr. Drummond's Report.

The Haemoglobin values are, on the whole, fairly high. They do not suggest serious malnutrition.

—	96%–106%	90%–95%	85%–89%	80%–84%	75%–79%	70%–74%
Men	3	4	....	3	2	....
Women	3	3	3	....	....	2
Children	2	3	3	....	3	....

There was evidence of Fluorosis which is discussed under the heading "Teeth."

Prominent abdomens in native children are popularly supposed to be a sign of advanced malnutrition. Unfortunately, they photograph fairly well and can be made to appear quite grotesque.

Most of the children seen, except for exclusively breast-fed infants, had some degree of abdominal distention. The distension was gaseous and deflation sometimes occurred in an astonishingly short time.

It seems probable that the fault lay more with the physical properties of the food than with its content of nutriment. For the native child there are only two kinds of food. Breast milk or adult's food. There are no children's foods to help this transition from one to the other. The adult natives' food, largely unprepared as it is, must strain the youthful digestive tract to the limit. Also, the Desert child, like his parents, must eat as much as it can when the food is there, because there may be no more for a long time.

The distension appeared to cause no discomfort. The stance and gait were slightly lordotic, but activity was not impaired.

For the children who had a noteworthy amount of distension, the Haemoglobin values were :—76%, 78%, 85%, 85%, 98%, 100%.

YAWS

Before any blood samples were taken, the purpose of the procedure was explained to the natives by interpreters in their own language, and consent obtained. We do not know exactly what the interpreters said but, at one place, the consent rate improved after the interpreter had had a dental extraction for violent toothache.

Blood samples for the Wassermann test, and other purposes, were taken from 34 of the 48 natives seen in the Desert proper. The Wassermann was positive in 27 of the 34.

The following extracts from A. F. Drummond's report show that nearly all the adults tested, and more than half the children, had positive Wassermann tests.

Natives of Pollock Hills

Clinical Record No.	Blood Sample No.	Age	Sex	W.R.
1	J 1	30	M.	++
2	J 2	35	M.	++
3	J 3	9	M.	++
4	J 4	24	M.	++
5	J 5	14	F.	++
6	J 6	9	F.	Negative
7	J 7	8	M.	Negative
8	J 8	6	M.	Negative
9	J 9	37	F.	++
10	J10	32	F.	++
11	J11	40	F.	++
12	No sample	....	....	No test
44	J35	16	F.	++
45	J34	20	F.	++
46	No sample	....	....	No test
47	J36	4	M.	++
48	J33	34	M.	++

If the positive Wassermanns in the Pollock Hills group were due to Syphilis, and not to Yaws, it is difficult to see how three children (Nos. 6, 7, 8) could have negative Wassermanns considering that both their parents must have had positive Wassermanns because all the adults in the group had positive Wassermanns.

There was no evidence of Neuro-Syphilis on clinical examination, nor auscultatory signs of Aortitis. No stigmata of Congenital Syphilis were found.

Most of the men were examined for possible scars of healed chancres, with negative results. All the men had ritual sub-incisions.

Case 2/J2.—Male, about 35 years, had a slight degree of " Sabre " Tibiae, usually attributed to osteitis of Early Yaws. He had also three lesions suggestive of the osteo-periostitis of Late Yaws, namely osteitis of the Frontal bone with ulceration and sinus-formation in the over-lying tissues, osteitis of the upper end of the Sternum, and osteitis of a left lower rib. The cardio-vascular and nervous systems appeared normal.

Case 48/J33.—Male, about 35 years, had a chronic bone infection in the neighbourhood of the lower end of the Right Humerus, with much limitation of elbow movement. There was also very little movement in the right wrist joint. The cause might have been Yaws or trauma with secondary infection.

Natives at Taltiwarra Water Hole

Thirteen natives were examined, but we were permitted to take blood samples from six only.

Clinical Record No.	Blood Sample No.	Age	Sex	W.R.
13	J13	40	M.	Negative
14	J14	22	M.	++
15	J15	16	M.	Negative
16	J16	18	M.	++
17	J17	20	M.	++
18	No sample	....	....	No test
19	J19	8	M.	Negative
20–25	No samples	....	....	No tests

There were no clinical signs of Yaws or Syphilis in this group.

Natives at Jupiter Well

Blood samples were taken from eight of the nine natives in this group.

Clinical Record No.	Blood Sample No.	Age	Sex	W.R.
26	J20	35	M.	++
27	J21	30	F.	++
28	No sample	9 months	F.	No test
29	J22	19	F.	++
30	J23	17	F.	++
31	J24	10	F.	++
32	J25	4	M.	++
33	J26	4½	M.	++
34	J27	2½	M.	++

Case 26/J20.—Male, about 35 years, was the well-built hunter and provider for the group at Jupiter Well. He complained of pain in his knees. There was much increased lateral mobility of both knee joints but no effusion. On the medial side of the left knee there was a rounded, firm, moveable, painless, subcutaneous lump about four times the size of a pea. Yaws must be considered in the differential diagnosis of such a tumour in the neighbourhood of the knees.

Case 32/J25.—Male, 4 years. This child walked with a slight limp and had tenderness of the left Tibia. A Commonwealth patrol officer had seen the child six months previously and noticed many sores on the body. There was a scar on the back which could have been caused by any kind of infection.

Case 34/J27.—Male, 2½ years. This child had an encrusted sore on the inside of the right upper arm, and a similar sore on the anterior abdominal wall. Both resembled papillomatous lesions of Early Yaws. Unfortunately, we were not equipped for microscopic examination of fresh specimens.

Natives at Likel Water Hole

Clinical Record No.	Blood Sample No.	Age	Sex	W.R.
35	J28	70	M.	+
36	J29	40	M.	++
37	No sample	15	M.	No test
38	J32	10	M.	++
39	No sample	9	M.	No test
40	No sample	8	F.	No test
41	No sample	7	F.	No test
42	J30	30	F.	++
43	J31	35	F.	++

Case 39.—Male, 9 years. This child had a minimal degree of " Sabre " Tibiae, but blood sampling was not permitted. His brother 38/J32 had a positive W.R.

Case 42/J30.—Female, age 30 years. The woman had scarring of old sinus formation, now closed, over a lower rib on the right side, and a similar condition at the corresponding site on the left side. Osteitis of Late Yaws was the most likely diagnosis.

The conclusion reached was that most of these natives had Yaws. What relationship, if any, that infection bears to some form of Syphilis is a matter for further investigation.

It may be of interest to compare the incidence of positive Wassermann tests among the Desert natives with that of the partly-civilised natives living near Giles Weather Station and at Wangaril water hole in the Dean Range, and with that of the natives at Warburton Ranges Mission.

	Wassermann Negative	Wassermann Positive	Number Tested
Sandy Desert	7	27	34
Giles	2	3	5
Wangaril	17	3	20
Warburton Mission	37	0	37*

* There were 360 natives at Warburton Mission.

The natives at Giles and Wangaril had occasional access to treatment by patrol officers and others with antibiotics which, of course, were freely available to those at Warburton Mission. All these natives wore some kind of clothing which would hinder the spread by contact of cutaneous infections such as Yaws. The Desert natives had neither clothes nor antibiotics.

DENTAL DISORDERS

Tooth decay was widespread in the adults. Mottling of the dental enamel was common in children and sometimes pronounced.

Detailed dental examination was not attempted. Only gross dental decay was looked for and noted. Most of the carious teeth noted below were mere shells, especially in the women. In the children dental caries was almost absent.

Number of Carious Teeth	Men	Women	Children
One	3	1	1
Two	1	1	0
Three	0	1	0
Four	0	1	0
Six or more	1	3	0

Mottling of the dental enamel was pronounced in two children (22/ and 19/J19) seen at Taltiwarra water hole, and in a child of about 7 years (No. 6) and a young woman of about 14 years (No. 5) seen in the Pollock Hills. (These places are about 170 miles apart.) Mottling of lesser degree was seen in several other children.

If the mottling is accepted as evidence of Fluorosis, the Fluoride concentration in the drinking water must have been well above the optimum for human beings living in the Desert climate.

When it was convenient, the natives would drink at the man-made Jupiter Well and the wells of the Canning Stock Route. But, when walking about the Desert, the only water available would be in shallow rock holes.

In the hot arid Desert, fluid in-take must be high, and there is almost no other source of fluid apart from water.

We took a sample of water from Jupiter Well, but we were not equipped to sample every waterhole. However, single samples would have given no indication of the average Fluoride concentration throughout the year.

To form a sound opinion about the optimum Fluoride concentration for natives in that climate, water samples would have to be taken over several years, and the results correlated with the incidence of Fluorosis.

Accute, marginal Gingivitis was present in one woman aged about 16 years (44/J35).

Hypertrophy of the gums was noted in a female child aged about 12 years (No. 5).

TRACHOMA

Only 7 of the 48 natives examined had completely normal eyes without evidence of past infection or injury. Their ages were from 8 to 10 years (four), and 16 to 35 years (three).

Twenty of the 48 natives had active Trachoma and seven others had pannus and scarring over the tarsal plates.

	Active Follicles	Healed, with Scarring
Men	7	2
Women	4	3
Children—		
Under 3 years	1	0
4 to 10 years	5	2
11 to 14 years	3	0

One young woman (5/J5), had active Trachoma and chronic lacrimal cystitis.

LEPROSY

No cases of Leprosy were found.

INTESTINAL PARASITES

Recently excreted specimens of human faeces were recovered from the ground near native camps. It was impossible to obtain specimens directly from individual natives. The findings are reported by A. F. Drummond.

MISCELLANY

Bilateral, firm, painless swelling of Parotid glands was noted in a 10 year old boy (3/J–). Such a condition is sometimes attributed to an unspecified dietetic deficiency.

Slight wasting of the left calf and thigh was present in a woman of 30 years (23/J–).

A woman of about 50 years (21/J–) had slight wasting of the right calf only. She walked on the outside edge of the right foot. No definite diagnosis was made.

Most of the children and adolescents had blonde hair which was invariably matted with mud.

Pediculosis capitis was detected in only one child (3/J–). Presumably mud concealed the condition in others of the same group.

SUMMARY

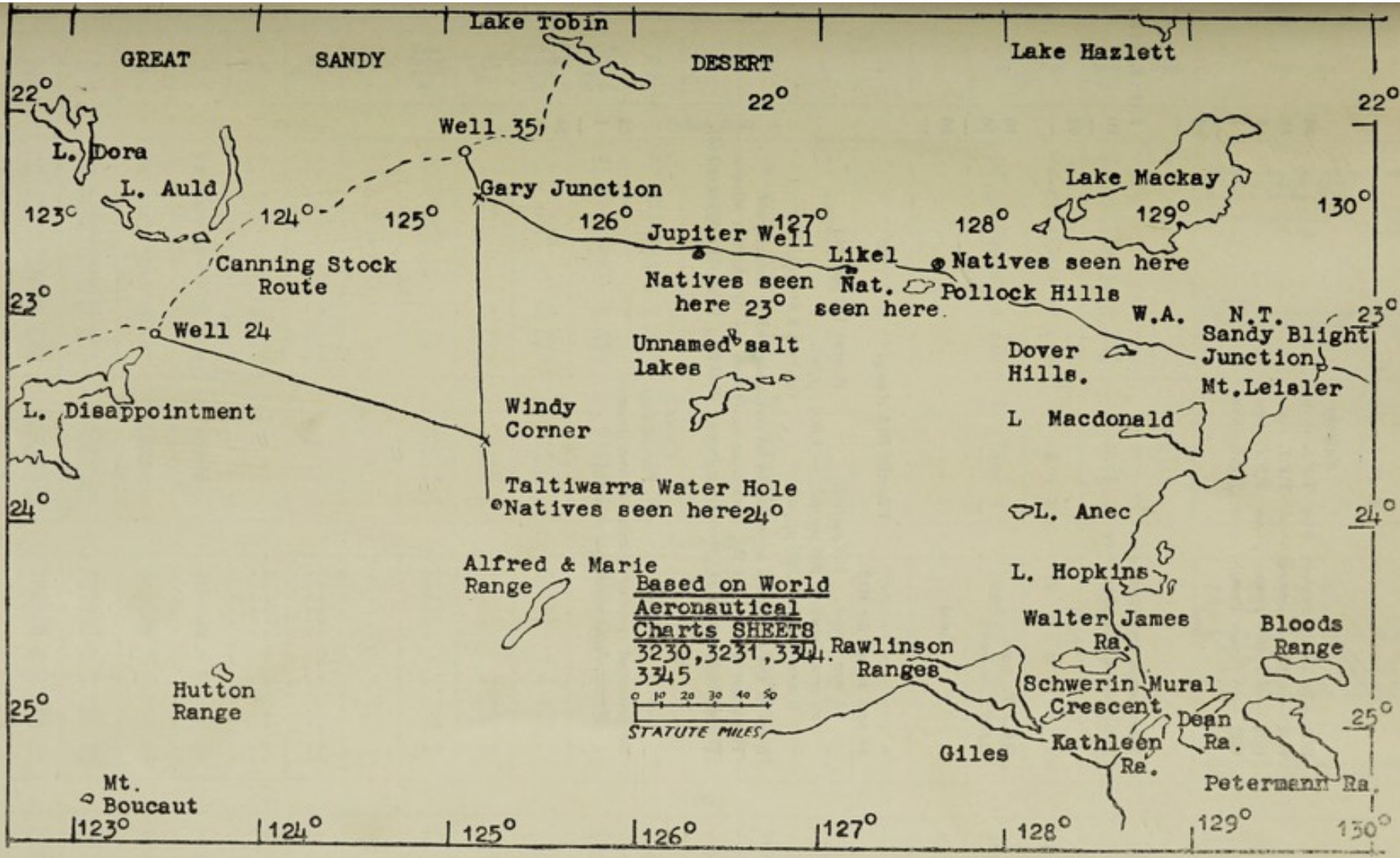
Forty-eight nomadic natives were examined in the Sandy Desert.

There was a high incidence of Dental caries, Trachoma and Yaws.

From the nutritional point of view, my impression was that they were holding their own, with difficulty. Probably, an extreme scarcity of game in the Desert in recent years has a bearing on this.

CONCLUSION

I cannot imagine that those natives would survive for many more years, as a people, in their present environment.


GREAT
SANDY
DESERT
Lake Tobin
Lake Hazlett
22°
L. Dora
L. Auld
Well 35
Gary Junction
123°
124°
125°
126°
127°
128°
129°
130°
Jupiter Well
Likel
Natives seen here
Natives seen here 23°
Nat. seen here.
Pollock Hills
Lake Mackay
Canning Stock Route
23°
Well 24
W.A.
N.T.
Sandy Blight Junction
Mt.Leisler
Unnamed salt lakes
Dover Hills.
L. Disappointment
Windy Corner
L Macdonald
Taltiwarra Water Hole
Natives seen here
24°
L. Anec
L. Hopkins
Alfred & Marie Range
Based on World Aeronautical Charts SHEETS 3230, 3231, 3334, 3345
Walter James Ra.
Bloods Range
Rawlinson Ranges
Schwerin Mural Crescent
Dean Ra.
Kathleen Ra.
Giles
Petermann Ra.
Hutton Range
25°
0 10 20 30 40 50
STATUTE MILES
Mt. Boucaut

CENTRAL DESERT SURVEY—1964

A. F. Drummond

Serology

WR +ve Reiter Protein +ve T.P.I. +ve	....	35
WR —ve Reiter Protein —ve T.P.I. —ve	....	58
WR —ve Reiter Protein —ve T.P.I. +ve	....	2
WR —ve Reiter Protein +ve T.P.I. +ve	....	1
Total		96

Toxoplasma Dye Test +ve	2	(1 : 8, 1 : 32)
Toxoplasma Dye Test —ve	90	
Total	92	

G.C.F.T. +ve	10
G.C.F.T. —ve	76
Total	86

Vitamin B12 Assays

68 sera tested for B12

3 sera below 200 $\mu\mu$/ml. (lowest 112 $\mu\mu$/ml.)
59 sera between 200 $\mu\mu$/ml. — 1,000 $\mu\mu$/ml.
6 sera above 1,000 $\mu\mu$/ml. (highest 2,848 $\mu\mu$/ml.)

None of the specimens appeared to be contaminated or haemolysed.
The three lowest total B_{12} were from natives of the Warburton Mission.
The six highest total B_{12} were from Jupiter Well (2) ; Giles (1) ; Wargaril (3).

Faeces

Parasitology

No protozoal cysts or helminthic ova detected	23
Hymenolepis nana ova detected	1
	24

21st *May*, 1964

Blood No.	Cast	Age	Sex	W.R.	B. P.C.F.T.	G.C.F.T.	Total Protein g/100 ml.	Albumin g/100 ml.	Total Globulin g/100 ml.	Vitamin B12 Assays Pg/ml.	Hb. %	P.	L.	M.	E.	B.	Anis	Poik.	Poly.	Hypo.	Other Data
Pollock Hills																					
J 1	F.B.	30	M.	++	++	....	6·6	....	....	344	94	37	44	5	14	....	Sl.	Sl.	Occ.	....	
J 2	F.B.	35	M.	++	++	±	6·4	3·6	2·8	480	98	45	46	1	8	....	Sl.	Sl.	Occ.	....	Osteitis—Rib, Sternum and Frontal Bone, probably Yaws.
J 3	F.B.	9	M.	++	++	Ac.	7·9	....	....	376	85	50	41	4	5	....	Mod.	Sl.	Sl.	....	Pot Belly brother of (1).
J 4	F.B.	24	M.	++	+	....	6·7	3·8	2·9	736	75	50	35	7	8	....	Sl.	Sl.	Occ.	....	
J 5	F.B.	14	F.	++	++	Ac.	7·5	3·9	3·6	I.S.	106	24	71	1	4	....	Sl.	....	Occ.	....	Girl at waterhole.
J 6	F.B.	9	F.	....	....	....	6·6	4·1	2·5	528	98	24	73	2	1	....	Sl.	Sl.	Occ.	....	
J 7	F.B.	8	M.	....	....	±	6·2	....	....	640	90	34	51	6	9	....	Sl.	Sl.	Occ.	....	
J 8	F.B.	6	M.	....	....	....	....	....	....	I.S.	100	49	48	1	2	....	Sl.	Sl.	Sl.	....	
J 9	F.B.	37	F.	++	++	....	....	....	....	I.S.	100	55	34	2	9	....	Sl.	....	Sl.	....	
J10	F.B.	32	F.	++	+	....	6·3	....	....	480	94	81	16	....	3	....	Sl.	Sl.	Occ.	....	
J11	F.B.	40	F.	++	++	....	....	....	....	I.S.	105	54	43	1	2	....	Sl.	....	Sl.	....	
J12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Refused.
*J33	F.B.	34	M.	++	++	....	7·5	3·0	4·5	464	105	53	31	1	15	....	Sl.	....	Occ.	....	Chronic bone infection right elbow—probably old compound fracture.
J34	F.B.	20	F.	++	++	....	6·2	3·0	3·2	608	90	59	38	2	1	....	Sl.	Sl.	Occ.	....	
*J35	F.B.	16	F.	++	++	±	7·7	3·7	4·0	864	90	67	30	....	3	....	Sl.	Sl.	Occ.	....	
J36	F.B.	4	M.	++	++	....	....	....	....	I.S.	92	30	53	2	15	....	Sl.	Sl.	Occ.	....	
Taltiwarra Waterhole																					
J13	F.B.	40	M.	....	....	Ac.	7·4	....	....	552	102	67	24	....	8	1	Sl.	....	....	....	
J14	F.B.	22	M.	++	++	....	6·7	3·9	2·8	344	78	66	30	....	4	....	Mod.	Sl.	Sl.	....	
J15	F.B.	16	M.	....	....	....	7·1	3·8	3·3	464	80	36	49	2	13	....	Sl.	Sl.	Occ.	....	
J16	F.B.	18	M.	++	++	Ac.	6·9	3·8	3·1	608	95	50	38	1	11	....	Sl.	....	Occ.	....	
J17	F.B.	20	M.	++	++	....	6·4	3·7	2·7	820	80	40	39	2	18	1	Sl.	Sl.	Occ.	....	
J18	F.B.	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	Refused.
J19	F.B.	8	M.	....	....	....	6·2	3·8	2·4	608	86	56	37	....	7	....	Sl.	Sl.	Occ.	....	
Jupiter Well																					
J20	F.B.	35	M.	++	++	....	6·9	3·6	3·3	720	94	59	29	3	9	....	Sl.	Sl.	....	....	
J21	F.B.	30	F.	++	++	....	6·2	3·0	3·2	544	87	67	27	2	4	....	Sl.	Sl.	Occ.	....	No. 1 wife of No. 20.
*J22	F.B.	19	F.	++	++	....	7·4	3·2	4·2	256	86	45	47	3	5	....	Sl.	....	Occ.	....	No. 2 wife of No. 20.
*J23	F.B.	17	F.	++	++	....	7·2	3·5	3·7	432	88	48	49	....	3	....	Sl.	....	Occ.	....	No. 3 wife of No. 20.
J24	F.B.	10	F.	++	++	....	6·2	3·3	2·9	280	85	52	40	3	5	....	Sl.	Sl.	Occ.	....	
J25	F.B.	4	M.	++	++	....	....	....	....	I.S.	78	29	61	4	6	....	Mod.	Sl.	Occ.	....	NT Wel. Off. J. Long rep. Yaws—like sores, Aug., 1963.
J26	F.B.	4½	M.	++	++	....	....	....	....	I.S.	76	30	65	1	4	....	Mod.	Sl.	Occ.	....	2 Mega Units procaien Penicil. Aug., 1963 (Yaws scars now).
*J27	F.B.	2½	M.	++	++	±	8·0	3·1	4·9	308	78	29	56	2	13	....	Mod.	Sl.	....	....	Clinical Yaws, given ½ mega unit Penicil. on 15/4/64, 16/4/64.
*J28	F.B.	70	M.	±	±	....	7·2	3·5	3·7	288	90	70	26	2	2	....	Sl.	Sl.	....	....	
*J29	F.B.	40	M.	++	++	Ac.	7·7	3·6	4·1	392	84	73	24	1	3	....	Sl.	Sl.	Occ.	....	
*J30	F.B.	30	F.	++	++	....	7·0	2·8	4·2	2,842	71	58	31	....	11	....	Mod.	Mod.	Inc. W.C.C.	....	Osteitis of Ribs. ? Sy. ? Yaws. ? Trauma.
J31	F.B.	35	F.	++	++	....	6·9	3·5	3·4	1,216	73	73	21	1	5	....	Mod.	Sl.	Occ.	....	
J32	F.B.	10	M.	++	++	....	....	....	....	I.S.	94	47	48	1	4	....	Mod.	Sl.	Occ.	....	Brother has slight sabre type tibia, but not allowed to be bled.
Giles																					
J37	F.B.	30	F.	++	++	....	7·4	....	....	1,008	112	77	17	1	5	....	Sl.	Sl.	....	....	Sabre Tibia.
J38	F.B.	8	F.	—	—	±	7·7	....	....	960	90	61	37	2	....	....	Sl.	Sl.	Occ.	....	
J39	F.B.	50	M.	—	—	....	....	....	....	I.S.	100	73	23	1	3	....	Sl.	Sl.	—	....	
J40	F.B.	40	M.	++	++	....	7·9	....	....	288	116	75	17	4	4	....	Sl.	Sl.	—	....	
J41	F.B.	30	F.	++	+	....	....	....	....	I.S.	99	69	23	3	5	....	Sl.	Sl.	—	....	

CENTRAL DESERT SURVEY—*continued*

Blood No.	Cast	Age	Sex	W.R.	R. P.C.F.T.	G.C.F.T.	Total Protein g/100 ml.	Albumin g/100 ml.	Total Globulin g/100 ml.	Vitamin B12 Assays Pg/ml.	Hb. %	P.	L.	M.	E.	B.	Anis	Poik.	Poly.	Hypo.	Other Data
Wangaril																					
J42	F.B.	65	M.	....	....	....	....	....	....	I.S.	84	59	36	3	2	....	Sl.	Sl.	Occ.	....	
*J43	F.B.	60	M.	++	++	....	7·7	3·2	4·5	384	88	81	16	2	1	....	Sl.	Sl.	....	....	
J44	F.B.	45	M.	....	....	±	....	....	....	I.S.	94	84	13	2	1	....	Sl.	....	....	....	
J45	F.B.	38	M.	....	....	+	7·0	....	....	336	84	11	27	....	61	1	Sl.	....	Occ.	....	
J46	F.B.	17	M.	....	....	....	6·9	....	....	200	94	73	23	3	1	....	Sl.	....	....	....	
J47	F.B.	16	M.	....	....	....	....	....	....	I.S.	104	55	34	1	10	....	Sl.	....	....	....	
J48	F.B.	18	M.	....	....	....	....	....	....	I.S.	100	81	17	....	2	....	Sl.	....	Inc. W.C.C.	....	
J49	F.B.	50	F.	....	....	....	7·8	....	....	1,472	78	66	31	2	1	....	Mod.	Sl.	Occ.	Inc. W.C.C.	
J50	F.B.	60	F.	....	....	....	7·2	....	....	668	104	87	12	1	....	....	Sl.	Sl.	....	....	Pneumonia.
J51	F.B.	50	F.	....	....	Ac.	....	....	....	I.S.	96	81	17	....	2	....	Sl.	Sl.	Occ.	....	
J52	F.B.	45	F.	++	++	....	....	....	....	I.S.	94	68	30	1	1	....	Sl.	Sl.	....	....	
*J53	F.B.	22	F.	....	....	....	7·5	3·2	4·3	480	84	57	34	1	8	....	Sl.	Sl.	....	....	
*J54	F.B.	18	F.	....	....	Ac.	8·4	3·5	4·9	560	88	44	39	....	17	....	Sl.	Sl.	Sl.	....	
J55	F.B.	20	F.	....	....	....	....	....	....	I.S.	83	50	49	....	1	....	Sl.	Sl.	Occ.	....	
J56	F.B.	17	F.	....	....	....	8·2	....	....	768	100	80	16	3	1	....	Sl.	Sl.	....	....	
J57	F.B.	10	F.	....	....	....	8·0	....	....	960	85	50	47	2	1	....	Sl.	Sl.	....	....	
J58	F.B.	11	F.	....	....	....	7·9	....	....	1,536	90	56	43	1	....	....	Sl.	Sl.	....	....	
J59	F.B.	22	M.	....	....	Ac.	....	....	....	I.S.	102	72	24	....	4	....	Sl.	....	Sl.	....	
J60	F.B.	12	M.	....	....	....	....	....	....	I.S.	93	60	34	3	3	....	Sl.	Sl.	....	....	
J61	F.B.	13	M.	++	++	....	7·4	....	....	1,472	83	54	41	....	5	....	Sl.	Sl.	Occ.	....	
Warburton Mission																					
J62	F.B.	22	F.	....	....	....	7·0	3·6	3·4	352	90	65	33	....	2	....	Sl.	....	Occ.	....	
*J63	F.B.	56	F.	....	....	....	7·8	3·2	4·6	560	88	55	37	....	8	....	Mod.	Sl.	Occ.	Occ.	
J64	F.B.	41	F.	....	....	....	7·7	....	....	800	88	73	21	1	5	....	Mod.	Sl.	Occ.	....	
J65	F.B.	70	F.	....	....	Ac.	8·0	....	....	I.S.	98	65	30	....	5	....	Sl.	Sl.	Occ.	....	
*J66	F.B.	50	F.	....	....	....	7·2	3·1	4·1	224	88	50	41	3	6	....	Sl.	Sl.	Occ.	....	
J67	F.B.	41	F.	....	....	+	....	....	....	I.S.	90	45	50	....	5	....	Sl.	Sl.	Occ.	....	
J68	F.B.	24	F.	....	....	Ac.	7·7	....	....	320	92	47	42	1	10	....	Sl.	....	Occ.	....	Supposed to have history of Cong. Lues.
*J69	F.B.	68	M.	....	....	....	7·5	3·1	4·4	272	100	43	57	....	....	....	Sl.	Sl.	....	....	
*J70	F.B.	67	M.	....	....	....	7·4	3·0	4·4	I.S.	102	71	15	8	6	....	Sl.	Sl.	....	....	
J71	F.B.	....	M.	....	....	+	7·7	....	....	272	75	57	35	....	5	3	Mod.	Sl.	Occ.	Sl.	Urethral discharge after visit Laverton. Also for G.C.F.T. 8 weeks ago.
J72	F.B.	21	F.	....	....	....	8·2	....	....	848	75	20	74	2	4	....	Sl.	Sl.	Occ.	....	One wife of No. 71.
J73	F.B.	17	F.	....	....	....	7·3	....	....	464	88	60	37	2	1	....	Sl.	Sl.	Occ.	....	
J74	F.B.	20	F.	....	....	....	....	....	....	I.S.	80	48	39	5	8	....	Sl.	Sl.	Occ.	Occ. Macro	
J75	F.B.	11	M.	....	....	....	7·0	....	....	184	80	61	29	3	7	....	Sl.	Sl.	Occ.	....	
J76	F.B.	13	M.	....	....	....	7·4	....	....	184	86	47	51	1	1	....	Sl.	Sl.	....	....	
J77	F.B.	13	M.	....	....	....	6·7	....	....	400	87	71	26	....	3	....	Sl.	Sl.	....	....	
*J78	F.B.	11	M.	....	....	....	7·4	3·4	4·0	288	85	57	40	....	3	....	Sl.	Sl.	Occ.	....	
*J79	F.B.	13	M.	....	....	....	8·0	3·5	4·5	112	86	72	23	2	3	....	Sl.	Sl.	....	....	
J80	F.B.	11	M.	....	....	....	....	....	....	I.S.	85	59	40	....	1	....	Mod.	Sl.	....	Occ.	
J81	F.B.	11	M.	....	....	....	7·0	....	....	240	80	60	35	3	2	....	Mod.	Sl.	Occ.	....	
*J82	F.B.	10	M.	....	....	....	7·7	3·6	4·1	228	82	58	33	2	7	....	Mod.	Sl.	Occ.	....	
J83	F.B.	13	F.	....	....	....	....	....	....	I.S.	84	61	32	1	6	....	Sl.	Sl.	Occ.	....	
J84	F.B.	13	F.	....	....	....	....	....	....	I.S.	88	59	30	3	8	....	Sl.	Sl.	....	....	
J85	F.B.	24	F.	....	±	±	5·9	....	....	698	86	90	8	2	....	....	Sl.	Sl.	....	....	Other wife of No. 71. G.C.F.T.
J86	F.B.	12	F.	....	....	....	7·4	....	....	755	91	53	37	....	10	....	Sl.	Sl.	Occ.	....	
J87	F.B.	12	F.	....	....	....	7·2	....	....	416	85	33	63	1	3	....	Sl.	Sl.	Occ.	....	
*J88	F.B.	11	F.	....	....	....	7·5	3·5	4·0	340	82	45	40	4	11	....	Sl.	Sl.	Occ.	....	
*J89	F.B.	12	F.	....	....	....	7·4	3·5	3·9	224	86	42	48	3	7	....	Sl.	Sl.	Occ.	V. Occ.	
*J90	F.B.	12	F.	....	....	....	7·2	3·3	3·9	I.S.	94	50	36	8	5	1	Sl.	Sl.	Occ.	....	
*J91	F.B.	11	M.	....	....	....	6·9	3·3	3·6	I.S.	70	69	29	1	1	....	Mod.	Mod.	Occ.	Sl.	
J92	F.B.	11	M.	....	....	....	7·7	....	....	256	94	69	22	5	4	....	Sl.	Sl.	Occ.	....	
J93	F.B.	12	M.	....	....	....	8·5	....	....	288	88	58	36	2	4	....	Mod.	Sl.	Occ.	....	
*J94	F.B.	12	F.	....	....	....	7·7	3·3	4·4	312	83	47	47	....	6	....	Sl.	Sl.	Occ.	....	
*J95	F.B.	12	F.	....	....	....	7·5	3·6	3·9	200	82	66	29	2	3	....	Mod.	Sl.	Occ.	....	
*J96	F.B.	10	F.	....	....	....	7·4	3·6	3·8	304	82	54	45	....	1	....	Mod.	Sl.	Occ.	Occ.	
*J97	F.B.	12	F.	....	....	....	7·5	3·5	4·0	472	75	59	34	4	3	....	Mod.	Sl.	Occ.	Occ.	

Appendix XVI

Health of the Kimberley Natives

By Dr. J. J. Elphinstone

LEPROSY

Leprosy control in the Kimberleys has reached the stage when we believe that we know the limits beyond which the disease is unlikely to spread. The limits are approximately fifty native families.

Unfortunately, the members of those families no longer live in compact groups as they did a few years ago. The families are often broken up and scattered over a wide area. Individual natives, or whole families, move freely between stations and towns. The follow-up of patients, after discharge from the Leprosarium, is therefore very difficult and will remain so until the natives adopt a more settled way of life.

Before 1962 we had very incomplete information about family contacts of Leprosy patients, and the best method of detecting fresh cases was by mass examinations of all natives on stations and missions. Now, while we cannot abandon our search for " stray " cases in the general native population, it is more rewarding to trace, and examine, the relatives of known Leprosy patients.

During 1962 sixteen fresh cases of Leprosy, nine Lepromatous and seven Tuberculoid, were diagnosed in the Kimberley Division. Of these, fourteen were the off-spring or siblings of past or present Leprosarium patients and would all have been detected, sooner or later, by systematic tracing of the patients' families. A few of the new patients did, in fact, seek treatment of their own accord. District Medical Officers detected several cases, when treatment was sought for some other condition. The two patients, whose families could not be traced, were old women, of poor intelligence, who could not remember their relatives.

During 1963 there were ten new active cases, seven Lepromatous and three Tuberculoid. In all but two the source of infection was traced to a member of the patient's family.

Re-admissions to the Leprosarium

In addition to the twenty-six fresh cases admitted to the Leprosarium during 1962 and 1963, twenty-two natives, who had previously been treated in the Leprosarium, were re-admitted during the same period because the disease had become active again. Also, three old natives, without active disease, were re-admitted for treatment of trophic lesions.

The table below shows the number of patients discharged from Derby Leprosarium every year since 1952, and the years when some of them had to be re-admitted. Unfortunately, the year of re-admission does not necessarily indicate when the disease became active again, because of the difficulty of adequate surveillance.

Of those discharged in 1952—19 per cent. were re-admitted within five years.
Of those discharged in 1953—20 per cent. were re-admitted within five years.
Of those discharged in 1954—17 per cent. were re-admitted within five years.
Of those discharged in 1955—35 per cent. were re-admitted within five years.
Of those discharged in 1956—25 per cent. were re-admitted within five years.
Of those discharged in 1957—16 per cent. were re-admitted within five years.
Of those discharged in 1958—32 per cent. were re-admitted within five years.

It will be noted that the proportion of discharged Leprosarium patients re-admitted within five years was far from negligible.

Twenty-seven per cent. of those discharged in 1952 were re-admitted within ten years and 30 per cent. of those discharged in 1953.

RE-ADMISSION TO DERBY LEPROSARIUM

Year of Discharge	Number of discharges during year	Died after discharge	Year of Re-admission									
			1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Before 1952	....	....	....	....	....	....	....	....	....	....	1	0
1952	51	2	3	5	2	0	1	0	1	0	2	1
1953	50	4	....	2	3	3	2	0	2	1	2	0
1954	48	6	....	....	1	2	3	2	5	4	1	0
1955	48	7	....	....	3	2	6	1	5	2	1	0
1956	36	2	....	....	....	1	2	2	2	2	0	0
1957	43	1	....	....	....	....	1	0	3	1	2	0
1958	55	3	....	....	....	....	....	5	1	4	7	1
1959	45	2	....	....	....	....	....	....	3	2	1	1
1960	6	....	....	....	....	....	....	....	....	1	1	0
1961	14	....	....	....	....	....	....	....	....	....	2	0
1962	22	....	....	....	....	....	....	....	....	....	0	2

All those re-admitted during 1962 had been treated initially with Sulphetrone or Promacetin or Neustab and Isonicotinic Acid Hydrazide. About half of them had later received D.D.S. (Avlosulfon) for varying periods which would be considered too short. Details are given below of the previous treatment received by those re-admitted in 1962.

TREATMENT PREVIOUSLY RECEIVED BY 1962 RE-ADMISSIONS

Duration of Treatment in Months

Patient	Tuberculoid or Letromatous	Sulphetrone Oral	Sulphetrone Parenteral	Promanide	Promacetin	Diasone	Isonicotinic Acid Hydrazide	Neustab	D.D.S.	Ciba 1906
B.A.	L.	....	12	....	....	....	....	....	....	....
D.M.	L.	....	4	....	....	....	....	....	....	....
N.L.	L.	11	1	....	....	....	26	26	30	....
N.N.	L.	12	8	....	....	....	....	11	26	....
L.E.	L.	....	15	....	....	....	....	....	....	....
S.V.	L.	....	48	....	....	....	9	9	37	....
B.	L.	10	....	....	13	....	26	25	14	....
D.W.	L.	....	16	....	....	....	....	....	....	....
J.K.	L.	....	21	7	....	....	26	48	....	....
E.N.	L.	....	45	....	....	....	....	....	....	....
A.Y.	L.	20	....	....	....	....	....	36	13	....
P.A.—										
1st admission	L.	22	....	....	....	24	....	....	....	....
2nd admission	L.	....	....	....	....	....	....	....	25	....
M.L.—										....
1st admission	L.	No record of treatment			....	....	....	....	....	....
2nd admission	L.	....	....	....	34	....	....	....	44	....
M.J.	L.	....	....	....	....	....	36	36	33	....
L.M.	L.	No record of treatment 1944–47				....	....	....	....	....
J.W.	L.	....	....	....	....	....	31	31	14	....
L.J.	T.	....	....	....	....	....	10	9	....	12
B.B.	L.	....	....	....	....	....	36	58	8	....
D.N.	T.	....	....	....	....	....	....	....	....	24
G.F.	L.	24	....	....	....	....	....	....	....	....

TREATMENT PREVIOUSLY RECEIVED BY 1963 RE-ADMISSIONS

Duration of Treatment in Months

Patient	Tuberculoid or Lepromatous	Sulphetrone Oral	Sulphetrone Parenteral	Promanide	Promacetin	Diasone	Isinicotinic Acid Hydrazine	Neustab	D.D.S.	Ciba 1906
M.M.	L.	....	43	6	....	....	22	22	7	....
L.Y.	L.	....	48	....	....	....	2	....	....	....
D.D.	T.	....	....	....	....	....	....	....	....	24
L.J.—										
1st admission	L.	7	16	....	....	....	....	11	19	....
2nd admission	L.	....	....	....	....	....	24	24	....	....
D.W.	T.	....	16	....	....	....	....	....	....	24

The results of treatment may be considered good or bad, depending on whether one compares them with those of Chaulmoogra or those of the modern treatment of other chronic infections. In future, the relapse rate will probably be lower for patients more recently treated with full courses of D.D.S., and, in some neural cases, with Diphenylthiourea.

If the relapse rate does not improve, we must question whether our drugs are good enough, the treatment long enough and the criteria of cure stringent enough. The follow-up of native patients, after discharge from the Leprosarium, is so difficult that we cannot afford the risk of early relapse.

Discharges from the Leprosarium

In 1962 twenty-two patients were discharged, six Tuberculoid and sixteen Lepromatous. The average length of stay in the Leprosarium was two years for Tuberculoid and nine years for Lepromatous cases, the latter's stay varying in individual cases from three years to twenty-six years in an unusually resistant case.

During 1963 eighteen patients were discharged. Eleven Lepromatous cases were in the Leprosarium for an average of eight years, and seven Tuberculoid for an average of two and a half years.

It will be noted that the duration of in-patient treatment at Derby is longer than is customary at some Leprosy hospitals, where it is considered safe to treat patients at home as soon as the skin lesions are bacteria free. We feel that such policy could be dangerous if applied generally to Australian natives at their present stage of assimilation and education.

TRACHOMA

At the present time, more Kimberley natives have active Trachoma than ten years ago.

In 1953, Dr. I. Mann studied Trachoma in the Kimberley Division and made a survey which included nearly half of the pastoral stations and missions. She examined 1,678 natives, which would probably have been about a third of the native population at that time.

The proportion of those examined in 1953 who had active Trachoma can be compared with the 1963–64 figures.

Percentage of Natives, of all Ages, with Active Trachoma

	1953 %	1963–64 %
Kalumburu Mission	19	31
Forrest River Mission	20	30
Balgo Hills Mission	22	60
Beagle Bay Mission	6	24
Lombardina Mission	19	21
Moola Bulla Station	35	40
Gogo Station	23	47
Jubilee Downs Station	50	50
Flora Valley Station	11	14
Fossil Downs Station	17	30

The above figures do not really give a true picture of the Trachoma situation. They include natives of all ages thus obscuring the fact that in children of school age, and adolescents, the incidence of active Trachoma is extremely high. Dr. Mann's 1953 Report does not tell us the proportion of children examined who had active Trachoma, because the numbers examined, in various age groups, is not stated.

The following figures show the present incidence of active Trachoma in native children, at the same localities mentioned above.

	1963–64 %	Number Examined
Kalumburu Mission	76	59
Forrest River Mission	50	80
Balgo Hills Mission	70	132
Beagle Bay Mission	34	138
Lombardina Mission	41	60
Moola Bulla Station	100	7
Gogo Station	74	75
Jubilee Downs Station	100	3
Flora Valley Station	100	10
Fossil Downs Station	72	11

It could reasonably be expected that town natives would suffer less from Trachoma, because of better living conditions, earlier detection and closer supervision of treatment. It is therefore of interest to consider the incidence of active Trachoma in Derby school children.

		Total Examined	Active Trachoma
State School	Native	133	77 (57%)
	White	97	4 (4%)
High School	Native	66	19 (28%)
	White	11	0
Convent School	Native	105	53 (50%)
	White	25	0
Pre-School Native Children			
In Derby Homes		25	21 (84%)
Mowanjum Mission		26	20 (76%)

The native children in the town have obviously not fared any better than those in the outback. Is there no truth in the belief that " an increase in living standards of 1 per cent. results in a fall in the Trachoma incidence of 10 per cent." (Gilkes, 1962) ? Perhaps the melancholy fact is that, for the majority of native families, although they live in more substantial huts, there is no significant difference in standards of sanitation and personal hygiene between the town and the bush.

Native children living in hostels in the town enjoy better accommodation and receive instruction in personal hygiene, but these advantages are off-set by the greater opportunities for infection and re-infection in the large group.

From the gloomy picture just described, it might be thought that very little had been done to halt the spread of Trachoma. Such a conclusion would be quite wrong. In 1959, at the instigation of Dr. I. Mann, every available native child in the Kimberley was, simultaneously, given a fortnight's course of Sulphadimidine. This has such a good effect that, in 1960, active cases could be found only in a few scattered areas.

In 1961–62, " blanket " treatment with a long-acting sulphonamide (Lederkyn) was tried, but had to be abandoned because of occasional serious toxic effects. Reduced dosage removed that danger, but, also, much of the effectiveness of the drug against Trachoma.

During 1963, we have been treating only active cases, and, once again, using Sulphadimidine.

The reason for the lack of success in controlling Trachoma is, in my opinion, that we have expected too much from drugs alone. We have relied on tediously long courses of not-very-efficient drugs while next to nothing has been done to improve the native environment which, with its over-crowding, dirt and flies and absence of personal hygiene, remains ideal for spreading the disease.

Only if there were a potent vaccine, or a drug as rapidly effective against Trachoma as, for example, Penicillin against Yaws could we expect to control Trachoma by that means alone.

The proposed appointment in 1964 of travelling nursing sisters will at least ensure that treatment is competently given and may help to hold the disease in check while the native acquires a better standard of living and a knowledge of hygiene.

HOOKWORM

The Hookworm-endemic areas in the Kimberley Division have increased in number in the past year.

In 1960, the disease was confined to the natives living at Beagle Bay Mission, Kalumburu Mission, Forrest River Mission and the Native Welfare Department's Reserve at Wyndham.

Recently, Hookworm ova have been found by Dr. House in the faeces of natives at Bow River and Argyle Downs, the infection having, presumably, been brought from Wyndham. Several moderately severe cases of Hookworm anaemia have been found at Mowanjum Mission and Kimberley Downs Station near Derby. The infection at Mowanjum was brought by a native family from Wyndham which passed through the Mission and eventually settled at Kimberley Downs, infecting several familes there.

There is no method of preventing the dissemination of Hookworm in this way short of prohibiting the movement of natives out of an endemic area, unless they have been certified free of the disease or recently received adequate treatment with anthelmintics. It is within the powers of the Commissioner to impose such a prohibition. But should it ever be necessary to do so, considerable disorganisation of the cattle industry would inevitably result.

With the aid of anthelmintics (at present, " Alcopar ") and oral Iron therapy, an uneasy equilibrium is being maintained, between the Hookworm and the natives, at Beagle Bay, Kalumburu, Forrest River and Wyndham. Occasionally, the balance inclines in favour of the parasite and a few children are found to have moderate or severe iron-deficiency anaemia.

It is notoriously difficult to get rid of Hookworm in a community once the soil is full of the larvae. The reason is the hardiness of the Hookworm larva and the length of time it can survive in slightly damp soil. In a cubic foot of contaminated soil at Derby laboratory, active larvae have been present for three months, and it is generally accepted that they can remain alive for at least four months.

If a person continues to camp on Hookworm-infested ground, he is likely to go on being infected for at least three months, by the larvae already in the soil, even if no more ova laden faeces are deposited. To keep his own faeces free of ova and, eventually, his intestine free of Hookworms, he would have to take four doses of anthelmintic at monthly intervals. Such frequent dosage is not to be lightly undertaken, although, so far, we have seen no toxic effects from " Alcopar."

As has been pointed out in previous reports, the real culprits in the dissemination of Hookworm infestation are the native mothers, nearly all of whom permit their young children to defaecate at random on the ground. This would not harm a nomadic tribe, which would have moved on before the Hookworm larvae had matured in the soil, but it could be lethal in a settled community. If we are ever to control Hookworm, the mothers must be persuaded to overcome their traditional reluctance to train and discipline their children.

There is wide-spread belief in the fallacy that Hookworm flourishes only during the " Wet," or rainy season, and that one has only to wait for the dry weather to kill off all the Hookworm larvae in the soil. Unfortunately, the most dangerous places for acquiring the infection are areas of infested ground round man-made collections of surface water from water-taps, showers and laundries. These are available all the year round in badly-managed camps. Where there are such collections of surface water, the camp administration also carries its burden of guilt for helping to spread the disease.

The acceptance of the native child into the general community, irrespective of standards of personal hygiene, has brought with it real danger of a limited spread of Hookworm infestation to European children, by the common use of children's playing grounds. A well-watered play-ground with bare-foot children must be the perfect environment for a Hookworm larva.

Some preliminary study has been made at Derby of the possibility of breaking the Hookworm's life cycle at the larval stage in the soil. The problem is to find a substance lethal to the larvae but not toxic to the children who are likely to gain access to the contaminated ground.

Appendix XVII

General Sanitation

SENIOR INSPECTOR'S REPORT

By A. A. Pilbeam

The activities of the General Inspection Branch continued to function and expand despite some difficulties relating to staff shortages.

Details are submitted hereunder with main activities of the Branch being centred around the following items :—

1. Rubbish collection and disposal, and the use of Builders' Bore Hole Latrines in replacing existing sanitary services.
2. Inspections of sub-divisions of land intended for housing purposes.
3. Royal Show activities.
4. Fly Control Campaign.
5. Mosquito Control survey along the Swan, Canning and Helena Rivers.
6. Routine inspections, including Country towns, complaints, Appeals to the Commissioner of Public Health, food and water sampling, and approval of septic tank plans.

The majority of these inspections and investigations were carried out in co-operation with Local Authorities. Figures relating to the various items are submitted hereunder.

Appendices concerning Fly and Mosquito Control are separately attached.

RUBBISH DISPOSAL

Improvements were noted in this direction with continued co-operation from Local Authorities. Continued application of the Sanitary Land-fill Method of rubbish disposal is evident.

A limited experiment in the paper sack method of collection and disposal of rubbish was commenced and completed with the co-operation of the South Perth City Council. A copy of the relevant report is submitted herewith.

BUILDERS' BORE HOLE LATRINES

Use has expanded with the promulgation of the appropriate By-laws.

SUB-DIVISIONS OF LAND

The year's activities concerning inspections of sub-divisions of land for the information of the Town Planning Board are as follows :—

Proposals (Metropolitan)	450
(Country)	14
Area Surveys	26
State Housing Commission	33
Appeals	27
Infant Health Sites	7
Taxation Department	23
Department of Industrial Development	5
Public Works Department	7
General enquiries, Local Authorities, Land Agents, etc.	940
Total	1,532

ROYAL SHOW

Inspection duties at the Royal Show, Claremont, were again undertaken by the Public Health Department in 1963, five (5) Departmental Officers being employed in this capacity.

All aspects of food handling and preparation, fly control, and the general sanitation of the grounds during the Royal Show Week received constant attention from the Inspection staff.

Considerable improvements were noted.

FLY CONTROL

Most Metropolitan and some Country districts again received attention, in co-operation with the respective Local Authorities.

Sixty University students were employed for varying periods from 7–8 weeks.

Nineteen Local Authorities were involved.

A total of 50,421 premises were visited, with 12,302 breeding sites being located in these premises.

Detailed figures are appended to this report.

MOSQUITO CONTROL

An alarming increase in complaints was received by the Public Health Department with regards to mosquito nuisance. This led to a restricted survey of the environs of the Swan, Canning and Helena Rivers being carried out by Departmental Officers in co-operation with Local Authorities bordering these regions.

Details of the survey are shown in an appendix attached to this report.

PEST CONTROL

The following figures show the activities of the Pest Control Section for the year 1963.

Treatments at Government Hospitals and Institutions	250
Treatments at Sewerage Works (Fly Control)	28
Miscellaneous	154
Total	432

Vermin Destroyed—440

Included in this category were rats, pigeons and cats.

ROUTINE INSPECTION DUTIES

Numerous aspects of sanitation were involved and relative details and figures are submitted herewith.

Septic Tanks

A total of 9,148 septic tank applications were approved during 1963. Of these, 762 were for combined systems, this figure representing an increase of 5 per cent. over figures for 1962.

Inspection of Six Pint Flushing Systems

237 six pint cisterns examined.

287 six pint pedestal pans examined.

Inspection of Imported and Frozen Fish—Fremantle Wharf

A total of 3,192,433 lb. were examined and passed for human consumption.

Food and Water Sampling

A total of 1,515 samples procured, comprising :—

Food	264
Miscellaneous	62
River water	98
Swimming pools	453
Water sampling at ocean beaches	638

Twenty-four samples of desiccated coconut, and 130 samples of Egg Pulp are included in these figures.

General Inspections

Towns—95, including Hospitals, and special inspections.

FLY CAMPAIGN, 1962–63

Summary of Results

Local Authority	Number of Students Employed	Total Man Weeks	Number of Premises Visited	Various Breeding Places at Premises Visited											Total Number of Breeding Places
				Rubbish Bins	Buried Food	Poultry Keeping	Incinerator	Garden Mulch	Compost	Blood & Bone	Animal Manure	Fowl Manure	Lawn Clippings	Others	
Fremantle City Council	4	54	5,219	147	62	143	16	62	12	1	45	35	60	....	583
Nedlands City Council	3	12	1,371	75	27	53	11	48	88	....	9	36	143	....	490
Perth City Council	4	25	2,436	63	22	11	8	11	20	....	21	15	64	....	235
South Perth City Council	3	25	3,854	125	106	88	16	47	71	8	42	84	151	....	738
Subiaco City Council	1	31	3,965	405	122	154	63	214	30	1	23	94	223	....	1,329
Cottesloe Town Council	3	15	1,888	112	29	6	20	3	33	1	17	9	45	....	275
Melville Town Council	16	112	10,823	259	268	282	62	151	141	2	62	99	645	....	1,971
Mosman Park Town Council	2	19	1,747	18	13	....	11	....	28	....	....	33	49	16	168
Armadale-Kelmscott Shire Council	1	8	842	35	3	47	2	....	7	....	13	18	23	....	148
Bayswater Shire Council	4	25	3,302	106	64	216	13	85	62	4	52	92	285	....	979
Belmont Shire Council	2	23	2,500	77	41	16	12	12	20	....	66	57	66	....	367
Canning Shire Council	2	16	2,333	281	103	67	20	141	38	....	104	85	234	15	1,088
Cockburn Shire Council	1	8	1,015	245	53	24	3	19	7	....	30	9	8	....	398
Gosnells Shire Council	2	20	1,868	59	12	23	4	13	1	....	23	11	20	....	166
Mundaring Shire Council	1	6	600	21	33	33	11	8	13	....	12	20	35	....	186
Peppermint Grove Shire Council	1	4	400	7	8	10	1	19	47	2	11	8	72	....	185
Perth Shire Council	7	44	4,627	217	925	185	97	185	185	....	146	438	185	....	2,563
Rockingham Shire Council	1	4	302	3	4	3	....	....	....	....	3	3	....	....	16
Swan-Guildford Shire Council	2	14	1,329	37	25	103	27	21	25	....	45	55	79	....	417
Totals	60	465	50,421	2,292	1,920	1,464	397	1,039	828	19	724	1,201	2,387	31	12,302

SUMMARY PARKS AND GARDENS SURVEY (FLY CONTROL)

Local Authority	Schools		Parks and Gardens		Bowling Clubs		Golf Courses		Hospitals		Tennis Courts		Others		Percentage of Infestation
	No. Visited	Infested	No. Visited	Infested	No. Visited	Infested	No. Visited	Infested	No. Visited	Infested	No. Visited	Infested	No. Visited	Infested	
															%
Fremantle City Council	5	1	12	2	2	2	1	1	2	1	1	1	2	2	32
Bassendean Shire Council	2	....	1	....	1	1	....	....	....	....	1	....	2	1	28·5
Mosman Park Town Council	4	....	11	4	1	1	1	....	1	1	1	1	1	....	35
Belmont Shire Council	7	....	4	....	1	1	....	....	2	....	2	2	4	....	15
Claremont Town Council	8	7	3	....	1	....	1	....	5	4	1	....	1	....	55
Canning Shire Council	7	....	2	....	2	....	1	....	....	....	....	....	1	....	Nil
Perth City Council	22	6	39	6	12	1	1	1	3	3	9	1	13	9	27·1
South Perth City Council	9	2	2	1	2	2	1	1	3	1	2	1	3	3	50
East Fremantle Town Council	2	....	4	....	1	....	....	....	1	....	1	....	1	1	9
Midland Town Council	3	2	2	....	2	1	....	....	....	....	1	....	1	....	33·3
Armadale-Kelmscott Shire Council	2	1	2	....	2	1	....	....	1	1	....	....	1	....	37·5
Nedlands City Council	5	....	10	....	4	1	2	1	3	....	4	1	4	1	12·5
Perth Shire Council	33	11	15	1	8	6	3	3	3	3	4	3	9	6	44
Gosnells Shire Council	6	1	4	....	1	1	....	....	....	....	2	....	....	....	15·3
Totals	115	31	111	14	40	18	11	7	24	14	30	10	43	23	Percentage of Total Infested 31·2%
	27%		12·6%		45%		63·6%		58·3%		33·3%		53·4%		

Appendix XVIII

Mosquito Survey

A Survey of the Potential Mosquito Breeding Sites of the Swan, Canning and Helena Rivers

By J. B. Flood

INTRODUCTION

Following the results of two previous limited mosquito surveys along part of the Swan River, made by Officers of the Public Health Department in March, 1961, and January, 1963, the Commissioner of Public Health instructed that a survey of the mosquito potential breeding sites along the Swan, Canning and Helena Rivers be carried out.

OBJECT

The object was to assist Local Authorities to control and eradicate mosquito breeding along the Swan, Canning and Helena Rivers.

LIMITS OF SURVEY

The rivers were traversed between the 18th March and the 10th May, 1963, as follows :—

A. Swan, both sides, from Fremantle to Barrett Street, Herne Hill.

B. Canning, both sides, from Canning Bridge to Royal Street, Kenwick.

C. Helena, both sides, from the Swan River junction to Scott Street, Helena Valley.

Due to heavy rains early in May, the survey of the Canning River was terminated at Royal Street, Kenwick.

POTENTIAL SITES

There are sixty-three (63) potential sites, ranging from ¼ to 400 acres, totalling 2,347 acres.

They are situated along the three rivers in fourteen (14) Local Authority areas. Tables I and II show their distribution along the rivers and in the Local Authority areas.

Site locations will be found in Appendix I, while the details of the sites will be found in Appendix II.

Permanent pools are on the sites but many more pools will be found after high tides.

The surface waters on most sites are tidal, but in addition, tidal flats sometimes also receive water from springs, drainage systems, seepage and rains. These latter sources, for the purpose of brevity, will be all grouped under the heading "Natural." Sites above tidal influence receive their surface water from "Natural" sources.

Table I

DISTRIBUTION OF BREEDING AND POTENTIAL BREEDING SITES ALONG THE RIVERS

River	Breeding Sites		Potential Breeding Sites		Combined Breeding and Potential Breeding Sites	
	Number of Sites	Acreage	Number of Sites	Acreage	Number of Sites	Acreage
Swan	24	1,005¾	14	511½	38	1,517¼
Canning	11	724½	5	40	16	764½
Helena	7	56½	2	9½	9	66
Total	42	1,786¾	21	561	63	2,347¾

Table II

DISTRIBUTION OF BREEDING AND POTENTIAL BREEDING SITES

Local Authority	Breeding Sites			Potential Breeding Sites			Combined Breeding and Potential Breeding Sites		
	River	Number of Sites Involved	Acreage	River	Number of Sites Involved	Acreage	River	Number of Sites Involved	Acreage
Canning Shire Council	Canning	7	560½	Canning	4	34	Canning	11	594½
Perth City Council	Swan	3	118½	Swan	3	363	Swan	6	481½
South Perth City Council	Swan Canning	2 3	128 142	Canning	1	6	Swan Canning	2 4 — 6	128 148 — 276
Belmont Shire Council	Swan	3	223	Swan	4	33	Swan	7	256
Swan-Guildford Shire Council	Swan Helena	8 6	123 46½	Swan Helena	3 2	46 9½	Swan Helena	11 8 — 19	169 56 — 225
Perth Shire Council	Swan	3	119	Swan	2	22	Swan	5	141
Bayswater Shire Council	Swan	2	137				Swan	2	137
Melville Town Council	Swan Canning	2 1	105 8				Swan Canning	2 1 — 3	105 8 — 113
Bassendean Shire Council	Swan	2	51	Swan	1	36	Swan	3	87
Midland Town Council	Helena	4	8½	Swan	1	10	Swan Helena	1 4 — 5	10 8½ — 18½
Gosnells Shire Council	Canning	2	14				Canning	2	14
Subiaco City Council	Swan	1	1½				Swan	1	1½
Mundaring Shire Council	Helena	1	1½				Helena	1	1½
Mosman Park Town Council				Swan	1	1½	Swan	1	1½
		50	1,786½		22	561		72	2,347½

N.B.—Nine (9) sites each involve two adjoining Local Authorities.

TIDES

Tides are of major importance in mosquito breeding and control.

There are two " Tidal Recorders " on the Swan River ; at the Western end of " A " Shed, Victoria Quay, Fremantle, and on the Western jetty at Barrack Street, Perth.

Copies of the daily tidal recording sheets, from the 1st January, 1960, to the 30th April, 1963, have been obtained and are available for perusal. Arrangements have been made for future monthly copies as available ; this will be about the middle of the following month.

Due to the small lunar influence on tides in the Fremantle area, it is not possible at the present time to predict high or low tides, nor times of tidal variations for the Swan River. Meteorological conditions are the major influences.

Although copies of tidal recording sheets are on hand showing all tides recorded at Barrack Street, from the 1st January, 1960, to the 30th April, 1963, insufficient information is available, nevertheless it appears that with unpredictable occasional exceptions, reasonable tides can be expected during late spring and early summer.

From late December, unpredictable high tides flood the low lying river flats. When the water recedes, unless effective control measures are immediately put into operation, with the optimum conditions prevailing—shallow pools of warm water—a mosquito plague occurs.

By observation during the survey, the Swan River is at all times an unbroken sheet of water from Fremantle to Herne Hill. Herne Hill residents state that the unbroken stretch continues to Upper Swan. In summertime the level of the river is affected by the rise and fall over the whole of the unbroken stretch.

The Canning River is tidal to Kent Street Weir, Cannington, and the Helena River for one mile east of the Swan River junction.

Insufficient information is available on the tidal levels in relation to the flooding of the breeding and potential breeding sites.

VEGETATION COVERAGE

Vegetation is of great importance in mosquito control. It can and does prevent access, not only for treatment, but for the effective treatment of the water underneath. The oils and larvicides settle on the vegetation instead of reaching the water.

The vegetation found on some sites excluded effective control as it was with great difficulty penetration through it on foot, without any equipment, was made.

In contrast, some grasses growing in water up to three feet deep, were so matted near the surface they provided footways across the water. This prevented access to larvae predators as they were unable to penetrate the weed and invariably larvae were found in visible water.

Attempts have been made to control vegetation growth, but to date with very little success as the re-growth rate is rapid.

Experiments should be carried out to ascertain if a suitable material can be used to control vegetation growth.

The most common types of vegetation on the sites were rushes, reeds, low scrub and grass. Trees were numerous. Medium scrub and some blackberry bushes were also sighted.

BREEDING

Mosquito breeding of varying density, stages and species, was found in all but one of the fourteen (14) Local Authority areas listed.

The infestations ranged from light to extremely heavy.

On two large sites the adult mosquitoes were so prevalent that it was not possible to enter one without the use of liquid repellant ; whilst on the other, no larvae would have been collected but for this protection. On many other sites adult mosquitoes were very prevalent.

The larvae collected from the breeding sites were identified as :—

a. Aedes alboannulatus
b. Aedes camptorhynchus
c. Aedes vigilax
d. Anopheles annulipes
e. Culex annulirostris
f. Culex fatigans
g. Culex globocoxitus
h. Culex pipiens australicus
i. Theobaldia atra.

PRESENT CONTROL MEASURES

Control measures were being carried out with verying degrees of success.

No matter what current control measures were used on some sites, due to their area, inaccessibility, inability to drain, or type and density of vegetation, only partial control could be expected.

Some Local Authorities anticipate spending approximately £2,000 during the current financial year on mosquito control along their river foreshores.

Amongst the control measures at present in use are :—

(a) Adequate and effective drainage systems.
(b) Predators—Gambusia affinis and other fish. Some water beetles, water boatmen, back swimmers, acquatic larvae of other insects and bird life.
(c) Treatment of water surface with oils—malariol, sump oil and distillate.
(d) Treatment with insecticides and larvicides. These are being mixed mainly by private companies and include, Pyrethrins, D.D.T. Lindane, Dieldrin and Baytex.

Equipment available for the dispersal of oils, distillate, insecticides and larvicides, includes :—

(a) 1 Todd Insecticidal Fog Applicator (T.I.F.A.) owned and operated by the Public Health Department Pest Control Unit.
(b) 10 Swing Fogs.
(c) 4 Holder Supra mechanical sprays.

At present experiments are being carried out with a portable compressor spray unit, from which long hoses will be used.

RECLAMATION

The reclamation of most sites is the only satisfactory, sure and permanent method of eradicating mosquito breeding. Some reclamation has already been carried out along the rivers by Central and Local Governments.

Reclamation can be carried out by dredging from the river by transporting fill, or by sanitary landfill disposal of rubbish.

Dredging from the river is much cheaper than transporting fill. The rate of sanitary landfill is about fifty (50) acres per year. Reclamation of foreshores has been made by this method in the past, but it would appear that with the number of depressions away from the rivers requiring reclamation, that little aid from this source can be expected for many years.

The Canning Shire Council has recently reclaimed low lying areas along the south bank of the Canning River west of Riverton Bridge. The area filled consisted of developed and undeveloped land.

By referendum, permission was obtained from land owners to resume the land in order to carry out reclamation.

The developed land was returned to the owners. The undeveloped land was sold, in some cases to the original owners, to cover costs of reclamation.

DRAINAGE

This term is used widely in mosquito control. Not only does it drain water off a site, it also allows water to remain in channels on a site.

Adequate and effective drainage systems, in conjunction with fish, are considered next in line to reclamation in the defence against mosquito breeding.

Channels are used to drain surface waters even in very low lying areas.

No doubt more water will flow on to a site from the river, but in doing so the channels will enable more fish to come in and remain, and when the tide turns, the water on the site will return much quicker to the river.

To be effective, the drainage system should be laid to a pattern, and the right type of drain, wide or narrow, and shallow or deep, constructed to suit local conditions and the normal river level.

Permanent or semi-permanent pools can be deepened and channels constructed from the back waters into them and thence to the river.

An effective drainage system requires continuous maintenance.

Effective drainage systems are in use on some river sites, but much more use could be made of them.

PREDATORS

Mosquito fish, both the native species and the imported gambusia affinis, even without drainage, play a major role in the control of mosquito breeding.

It was found by introducing mosquito fish into swamps at Durban in South Africa that the annual cost of mosquito control dropped to one-fifth that of previous years, and it is expected to be less in the years to follow.

Information can be obtained by local observation of control measures given by fish and other predators such as water beetles, water boatmen, back swimmers, acquatic larvae of other insects and bird life.

Some pools never seem to contain fish even though they are covered at high tidse. These pools are always a problem. Other pools may or may not contain fish after high tides. Several pools were free of larvae and fish but contained large numbers of water beetles, water boatmen or back swimmers.

Reservoirs of fresh water gambusia affinis are available but it may be necessary to establish reservoirs of the salt water adpated gambusia affinis.

Fish and no doubt other predators are affected by insecticides and larvicides.

Further information is required on biological control as it is felt that with drainage it should be the first line of attack on mosquito breeding whilst awaiting reclamation.

ACCESSIBILITY

The necessity to consider the use of insecticides and larvicides on a large scale can only be achieved economically by the use of the Todd Insecticidal Fog Applicator (T.I.F.A.), either in a vehicle, or on a shallow draft boat or pontoon with an outboard motor.

Difficulty could be experienced in approaching sufficiently close to carry out effective treatment. Some areas are considered too wide for verge application only. The approach, by land, to many sites would depend on the moisture content of the ground surface.

It may be possible whilst awaiting the filling of a site, to construct solid based strips through it, thereby enabling the regular use of a T.I.F.A. mounted on a vehicle.

As engineering problems would be involved it is suggested that this matter be referred to the appropriate engineers.

OIL AND INSECTICIDES

Oil based films spread over the surface of water are important in mosquito control as the larvae of the species of mosquitoes found along the rivers must rise to the surface to breathe. Oil prevents the successful intake of oxygen and damage the tissues, resulting in death.

Experiments conducted in the field overseas show that eighteen (18) microns (1/1430 of an inch) is attainable in practice and gives good results. This thickness of oil will enable 2,750 square feet to be covered with one (1) gallon of malariol. The spray equipment used was in good condition and controlled by an experienced operator.

The most common oils in use along the rivers were malariol, dieselene, sump oil and kerosene.

Natural oil films were sighted on many pools containing mosquito larvae and pupae. Whilst they may reduce their numbers they do not eradicate the larvae.

Insecticides are also important in mosquito control, but only as a last line of defence. They are used in fogging machines to control adults and as larvacides to control and eradicate larvae.

Unfortunately there is always the possibility they will also eradicate mosquito predators, and the adults and larvae will become resistant to them.

Two badly infested sites had, within weeks, been previously treated with insecticides for the eradication of argentine ants.

Both oil films and insecticides are rendered ineffective by high tides. They are spread out and then taken away by the receding waters.

It would appear that the use of insecticides, in some cases, did prevent fish coming in on the following high tides whereas oil films did not.

More information is required on the use of insecticides, both liquid and powder, in mosquito control as the use of a suitable one in correct proportions could be a useful aid.

DISCUSSION

A very serious problem of mosquito breeding exists along the three rivers. The most numerous and widespread type of mosquito being the Aedes vigilax which was found breeding along the tidal flats.

Attempts have been made, with varying degrees of success, to control the mosquito breeding by reclamation, drainage, fish, oils and insecticides.

Reclamation is the only satisfactory permanent method of eradicating mosquito breeding on the tidal flats. In addition, it results in enabling the reclaimed land to be used for parks, gardens, recreational centres, and in some instances, even building allotments.

Temporary measures of control, awaiting reclamation, can best be brought about by the construction of adequate and effective drainage systems, stocking with gambusia fish, supplemented where necessary with oils or insecticides. To enable any degree of temporary control, constant vigilance must be maintained at all times.

SUMMARY AND CONCLUSIONS

A survey of the foreshores along the Swan, Canning and Helena Rivers was carried out between the 18th March and the 10th May, 1963. It revealed mosquito breeding in forty-two (42) sites, comprising 1,786 acres and twenty-one (21) potential breeding sites comprising 561 acres. Nine (9) species of mosquitoes were identified.

Owing to the varied extensiveness and the peculiarities of the areas concerned, mosquito control presents many difficulties which need to be closely examined by experts. It would appear that the solution to the problem will require major engineering works such as, dredging, filling, clearing and drainage.

It is suggested that the task of planning both a short and a long term control programme could best be carried out by the appointment of a special committee, which could examine the suitability of the various anti-mosquito measures in relation to the precise localities involved.

ACKNOWLEDGMENTS

The Survey was conducted and the report compiled under the guidance of Dr. D. J. R. Snow, Deputy Commissioner of Public Health.

In the compilation of this information, the Department is indebted to the following, whose valuable assistance and advice is gratefully acknowledged.

Mr. C. F. H. Jenkins, Government Entomologist.

Mr. N. J. Henry, Public Works and Country Water Supply, Sewerage and Drainage Department.

Mr. J. S. H. Le Page, Public Works and Country Water Supply, Sewerage and Drainage Department.

Mr. D. I. Glendinning, Lands and Surveys Department.

Mr. J. Pericles, Swan River Conservation Board.

Mr. J. Tomlinson, Government Printing Office.

Mr. R. McKay, Fisheries Department.

Special mention must be made of Local Authorities and their Officers, without whose whole-hearted support the survey would not have been possible.

Also various Officers of the Public Health Department (especially, Mr. A. Pilbeam, Mr. J. Fowler, Mr. E. J. Britten, Mr. J. Slattery and Mr. R. Plummer), whose willing co-operation made the task far less difficult than it might otherwise have been.

APPENDICES

I.—Location of sites along the rivers.

II.—Breeding and potential breeding sites.

Appendix II

S Swan C Canning H Helena

BREEDING AND POTENTIAL BREEDING SITES

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S. 1	Point Roe, Mosman Park	Mosman Park Shire Council	Colonial Sugar Refinery Co. and Mosman Park Shire Council	1½	14	1	Heavy coverage of reeds	Tidal	River	Nil	Nil	No evidence of breeding. Further observation required to ascertain if pools remain and for how long after flooding.
S. 2	Point Currie (Pelican Point)	Subiaco City Council	State Govt. (Bird Sanctuary)	1½	10	1 to 2	Heavy coverage of reeds and some low scrub	Tidal	Land	Extremely heavy	Aedes vigilax	a. Filling of breeding pools. b. Drainage. c. Fish. d. Oil or insecticides.
S. 3	Sewerage Pumping Station, Trafalgar Road, East Perth	Perth City Council	State Govt.	¼	3	¼	Reeds and grass	Tidal	Land and river	Light	Aedes vigilax	a. Filling of breeding pools. b. Drainage. c. Fish. d. Oil or insecticides.
S. 4	Joel Terrace, Mt. Lawley	Perth City Council	Private	6	30	2	Reeds and rushes. Some trees	Tidal	River	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
S. 5	St. Anne's Hospital to East Street Jetty, Mt. Lawley	Perth Shire Council	Private and Perth Shire Council	3	20	1 to 2	Heavy coverage of rushes and grass. Difficult walking access	Natural (sources other than tidal)	River	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
S. 6	East Street Jetty to Western Boundary of Aerodrome, Maylands	Perth Shire Council	Private, Perth Shire Council and Commonwealth Govt.	100	80	2 to 30	Heavy coverage of reeds and low scrub. Some dead trees	Tidal and natural	Land and river—limited	Extremely heavy Light	Aedes vigilax Culex annulirostris Culex fatigans	a. Drainage. b. Fish. c. Oil or insecticides.
S. 7	Aerodrome and foreshore to eastern boundary Reserve No. 9323, Maylands	Perth Shire Council	Private, Perth Shire Council and Commonwealth Govt.	12	90	1 to 2	Low scrub	Tidal and natural	River. Land—limited	Heavy	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
S. 8	Clay holes, Peninsula Road, Maylands	Perth Shire Council	Private	19	30	4 to 8	Reeds, rushes and grass	Natural	Land	Nil	Nil	a. Fish. b. Oil or insecticides.
S. 9	Stone Street to Garret Road, Maylands and Bayswater	Perth Shire Council and Bayswater Shire Council	Private and Perth Shire Council	31	46	3 to 9	Heavy coverage of rushes, reeds and grass. Some trees. Difficult walking access	Tidal and natural	River—limited	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
S.10	Garrett Road to Katanming Street, Bayswater	Bayswater Shire Council	Private and Bayswater Shire Council	113	90	1 to 30	Reeds and low scrub. Some trees	Tidal and natural	Land. River—limited	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
S.11	Ashfield Parade, Bassendean	Bassendean Shire Council	Private and Bassendean Shire Council	13	27	2 to 9	Reeds and scrub. Some trees	Tidal and natural. N.B.—Ashfield drain discharges onto river flats	Land and river—limited	Extremely heavy N.B.—No predators were sighted. Argentine Ant eradication treatment carried out prior to survey	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
S.12	Ti tree swamp, Ashfield Parade, Bassendean	Bassendean Shire Council	Private and State Govt.	36	18	20	Low scrub	Natural	Land—limited	Nil (dry at time of survey)	Nil	a. Drainage. b. Fish. c. Oil or insecticides.

8.13	Bennett's Brook, Pyrton	Bassendean Shire Council and Swan-Guildford Shire Council	State Govt.	128	46	28	Reeds, low scrub and trees	Tidal and natural	Land—limited	Extremely heavy N.B.—No predators were sighted. Argentine Ant eradication treatment carried out in Southern section prior to survey	Aedes vigilax Aedes camptorhynchus	a. Drainage. b. Fish. c. Oil or insecticides.
8.14	Northern and Eastern sides of river. Bennett's Brook, Pyrton, to Woodbridge Creek, Caversham	Swan-Guildford Shire Council	Private and State Govt.	3 N.B.—Overall length 120 chains. Intermittent potential breeding sections	60	½ to 1	Reeds	Tidal	River. Land—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
8.15	Western side of river, Woodbridge Creek, Caversham, to Middle Swan Bridge	Swan-Guildford Shire Council	Private	2 N.B.—Overall length 140 chains. Intermittent potential sections	40	½ to 1	Reeds and grass	Tidal and natural	River. Land—limited	Moderate N.B.—Collected from fresh water pools on river flats	Anopheles annulipes Aedes alboannulatus Culex annulirostris Culex fatigans Culex pipiens australicus	a. Drainage. b. Retaining wall on fresh water springs to allow stocking with fish. c. Fish. d. Oil.
8.16	Western side of river, Middle Swan Bridge to River Road, Herne Hill	Swan-Guildford Shire Council	Private	2 N.B.—Made up of 3 isolated small sites—2 Natural water, 1 Tidal water	12	1 to 2	Grass and trees	Tidal and natural	River. Land—limited	Moderate	Culex annulirostris Culex fatigans Culex globocoxitus Culex pipiens australicus	a. Drainage. b. Retaining walls on fresh water springs to allow stocking with fish. c. Fish. d. Oil.
8.17	Inlet and clay holes, Middle Swan	Swan-Guildford Shire Council	Private	23	41	1 to 10	Some reeds and grass	Natural	Land	Nil	Nil	a. Drainage. b. Fish. c. Oil.
8.18	Eastern side of river, Middle Swan to Woodbridge Creek, Midland	Swan-Guildford Shire Council	Private	2 N.B.—2 isolated sites	20	1 small	Grass and trees	Natural	Land	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil.
8.19	Eastern side of river, Woodbridge Creek Junction, West Midland	Midland Town Council and Swan-Guildford Shire Council	Private, Midland Town Council and State Govt.	30	5 to 30	10 to 20	Low scrub. Some trees	Tidal and natural	Land—limited	Nil	Nil	a. Fish. b. Oil.
8.20	Guildford Grammar School, Guildford	Swan-Guildford Shire Council	Private	7	30	2 to 5	Rushes and grass	Natural and overflow from swimming pool	Land	Moderate	Culex annulirostris	a. Drainage. b. Fish. c. Oil.
8.21	Southern side of river, Guildford Grammar School to Railway Bridge, Guildford	Swan-Guildford Shire Council	Private	8	40	2	Rushes and grass	Tidal and natural	River. Land—limited	Moderate	Aedes vigilax	a. Drainage. b. Fish. c. Oil.
8.22	Wilkie Street, South Guildford	Swan-Guildford Shire Council	Private	3	10	3	Reeds, rushes and grass	Tidal	Land and river—limited	Heavy	Aedes vigilax	a. Drainage. b. Fish. c. Oil.
8.23	Beverley Terrace, South Guildford (Lime Creek)	Swan-Guildford Shire Council	Private	9	28	3	Rushes, reeds, grass and trees	Tidal and natural	Land—limited	Light	Aedes vigilax Culex pipiens australicus	a. Drainage. b. Fish. c. Oil.
8.24	Ivy Street, Redcliffe	Belmont Shire Council	Private	8	20	3 to 7	Rushes, reeds and trees	Tidal and natural	Land and river—limited	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil.
8.25	Fauntleroy Avenue, Redcliffe (Clay holes)	Belmont Shire Council	Private	11	16	4 to 10	Light timber on verges	Tidal and natural	Land. River—limited	Nil	Nil	a. Fish. b. Oil.
8.26	Central Avenue, Redcliffe	Belmont Shire Council	Private	75	2 to 36	2 to 24	Rushes, reeds, grass and trees	Tidal and natural	River—limited	Heavy	Aedes vigilax	a. Drainage. b. Fish. c. Oil.
8.27	Ascot Racecourse, Belmont	Belmont Shire Council	Private	10	12	1 to 12	Rushes, reeds and grass. Some trees	Tidal and natural	Land. River—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil.

BREEDING AND POTENTIAL BREEDING SITES—*continued*

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
S.28	Ascot Racecourse to Great Eastern Highway, Belmont	Belmont Shire Council	Private	140	108	7 to 38	Low scrub and reeds. Some trees	Tidal and natural	River—limited	Heavy	Aedes vigilax	a. Drainage. b. Fish. c. Oil.
S.29	Hardey Park, Belmont	Belmont Shire Council	Private	2	28	½ to 1	Reeds, grass and bamboos	Tidal and natural	River	Nil	Nil	a. Drainage and clearing of vegetation.
S.30	Riversdale Road, Rivervale	Belmont Shire Council	Private and Belmont Shire Council	10	50	½ to 10	Blackberry bushes, reeds, rushes, grass and trees. Impassable through blackberry bushes	Tidal and natural	River	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
S.31	Burswood Island. North of Railway line, Goodwood	Perth City Council	Private and State Govt.	112	40	28	Low scrub	Tidal	Land and river—limited	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticide
S.32	Burswood Island, South of Railway line, Goodwood	Perth City Council	State Govt.	251	90	10 to 40	Low scrub	Tidal	Land and river—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
S.33	Cement Works to Causeway, Victoria Park (including Rubbish Tip)	Perth City Council	State Govt.	94	94	10	Heavy coverage of rushes, reeds and grass. Some low scrub near causeway. Difficult access on foot in North-Eastern corner	Tidal and natural	Inaccessible by land or river	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides. N.B.—Planned to fill area north of Causeway in near future.
S.34	Ellam-Taylor Streets, Victoria Park	Perth City Council	Perth City Council	18	12	18	Rushes and grass	Natural	Land	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
S.35	Hurlingham, Ellam Street to Douglas Avenue, South Perth	South Perth City Council	South Perth City Council and State Govt.	85	68	8 to 16	Extremely heavy coverage of rushes on Western section—difficult access on foot. Remainder reeds and grass	Natural	Land—limited	Moderate	Culex fatigans Culex pipiens australicus	a. Drainage. b. Fish. c. Oil or insecticides. N.B.—The river section of this site has been filled from the river and by rubbish depositing.
S.36	Sir James Mitchell Park, South Perth	South Perth City Council	South Perth City Council and State Govt.	43	36	12	Rushes	Natural	Land and river—limited—	Light	Culex fatigans	a. Covering with top soil, as sand. b. Oil or insecticides. N.B.—Filled mainly with mud from river. This has dried out leaving deep wide cracks in which rain water lays. Covering with sand has commenced.
S.37	Cunningham Street, Alfred Cove	Melville Town Council	Melville Town Council	15	39	1 to 6	Reeds and some trees	Tidal and natural	Land	Moderate	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides N.B.—This site is being reclaimed by sanitary landfill. To be completed by 30/6/64.

S.38	Burke Drive, Pt. Walter, Attadale and Alfred Cove	Melville Town Council	Private and Melville Town Council	90	194	1 to 14	Mostly reeds. Rushes and grass East of Lenton Street. Some trees	Tidal and natural	Land and river—limited	Moderate	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
				N.B.—Bird Sanctuary—9 acres river foreshore, vicinity of Bricknell Road, Attadale								
C. 1	Bull Creek. Brentwood-Rossmoyne	Melville Town Council and Canning Shire Council	Private, Melville Town Council and Canning Shire Council	11	55	1 to 4	Reeds, heavy scrub with creepers and trees	Tidal and natural	Land and river—limited	Light	Aedes vigilax	a. Drainage. b. Fish. c. Oil or insecticides.
C. 2	Riverton Drive. Central Road to 5th Avenue, Rossmoyne	Canning Shire Council	Canning Shire Council	8	80	1	Reeds and trees	Tidal	Land and river	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
C. 3	Zenith Street West, to North end of Riverton Drive, Riverton	Canning Shire Council	Canning Shire Council	14	70	1 to 4	Reeds	Tidal	Land and river—limited	Light	Aedes vigilax	a. Fish. b. Oil or insecticides. Arrangement in hand to fill this site.
C. 4	Riverton Bridge to Kent Street Weir, Wilson and Cannington. Both sides of river included	Canning Shire Council	Private and Canning Shire Council	400	160	12 to 40	Reeds, rushes, grass, low scrub and trees	Tidal and natural	River—limited	Extremely heavy Light	Aedes vigilax Aedes camptorhynchus Aedes alboannulatus Culex annulirostris	a. Drainage. b. Fish. c. Oil or insecticides. Aircraft spraying has been used during the last two summers.
C. 5	Kent Street Weir, Cannington. South of and upstream	Canning Shire Council	Private	4	10	4 to 6	Trees	Natural	Land and river—limited	Light	Culex pipiens australicus	a. Drainage. b. Fish. c. Oil.
C. 6	West of Wilcox Street, Cannington	Canning Shire Council	Private	35	35	10	Rushes, grass and trees	Natural	Land and river—limited	Moderate	Culex fatigans Culex annulirostris Culex pipiens australicus	a. Drainage. b. Fish. c. Oil.
C. 7	West of Nicholson Road, Cannington	Canning Shire Council	Private	12	30	2 to 7	Rushes and trees	Natural	Land—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil.
C. 8	South of river, Nicholson Road, Cannington, to Spring Road, Kenwick	Gosnells Shire Council	Private	5 Comprising two small sites and numerous pools on river flats			Blackberry bushes, rushes, scrub, grass and trees	Natural	Land and river—limited	Light	Aedes alboannulatus	a. Drainage. b. Fish. c. Oil.
C. 9	North of river, Royal Street, Kenwick, to Nicholson Road, Cannington	Gosnells Shire Council	Private	9 Comprising three small sites and numerous pools on river flats			Blackberry bushes, scrub, grass and trees	Natural	Land and river—limited	Light	Aedes alboannulatus	a. Drainage. b. Fish. c. Oil.
C.10	Nicholson Road Bridge, Cannington. North of and downstream	Canning Shire Council	Private	2	7	1 to 3	Rushes, scrub and trees	Natural	Land and river—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil.
C.11	East of Wharf Street, Cannington (Disused loam pits)	Canning Shire Council	Private	½	5	1	Rushes	Natural	Land and river—limited	Moderate	Culex annulirostris Culex pipiens australicus	a. Fish. b. Oil.
C.12	Kent Street Weir, Cannington. North of and upstream	Canning Shire Council	Private	12	50	1 to 3	Rushes, scrub and trees. Difficult walking access	Natural	River—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil.
C.13	Riverton Bridge to Eastern Building line, Clontarf—including freshwater swamp	Canning Shire Council and South Perth City Council	Private	109	80	2 to 25	Rushes, reeds, scrub and grass. Some trees	Tidal and natural	Land and river—limited	Extremely heavy Heavy	Aedes vigilax Aedes camptorhynchus Culex annulirostris Culex pipiens australicus	a. Drainage. b. Fish. c. Oil or insecticides.
C.14	Clontarf	South Perth City Council	Private	77	88	1 to 12	Reeds, scrub and trees	Tidal and natural	Land and river—limited	Heavy Moderate	Aedes vigilax Aedes camptorhynchus Culex annulirostris Culex pipiens australicus Culex globocoxitus Theobaldia atra	a. Drainage. b. Fish. c. Oil or insecticides

BREEDING AND POTENTIAL BREEDING SITES—*continued*

SITE		Local Authority Involved	Owner or Controller	AREA			Vegetation	Surface Water Origin	T.I.F.A. Accessibility	BREEDING		Possible Solutions, other than fill, with constant vigilance
Index No.	Location			Acreage	Length Chains	Width Chains				Density	Types	
C.15	Western boundary Clontarf to Salters Point	South Perth City Council	South Perth City Council	60	80	5 to 12	Reeds, scrub and trees	Tidal and natural	Land and river—limited	Light	Aedes vigilax .... Aedes alboannulatus	a. Drainage. b. Fish. c. Oil or insecticides.
C.16	Mt. Henry to Cloister Avenue, Canning Bridge	South Perth City Council	Private and South Perth City Council	6	90	½ to 1	Reeds, scrub and trees	Tidal	Land and river	Nil	Nil	a. Drainage. b. Fish. c. Oil or insecticides.
H.1	Great Eastern Highway to Swan Street Bridge, East Guildford	Swan-Guildford Shire Council	Private	7 N.B.—Intermittent pools after 1 mile East of Swan River Junction	140	½	Rushes, grass and trees	(a) Tidal to 1 mile east of Swan River junction (b) Natural	Land—limited	Light	Anopheles annulipes .... Culex fatigans Aedes alboannulatus	a. Drainage. b. Fish. c. Oil.
H.2	South Stream, Swan Street bridge to rear of Govt. Railways Workshops, Midland	Swan-Guildford Shire Council	Private	6½	130	½	Grass	Natural	Land	Nil	Nil	a. Clearing of grass. b. Fish. c. Oil.
H.3	North Stream (backwater), Swan Street Bridge to rear Govt. Railways Workshops, Midland	Midland Town Council and Swan-Guildford Shire Council	Private	3 N.B.—Intermittent pools	130	½	Grass, bamboos and trees	Natural	Land	Light	Culex fatigans .... Aedes alboannulatus	a. Clearing of grass. b. Fish. c. Oil.
H.4	Rear of Govt. Railways Workshops to Kalamunda Road, Midland	Midland Town Council and Swan-Guildford Shire Council	Private and State Govt.	11	80	½ to 3	Grass and trees	Natural and drainage from Railway Workshops	Land	Light	Culex fatigans .... Culex pipiens australicus Culex annulirostris Anopheles annulipes	a. Drainage. b. Clearing of grass. c. Fish. d. Oil.
H.5	W.A.G.R. Stock truck washout and trade wastes drainage disposal area, Midland	Midland Town Council	State Govt.	1	5	2	Rushes and grass	Drainage from railway stock truck washout area and Army Depot	Land—limited	Moderate	Culex fatigans .... Culex annulirostris	a. Clearing of grass. b. Fish. c. Oil.
H.6	Abattoirs, Midland	Midland Town Council and Swan-Guildford Shire Council	Midland Abattoirs Board	(a) north of river 1½ (b) south of river 20	4 20	4 10	Grass .... Grass	Liquid wastes Disposal System	Land .... Land	Heavy .... Moderate	Culex fatigans .... Culex fatigans Culex pipiens australicus	a. Oil.
H.7	South of river adjacent Kalamunda Road, Bushmead	Swan-Guildford Shire Council	Private and State Govt.	3	10	3	Rushes and grass	Natural	Land—limited	Nil	Nil	a. Drainage. b. Fish. c. Oil.
H.8	Kalamunda Road, Bushmead to Scott Street, Helena Valley	Swan-Guildford and Mundaring Shire Councils	Private	3 N.B.—Overall length 240 chains. Intermittent breeding and potential breeding pools	60	½	Trees on river banks, also scrub at Scott Street end	Natural	Land—limited	Extremely heavy Light	Aedes alboannulatus .... Anopheles annulipes Culex pipiens australicus	a. Fish. b. Oil.
H.9	Brickworks, Helena Valley	Swan-Guildford Shire Council	Private	10	14	2 to 10	Rushes and scrub. Some trees	Natural	Land—limited	Heavy	Aedes alboannulatus	a. Fish. b. Oil.

Appendix XIX

Refuse Containers

Report of the Garbag (Paper Sack) Method of Refuse Collection and Disposal

Based on a Trial within the City of South Perth (27-12-63 to 27-4-64)

Compiled by Mr. J. F. Slattery on behalf of the Organising Committee

INTRODUCTION

In 1958 a Metropolitan Refuse Disposal Committee was formed by the Commissioner for Health. It comprised representatives of Local Health Authorities and Specialists from several Government Departments. Its objects were to co-ordinate refuse disposal activities, reduce the number of disposal sites, and improve the techniques of disposal. Having achieved outstanding success in improved disposal methods, the Committee turned its attention to the problem of collection.

Reports from elsewhere indicated that the replacement of metal rubbish receptacles by paper sacks had proved popular both with householders and with collection personnel. The committee was conscious of the disadvantages of the traditional metal bin i.e. noisiness, cleaning problems, odour and frequent fly-strike. A proposed experimental study was therefore endorsed—involving the use of paper sacks in lieu of metal bins in a selected suburb of Perth.

The project was made possible through the collaboration of the City of South Perth and residents of the district, Australian Paper Manufacturers, Bates Australasia Proprietary Limited, J. Gadsden Proprietary Limited, the Health Education Council of Western Australia, and the Department of Public Health.

Some 141 paper units were installed (at 124 homes, a block of flats and 7 shops). These were cleared once a week for 26 weeks and detailed observations were recorded. The Report which follows has been prepared by Mr. J. F. Slattery of the Department of Public Health. It describes the results of this experiment and indicates that replacement of the metal bin by paper receptacles is both practicable and desirable.

D. J. R. SNOW,
Deputy Commissioner of Public Health and Chairman,
Metropolitan Refuse Disposal Committee.

ADMINISTRATIVE ASPECTS

Organising Committee

Following several exploratory meetings between representatives of the Metropolitan Refuse Disposal Planning Committee, City of South Perth, and the W.A. Paper Sack Development Committee, it was decided to conduct a trial of disposable refuse containers for household rubbish.

The W.A. Paper Sack Development Committee agreed to provide the necessary equipment and supply of sacks for a limited period and meet the costs from its own resources, and the City of South Perth, as a member of South Zone 2, under the Metropolitan Refuse Disposal Plan, was selected as the venue ; the Council extending its ready co-operation to enable the trial to be conducted in its area.

To meet the particular problems arising from implementing the trial, an organising committee was constituted, which comprised :—

Mr. J. F. Slattery	....	Co-ordinating Officer, Metropolitan Refuse Disposal Planning Committee. (Department of Public Health)
Mr. E. M. Forman	....	Engineer, City of South Perth.
Mr. I. S. McNabb	....	Senior Inspector/Building Surveyor, City of South Perth.
Mr. D. W. Gibson	....	Co-ordinating representative, W.A. Paper Sack Development Committee.

The Committee determined its aim as follows :—

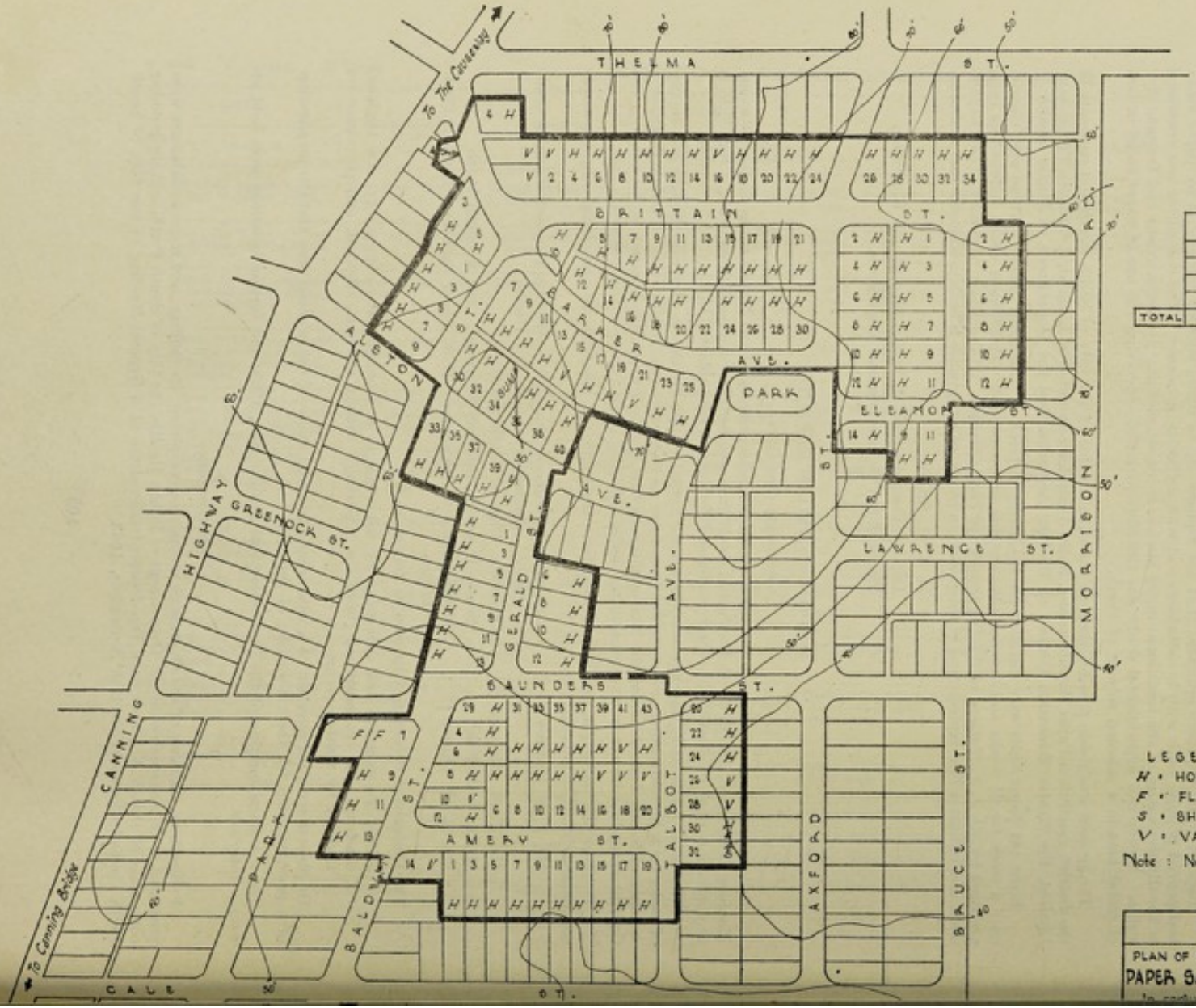
> AIM : To examine and determine by field trial in a representative community, the hygiene, aesthetic, and economic aspects of the " Garbag " system of refuse disposal, and propagate its findings by written report.

Its objects were the selection of a trial area, a pre-trial study of the selected area and the preparation of a practical plan for the conduction of the trial.

The inaugural meeting of the Committee was held in May, 1963, and further meetings were held at weekly intervals.

Field Committee

Preliminary planning of the Organising committee completed, its findings and recommendations were presented to representatives of the Department of Public Health, the City of South Perth, and the member companies of the W.A. Paper Sack Development Committee at a General Meeting at the City of South Perth Council Chambers on 13th September, 1963.



	LOTS	COMPRISING	Average of Bin distribution	Average of "Garbage" distn.
	4	8 LOCK-UP SHOPS & DWELLINGS	7	7
	2	1 BLOCK OF 21 FLATS	20	10
	124	124 DWELLINGS	124	124
	16	VACANT		(+8 Average Double Bdings)
TOTAL	146	133 PROPERTIES	151	149

LEGEND
H = HOUSE
F = FLATS
S = SHOPS
V = VACANT LAND
Note : Numbers shown are House numbers.

CITY OF SOUTH PERTH

PLAN OF SELECTED AREA (for TRIAL PERIOD) "GARBAG"

PAPER SACK METHOD of REFUSE DISPOSAL

Scale 1 1/2" = 200'-0" | Date : 11-8-66

Field Book : | Drg. No. 15C

Ruler

The meeting was chaired by Councillor W. Newman of the City of South Perth, Chairman of South Zone 2 under the Metropolitan Refuse Disposal Plan, and the Deputy Commissioner of Public Health, Dr. D. J. R. Snow, attended.

Representatives invited were as follows :—

Councillor W. C. Newman	City of South Perth (Chairman)
Dr. D. J. R. Snow	Deputy Commissioner of Public Health
Mr. A. A. Pilbeam	Department of Public Health
Mr. J. F. Slattery	Department of Public Health
Mr. M. Forman	City of South Perth
Mr. I. McNabb	City of South Perth
Mr. E. Beer	City of South Perth
Mr. V. Buchanan	City of South Perth
*Mr. D. Hone	Bates A/Asia Pty. Ltd.
*Mr. D. McGhee	Bates A/Asia Pty. Ltd.
*Mr. B. Officer	Bates A/Asia Pty. Ltd.
*Mr. P. Harrington	Bates A/Asia Pty. Ltd.
*Mr. G. Milner	Bates A/Asia Pty. Ltd.
*Mr. B. Scott	Australian Paper Manufacturers Ltd.
*Mr. D. Gibson	Australian Paper Manufacturers Ltd.
*Mr. M. Muggleton	J. Gadsden Pty. Ltd.
*Mr. E. Robertson	J. Gadsden Pty. Ltd.
Mr. J. Carr	Health Education Council
Mr. R. Plummer	Senior Medical Photographer, Department of Public Health.

* W.A. Paper Sack Development Committee.

This main committee was informed of the aims of the Metropolitan Refuse Disposal Planning Committee, and of the events leading to the proposed trial, the Deputy Commissioner of Public Health, Dr. Snow, directing attention to the fact that the correct order of priority had been observed in firstly obtaining efficiency in disposal methods, and subsequently giving attention to collection methods and receptacles.

As a result of this Meeting, the proposed plan was agreed to, and implemented.

Trial Area

The area selected is located in the Como Ward of the City of South Perth, and is representative of a normal metropolitan community of ¼ acre sub-division with a total population of 510 people, and includes dwellings, flats and shop premises.

The pre-trial study revealed as follows :—

(a)	Population :	Adults 322 Children 190 (under 16 years of age) Total : 512
(b)	Dwellings :	124
(c)	Shops :	7 (lock-up type)
(d)	Flats :	1 block of 21 units
(e)	Receptacles :	Standard metal container, approximately 2 cubic feet capacity, located at rear of premises.
(f)	Service :	Weekly collection on Monday of each week. Commences in trial area at approximately 12 noon. Collectors using metal " skip " to transfer refuse to vehicle.
(g)	Double Services :	4 premises have double services.
(h)	Time Taken :	64 minutes.
(i)	Man Minutes per Collection :	2·12
(j)	Plant :	Denis Paxit rear loading compaction type unit. Maximum capacity 14 cubic yards. 450–500 services.
(k)	Personnel :	1 driver, 4 collectors. (Plant and personnel controlled by City of South Perth)
(l)	Rubbish Charges :	£2 5s. per annum.
(m)	Disposal :	Combined zone site Rivervale (City of Perth). Disposal by sanitary land-fill.

Trial Plan

Duration

Initially established for a period of 12 weeks, with the first pick-up of sacks on the 2nd December, 1963, the duration was subsequently increased to 21 weeks by co-operation of the W.A. Paper Sack Development Committee.

Householder

A letter from the City of South Perth, advising of the trial and requesting co-operation was sent to each householder in the week preceding 2nd December, accompanied by a leaflet explaining the method of using the sack system. This was followed by a personal visit to advise on use and answer queries relating to the trial.

Equipment

Sack holding units, and an initial supply of two sacks were delivered to each premises in the week preceding the trial, and the units fitted by the W.A. Paper Sack Development Committee at the location agreed to by householders.

The holders and sacks complied with the following specifications :—

(a) *Sack Holder :*

Wall fixed type, diameter of aperture 12 inches, close fitting lids, and electro galvanised 0·0005 in thickness.

(b) *Sacks :*

Two ply moisture resistant. Outer ply D.C36 Sack Kraft H.W.S. and inner ply D.C27 Sack Kraft N.S.W. Dimensions 40 in. x 15 in. x 5 in. open mouth. Capacity 2·4 cubic feet, weight 5 oz. approximately. Sewn end.

The initial supply of 2,000 sacks was provided by Bates A/Asia Pty. Ltd. and stored at the City of South Perth Council Depot. Further supplies to meet the trial extension were provided as required.

Collection and Disposal

Collection vehicles and personnel were provided by the City of South Perth and disposal in all instances was to the Zone combined land-fill site at Rivervale.

To acquaint the collection personnel with the aims of the trial and to permit them meeting the supervising personnel a general meeting was held at the Council Depot on the 15th November, 1963.

The collection initially was conducted by the Denis Paxit rear loading unit with the normal complement of 1 driver and 4 collectors.

An initial "settling in" period of 4 weeks was allowed without specific direction to the collectors, and subsequent variations to work force, method of collection and type of vehicles applied.

Sack Delivery

In the initial stages, new sacks were left by collectors, but variations were applied, and are referred to later in this report.

Publicity

Publicity and press co-operation was provided by Mr. J. Carr of the Health Education Council, and photographic recording was provided by Mr. R. Plummer, Senior Medical Photographer, Department of Public Health.

Supervision of Trial

Supervision and work studies were conducted by a "Field Committee" constituted from members attending the General Meeting of 13th September, 1963.

A personal letter of Authority was issued to each member by the City of South Perth, and supervision commenced in the week preceding 2nd December.

All aspects of the trial were supervised and work studies conducted, particularly of the economic aspects and householder reaction.

Householders were interviewed each Monday morning prior to the collection, difficulties, comments, conditions and methods of using sack noted, and general advice given.

Time and work studies of various collection methods were conducted, capabilities of various collection vehicles analysed, and collectors' comments and attitude noted.

Standard recording pro-formas for each premises were evolved together with a weekly summary sheet, and questionnaires to obtain trial participants' written comments were prepared and issued during the period of the trial.

In developing the trial, the comparison of the sack system with the conventional metal receptacle was based upon several criteria :—

(a) Sanitation
(b) Aesthetics
(c) Noise
(d) Capacity
(e) Climatic
(f) Cost
(g) Time
(h) Location
(i) Convenience

COMMENCEMENT OF TRIAL

Pre-organisation and approach to householder was completed, and the pick-up by the sack system conducted on the 2nd December, 1963, as scheduled.

As the first four weeks of the trial were allowed as a " settling down " period specific instructions to the collectors was kept to a minimum, and the service was conducted in the accustomed manner using the Denis Paxit collection unit. The collectors delivered a new sack when the full sack was collected.

During this " settling down " period, general observations of the trial were made, and personal interviews conducted with householders and business occupants within the trial area, and observations and reactions recorded.

The immediate reaction of the householder upon commencement of the trial was a general clean up and for the first three weeks of operation, in addition to well filled sacks, an excessive amount of bulk and surplus refuse was removed by collectors. This additional refuse was placed in cartons or tins, and occasionally the standard metal receptacle was used in addition to the sack.

This initial householder reaction had been observed in other forms of trial and was anticipated.

The majority of householders indicated ready co-operation and initial difficulties were quickly resolved, enabling detailed studies to proceed of the various aspects.

TRIAL STUDY

Weather

During the period of the trial, extremes were encountered in climatic conditions. Temperatures reached 105° F., wind gusts up to 44 knots occurred, and a total rainfall of 318 points was recorded, 126 points falling in one period of 24 hours.

Holders

Holders : The sack holder proved effective and simple to use in practice, and did not provide specific difficulties to either collector or householder.

No corrosion occurred, lids were well fitting and flyproof, and sacks were firmly held by the spring arm method of attachment.

Minor defects noted were related to the spring clip of the sack fastening arms which occasionally became bent and ineffective, and occasionally a sagging of the unit under the weight of an excessively filled sack, which permitted a slight springing of the metal lid.

These defects are of a structural nature and can be easily remedied.

Sacks : The sacks proved efficient and practicable under all conditions and with a varied nature of refuse.

The refuse deposited was typical of the metropolitan community and comprised :—

(i) Organic matter and food scraps.

(ii) Dry refuse and household debris.

(iii) Paper and cartons.

(iv) Broken glass and bottles.

The volume per sack averaged 2·00 cubic feet with an average weight of 15·2 lb. per full sack.

Not one breakdown of a sack occurred as a result of climatic conditions ; damage in the earlier phases of the trial were attributable to misuse, resulting in tearing of both walls by broken glass or the sharp corners of cartons.

In four instances only were sacks damaged to an extent to require repacking before removal by collector.

Fly attraction was noticeably absent, and fly breeding was detected in three instances only.

Odour was virtually non-existent.

Animal Attacks

Animal attacks by cats and/or dogs occurred at varying frequency throughout the trial, and were primarily from attacks by stray cats.

A total of 20 animal attacks were recorded, two only to an extent which required repacking of the sacks before removal by collectors.

A wire mesh animal guard placed over the lower half of the sack effectively prevented access by animals. It was decided however, in order to assess the frequency and nature of animal attacks, guards would not be used during the period of the trial.

Dwellings

The householder quickly adapted to the use of the system and following the " settling down " period, the majority expressed a preference for the sack system over the metal receptacle.

Initial difficulties encountered included fitting of sack to holder, and tearing of the sack, resulting from the accustomed practice of compressing refuse in a metal receptacle, which when applied to the sack resulted in wall damage from the sharp corners of containers or broken glass.

Personal explanation and demonstration and increasing familiarity obviated these problems.

Complaints of insufficient capacity arose mainly from incorrect usage ; " bridging " across the sack with bulky refuse which reduced the capacity by obstruction of the lower portion was the main fault.

Experience reduced the number of sacks affected from 17 per week down to 2 per week.

From observations made of the total volume of weight of refuse removed from the trial area relative to the pre-trial study, it was evident that the volume being placed by the householder for collection by the Garbag system, was in excess of that normally removed.

Observations made of the volume being produced by the individual householder revealed that the increase was not constant to a particular producing premises but varied from one premises to another for the period of the trial. But, despite this variation, the utilisation of sack capacities per week remained constant and was recorded as :—

(a) Full = 50%
(b) Three quarter full = 25%
(c) Half full = 25%

The increase in refuse production was reflected in the number of requests for additional sacks for an occasional double service, which varied up to sixteen per week, and other than the four premises normally provided was also not constant to any particular producing premises, but did result in an average of 149 sacks per week being collected.

A notable aspect was that invariably an explanation was offered by the householder when a request for an additional sack was made.

Preference for the Garbag system was quickly expressed by the majority of householders and typical comments recorded referred to appearance and absence of flies and odour.

A questionnaire to assess trial participants' reactions issued on the 16th January, 1964, revealed that after 7 weeks of operation 90% favoured the system, eleven people only indicating a preference for the metal bin system.

The summary of replies received to the questionnaire is as follows :—

1. Unqualified preference for continuance of Garbag system	109
2. Qualified preference for continuance of Garbag system dependent upon no rise in charges	17
3. Preference for returning to metal bins	11
4. No replies received to questionnaire	4
Total	141

The results of this survey were given to trial participants by letter on the 7th April, 1964.

It was noticed that the people expressing opposition to the system were correctly using the sack, and generally giving full co-operation to the trial.

Initially full sacks were removed from the holders by the collection personnel and a new sack left under lid for attaching by householder.

A number of variations applied to the " pick up " location of a full sack from dwellings quickly revealed that the location of the sack had a marked effect on the gross collection time (see Collection Service), and various trials showed that when the sack is detached from the holder and brought forward to the building alignment prior to the arrival of the collection personnel, the time required to service the trial area was reduced.

To establish the householders' reaction to implementing this practice on their own behalf, the householders were requested to detach and bring sacks forward prior to collection on the Mondays of the 20th and 27th April, and to express their views in the questionnaire issued.

The response indicated the attitude of the householder to the system and the extent of co-operation. On the 20th April, 75% of the sacks were located as requested, 33 only of the 124 houses leaving the sack on the holder. This figure includes the eleven who previously expressed opposition to the system, and seven householders absent from home. The remainder, when interviewed, indicated they had either forgotten, or in the case of elderly women, indicated that they were not physically capable of removing the sack.

It is to be noted that six householders included in the above 75% had voluntarily without request, detached and brought forward the sacks from the instigation of the trial.

The figures for the 27th April compared with the above. The expressed opponents to the system leaving the sack on the holder, with a slight variation of the premises in the other categories.

This attitude of the householder was reflected in the views expressed in the questionnaire, when, of the 124 issued, 87 expressed their willingness to bring sacks forward, and seven indicated a preference to paying a small additional charge and have sack collected from the holder.

Of the remainder, 16 expressed a dissatisfaction with either method and 14 forms were not returned.

Of note, is the fact that in the weeks succeeding the trial observation, 68% of the householders continued to bring the sacks forward.

Flats

The flats comprise a 21 unit block, 20 occupied for the period of the trial, and accommodated a total of 34 adults.

Normal refuse service is one metal receptacle to each flat unit, giving a total of 20 services weekly.

Ten garbag units were installed in the courtyard in one set of 4 and two sets of 3, and arrangements made with the caretaker to fit the new sacks when delivered.

Additional sacks were left as spares.

Weekly refuse production was assessed at 20–24 cubic feet, as a result, one and occasionally two sacks were utilised each week in excess of the ten fitted to the holding units.

The nature of the refuse was similar in character to that produced from the dwellings, although on occasion additional bulk refuse comprising mainly newspapers and periodicals were left in a carton and not placed in a sack.

A significant factor is that 10–12 garbag sacks adequately coped with the refuse, giving a reduction in the number of services required, and providing a ratio of approximately one receptacle to each two flats.

Shops

The shops, all of lock-up type, existed in two blocks, and comprised :—Florist, Mixed Business, Bootmaker, Hairdresser, Fish Shop, Newsagent and Butcher shop. Each was equipped with one garbag unit.

The varied nature and quantity of refuse from these premises in most instances required the removal of large quantities of bulk refuse in addition to the full sack, this being most marked with the mixed business where large quantities of waste such as cardboard cartons, etc., is produced weekly and is not of a nature that could be accommodated in the sack.

Where the volume of refuse produced did not exceed the sack capacity, use and capability was similar to the results observed for the dwellings and flats.

Observations indicated that the sack system would not obviate the necessity for bulk removals from high quantity producing premises.

Collectors

The collectors gave full co-operation and offered practical comment and suggestion.

All expressed a preference for the system.

Points made being the ease of carrying the sack, reduced walking distance by servicing two premises without returning to the collection vehicle and the avoidance of carrying the " skip " weighing approximately 20 lb. in addition to the refuse, for the full day.

Collection Service

Following the initial " settling down " period various combinations of vehicles, man power and sack location were applied and observed. These included :—

Vehicles :

(i) Denis Paxit compactor unit—capacity = 14 c. yds. (compacted)
(ii) Standard open truck—capacity = 8·3 c. yds. (waterline)
(iii) Evan Bros. compactor unit—capacity = 14 c. yds. (compacted)

Man Power :

(i) Combination of 1 driver plus 4 collectors, 1 + 3, and 1 + 2.
(ii) Collectors preceding collection vehicle by 15 minutes.
(iii) One man solely on stacking.
(iv) Collectors loading and stacking (open vehicle).

Sack Location :

(i) Rear of dwelling (holder position).
(ii) Curbside.
(iii) Building alignment.
(iv) Fence alignment.

The work studies revealed that a 50% saving in man power on collection (exclusive of driver) can be obtained with the sack system, and a reduction in servicing time can be obtained when sacks are located forward of the premises prior to pick up.

The details of the observations are shown in the section " Economics " but may be summarised as follows :—

The pre-trial study of the selected area with the standard metal receptacle at the rear of the premises, using the Denis Paxit unit and the normal collection complement of 1 + 4, gave an average time for servicing of 64 minutes, giving a man minute per collection 2·12.

The introduction of the sack system, using the same vehicle and complement, resulted in a slight increase in time to 67 minutes or a man minute per collection of 2·25.

This time aspect remained constant over a period of six observations, and remained constant when a standard open truck was substituted for the Denis Paxit unit.

It was noted that an increase in refuse, occurred with the introduction of the sack system, which was assessed at 0·6 cubic feet per collection.

The early observations revealed that the type of collection vehicle had little bearing on the time factor in servicing, but indicated that with a variation on the pick up location of the sacks :—

(a) a reduction in man power was practicable.

(b) a time saving factor could be introduced.

Further observations were made of these aspects and applied to the various vehicles.

Denis Paxit

The use of this vehicle with the normal complement of 1 + 4 but varying to have three collectors preceding the collection vehicle by 15 minutes, removing the sacks from the holder, bringing the sack forward and placing at the curbside, with one man only loading, reduced the gross time for service from 67 minutes to 46 minutes, a reduction from 2·25 man minutes per service to 1·84 man minutes per service. Further trials with the work force reduced to 1 driver and 2 collectors, but with the sacks previously detached and brought forward by the householder to the fence alignment, reduced the gross collection time to 41 minutes, and a man minute per service of 0·82.

It was noted that the collectors, despite a 50% reduction in work force, were able to cope, and did not express any feeling of distress.

The gross time figure of 41 minutes for the Denis Paxit remained constant within the close limits for the remainder of the trial, varying factors resulting in slightly increased times but not exceeding 44 minutes.

A noteworthy fact is that a return to the full complement of 1 driver and 4 collectors in the later stages of the trial did not result in a marked reduction of time despite the additional two collectors, the time on one occasion reducing to 34 minutes, but normally remained constant at 40–42 minutes per service of the trial area.

Factors affecting the time aspect with the use of the Paxit vehicles was the necessity for stopping of the vehicle to permit compaction—normally required 10 times at a time of 20 secs. per compaction in the trial area ; the type of paxit resulted in a further time loss, the wider access of the older type tending to obviate a crowding factor which occasionally occurred with the collectors when using the more recent model with the different aperture design. Stacking, however, is not required with this type of vehicle.

The last two weeks of the trial indicated a slight increase, up to 42 minutes with 4 collectors, and 75% of sacks only brought forward by householders.

Open Trucks

The initial collection time of 67 minutes using a full complement of 1 + 4 with sacks being removed from holders by collectors, was reduced to 46 minutes or 1·84 man minutes per collection when the service was conducted on similar methods to the initial test with the Paxit ; three collectors preceded the collection vehicle by 15 minutes, removed sacks from holders at rear of premises and placed them at the curbside. Loading and stacking was done by one man.

This time was reduced to 34 minutes or 1·14 man minutes per collection when sacks were previously brought forward to the front fence alignment and work force employed was 1 driver, 3 collectors and 1 stacking.

The reduction of the work force to 1 driver, 2 collectors only and 1 man stacking resulted in an increased time of one minute, to 35 minutes, as a result of one man less being used gave a man minute collection figure of 0·93.

Further reduction of the work force to 1 driver and 2 collectors only, doing their own stacking, again increased the time of full service by two minutes to 37 minutes, but reduced the man minutes per collection to 0·74 minutes as a result of two less men being utilised.

The collectors did not feel distressed by the reduction of the work force.

A return to the full complement of 1 driver and 3 collectors and 1 man stacking, with a fence alignment collection resulted in a gross time of 40 minutes, with a man minute per collection of 1·34.

Observations indicated that stacking of sacks with an open truck vehicle would be necessary to obtain maximum capacity usage ; on one occasion the vehicle was unable to accommodate the final 9 sacks when stacking was not conducted ; the sacks were easily accommodated when stacking was resorted to.

Evan Bros. Compaction Unit

This is a new, recently developed, compaction type collection unit. Capacity being 14 cubic yards compacted, side loading with compaction to rear of vehicle.

The unit was obtained for one day during the period of the trial, but due to a number of interruptions to service by observers in the trial area, times are not conclusive. Servicing of the trial area with an operating personnel of 1 driver and 2 collectors with fence alignment resulted in a comparative time of 45 minutes or a man minute per collection of 0·91.

The side loading facilities of the Evans Bros. unit appeared to offer an advantage, with the freer access provided to collectors without crowding.

Four compactions were required, each of 20 seconds duration, compared to 10 each of 20 seconds for the Denis Paxit with similar number of services. As with the Paxit, stacking was not required.

Economics

The trial observations showed conclusively that the most desirable and economically practicable method of conducting a collection service by the Garbag system is the utilising of a work force of 1 driver and 2 collectors irrespective of the type of vehicle, with the filled sacks being brought forward by the householder to the front fence alignment on collection day, and it is upon this basis that the economic aspects of the Garbag system relative to the standard method is based.

Due to a number of variable factors, including the restricted period of the trial, and the limited number of premises serviced, some cost factors had of necessity, to be estimated, but are within tolerable limits.

In following tables, costs are related to collection aspects only, disposal is a factor common to both methods and is not included.

Table I

Relative Cost per Service of Collecting by Standard Method to Garbag System in the Trial Area

Basis of Computation :

(i) No. of services per week = average 149
(ii) Work force, skip method = 1 + 4
(iii) Work force, Garbag method = 1 + 2
(iv) Unit costs—open truck—estimated 10/- per hour
compactor unit—estimated 15/- per hour
wages per man—estimated 11/- per hour

	Standard Method (Skip Method) Bins at Rear (1 + 4)	Garbag System Sacks at Fence Alignment (1 + 2)
Open Truck :	5·5d.	2·4d.
Compactor Unit :	6·0d.	2·6d.

Table II

Relative Cost per Service of Collection by Standard Method to Garbag System in a Community Providing 10,000 *Services*

Basis of Computation :

Extrapolation of trial area volume and time to 10,000 services. Allowance made for service travelling time travelling to disposal site and the various capacities of open truck and compactor unit with full pay load.

	Standard Method (Skip Method) Bins at Rear (1 + 4)	Garbag System Sacks at Fence Alignment (1 + 2)
Open Truck :	7·25d.	3·5d.–4·25d.
Compactor Unit :	7·25d.	3·75d.–4·0d.

The cost factors shown in Tables I and II are computed from the information shown, and based on the average of six observations for each aspect.

For all practical purposes the cost factor may be considered to be equal for either bin or Garbag when collected from the rear of the premises serviced ; the dramatic cost per service reduction occurring when the sack is collected from the fence alignment of the premises serviced.

The extrapolation to a community of 10,000 absorbs the slight variations in service costs noticeable in the smaller community of the trial area, the difference in operating costs of the open truck and the compactor unit being balanced by the varied size of the pay load and the number of trips required to off load at the disposal site, resulting in a basic cost per service of 7·25d. with immeasurable variation for either open or compactor type vehicle, and with either sack or bin at the rear of the premises, the cost factor again being markedly reduced with fence alignment collection.

Table III

Comparison of Cost of Garbag System with Existing Standard Method in a Community Providing 10,000 *Services*

	Standard System Rear of Premises		Garbag System Rear of Premises	Garbag System Fence Alignment
Collection :	7·25d. per wk.	Collection :	7·25d. per wk.	4·00d. per wk.
Bin Provision :	2·00d. per wk.	Holder :	2·00d. per wk.	2·00d. per wk.
Skips, shoulder pads, etc. :	·04d. per wk.	Sack Delivery :	0·38d. per wk.	0·38d. per wk.
		Sack Cost :	8·40d. per wk.	8·40d. per wk.
Totals :	9·29d. per wk.		18·03d. per wk.	14·78d. per wk.
Per Annum :	483·08d.		937·56d.	767·56d.

N.B. : Holder, manufacturing cost 37/6d., estimated with depreciation, at same cost as metal bin provision and replacement.

Sack cost allowed at manufacturers' price of 8·4d.

The interpretation of Table III indicates that the introduction of the Garbag System will result in a cost increase ; this increase however, is offset by factors shown in the chapter " Conclusion."

CONCLUSIONS

1. The observations made throughout the trial, show conclusively that the paper sack system of refuse collection is practicable, efficient and attractive aesthetically.

2. The sacks are capable of containing all nature of refuse, and hold a larger volume of refuse relative to the standard metal receptacle in the trial area.

3. Bin sanitation, odour, and the noise factor in using and collecting metal receptacles is eliminated with the sack system.

4. The Garbag system provided conclusively that a main fly breeding source—the dirty rubbish bin—can be eliminated.

5. The majority of householders indicated a preference for the Garbag system, and it is preferred by the collection personnel.

6. The sack system maintains collection vehicles in a cleaner condition, and the necessity for daily cleaning is reduced or obviated.

7. Refuse enclosed in sacks permits simpler forms of collection vehicles resulting in reduction of capital cost to Local Authorities for provision or replacement.

8. The aesthetic appearance of the sacks permits a front fence alignment refuse collection, not acceptable with metal receptacles.

9. Present day concepts of communal health requires Local Health Authorities increasing attention to the provision of bi-weekly refuse collection, which will undoubtedly be obviated, and the increased costs avoided, with the introduction of the sack system.

10. The introduction of the Garbag system on a communal basis with a fence alignment collection, will result in an increased cost per tenement of approximately 24/– per annum (based on findings of trial area).

This increase would be offset by :—

(a) Improved standards of environmental sanitation.

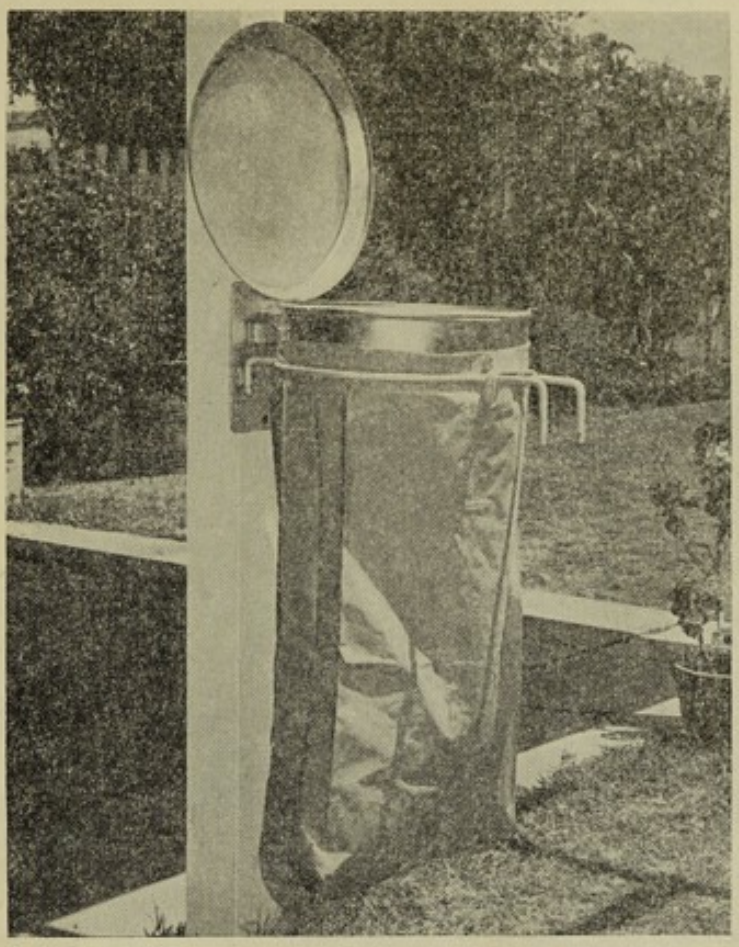
(b) Reduced capital costs of collection vehicles and equipment.

(c) The obviating of introducing a bi-weekly service.

SUMMARY

A study of the use of paper receptacles instead of metal bins, for domestic refuse, is described. Some 140 paper sacks (with special holders) were installed at 124 homes, one large block of flats and seven shops. The sacks were replaced each week. Factors such as noise, odour, fly-strike, convenience, acceptability and economics were observed and recorded over a period of 26 weeks. The findings indicate that the paper bag is a suitable, practicable and acceptable alternative to the metal bin.

Its adoption will be slightly more expensive than the present system, but this is outweighed by public health and other advantages.



The unit is aesthetically attractive. Reduced noise, odour and flies.

Reduced walking distance for collectors.

Varied form of collection vehicle is practicable.

Street alignment collection could be acceptable.

NO. 67 1851 67 1852

CITY OF SOUTH PERTH

MUNICIPAL OFFICES
CIVIC CENTRE
SOUTH PERTH
WESTERN AUSTRALIA

IT IS REQUESTED ALL LETTERS BE ADDRESSED TO THE TOWN CLERK AND EACH LETTER DEAL WITH ONLY ONE SUBJECT

The Householder :

Dear Sir/Madam,

REFUSE COLLECTION : PAPER SACK TRIAL PROJECT.

At the request of the Public Health Department, this Council has agreed to introduce a trial scheme in which disposable paper sacks will replace the conventional dustbin. The Department, in conjunction with the Metropolitan Refuse Disposal Committee, is particularly desirous of correlating information (which can only be obtained from such a trial) in an investigation to establish improved methods of garbage collection and disposal.

Similar methods in which the sacks are fitted to galvanised metal holders have proven in other parts of the world to be simple in operation and convenient to use. Schemes in these countries are operating successfully and in fact this system is being used in many hospitals and factories in Western Australia and other States.

A small area which includes your premises has been selected for the trial in this State and shortly you will receive a call from a Health Inspector of this Council and a representative of the Paper Sack Industry, which is co-operating with the Public Health Department and this Council in the trial. These representatives will explain the system to you. In the meantime we enclose a leaflet which describes the operation of the sack method.

To measure and assess the advantages of the system it will be necessary to operate the trial for a period of three months and to do this the co-operation of every owner or tenant of property within the test area is kindly sought. The trial will be conducted without cost to you, other than the normal garbage collection rate.

A sack and holder will be delivered to you in a few days and as from Monday, — September, 1963, the day on which the trial will commence, you are asked to place all your garbage in the sack, as dustbins in the test area will not be emptied after this date during the currency of the trial.

Yours faithfully,

E. J. JOHNSON,
Town Clerk.

The Garbag System

the NEW, CLEAN and EFFICIENT way of handling household garbage

The "Garbag System" introduces a new approach to the handling and disposal of garbage. It is being successfully used overseas and interstate, and is proving a boon to householders because amongst its many benefits it plays an important part in safeguarding your health and the health of your family!

1. EASY TO USE

To fix the paper sack to the holder is a simple operation. Unclip the metal side arms attached to the holder and open these outward. The sack is then opened up, the side walls pushed out and the sack placed over the holder. Bring the arms back to the original position and fix these into position with the clip. Your sack is now ready for use.

2. HYGIENIC

The only area of the holder likely to need regular cleaning is the inside rim and the underside of the lid. The lids are close fitting, and being attached to the holder will completely cover your garbage to KEEP FLIES OUT! We all know the danger from this source so KEEP THE LID DOWN AFTER USE! Very wet food waste should be well wrapped, also broken glass. Do not put hot ashes in the sack.

Issued by the W.A. PAPER SACK PROMOTION COMMITTEE, 9 Howard Street, Perth, W.A.

Form A.

W.A. PAPER SACK PROMOTION COMMITTEE

SOUTH PERTH GARBAG TRIAL

1st INTERVIEW

1. Name of Householder : ..... Date of Visit : .....
2. Flat/Dwelling/Shop : ..... By : .....
3. Address : .....
4. Number in Family : .....
5. Do more than one family share house : .....
6. Is there a front fence and/or gate : .....
7. Is footpath made : .....
8. Distance from dustbin to front of house (approx.) : .....
9. Is wet waste normally wrapped : .....
10. Usual size and number of dustbins used : .....
11. Where is dustbin normally left for collector : .....
12. Is dustbin normally cleaned after using : .....
13. Does lid properly fit dustbin : .....
14. Where is dustbin normally stored : .....
15. Where will sack holder be put : .....
16. How are bottles normally disposed of : .....
17. How are papers disposed of : .....
18. Initial reaction to scheme : In favour/not in favour : .....

    For what reasons : .....

    .....

    .....

19. Other Comments : .....

    .....

    .....

    .....

TEL. NO. 67 1651 67 1652

CITY OF SOUTH PERTH

MUNICIPAL OFFICES
CIVIC CENTRE
SOUTH PERTH
WESTERN AUSTRALIA

IT IS REQUESTED ALL LETTERS
BE ADDRESSED TO THE TOWN CLERK
AND EACH LETTER DEAL WITH ONLY
ONE SUBJECT

16th January, 1964.

Dear

re : GARBAGE REFUSE DISPOSAL TRIAL

This Council, the Public Health Department and the Paper Sack Industry thank you for your co-operation during the current refuse collection trial using disposal paper sacks.

As you are aware the conduct of the trial has been closely supervised throughout, and will continue to be watched for the remainder of the trial. At this stage your views of the scheme would be appreciated and you are asked to complete the attached questionnaire which will be collected next Monday.

All information submitted by you will be treated as strictly confidential.

Yours faithfully,

J. HARRINGTON,
Acting Town Clerk.

Form B.

CITY OF SOUTH PERTH

GARBAG REFUSE DISPOSAL TRIAL

2nd INTERVIEW

Name :..... Date :.....

Address :..... By :.....

Flat/Dwelling/Shop :.....

Sack : Is it large enough ?.....

Any difficulty in putting on ?.....

Bothered by cats, dogs or rodents ?.....

Easier to handle ?.....

Unit : Is it satisfactory ?.....

If not, why not ?.....

.....

Do you find it cleaner than dustbins ?.....

Is it more convenient to use ?.....

System : Is the system more hygienic ?.....

Any reduction of flies ?.....

Any reduction of smells ?.....

Any difficulty in leaving bottles separately ?.....

What do you feel about using dustbins again ?.....

.....

.....

.....

What Do You Think of The System ?.....

.....

.....

.....

.....

TEL. NO. 67 1851 67 1852

MUNICIPAL OFFICES
CIVIC CENTRE
SOUTH PERTH
WESTERN AUSTRALIA

IT IS REQUESTED ALL LETTERS BE ADDRESSED TO THE TOWN CLERK AND EACH LETTER DEAL WITH ONLY ONE SUBJECT

CITY OF SOUTH PERTH

7th April, 1964.

Dear Householder,

RE GARBAG REFUSE TRIAL

As a Householder co-operating with the Public Health Department in the City of South Perth in the Garbag Refuse Trial, you will be interested in the opinions of the system expressed in a questionnaire recently completed by householders in the trial area.

The questionnaire has revealed that of one hundred and forty-one premises equipped with the system, 90% of the householders concerned have indicated their acceptance of the system, analysis of opinions being as follows :—

1.	Unqualified preference for continuance of the Garbag system	109
2.	Qualified preference for continuance of the Garbag system dependent on no rise in charges	17
3.	Preference for reverting to use of conventional bin	11
4.	No replies received to questionnaire	4
	Total	141

You will be further advised in this matter at an early date.

Thanking you for co-operation extended.

Yours faithfully,

E. J. JOHNSON,

Town Clerk.

17th April, 1964.

TEL. NO. 67 1851 67 1852

CITY OF SOUTH PERTH

MUNICIPAL OFFICES
CIVIC CENTRE
SOUTH PERTH
WESTERN AUSTRALIA

IT IS REQUESTED ALL LETTERS BE ADDRESSED TO THE TOWN CLERK AND EACH LETTER DEAL WITH ONLY ONE SUBJECT

Dear Householder,

RE: GARBAG REFUSE DISPOSAL TRIAL

As you are aware, the current garbag trial has been closely supervised throughout, and investigation of the trial so far, reveals that economic saving may be possibly attained if the collection point for the sack is close to the collection vehicle.

It will be appreciated that the introduction of improved methods in an essential service may result in a variation to the expenses incurred in conducting the service ; and to assist in determining this aspect of the trial you are requested to complete the attached questionnaire.

As the opinion expressed by you will be important in determining the final aspects of the trial, and as it is considered that such expression should not be submitted without experiencing practical application of query (a) of the questionnaire, your co-operation is sought in arranging for a member of your household to remove the full sack from the holder and place it at the front of your house prior to 11.30 a.m. for each of the next two collection days, i.e. Monday 20th April and Monday 27th April.

For this reason the questionnaire will not be collected from you until Monday 27th April, 1964.

Your continued co-operation will be greatly appreciated.

E. J. JOHNSON,

Town Clerk.

CITY OF SOUTH PERTH

GARBAG REFUSE DISPOSAL TRIAL

Questionnaire

If the system was introduced on a full community basis, would you :

(a) Be prepared to bring full sack forward to the front of your house on collection day,

.....

or,

(b) Prefer to leave the sack on holder for removal by collector and pay a small additional charge,

.....

Appendix XX

Fremantle Hospital

ALL PATIENTS DISCHARGED IN AGE GROUPS

	1963	1962
Total Cases—		
Male	4,148	4,014
Female	3,873	3,996
Total Days Stay in Hospital—		
Male	40,182	37,850
Female	35,790	37,044
Average No. Days in Hospital—		
Male	9·7	9·4
Female	9·2	9·3
Total Male and Female Cases	8,021	8,010
Total Male and Female Days Stay in Hospital	75,972	74,894
Male and Female Average No. Days in Hospital	9·5	9·4
Daily Bed Average	208·1	205·2

OPERATION CASES IN AGE GROUPS

	1963	1962
Total Cases—		
Male	2,403	2,091
Female	2,374	2,263
Total Days Stay in Hospital—		
Male	22,253	20,535
Female	19,197	19,115
Average No. Days in Hospital—		
Male	9·3	9·8
Female	8·1	8·4
Total Male and Female Cases	4,777	4,354
Total Male and Female Days Stay in Hospital	41,450	39,650
Male and Female Average No. Days in Hospital	8·7	9·1
Daily Bed Average	113·6	108·6

Royal Perth Hospital

ALL PATIENTS DISCHARGED IN AGE GROUPS

	1963	1962
Total Cases—		
Male	6,759	7,121
Female	6,524	7,087
Total Days Stay in Hospital—		
Male	116,232	116,828
Female	109,441	118,275
Average No. Days in Hospital—		
Male	17·2	16·4
Female	16·8	16·7
Total Male and Female Cases	13,283	14,208
Total Male and Female Days Stay in Hospital	225,673	235,103
Male and Female Average No. Days in Hospital	17·0	16·5
Daily Bed Average	618·3	644·1

OPERATION CASES IN AGE GROUPS

	1963	1962
Total Cases—		
Male	3,073	3,027
Female	2,719	2,932
Total Days Stay in Hospital—		
Male	62,949	60,059
Female	54,123	56,076
Average No. Days in Hospital—		
Male	20·5	19·8
Female	19·9	19·1
Total Male and Female Cases	5,792	5,959
Total Male and Female Days Stay in Hospital	117,072	116,135
Male and Female Average No. Days in Hospital	20·2	19·5
Daily Bed Average	320·7	318·2

Princess Margaret Hospital

ALL PATIENTS DISCHARGED IN AGE GROUPS

	1963	1962
Total Cases—		
Male	4,350	4,326
Female	3,032	2,980
Total Days Stay in Hospital—		
Male	28,537	28,517
Female	20,844	19,743
Average No. Days in Hospital—		
Male	6·56	6·59
Female	6·87	6·62
Total Male and Female Cases	7,382	7,306
Total Male and Female Days Stay in Hospital	49,381	48,260
Male and Female Average No. Days in Hospital	6·69	6·61
Daily Bed Average	135·29	132·22

OPERATION CASES IN AGE GROUPS

	1963	1962
Total Cases—		
Male	1,490	1,373
Female	1,000	943
Total Days Stay in Hospital—		
Male	11,335	10,124
Female	7,777	7,387
Average No. Days in Hospital—		
Male	7·61	7·37
Female	7·78	7·83
Total Male and Female Cases	2,490	2,316
Total Male and Female Days Stay in Hospital	19,112	17,511
Male and Female Average No. Days in Hospital	7·68	7·56
Daily Bed Average	52·36	47·98

Royal Perth Hospital, Fremantle Hospital and Princess Margaret Hospital

ALL PATIENTS DISCHARGED, 1963, IN AGE GROUPS

Age Group	Cases			Total Days Stay in Hospital			Average No. Days in Hospital	
	Male	Female	Per cent. of Total	Male	Female	Per cent. of Grand Total	Male	Female
0–14	5,617	3,968	33·41	36,298	25,863	17·71	6·46	6·52
15–19	952	874	6·37	9,478	7,004	4·70	9·96	8·01
20–29	1,347	1,241	9·02	14,173	9,732	6·81	10·52	7·84
30–39	1,264	1,251	8·77	15,634	12,799	8·10	12·37	10·23
40–49	1,231	1,197	8·47	18,047	15,704	9·61	14·66	13·12
50–59	1,506	1,162	9·30	24,655	20,390	12·83	16·37	17·55
60–69	1,534	1,462	10·44	27,834	27,774	15·84	18·14	19·00
70 and over	1,806	2,274	14·22	38,832	46,809	24·40	21·50	20·59
Total	15,257	13,429	100·00	184,951	166,075	100·00	12·12	12·37
Total Male and Female	28,686			351,026			12·24	

Daily Bed Average: 961·7

OPERATION CASES IN AGE GROUPS, 1963

Age Group	Cases			Total Days Stay in Hospital			Average No. Days in Hospital	
	Male	Female	Per cent. of Total	Male	Female	Per cent. of Grand Total	Male	Female
0–14	2,240	1,565	13·26	15,774	10,290	7·43	7·04	6·58
15–19	559	423	3·42	6,632	3,652	2·93	11·86	8·63
20–29	724	670	4·86	8,896	4,991	3·96	12·29	7·45
30–39	652	711	4·75	8,337	6,780	4·31	12·79	9·54
40–49	616	655	4·43	9,773	9,056	5·36	15·87	13·83
50–59	713	578	4·50	12,654	10,590	6·62	17·75	18·32
60–69	681	624	4·55	14,789	13,622	8·09	21·72	21·83
70 and over	781	867	5·75	19,682	22,116	11·91	25·20	25·51
Total	6,966	6,093	45·52	96,537	81,097	50·61	13·86	13·31
Total Male and Female	13,059			177,634			13·60	

Daily Bed Average: 486·7

PATIENTS DISCHARGED DURING 1963

Item	Disease	International Classification Categories	Number of Cases		Number of Days in Hospital		Per cent. of Grand Total	Average Number Days in Hospital		Average Age of Patients		Results*					
			Male	Female	Male	Female		Male	Female	Male	Female	Sex	1	2	3	4	5
1	Tuberculosis, All Forms	001–019	17	25	285	359	·18	16·8	14·4	44	46	M.	2	7	5	1	2
												F.	1	16	7	....	1
2	Syphilis, Gonorrhoea and other Venereal Diseases	020–039	6	12	158	267	·12	26·3	22·3	29	36	M.	1	2	2	1	....
												F.	2	6	2	....	2
3	Other Infectious Diseases	040–138	476	403	4,086	3,143	2·06	8·6	7·8	14	16	M.	88	359	17	3	9
												F.	83	295	13	3	9
4	Malignant Neoplasms including those of Lymphatic and Haematopoitic Systems	140–205	681	604	12,619	12,655	7·20	18·5	21·0	58	60	M.	51	280	192	12	146
												F.	43	306	149	9	97
5	Benign and Unspecified Neoplasms	210–239	193	267	1,798	2,780	1·30	9·3	10·4	40	39	M.	42	116	22	9	4
												F.	93	145	21	3	5
6	Allergic Disorders	240–245	163	222	1,073	1,486	·73	6·6	6·7	22	29	M.	13	135	9	4	2
												F.	14	193	7	4	4
7	Diseases of Thyroid Gland	250–254	12	42	126	765	·25	10·5	18·2	45	45	M.	....	10	2	....	....
												F.	5	29	5	1	2
8	Diabetes Mellitus	260	56	127	1,277	2,296	1·02	22·8	18·1	53	59	M.	5	37	7	4	3
												F.	3	86	20	3	15
9	Diseases of Other Endocrine Glands	270–277	13	17	119	247	·10	9·2	14·5	30	44	M.	....	10	3	....	....
												F.	2	5	7	2	1
10	Avitaminoses and Other Metabolic Diseases	280–289	28	35	508	636	·33	18·1	18·2	41	50	M.	3	16	6	1	2
												F.	3	22	7	1	2
11	Diseases of Blood-Forming Organs and Blood	290–299	130	108	1,154	1,316	·70	8·9	12·2	29	54	M.	7	87	25	8	3
												F.	4	80	16	2	6
12	Mental Psychoneurotic and Personality Disorders	300–326	525	646	6,796	10,459	4·92	12·9	16·2	40	42	M.	12	324	177	5	7
												F.	18	450	174	1	3
13	Vascular Lesions affecting Central Nervous System	330–334	195	203	6,854	6,062	3·68	35·1	29·9	63	69	M.	6	99	39	1	50
												F.	2	90	33	....	78
14	Inflammatory and Other Diseases of Central Nervous System	340–357	299	234	6,686	3,830	3·00	22·4	16·4	36	41	M.	23	180	76	3	17
												F.	13	157	51	6	7
15	Diseases of Nerves and Peripheral Ganglia	360–369	41	51	534	889	·41	13·0	17·4	46	47	M.	3	27	10	1	....
												F.	6	31	14	....	....
16	Diseases of the Eye	370–389	449	429	4,777	4,633	2·68	10·6	10·8	35	42	M.	57	347	42	2	1
												F.	55	330	43	1	....
17	Diseases of Ear and Mastoid Process	390–398	256	212	1,701	1,395	·85	6·6	6·1	12	18	M.	17	228	9	1	1
												F.	7	195	9	1	....
18	Rheumatic Fever and Chronic Rheumatic Heart Disease	400–416	61	78	1,261	1,533	·80	20·7	19·7	24	30	M.	5	47	7	....	2
												F.	3	54	18	....	3
19	Diseases of the Heart and Arteries including Hypertension and Arteriosclerosis	420–456	671	596	13,716	11,567	7·20	20·4	19·4	62	66	M.	31	421	98	9	112
												F.	19	394	67	8	108

PATIENTS DISCHARGED DURING 1963—*continued*

Item	Disease	International Classification Categories	Number of Cases		Number of Days in Hospital		Per cent. of Grand Total	Average Number Days in Hospital		Average Age of Patients		* Results					
			Male	Female	Male	Female		Male	Female	Male	Female	Sex	1	2	3	4	5
20	Diseases of Veins and Other Diseases of Circulatory System	460–468	244	267	3,763	3,933	2·19	15·4	14·7	46	50	M.	42	180	11	2	9
												F.	52	189	19	1	6
21	Diseases of Respiratory System	470–527	1,930	1,541	12,245	8,976	6·05	6·3	5·8	20	18	M.	368	1,457	47	5	53
												F.	332	1,153	20	3	33
22	Diseases of Buccal Cavity and Oesophagus	530–539	157	155	953	640	·45	6·1	4·1	26	23	M.	28	117	7	3	2
												F.	31	117	4	2	1
23	Diseases of Stomach and Duodenum	540–545	252	114	4,073	1,703	1·65	16·2	14·9	51	53	M.	40	177	17	8	10
												F.	15	82	8	4	5
24	Appendicitis	550–553	387	313	3,251	2,323	1·59	8·4	7·4	24	22	M.	173	211	2	....	1
												F.	143	164	5	1	....
25	Hernia of Abdominal Cavity	560–561	326	141	3,736	1,716	1·55	11·5	12·2	39	48	M.	76	228	20	....	2
												F.	53	76	11	1	....
26	Other Diseases of Intestines and Peritoneum	570–578	404	437	4,439	5,225	2·75	11·0	12·0	27	37	M.	87	279	22	5	11
												F.	97	296	17	6	21
27	Diseases of Liver and Gall Bladder	580–586	157	260	2,961	4,279	2·06	18·9	16·5	58	57	M.	37	79	21	6	14
												F.	78	154	12	5	11
28	Diseases of Pancreas	587	28	31	311	521	·24	11·1	16·8	36	43	M.	1	22	2	1	2
												F.	5	22	2	....	2
29	Nephritis and Nephrosis	590–594	83	70	1,132	1,074	·63	13·6	15·3	21	26	M.	6	56	13	4	4
												F.	3	53	5	....	9
30	Other Diseases of Urinary System	600–609	296	367	3,517	4,156	2·19	11·9	11·3	48	36	M.	28	180	36	42	10
												F.	58	238	36	28	7
31	Diseases of Male Genital Organs	610–617	303	....	4,431	....	1·26	14·6	....	47	....	M.	78	198	12	8	7
												F.	....	....	....	....	....
32	Diseases of Breast	620–621	7	52	31	273	·09	4·4	5·3	50	42	M.	....	7	....	....	....
												F.	10	26	7	9	....
33	Diseases of Female Genital Organs, Uterus, Ovary, Fallopian Tubes, Parametrium	622–637	....	753	....	5,944	1·69	....	7·9	....	40	M.	....	....	....	....	....
												F.	131	440	64	117	1
34	Complications of Pregnancy	640–649	....	83	....	449	·13	....	5·4	....	28	M.	....	....	....	....	....
												F.	13	57	6	7	....
35	Abortion	650–652	....	299	....	918	·26	....	3·1	....	28	M.	....	....	....	....	....
												F.	100	193	....	6	....
36	Delivery Complications and Complications of Puerperium	660–689	....	9	....	101	·03	....	11·2	....	35	M.	....	....	....	....	....
												F.	1	5	3	....	....
37	Diseases of Skin and Cellular Tissue	690–716	505	439	6,395	6,337	3·63	12·7	14·4	29	34	M.	77	403	18	....	7
												F.	76	344	15	....	4
38	Arthritis and Rheumatism, except Rheumatic Fever	720–727	111	140	2,686	3,872	1·87	24·2	27·7	46	52	M.	4	88	17	1	1
												F.	3	111	18	6	2
39	Osteomyelitis and Other Bone and Joint Diseases	730–738	297	113	5,685	2,195	2·24	19·1	19·4	30	38	M.	29	243	20	4	1
												F.	10	86	13	3	1
40	Other Diseases of Musculo-Skeletal System	740–749	149	181	1,043	2,494	1·01	7·0	13·8	20	42	M.	8	130	10	1	....
												F.	38	130	9	1	3
41	Congenital Malformations	750–759	322	244	4,101	3,340	2·12	12·7	13·7	9	8	M.	24	236	48	1	13
												F.	14	174	41	3	12

42	Birth Injuries, Asphyxia, and Infections of New Born	760–776	80	58	641	538	·34	8·0	9·3	2	2	M.	21	50	6	1	2
												F.	7	42	3	2	4
43	Symptoms Referable to Systems or Organs	780–789	1,035	812	8,867	6,898	4·49	8·6	8·5	37	35	M.	105	665	103	125	37
												F.	70	531	92	100	19
44	Senility and Ill-defined Diseases	790–795	116	145	1,028	1,566	·74	8·9	10·8	45	49	M.	6	59	33	7	11
												F.	7	87	37	5	9
	Total	....	11,461	11,335	140,817	135,689	78·78	12·3	12·0	34	37	....	3,327	15,451	2,323	644	1,051
45	Fractures of Skull and Face Bones	N800–N804	266	76	3,481	632	1·17	13·1	8·3	29	32	M.	23	214	9	4	16
												F.	8	62	3	....	3
46	Fractures and Dislocations of Vertebral Column	N805–N806	62	25	1,857	1,568	·98	30·0	62·7	33	52	M.	5	49	6	1	1
												F.	3	18	3	....	1
47	Other Fractures of Trunk, Sternum, Larynx and Pelvis	N807–N809	90	54	1,790	1,708	1·00	19·9	31·6	46	53	M.	13	68	3	2	4
												F.	9	41	1	....	3
48	Fractures of Upper Limb	N810–N819	325	216	1,642	1,701	·95	5·1	7·9	21	32	M.	17	297	10	1	....
												F.	21	188	7	....	....
49	Fractures of Lower Limb	N820–N829	431	384	15,001	13,832	8·21	34·9	36·0	36	60	M.	44	355	18	2	12
												F.	48	283	29	....	24
50	Dislocation without Fracture	N830–N839	62	37	745	554	·37	12·0	15·0	26	37	M.	14	48	....	....	....
												F.	7	29	1	....	....
51	Sprains and Strains	N840–N848	101	46	862	375	·35	8·5	8·2	34	34	M.	10	84	7	....	....
												F.	2	37	6	1	....
52	Head Injury (excluding Skull Fracture)	N850–N856	944	367	6,571	3,385	2·84	7·0	9·2	27	29	M.	155	744	19	12	14
												F.	62	291	4	2	8
53	Internal Injury of Chest, Abdomen and Pelvis	N860–N869	62	11	783	112	·25	12·6	10·2	24	17	M.	12	45	1	....	4
												F.	1	9	....	....	1
54	Lacerations, Contusions and Superficial Injuries	N870–N929	657	264	4,235	1,834	1·73	6·4	6·9	24	24	M.	71	578	5	3	....
												F.	34	224	6	....	....
55	Effects of Foreign Body entering through Orifice	N930–N936	85	74	259	192	·13	3·0	2·6	26	37	M.	26	54	5	....	....
												F.	21	52	1	....	....
56	Burns	N940–N949	180	105	3,324	1,593	1·40	18·5	15·2	16	14	M.	44	131	2	....	3
												F.	18	80	....	....	7
57	Injury to Nerves and Spinal Cord without Bone Injury	N950–N959	27	2	347	9	·10	12·9	4·5	37	13	M.	2	20	4	1	....
												F.	....	2	....	....	....
58	Effects of Poisons	N960–N979	260	304	1,339	1,574	·83	5·2	5·2	22	27	M.	58	189	10	....	3
												F.	72	211	13	3	5
59	Effects of Exposure and Unspecified Injuries and Reactions	N980–N999	150	87	1,334	990	·66	8·9	11·4	29	36	M.	14	127	1	4	4
												F.	9	74	1	....	3
	Total (N Categories)	....	3,702	2,052	43,570	30,059	20·97	11·8	14·6	27	35	....	823	4,604	175	36	116
60	Investigations, Observations and After Care	Y00–Y10	94	42	564	327	·25	6·0	7·8	21	30	M.	7	54	17	16	....
												F.	4	14	12	12	....
	Total (Y Categories)	....	94	42	564	327	25·00	6·0	7·8	21	30	....	11	68	29	28	....
	Grand Total	....	15,257	13,429	184,951	166,075	100·0	12·1	12·4	32	37	....	4,161	20,123	2,527	708	1,167

* Results : 1 = Cured
2 = Improved
3 = Unchanged
4 = Investigation only
5 = Death

(9)—9348

Royal Perth Hospital, Fremantle Hospital and Princess Margaret Hospital

OPERATION CASES DISCHARGED, 1963

Item	Operation	Code of Surgical Operations	Number of Cases		Number of Days in Hospital		Per cent. of Total Oper'n Beds *	Average Number Days in Hospital		Average Age of Patients		Results					
			Male	Female	Male	Female		Male	Female	Male	Female	Sex	1	2	3	4	5
1	Neurosurgery, Brain and Cerebral Meninges	001–019	148	74	3,761	2,551	3·55	25·4	34·5	33	37	M.	13	82	27	1	25
												F.	4	41	14	....	15
2	Neurosurgery, Spinal Cord and Spinal Meninges	020–029	56	27	1,460	575	1·15	26·1	21·3	37	29	M.	7	28	12	3	6
												F.	3	15	6	....	3
3	Neurosurgery, Peripheral Nerves and Sympathetic System	030–049	42	30	604	358	·54	14·4	12·0	52	44	M.	2	35	5	....	....
												F.	4	23	3	....	....
4	Thyroid and Parathyroid	070–079	8	25	79	372	·25	9·9	14·9	38	39	M.	1	7	....	....	....
												F.	5	18	2	....	....
5	Pituitary, Thymus and Other Endocrine Organs	085–096	....	2	....	300	·17	....	150·0	....	60	M.	....	....	....	....	....
												F.	....	....	....	....	2
6	Opthalmic Operations	100–199	384	377	4,678	4,265	5·03	12·2	11·3	35	39	M.	50	318	15	1	....
												F.	57	309	11	....	....
7	Ear, Nose and Throat	200–249	485	286	5,284	2,222	4·23	10·9	7·8	26	23	M.	26	408	31	4	16
												F.	14	254	13	1	4
8	Teeth and Gums	250–259	96	100	343	258	·34	3·6	2·6	19	21	M.	21	72	2	1	....
												F.	27	70	3	....	....
9	Pharynx, Tongue, Palate and Buccal Cavity	260–299	576	594	2,589	1,875	2·51	4·5	3·2	16	17	M.	176	373	19	4	4
												F.	177	399	16	1	1
10	Heart and Pericardium and Intrathoracic Great Vessels	300–329	42	68	782	1,085	1·05	18·6	16·0	32	22	M.	2	19	14	....	7
												F.	6	43	14	....	5
11	Lung, Bronchus and Mediastinum and Collapse Therapy	330–354	98	52	1,474	955	1·37	15·0	18·4	36	34	M.	2	68	12	6	10
												F.	8	28	9	1	6
12	Breast	380–389	7	134	96	2,319	1·36	13·7	17·3	58	54	M.	....	7	....	....	....
												F.	21	90	11	11	1
13	Abdominal Wall	400–419	396	227	5,383	3,914	5·23	13·6	17·2	40	47	M.	89	273	11	6	17
												F.	69	118	17	11	12
14	Stomach	420–439	123	52	2,454	1,213	2·06	20·0	23·3	47	52	M.	23	79	12	1	8
												F.	8	37	3	1	3
15	Appendix	440–449	386	336	3,217	2,505	3·22	8·3	7·5	24	22	M.	175	209	1	....	1
												F.	147	185	3	1	....
16	Intestines (except Appendix and Rectum)	450–469	119	94	2,326	1,868	2·36	19·5	19·9	46	54	M.	21	71	13	4	10
												F.	19	60	8	3	4
17	Rectum and Anus	470–499	150	108	2,501	1,770	2·41	16·7	16·4	42	50	M.	39	105	5	1	....
												F.	33	72	2	....	1
18	Liver and Bile Ducts	500–529	98	181	2,294	3,241	3·12	23·4	17·9	56	57	M.	35	53	7	1	2
												F.	77	88	8	1	7
19	Pancreas	530–539	1	....	15	....	·01	15·0	....	30	....	M.	....	1	....	....	....
												F.	....	....	....	....	....
20	Spleen	540–549	18	6	311	175	·27	17·3	29·2	27	25	M.	7	8	1	....	2
												F.	1	5	....	....	....

OPERATION CASES DISCHARGED, 1963—*continued*

Item	Operation	Code of Surgical Operations	Number of Cases		Number of Days in Hospital		Per cent. of Total Oper'n Beds *	Average Number Days in Hospital		Average Age of Patients		Results					
			Male	Female	Male	Female		Male	Female	Male	Female	Sex	1	2	3	4	5
21	Kidney and Ureter	600–639	74	78	1,590	1,935	1·98	21·5	24·8	47	44	M.	14	46	9	3	2
												F.	18	51	5	2	2
22	Bladder and Urethra	640–669	348	136	5,065	1,785	3·86	14·6	13·1	54	47	M.	22	218	44	51	13
												F.	14	70	21	28	3
23	Prostate and Seminal Vesicles	670–679	171	....	4,947	....	2·79	28·9	....	72	....	M.	42	111	2	2	14
												F.	....	....	....	....	....
24	Other Male Genital Organs	680–699	192	....	1,276	....	·72	6·6	....	17	....	M.	46	139	3	2	2
												F.	....	....	....	....	....
25	Ovary and Fallopian Tubes	700–719	....	89	....	1,181	·67	....	13·3	....	32	M.	....	....	....	....	....
												F.	15	57	13	3	1
26	Uterus and Supporting Structures	720–739	....	472	....	3,740	2·11	....	7·9	....	42	M.	....	....	....	....	....
												F.	92	248	31	101	....
27	Vagina, Vulva and Perineum	740–759	....	191	....	2,269	1·28	....	11·9	....	49	M.	....	....	....	....	....
												F.	65	97	26	3	....
28	Obstetric Operations (D. and O.)	760–799	....	349	....	1,003	·56	....	2·9	....	30	M.	....	....	....	....	....
												F.	93	239	1	15	1
29	Orthopaedic Surgery	800–899	1,333	946	23,329	21,669	25·33	17·5	22·9	32	45	M.	134	1,120	41	25	13
												F.	136	733	40	13	24
30	Peripheral Blood Vessels and Lymphatic System	900–929	177	171	3,209	3,437	3·74	18·1	20·1	43	43	M.	20	84	55	5	13
												F.	19	109	34	5	4
31	Skin and Subcutaneous Tissues	930–949	1,101	642	12,236	7,827	11·29	11·1	12·2	30	33	M.	190	885	18	6	2
												F.	144	481	13	1	3
32	Other Surgical Procedures	950–999	337	246	5,234	4,430	5·44	15·5	18·0	35	43	M.	26	250	34	8	19
												F.	11	190	21	4	20
	Total	....	6,966	6,093	96,537	81,097	100·00	13·9	13·3	34	37	....	2,470	9,199	741	341	308

* Operation cases occupied one-half of the total bed days. To find the percentage of total beds occupied by the various type of operation cases, divide the percentage figure in Column 6 by 2.

ACCIDENTS, POISONINGS AND VIOLENCE, 1963

Accident	"E" Code	Number of Patients	Days in Hospital	Percentage of Hospital Beds Occupied	Average Age of Patients	Number Died
Railway Accidents	800–802	20	333	·09	44	1
Motor Vehicle Traffic Accidents	810–825	1,621	28,429	8·10	30	47
Motor Vehicle Non-Traffic Accidents	830–835	50	708	·20	26	2
Other Road Vehicle Accidents	840–845	139	1,129	·32	16	1
Water Transport Accidents	850–858	8	47	·01	31	....
Aircraft Accidents	860–866	4	88	·03	24	....
Accidental Poisoning	870–895	248	621	·18	9	1
Accidental Falls	900–904	1,301	20,905	5·96	41	42
Accidents caused by Hot Substances, Corrosive or Steam	917	175	2,301	·66	10	....
Other Accidents	910–936	1,567	12,750	3·63	25	12
Medical and Surgical Complications and Therapeutic Misadventures	940–959	156	2,135	·61	35	1
Late Effects of Injury	960–965	48	1,293	·37	39	....
Suicide and Self-Inflicted Injury	970–979	309	2,128	·61	36	9
Homicide and Assault	980–985	93	505	·14	34	....
Total	....	5,739	73,372	20·91	30	116

Appendix XXI

MEAT INSPECTION

Meat inspection was carried out by Departmental inspectors at four major metropolitan abattoirs. The numbers examined were :—

Cattle	77,802
Calves	8,258
Sheep	876,010
Pigs	148,848
	1,110,918

Details of the condemnations are contained in Appendix XXVII.

During the year, meat inspection was inaugurated at Esperance, bringing the number of country centres regularly inspecting meat to nineteen.

PUBLIC BUILDINGS

This year the section has dealt with a total of 313 applications in connection with public buildings throughout the State.

Details of the approval are as follows :—

Privately owned buildings—	
New work	164
Additions and alterations	83
Re-wire of electrical installations	10
Government Building (privately designed)—	
New work	20
Additions and alterations	36
	313

All plans and specifications submitted for approval were examined with regard to the following aspects :—

Provision of escape to comply with the Public Buildings Regulations.

Fire isolation, fire protection and equipment.

Structural stability.

Electrical installation.

Ventilation.

Natural lighting (classrooms).

Toilet accommodation and other facilities.

Inspections

Regular inspections were made to see that the buildings meet with the public building requirements.

A new policy was adopted in March of this year whereby private architects commissioned to plan and supervise Government owned public buildings, such as hospitals and State schools, were required to submit plans and specifications to this Department for approval. This resulted in a substantial increase in work for this section, necessitating the appointment of additional staff.

Numerous samples of lining materials (for use in public buildings) were forwarded to the Government Chemical Laboratories for testing to ascertain their respective fire resistivity, using the standard testing cabinet.

The results of these tests have been recorded and applied accordingly.

L. H. G. WORSAM, Senior Inspector,
Meat Inspection and Public Buildings.

Appendix XXII

DERBY LEPROSARIUM

WESTERN AUSTRALIA

Admissions and Discharges for the Year 1963, compiled from the Monthly Returns of the Superintendent

Month	Admissions							Discharged											Inmates Remaining in Leprosarium		
	Males			Females				Males					Females								
	Admitted	Re-Admitted	Total Males	Admitted	Re-Admitted	Total Females	Total Admitted	Discharged Cured	Deceased	Absconded	Discharged Non-Infectious	Total Males Discharged	Discharged Cured	Deceased	Absconded	Discharged Non-Infectious	Total Females Discharged	Total Discharged	Males	Females	Total Remaining
January	1	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	106	74	180
February	...	...	...	1	...	1	1	...	1	...	...	1	...	...	...	...	...	1	105	75	180
March	...	1	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	106	75	181
April	2	...	2	...	1	1	3	3	1	...	...	4	2	...	...	...	2	6	104	74	178
May	...	...	...	...	...	...	...	3	1	...	...	4	2	...	...	...	2	6	100	72	172
June	1	...	1	1	...	1	2	...	1	...	...	1	...	1	...	...	1	2	100	72	176
July	...	1	1	...	1	1	2	...	1	...	...	1	...	...	...	...	...	1	100	73	176
August	2	...	2	...	...	...	2	1	1	...	...	2	1	2	...	...	3	5	100	70	170
September	...	...	...	1	1	2	2	...	...	...	...	...	...	...	...	...	...	...	100	72	172
October	...	...	...	...	...	...	...	3	...	...	...	3	2	...	...	...	2	5	97	70	167
November	1	...	1	...	...	...	1	1	...	...	...	1	...	...	...	...	...	1	97	70	167
December	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	1	96	70	166
Total	7	2	9	3	3	6	15	11	7	...	...	18	7	3	...	...	10	28	...	...	...

Analysis of Admissions and Discharges During 1963

Inmates as at 31st December, 1962	179
Admissions for period ended 31st December, 1963	15
Discharged for period ended 31st December, 1963	18
Deaths for period ended 31st December, 1963	10
Absconded for period ended 31st December, 1963	—
Total Remaining at Leprosarium, 31st December, 1963	166

Appendix XXIII

INCIDENCE AND MORTALITY OF NOTIFIABLE DISEASES

Diseases Notifiable	1960			1961			1962			1963		
	Cases Reported	Amend. Diagnosis	Deaths	Cases Reported	Amend. Diagnosis	Deaths	Cases Reported	Amend. Diagnosis	Deaths	Cases Reported	Amend. Diagnosis	Deaths
Acute Rheumatism	14	14	(A) 7	10	10	(A) 3	9	9	(A) 4	18	18	....
Amoebiasis	5	5	....	2	2	....	1	1	....	1	1	....
Ankylostomiasis	....	....	....	....	....	2	15	15	....	....	....	....
Breast Abscess	....	....	....	....	....	....	9	9	....	4	4	....
Brucellosis	7	7	....	5	5	....	6	6	....	7	7	....
Chorea	3	3	....	....	....	....	....	....	....	1	1	....
Dengue Fever	....	....	....	....	....	....	....	....	....	....	....	....
Diphtheria	5	5	....	15	15	....	17	17	1	5	5	....
Dysentery (Amoebic)	5	5	....	5	5	....	2	2	....	2	2	1
Dysentery (Bacillary)	104	104	....	117	117	3	179	179	5	102	102	1
Encephalitis Lethargic	....	....	....	2	2	....	....	....	....	....	....	2
Erythema Nodesum	1	1	....	....	....	....	....	....	....	1	1	....
Hydatid	1	1	....	....	....	....	1	1	1	....	....	....
Infantile Diarrhoea	30	30	(B) 10	48	48	(B) 23	49	49	(B) 24	2	2	(B) 20
Infective Hepatitis	256	256	4	262	262	4	115	115	2	144	144	7
Lead Poisoning	2	2	1	1	1	....	1	1	....	1	1	....
Leprosy	18	18	....	15	15	....	17	17	....	10	10	....
Leptospirosis	9	9	....	13	13	....	7	7	....	16	16	....
Malaria	4	4	....	2	2	....	3	3	....	31	31	....
Meningococcal Infection	4	4	2	2	2	1	2	2	4	4	4	1
Ornithosis	2	2	....	2	2	....	....	....	....	....	....	....
Paratyphoid	5	4	1	6	6	....	1	1	....	3	3	....
Poliomyelitis	14	7	....	3	3	....	6	6	1	5	5	2
Pleural Effusion	14	14	1	19	12	....	10	5	....	4	2	....
Puerperal Fever	1	1	1	3	3	....	....	....	....	4	4	....
Purulent Opthalmia	67	67	....	29	29	....	29	29	....	36	36	....
Rubella	127	127	....	264	264	2	106	106	....	107	107	....
Salmonella Infection	28	28	....	43	43	....	61	61	1	36	36	1
Scarlet Fever	38	38	....	45	45	....	30	30	....	35	35	....
Tetanus	8	8	6	5	5	2	1	1	2	9	9	2
Trachoma	437	437	....	369	369	....	377	377	....	259	259	....
P.T.B.	322	282	28	246	197	18	275	238	24	252	216	13
Other T.B.	37	34	2	43	41	1	29	25	5	30	28	....
Typhoid Fever	1	1	....	4	4	....	5	5	....	6	6	....
Typhus Fever	....	....	....	4	4	....	....	....	....	2	2	....

Deaths exclude full-blood aboriginals.

(A) Rheumatic Fever.

(B) Gastro-Enteritis and Colitis (except Ulceration) under two years and Diarrhoea of the new born.

Appendix XXIV

MATERNAL MORTALITY

Period	Average Live Births	Average Maternal Deaths	Average Rate
1901–1905	6,681	28·0	4·19
1906–1910	7,691	43·4	5·64
1911–1915	8,844	39·4	4·46
1916–1920	7,726	41·4	5·36
1921–1925	8,056	34·2	4·25
1926–1930	8,748	46·8	5·35
1931–1935	8,062	35·4	4·39
1936–1940	8,877	32·4	3·65
1941–1945	10,408	24·4	2·34
1946–1950	13,130	21·4	1·63
1951–1955	15,724	13·8	0·88
1956–1960	16,922	8·2	0·48

Year	Live Births	Deaths From									
		Puerperal Septicaemia		Other Puerperal Infections		Abortion		All other Complications of Pregnancy and of the Puerperal State		All Complications of Pregnancy and the Puerperal State	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
1946	12,105	....	....	3	0·25	5	0·41	18	1·49	26	2·15
1947	12,874	1	0·08	1	0·08	8	0·62	22	1·71	32	2·49
1948	12,981	2	0·15	4	0·31	1	0·08	13	1·00	20	1·55
1949	13,511	....	....	2	0·15	3	0·22	11	0·81	16	1·18
1950	14,228	....	....	2	0·14	1	0·07	10	0·70	13	0·91
1951	14,794	....	....	2	0·14	3	0·20	11	0·74	16	1·08
1952	15,413	....	....	3	0·19	3	0·19	12	0·78	18	1·17
1953	15,862	....	....	....	....	1	0·06	8	0·50	9	0·57
1954	15,928	....	....	....	....	5	0·31	7	0·44	12	0·75
1955	16,623	....	....	....	....	1	0·06	13	0·78	14	0·84
1956	16,916	....	....	....	....	2	0·12	7	0·41	9	0·53
1957	16,924	....	....	....	....	3	0·18	8	0·47	11	0·65
1958	16,731	....	....	....	....	1	0·06	7	0·42	8	0·48
1959	17,111	....	....	....	....	1	0·06	4	0·23	5	0·29
1960	16,926	1	0·06	....	....	3	0·18	4	0·24	8	0·47
1961	17,078	....	....	....	....	2	0·12	5	0·29	7	0·41
1962	17,064	....	....	....	....	1	0·06	4	0·23	5	0·29
1963	17,290	....	....	....	....	1	0·06	3	0·17	4	0·23

All Rates per thousand live births

Place	1960	1961	1962	1963
Western Australia	0·47	0·41	0·29	0·23
New Zealand (a)	0·34	0·33	....	....
New South Wales	0·68	0·50	0·34	....
Victoria	0·25	0·32	0·18	....
Queensland	0·68	0·76	0·64	....
Tasmania	0·45	0·33	0·33	....
South Australia	0·62	0·27	0·61	....

(a) Non-Maori.

Appendix XXV

STILLBIRTH AND INFANT MORTALITY RATES

Year	Total Births including Stillbirths	Stillbirth Rates	Mortality Rates			Total mortality rates under one year	Total mortality rates under one year including Stillbirth
			Under one week	Under one month	Over one month and under one year		
1946	12,398	23·1	17·1	20·6	9·6	30·3	53·4
1947	13,178	23·2	16·9	19·4	13·2	30·2	53·4
1948	13,197	20·5	16·9	18·7	8·4	25·0	45·5
1949	13,779	19·4	16·2	19·0	6·8	25·9	45·3
1950	14,468	16·6	16·2	18·0	8·6	26·7	43·3
1951	15,091	19·7	16·2	19·7	8·5	28·2	47·9
1952	15,697	18·1	15·5	17·7	6·8	24·5	42·6
1953	16,130	16·6	13·4	16·2	7·3	23·4	40·0
1954	16,198	16·7	14·2	15·8	6·4	22·2	38·9
1955	16,862	14·2	13·3	15·8	6·3	22·1	36·3
1956	17,142	13·2	13·0	15·7	6·7	22·4	35·6
1957	17,169	14·3	13·6	14·9	5·9	20·8	35·1
1958	16,956	13·3	12·8	14·2	7·1	21·2	34·5
1959	17,336	13·0	12·3	13·6	6·3	19·9	32·9
1960	17,152	13·2	13·9	15·7	5·7	21·3	34·5
1961	17,318	13·9	10·3	12·6	6·8	19·4	33·3
1962	17,267	11·8	12·6	14·3	7·7	22·0	33·8
1963	17,468	10·2	12·3	14·7	5·5	20·2	30·4

In above table all rates are calculated in deaths per 1,000 of total births, including stillbirths.

INFANT MORTALITY

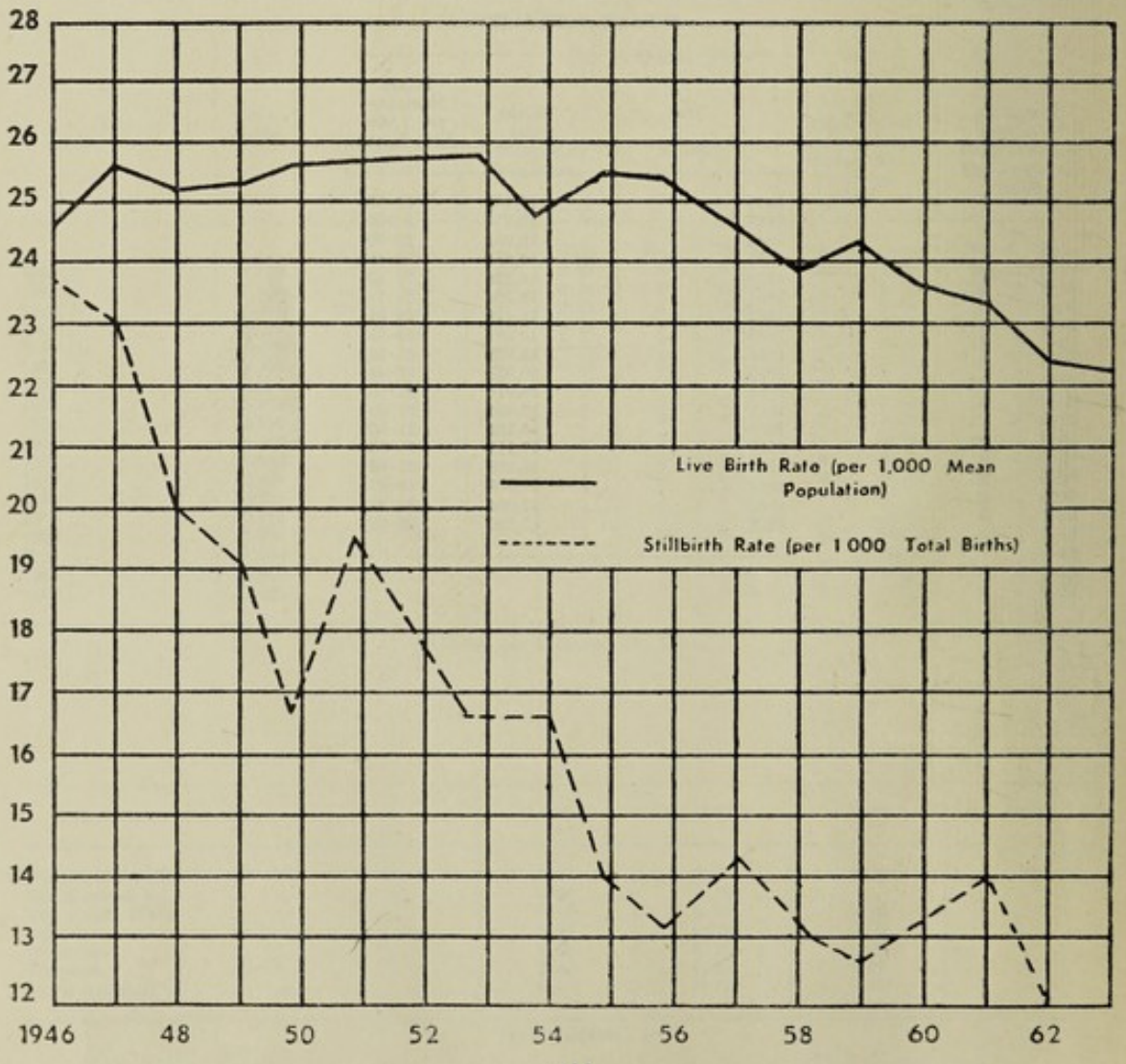
Year	Births	Infant Mortality per 1,000 Live Births
1946	12,105	31·06
1947	12,874	30·92
1948	12,931	25·60
1949	13,511	26·42
1950	14,228	27·13
1951	14,794	28·73
1952	15,413	24·91
1953	15,862	23·83
1954	15,928	22·54
1955	16,623	22·44
1956	16,916	22·70
1957	16,924	21·09
1958	16,731	21·52
1959	17,111	20·16
1960	16,926	21·62
1961	17,078	19·67
1962	17,064	22·27
1963	17,290	20·42

(10)—93420

Appendix XXVI

WESTERN AUSTRALIA – STILLBIRTH AND BIRTH RATES

Year	Mean Population	Live Births		Stillbirths	
		Number	Rate per 1,000 Mean Population	Number	Rate per 1,000 Total Births
1946	492,771	12,105	24·57	293	23·63
1947	502,951	12,874	25·60	304	23·07
1948	514,621	12,931	25·13	266	20·16
1949	532,603	13,511	25·37	268	19·45
1950	557,878	14,228	25·50	240	16·59
1951	580,317	14,794	25·49	297	19·68
1952	600,615	15,413	25·66	284	18·09
1953	621,034	15,862	25·54	268	16·62
1954	639,963	15,928	24·89	270	16·67
1955	657,323	16,623	25·29	239	14·17
1956	674,459	16,916	25·08	226	13·18
1957	687,448	16,924	24·62	245	14·27
1958	699,915	16,731	23·90	225	13·27
1959	711,737	17,111	24·04	225	12·98
1960	722,900	16,926	23·41	226	13·18
1961	737,386	17,078	23·16	240	13·86
1962	755,259	17,064	22·59	203	11·76
1963	773,235	17,290	22·36	178	10·19



Appendix XXVII

MEAT INSPECTION FOR THE YEAR ENDED 31st DECEMBER, 1962

Number and Type of Animals Slaughtered		Carcases Condemned for—									Part Carcases Condemned for—						Organs Condemned for—					
		Tuberculosis	Actinomycosis	Piroplasmosis	Caseous Lymphadenitis	Para-Typhoid	Traumatic and Septic Conditions	Pleuro-Pneumonia	Other Abnormalities	Total Carcases Condemned	Actinomycosis	Caseous Lymphadenitis	Tuberculosis	Arthritis	Other Abnormalities	Total Part Carcases Condemned	Actinomycosis	Echinococcosis	Pleuro-Pneumonia	Tuberculosis	Other Abnormalities	Total Organs Condemned
Robb's Jetty (including Watson's and Anchorage Butchers)																						
Cattle	19,618	19	....	2	....	....	82	....	18	121	142	....	....	....	88	230	228	93	....	18	958	1,297
Calves	509	....	....	....	....	....	....	....	2	2	....	....	....	....	....	....	....	....	....	....	....	....
Sheep	267,498	....	....	....	15	....	112	....	202	329	....	509	....	444	8	961	....	261	....	....	19,667	19,928
Pigs	95,914	27	....	....	....	35	49	....	79	190	....	....	981	367	655	2,003	....	....	....	19	33,266	33,285
Midland Junction (including Foggitt Jones)																						
Cattle	58,184	79	....	....	....	....	86	....	83	248	184	....	106	5	70	365	278	91	....	79	1,208	1,656
Calves	7,749	1	....	....	....	....	1	....	....	2	....	....	....	....	5	5	....	....	....	....	....	....
Sheep	608,512	....	....	....	403	....	176	....	2,567	3,146	....	715	....	696	42	1,453	....	453	....	....	76,532	76,985
Pigs	52,934	6	....	....	....	11	24	....	44	85	....	....	108	394	86	588	....	3	....	....	7,959	7,962
Kalgoorlie																						
Cattle	2,054	....	....	....	....	....	....	....	....	....	13	....	....	....	2	15	....	....	....	....	49	49
Calves	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep	32,828	....	....	....	2	....	5	....	6	13	....	27	....	27	6	60	....	....	....	....	1,925	1,925
Pigs	3,081	....	....	....	....	....	....	....	2	2	....	....	24	1	10	35	....	....	....	....	126	126
Perth Meat Markets																						
Cattle	1,654	....	....	....	....	....	10	....	15	25	....	....	....	....	....	....	....	....	....	....	66	66
Calves	8,434	....	....	....	....	....	2	....	206	208	....	....	....	....	....	....	....	....	....	....	41	41
Sheep	5,059	....	....	....	....	....	9	....	22	31	....	....	....	....	21	21	....	....	....	....	....	....
Pigs	289	2	....	....	....	5	1	....	6	14	....	....	....	....	....	....	....	2	....	....	12	14
Fremantle Meat Markets																						
Cattle	77	....	....	....	....	....	....	....	....	....	....	....	....	....	2	2	....	....	....	....	....	....
Calves	982	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Sheep	21	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pigs	99	....	....	....	....	....	....	....	2	2	....	....	1	....	....	1	....	....	....	....	2	2
																					10	10
** Country Districts*																						
Cattle	39,365	23	1	....	....	....	50	....	29	103	13	....	16	19	112	160	136	204	....	48	587	975
Calves	15,117	....	....	....	....	....	14	....	206	220	....	....	....	....	3	3	....	....	....	....	1	1
Sheep	265,546	....	....	....	38	....	254	....	506	798	....	187	....	261	190	638	....	1,232	....	....	9,773	11,005
Pigs	17,294	21	....	....	....	14	41	....	28	104	....	....	141	105	84	330	....	25	....	44	1,362	1,431

Totals—
Cattle 120,952
Calves 32,771
Sheep 1,778,464
Pigs 169,511
798

* Country Districts included the following centres :—Albany, Busselton, Collie, Dardanup, Denmark, Donnybrook Esperance, Geraldton, Harvey, Katanning, Merredin, Mandurah, Manjimup, Narrogin, Northam, Plantagenet, Wagin, Waroona, York.

Appendix XXVIII

REVENUE AND EXPENDITURE FOR THE YEAR, 1963.

REVENUE

	£	s.	d.
Derby Leprosarium—			
Maintenance Fees	16,533	16	3
Other Revenue	534	18	0
Anatomy Licenses	22	15	0
Building Inspection Fees	1,416	15	2
Examination Septic Tank Plans	18,459	0	2
Fish Branding Fees	1,353	13	1
North-West Health Inspectors Scheme (Kimberley)	697	19	6
Infectious Diseases—			
General	7,912	14	10
Other	29	12	6
Local Health Authority Proportion	23	5	6
Immunisation—Diphtheria	127	8	6
Health Laboratories—			
Water Sampling Fees	2,300	0	0
Fees :			
Albany	1,303	4	4
Bunbury	5,108	13	10
Derby	775	9	6
Geraldton	1,230	8	3
Manjimup	2,099	18	11
Narrogin	1,546	7	1
Northam	1,350	8	8
Wooroloo	165	10	3
Maternity Home and Private Hospital Licenses	49	10	0
Meat Branding Fees	20,303	9	1
Nurses Registration and Examination Fees	3,409	2	9
Other (including Pest Control)	8,311	0	7
Pathological Fees (Public)—Central Laboratories	8,163	17	10
Pathological Fees—Commonwealth Recoups	4,726	1	6
Perth M.O. Fees	1,541	9	6
Pesticide Registration Fees	272	15	0
Polio Refunds (1956-57)	301	4	6
Radioactive Substances Act	136	0	0
Sanitary Fixtures and Fittings Fees	67	12	10
Sanitation—Other	516	4	2
Tuberculosis—Laboratory Unit Costs—Chest Clinic	19,023	7	6
Non-Tuberculosis—Laboratory Unit Costs—Perth Chest Hospital	21,852	19	0
Tuberculosis—Laboratory Unit Costs—Perth Chest Hospital	21,302	5	0
Wooroloo Isolation Hospital Benefits—Lepers	64	6	0
Wooroloo Isolation S. and O. Benefit—Lepers	72	0	0
Derby Dentists Fees	930	16	10
Port Hedland Dentists Fees	1,849	5	6
Tuberculosis Diagnosis—			
Commonwealth Capital Recoups	12,497	0	0
Commonwealth Maintenance Recoups	405,746	0	0
Bore Hole Toilet Fees	2	0	0
Photographic Charges	11	15	6
Wooroloo Isolation Pensioners Benefits—Lepers	291	12	0
	£594,433	14	5

EXPENDITURE

	£	s.	d.
Salaries (including Tuberculosis)	455,817	4	0
Infectious Diseases	44,495	15	9
School Medical Doctors and Nurses Travelling	5,961	12	11
Dental Bursaries	13,487	18	6
School Dentists Travelling and Expenses	6,859	6	10
School Medical and Dental Services—Other Expenditure	15,379	5	3
Travelling and Transport Generally	5,017	14	7
Travelling and Transport Commissioner and Medical Officer	891	3	11
Ophthalmic Survey	1,180	1	1
Postage and Telephones	3,473	11	9
Laboratory	75,748	14	1
Venereal Diseases	3,910	1	11
Infant Welfare Centre (including Salaries)	139,789	17	1
Maintenance and Transport—Lepers	75,248	13	9
Poliomyelitis	22,519	6	8
Sanitation—Government Buildings	11,048	1	7
Tuberculosis Clinics	410,010	16	3
Miscellaneous	34,091	17	10
	£1,324,931	3	9

By Authority. ALEX. B. DAVIES, Government Printer