

The Rt. Hon. The Earl of Rosebery, K.T., P.C., D.S.O., M.C.

Frontispiece

THE SCOTTISH NATIONAL
BLOOD TRANSFUSION
ASSOCIATION

1940-1965

W. N. BOOG WATSON



E. & S. LIVINGSTONE LTD.
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PREFACE

THROUGHOUT the ages blood has been regarded by man as a substance possessing unique properties of the greatest value to himself; he has often attributed to it magical or mystical virtues by which courage may be given to the coward, health to the ailing, strength to the weak and youth to the aged; from time to time he has bathed in it, dried and eaten it, applied it to his skin in an ointment or administered it as a potion. But it is only within the term of recent history that, discarding earlier practice, he has learned to transfuse the blood of one man into the vein of another. The astonishing development of this procedure ranks as one of the three great advances in medicine in the last twenty-five years, the other two being the discovery of antibiotics and the introduction of new methods of anaesthesia. To enable full use to be made of this potent aid in the care of the sick and injured there exists in Scotland a national organisation of doctors and nurses, scientists and technicians, administrators and their staffs backed by many thousands of volunteers. This, the Scottish National Blood Transfusion Association, celebrates in 1965 its twenty-five years of service to the community.

FOREWORD

BY

THE RT. HON. THE EARL OF ROSEBURY
K.T., P.C., D.S.O., M.C.

President of the Scottish National Blood Transfusion Association

IN this short History Dr Boog Watson has made a most interesting story of the development of the Scottish National Blood Transfusion Association covering its twenty-five years since 1940.

While a great many people have contributed to the achievements of the Service in that period, I would like to make special acknowledgment of the blood donors without whom there would have been no story.

All who have volunteered so readily over the years to give their blood have played a vital part in the work of the Association and can rightly take credit for a substantial share in its proud record of achievement.

ROSEBURY.

ACKNOWLEDGEMENTS

MUCH of this short history has been obtained from directors, deputy directors and organising secretaries of the five regional services and the writer is grateful to the following for their help and cheerful patience under questioning : Professor D. F. Cappell, Professor J. Cruickshank, Dr H. J. R. Kirkpatrick, and Professor J. P. Todd ; Dr C. Cameron, Dr I. A. Cook, Dr R. A. Cumming, Dr H. B. M. Lewis and Dr J. Wallace ; Mr G. R. Milne ; Miss V. Christie, Mrs H. L. Manning, Miss H. M. White, Miss D. Nelson and Sister J. Erskine.

Mr N. A. Milne has kindly made available the records of the Association and he, Dr C. P. Stewart and Dr R. M. Gordon have been generous in their advice and criticism. Much help has been received from Mr C. S. Gumley who has been concerned with the Transfusion Service since 1934 and was honorary secretary of the Association for nineteen years. The help received from Mrs N. Armstrong, Edinburgh Room, Edinburgh Public Library, Miss H. Wardle, Librarian, Royal College of Surgeons of Edinburgh, Miss M. J. Yeats, Scottish Home and Health Department and Miss H. D. Shepherd is gratefully acknowledged.

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The Early Years

Soon after medical science was revolutionised in the middle of the seventeenth century by William Harvey's proof of the circulation of the blood, attempts at transfusion were made by scientists in this country and in France. One of the first investigators was Sir Christopher Wren and in the report published on his researches in 1657 we read that "Hence arose many new Experiments and chiefly that of Transfusing Blood—that will probably end in extraordinary success." This early optimism was premature and nearly three hundred years elapsed before it was justified. During that interval of time it was learned, sometimes through tragic experience, that only human blood may be introduced with benefit and safety into the veins of a human being ; that sometimes blood may be induced to pass without clotting through a tube directly from one person to another but that satisfactory transfusion can be secured only with the use of apparatus and that blood must be treated with citrate or other suitable substance to prevent coagulation if it is to pass through such apparatus, or to be preserved even for a short time. It was also learned that blood may be stored for periods of up to three weeks but only if there is strict control of temperature and of certain other factors. At the beginning of this century researches of the greatest importance revealed that members of the general population can be classed in one or other of a number of groups according to certain reactions given in the laboratory by their blood. As certain blood

groups are incompatible with each other the greatest care must therefore be taken to ensure that the blood of a donor is suitable to the receiver. This testing or "grouping" must be carried out in a laboratory in every case.

The year 1914 may be taken as the date of the introduction of transfusion as it is practised today, for in that year citrated blood was successfully used for the first time. During the 1914-1918 war more and more recourse was had to this procedure in the treatment of the wounded in military hospitals all over the world and very many lives were saved by it.

Blood consists of two principal constituents, the minute bodies which give it its red colour and which are called "corpuscles" and the fluid which carries the corpuscles throughout the vessels of the body and which is known as "plasma." When blood citrated to prevent clotting is allowed to stand, the corpuscles sink to the bottom of the vessel leaving a layer of straw-coloured plasma above it. This plasma can be drawn off and stored for a much longer time than can blood itself and since it has valuable properties it can often be used as a substitute for blood. For this reason more and more attention came to be given to the production, storage and use of plasma from blood not immediately needed in treatment.

In the years between the wars increasing use was made of transfusion in cases of emergency in civilian surgical and medical practice. Most often the purpose was to compensate for loss through haemorrhage in childbirth or from injury or disease but blood or plasma was also used in the treatment of shock from burning or other accidents. It is true that the establishment of a

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FIG. 1
Blood collection—1950.

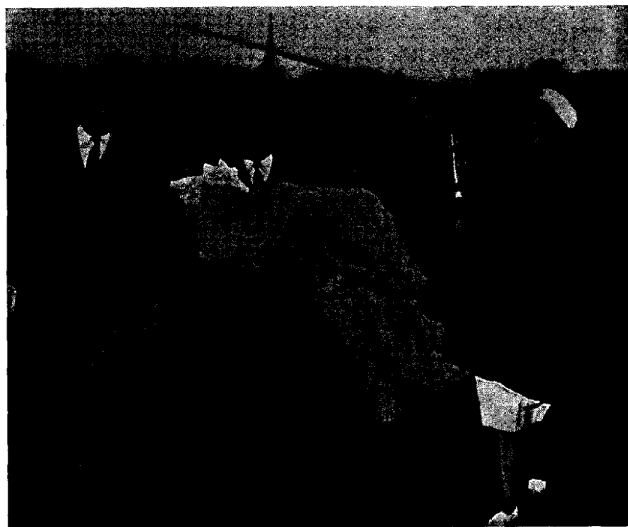


FIG. 2

Transfusion in the age of the helicopter ambulance. (Photo by courtesy of The Scotsman Publications Ltd.)

store of blood, from which supplies could be drawn as need arose, had been suggested as early as 1916 but no action was taken to carry out the suggestion until 1937 when the practice of storing blood in "blood banks" was instituted in Madrid during the Spanish Civil War.

In Great Britain the year 1939 was that in which, through the impetus of war, the storage of blood in blood banks was first introduced. Before that date, by universal practice, blood needed for the treatment of any individual patient was obtained from a donor called specifically for that particular case. The Munich crisis in 1938 had been a clear indication that war was imminent and at the beginning of 1939 the Department of Health, as part of a review of emergency medical preparations in Scotland, set up a special Blood Transfusion Sub-Committee from members of its Scientific Advisory Committee, under the chairmanship of Sir John Fraser, Professor of Clinical Surgery in Edinburgh. Its purpose was "to investigate existing facilities for Transfusion; to consider the possibility for improving those facilities, especially in smaller centres and in country areas; and to advise on the storage of blood in selected centres." Following a study of the use made of blood banks in the Spanish war, and in view of the general expectation of heavy civilian air casualties if war broke out, the sub-committee determined on immediate action. Some months before its official report was published it recommended that stores of blood be established in the principal centres of population. This suggestion was taken up at once by Dr C. P. Stewart in Edinburgh Royal Infirmary, and Professor N. Morris, Stobhill Hospital, Glasgow. So it was that when war was

declared on 3rd September 1939, small blood banks were already in existence in those two centres. A week later the sub-committee's report was published. It stated that in face of a national emergency such arrangements for a transfusion service as existed would prove quite inadequate. There were districts where no facilities at all existed; in some smaller hospital areas, when a patient was thought to need transfusion, relatives were sent for and tested immediately before treatment was given. Several hospitals had lists of professional donors, whose fee was sometimes as much as two guineas. Other hospitals, particularly those in larger centres, favoured a voluntary service, donors being recruited by public appeals and from organisations such as the Red Cross, T.O.C. and the Rover Scouts. Only in Edinburgh did a regional scheme exist.

The sub-committee's report strongly supported the voluntary system of donors. It declared equally strongly that blood banks must be established at once in the principal centres and it pointed out that arrangements for these were already under way in Glasgow and Edinburgh. The sub-committee, too, stated that for the whole country blood transfusion must be organised on a regional basis and it also advocated a national organisation.

Letters were thereupon sent to Lord Provosts and other civic leaders urging that public meetings be held, committees formed and services set up, and to this appeal there was heartening response. When a national organisation was considered some voices proposed that the Edinburgh service be extended to cover the whole country. Others suggested the Red Cross as the national co-ordinating body, but in the

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end it was agreed that a National Blood Transfusion Council should be called to take central control and to form, in its turn, a more permanent Blood Transfusion Association. On 9th February 1940, therefore, at the invitation of the Secretary of State for Scotland, a meeting of this Council was convened under the chairmanship of Lord Rosebery, comprising Lord Provosts of cities, surgeons and physicians, members of the Red Cross, Women's Voluntary Service and other organisations and representatives of the transfusion services already in existence and of the Department of Health for Scotland. The Secretary of State, then the Rt. Hon. D. J. Colville (later Lord Clydesmuir), explained to the Council that while the transfusion service must in large measure remain a voluntary service, supported by voluntary donations, the Government, too, had its responsibility and the Exchequer would, therefore, make a very generous grant. The Council then considered the steps necessary to form an association, appointed executive, finance and technical committees and asked Mr C. S. Gumley, W.S., honorary secretary of the Edinburgh service, to draft a constitution. On 5th March a second meeting of the Council was held at which the constitution was approved, the appointment of committees confirmed and the Scottish National Blood Transfusion Association was formally constituted. This meeting of the Council on 5th March 1940, therefore, marks the birth of the Association (Appendix A).

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The Association

The Association, 1940-1951. The Association showed no delay in setting about its task. A new procedure had to be introduced everywhere for obtaining and using blood. In future, only in exceptional circumstances would the volunteer be called to hospital to give blood for the immediate treatment of a single patient. Instead, sessions at fixed times were to be organised to which donors were called in numbers depending on the amount needed to build up and replenish the blood banks. At those banks, blood after testing and grouping was either stored as whole blood or processed to produce plasma, and kept until asked for by hospitals in the region.

Both at the banks and in the hospitals refrigerators were needed to preserve the blood at a carefully controlled temperature. A survey of the whole country revealed deficiencies and special needs in the different regions and, to meet these, transfusion outfits, refrigerators and other equipment were quickly issued. The refrigerators supplied were of the kind actuated by gas, cylinders of which were held locally in reserve. This precaution enabled the apparatus to continue to function when main gas or electricity supplies were interrupted by air attack. Funds were needed at once and schemes were set on foot for raising money by flag days, by written appeals and posters and by concerts and cinema shows.

Five Regional Transfusion Services were established, the Northern, North Eastern, Eastern, South Eastern and Western, centred respectively on Inverness,

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Aberdeen, Dundee, Edinburgh and Glasgow. Funds were centralised in the hands of the Association—a procedure which called for tact and firmness. Each region had its director, with specialist qualifications in medicine or biochemistry, a regional organiser and a regional committee. In each region the recruiting of donors, the preparation of blood and liquid plasma and the issuing of these and of equipment was undertaken by the regional services themselves, but advice and practical help as well as money were provided by the Association. As national organiser the Association appointed Mr J. R. Copland who had had years of experience in the Edinburgh service. Through its members co-opted from the Navy, Army and Air Force the Association had access to the fighting services which provided an important field of opportunity for both the use of transfusion and the enlistment of donors.

So great were the zeal and efficiency of the newly formed Association that in July 1940 the chairman of the technical committee, Sir John Fraser, was able to say "the progress of the work during the past four months has been such that the various services are now able to cope with any demands which may be made on their resources." But there could be no complacency. Not only was the call ever greater for blood for transfusion: there was also an ever-increasing appreciation of the value of plasma, especially in the treatment of shock. At the same time it was clear that the regional staffs could undertake no more than their already heavy routine of work and soon the time came to make another major step forward and to establish one or more "central depots." In August 1941, therefore, the Association resolved that two such units

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be set up, one in Edinburgh and one in Glasgow, their functions being to prepare and store plasma; to supply it to hospitals when asked to do so; and to satisfy the needs of the armed forces. It was agreed that a predetermined quantity of blood for processing would be provided regularly from each blood bank in the country. At the same time the Association took another very important decision.

Plasma in liquid state has a limited useful life at the end of which it must be discarded. But plasma can be dried, and reconstituted, when needed, by the addition of specially prepared sterile water. In the dried state it can be preserved for a much longer period. For this reason there arose a great demand for dried plasma in the armed forces, especially the Navy and Air Force. In civilian practice, too, dried plasma was found to be an invaluable standby in case of emergency. In the beginning of 1943, therefore, apparatus for drying plasma on a scale to meet all Scottish needs was installed in Edinburgh.

The basis of the service continued to be the voluntary donor. Yet in 1943, while a great increase in their numbers was needed to meet the requirements of the plasma units, conditions of war made such an increase ever more difficult. Many donors and potential donors joined the armed forces; others after being engaged in factories for long hours had to cover great distances to and from the withdrawal sessions, often in black-out conditions. The Association, therefore, increased its mobile teams so that volunteers in outlying districts and in the fighting services might conveniently be approached and an intensive appeal for donors by every kind of publicity was undertaken. As a result

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the number of donors rose in that year from 43,000 to 57,000. During the first half of 1944, as "D" day drew nearer, both the regional and the central services increased their activities still farther and the names on the panel of donors rose by another 10,000. In the third quarter of the year came the emergency demands resulting from the invasion of France. They were less than had been expected largely because the initial treatment given in the field was so good that casualties arriving at base hospitals at home did not need resuscitation treatment on the scale that had been expected. Much of the whole blood, therefore, held in reserve was used for the preparation of dried plasma and a record number of bottles was dispatched from the drying unit. Most went to the army overseas, some to the navy and a considerable quantity, along with transfusion equipment, as part of the supplies delivered by parachute to the underground armies operating in occupied territories. A thousand bottles went to the Polish underground forces in the Warsaw uprising and news of this gave lively satisfaction to the Polish troops stationed in Scotland, many of whom were blood donors. At the end of that fateful year the Association was able justly to congratulate itself on its achievement.

In the years immediately following the war the Blood Transfusion Service in Scotland experienced the difficulties of transition from war to peace which were common to all medical services and had also to cope with problems peculiar to itself. There were the inevitable changes of staff as men and women came back from the forces; premises taken over for war purposes returned to their peacetime uses; as public enthusiasm waned, something of a slump took place in

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the attendances of donors at withdrawal sessions. It is true that a substantial decrease occurred in the requirements of hospitals treating service patients, but the demands of civilian hospitals, far from diminishing, continued to extend with the growing importance of the use of blood in maternity work and the treatment of burns and other accidents. At the same time rapidly increasing attention was being given to problems caused by the "Rhesus Factor" which had been under active study since 1941.

For some years it had been realised that certain cases of stillbirth, of death soon after birth and of serious brain damage, resulting in mental deficiency and spasticity, were due to the same cause. Between 1939 and 1941 this cause was shown to be an incompatibility in the blood of the mother and of the child, resulting from the presence or absence of a constituent called the Rhesus factor. Transfusion promised to play a great part in meeting the problem of the "Rhesus baby."

In the period of transition from war to peace the work of the Association was made even more difficult by uncertainty about its future. Since its formation some eight years before under the impact of war, a revolutionary change had taken place which many years of peace might not have produced. Blood transfusion, no longer an almost desperate measure taken in face of an emergency, was a well-established form of treatment having ever widening possibilities. Ever since its inception the Association, to maintain financial solvency, had had to depend more and more on the grant received from the Government (Appendix B). By the year 1948, when money from voluntary sources had dwindled greatly, the Government grant

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had multiplied and now formed eighty-five per cent of the Association's income. In that year the future of British medicine would be determined and it was realised that the Association might soon lose its independence and its work be merged in that of the National Health Service. Such a change was, indeed, considered and it was proposed that the provision of blood transfusion services should become a responsibility of the regional hospital boards. The central authority, however, concluded that the work could with great advantage be left in the hands of a voluntary organisation. When the National Health Service (Scotland) Act came into force in 1948, therefore, the Association remained an independent body and in 1951 its position in the health structure of the country was confirmed by an Agreement between the Secretary of State and the Association.

The Association, 1951-1965. Under the agreement of 18th December 1951, the Association remained an independent charitable body, but all of its property, including buildings, motor vehicles and equipment was transferred to the Secretary of State. The Association was still open to accept donations from the general public and it continued to receive a government grant for expenditure approved by the central authority. In order that the Department of Health and the hospital boards should have their say in the Association's affairs three members of council and of the executive committee were to be nominated by the Secretary of State, one of them being the medical secretary, and each of the five regional hospital boards was to nominate a member.

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With its position thus established the Association was able to set about the new tasks which lay ahead. In every region the panel of donors was drastically revised. The names of all who had ceased to take active interest in the work were removed so that the lists contained only "live" donors who could be expected to attend withdrawal sessions when asked to do so. At the same time the work of securing new "live" donors was vigorously pursued. The need continually to enlist more donors was caused by the rapid increase in the scope and complexity of blood transfusion work and some measure of this increase is to be seen in Appendix B.

More and more of the Association's attention was directed to the Rhesus problem and the demands made for ante-natal testing increased rapidly. A second major advance was concerned with the fractionation of blood. With special laboratory techniques it was now possible to concentrate or to extract constituents or fractions of blood invaluable in the prevention or control of certain infectious fevers and bleeding diseases. A Blood Products Unit was therefore established in the South Eastern Centre, while the production of dried plasma for the whole of Scotland was transferred to the Western Region. By 1955, the medical secretary was able to report that in addition to dried plasma the Association was producing anti-haemophilic fraction, fibrinogen fraction and gamma globulin.

Ever since the five regional centres had been fully established in 1940 the scientific and technical staff had considered research to be an essential part of their work. Even during the most critical years of war an opportunity

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was somehow found to investigate problems of blood transfusion and papers of importance were published. In 1955, the directors were able to claim that in the course of the years certain types of serological investigation had become primarily their responsibility and in order that this work might be still farther developed it was recommended that research centres be established in the South Eastern and the Western Centres. This decision was a timely one because teaching, an activity which goes hand in hand with research, was now becoming a prominent feature of the work of the Association as the demand for instruction increased.

In 1954, the annual meeting of the British Medical Association took place in Glasgow and in 1959 the British and Canadian Medical Associations held a combined meeting in Edinburgh. On each occasion the Blood Transfusion Association arranged an exhibit to illustrate the scope of blood transfusion work. Every year courses of instruction were organised for medical officers and for laboratory technicians. More particularly in the two larger regions, where there were post-graduate colleges, doctors sitting examinations for higher qualifications, many of them from overseas, sought special instruction in blood transfusion subjects. With the introduction of a new higher qualification, the membership of the College of Pathologists, the demand for post-graduate teaching became still greater. By 1960, Glasgow and St Andrews Universities, recognising the importance of blood transfusion as a subject in the curriculum, had appointed the directors of their respective regional services to the academic staff. Aberdeen followed in 1963 and Edinburgh in 1964.

A two-day conference on blood transfusion was held

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in Glasgow in May 1963, under the auspices of the Scottish National Blood Transfusion Association, the University of Glasgow and the Royal College of Physicians and Surgeons. The main purposes of the conference were to stress the need for ensuring the best use of available blood and blood products and to further the safety of this form of therapy for the patient. It was attended by physicians and surgeons who in the course of their work have occasion to use blood and its products.

The Regional Services

The Northern Region. Between 1936 and 1939 the Royal Northern Infirmary and some of the smaller hospitals in the north of Scotland formed their own small lists of donors who were called on to give blood in case of emergency. In the late summer of 1939 Dr C. P. Stewart, on behalf of the Blood Transfusion Sub-Committee, visited the Royal Northern Infirmary and discussed with Dr H. J. R. Kirkpatrick, pathologist to the hospital, the setting up of a blood bank. As a result, there was formed, under the chairmanship of Lt.-Colonel Philip Mitford, one of the managers of the Royal Northern Infirmary, a local committee which functioned until after the introduction of the National Health Service, and a blood transfusion service was formed, having Dr Kirkpatrick as director. In March 1940, the organisation so established became the Northern Regional Service.

Using the local hospitals' lists of volunteers as a basis the service built up its panel of donors over the mainland of the north of Scotland. In this area of wide spaces and a scattered population the need to obtain blood laid an immense amount of work on the shoulders of the voluntary withdrawal team. In the words of Mr A. J. C. Hamilton, surgeon to the hospital at the time, "the journeying of the blood transfusion team during the war to collect blood from places as far apart as Kinlochleven, Wick and Thurso on stormy winter nights with car headlights masked was but another of the unrecorded epics of the war."

The problem of accessibility determined the policy of the service with regard to peripheral hospitals. While grouping and testing were concentrated on the Royal Northern Infirmary, steps were taken to instal subsidiary blood banks without delay in the hospitals in Fort William, Stornoway and Wick and later in Broadford, Dingwall and Golspie. When additional quantities of blood were required in these hospitals supplies were sent, according to the urgency of the case, by public transport, or by W.V.S. or other special cars, or, in the case of Stornoway, by aeroplane.

In the beginning the principal blood bank and the processing and administrative sections were situated in two small rooms in the pathological department of the Royal Northern Infirmary—accommodation which was cramped from the start and in which the staff laboured under increasing strain. It said much for the care of the workers and the quality of their work that over a period of eleven years no serious mishap was allowed to occur. In 1951 new and adequate premises were added to the hospital to house the blood transfusion service.

The Northern service covers a very wide area of mainland and sea-loch, ocean and island. This causes considerable difficulties in both the collection and supply of blood particularly in winter. But as far as population is concerned the Northern is the smallest region and for this reason it has never been found necessary to appoint a whole-time director. Instead, the pathologist and, more recently, the haematologist of the Royal Northern Infirmary in Inverness has held the dual appointment of pathologist or haematologist to the hospital and director of the blood transfusion service.

The North-Eastern Region. Like other large hospitals Aberdeen Royal Infirmary and the Aberdeen Maternity Hospital before the war had a small roll of donors who were called on to give blood in an emergency. In the summer of 1939 the Scientific Advisory Committee of the Department of Health for Scotland drew the attention of the senior medical staff of the Infirmary to the need, in the event of war, for a store of blood for the treatment of air-raid casualties. Professor J. Cruickshank undertook to provide room for a blood bank in the Department of Bacteriology at the University and a committee was formed of medical men and public-spirited citizens in Aberdeen and the surrounding district. The first meeting of the committee took place on 4th August 1939, when Mr J. R. Copland described the organisation and activities of the Edinburgh transfusion service. A blood transfusion service for the north-east was then constituted under the directorship of Professor Cruickshank; donors were quickly enrolled and tested and at the actual moment when war was declared on 3rd September, the withdrawal team was engaged on its first bleeding session at the Royal Infirmary.

In March 1940, the Aberdeen and North-East of Scotland Service, as it was already called, was incorporated into the Scottish National Blood Transfusion Association and its constitution was formally approved at a meeting on 7th September 1940. The committee continued to issue its annual report until it was dissolved in 1954.

Because transport between Orkney and Shetland and the mainland was at that time almost wholly by sea through the port of Aberdeen, those islands were

included in the North-Eastern Region. As soon as the National Association had been formed a survey of the North-Eastern Region was made and this showed that facilities for transfusion in all the outlying hospitals were gravely inadequate. As a matter of great urgency, therefore, apparatus and refrigerators were sent out to these hospitals, first priority being given to Orkney and Shetland because of recent dangerous developments in the war at sea.

In the North-Eastern Region the service from the beginning was based on Foresterhill, where the University provided in the Bacteriology Department accommodation for the organising secretary and her staff and for the principal blood bank and the laboratory services. A secondary blood bank was also established for a time at Woodend Hospital and from these two sources the needs of the area for blood and plasma were met. During the war years the clerical and laboratory work at the centre as well as the work of the withdrawal teams was maintained very largely by volunteers from the University staff, their families and friends. Appeals to the public for money and donors were directed through the town councils in the burghs and through the Women's Rural Institutes in the villages and country districts. A notable feature in the North-East was, and still is, the enthusiastic help given by many local doctors in enrolling donors and arranging withdrawal sessions. In consequence, relatively few local organisers have been recruited from the general public. Unlike regions farther south, the North-East Region contains few big organisations or industrial firms and there is only one area, Aberdeen itself, in which a large concentration of population is to be found. It is in the

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main a district of farming and fishing communities and from the beginning of the service much use has therefore been made of mobile withdrawal teams.

In the first years of peace, as the need for blood and plasma continued to grow and the demand by the University for a return of their premises to peacetime uses became more urgent, the service began to look for more spacious accommodation of its own, but it was not until 1956 that a new department was opened in the precincts of the Royal Infirmary, where a staff engaged whole-time on blood transfusion work and immuno-haematology was employed.

The Eastern Region. For some time before the year 1938 Dundee Royal Infirmary had a list of donors, maintained by the hospital dispenser, which was sufficient for its own immediate needs. In the autumn of 1938 Professor D. F. Cappell, pathologist to the hospital, who had made first-hand acquaintance with the working of blood transfusion services in Canada, anticipating the outbreak of war took over responsibility for this donor service and in the spring of 1939, with the co-operation of the surgeons and managers of the hospital, set about the formal constitution of a blood transfusion service covering all the city of Dundee. In the autumn of that year a blood bank was established in the Royal Infirmary's department of pathology, the first emergency equipment for which consisted of a number of milk bottles with their racks obtained from a well-known Dundee dairy. By the spring of 1940 the organisation had been extended to cover the east of the country and at a meeting held on 12th April 1940, addressed by the Secretary of State for Scotland, it was formally

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constituted as the East of Scotland Regional Service under the directorship of Professor Cappell and incorporated into the Scottish National Blood Transfusion Association. The general committee formed on that occasion regularly held meetings until 1951 when it lapsed. The finance committee continues to function.

In its earliest years the service was run almost without exception by voluntary workers. Much of the administrative work was done by wives and friends of University and hospital staff; the Red Cross provided drivers and assistants for the mobile teams and medical students along with the director engaged in the actual withdrawal of blood. As the scope of the service increased after the war, however, more and more use was made of paid regular staff but the work did not justify a whole-time appointment at its head until 1954 when the dual office of director of the blood transfusion service and hospital pathologist came to an end and the present director was appointed.

The accommodation originally provided was in the basement of the department of pathology and housed not only the blood bank but also the laboratory, donor clinic and administrative office. It was inadequate even at the start and at the end of fourteen years the staff was working under great stress and difficulty. Another centre within the Infirmary precincts was therefore designed, and in 1955 the service was transferred to the up-to-date premises which it now occupies.

In the Eastern Region the area over which donors are recruited is of considerable extent, stretching from Dunblane in the south-west to Edzell in the north-east.

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The population is so distributed, however, that half the donors live within easy reach of Dundee Royal Infirmary and attend donor sessions there. In consequence, less recourse is had in this region than in others to the mobile withdrawal team, the use of which is still farther reduced by the exceptional circumstances prevailing at Perth. Since before the establishment of the National Association, the department of pathology in Perth Royal Infirmary has continued to maintain its own panel of donors and its own local blood bank, supplying the ordinary needs of the hospital. Special blood and extra supplies of blood and plasma, if required, are obtained from the regional centre in Dundee.

It was in this Region in the early 1940's that much of the original work on the Rhesus blood groups was done. The investigations of Professor Cappell and a member of his staff, Dr Marjory McFarlane were fundamental and helped to advance the knowledge of this complex system, both from the point of view of its genetic background and of its clinical effects.

The South-Eastern Region. Edinburgh was the only place in Scotland in which before the 1939-1945 war a blood transfusion service established on a regional basis was to be found and credit for its inception must be given to one private citizen. In 1929 John R. Copland, a dentist living and practising at 22 Gilmore Place, Edinburgh, was prompted to take the first step in providing a service on learning of the death of a friend's wife who might have lived had her husband's blood been of the right group for the purpose of transfusion. John Copland was at the time an officer-bearer in the

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Holyrood Conclave of the "Crusaders," a body of voluntary social workers, and with their support he formed a small roster of blood donors. As the possibilities and the needs grew he dedicated himself to the work of blood transfusion and for some years he ran a twenty-four-hour service almost unaided, sleeping with a telephone beside his bed, holding himself in readiness to answer appeals for help and driving by day or night to take a donor to hospital or to give blood himself. Grouping of the donors on his list was done in the laboratories of Edinburgh Royal Infirmary. By 1934 the interest of the Crusaders had evaporated and the work had expanded to such a point that it could no longer be overtaken by one man alone. In 1936 a committee, formed at the instigation of the Lord Provost, Sir Louis Gumley, took over responsibility for the service; Mr Charles Gumley, W.S., became honorary secretary and John Copland continued his work as organiser, assisted by Miss Helen White who in 1940 became organising secretary for the South-Eastern Region. Under the new dispensation, calls for help came no longer to Gilmore Place but to the Royal Infirmary where a porter was available at any hour to take donors by taxi to and from outlying hospitals and nursing homes. In March 1940, John Copland became National Organiser in the newly formed Scottish National Blood Transfusion Association and in 1945 his work for the community was recognised by the award of the M.B.E. Not long afterwards his health began to fail and he died in 1949.

When the National Association was formed, the South-Eastern Region, within the framework of that Association, retained a measure of autonomy having

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its regional executive committee under the chairmanship of the Lord Provost, and it has continued to issue its own annual reports. In March 1940, Dr C. P. Stewart accepted as part of a dual appointment the directorship of the regional service. Enrolment of donors continued until 1949 to be conducted at 22 Gilmore Place but the service was centred in the Royal Infirmary in the Clinical Chemistry Department, of which Dr Stewart was director and where a blood bank had already been established. In 1941 when the decision was taken to form two plasma depots to supply the country, Edinburgh was chosen as the site for the Eastern depot. In that year, too, the Polish Red Cross founded in Edinburgh its Institute of Blood Transfusion for the purpose of training workers so that a service might rapidly be established in Poland when that country was liberated. The presence in Edinburgh of the Polish Faculty of Medicine and of the Paderewski Hospital made it easy for staff to be recruited; initial training was provided at the Centre in the Royal Infirmary and the Polish workers then acquired experience of withdrawing blood among voluntary donors in the Polish armoured division, which was stationed in Scotland, and of giving blood in the Polish military hospitals. Plasma was prepared, equipment bought and kept in reserve and when the end of the war came the Polish Blood Transfusion Institute was ready to move to Poland. It was a keen disappointment to all concerned that, though individual members of the staff returned to their own country, political obstacles prevented the stores from ever reaching Poland.

In 1943 Edinburgh became, and continued to be for twelve years, the processing centre for the whole of

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Scotland for the production of dried plasma, that city being considered less likely than Glasgow to suffer attack by air. Active interest in this project was shown by the Ministry of Health in London, which was responsible for the only drying centre solely for civilian needs existing in the country at the time. Since this was situated in Cambridge and was liable to air attack it was thought most desirable that a second centre be established elsewhere in the United Kingdom. Money was needed for the new equipment and much of it came from voluntary sources, the "cold room" itself being provided by donations from the Edinburgh Ladies' College now the Mary Erskine School for Girls.

Because of these added functions the work of the centre increased greatly and when Dr Stewart resigned his part-time office at the end of the war in order to re-organise the peacetime activities of the department of clinical chemistry, the directorship became a whole-time post. Within five years the existing accommodation had become overcrowded and wholly unsuitable. A new blood transfusion centre was therefore designed and opened in another part of the Royal Infirmary grounds and on 4th September 1950 it received an official visit from the Queen.

The work of the centre was greatly increased when fractioning of plasma was introduced in 1953. Because of delay in rebuilding the Infirmary it was clear that the centre would have to remain in the existing building. A major reconstruction and extension to the Centre was carried out and was opened in 1961 by Lady Primrose. The centre is now one of the finest and most progressive in the country.

It comprises three main sections ; the regional blood

bank ; the transfusion haematology laboratories where tests are made of the blood of patients requiring treatment with blood or blood products ; and the national blood products unit which supplies blood fractions for clinical use throughout Scotland.

Fractions produced are gamma globulin, used in the prevention of certain infectious diseases ; anti-haemophilic globulin for the treatment of haemophilia ; albumin, which is employed in liver and kidney disorders ; and fibrinogen for the treatment of some kinds of haemorrhage.

The Western Region. The regional service in the west originated in June 1939, when representatives of Glasgow Corporation, of the hospitals and of other interested bodies were called to a meeting in the City Chambers of Glasgow at which the Lord Provost presided and a blood transfusion service was constituted. Accommodation was furnished by the St Andrew's Ambulance Association in North Street and there a panel of donors was established who could be called on to provide blood in an emergency in any of the five principal hospitals in the city.

It so happened that in the early months of the war the Department of Health had set up a "Saline Infusion Fluids Centre" for the preparation of saline, glucose and other solutions used for intravenous injection, entrusting the work to Professor J. P. Todd of the School of Pharmacy in the Royal Technical College later to become the Royal College of Science and Technology and now the University of Strathclyde. For the sake of convenience, therefore, when in March 1940, the local Glasgow Blood Transfusion Service

became the West of Scotland Regional Service, the principal blood bank was established beside the Infusion Fluids Centre in the College. A second blood bank was maintained at North Street and the donor panel and administrative office also remained at that address.

The regional committee, formed when the service was established, continued to meet and to publish its own annual report until shortly after the National Health Service was instituted.

Soon after the end of the war Professor Todd, who had become part-time director in succession to Professor Morris, resigned in order to resume full-time teaching duties. The present director was appointed whole-time and the premises in the Royal College of Science and Technology being required for their peacetime functions, other accommodation was sought for the blood bank and the infusion fluids centre. In 1946 they were transferred to a building at 15 North Portland Street which had at one time been a hospital annexe and during the war served as a store for the Royal Navy.

The official opening of this new centre by the Secretary of State, Mr Joseph Westwood, took place on 23rd May 1947. Three years later, under a re-organisation by the National Health Service, the infusion fluids centre was transferred to a building elsewhere in the city. The blood transfusion service profited by the space thus made available but the work continued to increase and it was soon manifest that other premises must be found. For considerations of Civil Defence a site was selected, not in Glasgow itself, but at Law Hospital, Carlisle, and in 1956 the new

building was so far completed that it was possible to transfer to Law the greater part of the plasma drying which had previously been done in Edinburgh. The Western Service then became responsible for the production of dried plasma for the whole of Scotland except the South-Eastern Region. By the end of 1957 the Western Region's new centre at Law Hospital had been brought into full use, but it was found advantageous to retain in Glasgow a blood bank, bleeding centre and the headquarters of the donor organisation and those departments continued to operate at North Portland Street for a time. That area of the city, however, was earmarked by the Corporation for clearance and re-development and for this reason the blood transfusion service in 1962 transferred its activities to 82 West Regent Street, a building previously used as administrative offices by the Regional Hospital Board.

The Western Regional Service, like each of the other services, has a character of its own. It covers a great part of Scotland and supplies blood to hospitals as far scattered as Stranraer and Campbeltown, Oban and Dumfries. Half the population of Scotland looks to it for blood and in return provides a field for the recruitment of donors. Much of that population works in large industrial units. In consequence, in the West, the work of the donor organisation is more closely centralised, less use is made of local organisers, and to a much greater extent than in other regions the mobile withdrawal teams work in factories, shipbuilding yards and large business organisations. The management of these concerns, with few exceptions, has always shown generosity and support to the blood transfusion service, and industrial surgeons, personnel officers, shop

stewards and welfare committees have co-operated sympathetically in enlisting donors and organising bleeding sessions. The records refer, too, with gratitude to the United States Navy, for in April 1950, when an outbreak of smallpox in the city of Glasgow interrupted for a time the holding of local withdrawal sessions, two hundred members of the crews of two U.S. destroyers on a visit to the Clyde donated blood.

From its plasma-drying unit the Western Regional Service supplies dried plasma not only to hospitals all over the country but also to industrial surgeons in factories and shipyards, to medical officers of the Coal Board and to surgeons of ocean-going ships.

The Organisers and the Donors

The Organisers. It may truly be said that the donors are the bricks of which the main structure of the blood transfusion service is built and the organisers are the mortar which holds the structure together. When the National Association was formed in 1940 an organising secretary was appointed in each of the five regions, whose main responsibility was twofold—to raise the money needed to maintain the service and to recruit donors and arrange blood-withdrawal sessions. The methods used varied to some extent from place to place but most activities were common to all areas. Flag days were held every year; charity concerts, theatre shows and other entertainments were organised; notices and paragraphs were published in local newspapers; appeals went out from church pulpits, in cinemas and at public meetings sponsored by civic leaders; personal contacts were made by house-to-house visiting or, in the critical days of war, by "button-holing" private citizens in the streets. By these means the attention of the public was drawn to the need for more money and more donors. Since the introduction of the National Health Service in 1948 the regional organisers' chief concern has been the maintenance of the donor service. From the start they depended for success in this field on voluntary local organisers. In every rural parish, country town and city district in which donors were recruited the regional organisers by personal search and personal approach secured their local organisers, often through such channels as the

Red Cross, W.V.S., or Women's Rural Institutes. A study of the record in a regional office shows how diverse have been the men and women engaged on the work. People from all walks of life are included in the list of those who have made and maintained contact with the donors and who also, in four of the five regions, have arranged the details of withdrawal sessions when visits were paid by the mobile team to their areas.

The Donors. In the early days blood for transfusion was given by a relative or acquaintance of the recipient. In the 1914-1918 war, blood was provided by lightly wounded men or by members of field ambulances, officially known as "resuscitation men." A roster was kept of volunteers whose blood had already been "grouped" and who could be called on for the immediate treatment of casualties. Since a fortnight's leave in Great Britain was granted to each donor after every transfusion there was no shortage of volunteers.

In the years that followed the war the traditional procedure of seeking donors among relatives and friends was maintained but it could not satisfy the ever-increasing demand, and blood from other sources had to be found. At one time it was suggested that, in addition to their other duties, the police should be expected to act as blood donors. Money payment met the need in a considerable number of cases and according to the "Model Rules for a County Blood Transfusion Service" issued at one time by the British Red Cross, the fee payable was to be one guinea. It was realised, however, that money as an inducement often failed to bring forward the best type of volunteer. In the end the giving of blood without payment came to be looked on

as a highly satisfying form of social service and public-spirited members of the community began to come forward as volunteers. Between the wars, therefore, all over the country local arrangements for transfusion came into being. Donors in some areas were paid and in at least one hospital a glass of brandy was the reward handed out for a donation of blood, while in others unpaid and unrewarded volunteers were recruited, the general practice being for individual hospitals to organise their own procedures.

Transfusion was still an emergency measure, the blood of the donor being withdrawn, citrated and introduced with little delay into the recipient's vein. In every case of transfusion, therefore, the donor was called to a hospital for the treatment of one particular patient, with whose injury or illness and subsequent progress he was personally concerned and this personal interest in an individual patient could be a powerful factor in attracting members of the public to the work.

The introduction in 1939 of blood banks in which blood was stored, necessitated an entirely new procedure. It meant that blood given by a volunteer was stored along with that given by others and this formed a supply which at some later time was administered to patients about whom the donors knew nothing, and there were fears that their loss of personal concern with one patient might handicap the recruitment of the large number of new donors who were needed to establish blood banks. How groundless were those fears and how heartening the response of the public to the call was shown in the rapid expansion of the donor panels during the war and their continued increase in years of peace (Appendix B).

In the early days it was common practice, on every occasion when a donor had given blood, to present him with a printed certificate recording that he had carried out this service. A certificate for each donation is still issued, although in 1951 a badge, agreed by the Committee on the Grant of Honours, Decorations and Medals was approved by King George VI for use in the United Kingdom. This badge in bronze is presented to a donor after ten donations; after twenty-five donations a silver badge is given; and the donor who gives blood on fifty occasions receives a badge in silver gilt. Many donors qualify for badges every year. In Scotland the number of badges won in 1964 was bronze, 3,230; silver, 612; silver gilt, 33.

As the Association approaches its twenty-fifth birthday new surgical techniques, in particular the use of the heart-lung machine and the artificial kidney, have brought about yet another strain on its resources. The use of these techniques requires for each individual patient a large supply of blood which must be withdrawn only a few hours before the operation. To obtain such a supply, as many as twenty or more donors at one time may have to be summoned at short notice. As far, therefore, as this field of the work is concerned, the function of the donor may be said to have described a full circle and he finds himself, as in the early days of blood transfusion, called out in an emergency to provide treatment for an individual patient. To such calls, urgently made, often at inconvenient hours and without regard to personal circumstances, the response of the donors of today is as ready as ever.

Conclusion

In Scotland the Blood Transfusion Service administered by the Scottish National Blood Transfusion Association occupies a unique position. It plays an important role in the National Health Service. The Association remains an autonomous, voluntary body satisfying urgent needs of sick and injured persons all over the country; at the same time it offers to the ordinary citizen, irrespective of training, experience or material circumstance, a wonderful opportunity of rendering personal service to others. For twenty-five years the record of the Association has been one of solid achievement. What began as a temporary expedient to serve the emergency needs of hospitals in time of war has become a great and permanent service. Its directors, men of hospital consultant status, control large and complicated organisations; its centres and laboratories, staffed by doctors, scientists and technicians of skill, carry out intricate routine procedures and much original research; its withdrawal teams at the centres or in mobile units secure the enormous quantity of blood required every year; its regional and local organisers with zeal and tact recruit and retain a great army of donors; and the donors themselves, on whom the success of the whole enterprise depends, cheerfully do their part for the love of the cause. Truly the old prophecy has been fulfilled, "Blood Transfusion has ended in extraordinary success."

APPENDIX A

OFFICE-BEARERS AND OFFICIALS

President

1940- The Earl of Rosebery, K.T., P.C.,
D.S.O., M.C.

Vice-President

1959- C. P. Stewart, Ph.D., D.Sc.

Chairman of Executive Committee

1942-1951 J. R. Little, J.P., F.R.S.E.
1951-1959 W. J. Stuart, C.B.E., F.R.C.S.E.
1959- C. P. Stewart, Ph.D., D.Sc.

Secretary

1940-1959 C. S. Gumley, W.S.
1959- N. A. Milne, W.S.

Treasurer

1940-1946 T. A. Mowat, C.A.
1946- C. G. M. Pearson, C.A.

Medical Secretary

1940-1942 Dr T. W. Buchan
1942-1947 Dr J. S. Westwater
1947-1953 Dr J. Smith, O.B.E.
1953- Dr R. M. Gordon

Assistant Medical Secretary

1956-1964 Dr A. Menzies

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Regional Directors

Northern	1940-1960	Dr H. J. R. Kirkpatrick
	1960-	Dr I. A. Cook
North-Eastern	1940-1956	Professor J. Cruickshank, C.B.E.
	1956-1963	Dr J. S. Campbell
	1963-	Dr H. B. M. Lewis
Eastern	1940-1945	Professor D. F. Cappel, C.B.E.
	1945	Dr M. N. McFarlane
	1945-1946	Professor S. McDonald
	1946-1947	Dr Ann Sandison (acting)
	1947-1950	Dr Sheila Maw
	1950-1954	Dr Avril Johnstone
	1954-	Dr C. Cameron
South-Eastern	1940-1946	Dr C. P. Stewart
	1946-1947	Dr D. A. C. McRae
	1947	Dr D. C. Haig, J.P. (interim)
	1947-	Dr R. A. Cumming, O.B.E.
Western	1940-1944	Professor N. Morris
	1944-1946	Professor J. P. Todd
	1946-	Dr J. Wallace

Organising Secretaries

National Organiser	1940-1949	J. R. Copland, M.B.E.
Northern Region	1940-1945	Mrs Fraser-Simpson
	1945-	Miss V. Christie
North-Eastern Region	1940-1941	Dr J. Stephen
	1941-1945	Miss B. Mitchell
	1945-	Mrs H. L. Manning
Eastern Region	1940-1942	R. G. Scott
	1942-1945	Mrs M. F. Scott
	1945-1961	Mrs A. W. Scrimgeour
	1961-	Miss I. E. Carstairs
South-Eastern Region	1940-	Miss H. M. White
Western Region	1940-1944	J. S. W. Henderson
	1944-1946	Mrs P. S. W. Peat
	1946-1947	Miss J. R. Sample
	1947-	Miss D. Nelson

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APPENDIX B
THE STATISTICAL PICTURE

	1944	1948	1952	1956	1960	1964
Donations	£3,592	£2,355	£379	£997	£340	£117
Flag days	£8,239	£3,970
Exchequer grant	£7,250	£34,125	£101,799	£138,739	£247,430	£363,368
Donors	57,184	115,687	76,691	135,185	185,017	207,922
Blood issued (bottles)	11,781	20,313	54,764	77,005	101,790	121,819
Liquid plasma (bottles)	5,723	7,269	5,537	2,717	372	705
Dried plasma (bottles)	901	1,101	554	1,832	8,406	14,318
Staff employed—						
Whole-time staff	66	71	134	208	252	309
Part-time staff	18	12	34	50	79	88

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