

RES MEDICA

Journal of the Royal Medical Society



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ISSN: 2051-7580 (Online) ISSN: 0482-3206 (Print)

Res Medica is published by the Royal Medical Society, 5/5 Bristo Square, Edinburgh, EH8 9AL

Res Medica, Winter 1957, 1(1)

[doi:10.2218/resmedica.v1i1.284](https://doi.org/10.2218/resmedica.v1i1.284)

James A. Gray.

Vol. I., No. 1

WINTER 1957

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THE JOURNAL OF
THE ROYAL MEDICAL SOCIETY



In this Issue :

SIR STANLEY DAVIDSON

“TO BE OR NOT TO BE—A DOCTOR”

SIR ARTHUR PORRITT

“MODERN CONCEPTS OF BREAST
CARCINOMA”

DR A. G. MACGREGOR

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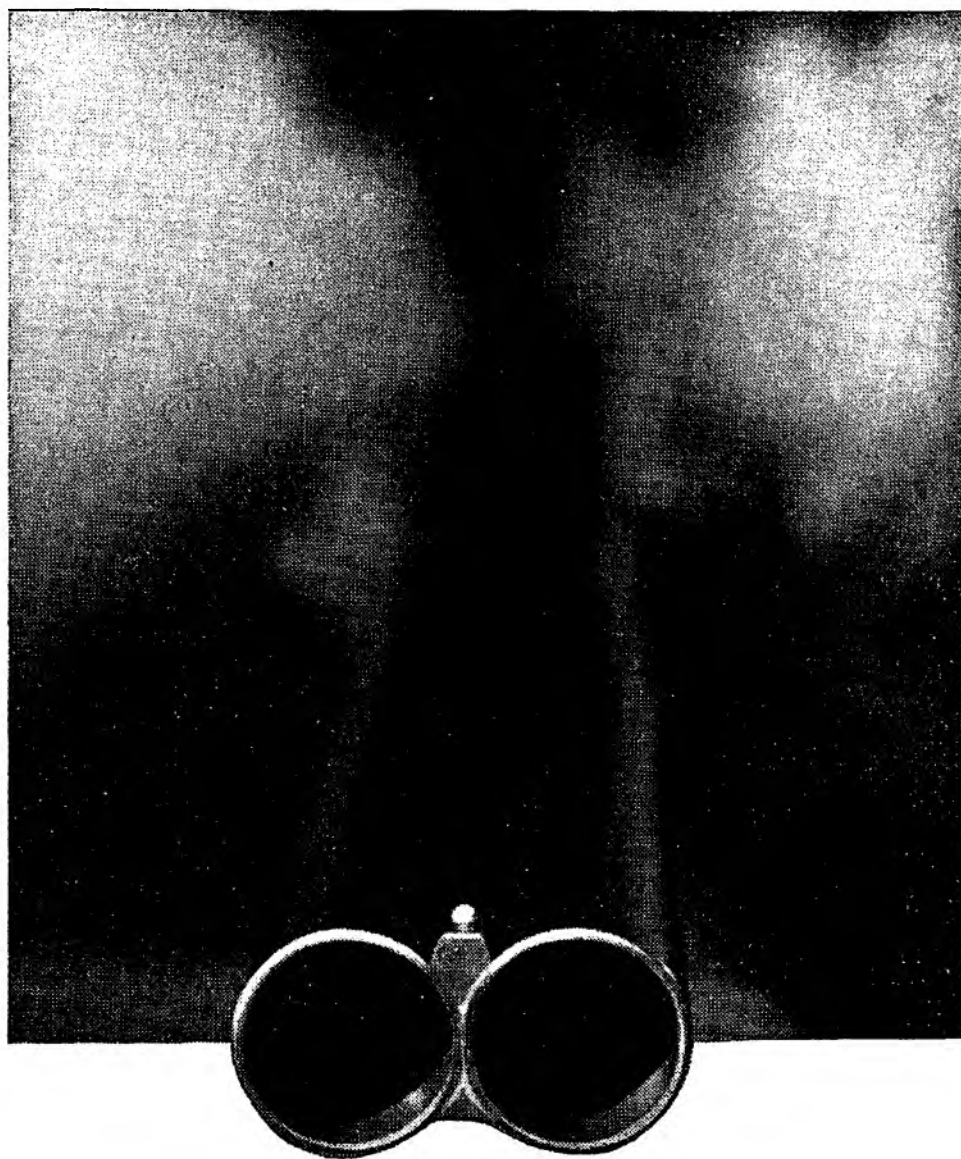
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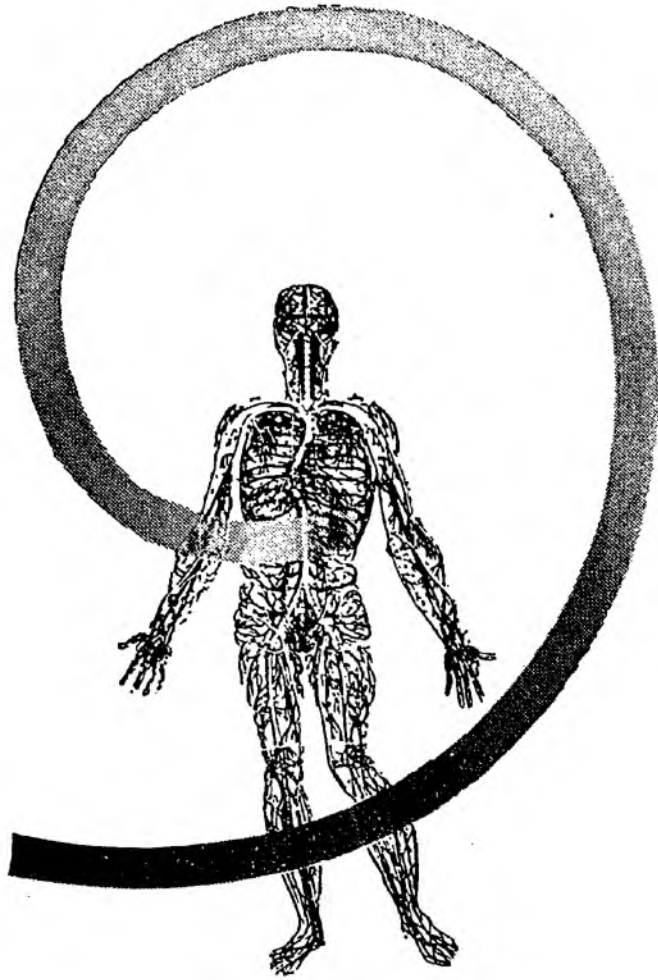
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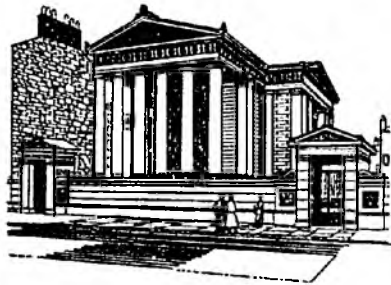
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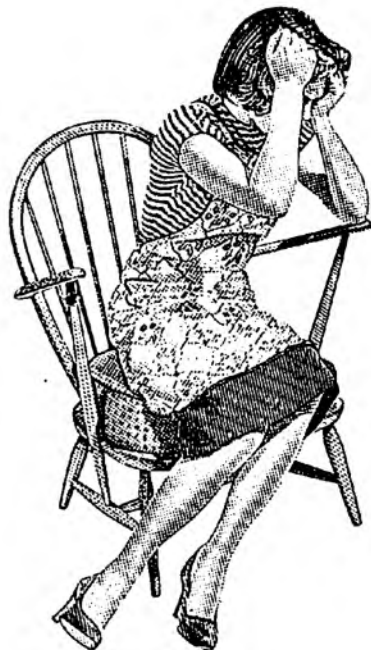
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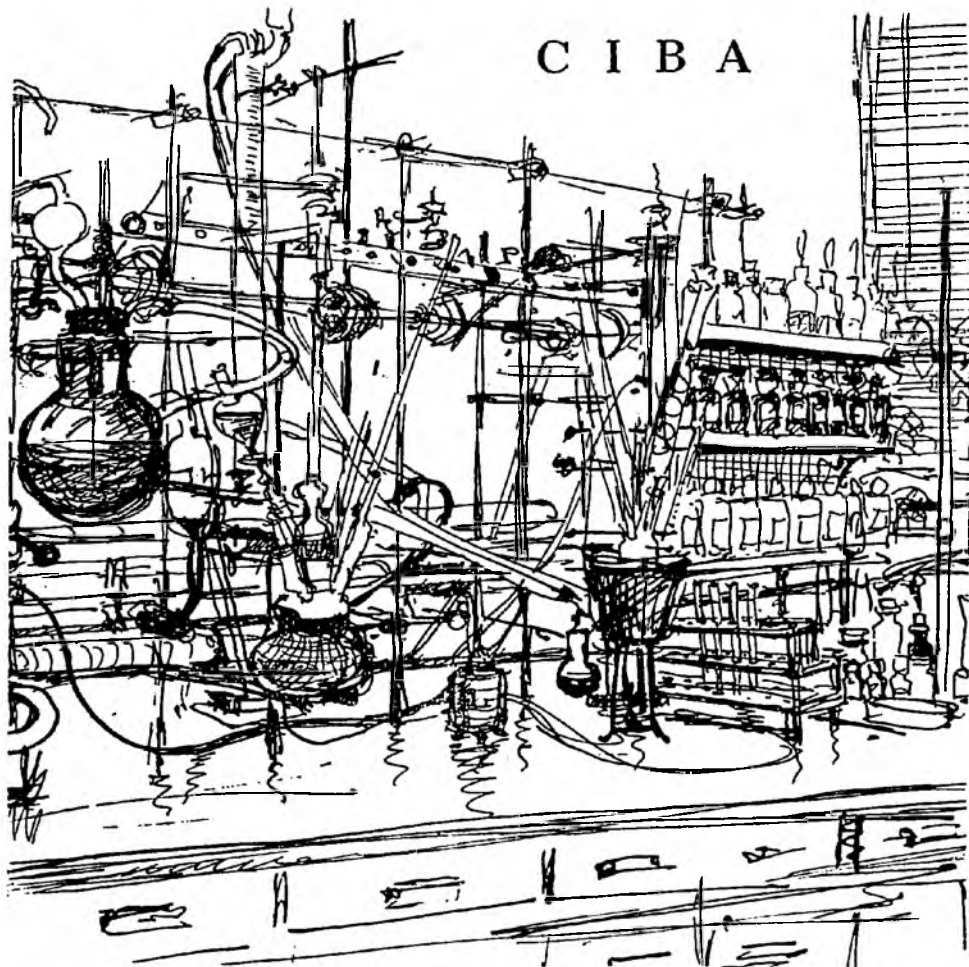
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RES MEDICA

THE JOURNAL OF THE ROYAL MEDICAL SOCIETY

Editor: J. A. GRAY

Editorial Committee: F. COCKBURN, A. W. DELLIPANI,
and C. V. RUCKLEY



The Journal

AFTER 220 YEARS of journalistic infertility, the Royal Medical Society has given birth to *Res Medica* and it is appropriate enough that nearly nine months have elapsed since the end of last Session when the idea was first conceived. Previous attempts to publish the Transactions of the Society have on the whole been abortive, and the idea of a regularly produced Journal never seems to have been seriously entertained.

In January 1779, the eminent Dr Andrew Duncan, a pioneer in psychiatric work and later a President of the Royal College of Physicians of Edinburgh, proposed that the Royal Medical Society should exercise its right of publication. Two months afterwards an announcement was made in the *Medical Commentaries* that the first volume of the forthcoming Transactions would contain an article by Dr John Purcell, Professor of Anatomy in Trinity College, Dublin, on the Sigaultian Operation. Early in 1782 a further announcement appeared but subsequently the newly formed Printing Committee went into abeyance and, after a final brief flicker of activity in 1814, it was finally extinguished.

During the eighteenth century again, another attempt was made to give wider recognition to the Minutes and Dissertations of the Society and this time it met with some success. For a period of six hours each Member who so wished was allowed to peruse the documents of which several copies were made at the Society's expense. They were then sent on to the next most senior Member on the list at the appointed time. This clumsy but apparently workable "Circulation of Papers" continued for a number of years.

At the end of last century the idea of publication again came to the fore. In January 1888, Dr E. H. Ezard, Junior President, proposed that an annually elected office of Editor of Transactions be created. This post of *Actorum Redactor* was later abolished in favour of an Editorial Committee of the four Presidents, and in the spring of 1892 there appeared a selection of Dissertations by Members of the Society who had attained eminence in the Profession. The Preface was written by Sir Douglas Maclagan, an *Olim Praeses* who had at one time been a tireless worker for the Society.

It is obvious that since very early days the Society has frequently felt the need and the desirability to expand its audience and include those outside the four walls in which its meetings are held. This, it may be said, is the motivating force behind the introduction of *Res Medica* and indeed its very *raison d'être*. Thousands of pages of manuscript lie dusty and almost forgotten within the bookcases at 7 Melbourne Place, many written by famous practitioners of the Art of Medicine, and it will


be our revered privilege to rediscover them and allow some of the wit and wisdom of the last two centuries to reach the light of day through the medium of the modern printing press. Although it is at present impossible to include more than a fraction of the Society's annual Proceedings, it is hoped that future editions will be augmented both in their material content and in their circulation. A Journal of the Royal Medical Society should be of general interest to students and doctors in the Edinburgh Medical School and for this reason its sale will not be restricted merely to the confines of the Society or to its past Members and Fellows. Moreover, it seems appropriate that the staff of the Faculty of Medicine, to whom all students must inevitably be indebted, should have the opportunity of writing in the Journal and of expressing their views both to graduates and to undergraduates without the intervening medium of the lecturer's bench.

It is therefore a great honour for this first issue to be introduced by the Professor of Medicine, Sir STANLEY DAVIDSON, and his words of understanding and encouragement have a message for all who aspire to or have already entered our Profession. Any student who has doubted the wisdom of his choice of career or who has suffered some setback to his academic progress, will draw courage and determination from reading Sir Stanley's article. Dr MACGREGOR, too, has kindly agreed to share the benefits of his recent experiences in America, a topic better suited to the pages of this Journal than to the formal atmosphere of the lecture theatre.

We in Edinburgh proudly respect and admire the traditions of our Medical School, and it is only right that these should be reflected in the pages of *Res Medica*. At the same time we feel it would be unnecessary to justify the inclusion of foreign material. Although certain social and political groups have a tendency to encircle themselves in an impenetrable barrier of self-righteousness and self-satisfaction, this trait is fortunately not marked in most quarters of our Profession, and we do not intend that it should be in *Res Medica*. One of our aims, therefore, will be to include contributions from men belonging to institutions with a stature equal to our own but whose views we may not necessarily share. The value of such contributions lies not only in their content but in their controversial nature for they stimulate thought and discussion—those very attitudes of mind that any society would be unwise to reject. For this very reason Sir ARTHUR PORRITT'S Inaugural Address for the 221st Session does much to enhance the pages of our first number; surely there are few subjects which will produce more discussion in medical circles than the treatment of mammary carcinoma. In his vote of thanks, Professor JOHN BRUCE pointed out that Sir Arthur's views were not those commonly held in Edinburgh, but he also indicated how welcome they were and how much could be gained from studying them.

Before concluding this somewhat explanatory Editorial, the Committee wishes to acknowledge their sincere gratitude to those who have helped and encouraged them in this venture. Professor BRUCE has made many sympathetic and valuable suggestions and has helped us with advertisements. And last but not least, we thank our Printer, without whose self-sacrificing efforts this Journal would never have become a reality.

It is our hope and trust that *Res Medica* will prove a benefit to our University and will maintain the venerable traditions of The Royal Medical Society in the years that are to come.

 For historical detail we are indebted to James Gray's "History of the Royal Medical Society," published in 1952 by the Edinburgh University Press.

TO BE OR NOT TO BE—A DOCTOR

By SIR STANLEY DAVIDSON

B.A., M.D., P.R.C.P.E., F.R.C.P.(Lond.)

*Hon. Physician in Scotland to H.M. the Queen; Professor of Medicine
in the University of Edinburgh*

THE PUBLICATION of the first number of *Res Medica*, the Journal of the Royal Medical Society, is a matter of great interest not only to past, present and future members of the Society, but to all teachers and students in the famous Medical School of Edinburgh. Accordingly, it was both an honour and a privilege to be asked by the Editor to contribute an article which contains a personal message to students and prospective students who may have doubts about the future of the medical profession. It also gives me the opportunity of expressing my best wishes for the success of this journalistic venture.

July 1948 will always be remembered in the annals of British medicine as the date on which was started the greatest experiment in social medicine the world has ever seen. Ten years is too short a time for such a major scheme to be firmly set on its feet or for a final evaluation to be made of its merits or demerits. It is inevitable that "teething" troubles should have occurred which have caused annoyance, inconvenience and hardship to patients and to some sections of the medical profession. Certain unfortunate incidents have led to acrimonious disputes between successive Ministers of Health and the representatives of the general practitioners and the specialists. Unfortunately reports of these disputes and negotiations, often ill-informed and exaggerated, have not been confined to the medical journals but have occupied considerable space in the lay Press.

On the whole, the medical profession's claims have not been well received by the lay Press and this, together with the public expression by some doctors of their dissatisfaction with their terms of service, may well have given rise to grave doubts in the minds of parents and of prospective medical students as to the wisdom of entering the medical profession. It is my desire to try and put these matters in proper perspective because of my sincere belief that the profession of medicine has always been and still remains the most attractive, interesting and rewarding of all professions.

The decision to devote one's life to any particular profession, business or trade is usually reached for one of three reasons. First, the boy or girl may feel that he or she has been born with a particular vocation in life, e.g. to be a doctor or a nurse. This, however, is exceptional. Secondly, a person may be influenced in his or her choice of occupation by environmental circumstances, e.g. the father, mother, a near relative or a close friend who is greatly respected and admired may be a doctor or a nurse. This is not uncommon. Thirdly, parents and their child may consider the choice of a career from the viewpoint of (a) financial reward, (b) security of tenure and conditions of service, or (c) interest in the work. These are the considerations which usually influence the final decision, and accordingly it seems to me appropriate to consider them in some detail.

Few students enter a medical school with the idea of making big

money out of medical practice. Even prior to the inception of the National Health Service (N.H.S.) in 1948 it was well recognised that only a small percentage of specialists made an income of £10,000 to £30,000 per year. The majority of doctors had to be satisfied with an income of £1000 to £2000 per annum. I believe that it would be difficult for anyone who has factual information regarding the income of the various professions to deny that at the present time the average gross income of the doctor compares favourably with the average gross income of the cleric, the schoolmaster, the lawyer, the civil servant or the salaried executive in an insurance company, bank or business, of comparable age, experience and ability—even when the doctor's special responsibilities have been taken into consideration.

Why then are many doctors dissatisfied with their remuneration? The answer is that owing to high taxation one-third to two-thirds of a doctor's income may be required for income tax and surtax. As a result of inflation the remaining income only purchases to-day about one half or less of the goods and services which it would have bought some ten to fifteen years ago. High taxation is the price that all Western democracies have had to pay for the social services which are part of the so-called welfare state. It is the price which has had to be paid for a bloodless revolution, which has greatly raised the standard of living of the working classes and reduced the standard of living of the middle and upper classes. It is not surprising therefore that considerable dissatisfaction is expressed by the professional classes at their standard of living as compared with pre-war days. However, for better or worse it is impossible to put the clock back and any political party that attempted to do so would never be elected to office.

While no one can deny that some doctors are feeling the financial strain acutely and others are finding it difficult or impossible to bring up their families in the way they themselves were brought up, it must not be forgotten that this financial strain is felt by members of all other professions, and probably to an even greater extent, since their incomes are generally less than those of the medical profession.

Now let me say something about security of tenure and conditions of service. Doctors who receive at the present time all or a considerable part of their income from a university or from the National Health Service are much more secure than those whose income was derived almost entirely from private practice with all the severe competition which existed in this field prior to 1948. This is an undisputed fact which is held by certain people to be one of the harmful aspects of the N.H.S. Such individuals claim that this lack of competition stifles enterprise and encourages laziness. In my opinion this aspect has been greatly exaggerated. The income of a general practitioner or a part-time specialist still depends to a considerable degree on his ability to attract patients by his personality, technical efficiency, and capacity for hard work. In addition, the present keen competition for a post of a principal or partner in a general practice or a specialist in hospital ensures the selection of persons of high quality who are not likely to lose initiative and become lazy. Further, there is the stimulus of private practice and the merit award for specialists.

Another important condition of service should be mentioned, namely that at the present time those who receive all or a large part of their income from a university or from the N.H.S. continue to be paid when they are absent from work on grounds of sickness, when they visit medical conferences, or when they go on holiday for periods up to six weeks per

annum. In contrast, in the era prior to 1948 the specialist's income ceased when he was absent from duty for any reason. Mention must also be made of the fact that on retiral doctors in the N.H.S. or on a university staff receive a pension. The amount of this pension depends on the contributions paid by the doctor and by the State or university during his professional career. It is not based solely on his income from sessional fees or university salary, but also on his merit award if he has been fortunate enough to have gained one. The result is that the specialist who was appointed in the age group 30-40 years on a full-time or part-time basis can look forward to a handsome pension on retiral at the age of 65.

At the present time there are two groups of doctors who have a legitimate grievance with their conditions of service, namely, the assistant in general practice who finds it difficult to get a partnership, and the well trained senior registrar who is faced with excessive competition in his efforts to attain consultant status. This unfortunate state of affairs is due in the first place to over-production of doctors in the post-war era, and in the second place to a miscalculation by the Government of the number of consultant posts which they proposed to create in the N.H.S. It is my belief that both these unsatisfactory conditions of service will be rectified within the next decade, by the reduced entry of medical students to the universities and the reduction in the number of senior registrars who will be trained in the future.

Lastly, it is important to realise that provided a doctor carries out his work in a reasonably conscientious and efficient manner and conforms to the regulations laid down by the General Medical Council he has complete security of tenure for the duration of his contract, whether he is employed by the N.H.S. or by a university.

While a reasonable financial reward and security of tenure are desirable, nay essential, if an individual is to give of his best to his profession or business, a vital interest in one's work is of far greater importance to one's ultimate happiness. Medicine always will be a compound of science and art. In what other profession can an individual enjoy such a thrill from scientific work as well as so much happiness and gratitude as a reward for his services? How I bless my good fortune in embarking on a medical career 45 years ago at a time which coincided with an epoch of medical discoveries in the fields of diagnosis and treatment unequalled in the last 2000 years. I still find it difficult to realise that during my professional life nutritional diseases such as pellagra, beriberi, and scurvy have disappeared from many parts of the world; that tropical diseases such as malaria, which were the scourge of many countries, have been eradicated or largely brought under control; that infections such as diphtheria have been virtually eliminated in many lands; that tuberculosis is on the run and will soon be as rare in Great Britain as is diphtheria at the present time; that patients who formerly died of pernicious anaemia, diabetic coma, or thyrotoxic heart disease can now all be saved by modern methods of treatment. As one who was desperately ill with pneumococcal pneumonia on no less than three occasions, I look with wonder at the patients in my wards similarly affected who now sit up and read within 48 hours of the commencement of antibiotic treatment.

Equally remarkable are the technical advances in midwifery, gynaecology and surgery, due largely to great improvements in anaesthesia and the prophylactic use of antibiotics. The brain, the lungs, and the heart have opened their portals to the surgical specialist. These are but a few of the amazing advances in medicine which have occurred in

my lifetime. How could anyone fail to be entranced and delighted to belong to a profession which has achieved such remarkable results? Nevertheless, these therapeutic triumphs should not blind us to the fact that many important diseases are still beyond our control and that accordingly the tempo of research must continue unabated, with ever improved apparatus and with ever more skilled workers.

An equally important part of a doctor's life is the care of the sick and dying with all the consequent responsibilities both to patients and to relatives. This demands that the doctor should have a high sense of vocation and duty if his work is to be carried out in the Hippocratic tradition. His reward is the love and gratitude of his patients which more than compensate him for the strain and long hours of work.

To carry out the work of a doctor properly, the medical profession needs men of high moral, intellectual, and scientific status. To achieve this the quality of students selected for training in the medical schools must be good and the standard of teaching both in the basic sciences and in the clinical subjects must be high. How does the present day medical student compare with his predecessor 30 or 40 years ago? As a teacher in the Universities of Edinburgh, Cambridge, and Aberdeen during a period extending over 37 years, I feel I have had sufficient experience to try and answer this question. In the first place it should be remembered that a really good medical student will make a good doctor irrespective of the quality of his teachers, and that a bad medical student, if he manages to achieve graduation, usually makes a poor doctor no matter how well he is taught. It is on that large group of students who occupy the middle of the class examination lists that the effects of good or bad teaching are apparent. Comparing this group of students with the same category at the university in my student days, I have no hesitation in saying that the average medical student of to-day is a more serious, hard-working person and that his knowledge and understanding of the basic sciences and of the clinical aspects of medicine are better. It would indeed be surprising, and in fact most disturbing, if this were not the case, because the medical course has been lengthened by a year, the number of teachers has been greatly increased and the number of students greatly reduced.

In the pre-war years and in the post-war years of 1945 to 1950 the number of students entering medicine annually in the University of Edinburgh and the Extra-Mural School of Medicine was approximately 225 and 80 respectively. The total number who started medicine in October 1957 in Edinburgh was approximately 150—a 50 per cent. reduction. In addition it should be remembered that it is only recently that all medical students after passing the Final Examination have been compelled to work for a minimum of one year in hospital as a House Officer before being registered for independent practice, and many do two years or more. It is therefore not surprising that the average young doctor entering general practice to-day is better qualified than was his predecessor of 39 years ago.

For all the above reasons I am satisfied that on the grounds of financial reward, security of tenure, conditions of service and interest in one's work, the medical profession still remains the most interesting and most rewarding of all the professions.

Accordingly, I give this message to all students and prospective students of medicine: Be of good cheer; you will get a better training as a medical student to-day than ever before and thereafter you will

become a member of a profession which will give you security, a reasonable income and a good pension, and one which is the most interesting and rewarding of all professions because of the service it renders to mankind.

Now I come to the second reason for accepting the Editor's invitation to write this article, namely to wish him and his staff all good fortune for the success of *Res Medica*. As one who took part in launching the *Scottish Medical Journal* two years ago, I have some personal knowledge of the difficulties associated with the publication of a new journal. The high cost of paper, printing, etc. makes it difficult to finance a journal unless the revenue derived from its sale is greatly augmented by income obtained from advertisements. The sponsors of journals with only a small and local circulation naturally find it difficult to persuade commercial firms to buy advertising space. The high cost of production has resulted in the last few years in the cessation of publication of a number of monthly, weekly and daily journals catering for the general public. However, courage and optimism are the perquisites of youth and Mr Gray and his editorial committee are obviously supplied with these attributes in abundance. He has assured me that he has no doubt whatsoever about the success of this venture.

On behalf of a multitude of Edinburgh students and graduates of medicine I end this article by proposing the toast with which we conclude our medical dinners in Edinburgh, namely, *FLOREAT RES MEDICA*.

THE ROYAL MEDICAL SOCIETY

7 MELBOURNE PLACE.

The following is the Society's Syllabus from December 6th, 1957, until the end of the 221st Session:

December 6—TALK: R. H. GIRDWOOD, Esq., M.D., Ph.D., F.R.C.P., F.R.C.P.E. "The American Scene—A Photographic Record."

January 10—DISSERTATION: J. G. TURNBULL, Esq. "Disseminated Sclerosis."

January 17—DISSERTATION: M. J. MCLEAN, Esq. "Dissecting Aneurysm."

January 24—ADDRESS: Professor JOHN BRUCE, C.B.E., F.R.C.S. "A Surgical Gossip."

January 31—DISSERTATION: A. W. DELLIPANI, Esq. "Hepatic Cirrhosis."

February 7—TALK: Professor Sir WALTER MERCER, P.R.C.S.E. "Russian Surgery and Other Things."

February 14—DISSERTATION: ALAN MILNE, Esq. "Poliomyelitis."

February 21—ADDRESS: Professor E. J. WAYNE, M.D., F.R.C.P. (Lond.), F.R.F.P.S. "The Diagnosis and Treatment of Thyrotoxicosis."

February 28—DISSERTATION: J. J. C. CORMACK, Esq. "The Society's Library."

March 7—PRESIDENT'S VALEDICTORY ADDRESS.

Wednesday, March 12—ANNUAL EXTRAORDINARY GENERAL MEETING.

Meetings are held at eight o'clock prompt on Friday evenings during the session.



BENJAMIN FRANKLIN

Terra cotta bust

by Jean Jacques Caffieri

1777

BENJAMIN FRANKLIN

By

FORRESTER COCKBURN

ON THE EVENING of Tuesday, the 29th of January 1957, Mr Eldred D. Kuppinger, United States Consul General in Edinburgh, presented the Franklin Commemorative Medal to the Society on behalf of The Congress of the United States of America. The ceremony took place in the Society's premises at 7 Melbourne Place where the Senior President, Mr T. Ramsay McCall, received the medal on behalf of the Royal Medical Society.

Benjamin Franklin was born in Boston on January 17, 1706, and to commemorate the 250th anniversary of his birth The Congress of the United States of America authorised The Franklin Medal to be awarded to the Societies, Institutions and Enterprises of which Franklin was a member, founder or sponsor. Ten leading British Societies in the eighteenth century counted Franklin an honoured member: The Royal Society of London; The Royal Society of Arts; The Royal Society of Edinburgh; The Royal Medical Society; The Philosophical Society of Edinburgh; The Society of Antiquaries; The Manchester Philosophical and Literary Society; The Medical Society of London; The Society of Thirteen; The Society of the Constitutional Whigs. Such was the range of interest in this man that he was acknowledged by scientist, philosopher and politician as commanding of their respect, admiration and gratitude. Through time he became a member of twenty-five learned societies in America, France, the Netherlands, Germany, Italy, Russia, Spain and Great Britain.

From what beginnings did such a man rise? Born in Boston the youngest son of Josiah and Abiah Franklin, he had nine brothers and five sisters. His father, a candle-maker, could afford him only two years of formal schooling, after which time he was apprenticed to his brother James, a printer. Tiring of his lack of freedom he ran away from his apprenticeship to New York and later went to Philadelphia where he gained employment as a printer. It was in 1724 that Franklin first visited this country and worked at his trade in London. His stay was not long, however, for he returned to Philadelphia in October 1726, and formed a printing company in that city some two years later. His ability as a business man ensured his prosperity and he had acquired a small fortune by the time he reached the age of forty years. The future thus fairly well assured, thoughts of retirement began to assail him.

With what activities did this man fill his time? It was at this point in his career that the question of the nature of electricity began to interest him and a gift of apparatus from the Royal Society of London made possible the furtherance of electrical experiments which he had started in 1746. His retreat from the management of the Philadelphia printing establishment in the following year allowed him full time for his researches into the nature and relationship of lightning and electricity. With his classic kite experiment he demonstrated the identity of these phenomena, invented the lightning conductor, and later introduced electrotherapy in nervous disorders.

About this time, his brother John was troubled with retention of urine. Benjamin consulted a silversmith and gave instructions for the design and making of the first flexible catheter to be used in America, and had it sent to his brother. Agricultural techniques, too, underwent a number of reforms under his guidance, for his new home, a three hundred acre farm in New Jersey, provided him with the opportunity for experimentation in this branch of science. Franklin greatly enjoyed his new life on the farm from which he derived both mental and physical benefit. He once wrote: "Farming is the most honourable of all employments, the most useful in itself and rendering man the most independent."

How any one man could cope with such a variety and intensity of work is beyond the ken of most for, in spite of his farmwork and inventions, Franklin still found time to correspond with many friends all over the world. He took a keen and active interest in world affairs generally, as well as in science and the arts. Music too came within his field of study and activity both as a composer and as an instrumentalist. By the invention of the Armonica, an instrument similar to Musical Glasses, he provided a source of music which appealed to many, including Beethoven and Mozart who both wrote compositions specifically for it.

Entering the political field through his appointment as joint Deputy Post Master General of North America, Franklin found himself almost at once involved in conflicts pertaining to the government of the "States" of North America, and more particularly to the strained relationships between our two countries. At the Albany Congress in 1754 he put forward a plan of Colonial union and soon after this, as agent for the Pennsylvania Assembly, he returned to the United Kingdom to strive for the restoration of good feeling between the American Colonies and this country.

During a tour of duty which lasted nearly five years, Franklin first set foot in Scotland in the year 1757. Short though this visit was, he made a number of friends, amongst whom was Dr Cullen, a founder of the Royal Medical Society and at that time one of the leading physicians in Edinburgh. The Town Council made Franklin a "Burgess and Guild Brother" of the city; the University of St Andrews made him an Honorary Doctor of Laws, and he became a member of the Philosophical Society of Edinburgh, all within a comparatively short space of time. Dr John Fothergill, another member of the Society, was Franklin's particular friend and attended him at about this period for recurrent colds and fever with severe head pains. In his autobiography, Franklin records that he met with Dr Fothergill and David Barclay on a number of occasions and discussed at length, a plan for a reconciliation between the British Government and the Colonies.

Smallpox, which was at this time rife in the North American Con-

inent, had caused the death of one of Franklin's children so that a consideration of the nature of this disease and its treatment was often foremost in his discussions with the physicians of this country. Among the medical men with whom he argued this problem was William Heberden and the result was that fifteen hundred copies of a pamphlet on inoculation for smallpox were dispatched to America for free distribution. Heberden, who composed the pamphlet, desiring no personal credit, did not append his signature but Franklin disclosed the author's name in order that the instructions should carry authority.

Home leave in 1762 was short-lived, for two years later he was again in England as agent for the Pennsylvania Assembly, serving part of the time also as agent for Georgia, New Jersey and Massachusetts. Called to the House of Commons in 1766, he was examined in support of the repeal of the Stamp Act.

Perhaps Franklin's best known contribution to medical science was made in 1775 when, because of failing sight, he required to wear spectacles. This impediment far from handicapping a seventy-year-old man merely provided him with the opportunity to invent bifocal lenses. In a letter written ten years later he tells how he instructed the famous London optician, Dolland, to make the upper half of the lens "least convex for distant objects," and the lower half "most convex for reading." Even at such a critical stage in the Colonial struggle, Franklin's mind was not taken up entirely with affairs of the State, but could afford some time for the investigation of scientific problems as well.

As one of a committee of five, he helped to draft "The America Declaration of Independence" in 1776. Throughout the ensuing American War of Independence, Franklin spent most of his time in France acting as Minister Plenipotentiary of the United States to France. Even in the darkest days of misunderstanding between our countries, however, Franklin maintained a steady correspondence on scientific matters with his friends in Britain. As sponsor of the order which gave immunity to Captain Cook on his voyage of exploration, the sincerity of his desire for a united world effort to further the acquisition of knowledge was made clear for all to see. Recognition of this act was made a year after the signing of the Peace Treaty, when the Royal Society of London awarded him a gold medal struck in Cook's honour. It was in the same

The United States Post Office have issued many stamps portraying Benjamin Franklin. The three-cent rose-carmine illustrated here was issued on January 17, 1956, the 250th anniversary of Franklin's birth. It reproduces "Franklin Taking Electricity from the Sky," a celebrated painting by Benjamin West, the artist from Pennsylvania who became President of the Royal Academy



An External Laxative

From "Of Purgatives" . . . Thos. Livingstone. 1751.

"Heurnicus in his commentary upon Hippocrates informs us that the Ancients purged themselves by washing their feet in a decoction of White Hellibore, and that a piece of Hellibore which was used to keep open an issue proved a purgative, and a kind of vermifuge ointment in which Coloquinlida is one ingredient, when externally applied to the body purges not only children but also adults. Mr Munro gives us a pretty example of this in a young lady who had an ulcer of her leg which it seems had been dressed with a tincture of Myrrh and Aloes. She was brought extremely low by an obstinate diarrhoea which no medicine could have the least effect on, till he ordered the dressing to be changed, upon which the diarrhoea was removed."

year, 1784, that the Royal Medical Society made Franklin an Honorary Member for his services to Medicine.

What were these services which our predecessors saw fit to honour? Allusions have already been made to his inventions and their application to Medicine. Public Health, too, was almost an obsession with him and through the medium of *Poor Richard's Almanac* he would convey his opinions to doctors and public alike. Some of the earliest observations on lead poisoning as an industrial hazard were put forward by Franklin in 1786 when he wrote of the disease as affecting—"glaziers, potters, letter-founders, plumbers, white lead makers, and painters." From a letter written to Benjamin Rush it is seen that his views on the common cold still hold good to-day. He writes: "I hope that after having discovered the benefit of fresh and cool air applied to the sick, people will begin to suspect that possibly it may do no harm to the well," and adds, "people often catch cold from one another when shut up together in close rooms, coaches, etc." We find too that the organisation of the vast hospital system in the United States owes much to the work of Franklin in the eighteenth century. He formulated a general plan for the construction and administration of a large number of these hospitals. "Early to bed and early to rise" is one of Franklin's popular medical aphorisms which is still in use to-day.

Franklin's own health, apart from several severe attacks of gout, had on the whole been good, until at the age of 73 years he developed symptoms of a stone in the urinary bladder. Operation was considered by John Hunter and other eminent surgeons of the time but all advised against such a measure because of the patient's advanced age. The pain he suffered from this complaint must have been more than most could bear, but he did not let it interfere with his duties during the war, and in the subsequent peace negotiations. Eventually, increasing doses of laudanum were necessary and finally, after being bed-ridden for a year, Benjamin Franklin died in coma on the night of April 17, 1790, at the age of 84.

Inscribed on the Memorial Medal are these words: "Wise and Good Men are the Strength of a Nation." Who better exemplifies this principle than Benjamin Franklin?

For the blocks illustrating this article we are indebted to
"Clinical Excerpts," published by Bayer Products Ltd.

MODERN CONCEPTS OF BREAST CARCINOMA

By SIR ARTHUR PORRITT

K.C.M.G., C.B.E., M.A., M.Ch., F.R.C.S.

Sergeant Surgeon to H.M. the Queen

TWENTY YEARS AGO, it was generally considered that breast cancer was readily accessible to radical surgery and that radical surgery had more to offer here than perhaps anywhere else in the body. In the intervening years, this pseudo-complacency has suffered a series of rude shocks, until to-day the pendulum has swung full distance and radical mastectomy plays but a minor role in the treatment of carcinoma of the breast. The now obvious gaps in our armamentarium have been filled by X-ray therapy, with or without local surgery, by the use of the sex endocrines and the cortico-steroids and by what may be termed "physiological" operations on various endocrine glands.

In the mid-thirties, the surgeon could accept full responsibility for treatment by the use of his technical skill. Nowadays, however, each individual patient, and almost each individual cancer, demands such nicety of judgment and keenness of assessment, if the correct method or combination of methods is to be used, that the surgeon must enlist the co-operation of those of his colleagues who specialise in radiotherapy, in histo-pathology and in steroid chemistry.

The complexity of the subject of breast cancer therapy is now all too obvious and many of us feel we are groping in a very stimulating but very perplexing dark. Hence, there may be some value in a general surgeon, who can contribute little new to the problem, attempting a summary of the existing situation.

Such is the breadth of knowledge now required and so great is the accumulation of new facts and theories concerned that even my thirty years of clinical experience seem an indifferent qualification for the task. Such experience, however, does indelibly impress upon one's mind and on one's heart that breasts belong to people! And these people, our patients, are well aware not only of the dual functions of the breast for lactation and decoration, but also of the sword of Damocles that hangs over them in the sinister shape of carcinoma. I do not intend to enlarge upon this aspect save to stress the vital importance to the patient of undergoing any form of treatment which may involve disfigurement or mutilation. Many patients will state, quite honestly, that they would prefer to keep their carcinoma rather than submit to radical mastectomy.

The breast is so readily accessible to the patient, and she is usually so well aware, either subjectively or in fact, of pathological changes in it, that in no sphere of clinical surgery can that much-maligned phrase "the doctor-patient relationship" be more profitably exercised or the milk of human kindness be more sympathetically expended.

May I first consider briefly some points relative to the history, incidence, aetiology, clinical picture and prognosis of the disease?

History

From the detailed description of what he termed "Bulging tumours of the Breast," it would seem that the great Egyptian surgeon of 3000 B.C., Imhotep, recognised breast carcinoma as an entity. His findings are recorded in the Edwin Smith Surgical Papyrus and probably constitute the first written word on this dire disease. Hippocrates was well aware of it and enunciated the odd theory that bleeding from the nipple was a sign of madness. Celsus, in 100 B.C., advocated the treatment of mammary carcinoma by caustics; this method retained its popularity for centuries and was, amazingly enough, used in this country as recently as the 1860's. Sir D'Arcy Power recalled having seen two cases so treated in his youth and I believe these two specimens are still to be seen in the museum of St Bartholomew's Hospital. Neither must we forget the name of Galen in this connection, for it was he who likened the disease to a crab and thus gave it the name which has lasted to this day. From descriptions in medieval literature, it would seem that only very advanced and usually fungating, cancers came to light and these were treated surgically by operations, deservedly labelled "amputations." Many illustrations in ancient books can still be found showing a weird variety of slices, shears and clamps used for this purpose, and the accompanying rope tied round the base of the breast as a form of tourniquet was a well-known feature.

The first form of planned mastectomy was probably carried out by Jean Petit in the early seventeenth century, but more than a hundred years had still to pass before we come to the great pioneers of breast surgery, to whom we should surely pay homage, Charles Moore, Mitchell Banks, Sampson Handley and Cheate in this country, and Pancoast, Samuel Gross and Halsted in America. All these men worked on the hypothesis that to eradicate breast carcinoma, as well as the tumour itself, all areas of lymphatic drainage that were surgically accessible should be cleared. Charles Moore, of the Middlesex Hospital, first practised the removal of the pectoral muscles and their accompanying lymphatic chains in 1867. Some ten years later, Mitchell Banks of Liverpool described his axillary clearance and, in 1889, Halsted of Baltimore introduced a radical mastectomy which is still the prototype of all radical mastectomies done to-day. This is surely a wonderful tribute both to the man and his method. Re-orientation of our ideas on this subject has served only to limit the scope of the operation and not to decry its technique or rationale.

Incidence

I have already used the words "dire disease" and this carcinoma of the breast most certainly is. Statistical evidence seems to show quite definitely that, even allowing for a slow increase in the average age of the population, its incidence has specifically increased in the last thirty years. It accounts for approximately one-third of all malignant neoplasms in women; one woman in every twenty of adult age acquires it; it kills over 7000 women every year in this country. But, unlike certain other growths, it flourishes in almost every clime and every quarter of the globe, and now has the sinister reputation of having outstripped its partner in crime, carcinoma of the uterus, as the most lethal carcinoma in women.

Its peak incidence is certainly in the menopausal years, particularly when this period is either delayed or protracted. The rather futile controversy as to which breast is the more frequently attacked still goes on, but the stress laid of recent years on endocrine influence gives more point

to the equally debated question as to whether the breast that has lactated is more likely to develop cancer than the virginal breast or vice versa.

Aetiology

In respect of aetiology, carcinoma of the breast differs little from its fellows elsewhere in the body. Theories are rampant, facts are few. Bittner's discovery of his "milk factor" in 1936 stimulated a genetic approach. The action of this virus-like agent, transmitting dominantly through the female mammary tumors to suckling mice and, at the same time, producing anti-carcinogenic antibodies, has unfortunately never been established in the human. But few will deny that a familial trend exists not only towards carcinoma in general but more specifically to carcinoma of the breast itself. Jacobson of Denmark, some ten years ago, however, favoured the theory of a general cancer gene, transmitted according to Mendelian principles and estimated by him to be present in approximately 10% of the population. Only much time, together with detailed statistical work, could prove or disprove this conception. Whether such a genetic or familial trend does or does not exist, there is no doubt that the factor of chronic irritation is a potent one in breast carcinoma. It has been truly said that carcinoma of the breast thrives in an environment of oestrogens, a fact which almost certainly accounts for its marked predominance in women and probably also for the fulminating characteristics of pregnancy carcinoma, when the placenta adds its considerable quota of oestrogens to those already present. Throughout a woman's functional life, the breast responds in varying degree to a repeated cyclical stimulation from oestrogens which leads in a proportion of patients, to the cystic degeneration of fibro-adenosis. Again, the stagnant secretions of the breast, particularly after lactation, have been indicted as potential irritants. Yet one more thought is perhaps worthy of consideration in this respect: two out of every three carcinomata of the breast occur in the outer quadrants. The difference in tissue mass as represented by the axillary tail is so small that the probability of multiple minor traumata should perhaps be entertained. In other tissue, the carcinogenic significance of repeated trauma is well enough established.

Clinical Picture

No detailed description of the clinical picture is called for in this lecture but perhaps one or two salient points merit attention. The controversial question of "staging" still awaits solution. The fallacies of clinical staging become more obvious every day, even admitting a certain degree of international unanimity in definition of the various stages. Surgical or operative staging, pathological staging and histological staging, all show how erroneous the first clinical assessment can be. Axillary glands, the crucial factor in correlating clinical findings to therapy, are clinically missed in as many as 50% of cases and, when found, by no means always harbour metastases. Add to this the findings of Sampson Handley and Scarff, that one-third of all cases and 50% of inner quadrant cases produce clinically undiscoverable internal mammary and mediastinal glands and the value of clinical staging, except for preliminary descriptive purposes, seems to get smaller and smaller.

The importance of the doubtful lump, however, becomes greater as the education of the lay public extends. If every doubtful lump in the

breast were discovered, reported and dealt with whilst still covered by that label, the figures for carcinoma of the breast would undergo a magical transformation. I still like to use, both to patient and student, those three excellent aphorisms of Riddell—

“The period of observation is the period of lost opportunity”;

“No lady keeps a lump in her breast”; and

“Beware the ample bosom.”

The clinical diagnosis of carcinoma of the breast is not as easy as the text-books used to lead us to believe. The doubtful lump is far commoner than the classical carcinoma and it is the former that will produce therapeutic dividends. After all, it is the survival of the patient that counts.

In this connection, one must always bear in mind the fact, which is now well established, that the average span of life in untreated carcinoma of the breast is three years. Hence, figures of three years' survival *after* treatment are relatively worthless. It seems obvious that the disease runs a natural course, that there are certain factors which expedite that course and others which delay it, some almost indefinitely. In treatment, we break into the natural course for better or for worse, and it needs the keenest judgment to decide if and how, and where, to make that break.

Prognosis

Carcinoma of the breast, being so readily accessible clinically, affords numerous examples of what Gordon-Taylor has described as “cancer immunity.” The atrophic scirrhus of the eighty-year-old patient which she has knowingly kept for twenty or thirty years is a classical example. In prognosis, the rate of growth is infinitely more important than the duration of symptoms. The lethal encephaloid cancer often kills the patient without producing a single metastasis. Again, quite frequently, long intervals of many years may transpire before secondary growths, which must presumably have been in situ before the primary was removed, effloresce into further and very fatal activity. This represents a breakdown in immunity and such a failure of the natural mechanism is usually a concomitant of other quiet unrelated illnesses. These happenings, and even the well-authenticated actual disappearance of some tumours, all offer very intriguing problems which are probably associated more with the aetiology of cancer as a whole rather than of the breast in particular.

Age is undoubtedly a factor in prognosis and, despite the widely held belief that the younger the patient the worse the outlook, Macdonald has recently produced figures to show that the immediate post-menopausal years (50-60 age group) are probably the most dangerous. It has only recently become appreciated that, at this stage, oestrogen production is not as deficient as was formerly thought.

Before delving deeper into a consideration of methods of treatment to-day, I feel I should list the series of jolts which personally destroyed my complacency in the belief in which I had been brought up, that for all cases of breast carcinoma, which were not obviously hopeless and moribund, the answer was radical mastectomy. They were:

- (i) Thoughts about the hormone dependency of carcinoma of the prostate and the fact that oestrogen therapy in man had produced carcinoma of the breast.
- (ii) The summary from St Bartholomew's Hospital, produced by Murley and his colleagues, showing that, over a period of ten

years, the results of treatment (irrespective of surgeon and and irrespective of method) showed a miserable 1% difference in survival rates.

- (iii) The work of Sampson-Handley (1952) on the frequency of lymphatic spread of growth to the internal mammary and mediastinal glands.
- (iv) The great advances in endocrine chemistry and their application to the problem of breast carcinoma, by surgery of the various endocrine glands and by sex hormone and steroid administration.

These developments seemed logically to push the pendulum of therapy further and further away from the radical surgery of the preceding sixty years. To-day, it would almost appear we have come to the point where, not only has the field of local surgery, that is surgery of the breast itself, dwindled to minor proportions, but where we must honestly face up to the question as to whether surgical therapy is indicated at all.

I feel one has only to ask this question to get at least a qualified affirmative but to decide into which class any particular growth, and any particular patient, falls is a matter of infinite difficulty. Even when one decides that treatment is indicated, which will obviously still be the case in the majority until our knowledge expands yet further, we now possess a great series of therapeutic weapons, besides mere local cutting, and their use, alone or in combination, requires almost the judgment of a Solomon.

Treatment

THIS may be very simply summarised as follows :

I SURGERY	{ Ultra-radical Radical Palliative	{ with or Deep X-ray without Therapy
II RADIOTHERAPY	{ Alone Pre-operative Post-operative	
III HORMONE THERAPY	{ Oestrogens Androgens Cortisone	
IV ENDOCRINE SURGERY	{ Oophorectomy Adrenalectomy Hypophysectomy	
V SYMPTOMATIC		

It is obviously not easy to get all these various methods into perspective and it may be profitable first to discuss each as an entity and then to try and link them in combinations likely to give the best therapeutic results to each individual growth and patient. It will be immediately apparent, however, that surgery on the breast alone has but a limited scope. And that, to my mind, poses the first major question to be answered—"What now is the field of radical surgery?"

RADICAL SURGERY.—Unless, with all the knowledge we now possess and all the data we can accumulate in any particular case, we can honestly expect to extirpate the disease, lock, stock and barrel, then there is no excuse for the major mutilation involved. This is not the place to enlarge on the psychological effects of removal of the breast, but it is most certainly a matter that must be constantly in the forefront of our minds. Very few women can completely readjust mentally to the loss of a breast, valiant though their efforts may be. The absence of such an obvious physical

feature is a constant reminder of the sword of Damocles that has hung, and for all they know or are told, still hangs over them. The hiatus engenders almost as much, and sometimes more, mental trauma than did the original lump in the breast. This all-important fact and the accumulation of statistics of survival periods over now a long period of years, have given a new orientation to the value of radical mastectomy. There is no doubt, however, that the Halsted operation, which as a technical exercise has most certainly worthily stood the test of time and has now a world mortality of under 1%, can, in well-chosen cases, effect something as near a cure of breast cancer as anything we know. The choice—to mutilate or not to mutilate—depends essentially on the clinical presence of glands, apparent or presumed. There are those who believe that the lymphatic nodes, on the analogy of infection, are effective blocks in the path of spread and that to remove them by surgical dissection is deliberately to break down natural barriers. Professor McWhirter and his School here in Edinburgh, are the great protagonists of this belief, and it would certainly seem that figures amply bear out their hypothesis. In other words, nodes, unless minimal, are a contra-indication to radical surgery for they indicate a spread of the disease beyond the scope of surgical extirpation.

Therefore, the Halsted type of mastectomy should be limited to the case which is genuinely clinical Stage I—a lump in the breast with no clinical axillary glands. To this, one must add Sampson Handley's findings in respect of internal mammary gland involvement, which would logically limit the cases suitable for radical mastectomy to Stage I growths *in the two outer quadrants only*. In such cases, one may reasonably expect a five-year-survival rate of 80% and a ten-year-survival rate of 60-65% and these figures undoubtedly justify the mutilation involved. In this connection, it may be mentioned that adjuvant radiotherapy seems to effect no improvement in these figures and, therefore, it can fairly be said that, in this very limited field, surgery, and surgery alone, still offers optimum results.

It must be mentioned, however, that there is a small, but active school which sees in the new developments a challenge to surgery and which has extended the scope of the radical operation to include the removal of even wider fields of possible spread. Urban, in 1954, advocated and practised such an ablation which consisted of the lateral third of the sternum, the costal cartilages, the internal mammary vessels and their concurrent lymphatic chains and the supraclavicular glands and, of course, a full axillary clearance in addition. To a modified degree, Sampson Handley has extended the scope of the original radical mastectomy and it is not without historical interest to remember that Halsted himself, in his earlier days, included the homo-lateral supraclavicular glands in the scope of his dissections. Such heroic extirpations as Urban's must, of necessity, add to the morbidity and mortality of the operation and it remains to be seen whether ends will justify means.

PALLIATIVE SURGERY.—Going to the other extreme, once one has admitted the limitation of a radical operation and has frankly faced up to the fact that, in a particular case, the main therapeutic attack is not to be operative, there still remains a large and useful field of minor or palliative breast surgery. Professor McWhirter's contention that a removal of breast disc alone, together with X-ray therapy to control local recurrences, is better than radical mastectomy, is amply borne out by his figures which, to date, show an over-all 5% advantage for the simpler

methods and this figure has deservedly received world-wide attention. His results have been even better in Stage II growths than in Stage I growths and constitute a very definite advance in surgical thought on this most difficult problem.

If there is anything original I can personally offer in this question, it is work along similar lines which I began with the help of my radiotherapeutic colleague, Dr M. Hulbert at St Mary's Hospital some seven years ago. We have been even more conservative than McWhirter and have worked on the basis that, if surgery is not meant to be the main line of defence, it should not mutilate; I have removed simply the lump itself and a wedge of surrounding breast tissue and left the disc in situ. This has been combined in most cases with a very modified exposure of the axilla to prove or confute clinical findings in respect of axillary nodes and to obtain a suitable gland for biopsy and prognosis purposes. Each case has received adequate radiotherapy to those areas suggested as necessary by the clinical and surgical findings. Results to date are not sufficiently numerous to be statistically significant but the trend is quite obvious and follows exactly that of Professor McWhirter, showing a small but definite advantage in favour of the minor procedure in comparison to a parallel series of radical mastectomies. Moreover, there is the added advantage of a series of very grateful patients who have *not lost their breasts*.

I need not here do more than mention the obvious value of palliative surgery in dealing with the breast carcinoma that is about to fungate or has, in fact, fungated through the skin, though this again is a field where radiotherapy can be of the greatest use.

RADIOTHERAPY.—If we general surgeons are completely honest with ourselves, I think we regard X-ray therapy with an odd mixture of awe, doubt and respect! We have all seen the great relief it can give to frankly inoperable cases, both at the site of the growth and elsewhere; we have all frankly admired it for turning an inoperable case into an operable one, and we have all used it in the fond belief that it would be wrong not to twang every string in the therapeutic bow, however little we may know of its friability or its strength.

But the days when radiotherapy was looked on as the hand-maiden of mastectomy are past. It is an accurate and scientific therapeutic method in its own right and can be used as the sole method of treatment in certain selected cases of breast carcinoma. Its position in the therapeutic armamentarium can be likened to that of a Dominion in the Commonwealth; it has a domestic sphere of influence of its own and unites with the other "Dominions" of endocrine therapy and endocrine surgery to assist the "Mother Country" of General Surgery in an all-out attack in time of danger.

The potency and accuracy of radiotherapy have greatly increased over recent years with the arrival on the scene of the megavolt machine, the linear accelerator and the cobalt units. There would now seem no vestige of doubt that ray therapy can inhibit and even completely destroy neoplastic activity, and achieve this without mutilation and without mortality. Where to draw the dividing line between inhibition and destruction, with reference to the effect on normal tissues, is still a matter of debate. Many examples have been given of active cancer cells found locked up in the firm fibrosis of a gland treated by deep X-ray therapy. The dosage lethal to neoplastic cells lies very near, if not beyond, the tolerance dose of normal skin. Breast tissue, on the other hand, is of relatively low susceptibility. If

recurrences do occur after radiotherapy, they are notoriously resistant to further treatment. On the debit side of the balance, too, must be placed the quite definite, though admittedly temporary, physical discomfort, mental lethargy and depression which commonly accompany this form of therapy.

In using irradiation, just as much sound judgment and keen clinical and pathological assessment of a particular case are required as when surgical measures are contemplated. There are undoubtedly some cases which are resistant to radiotherapy from the start and, if it is given to such cases, spread seems to be accelerated and the actual areas treated tend to harbour metastases.

If used in conjunction with surgery, as is nowadays almost a routine, except perhaps for the genuine Stage I growth in the outer quadrants, its sphere can at first be limited according to glandular involvement, either surgical or pathological. It is wise, after operation, to leave sufficient interval to ensure good wound healing before starting treatment. Indifferent wound healing is one of the chief arguments, though not really a very cogent one, against pre-operative irradiation, as such treatment has a negligible effect on the technique of subsequent surgery.

Irradiation therapy produces its optimal effects in clinical Stages II and III. To give some idea of its value, the following average figures of a number of series may be quoted. In Stage II, the 10-year survival rate with surgery alone amounts to 25% only; if deep X-ray therapy has also been used, this figure is increased to 32%. In Stage III, surgery alone can claim only a 7% ten-year survival rate; surgery *and* irradiation, 9%, and radiotherapy alone 13%. In the later stages of the disease, when widespread dissemination has occurred, radiotherapy finds its greatest value in the relief of pain due to osseous deposits.

Before leaving the subject of irradiation, mention should perhaps be made of Pannett's recent intriguing suggestion that the benefit derived from ray therapy comes not from the direct effect on the cancer cell but from chemical changes produced in the surrounding normal cells, which are stimulated to produce chemical substances lethal to the neoplastic cell contained in their midst. This work derives from the original observations of Keynes in the early thirties, when he reported the disappearance of breast cancers surrounded by a ring of radium needles, a method similar to that used in the treatment of cancer of the tongue.

In introducing the next group of therapeutic measures available in treating breast carcinoma, it must be stressed that they have a value only in the so-called "hormone-dependent" growths which regrettably make up only some 45% at the most of all breast cancers. For the remainder, surgery and irradiation offer all that is available. But, for this 45%, if they can be identified, the field of therapy has, of recent years, expanded in a most dramatic manner. Heretofore, this identification has been by trial and error and the whole subject has been on a purely empirical basis. Only after protracted courses of hormone therapy or having undergone major operations on the endocrine glands, could the unfortunate patient be told that her growth was not hormone dependent. Histological examination of the tumor often gives a good lead in making a decision on dependency for the greater the cellular differentiation of the growth, the greater the likelihood of its being dependent. Again, the age of the patient was assumed to be a reasonable pointer. The younger patients produce a much higher proportion of dependent tumours because their oestrogen output is relatively so much greater. Even now, doubt

is being cast on the oestrogens as the only hormone involved, and the work of Skowen and Hadfield recently stresses the importance of pituitary prolactin as a potent force. From their research, the possibility of a breast cancer stimulated entirely by a pituitary hormone certainly cannot be ruled out and proof is more than presumptive that, even if this is not so, the pituitary and ovarian hormones are synergistic in their influence on mammary carcinoma.

To-day, however, it is possible, by a number of bio-assays, chemical estimations and clinical tests, to *prove* that a particular growth is hormone-dependent. We have passed from the empirical state of qualitative endocrinology to the quantitative. Certain laboratory estimations and assays have now been developed which make possible two clinical tests that go a long way to prove the hormone dependency or otherwise of any given tumour.

In the blood, a raised serum calcium and a raised alkaline phosphatase are both indications of the likelihood of osseous metastases, whilst a raised acid phosphatase points more to visceral secondary deposits. Calcium excretion in the urine is a good index of bone destruction and can be estimated quantitatively. As a round guide, it can be said that every 100 mg. of urinary calcium represent 1 g. loss of skeletal bone.

The endocrine assays are a more recent development. F.S.H. estimations show indirectly the patient's oestrogen activity, and it is well to remember that the more oestrogens the more growth. Since oestrogens inhibit the pituitary, the more F.S.H. the less oestrogen.

By the bio-assay method of Allen and Doisy, however, it is now possible to estimate oestrogen levels directly and to divide them into their "To" and "Tzn" fractions. After a normal menopause, F.S.H. values are high, but in cases of cortical stromal hyperplasia, an opposite trend is noticed and oestrogen values, especially of the "Tzn" fraction, rise sometimes to phenomenal heights, especially in cases of breast carcinoma. Hadfield's urinary assays of mammatrophic hormones in the urine have provided a most useful guide to the potential value of hypophysectomy.

The two clinical tests which can be applied to any patient with breast carcinoma and particularly those in the advanced stage, where hormone therapy or endocrine surgery is being contemplated, are as follows:

1. The Stilboestrol Stimulation Test is self-explanatory. The exhibition of stilboestrol produces both a raised serum calcium and a raised urine calcium excretion, together with an obvious worsening of symptoms, especially pain, in any patient whose growth is hormone-dependent. The trial dose of stilboestrol is usually 10 mg. daily for three days, and the effects of this in a susceptible case may last for as long as a month. The test should not be used in patients with poor renal function. It is hardly necessary to say that the raised calcium figures will apply only to cases with osseous metastases.

2. Cortisone Inhibition Test: Here, the effect is just the opposite and, together with amelioration of clinical symptoms, there is a marked fall in urinary calcium excretion. The usual dose of cortisone given is 200 mg. daily for three days, followed by 100 mg. daily for as long as required.

Without previous oophorectomy, the test, of course, loses its value.

One may now, perhaps, say a few words about the specific uses of the several hormones used in therapy and the operations performed to regulate their activity.

Hormone Therapy

Oestrogens : Stilboestrol (usually prescribed in the form of dinoestrol) finds its chief use in the treatment of the elderly patient. In such a case where the natural supply of oestrogens has dried up, stilboestrol, probably by acting as a pituitary depressant, actually inhibits the growth which, in an earlier age group, it would have stimulated. It is this latter fact which underlines the danger of the rather wholesale prescribing of stilboestrol for the pains of fibro-adenosis that is so prevalent to-day.

In general, therefore, stilboestrol should not be used before the menopause, nor is it wise to use it in cases where there is a family history of carcinoma, or where the disease presents with bleeding from the nipple. Beneficial effects are best shown on visceral metastases, but side-effects are not uncommon, particularly subcutaneous oedema due to salt and water retention, pain in the breast, uterine bleeding and nausea. In those cases which react favourably, about 40% of visceral metastases and 30% of osseous, the remission can be expected to last up to two years or more.

Androgens are usually given in the form of testosterone propionate, and are chiefly used in the pre-menopausal patient. Such temporary remission of symptoms as they produce, especially of pain in the case of osseous secondaries and in the late exacerbations following adrenalectomy, occur in not much more than 20% of cases and rarely does the improvement last more than a year. Side effects of masculinisation are common. It would probably be fair to say that the androgens never produce such a good effect as oophorectomy, but they can be used after this operation with advantage, to enhance the effect.

Cortisone : Steroid medication inhibits both adrenal and pituitary function and it is most important to bear this fact in mind when assessing the results of adrenalectomy. After this operation the administration of cortisone becomes essential and it seems not improbable that the apparently beneficial effects of adrenalectomy are, in fact, due directly to the replacement doses of cortisone and not to the adrenal ablation. Adrenalectomy is known to produce a marked increase in both ACTH and mammatrophic hormones and, therefore, it is possible, in tumours which are pituitary-dependent, that adrenalectomy may, in fact, do harm that will automatically be corrected by the subsequent giving of cortisone. It is believed, by some workers, that cortisone has a direct action in that it competes with oestrogen for protein molecules in the circulating blood and, as the oestrogens have the greater affinity, very large doses of cortisone are required to displace them. Hence the possibility of ultimate "escape" from cortisone effect when the dosage becomes so heavy as to produce such well-marked side-effects as "moon-face" and peptic ulceration. Such an "escape" usually occurs within a two-year period from the start of cortisone therapy. To-day, cortisone is most frequently exhibited in the form of prednisone, which has less tendency to lead to distressing side-effects.

Endocrine Surgery

In considering endocrine surgery, what has been so forcibly termed elsewhere "a series of planned rearguard actions" implies that the battle has been already lost and one is only "staving off" the inevitable. But it is also fair to say that the three operations of oophorectomy, adrena-

lectomy and hypophysectomy have given months, and even years, of life with great improvement of symptoms, to cases which must otherwise have perished out of hand. At the risk of being repetitive, it must be stressed again that good can be done only in those cases in which the growth is hormone-dependent and that these number less than 50% of the total.

OOPHORECTOMY.—This was practised empirically for cases of breast carcinoma as long ago as 1896. It probably fell into disrepute because, at that time, it was not appreciated that its possible sphere of usefulness was so limited and, if *all* cases were treated by ovarian ablation, the results would certainly not recommend the operation.

Its possible value would seem to be greatest obviously where urinary oestrogen values are highest, that is in pre-menopausal patients particularly and, to a lesser extent, in menopausal cases which form a relatively large group, and in those post-menopausal women who have cortical stromal hyperplasia of the ovaries. In passing, it should be noted that breast carcinoma has been reported to occur in 2% of previously castrated women.

Regarding the method of producing castration, there seems to-day a consensus of opinion that surgical removal gives a definitely more complete and effective result than irradiation.

ADRENALECTOMY must be combined with, or follow, oophorectomy if it is to achieve beneficial results in the treatment of advanced hormone-dependent breast cancer. In such cases, which can now be identified by a good response to the cortisone inhibition test, the remaining oestrogen factory producing mainly the "Tzn" fraction, is removed. The operation has small value where the metastases are hepatic, cerebral or pulmonary, but osseous deposits particularly and, to a lesser extent, skin secondaries, are favourably affected. The leading protagonist of the operation in this country, Stanford Cade, claims approximately 100% satisfactory remissions in castrated women, one-third of these being benefited for periods of two years or more. The best results appear to occur in those cases where the original breast growth was *not* a scirrhus carcinoma. However, the operation carries an appreciable mortality (12-15%) and its difficulty lies chiefly in the complete eradication of adrenal tissue. It is estimated that about one-third of the patients have accessory adrenal tissue outside the actual gland itself. There seems considerable basis for the belief that oophorectomy, combined with cortisone therapy, achieves as much as the technically difficult operation of adrenalectomy.

HYPOPHYSECTOMY is, at the moment, the last ditch in the hormonal-surgical attack on advanced mammary carcinoma. Heretofore, it has been difficult to select suitable cases, except on a purely empirical basis, but Hadfield's recent work in estimating urinary prolactin may give a very useful pointer.

At least half the cases submitted to this operation obtain a very definite symptomatic improvement, and this percentage may well be increased when selection is more accurate. The operation, of course, demands the very specialised technique of a skilled neuro-surgeon. It has the advantage that it does not produce the pronounced upsurge of mammatrophic activity that adrenalectomy does. In fact, the post-operative management of a case of hypophysectomy is much easier if

the adrenals are still intact. Adrenalectomy preceding hypophysectomy tends to produce a very marked instability of fluid and electrolytic balance.

The side-effects of hypophysectomy must be borne in mind. Approximately half the cases will get subsequent diabetes insipidus and all will show greatly decreased thyroid function. Such a state of affairs calls for permanent post-operative treatment in either or both of these directions.

Conclusions

From all this mass of facts and theories, can one extract a practical *modus operandi*? I like this series of simple questions which Moore and Jessiman suggest should be asked in assessing each particular case:

1. At what stage in the natural course of the disease is the patient when first seen?
2. What has surgery, radical or local, to offer?
3. Has irradiation therapy a place?
4. Is the tumour hormone-dependent?
5. If so, what is the probable source of the hormone?
6. Can its removal by hormonal therapy or endocrine operations help the case?

These may be simple questions to ask; they are still not so easy to answer. But a great deal can be learnt about the activity of any growth by a careful study of symptoms and signs including discoverable visceral and soft tissue metastases and the radiological findings, and by the application of the tests previously described.

One feels, however, that a complete reorientation of thought on the problem is urgently needed. The first essential in any case is the discovery of the hormone dependence of the growth. We should aim to achieve this *before* and not after the appearance of metastases. If this were possible, then the unfortunately larger group of non-dependent growths would be treated by a judicious mixture of surgery and deep X-ray therapy. To consolidate my own ideas, I believe that in this group, radical mastectomy alone is the treatment of choice for genuine clinical Stage I growths in the outer quadrants; that Stage I growths in the inner quadrants call for radical mastectomy together with irradiation of the internal mammary and supra-clavicular fields of lymphatic spread and that, for all other cases, local and non-mutilating surgery, with carefully planned deep X-ray therapy, is indicated.

In the hormone-dependent class, there would seem every indication for proceeding with a similar basic plan, reinforced without delay by surgical castration and supportive cortisone therapy. In those cases which break down under such a regime, hypophysectomy should be seriously considered.

One realises that such a simplification and condensation of thought is full of fallacies, but it does embody two principles—that of turning a full battery of therapeutic guns, carefully arranged and accurately trained, on to the target of growth and, secondly, that of sparing the patient as much discomfort and disfigurement as possible in the process.

Thus, while sadly *cure of the disease* still eludes us, *care of the patient* can be exercised to the full.

NORTH AMERICAN KALEIDOSCOPE

By ALASTAIR G. MACGREGOR

B.Sc., M.D., F.R.F.P.S.G., M.R.C.P.E., M.R.C.P.

Senior Lecturer in Therapeutics in the University of Edinburgh

I HAVE CALLED these brief remarks a kaleidoscope because inevitably the impressions left after a brief three months spent travelling, visiting and lecturing from New York to San Francisco and from Vancouver to Boston are those of an ever changing, ever fascinating pattern of personalities and scenery, hospitals and research institutions. I can but discuss a few aspects of general rather than of particular interest. Undoubtedly, for those of us fortunate enough to have been allowed to travel thus widely, the impact of the different environment is such that, in retrospect, much of it seems unreal. The American culture, the whole fascinating mechanism of living, is so indescribably different from anything that we have at home, that to experience it for even a few months is to broaden one's outlook and widen one's own horizon to an extent which previously one would have thought unnecessary. It is in the very nature of us all that we have a self-conceit that we are already broad-minded, well travelled and appreciative of other cultures than our own. Nobody's medical or social education is complete until he has at least sampled American and Canadian life, and a generalisation such as this is not as platitudinous as it sounds.

Ideally, a period of a year spent working as an integral part of a unit in a university or a medical school is the method by which most benefit is derived. Thereby three months of travelling can be combined with nine months of work and progress, a period during which new techniques can be learnt and new disciplines assimilated. Thereafter the return home is made with a refreshed and revitalised outlook. To remain for too long in any environment without the catalytic effect of outside contacts, may make the best of us become narrow-minded and occasionally parochially prejudiced in our actions and thoughts.

My own recent peregrinations had a double origin—the Court of the University of Edinburgh kindly gave me leave of absence in order that I might accept a travelling lectureship to the four Western Canadian University Medical Schools and also to various other universities. These visits were combined with studies, on behalf of the South East of Scotland Regional Hospital Board, at a number of centres where various techniques were being used for the application of radioactive iodine to the problems of the diagnosis and treatment of thyroid disorders. Both purposes were achieved by a programme which included short visits to many universities and centres, and more prolonged periods of about ten days at each of several units in New York, Baltimore, Cleveland, Rochester (Minnesota) and Boston.

How can one give a brief vignette of an all-embracing journey? Any transatlantic voyage, even in a January gale which made the world's fastest liner a day late, is an experience, although it is perhaps significant that after the voyage I arranged to fly home three months later. In New York, after an initial contretemps with a taxi driver who thought

that any liner passenger was fair game and likely to be amenable to crookery (but who on this occasion found that he had made a mistake) I spent ten days visiting various hospitals and sightseeing. Here also for the first time I heard the haunting melodies from the score of "My Fair Lady," melodies which follow one in every private home throughout the Continent, melodies which we here can still only enjoy from privately imported records. Its impact here on its arrival at Drury Lane in April will be fabulous.

But a recitation of a timetable is not my purpose. Most stimulating was the contact with, and teaching of medical students. This was my privilege in Baltimore, Cleveland and Western Canada. There is little doubt that the older and more mature American medical student has a theoretical knowledge and a background of relevant physiological and biochemical experience often more profound than his contemporary here. But he is often less at home at the bedside, less able to elicit physical signs and frequently more liable to reach bizarre diagnoses than is his British counterpart. He does this because he is at least aware of conditions of which our students have never heard. This, in itself, is most creditable provided he retains his sense of proportion. Nevertheless, the manner of case presentations by students at conferences and seminars in Baltimore and Boston, Cleveland and Saskatoon was often of a very high standard.

Any visitor is inevitably impressed by the physical facilities and amenities of many American and Canadian hospitals. The provision of so much that makes professional working and teaching conditions pleasant for the doctor poses the question of whether the standard of "patient-care," as it might be called, is equally high. As might be expected, most patients are able to benefit by all the resources of medical science, albeit that this may be expensive. Some of the hospitals for the indigent poor are, unfortunately, more stark and barren than many of our more backward hospitals, but in contrast, the institutions of the Veterans' Administration are superb. In some places the medical care of the patients was not as comprehensive and complete as is usually the case in comparable hospitals here. The reasons were many: sometimes the exigencies of the patient's financial circumstances prevented his having access to facilities which would be provided as a matter of course in this country; occasionally the numerous consultations and investigations advised led to a befogging of the primary issue, the cure or relief of the patient's symptoms. This might result in unnecessary use of medical resources, with the financial burden being carried by the patient; occasionally the superfluity of specialist opinion resulted in no single individual being able to make decisions, which to an outsider appeared obvious and straightforward.

This leads me to discuss what all British visitors are asked: the results and experience of nearly ten years of the British National Health Service. All Americans, medical and lay, are intensely interested in our N.H.S. The medical profession, unfortunately, tends to be irrationally prejudiced and holds innumerable misconceptions regarding conditions of work, the directive power of the Government with regard to care of patients and prescription of drugs, and the cost, to the individual, of the service. Unfortunately, the American Medical Association has about the most powerful imaginable "lobby" in Congress and wields an immense influence upon the Press. As a result both the profession and the lay public are given biased, and often inaccurate, information about the National Health Service. I met, and lived with, very many non-medical

families. It was most humbling to realise that, although in some respects our profession is less respected in this country than it was fifty years ago, the medical profession in the U.S.A. has, by the workings of its public relations, and by its financial policy in Eastern large cities in particular, forfeited much more in terms of good will.

One heard a lot about, and was constantly assured, that the Health Insurance Schemes, such as Blue Cross and Blue Shield, covered all necessary medical expenses. Such schemes, however, are never comprehensive, medical fees for attendance outside hospital are not included, and many procedures and drugs are specifically excluded from the terms of the insurance. There is no reciprocity between many of the schemes in different States, and usually there is a time limit beyond which benefit cannot be obtained. Despite all the insurance schemes, a severe, and particularly, a prolonged illness can and does bankrupt many American families; moreover, the high level of fees demanded for straightforward medical and dental care is often so high that they may represent an inordinate proportion of a slim family budget. It should be remembered that even in the free, expanding and bountiful American economy not all citizens have high incomes in terms of purchasing power.

I was fortunate to be able to visit the four medical schools in the Western Canadian Provinces at Vancouver, Edmonton, Saskatoon, and Winnipeg. Each had its own atmosphere, its own administrative problems and its own particular method of dealing with that perennial and international problem of the relationship between a university teaching centre and the rest of the medical profession in the city. This, in an atmosphere where the number of patients seen determines the incomes of individual or institution, is often not an easy relationship. The main teaching hospital in Vancouver is an "open" hospital, in the sense that most practitioners in the area can admit their patients to the institution for treatment by themselves. A service of house physicians and house surgeons is not general throughout the hospital, and thus many of the patients may have no intermediary between the referring physician and the nursing staff. Such an atmosphere is not always conducive to the best standards of teaching and of medical care. The university authorities there are fully aware of this and are anxious to proceed with the development of a university hospital, in the superb peninsular site occupied by the university campus itself. Saskatoon, wherein is the medical school of the University of Saskatchewan, has had a preclinical medical school for many years, but only on the recent completion of the new University Hospital, has clinical teaching been undertaken. This hospital, built of granite by masons from Aberdeen, is rapidly expanding its departments and attracting a staff from Eastern Canada, the United States and the United Kingdom. To it is already flowing an increasing stream of patients from all parts of the province. In such institutions the vitality of Canada and of Canadian medicine is obvious. Saskatoon is led by staff members who are determined to make it succeed and to turn it into one of the leading North American medical centres.

But so much else could also be described. I have a vivid recollection of a visit to the Government Hospital at Edmonton for Eskimos and for Red Indians from the whole of Northern Canada. I saw there tuberculosis-ridden Eskimo women tattooed on face, hands and knees. The charts above the cots of the Indian babies were always intriguing—they showed names as diverse as William Arthur Foot-in-Hell and Johnny Cut-throat (an especially cherubic-looking infant). The most certain sign

of a full-blooded Red Indian is that he should be called Donald MacDonald or Pierre Dumas—for respect and admiration for the original Scots and French trappers led to the adoption of their names by many families. It cannot, however, be denied that much Scots and French blood flows in the Indians and Eskimos of today.

American hospitality is always described as prodigious. Only in its experience does one realise its extent. Many prolonged talks and discussions into the small hours of the morning were among the most valuable results of the trip. The fantastic distances covered and the variable scenery all make an indelible impression. To leave Minneapolis in a February blizzard with four feet of snow, and to arrive a few hours later in San Francisco and find the spring flowers over and camelias in bloom by the bedroom window was a soul warming experience, quite apart from the thrill of the westward flight across the prairies, the Rockies, the Sierra Nevada range and the descent over the lush Californian valleys, the first sight of green after thousands of miles of snow and browned terrain. A few days later I travelled by train through Jasper National Park from Vancouver to Edmonton, a majestic and magnificent route for which no superlatives can exaggerate the scenery. Travelling yet further East, I visited the expanding Alberta oil fields, passed over the extensive Canadian prairies and saw the vast areas of virgin territory in North Ontario.

Arrival back at the eastern seaboard, via Toronto and Niagara, meant that once again one could read one of the few objective and balanced newspapers, the *New York Times*. There is no "national press" in the sense that we know it, in the United States. The majority of newspapers throughout the country are local and primarily concerned with local and area news. They give about as much space to happenings in Washington as do our newspapers to the political climate of Paris, and their references to Europe and the United Kingdom are about as extensive as the coverage by the *Scotsman* of the affairs of the Boy Scouts in Fiji. Many Americans, especially those in the professions, realise this and the weekly edition of the *Manchester Guardian* is widely read in many households as it gives such a fair and balanced survey of the world scene. The only comparable American cover is the Sunday edition of the *New York Times* which, with its numerous supplements and its *Review of the Week*, is excellent in all respects.

I returned home with thankfulness that I lived in an atmosphere most aspects of which I could at least understand even if I could not always altogether approve, for one always wishes to emulate at home the best that one sees abroad. Inevitably, a traveller wishes to be able to return at some future date to the United States and to Canada in order to renew friendships, widen contacts and, where possible, learn where they can teach, as well as teach where they can learn.



No Comment

From a dissertation "Of Purgatives" . . . Thos. Livingstone. 1751.

" . . . upon searching into a good many books I have found them so much divided in their opinions, that if I should enter into the debate I would but lose myself in a multiplicity of different doctrines."

Bronchogenic Carcinoma: Some Aspects of its Aetiology and Prevention

By JAMES A. GRAY

BASED ON A DISSERTATION READ BEFORE THE ROYAL MEDICAL SOCIETY
ON FRIDAY, 18TH OCTOBER 1957.

*For thy sake Tobacco, I,
Would do anything but die.*

LAMB: *Farewell to Tobacco.*

FIFTY YEARS AGO, bronchogenic carcinoma was a rare disease; to-day it is the most frequently encountered intra-thoracic neoplasm and it is one of the commonest of all the killing tumours. It still bears a grave prognosis despite the advances in surgical and diagnostic technique which allow the treatment to be begun much earlier than was possible in former days. The general public, let alone the medical profession, is becoming increasingly alarmed by this condition, not only on account of its lethal character, but because of the correlation between it and the almost universal habit of cigarette smoking. Questions of ethics and sociology, of politics and economics, of industry and international relations are some of the problems closely interwoven in the suspected aetiology and in the hoped-for prevention of bronchogenic carcinoma.

Most authorities agree that the rising mortality from lung cancer represents a real and not merely an apparent increase. A possible explanation for this is the increasing presence of a carcinogen which was formerly not so much in evidence. Moreover, the preponderance of male to female deaths suggests that men, by reason of their occupation or habits, may be more exposed to such an influence than women. Women are beginning to smoke as much as men and the female incidence may possibly rise because of this; on the other hand, it has been postulated that the male bronchial mucosa may be more susceptible to malignant changes. In 1950, however, Doll and Hill (14) presented figures consistent with the view that amongst non-smokers living in the same area (Greater London) the risks of developing lung cancer were approximately the same in men and women, a fact which tends to minimise the possibility of an inherent sex predisposition irrespective of external influences.

It has been known for many years that certain occupations bear a lung cancer hazard. The well-known miners' cancer of the cobalt and pitch-blende workings in Schneeberg and Joachimstal was first described in 1879. Pitch-blende has a uranium content of 70% but also contains manganese, iron, cobalt, silica and nickel. Radioactivity has often been quoted as the factor responsible but this is not known for certain (25). More recently, other industries have been shown to have a significant lung cancer hazard. Haematite miners are exposed to such a risk, not thought to be due to any specific carcinogen, but rather to the irritation by silica, ferric oxide and chronic infection. Siderosis, therefore, predisposes to carcinoma of the bronchus (19), whilst pneumokoniosis in Welsh coal miners shows rather the opposite effect (21). The nickel refiners at Clydach in North Wales and asbestos textile workers (12) have an increased lung cancer

hazard. An investigation into the bichromates industry in three factories in Great Britain (1) showed that the workers were exposed to a risk which was quite independent of their social, residential, smoking or other habits. Coal gas workers have an increased ratio of registered to expected deaths from bronchogenic carcinoma which is $2\frac{1}{2}$ times that for the general population. (11) At one time it was thought that the incidence of bronchogenic carcinoma might be greater amongst those exposed to tar from roads or to exhaust fumes from motor engines and that this might help to explain the rising mortality figures over the last fifty years. However, no such correlation has been found despite investigations amongst road-menders, asphalters and garage-hands (13 and 20).

The legacy of chronic infection was at one time suspect in the aetiology of bronchogenic carcinoma. Active tuberculosis and lung cancer may be found concurrently and even when an unequivocal diagnosis of tuberculosis is made, the possibility of an associated neoplasm should be borne in mind. Cancer of the lung has been reported in the neighbourhood of healed tuberculous foci and it is rather doubtfully argued that the drop in mortality due to tuberculosis might so have increased the number of healed tuberculous lesions, that there followed a rise in incidence of bronchogenic carcinoma. (13) A lower respiratory tract infection which does not subside should always be regarded with suspicion and it must be remembered that such an infection is more likely to be the result than the cause of a lung cancer. Doll (10) concluded from his study of the mortality from bronchogenic carcinoma among non-smokers, that neither occupational hazards nor the previous occurrence of certain respiratory diseases is likely to be of frequent aetiological importance.

The mechanism causing one small group of pulmonary carcinomas, the scar cancers, is obvious from the name. Reparative hyperplasia following trauma frequently simulates neoplastic change and there is often an indistinct borderline between the two processes. It is sometimes found therefore that scars in lung tissue form precancerous foci. Obstruction of lymph drainage allows anthracotic material to accumulate with the possible liberation of carcinogens. Tuberculous lesions, infarction and inhaled foreign bodies, as well as scars can form the nidus of irritation in which such cancers develop. Each of the three classical histological types of bronchogenic carcinoma has been observed in scar cancers. Usually these tumours are peripheral but may be perihilar because of the centripetal lymph drainage. A central lesion may simulate the primary and yet be in fact a metastasis from some small unrecognised subpleural focus (29).

The two most controversial and important factors in the aetiology of lung cancer remain to be discussed: atmospheric pollution and tobacco smoking. Both could well explain the increased lung cancer mortality and smoking in particular the marked preponderance of male to female deaths. Doll (9 and 10) showed that in 1950 the annual lung cancer mortality per 1000 of the population for both sexes and for all age groups between 25 and 74 was least in rural districts, was greater in urban areas and was maximal within the confines of Greater London. In 1952 a group of workers in Liverpool (27) showed that of 100 lung cancer patients, 47% had been exposed to dust, fumes and smoke whilst of 200 carefully matched controls, only 43% had been similarly exposed. Likewise there was a small, though statistically insignificant, increase in the number of cancer patients who lived within an industrial area as compared with the number of controls whose residence was similarly situated. For a series of cases between 1946 and 1947, the incidence of cancer of the male and female lungs and

of the male larynx was positively correlated with the density of the population whilst, for some obscure reason, the reverse was true for cancer of the female larynx (7).

In 1955, Stocks and Campbell (30) investigated this remarkable tendency for increased mortality from bronchogenic carcinoma in urban as opposed to country areas. They chose three districts for their study: rural Wales, a mixed area round Chester and Wrexham and a Liverpool county borough and found that the death rate from bronchogenic carcinoma rose in proportion to the number of cigarettes smoked per week, pipe smokers being arbitrarily classed with those smoking 25 cigarettes weekly. The Liverpool mortality exceeded the rural death rates in each smoking category, but the urban/rural ratio fell progressively from about 9:1 amongst non-smokers to a value approaching unity amongst heavy cigarette smokers. The absolute urban excess was found to be similar in each smoking category and suggested that an "urban" factor was added to the effects of smoking. By comparing the amounts of 3:4 benzpyrene in the air of the Liverpool district and the rural area in question, they concluded that this carcinogen might be the agent responsible for the association of lung cancer with both smoking and urban residence.

Attempts to correlate smoking and lung cancer have been directed along four separate channels, three of them statistical and one experimental. The first method was to demonstrate the rising incidence from bronchogenic carcinoma in relation with the increased tobacco consumption of the population. In this respect Ochsner (28) graphically demonstrated the correlation of the death rate from pulmonary neoplasm in the U.S.A. between 1920 and 1933 with the rising production of tobacco and automobiles. A similar trend has been reported by workers in this country and elsewhere (8). Moreover, lung cancer is rare in Iceland, where it holds ninth place amongst the cancers found at post-mortem examinations, and Dungal (17) suggested that this might be due to the comparatively low tobacco consumption in that country. Kennaway (22) pertinently remarks, however, that a simultaneous increase in tobacco consumption and lung cancer cannot prove that there is any aetiological relation between the two. Other changes have occurred at the same time, for example the increased issue of wireless licences, which show a remarkable parallelism when matched against the lung cancer mortality graph. On these grounds it is therefore doubtful what significance can be placed on this method of approach to the problem.

The second and more successful attempt to investigate the suggested correlation between smoking and lung cancer has been to inquire into the smoking habits of a group of patients with the disease and to make a simultaneous inquiry into a group of carefully matched controls not suffering from the disease. Many workers have demonstrated that there are significantly more smokers than non-smokers who develop bronchogenic carcinoma, and that there is a greater number of heavy cigarette smokers amongst the cancer patients than amongst the groups of control patients without cancer. The classical study of this problem by Doll and Hill (14) in 1950 is worthy of note, not only because it proves its point, but because it emphasises what caution must be exercised by the statistician when he criticises his data if he is not to create a false impression by the mass of figures he displays. Even Disraeli who described three types of falsehood: "Lies, damn lies and statistics," would have been hard pressed to pick faults in the findings which Doll and Hill presented. They were meticulous in ensuring that their conclusions were unbiased.

The cancer and control patients were selected to be of the same age and sex throughout and the only differences were in their place of residence and their social status. Misdiagnosis was considered unlikely. The interviewers used a standard questionnaire and the memory and veracity of the patients in regard to their smoking habits was checked upon. The bias of the interviewers to scale up the smoking habits of the cancer patients was negligible nor did they select controls who had unusually light smoking histories. The cancer patients who were aware that they at least had some chest condition, did not therefore exaggerate their smoking habits any more than did other patients with non-malignant respiratory diseases. The investigation took into account whether the patient had at any period smoked, the ages of stopping and starting the amount smoked before the onset of the illness which brought him into hospital, the main changes in his smoking history and the maximum ever smoked, the varying proportions of pipes or cigarettes and whether or not the patient inhaled. These precautions taken, Doll and Hill suggested that their findings indicated that, above the age of 45, the risk of developing the disease increased in simple proportion to the amount smoked, and that it might be approximately 50 times as great amongst those who smoked 25 or more cigarettes a day as amongst non-smokers.

The third and final statistical approach to the problem of smoking and bronchogenic carcinoma was undertaken by the same workers (15 and 16). This time Doll and Hill took, instead of a "backward" series as before, a "forward" series or in other words, instead of comparing the smoking habits of patients who had already developed the disease with a group of controls, they first assessed the smoking habits of a group of people, the Medical Profession of this country, and are now waiting to see how many die from the disease. Doll and Hill received over 40,000 replies to the questionnaire they sent out and although the investigation only began in 1951, there have been sufficient deaths already to indicate a marked and steady increase in the mortality from lung cancer as the amount smoked increases; the trend is a feature of each age group over 35 and the mortality is greater amongst cigarette smokers than pipe smokers; the death rates fall as the length of time increases over which smoking has been given up; the mortality for smokers of 25 or more cigarettes a day is 40 times that for non-smokers.

The fourth and most direct method of showing the link between smoking and lung cancer is the demonstration of carcinogenic agents in tobacco. Arsenic was at one time considered important and certain American cigarettes were shown to have a high arsenic content. However, the high death rate from bronchogenic carcinoma in Istanbul where arsenic free cigarettes are commonly smoked, suggests that arsenic is not a factor. Moreover, when it is applied to the skin of laboratory animals, it fails to produce cancer in the way in which tobacco tar does (13).

The temperature of combustion of a cigarette often exceeds 650° C whilst pipe smoking is a cooler process with temperatures around 500° C (18). At the higher ranges polycyclic hydrocarbons are formed and some of these substances can produce squamous carcinomas in strains of mice which are free from any predisposition to spontaneous cancer. As much as 4.0 μ g of 3:4 benzpyrene has been gathered from the smoke of 500 cigarettes and the cigarette paper too liberates carcinogens when burnt, although these are insignificant amounts (5 and 6). Cigarette paper had previously been suspected as a cause of the higher mortality of cigarette—as opposed to pipe—smokers, but it appears more likely that the temperature differences, the condensation of quantities of tar in the pipe stem and

the amount inhaled are more likely to be the factors involved (4 and 32). Petrol lighters have been suspected but it was found that they were not used any more often by patients with bronchogenic carcinoma than by non-cancer patients (13).

The tar collected from "smoking machines" is carcinogenic and in 1954 Graham (20) found that an acetone solution of cigarette tar produced epidermoid carcinoma in mice after 71 weeks which is a little more than half their average life span of two years. This period, he pointed out, was equivalent to the 30 to 50 years required in man to produce lung cancer by smoking. Campbell (3) showed that 70% of the mice surviving after repeated exposure to dust from the sweepings of tarred roads developed cancer of the skin but the concentration of tar present was far higher than that to which human beings are ever subjected. Unfortunately similar experiments cannot be employed with cigarette smoke because mice rapidly succumb to nicotine poisoning if allowed to inhale significant quantities (20). Lung tumours, however, have been

OPERA OCCULTA

With a mixture of pride and humility I began to turn the pages of the great leather-backed volumes which enclose the early Dissertations of the Royal Medical Society. It was something to be done with care, for the pages are brittle and cachetic. The regular, flowing, almost copper-plate writing is only slightly faded and is eminently legible. We, who can achieve immaculate script only through the medium of machinery, might pause and consider the scholarship of our predecessors who wrote Greek, Latin or English with artists' hands.

The fascination of these works, however, does not end in the contemplation of their beauty. Into these pages has been poured all the erudition and earnest speculation of more than two hundred years ago. Not only do they carry a mass of information of the state of medical knowledge in the eighteenth century, but they also breathe an aura of the life, manners and social conditions of the time. So much is there that is interesting, so much to amaze or amuse, that it seems scarcely possible to pick out isolated passages of adequate brevity for the confines of this production. However, with the hope that the authors would have excused the mutilation of their opera, I have selected at random a few passages. They will be found in this and subsequent issues.

Diagnosis?

From a letter to the President of the Society in 1777.

"At eleven o'clock that night a messenger came to me, saying that Watson was going mad. I found him perfectly sensible, complaining of a lightness across his stomach, with a peculiar sensation (to quote his words) 'his entrails moving up and down as if they were alive,' and he said he could not drink. I had a looking glass brought privately to me, and held it up before him: the sight of which threw him into violent agitation. I then persuaded him to try to drink; but on the fluid approaching near his lips he was in a similar agitation to that which the glass produced. It next occurred to me that the accession of cold air to the body, according to some author, had the same effect; I therefore fanned him with my hat . . ."

demonstrated in rats treated with 3:4 benzpyrene, methylcholanthrene and the condensate from cigarette smoke (2).

It may be argued that tobacco will evoke different responses in human beings and in animals. Yet in 1956, Lasnitzki (24) working on human foetal lung explants showed how quantities of benzpyrene similar to those obtained by smoking 500 or more cigarettes, could induce bronchiolar epithelial hyperplasia. The change consisted of an increased proliferation of the lining epithelium from the normal one row of cells to rows with cells 6 or 12 deep. They frequently spread to cause partial or complete obstruction of the lumen and showed an irregular increase in size as well as abnormal mitoses. Short of experiments on living human subjects, these findings must surely be conclusive. Moreover, Auerbach's examination of post-mortem material (23) showed that there was a remarkable parallelism between the smoking habits of the deceased and the occurrence of basal cell hyperplasia, stratification, squamous metaplasia and even carcinoma-in-situ. This was present in many cases and was often wide spread on the bronchial mucosa and rather unexpectedly on the trachea itself.

That the aetiology of bronchogenic carcinoma, with the possible exception of the adenocarcinoma, is linked with cigarette smoking is now apparent and may be summed up in the words of the Medical Research Council's statement in June of this year (26):

- (1) A very great increase has occurred during the past 25 years in the death rate from lung cancer in Great Britain and other countries.
- (2) A relatively small number of the total cases can be attributed to specific industrial hazards.
- (3) A proportion of cases, the exact number of which cannot yet be defined, may be due to atmospheric pollution.
- (4) Evidence from investigations in different countries indicates that a major part of the increase is associated with tobacco smoking, particularly in the form of cigarettes. In the opinion of the Council, the most reasonable interpretation is that the relationship is one of direct cause and effect.
- (5) The identification of several carcinogenic substances in tobacco smoke provides a rational basis for such a causal relationship.

* * * *

PREVENTION

IT WAS only through improvements in sanitation and hygiene that the inhabitants of this country were spared from further major outbreaks of cholera during the seventeen years which preceded Koch's demonstration of the *Vibrio cholerae*. To-day we are in a similar position with regard to lung cancer. Cigarette smoking is a known aetiological agent in bronchogenic carcinoma and although the exact mechanism of the disease is not fully understood, it is surely common sense to dissuade the public from a habit which predisposes them to a fatal condition.

Moderation in the smoking habit seems to be the only way of lowering the intake of carcinogens. No filter is yet available which will exclude all harmful substances whilst still providing a sufficient pressure drop and retaining the flavour of the tobacco. Modification of pyrolysis or the removal of some precursors of known carcinogens before the cigarettes are manufactured may eventually provide one solution to the problem (31).

The tobacco consumption of this country continues to rise and the age at which smoking becomes a regular habit appears to be falling. It is unfortunate that so few members of the Medical Profession, apart from influencing the public against the cigarette habit, have failed to, or have not wished to, grasp the fact that smoking predisposes to bronchogenic carcinoma. Besides it is very difficult to bring home forcibly enough to the layman the view that the disease may take from twenty to thirty years to make itself manifest. Despite appeals from bodies like The British Medical Association, the Government dallied long before making any declaration to the public. It seems as if in this age of enlightenment, the chance of disappointing the electorate and of losing an annual revenue of over £700 million from tobacco excise can stand in the way of the nation's health.

To use the time honoured adage, "Prevention is better than cure," and when true cure is available to so few lung cancer patients, prevention must be the line adopted. There is a wealth of wisdom contained in the following words written by William Lambe in 1815:

We are constantly deluded by language. We say a person dies of a cancer. . . . The truth must be that a person dies of the causes of cancer; and the cancer is not the cause but the mode of dying.

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