



Victorian Cancer News

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the Public Education Sub-Committee
of the Anti-Cancer Council of Victoria*

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DRUGS TO EXTEND LIFE

A current trial of anti-leukaemic drugs in Melbourne provides local proof that acute leukaemia in children, although not as yet curable, may be controlled for longer and longer periods.

This is one of the most heartening gains in the modern treatment of cancer.

Only fifteen years ago almost nothing could be done for children with leukaemia, and less than half the young patients lived for six months after diagnosis. Now over half the children under treatment live for at least a year, and some for several years.

Leukaemia, which is a disease of the blood cells, accounts for 45% of all cases of cancer in children. And cancer, although rare in childhood, is, next to accidents, the most common cause of death between one and 15 years of age.

The therapeutic value of anti-leukaemic drugs is being studied by Dr. John Colebatch during his tenure of a grant from the Anti-Cancer Council of Victoria. In his investigations relating to the treatment of leukaemic children at the Royal Children's Hospital, Dr. Colebatch has the assistance of colleagues Dr. Leon Taft and Dr. Arthur Clark.

Young patients treated with anti-leukaemic drugs, it has been found, not only may enjoy a considerable extension of life, but these added months are happy ones during which the child may live at home and attend kindergarten or school.

There is always the chance, too, that in these months some better and more effective way of controlling the disease may be discovered.

What a contrast to the picture of only a few years ago when no form of treatment did any good for these unfortunate children; when nothing could interrupt the course of the disease!

STUDY OF LEUKAEMIA IN CHILDREN

by Carlotta Kellaway

QUESTIONS TO BE ANSWERED

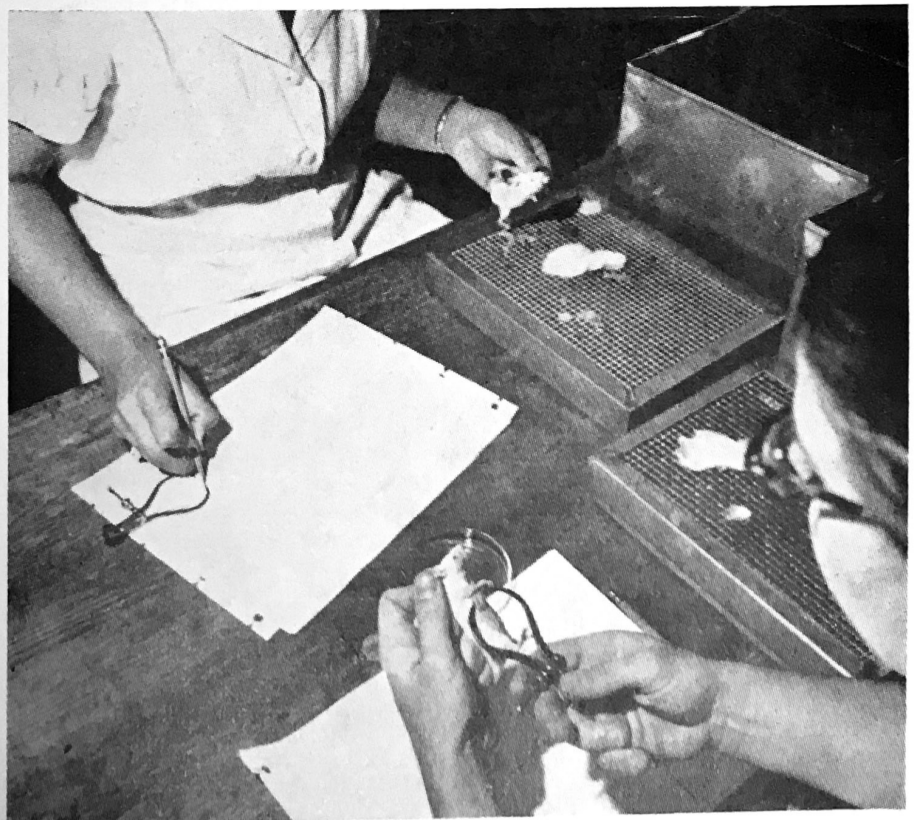
This thorough trial of anti-leukaemic drugs will answer a number of questions.

Which are the most effective drugs?
What period of good health may be expected for the child under treatment?

How can treatment best be designed to let the child lead as normal a life as possible? Why do some cases respond better to the drugs than others?

The basic causes of the disease are, of course, of vital importance to all who are concerned with the care of children suffering from leukaemia.

One part of Dr. Colebatch's investigation is to search for all the possible causes in each case; for example, exposure to irradiation, family history, history of infections, exposure to chemicals — anything that may help to solve this problem which baffles cancer research workers everywhere.



Before it can be accepted for clinical use, each drug undergoes a rigorous testing programme. At the Sloan-Kettering Institute in New York, thousands of compounds are tested every year on animal cancers. To be considered worthy of further trial, a chemical must retard the growth of cancer by at least 25% and, preferably, by 75%.

EXTENSION OF LIFE

Children with leukaemia, unless given the most modern treatment, live on the average less than three months, and few survive for as long as one year.

Of 65 patients treated at the Royal Children's Hospital from 1938-1948, more than half died in two months, only one survived for more than 12 months, and none for as long as two years.

In recent years a tremendous advance has been made in extending the life of leukaemic children by the careful selection and administration of anti-leukaemic drugs.

Of the 70 patients treated at the Royal Children's Hospital since 1958, twenty-two have survived for more than 12 months, nine for more than 18 months, and four for more than two years.

How precious are these added months and years of life to patients, parents and doctors. The gain may not seem large, but it allows the hope that other ways of controlling the disease may be developed during the child's lifetime, and that permanently effective drugs may eventually be discovered.

THE ANTI-LEUKAEMIC DRUGS

What are the anti-leukaemic drugs being tested in Melbourne, and how do they act?

All the drugs used at the Royal Children's Hospital in one way or another succeed in limiting the growth of leukaemia.

One group of drugs acts by reducing the amount of certain chemical substances available to the cancerous leukaemic cells. When these drugs are given, the progress of leukaemia is temporarily halted. Unfortunately, these drugs have unwanted side effects, since they also influence adversely, but to a lesser degree, normal body cells. It is a delicate task to ascertain the exact amount of one of these drugs that will produce the maximum destructive action on the leukaemic cells, while doing as little damage as possible to the normal body cells.

Another group of drugs, the steroid hormones, are very effective in promoting the well-being of the child with leukaemia when he is suffering severely from the symptoms of the disease. These hormones do not so much attack the essential cause, whatever that may be, but help the patient's recuperative powers. These hormones are invaluable in support of treatment with the more toxic drugs in the first group of chemicals.



A selection of anti-cancer drugs from several countries now in use in Melbourne.

ARREST OF LEUKAEMIA

In four out of five cases of acute leukaemia in children where doctors make full use of all the modern measures available, says Dr. Colebatch, a temporary arrest of the disease may be expected.

During this period the child, for at least one month and often for more than a year, has no symptoms. There is no enlargement of the spleen and lymph glands, and no significant anaemia is noticed.

Types of acute leukaemia obviously differ in their response to treatment. But it is an encouraging fact that in acute lymphatic leukaemia, the commonest variety seen in children, good remissions have been obtained in 32 out of 35 cases (92%).

A MORE NORMAL LIFE

It is perhaps the quality of the added life granted to leukaemic children that more than anything else shows how much has been achieved.

It has been found possible to avoid injections almost entirely, and to reduce the number of blood transfusions to an average of about two per year. As a result, treatment for leukaemia is now much better suited to the psychological needs of the child, and consequently has won greater confidence both from referring doctors and from parents. With their co-operation an adequate treatment programme is now practicable in at least 85% of cases.

Leukaemic children are no longer kept in hospital except for an initial period which seldom exceeds a fortnight and for most children is less than 10 days.

During the periods of arrest of the disease, which may exceed a year in length, the children usually continue to attend kindergarten or school.

Mothers report that not only do the children feel well during these periods, but they often stand up to common coughs and colds better than their brothers and sisters.

These results have, of course, only been obtained by the utmost patience and skill in the handling of the children. Dr. Colebatch and his colleagues at the Royal Children's Hospital are profoundly concerned about the small patients in their care. They are deeply involved in the world-wide search for a more assured future for these little children.

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VICTORIAN NEWS

HEALTH WEEK, 1961

As reported in our May issue, the Victorian Health Education Committee has selected the early detection of cancer as the theme for Health Week (15th-21st October).

The opening ceremony on Monday, 16th October, will be performed in the Lower Melbourne Town Hall by the Minister of Health. An eminent medical authority has been invited to speak at the ceremony.

As in previous years, the mass chest X-ray unit will be operating in the Lower Town Hall; on this occasion, a special anti-cancer display will be associated with it.

During the Week three meetings for women only, and a meeting for the general public, will be held under the auspices of the Anti-Cancer Council at the Russell Street Theatre, while lunch-time screenings of general health films will be presented at the Shell, Vacuum, I.C.I., and State Library Theatrettes. Other meetings and film shows have been arranged at the Brunswick, Dandenong, Kew and Malvern Town Halls.

Metropolitan and country radio stations are readily co-operating with the Committee, and have agreed to feature cancer talks or programmes. It is hoped that the three Melbourne television stations will also help to publicise the Week.

Finally, the Committee, with the approval of the Director of Education, has decided to introduce an anti-smoking programme for senior pupils in secondary and technical schools. The following materials will be distributed to school authorities and to youth and other organisations concerned with the health and welfare of young people:—

- (1) a folder, "Shall I Smoke?" setting out objectively some current data on the subject of smoking;
- (2) a poster, illustrating the risk of lung cancer from cigarette smoking.

A limited number of film-strip kits—"To Smoke or Not to Smoke"—are on order from the American Cancer Society. When received, the kits will provide doctors and teachers with a comprehensive aid for presenting information about the relationship between smoking and lung cancer.

CANCER CONSULTATIVE CLINIC

Following discussions between the Royal Melbourne Hospital Board of Management, the Faculty of Medicine of Melbourne University, and the Cancer Institute Board, a Cancer Consultative Clinic has been established at the Out-Patient Department of the Royal Melbourne Hospital.

The new Clinic will enable full use to be made of the consultative facilities of the Hospital and the Peter MacCallum Clinic. A surgeon and a radiotherapist will be in attendance to decide the most appropriate form of treatment for each patient, and a physician will also be available for consultation if required.

Patients may be referred to the Consultative Clinic by the Royal Melbourne Hospital, the Peter MacCallum Clinic, or directly by the patients' own doctor. All consultations are by appointment only, and in most cases attendances will be limited to one visit. No charge will be made to the patient for the first consultation.

WANGARATTA CONFERENCE

The Fourth Regional Conference organised by the Upper Murray Regional Cancer Committee, and held at Wangaratta on 19th July, was addressed by Mrs. M. Esson, Almoner for the Anti-Cancer Council. The meeting, under the chairmanship of Mr. Mac Holten, M.H.R., was attended by representatives from many municipalities in the North East.

There was no need for anyone with cancer to suffer unnecessary financial hardship, Mrs. Esson told the Conference, for help was available from a number of sources. Country patients were often entitled to aid from Government sources, or from the voluntary social services such as Legacy and Red Cross. Anyone who did not qualify for assistance from these agencies could be helped by the Anti-Cancer Council through the local Committee.

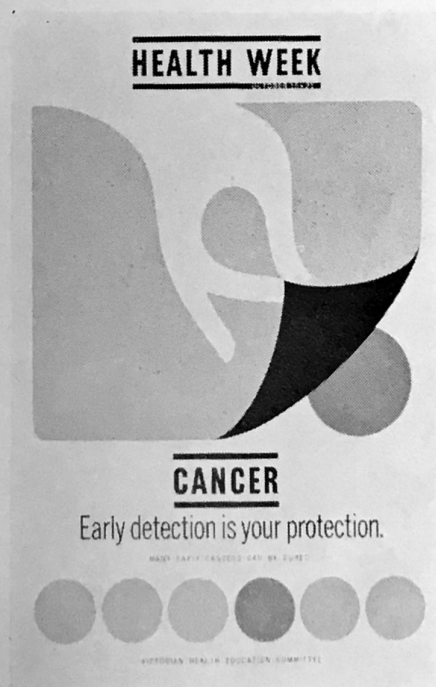
Discussing public education on cancer, the Conference decided to undertake an education programme in several centres in the area later in the year. Mr. Holten said his committee believed it could help to save lives by distributing literature and organising meetings to increase public awareness of the signs and symptoms of cancer.

QUEENSLAND CANCER APPEAL

A public appeal for £500,000 to fight cancer will be launched in Queensland next April. It will last for three months.

Announcing details of the campaign, the Chairman of the Queensland Cancer Fund, Mr. D. J. Lambert, said that the main objective is to provide funds for a new cancer research and treatment centre at the Brisbane General Hospital. The Fund would also help to establish cancer detection centres in country areas, provide hostel accommodation for country patients and a welfare service for cancer sufferers and their families, and support professional and technical education.

In addition, a drive to educate Queenslanders on the signs and symptoms of cancer and the importance of early treatment would play an important part in the campaign, he said.



"Health Week" Poster.

VIRUSES IN CANCER RESEARCH

by Maria Duran-Reynals

No evidence has yet been found that any human cancer is caused by a virus. Cancer in human beings is neither contagious nor infectious. However, it has been known for some time that viruses are implicated in the development of some forms of animal cancer, and the study of viruses is now one of the most active areas of cancer research in the United States.

In this article, reprinted with permission from the American Cancer Society's journal, "Cancer News," Mrs. Maria Duran-Reynals reviews the history of research in this field, and outlines some of the problems still puzzling research scientists. For many years Mrs. Duran-Reynals, a biologist, worked with her husband, Dr. Francisco Duran-Reynals, at the Yale University School of Medicine. She is now engaged in cancer research at the Selman Waksman Institute of Microbiology at Rutgers University.

Dr. Duran-Reynals was one of the early proponents of the virus theory of cancer causation. At the time of his death from cancer in 1958, he was a member of the faculty of Yale Medical School, where his research was supported by the Coffin Childs Fund, the American Cancer Society, and the United States Public Health Service.

This Spring the volunteer workers of the American Cancer Society once again set out on their rounds in search of the funds needed for service to patients, for education of doctors and the public, and for the task that goes to the root of the problem—research to find the cause and, with it, the cure of cancer. It is this latter endeavour that I write of here in the name of my husband, who died of cancer three years ago, and who had devoted his life to the study of this baffling disease.

The progress of medical research from the days of Pasteur, at the turn of the century, is truly astounding. In 1904 a member of my family lost her four children in one week in an epidemic of diphtheria. Together with diphtheria, most infectious diseases—such as childbed fever, rabies, yellow fever, pneumonia, typhus, gangrene, typhoid fever and all sorts of post-surgical infections, as well as such conditions as diabetes and the vitamin deficiencies, rickets and pellagra—have virtually been eliminated or ceased to be a major medical problem in less than 50 years. But as the average span of life has been notably increased in this 50 years, much too often the prolongation of life leads but to the grim encounter with cancer.

It is not that cancer has been neglected in this 50 years. **In fact, more has been learned about cancer and its control in the past half-century than in all previous history.** Today we may know more about cancer than about other diseases which can be controlled. Perhaps it could be said that the difficulty with cancer is a



Mrs. Maria Duran-Reynals.

profusion of clues from which what is true has to be separated from what is a mirage.

Towards the end of the 19th century several theories had already been formulated as to the cause of cancer. In Germany the great discoveries were in progress that made it possible to distinguish the various shapes and characteristics of the different cells which make up the different tissues in the body. Through a microscope the cells that make up the liver could be distinguished from the cells that make up the skin and the cancer cells could be distinguished from the normal cells.

These findings led to the first theories on the cause of cancer which, on the whole, were variations on the same theme—that an internal change took place in the cell, which altered the controls that kept its multiplication within normal bounds.

In 1903, however, a French scientist, named Amédée Borrel, came up with a totally different theory. Cancer, he said, is caused by a virus. His reasoning was

beautifully simple: (1) Cancer is abnormal cell growth; (2) viruses propagate in cells, thereby destroying them; (3) certain viruses—before destroying the cell—induce a transitory stage of cell growth; (4) a virus that would propagate slowly may never destroy the cell, which would then multiply indefinitely—the virus multiplying along with the cell.

Five years after Borrel proposed this theory, it was found in Sweden that a cancer of the blood in chickens, similar to human leukemia, was caused by a virus. In the following years several scientists found that different types of cancer could be induced by viruses in chickens, turkeys, guinea hens, pigeons, frogs, rabbits and mice; moreover that chickens could be protected from cancer if they were raised in isolation, and that cancer of the breast in mice is transmitted through the mother's milk.

As these discoveries were made, it was also found that with certain of these cancer-causing viruses the animals had to be infected at birth to develop cancer later in life. The time during which the animal was vulnerable to infection was found to be critical; only during a brief span of days or maybe weeks, but no longer.

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As these discoveries were made, it was also found that with certain of these cancer-causing viruses the animals had to be infected at birth to develop cancer later in life. The time during which the animal was vulnerable to infection was found to be critical; only during a brief span of days or maybe weeks, but no longer.

Subsequent studies corroborated this latency concept and are now universally accepted. Most of us are well acquainted with the classical example, which is the cold sore that breaks out on the lips after a fever, after exposure to the sun, after a hormonal disorder. Years can go by between one cold sore and the next but the virus that causes it, known as **herpes** virus, has remained in the tissues, invisible and yet ready to cause a lesion when triggered.

With all this and much more I have not mentioned, it would seem that the case for the virus theory of cancer was gaining ground rather fast. Nature, however, delights in riddles. As knowledge about viruses progressed, it was also discovered that tars and other chemicals, X-rays, sunlight, atomic radiation and hormones cause cancer, and that lines of mice could be bred that had 90 per cent of cancer or practically no cancer at all; in other words, that genetics could be the

deciding factor. Genetics, of course, can be the deciding factor in many infectious diseases. Even the black death in the 14th century did not kill all its victims, presumably due to the large proportion of genetically resistant individuals among the survivors.

Some hormones and X-rays lower the defences of the body against infection. Hormones can also arrest cancer. Radiation can cause cancer but it can also destroy cancer tissue. Viruses have been found that destroy cancer tissue in animals.

Another finding that added a new dimension to the virus theory was made by my husband in 1940, when he showed that a virus that causes cancer in adult chickens would cause, in the new-born chick, a rapid illness that induces hemorrhages in the internal organs and kills the chick in a few days. In view of this finding my husband then asked himself, could the opposite be true? Is it possible

that some viruses that originally cause acute illness are capable under certain conditions of inducing cancer?

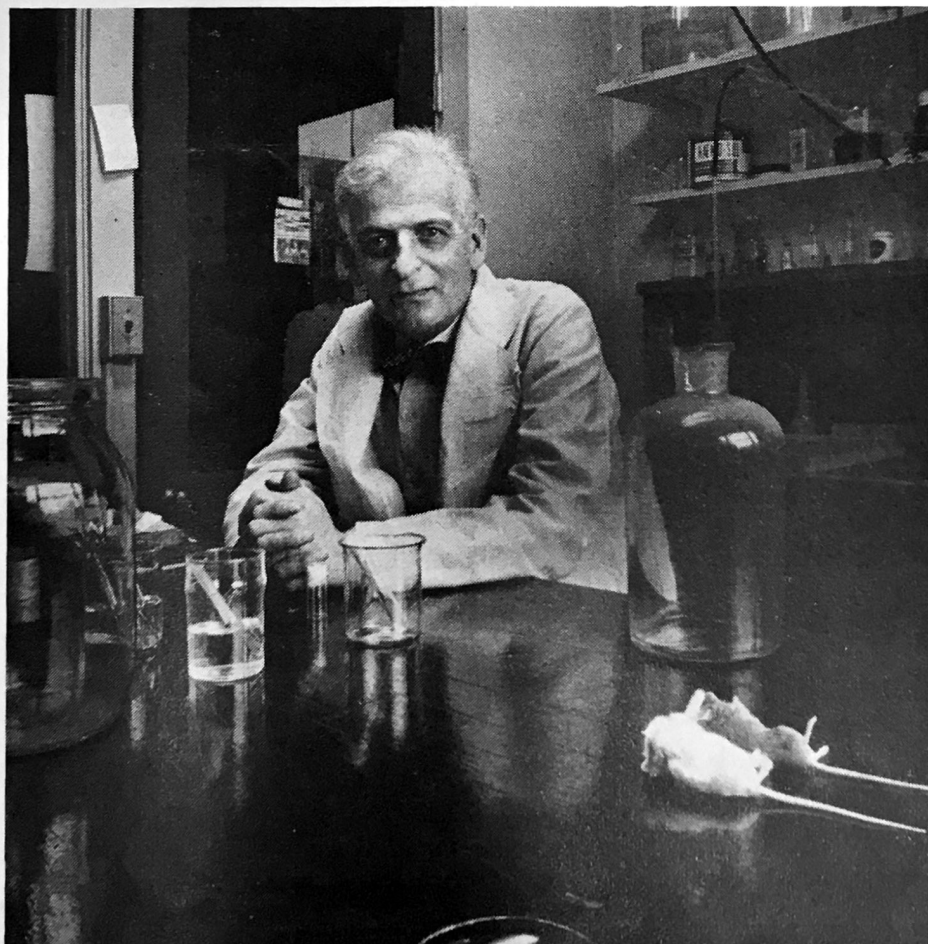
In his last experiments my husband treated mice with a cancer-causing chemical and with the hormone cortisone. He then inoculated these mice with a virus that by itself induces a skin ulcer. The ulcer healed, but an ugly scar remained and several weeks later a cancer developed in the scar. Which was the all-important factor in this formula for cancer? The chemical? The hormone? The virus? And by all-important is meant the one factor without which no cancer will develop even if the other factors should be present. This is what my husband was trying to elucidate when illness put an end to his work.

No wonder that cancer is many things to many people. To the biochemist it is a chemical change; to the geneticist it is the constitution of the host; to the endocrinologist it is a hormonal alteration; to the biophysicist it is the chance encounter with an invisible ray; to the virologist it is a sick host where a virus can thrive; to those of us who have known it as a disease it is a cruel, devastating experience that must be eliminated from the order of things.

In all of this we have been dealing only with experimental cancer; that is, cancer in animals studied in laboratories. To what extent any of these experimental findings apply to human cancer remains to be seen. With the help of the American Cancer Society and other agencies many brilliant men and women are working to put the pieces together.

The lives of many depend on these men and women of science finding the right answers. Failure in research is total failure often made the more bitter because of the knowledge that the failure of today will be the success of tomorrow, and tomorrow will be too late.

It is these men and women I wish you would have in your thoughts when you contribute the funds they need for their work. You may give with the certainty that some day in some laboratory, wherever it may be, the answers we seek will be found.



The late Dr. Francisco Duran-Reynals in his laboratory at Yale University.

AUSTRALIA FIGHTS CANCER

COMPREHENSIVE REPORT FROM NEW ZEALAND

We have just received a report from the Auckland Division of the British Empire Cancer Campaign Society in New Zealand reviewing the progress of anti-cancer activities in Australia. The report, although compiled to acquaint the New Zealand Society with the work of Australian cancer organisations, is of such general interest that we have decided to summarise here its key sections. We would also like to compliment the compiler, Mr. R. N. Stevenson, Managing-Secretary of the Auckland Division, for his comprehensive and thorough coverage of all aspects of cancer work in this country.

ADMINISTRATION

The main administrative features of cancer organisations in five States are described.

New South Wales: The State Cancer Council, which was established in 1955, aims to assist research into causes, prevention, diagnosis and treatment of cancer; to foster under-graduate and post-graduate education and public education; to co-ordinate the activities of all bodies involved in cancer work; and to conduct public appeals for funds. The Council receives a State Government grant of approximately £50,000 per annum. It also obtains an average sum of £6,000 per annum from the public in the form of donations and bequests. Approximately £35,000 is allocated for research fellowships.

Queensland: The Queensland Health Education Council, which has the support of the State Government, includes cancer education as part of its health programme. There is representation on the Council of medical personnel associated with the Queensland Radium Institute and the Brisbane General Hospital as well as the University of Queensland.

Victoria: The Anti-Cancer Council of Victoria, established by the State Parliament in 1936, is controlled by an Executive Committee with both medical and lay members. There is also a Finance Committee, a Medical and Scientific Committee, and Committees for Public and Professional Education. Eleven regional committees (set up in centres where there are regional base hospitals) and numerous sub-committees provide a State-wide network of voluntary workers helping to promote public education and providing welfare services.

These committees assisted with the Council's 1958 appeal which raised nearly £1,400,000, thus placing Victoria in the strongest position of any State for finance. Allocation of funds is 75 per cent for research, 12½ per cent for education of the public and the medical profession, and 12½ per cent for aid to cancer sufferers. Annual research expenditure is now approximately £120,000.

Tasmania: The Tasmanian Cancer Committee was constituted by Act of Parliament in 1936 with the object of promoting cancer research and the collection of funds for that purpose.

South Australia: The Anti-Cancer Campaign Committee of the University of Adelaide was formed in 1928 to aid research into problems of cancer and to extend modern methods of treatment. Finance comes from gifts and bequests, government grants and subsidies and public appeals. Three public appeals, the last in 1950, have raised a total of more than £100,000. Government aid has been approximately £3,000-£5,000 per annum since 1929.

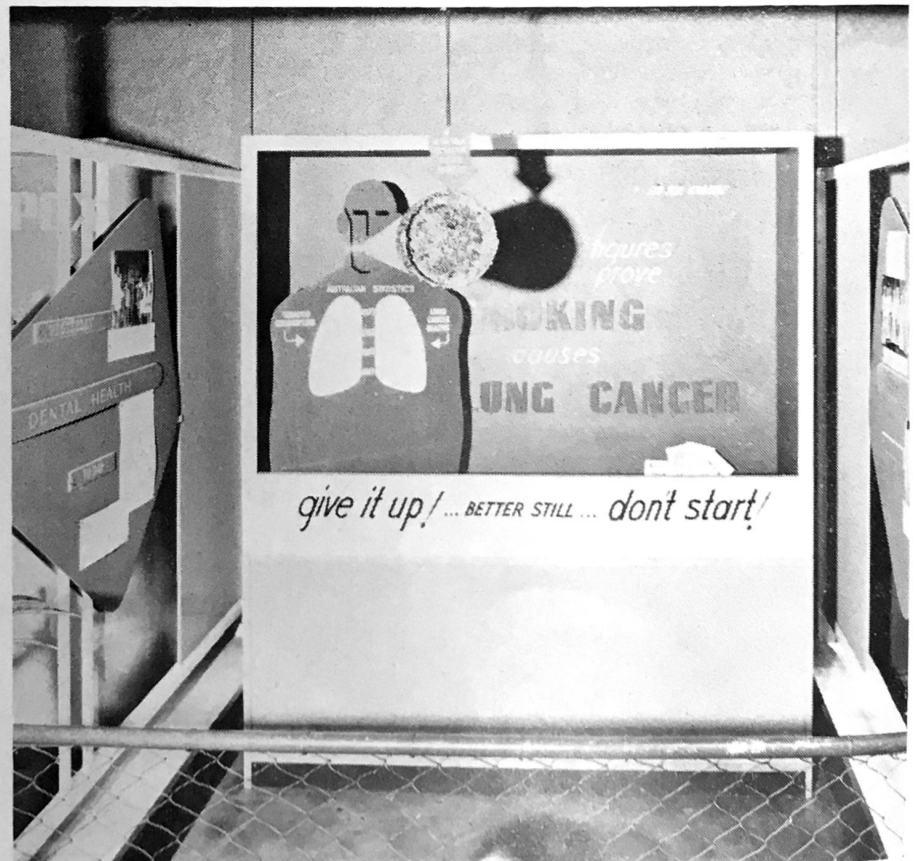
(As readers of this Newsletter will know, within the last year new cancer organisations have been established in Queensland and Western Australia, and the South Australian Committee has been reconstituted.)

PUBLIC EDUCATION

Active public education campaigns are reported in most States.

Distribution of leaflets and booklets throughout the State is a main feature of the N.S.W. campaign. This has been effected with the co-operation of local government authorities, public utilities, pharmacies, insurance companies, trade unions and the Country Women's Association.

An interesting distribution medium used in Queensland is that of book-marks—80,000 of these per year are distributed through public libraries. These book-marks discuss smoking in relation to lung cancer.



Queensland Health Education Council Exhibit at the Brisbane Showgrounds.

SECONDARY SCHOOLS' CAMPAIGN

Much publicity has been given lately to another important educational project in Queensland—the campaign in the secondary schools in regard to smoking and lung cancer.

This scheme which began in 1959 has the backing of the Ministers for Education and Health, the approval of the British Medical Association and of the staff of the Queensland Radium Institute. A circular sent to all teachers in the State explained the nature of the programme and enclosed a pamphlet entitled "Notes for Teachers: Smoking and Lung Cancer," and a pamphlet for every child, "To Smoke or Not to Smoke." Supplementing this programme is the release throughout the schools of a film called "Tobacco in the Human Body," produced by the Encyclopaedia Britannica organization.

The various educational techniques employed by the Victorian Education Committee are described at length in the Report. Considering public education to be a social as well as a medical problem, the Committee aims not only to publicise the warning signs but also to create a more balanced attitude in the community towards cancer—to teach people to be alert but not alarmed.

The Report also comments on the wide range of films available from the Victorian State Film Centre and describes in detail the film "Horizons of Hope": "This is a splendid presentation of modern research into cancer. It is well presented, animated in places, and sums up the whole problem of cancer very well indeed."

PROFESSIONAL EDUCATION

Professional education is being tackled in a number of different ways, says the Report. In N.S.W., exhibits relating to cancers of the lung, stomach, breast, uterus, colon and rectum have been used for teaching medical students. Monographs have been obtained at a cost of £7,000 from the American Cancer Society and forwarded to every doctor and final-year medical student in the State. A book, "Cancer Nursing," also produced in U.S.A., has been sent to the 50 principal hospitals in the State.

In Victoria the Anti-Cancer Council provides a grant to the Melbourne Post-Graduate Committee to undertake education of the medical profession at the post-graduate level in the field of cancer.

RESEARCH

With considerably more finance available in Victoria for research than in any of the other States the Report deals with local projects of special interest in some detail.

Annual research expenditure of the Anti-Cancer Council of Victoria has increased from £12,000 in 1956/7 to £120,000 in 1959/60.

A large part of Victoria's expenditure is in the fields of leukaemia and carcinogenesis. The Report reviews Dr. Donald Metcalf's work at the Walter and Eliza Hall Institute on the fundamental characteristics of leukaemia in mice. It refers also to clinical studies being made on leukaemic children at the Royal Children's Hospital and other clinical and scientific studies under way at St. Vincent's Hospital and the Alfred Hospital.

Research in carcinogenesis (the origin or induction of cancer) is centred in the University of Melbourne in the Departments of Pathology, Botany, Physiology and Organic Chemistry.

The application of television techniques to cancer diagnosis by Dr. G. Berci in the Department of Surgery, University of Melbourne, is also discussed.

In N.S.W., the State Cancer Council in 1960 allocated £26,500 to 12 approved research workers at the University of Sydney. The remainder of its research expenditure of £35,000 was spent in grants to the University of N.S.W. (3 projects), the University of New England, St. Vincent's Hospital, the Royal North Shore Hospital and the Royal College of Obstetricians and Gynaecologists. Specific research projects included studies on breast cancer, the biology of the nucleic acids, and topics related to the culture of bone marrow cells.

SPECIAL INVESTIGATION UNIT

A special unit for investigation and treatment of certain types of cancer, situated at the Prince of Wales Hospital, Randwick, is reviewed as an interesting aspect of the work of the N.S.W. State Cancer Council. Here, says the Report, every facility for full investigation and treatment is available, linked with clinical research and research into cancer chemotherapy. Nearly 400 patients a year are admitted and the average duration of the stay is 17 days.

Maintenance costs of the Unit are borne by the Hospitals Commission of New South Wales, the Council providing some £12,000 per annum from Trust Funds for salaries, special equipment and other facilities.

The Unit's chemotherapy programme is concerned with the introduction of new chemical substances and the improvement of techniques in the use of the better established ones, and involves a testing of American, British, French, Japanese and Russian products.

The chief line of research at present is the determination of hormonal dependence of cancer cells derived from actual tumours of patients under treatment. Metabolic studies are also carried out.

RADIOTHERAPY CENTRES

The Report reviews the facilities for radiotherapy treatment in Australia. In addition to conventional deep X-ray machines, supervoltage equipment is now available in all States.

Two Cobalt "bombs" are operating in Sydney, one at the Royal Prince Alfred Hospital and another at St. Vincent's Hospital. A similar unit is in operation at the Peter MacCallum Clinic in the Launceston General Hospital.

Supervoltage linear accelerators (4 Me V) are installed at Adelaide, Brisbane, Melbourne, and Perth. So heavy is the demand on these machines that it has been found necessary to obtain supplementary supervoltage sources in South Australia, Queensland and Victoria.

"ENTHUSIASM AND EXPANSION"

Mr. Stevenson concludes his Report as follows:

"There has been much to see and to learn, most noticeable of all has been the thread of enthusiasm running through all these groups as they expand into educational and research fields. They are relatively new in the field of full-scale anti-cancer campaign activities, but it is certain that these organisations are fulfilling a great public need.

With the probability of a national cancer association being formed in Australia, there will then be a unified development which, while still allowing for individual State effort, will co-ordinate research and provide educational material for both the public and the medical profession. Such a policy of unity will strengthen the effectiveness of the fight against cancer in Australia."

NOTES ON THE HISTORY OF CANCER

by A. J. Brown

III. THE MIDDLE AGES AND RENAISSANCE

From classical times to the 17th century, the theory that the processes of the body were ruled by the four "humours" of blood, phlegm, yellow bile and black bile remained virtually unchallenged. Not only was it believed that the proportions in which these "humours" occurred in a person's body determined his temperament—we still refer to people as sanguine, phlegmatic, or melancholy (from **melan cholos**, or black bile)—but disturbances in the balance between them were thought to be the cause of all disease.

As we have seen, Galen (d. A.D. 203), the last great physician of antiquity, identified the (non-existent) black bile as the offending agent causing cancer, since it tended to concentrate and solidify in certain common sites such as the lips, breast and tongue. His doctrine remained the dominating influence in medical thinking on cancer for more than one thousand years.

So great was the general belief in Galen's infallibility that when in the 16th century the anatomist Andreas Vesalius demonstrated Galen's concept of the hip bone to be incorrect, his contemporaries argued that different fashions in dress must have brought about changes in man's physical shape.

Thus, the Middle Ages added little to our knowledge of cancer, although the field of known cancers, especially internal ones, slowly widened. The Arabian physician Avicenna (A.D. 980-1037) introduced the internal use of arsenic, and a century later his compatriot Avenzoar suggested enemas and sound feeding in treating gastric cancer.

In Western Europe the medieval separation of surgery and medicine did little to facilitate progress. Lanfrank (d.1315) "the father of French surgery," and Guy de Chauliac (1300-1367) placed the pursuit of surgery on a more scientific basis. The latter's authoritative textbook "Chirurgia Magna" earned him widespread recognition, and some of his procedures are still followed today. For operable cancer he recommended conservative treatment and a strict diet.

The famous French army surgeon Ambroise Paré (1510-1590), renowned for his innovations in the treatment of wounds, held to Galen's view that cancer was caused by an excess of black bile. He believed, however, that there was an antecedent cause in the blood which might be due to irregular diet. He interpreted the spread of the disease in

orthodox fashion, viewing metastases as local manifestations of the "melancholy" humour, but recognised nevertheless the essential truth stressed by modern health education—namely, that early cancer can be treated successfully.

Paré's contemporary Paracelsus (1490-1541) was one of the first to actively oppose Galen's doctrines. This remarkable man, who has been variously described as a charlatan, a braggart, and the "Luther of medicine," suggested that mineral salts in the blood, when concentrated in a particular part of the body and unable to find an outlet, were the real cause of cancer. Though equally without foundation in fact, this has a rather more reasonable basis than the humoral theory.

The final demolition of the Galenic system came with Harvey's discovery of the circulation of the blood (1628), followed by the microscopical inspection of the red blood cells by Leeuwenhoek and Malpighi (1661). This proved once and for all the non-existence of "black bile."

Unfortunately, the early microscopes were not sufficiently powerful to enable the structure of tissues to be accurately discerned. Consequently, a fresh confusion of thought arose on the basis of the newly-discovered lymphatic system (1652). The new doctrine—the "sour lymph" theory introduced by the philosopher Descartes—occupied investigators for the next 150 years.

In essence, Descartes' theory assumed that lymph coagulated through some process and became hard, forming scirrhus (a type of carcinoma). If, however, the lymph then fermented, or became sour, or otherwise contained some acid substance, severe cancer would develop. The severity of the disease thus depended on the quality of the lymph, its thickness, fermentation and acidity.



Paracelsus teaching in his laboratory (from a painting by Sante Graziani and reproduced by permission of Lederle Laboratories). Paracelsus is widely regarded as the man who bridged the gap between alchemy and the therapeutic use of drugs.

The Paris surgeon, Henri Le Dran (1685-1770), subscribed to this theory, and from personal observations concluded that in its earliest stages cancer is a local lesion, but that if the cancerous lymph passed beyond the adjacent lymph nodes the entire system would be involved. Despite the incongruity to us of the "sour-lymph" theory, in the long run it had certain positive results in that it favoured the removal of cancerous lymph glands.

So far, very few attempts had been made to provide a basis of experimental evidence for the various theories of cancer causation and growth. One of the first to conduct a systematic experimental investigation was the Frenchman, Bernard Peyrilhe (1735-1804), who attempted to identify the cancer toxin, to ascertain the manner of growth, and to develop methods of treatment.

At this time the idea that cancer was an infectious disease was gaining force, and Peyrilhe sought to demonstrate its infectivity by injecting human cancer tissue into a dog. The only result was the development of an abscess which led a sympathetic maidservant to drown the animal, and thus put an ignominious end to the experiment. Peyrilhe also prescribed carbon dioxide and carrot juice for the treatment of cancer.

In England, John Hunter (1728-1793) put forward the theory "that tumours grew from the coagulable lymph constantly thrown out by the blood, that tumour tissue like normal tissue was nourished by the organism and developed according to the same biological laws." His views represented a distinct advance toward the concepts of cellular pathology.

Really significant progress in our knowledge of cancer, however, had to await the development of greatly improved microscopes in the second and third decades of the 19th century.