THE THOMAS BAKER, ALICE BAKER, AND ELEANOR SHAW MEDICAL RESEARCH INSTITUTE

ALFRED HOSPITAL, PRAHRAN
VICTORIA, AUSTRALIA

Twenty-Fourth Annual Report

1950

The Baker Medical Research Institute derives its main financial support from the Thomas Baker (Kodak), Alice Baker, and Eleanor Shaw Benefactions. It is also dependent upon grants from The National Health and Medical Research Council, and donations from private sources. The latter may be allocated to an Endowment Fund.

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ALFRED HOSPITAL, PRAHRAN
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Twenty-Fourth Annual Report

1950

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(As at 31st December, 1950.)

Director: T. E. LOWE, D.SC., M.D., F.R.A.C.P. (~~deceased~~.)
Associate Director: P. FANTL, D.SC.
*J. BORNSTEIN, M.D., M.R.A.C.P. (on leave).
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*Supported by grants from National Health and Medical Research Council.

DIRECTOR'S REPORT TO THE TRUSTEES

Gentlemen,—

In recent years there have been considerable advances in all branches of science, and it seems appropriate to consider the impact of these changes on medical research and the influence they must exert on the nature of the work carried out in this Institute.

Medical research is essentially that branch of biology which is concerned with the study of man and the diseases which afflict him. To this end it is necessary to study both the normal individual and the naturally occurring disturbances which we call diseases, and frequently, for comparison, to study animals in a similar manner.

Early in the study of biology it was realized that the structure (form) of an organ was related to its function (mode of action), and that changes in one were often associated with changes in the other. In second half of last century a detailed study of the changes in structure produced by disease was commenced, and led to the development of the study of morbid anatomy. During the present century emphasis in research was shifted slowly towards a study of disordered function, for it has been realized that gross disturbances of structure do not always occur with severe or even fatal disturbances in function. This is particularly so in acute disease. This study of function (physiology) has led naturally to the application of the special techniques of chemistry to the elucidation of the interactions of the various chemicals within the body. From this field has been built the science of biochemistry.

In general, chemistry may be defined as the science of the elements and their laws of behaviour and combination, and it is therefore complementary to physics, which deals with the properties of matter and energy in all its forms. It is to be expected that the special techniques and concepts of physics have just as much application to the study of living tissues as has chemistry.

Modern trends in medical research add, to the existing methods of study of diseases, many techniques of physics, and so the biophysicist—skilled in physics and biology—is rapidly becoming an equal partner with the biochemist, the pathologist, and the clinical observer.

It will be seen that there are only arbitrary dividing lines between the provinces of the biochemist, biophysicist, clinical observer and others. The essential difference between them is their training in different techniques of investigation, and for complete investigation of any problem integration of their efforts is necessary.

In the future it is anticipated that biophysical techniques will be introduced into our methods of study to a much greater extent than at present. Among the new techniques being used in medical research are flame photometry for the rapid estimation of various elements in body fluids, high speed and refrigerated centrifuges for the separation of the constituents of solutions, electrophoresis techniques for the electrical separation of ions in solutions, electron microscopy, use of radioactive isotopes, and many applications of electronics. Whilst it is not anticipated that all this equipment will need to be installed in the Institute—much

of it is very expensive and arrangements can often be made to get assistance from other research organizations—an understanding of the capabilities and limitations of the methods is essential. The recent appointment of a biophysicist to the Clinical Research Unit has been a great help to workers in the Institute in providing for them the background of knowledge of physical methods.

Medical research groups work in the advancing front of medical knowledge, and when any field has become stabilized such methods of investigation and treatment as that field has developed should be standardised and handed over to the practising doctor for routine use. This has been done in this Institute in the fields of morbid anatomy, bacteriology, and biochemistry, whose established procedures have been transferred to the Hospital Pathology Department.

During the past year two teams have been working on biochemical problems in the Institute.

Dr. Fantl and his co-workers have continued their studies on the factors which lead to coagulation of shed blood and the maintenance of fluidity of blood within the vascular channels. They have also been investigating the metalbolism of substances with vitamin K activity.

Dr. Bornstein and Miss Trewhella have been studying methods of assaying hormones of the pancreas (insulin), pituitary (A.C.T.H.) and suprarenal glands. They have also co-operated with members of the Walter and Eliza Hall Institute in a study of the reactions between R.D.E. and adrenal corticoids, and, with the Clinical Research Unit of the Children's Hospital in a study of the adrenal corticoids in Pink Disease.

In addition to these main lines of study, close co-operation has been maintained by the Institute Staff with members of the Clinical Research Unit, and with them studies have been carried out relating to the mechanisms of oedema formation, basic electrocardiography, the reactions of cerebral blood vessels in animals, the motility and secretory activity of the stomach and upper intestine in man, and to the measurement of blood flow in limbs, the seat of diseases of the arteries.

By this time it had been hoped to have established a pharmacology laboratory, but, owing to unforeseen circumstances, this project has been postponed temporarily.

It is a pleasure to record the good relations existing between University departments and the Institute. Dr. S. Rose, of the Department of Physiology, has worked for some months in the Institute studying the part played by adrenal corticoids in diabetic ketosis in animals and man, and members of the Departments of Biochemistry and Mathematics have given us much assistance.

In August Dr. Bornstein went overseas on a Fellowship from the National Health and Medical Research Council, and will work for a year with Dr. R. D. Lawrence and Professor Charles Gray in London, then for a further year with Professor Cori in St. Louis, U.S.A. During his absence his team is continuing their studies on hormones.

During the year we have had profitable and stimulating discussions with visitors from Great Britain, the United States of America, New Zealand, and other States of the Commonwealth.

Visits were made by Dr. Fantl and myself to medical research institutions in Brisbane and Sydney to see the work being done in those centres, and to make personal contact with research workers there.

Many of the projected alterations to the buildings have been completed, and a still-room and room for washing up glassware are now in use. Steam heating for the animal house was in operation before last winter, and it is notable that it was followed by an increase in the rate of breeding of animals during the winter months.

Grateful acknowledgment is made to Mrs. W. J. Penfold for a gift of medical journals from the library of her late husband—the first Director of the Institute. The following are also thanked for gifts to the library:—

Abbott Laboratories; Alfred Hospital Library; Bayer Products Ltd.; Bausch & Lomb Optical Co.; Hospitals and Charities Commission; Commonwealth Scientific and Industrial Research Organization; Eastman Kodak Ltd.; Felton, Grimwade & Duerdins Ltd.; Imperial Chemical Industries of Australia and New Zealand Ltd.; International Anethesia Research Society; Lilly Research Laboratories; Lister Institute; Mayo Clinic; Medical Research Council, London; Middlesex Hospital Medical School; Munitions Supply Department; National Health and Medical Research Council, Canberra; New York State Department of Health; Organisation for Scientific Research, Indonesia; Parke Davis & Co.; Queensland Institute of Medical Research; Rockefeller Institute for Medical Research; Mr. A. J. Trinca, F.R.C.S.; Walter and Eliza Hall Institute.

Our thanks are also due to various Libraries that have lent many journals to us, and particularly to the librarians, whose assistance is greatly valued.

As in previous years. much assistance, both professional and in materials, has been given to us by other organisations, and grateful acknowledgment for such is expressed to the following and their associates:—

National Health and Medical Research Council.

Professor V. M. Trikojus (Biochemistry Department, University of Melbourne).

Dr. F. G. Morgan (Director, Commonwealth Serum Laboratories).

Dr. A. W. Turner (C.S.I.R.O.).

Members of the Honorary Medical Staff, Alfred Hospital.

The Red Cross Blood Transfusion Service.

Dr. Lewis, Mr. Goble and other members of the Staff of Kodak A/asia Pty. Ltd.

It is a pleasure for me to thank the Trustees for their wholehearted support and assistance during the year.

Also, I wish to thank the members of the Advisory Committee, who have been very ready to help whenever their assistance has been sought.

In the following pages an account of the scientific work of the Institute during 1950 is recorded. As much of the studies carried out in conjunction with the Clinical Research Unit is described in detail in its report, they are given here in outline only. A list of publications from the Institute is also appended.

T. E. LOWE,
Director.

BLOOD COAGULATION STUDIES

Dr. P. Fantl and Miss L. Ebbels.

In the last few years at this Institute we have had occasion to investigate haemorrhagic tendencies which could not be classified in any of the known groups. One category concerned male "haemophiliacs" who gave no family history of haemophilia. As, however, no thorough investigation of the pedigree of the patients was possible, it was not justifiable to assume that the patient's condition was due to genetic mutation. In view of eugenic implications and to give a lead to the treatment of the condition, it was imperative to establish the cause of the bleeding tendency. There is some evidence to indicate that haemophilia is due to lack of a plasma soluble factor required for thromboplastin activity. On the basis of this assumption the necessary tests have been elaborated. The abnormality in the thromboplastin complex is detected by estimating the plasma coagulation time, using a series of dilute brain extracts, and further by determining the coagulation time of mixtures prepared from patient's plasma and that from normal donors. Blood plasma from haemophiliac patients shows delayed blood and plasma coagulation time, which can be reduced to a normal value by a very low concentration of brain extract or by the addition of approximately 10 per cent. of normal plasma.

Using these tests, a severe haemorrhagic condition simulating haemophilia has been revealed in both sexes. This disorder is acquired, and is characterized by the presence of an inhibitor of the plasma thromboplastin complex. It could be established that the antagonist is not of the heparin type. It is readily detected and differentiated from haemophilia, as usually the addition of small quantities of the patient's plasma to normal plasma delays the coagulation time of the latter. From this result it is apparent that transfusion of whole blood is of limited value in repairing this haemorrhagic condition. The use of washed red cells instead of whole blood appears to be preferable.

The clinical investigation of most of these cases has been carried out by Dr. John McLean.

INVESTIGATION OF THE PHENOMENA OF FIBRINOLYSIS

Dr. P. Fantl and J. F. Nelson.

In previous reports it was indicated that patients, following convulsions produced by electric stimulation, showed fibrinolytic activity in their plasma. Further, it was found that saline extracts of human brain contained a factor (fibrinokinase) which, when combined with human plasma, activated a plasma factor (profibrinolysin) to the enzyme fibrinolysin. It should be pointed out that although other organs contain fibrinokinase they do not yield soluble activators. Since brain is a very rich source of phospholipids, it is possible that the activator belongs to this group of substances, or that the phospholipids have an effect of rendering the active principle soluble. The connection of phospholipid changes and fibrinolysis was investigated in the plasma of patients undergoing electrical convulsive therapy (E.C.T.). Again it was possible to obtain fibrinolysis in all instances. Estimations of total lipid, phospholipids, and cholesterol before and after E.C.T. did not show significant variations.

Animal experiments indicated that rats under nembutal anaesthesia showed fibrinolytic activity which was not appreciably altered after adrenalectomy and hypophysectomy.

The fibrinolysis experiments indicated a marked specificity of the enzyme. Whilst fibrin was broken down, fibrinogen was not affected. Since the molecular changes from fibrinogen to fibrin during the clotting process may involve amino groups, it was decided to investigate this possibility. Fibrinogen was isolated from human and dog plasma and fibrin was produced from it by the addition of bovine thrombin. The Sorensen formol technique was applied and the amount of baryta required to change the pH from 7 to 9 was measured. It was found that fibrin consumed less baryta than the same quantity of fibrinogen from which it was prepared. However, when fibrin as well as fibrinogen were dissolved in 30% urea, equal volumes of alkali were required for neutralization. Since fibrinogen in the absence or presence of urea took up equal volumes of alkali it was concluded that urea in the concentration employed did not alter the concentration of free amino groups. Further, it was observed that solutions of fibrin in urea gelled immediately when diluted with distilled water, and quantitative recovery of fibrin was obtained. From these experiments it is concluded that the number of amino groups in fibrinogen and fibrin is the same and the apparently smaller number of amino groups in fibrin suspended in aqueous formaldehyde is due to insolubility.

METABOLISM OF SUBSTANCES WITH VITAMIN K ACTIVITY

Dr. P. Fantl, G. J. Lincoln and L. Bennett.

Although it is well established that certain derivatives of 1,4 naphthoquinone are required for the synthesis of prothrombin in the liver, the mechanism of this process is not understood. Metabolic studies were carried out, using the water insoluble compounds 2-methyl, 1, 4 naphthaquinone (Vitamin K_1), 2-methyl 1,4 naphthohydroquinone diacetate (Acetomenaphthon) and the water soluble preparation 2 methyl, 1,4 naphthohydroquinone diphosphate. The drugs were administered orally to rabbits on a vegetable diet and to rats on a meat diet. It was observed that in some cases the excretion of urinary glycuronidates was increased following the administration of the drugs. The estimation of glycuronic acid was carried out by colorimetric procedure. using either naphthoresorcinol or carbazole. Further, it was observed that the reducing power of the urines was increased following administration of the drugs. However, acid hydrolysis did not increase the reducing power of the urines, which is evidence against the excretion of a combined glycuronidate. Approximately 20% of the drugs were excreted in 24 hours after administration. This was independent of the solubility of the drug. It was possible to isolate 2 methyl, 1,4 naphthoquinone from the urinary metabolite.

STUDIES ON ENDOCRINE INFLUENCES ON CARBOHYDRATE METABOLISM

Dr. J. Bornstein and Miss P. Trewhella.

The influence of several endocrine glands on glycogen deposition in the isolated rat's diaphragm has been studied, and it has been shown that the suprarenal and anterior pituitary glands both have a separate, if complementary antagonizing effect on the action of insulin.

Previous work on insulin assay in the alloxan, diabetic, hypophysectomized adrenalectomized (A.D.H.A.) rat has been extended and shows that diabetic patients fall into two groups, the larger having no detectable insulin, as assayed

by this technique, present in their plasma, and the smaller having a plasma insulin concentration within the normal range.

Investigation of A.D.H.A. rats injected with plasma from the patients in whom no insulin was detectable showed that a temporary resistance to the normal action of insulin was induced in these animals. Attempts made to fractionate diabetic plasma resulted in the loss of this property.

An assay technique for adrenocorticotropic-like activity of blood plasma has been developed and used in the investigation of various cases. It has been shown that the plasma concentration of A.C.T.-like substance is raised in Cushing's syndrome, low in Simmons' disease, high in post-operative stress and cardiac patients in severe failure. In a number of diabetic patients it was found that in the uncontrolled, but non-ketotic, patient the plasma A.C.T.-like activity was normal.

In view of the recent interest in the relation between the thyroid secretion and insulin action, preliminary experiments have been commenced on an accurate technique for the measurement of tissue and blood iodine in the hope of being able to get an accurate guide to thyroid activity. Preliminary results suggest that an assay for thyrotropic hormone may be possible, using the guinea pig thyroid iodine content as a basis for the assay.

In co-operation with Professor Sir Macfarlane Burnet, of the Walter and Eliza Hall Institute, and other members of his staff, experiments were carried out on the effect of bacterial enzymes and influenza virus on glucose metabolism.

Preliminary results show that glucose utilization by the isolated diaphragm is appreciably increased by the intravenous injection of the receptor destroying enzyme (R.D.E.) of the cholera vibrio. The sample of R.D.E. was tested for its ability to destroy a sample of corticotrophic hormone prepared by us, and it seemed inactive.

THE FOLLOWING RESEARCH PROJECTS OF THE CLINICAL RESEARCH UNIT ARE BEING ASSISTED BY VARIOUS MEMBERS OF THE INSTITUTE STAFF:—

CONGESTIVE CARDIAC FAILURE

Dr. T. E. Lowe.

During 1949 an investigation was commenced into some of the problems associated with congestive cardiac failure. Most of these patients have an excessive amount of water retained in their bodies, and this gives oedema formation. Associated with the retention of water there is a concomitant retention of salts.

Many theories have been put forward to account for the retention of water and salt in cardiac failure. but as all of them seem incomplete in some one or other aspect we have been conducting balance studies of both water and salt metabolism in such patients. In addition some observations have been made on the degree of activity of the pituitary and suprarenal glands in cardiac failure.

The observations so far made indicate that on a standard form of therapy most patients with cardiac oedema lose their excess fluid in the same general way. A few, however, do not follow this behaviour, and we have noted that in them the urinary content of anti-diuretic hormone is increased. In all patients studied the blood corticotropic hormone-like activity was greatly increased whilst the patients were in a state of failure. It returned to normal when the failure was relieved. Except for those few patients with excessive anti-diuretic hormone activity there was no need to exhibit mercurial diuretics to produce the diuresis. In the former cases, however, mecurial diuretics were necessary to produce a diuresis.

The water balance studies further indicate that during diuresis there appear to be two mechanisms controlling the fluid lost from the body. One is a fast-acting control producing day to day variations of fluid loss or gain about a slowly changing curve determined by a slow-acting mechanism. It is suggested that the fast-acting mechanism is concerned with control of ionic concentrations, whereas the slow-acting one is concerned with the total amount of fluid within the body.

ELECTROCARDIOGRAPHY

Dr. T. E. Lowe.

The use of instruments to give a continuous record of the heart's electrical activity has been a clinical routine for many years. Since Einthoven, at the beginning of this century, expounded the basic principles of this method, most of the advances made have been in instrument design and in increasing the number of points on the body from which recordings are made.

In general, these records have been made in the frontal plane of the body, and more recently in a plane through the precordium. However, anatomically the heart has three dimensions, and it is to be expected that its electrical activity will also occur in three dimensions. For this reason an investigation has been commenced into the electrical component of the heart's activity situated in the sagittal plane.

The usual recordings made relate the intensity of the electrical changes to a time base. However, they can also be considered as changes in space if two leads are taken together. This procedure is called vectorcardiography, for at

any instant the heart's electrical activity can be represented as a vector quantity, i.e., it has both magnitude and direction. Recent developments in electronic equipment have made possible instrumental synthesis of leads, and so the vector path can be represented on the fluorescent screen of a cathode ray tube.

Apparatus has been constructed for this purpose, and a study of the vectorcardiogram, in both frontal and sagittal planes, has been commenced.

It is anticipated that by the use of such a machine the present multiplicity of records taken from a patient will be greatly reduced in number.

SYMPATHOMIMETIC AND SYMPATHOLYTIC DRUGS

Dr. A. J. Barnett.

Recently our knowledge of the physiology of the sympathetic nervous system has been greatly extended by the discovery that the substance liberated by sympathetic nerves is mainly noradrenaline, and not adrenaline, as previously believed. Extensive investigations have been made elsewhere of the action of noradrenaline, particularly on the vascular system, both in animals and man. However, as yet, there have been no reports on its action on the cerebral vessels. There is much difference of opinion as to whether the cerebral vessels are capable of active constriction, and, if so, whether they are influenced by sympathetic nervous activity. The question is of practical importance, as, if such constriction does occur, it may be the cause of some of the cerebral manifestations of arterial hypertension in man, and may be relieved by the administration of sympatholytic drugs. In conjunction with Dr. J. Bornstein (Baker Institute) and Dr. K. Bradley (Neurosurgical Unit) the effects of adrenaline and noradrenaline in the cerebral vessels of the rabbit have been studied. Evidence has been obtained that both these substances cause a constriction of the small arteries and arterioles in this animal.

With the demonstration that noradrenaline will produce arterial hypertension, its possible importance in certain cases of human hypertension becomes more apparent. Investigation therefore has been carried out on the effect of certain sympatholytic drugs, particularly "Dibenamine," against the action of noradrenaline. Although "Dibenamine" has been shown to have a certain noradrenolytic action, its toxicity is such that it has great disadvantages as a diagnostic or therapeutic agent.

For some time, the ganglionic blocking agents penta- and hexa-methonium iodide and bromide have been used in investigation of peripheral vascular disease. More recently they have been employed for the therapeutic effect of their sympatholytic action in the treatment of patients suffering from arterial hypertension, and investigations have been commenced to study their pharmacological action in detail.

THE MEASUREMENT OF BLOOD FLOW IN LIMBS

Dr. A. J. Barnett.

Many of the diseases which affect the peripheral arteries lead to their narrowing or occlusion, with the result that the blood flow to the affected region is diminished. In the limbs this can lead to gangrene and other disorders.

In the management of patients with these diseases, it is helpful to have a measurement of the degree of reduction of blood flow to the part and also of the ability of various drugs to improve that supply in any one patient.

An estimate of blood flow in the limbs can be made by the technique of venous occlusion plethysmography. In this procedure portion of the limb is enclosed in an airtight box, and its increase in volume over a given time is measured when blood is prevented from passing beyond the box by a venous occlusion cuff.

This method of investigation, although well established, has been little used in Australia, and the necessary apparatus has been constructed in our own workshop.

It has been found valuable in differentiating between true arterial diseases and other conditions (e.g., Sudek's atrophy) which mimic them. It has also been used to determine which of several drugs produces the best response in individual patients.

STUDIES OF URINARY BLADDER FUNCTION IN DISEASES OF THE PROSTATE GLAND

Dr. A. J. Barnett.

Enlargement of the prostate gland produces disturbances of function of the urinary bladder, and clinical observations have indicated that these disturbances are probably of several types.

An investigation has been commenced in which the correlations between the intravesical pressure and the bladder volume are recorded. The apparatus consists basically of tambour and lever attached to a catheter inserted in the bladder, and records are made on the smoked paper of a kymograph.

Measurements made to date indicate considerable variations from the normal pressure-volume relations in patients with enlargement of the prostate gland, also marked changes have been noted in the bladder pressures and volumes which produce a desire to micturate. In general, it has been shown that, in most cases, there has been no defect in the power of bladder muscles.

It is thought that these investigations will lead to the development of this technique (cystometry) into a method of investigation which will assist not only the urological surgeon, but also physicians called upon to treat patients with bladder dysfunction.

STUDIES ON THE PHYSIOLOGY AND PATHOLOGY OF THE STOMACH AND DUODENUM

Dr. R. R. Andrew.

Three physiological problems connected with the stomach and duodenum are being studied. They concern gastric and duodenal motility in patients with peptic ulceration, the motor and secretary activity of the stomach after the operation of vagotomy, and the effects of atropine, morphine, insulin and banthine on these functions.

Records of gastric, duodenal and jejunal motility have been made by balloon kymography in cases of duodenal ulcer in an attempt to find the factors involved in the production of ulcer pain. Double lumen, three lumen and four lumen Miller-Abbot tubes carrying one, two or three balloons are swallowed under X-ray control and pressure changes in the stomach, duodenal cap and jejunum recorded.

THE MEASUREMENT OF GASTRIC ACIDITY IN SITU IN MAN

Dr. P. J. Parsons,
Kimpton Research Fellow.

The measurement of the pH of the gastric secretion within the stomach has many advantages in clinical medicine, but is technically difficult. An indwelling glass electrode has been used for similar determinations in animals, but is considered too fragile for use in man. Experiments are therefore being carried out in an endeavour to adapt a metal-metal oxide electrode, which will fit on the end of a gastric catheter, to determine gastric pH values in man. An antimony-antimony oxide combination is being used, and the potentials generated in it are recorded through a potentiometer circuit. Calibration studies show that this electrode gives a linear relationship between voltage generated and the pH of the test solution over the range pH 1-8.

With a view to their use in the treatment of peptic ulcer the effect of the hexamethonium and pentamethonium drugs on gastric secretion are being studied with this apparatus.

At a later stage, when a continuous recording device is installed, it is planned to use this apparatus to record continuously gastric acidity in cases of peptic ulceration.

THE THOMAS BAKER, ALICE BAKER AND ELEANOR SHAW MEDICAL RESEARCH INSTITUTE

Revenue Account for the Year Ended 31st December, 1950

EXPENDITURE.						INCOME.					
Salaries and Wages				£10,640	16 1	Donations—					
Drugs				218	5 1	Thomas Baker (Kodak), Alice Baker and Eleanor Shaw Benefactions				£7,200	0 0
Instruments and Glassware				450	2 1	Government Grants—					
Special Maintenance				742	4 9	National Health and Medical Research Council				2,662	10 0
Repairs and Renewals				36	3 5	Interest from Investments—					
Miscellaneous and Administration—						Thomas Baker (Kodak), Alice Baker and Eleanor Shaw Benefactions—					
Fuel and Lighting	£74	15	11			Australian Commonwealth Inscribed Stock	£552	10	0		
Insurance	104	2	5			Endowment Investments—					
Library Maintenance	388	8	6			Australian Commonwealth Inscribed Stock	179	1	4		
Printing and Stationery	112	2	8			Grain Elevators Board Inscribed Stock	93	15	0		
Travelling Expenses	62	6	4			Australian Consolidated Treasury Bonds	16	5	0		
Sundries	321	15	10							841	11 4
				1,063	11 8	Biochemistry Fees				2	2 0
						Sundries				20	1 6
						Deficiency for the Year				2,424	18 3
				£13,151	3 1					£13,151	3 1

THE THOMAS BAKER, ALICE BAKER AND ELEANOR SHAW MEDICAL RESEARCH INSTITUTE

Balance Sheet at 31st December, 1950

LIABILITIES.			ASSETS.		
Current Liabilities—			**Current Assets—**		
Commercial Bank of Australia Ltd.	£1,596 3 9		Sundry Debtors		£443 12 5
Sundry Creditors	349 18 1		**Investments—**		
		1,946 1 10	Grain Elevators Board Inscribed Stock—		
Capital Grants and Gifts—			3¼% due 1/5/1952	£2,500 0 0	
Balance, 31st December, 1949	156 12 7		Australian Commonwealth Inscribed Stock—		
Add Grants made during the year	1,364 12 2		3¼% due 15/10/1960	5,000 0 0	
	£1,521 4 9		3¼% due 15/10/1963	500 0 0	
Less Disbursements during the year	1,148 8 2		Australian Commonwealth Treasury Bonds—		
		372 16 7	3¼% due 15/9/1961	500 0 0	
					8,500 0 0
Endowment Fund		8,500 0 0	**Fixed Assets—**		
Revenue Account—			Furniture and Fittings		2,100 0 0
Balance at 31st December, 1949	1,094 11 9				
Add Recoup of Deficit for Year Ended 31st December, 1949, from the Thomas Baker (Kodak), Alice Baker and Eleanor Shaw Benefactions	1,555 0 6				
	£2,649 12 3				
Less Deficiency for Year Ended 31st December, 1950	2,424 18 3				
		224 14 0			
		£11,043 12 5			£11,043 12 5

Note: 3¼% Commonwealth Government Inscribed Stock face value of £17,000 is inscribed in the names of the Trustees of the Thomas Baker (Kodak), Alice Baker and Eleanor Shaw Benefactions for the benefit of the Institution.

AUDITORS' REPORT TO THE TRUSTEES.

We have examined the above Balance Sheet with the Books of the Institute, and, having obtained all the information and explanations required by us, we are of opinion that the Balance Sheet shows a true and fair view of the state of the Institute's affairs at 31st December, 1950, according to the best of our information and the explanations given to us and as shown by the Books of the Institute.

FLACK & FLACK,
Chartered Accountants (Australia),
Honorary Auditors.

Melbourne,
21st March, 1951.

PUBLICATIONS BY MEMBERS OF THE INSTITUTE STAFF DURING 1950

P. Fantl, Betty A. Everard and J. F. Nelson: "THE QUESTION OF ARGININE LINKAGE IN SALMINE," Aust. J. Science, Vol. 12 (1950), p. 145.

P. Fantl and Betty A. Everard: "THE ACTION OF PROTAMINE ON BLOOD PLASMA," Aust. J. Exp. Biol. & Med. Science, Vol. 28 (1950), p. 253.

P. Fantl and Mildred Fitzpatrick: "FIBRINOLYSIS INDUCED BY BRAIN EXTRACTS," Brit. J. Exp. Pathology, Vol. 31 (1950), p. 131.

J. Bornstein: "A TECHNIQUE FOR THE ASSAY OF SMALL QUANTITIES OF INSULIN USING ALLOXAN DIABETIC, HYPOPHYSECOTOMIZED, ADRENALECTOMIZED RATS," Aust. J. Exp. Biol. & Med. Science, Vol. 28 (1950), p. 87.

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