One hundred years : Wellcome: in pursuit of excellence / Gilbert Macdonald.

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1880-1980

IN PURSUIT OF EXCELLENCE

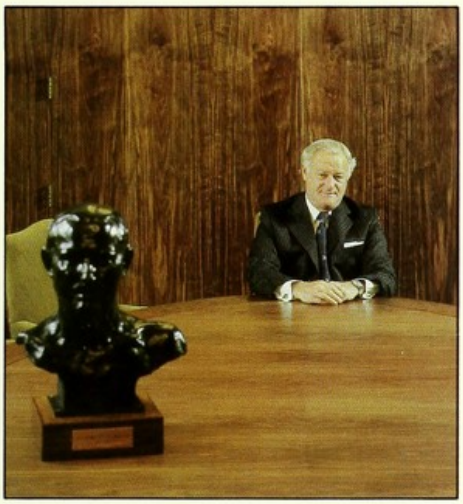
1880-1980

IN PURSUIT OF EXCELLENCE

'I like the ripeness and dignity of old traditions; we may sometimes need them in these days as a check on haste and exuberance; but we all know their detrimental possibilities if they are just blindly worshipped, without any serious attempt to blend and harmonise them with healthy and necessary modern development.'

Sir Henry Dale, OM, FRS
From his lecture
Medical Research as an Aim in Life,
delivered to the Royal Medical Society,
Edinburgh, on 21 January 1949.

Foreword



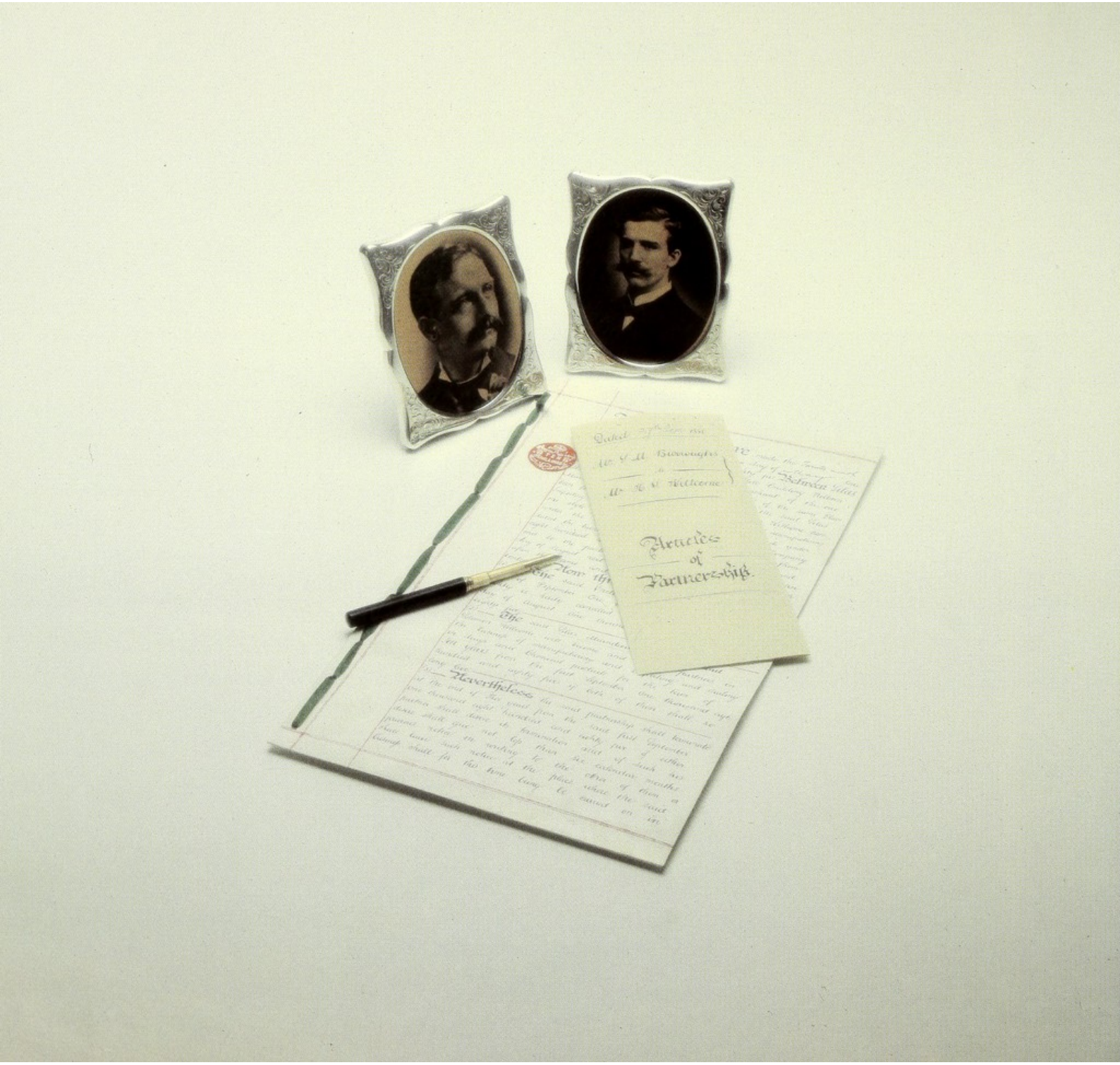
This book is the story of a hundred years in the life of a commercial company. It is a rare company in that it is so large and yet privately owned. It is unique in its industry in that it is owned by a charitable trust.

I am very glad to write this foreword and for the opportunity it gives to thank the author and others who have contributed to the painstaking research.

There are here presented profiles of the colourful men who were the enthusiastic founders, descriptions of the firm's early days and references to some of its difficult times. The company is now large enough to be important in the world of human care yet small enough to be personal in its dealings, and some of its members have contributed great things to science.

It is an honour for me to introduce the book and to give my best wishes to our 18,000 employees and to others associated with us for our centenary year.

A. J. Shepperd CHAIRMAN
The Wellcome Foundation Limited
The Wellcome Building, Euston Road, London


Articles
of
Partnership.

The Founders

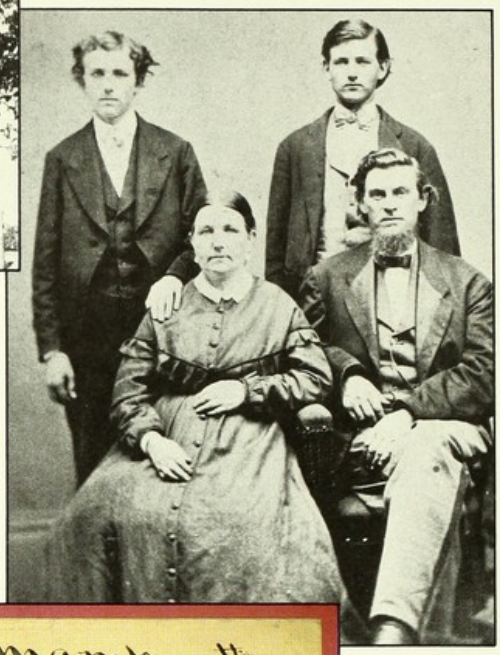
The firm of Burroughs Wellcome & Co. was established in London on Monday 27 September 1880, when a deed of partnership was completed between two American pharmacists – Silas M. Burroughs and Henry S. Wellcome. Both men were entrepreneurs with flair, initiative and enormous energy. Burroughs, aged thirty-four, was the senior partner but he died of pneumonia in 1895. Wellcome, twenty-seven, lived on until 1936 and it was he who made the major contribution to the Company's growth and prosperity.

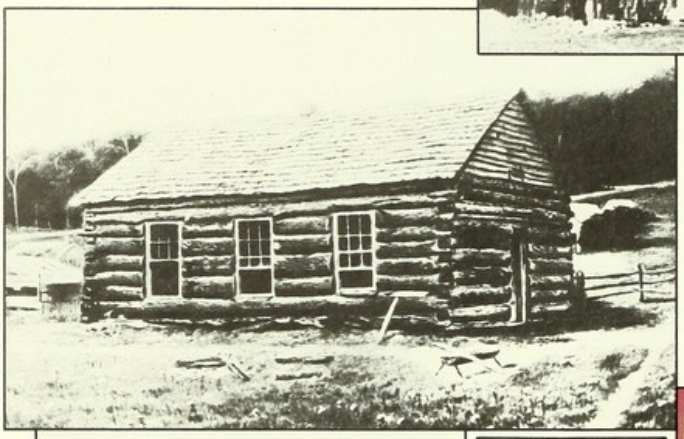
Henry Wellcome was the younger son of Solomon Wellcome, a farmer-preacher from Almond, Wisconsin. He was educated in a traditional log cabin frontier school where he developed some of the thrust and drive which characterised his later activities. At the age of nine he was involved in an American Indian uprising – and in later life in London he devoted much time, energy and money to the welfare of the Indians in the land of his childhood. Henry came of a deeply religious family. Not only his father but his two uncles were ordained ministers. It was this background which stimulated him, when he was twenty-one, to write to his parents: 'I have always had a desire for wealth and still have. . . but I want to live a life devoted to the true God and to mankind.'

At the age of thirteen, however, he had his first experience of the medical world – helping in the family drug store in Garden City, Minnesota. Those were the days of horse and buggy medicines, and this was Henry Wellcome's introduction to the pharmacy of the day. His medical-scientific bent was stimulated by his uncle, Dr Jacob Wellcome, and an English chemist, H.J. Barton, who had settled in the community. Henry soon thought it was time to move on, and he took a post with a firm of pharmaceutical chemists, Pool and Geisinger, in the nearby town of Rochester. He took with him a testimonial signed by fourteen Garden City notables, an early example of the skilful use of publicity and public relations which he neither lost nor abused throughout his business life.

In Rochester he was befriended and influenced by another doctor – William Mayo, father of the two sons 'Dr Will' and 'Dr Charlie' who were subsequently to found their famous clinic there. Henry, realising the advantages of a qualification, moved first to a college in Chicago and then to the College in Philadelphia where he graduated in pharmacy in 1874.

Silas Burroughs was an outstanding promoter of new ideas and products, with immense technical expertise. He was born in 1846, seven years before Wellcome and several hundred miles east in Medina, New York. He spent his youth and early manhood in pharmacies in Lockport and Buffalo before moving to Philadelphia. He graduated in 1877, returned to John Wyeth & Brother,





HAVE YOU HEARD THE

NEWS?

"INDIANS!"

'INDIANS!'

ARE

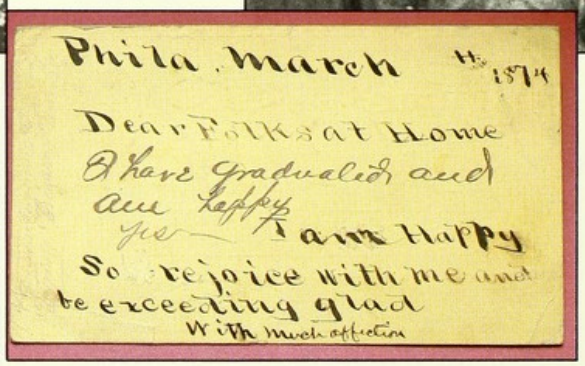
ON

THE

WAR

PATH

S. C. WELLCOME & Co.



Top: Badge of Garden City School and top centre, Henry Wellcome's home from 1861 to 1870
Left centre: Log-cabin school at Garden City
Above: Evan's Hotel, Garden City – shelter for women and children during Indian rising of 1862

Centre: Henry, aged 11
Top right: Henry with his parents Solomon and Mary Wellcome, and brother George (behind father) in 1869
Left: S. C. Wellcome's eye-catching advertisement (probably written by Henry) in the Garden City Herald 1868
Above: Passed!

pharmaceutical manufacturers, with whom he had been a sales representative, and was sent in 1878 to London. It was only a matter of months, however, before he resigned to set up his own agency on behalf of Wyeth and several other American companies. John Wyeth, in celebrating their centenary in Britain in 1978, paid tribute to his contribution on their behalf.

Meanwhile, back in the States, Wellcome was carefully planning his career. Even as a student, his scientific acumen was recognised. His thesis, *Urethral Suppositories – Improvements in their Shape and Manufacture,* was the first of a series of original papers. He was also in great demand as a lecturer. He had taken up his first preference as a pharmacist with an exclusive drug house in New York called Caswell, Hazard & Co. The salary was small, but it was experience that Wellcome was seeking. Two years later he was invited to join the well-known firm of McKesson & Robbins. His brief was to introduce and promote the new gelatine-coated pills to doctors and druggists.

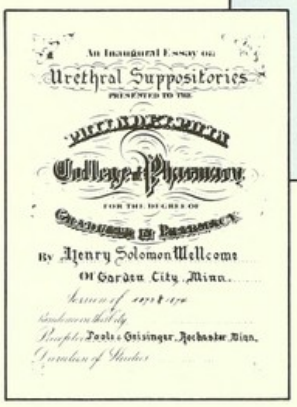
This gave him an opportunity to travel, and he made a number of journeys by mule in remote parts of Central and South America. He put any spare time he had to good use. For example, although the medicinal qualities of cinchona bark had been known for centuries, little was known of its most active constituent, quinine, and how it could be produced. As a result of his observations in Ecuador and Peru, Wellcome published a paper on the subject in the *Proceedings of the American Pharmaceutical Association* and the *Pharmaceutical Journal* of Great Britain.

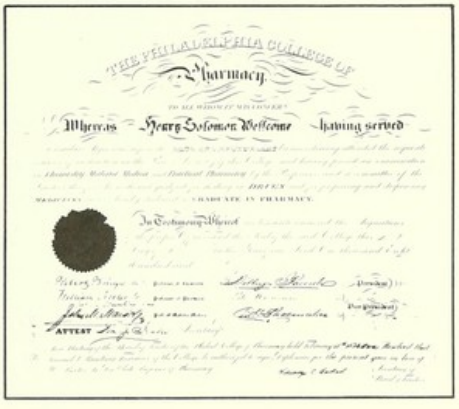
Wellcome was soon faced with the need to make a major decision. He had received an offer from Burroughs to join him in England. There was, though, another name which attracted him to Europe – Frederick Belding Power, like Burroughs, a former fellow student in Philadelphia, who had been described earlier in a letter from Wellcome to his parents as 'the best student in the college, bound to excel all others. . a natural chemist'. Power had joined up with a distinguished chemist in Germany in 1879 and Wellcome's scientific intuition detected possible areas of collaboration. However, McKesson & Robbins helped Wellcome to make up his mind. They offered him the sole agency for their products in Britain and all other countries outside the United States. Henry set sail for England.

Yet he kept his options open. After a visit to Vienna, he met Power in Strasburg. Their friendship was consolidated and the door kept open for future collaboration. Power, in fact, joined Wellcome sixteen years later as his first Director of Chemical Research, one of the first examples of Wellcome's uncanny knack of selecting staff who were to achieve outstanding reputations.

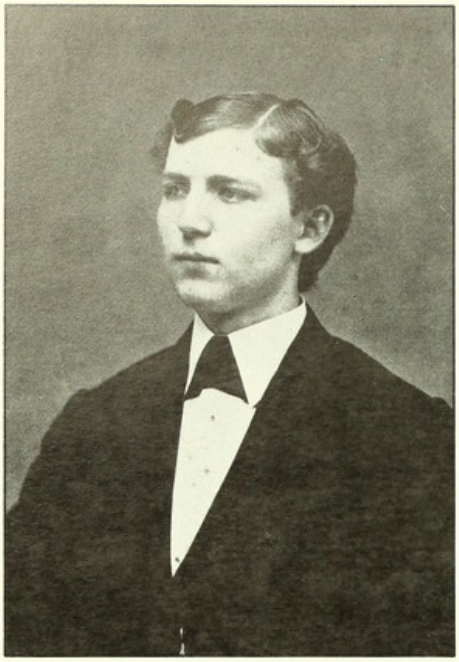
The principal factor in the decision of Burroughs and Wellcome to

Right: Models of the improved suppositories and bougies, prepared by Wellcome in 1893, recalling his thesis


An Inaugural Essay on
Urethral Suppositories
PRESENTED TO THE
College of Pharmacy
FOR THE DEGREE OF
By Henry Solomon Wellcome
Of Garden City, Minn.


THE PHILADELPHIA COLLEGE OF
Pharmacy
Whereas Henry Solomon Wellcome having served

Above: Title page of Inaugural Essay on Urethral Suppositories Right: Graduate in Pharmacy, 9th March 1874

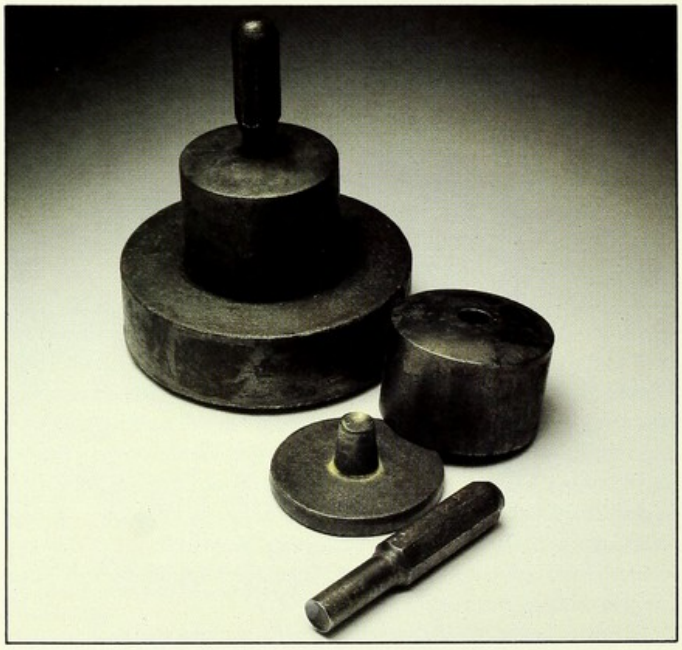


Henry Wellcome, aged 16

Dr Jacob Wellcome, frontier soldier and surgeon apothecary

set up on their own in the United Kingdom was 'compressed medicines', the new method of presenting drugs which had been developed in the United States. In Britain it was the day of the potion, the pestle and the pill. The contrast with the new compressed drugs coming from America, which Burroughs and Wellcome were experienced in selling, could hardly have been greater. Although the compressed pill was first made in England as early as 1843 by Brockedon (whose business and rights were later acquired by Burroughs Wellcome), the great technical advance had been made in America in the 1870s. There is evidence to suggest that Burroughs Wellcome were first in Britain to use the term 'tablet' for this type of medicine, although in America John Wyeth had used it earlier. What is certain is that the word 'Tabloid' which Wellcome coined and registered in 1884 was to become one of the most renowned of all trade marks.

Sir Henry Dale, in an obituary tribute to Wellcome in *The Times* of 1 August 1936, wrote that 'Henry Wellcome, for a man of such wide and generous activities and interests, was curiously lonely and it is doubtful that anyone knew him with sufficient intimacy to do more than speculate as to his real feelings and motives.' There is, however, enough in the records and personal files to enable a composite portrait to be drawn, even if the image may sometimes be blurred. It is

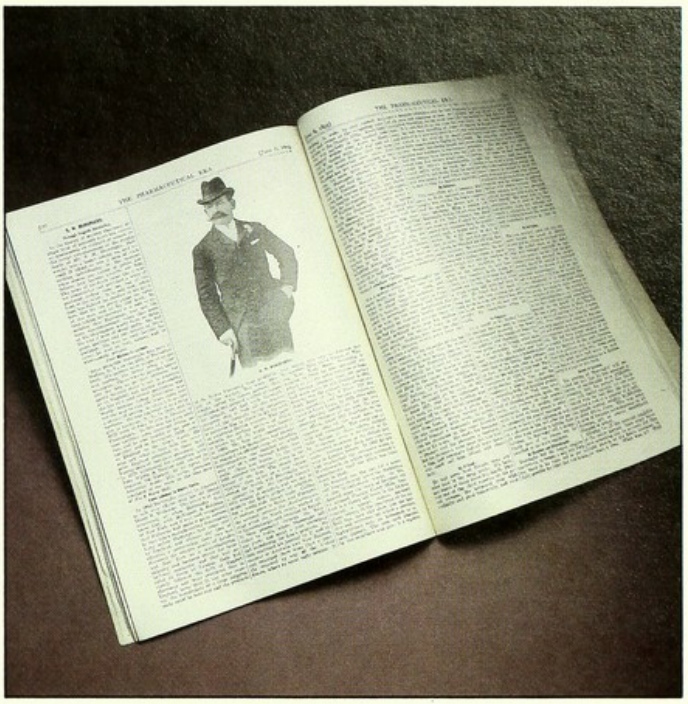


Right: Brockedon's original apparatus for the manufacture of compressed drugs, 1843

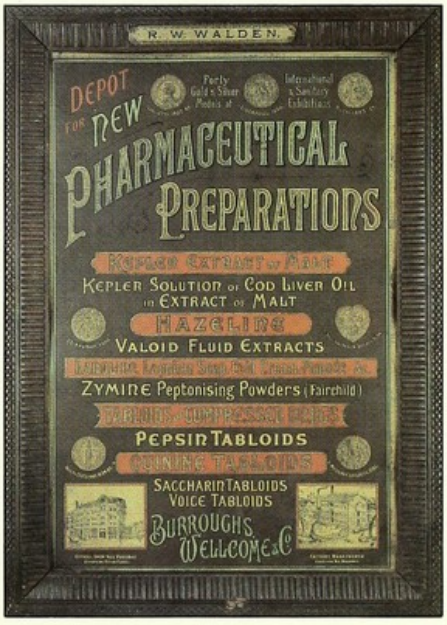
possible that when he went into partnership he saw the first opportunity of fulfilling his expressed ambition to amass a fortune. This unassuming, reserved man, already with a sense of destiny, linked up with an extrovert who loved life, something of a dandy, a brilliant salesman and an opportunist in the best sense.

Each partner had a strong personality and it is no surprise that their relationship came at times to resemble, in its stresses and strains, that of their famous contemporaries, Gilbert and Sullivan. In its own field it was no less successful. Its flavour was captured perfectly in one paragraph of a two-page obituary on Burroughs in the *Pharmaceutical Era*. 'No Partnership could have been more ideal in its constitution. The influence of Henry Wellcome in cementing and organising the business of the firm cannot be lost sight of in commenting upon the brilliance of the senior partner. While Burroughs was a man of intense mental, physical and commercial energy, of buoyant individuality and brilliant initiative, he lacked that steady persistence, that capacity for governing and directing others, that shrewder judgement and that love for executive work and detail that distinguished his partner. Burroughs threw off multitudes of crude red-hot ideas. Wellcome, brimming over with energy and originality himself, had sometimes to work out Burroughs' as well as his own ideas before they could be given to the world as definite artistic entities.'

Even had Burroughs not died so early, the partnership might not have survived for long. Even before the death of his partner, Wellcome had started to anticipate the day when the business would be wholly his. Neither the Wellcome Physiological Research Laboratories when they were established in 1894 nor the plans for the Wellcome Chemical Research Laboratories (opened in 1896) bore the name of Burroughs. It has been suggested that Wellcome had the comma removed from the original title of the Company, Burroughs, Wellcome & Co., to give the impression of a one-man business!



Above: Extract from 'Pharmaceutical Era', 1895



Right: Two of the earliest pharmacy signs


The American Society
in London.
Thanksgiving Banquet,
GRAND HALL, HOTEL CECIL,
LONDON,
NOVEMBER 26TH, 1896.
THE METLAKAHTLA CASE
A
THE STORY
OF
Metlakahtla
HENRY S. WELLCOME
FOURTH EDITION
SAMPSON & CO.
LONDON
PERSONAL & CONFIDENTIAL.
16th December, 1931.
SIR,
I have the honour to inform you at the Prime
Minister's request that it is his intention, in respect
of the forthcoming list of New Year Honours, to submit
your name to the King with a recommendation that he may
so graciously please to approve that the honour of
Knighthood be conferred upon you.
Before doing so, however, Mr. MacDonald would be
glad to know that this mark of His Majesty's favour would
be agreeable to you, and I am therefore to ask if you will
be good enough to communicate with me accordingly at your
earliest convenience.
Yours faithfully,
Henry S. Wellcome, Esq., LL.D.

Henry Wellcome

Henry Wellcome, recuperating in the forests of Maine, 1886-87

Although the early initiative came from Burroughs, it was Wellcome who settled the Company on sound lines and pointed the way to its becoming the force it is in world pharmaceuticals today.

In spite of his basically unassuming nature, he had a great desire to see his name publicly and prominently associated with everything he did. It can be argued that this sprang less from a desire for self-glorification than from the knowledge that the more the name Wellcome was promoted, the more business interests would be furthered and the better able he would be to support research. Wellcome realised that the encouragement and support of medical and scientific research would further the interests of the Company. He was, furthermore, resolved to make his mark as a pioneer of the history of medicine and established in 1913 his first medical museum. In due course he was awarded a Fellowship of the Royal Society (1932) and of his many honours, except perhaps his knighthood in the same year, this gave him most satisfaction.

A flow of promotional material emerged from the Company each year. It was not uncommon for Wellcome to take twenty pages of advertising in one issue of the trade press, and in the *Lancet* on one occasion the advertisement ran to twenty-seven pages. The quality of his advertising was in keeping with his products and in the early days he prepared and designed much of it himself. Books were issued to mark notable events, at the same time promoting the Company. His diaries for doctors, nurses and pharmacists were much sought after. Today's only survivor, the Wellcome Medical Diary, still holds a unique place as a pocket reference book for practitioners.

In another shrewd piece of public relations he presented to each of the 300 guests at a banquet for the American Ambassador in London in 1896 a 146-page souvenir book bound in leather. It included an illustrated menu, a history of Anglo-American relations and of Thanksgiving Day. Indeed his interest in the United States never flagged.

He was also an internationalist, interested in all races and their advancement. In 1886, while convalescing in Maine from a breakdown resulting from overwork, he wrote *The Story of Metlakahtla,* an account of an American Indian tribe to which his friend, Father William Duncan, had been a missionary. He established a Publication Trust Fund in 1908 under the control of the China Medical Missionary Association to provide standard medical, surgical and chemical text books, translated into Chinese, at prices within the reach of native students. In Uganda he founded the Wellcome Medical Hospital Dispensary in 1905 and the Lady Stanley Maternity Hospital in 1927, two of many examples of his life-long interest in Africa.

Among many of the honours conferred on Wellcome were–Knighthood (lower centre); Legion of Honour (lower right); 'Comendador de la order de la Republica' of Spain (upper centre)

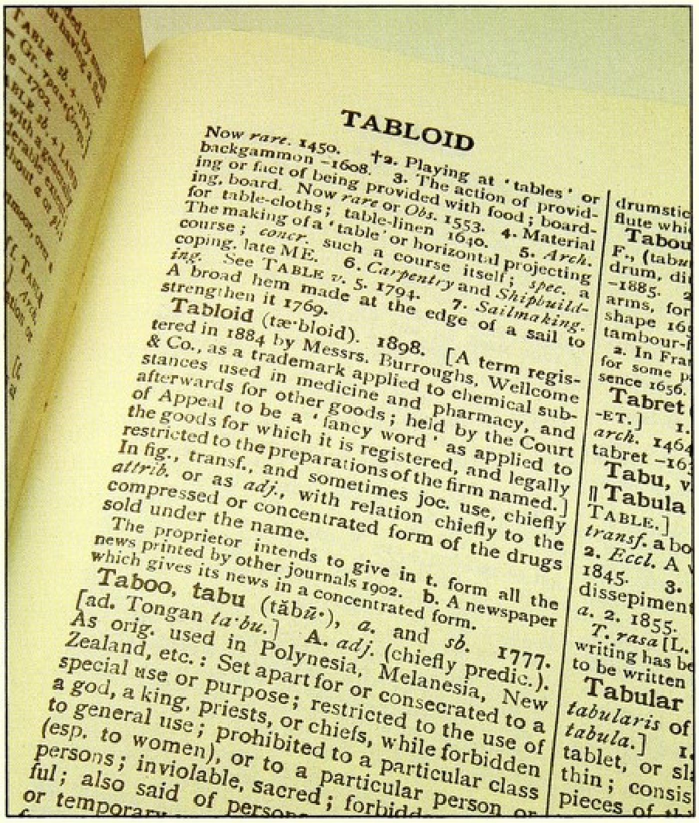
Wellcome was a generous man and privately befriended a number of people in need, while he was funding medical and pharmaceutical research on a vast scale. Nevertheless, if anyone let him down in work or friendship, or failed to reach the exceptional standards of behaviour which he set, he showed his disappointment in no uncertain manner. This trait came from his descent from people of strong moral and religious principles. He wrote to his parents when he was seventeen: 'I feel so rejoiced to think that we as a family are all trying to live to the honour and glory of the Maker.'

He could be remarkably obstinate. For example, he delayed until 1924 the establishment of The Wellcome Foundation Limited, although as early as 1920 the secretary and financial controller of the business, Mr Gerald Moore, had tried to persuade him of the benefits of bringing all his interests under this one umbrella. The same obstinacy and stubbornness in a cause stood him in good stead on many occasions, particularly when a trade mark or a product was threatened. The famous 'Tabloid' case was a *cause célèbre* of its day. In 1903 Wellcome decided that the time had come to take legal action against anyone using the mark he had registered twenty years earlier (the name Tabloid 'came to him' at half-past four one morning in 1884 by combining the word tablet and alkaloid, and he at once sent for his secretary to dictate, even at that early hour, a memorandum on the subject). Under the most skilful cross-examination by the Defence over the many months of the case, Henry Wellcome could not be moved from his submission that "'Tabloid' is a registered trade mark for goods manufactured by Burroughs Wellcome & Co." Wellcome won and established the Company's exclusive right to the use of the term. 'Tabloid' was to become one of the most distinguished of all registered trade marks and found its way into several editions of the Oxford Dictionary.

Wellcome was a perfectionist with a keen eye for detail. He once had twenty-six coats of paint applied to the walls of the Wellcome Museum of Medical Science before he was satisfied. He wished the shade to match a horse chestnut he carried with him; he had overlooked the fact that the colour of the chestnut was changing continuously as a result of oxidation!

Despite this extravagant perfectionism he was a remarkably frugal man, living an austere, almost Spartan, existence. He stipulated in his will that his funeral was to be simple and inexpensive. Some of this attitude is traceable to his student days in America when he confessed to his parents 'I have not bought a rag of clothes since I came to this City, and have not a whole pair of pants or boots to my name. I have had to wear rubbers over my boots to keep them together. I think Philadelphia life has learned me to be economical.'

Wellcome presiding at Thanksgiving Day banquet in 1896



TABLOID

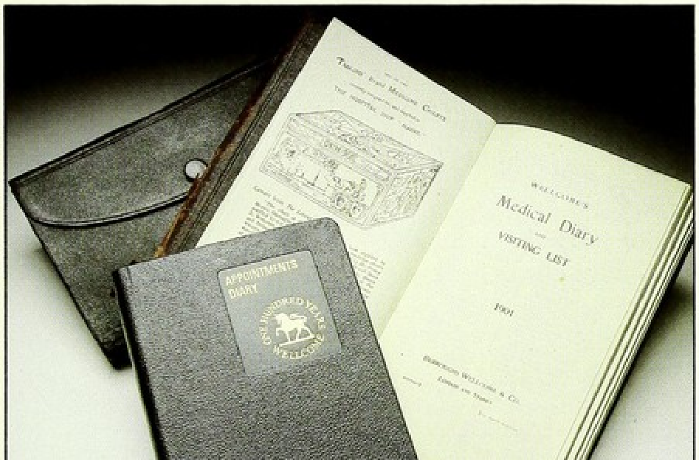
Now *rare*. 1450. †2. Playing at 'tables' or backgammon –1608. 3. The action of providing or fact of being provided with food; boarding, board. Now *rare* or *Obs.* 1553. 4. Material for table-cloths; table-linen 1640. 5. *Arch.* The making of a 'table' or horizontal projecting course; *concr.* such a course itself; *spec.* a coping, late ME. 6. *Carpentry* and *Shipbuilding*. See TABLE *v.* 5. 1794. 7. *Sailmaking*. A broad hem made at the edge of a sail to strengthen it 1769.

Tabloid (tæ·bloid). 1898. [A term registered in 1884 by Messrs. Burroughs, Wellcome & Co., as a trademark applied to chemical substances used in medicine and pharmacy, and afterwards for other goods; held by the Court of Appeal to be a 'fancy word' as applied to the goods for which it is registered, and legally restricted to the preparations of the firm named.] In fig., transf., and sometimes joc. use, chiefly *attrib.* or as *adj.*, with relation chiefly to the compressed or concentrated form of the drugs sold under the name.

The proprietor intends to give in t. form all the news printed by other journals 1902. **b.** A newspaper which gives its news in a concentrated form.

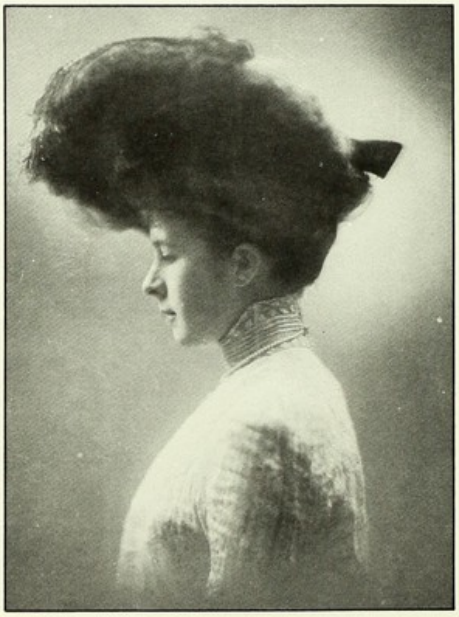
Taboo, tabu (tăbū·), *a.* and *sb.* 1777. [ad. Tongan *ta·bu*.] **A.** *adj.* (chiefly predic.). As orig. used in Polynesia, Melanesia, New Zealand, etc.: Set apart for or consecrated to a special use or purpose; restricted to the use of a god, a king, priests, or chiefs, while forbidden to general use; prohibited to a particular class (esp. to women), or to a particular person or persons; inviolable, sacred; forbidden

Above: Extract from 'The Shorter Oxford English Dictionary'



Left: The Wellcome Medical Diary, past and present

Wedding present given by staff to Wellcome



Top right: Henry Wellcome with his wife, son and household staff
Right: Syrie Wellcome, 1902

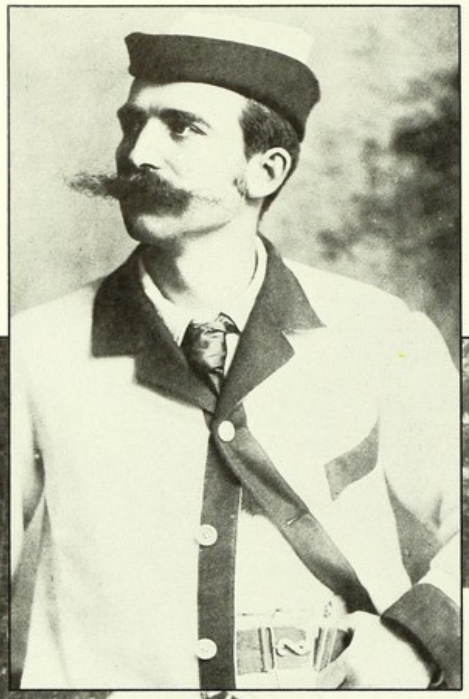
He did on one occasion say to Sir Henry Dale that he, Wellcome, chose to spend his money 'in supporting research as another man might want to spend his on a racing stable'. Henry Wellcome was nevertheless one of the first half dozen people in Britain to own a motor-car and indeed, later, preferred to drive one of his vintage models rather than buy a new one.

He married in 1901, at the age of forty-seven, Syrie Barnardo, twenty-one-year-old daughter of the founder of Dr Barnardo's Homes. There was a son, Henry Mounteney, who, however, was not destined to follow in his father's footsteps, but the marriage was dissolved in 1916 after a six-year separation. With hindsight it seems ironic that when in 1883 Burroughs wrote to Wellcome seeking advice as to whether or not he should marry, Wellcome's reply ('Don't!') ran to four pages. Amidst much homespun philosophy about why Burroughs should not marry, Wellcome included as one of his reasons that it would affect his contribution to the Company at a time when they were making their way. He ended his letter by saying that he, Wellcome, would probably end his days a lonely old man envying the Burroughs family fireside. Burroughs ignored Wellcome's advice, and his marriage was a happy one. Wellcome ended true to his forecast – a man with few close friends.

One of the most revealing of all stories about Wellcome appears in the early history of the Automobile Association written by its first secretary, Stenson Cooke, and entitled *This Motoring*. It illustrates many of Wellcome's attributes – foresight, planning, initiative, insistence on quality, marketing skill and desire for recognition. Henry Wellcome in 1908 approached Mr Cooke with the suggestion that it would be useful to equip AA patrolmen with first-aid kits because 'cars are increasing in numbers and are now travelling at speeds of up to 20 miles per hour'. In the presence of the secretary, Wellcome produced an attractive kit which he had designed in the AA colours, and which included about twenty essential items – bandages, tourniquet, cotton wool, gauze, adhesive plaster, ionised iodine, aromatic ammonia, scissors, pins and a book of instructions.

The secretary was tremendously impressed but, not unnaturally, worried about the cost. 'That's no problem', said H.W., 'my firm will give you as many complete equipments as are needed by your patrols for, let us say, the next two years. And after that...' 'We can buy', said the Secretary. 'But what about training? Do you think the St John Ambulance people would be good enough to help?' 'Of course they will. I'm on the Council and can put you in touch with the people who count.' The secretary of the AA was overwhelmed, and expressed on behalf of his Association his immense gratitude. 'That's alright', said Henry Wellcome, 'and you needn't go making me an Honorary Life

Top: Tabloid First Aid Kit for the AA
Lower: Picture, taken by Wellcome, shows one of his first cars on tour in Europe in 1907-08. With him is his courier, interpreter and faithful friend, John Ferreira.

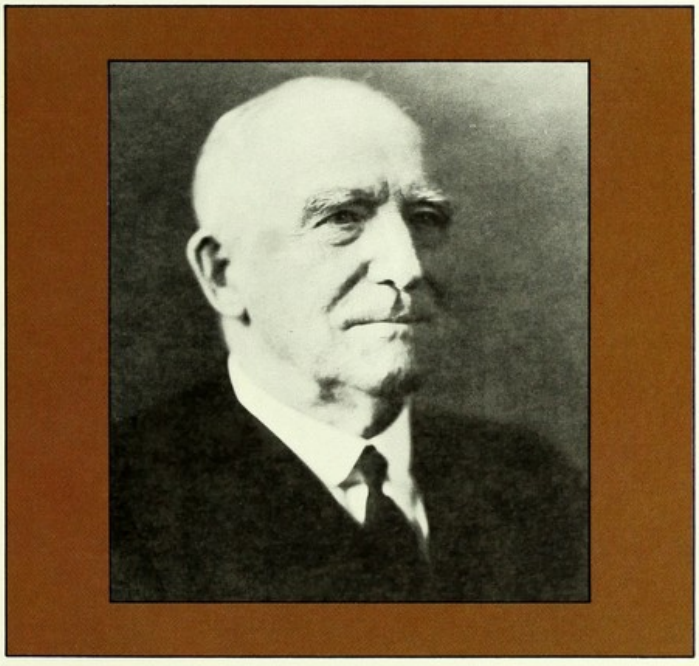


Top: Wellcome in canoeing attire
Lower: In the forests of Maine, 1886

Member or anything.' That, of course, was precisely what they did.

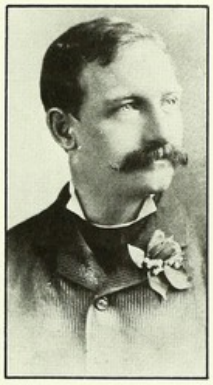
Wellcome's personal courage was never in doubt. One of his pastimes was canoeing, in which he had attained an Indian-like proficiency as a boy on the frontier creeks. In 1884 he was boating on the Thames with Miss Annie Wakeman, an American writer, when, near Boulters Lock, the canoe was submerged by a sudden rush of water from the gates and the lady was trapped under the boat. Wellcome rescued her, and was awarded the Bronze Medal of the Royal Humane Society for life saving 'at great personal risk.'

There was, too, an unusual tribute published in the *British Medical Journal* from Wellcome's surgeon, Mr Kenneth Walker, who tended him in his last illness. (Wellcome at the age of eighty-two the previous year had been operated on for cancer of the prostate at the Mayo Clinic.) 'During the last two weeks of his life Sir Henry Wellcome displayed in particular three characteristics which were so integral a part of his nature that nothing, not even the final struggle to live, could obscure them: a tenacious courage, an unflagging interest in all the concerns with which he had been associated and an unfailing good humour and gratitude to his medical attendants.' The last word, however, is from a contemporary of his staff – 'I didn't really know him although I did a lot of work for him. He was a very great man and we were all proud to work for him.'



Left: One of the last photographs taken of Sir Henry Wellcome Right: The partners in 'theatrical' attire (Wellcome, top)

Silas Burroughs



Silas M. Burroughs was a very different character. He was an enthusiastic traveller and spent many years promoting Company business and, one suspects, enjoying the good life. Unlike Wellcome, Burroughs took an active interest in the social and economic problems of the day. He had become a British subject in 1890 and once considered standing as a radical for the Dartford constituency, where the Company had its factory. Had he done so he might have gone on to be as successful a Member of Parliament as his father was of the United States Congress.

Burroughs' outgoing nature and his progressive political beliefs led him to take an interest in the welfare of his employees far ahead of his time. He was described, in his thirties, as a very handsome man, blue-eyed, with a magnetic personality. He went round the Works regularly asking the ladies 'Are you happy in your work?' No overseas trip was complete for Burroughs without the purchase of a present for each employee. It was he who first encouraged the staff towards cultural pursuits such as literary conversaziones or musical evenings in Holborn. The reproduction of the menu of the fifth annual dinner for employees suggests that this sort of occasion would not be readily forgotten.

It was Burroughs who, according to *Talk*, a popular magazine of the day, 'provided a library and a piano and surrounded the works at Dartford with fruit and flower gardens for the benefits of employees. At a cost of hundreds of pounds he converted a sludge pond into a silver lake whereon a sailing boat. . . skims amid swans and smaller water fowls and there is an island, beneath whose cool and graceful willows, those who will can dine pleasantly on these hot noons. Shoes and aprons are provided free. The windows of the factory are gay with geraniums and the walls are graceful with creepers; and the girls and women who work there are a contented-looking, comely, and self-respecting and happy a set as you can find anywhere. Further instances of consideration are to be found in the provision of a bathroom and a splendidly appointed kitchen.'

Another of his contributions to the Company was the introduction of an education scheme to enable employees to attend Dartford Technical Institute. Burroughs made his home in the town of Dartford itself and became closely involved in the life of the community. He was one of the founders of the Livingstone Hospital, named after the explorer, and gave a personal cheque for £1000 towards its construction. H.M. Stanley, the great explorer, laid the foundation stone and Burroughs was its first President in 1894. A bust of Burroughs was later commissioned and is still prominent today in one of the hospital wards.

The depth of affection in which Burroughs was held by all employees

Left: Dinner menu for Annual Outing, George & Dragon, Ightham, Kent, 1885
Below: Outing to Southsea, 1891
Inset: Selection of gifts to employees, brought back by Burroughs from his travels

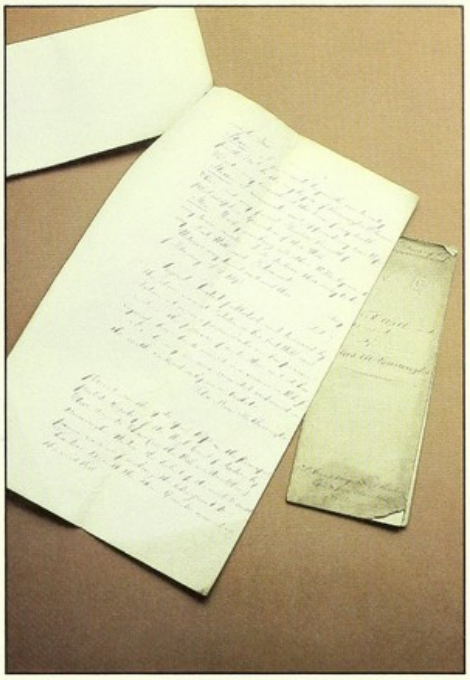
is shown by the wording on the tablet which they had placed in the City Temple, Holborn Viaduct, near the Snow Hill premises

SILAS MAINVILLE BURROUGHS, 1846-95

The employees of Burroughs Wellcome and Company have erected this tablet to place on record the esteem and affection in which they hold his memory, their grateful recognition of his constant desire to promote their happiness and welfare and their deep sorrow at his death which occurred after a short illness in the Riviera on the 6th February 1895 in the forty-ninth year of his age.

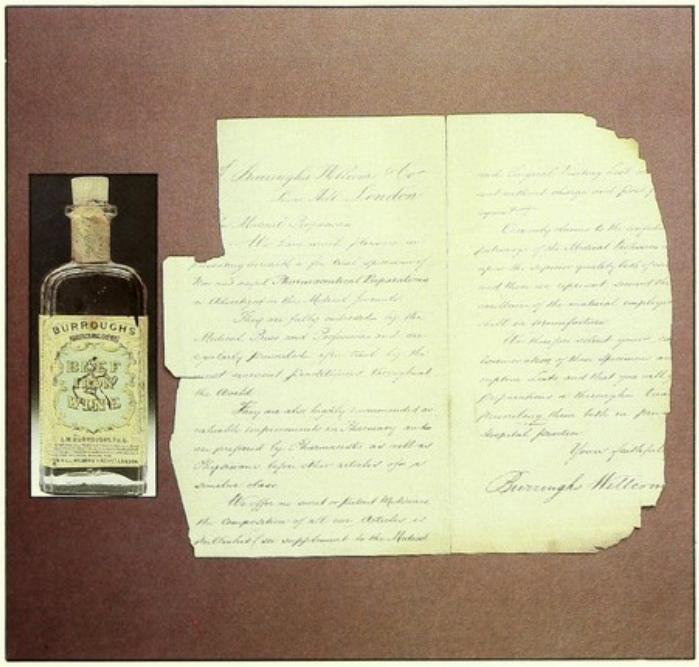
Burroughs was one of the first employers in Britain to introduce the eight-hour day, and his final contribution to the welfare of his employees was a provision in his will to the effect that one twenty-fourth of his estate was to be divided among employees at the time of his death.

It was fortunate for the embryonic company that two men of such remarkable but different talents and personality were able to combine in a common endeavour.



Left: The Will of Burroughs
Below: Remains of early mailing to medical profession
Inset: One of Burroughs products–probably 1879 or early 1880

Left: Bust of Silas Burroughs in ward of Livingstone Memorial Hospital, Dartford (Plaque accompanying this bust had wording similar to that on tablet in City Temple, Holborn, damaged during Second World War).
Below: Memorial tablet in City Temple




PROPERTY
OF
B.W.&C.
'Tabloid'
Compressed
Drugs
'Saxin'
Burroughs Wellcome & Co.
LISTA DE PRECIOS
LONDRES, E.C.
Price List
Burroughs, Wellcome & Co.
1897.
MEDICAL
FORMULÆ
Burroughs Wellcome & Co
LONDON
Cook's
CONTINENTAL TIME TABLES
COOK'S TOUREN.
SLEEPING CAR TICKET
J. LOBE Y C.ª HABANA.
LONDON. E.C.

The early years

'May Dartford Flourish' The Dartford Borough Coat of Arms

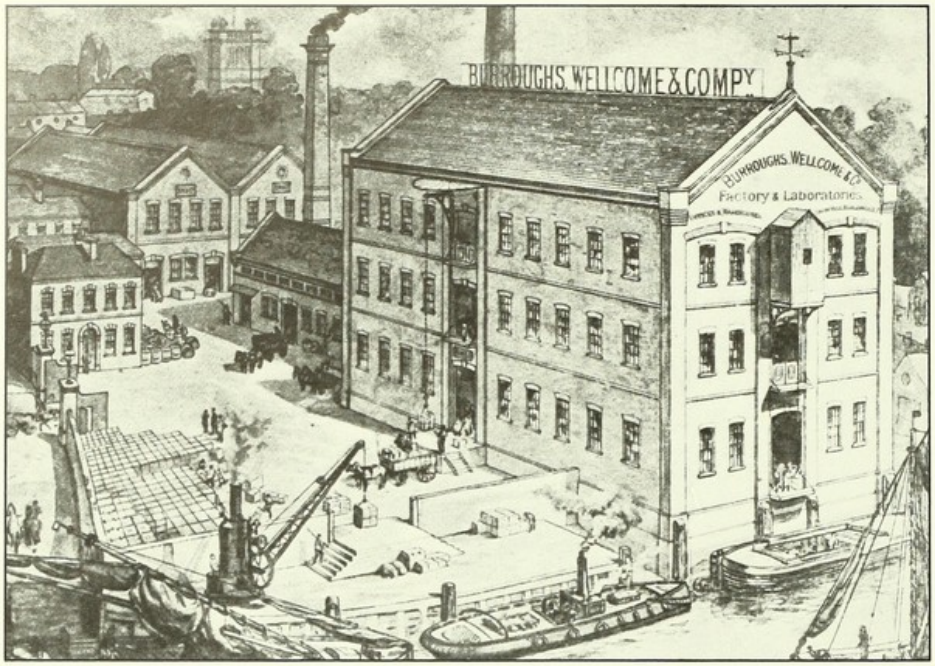
It took little time for Silas Burroughs and Henry Wellcome to translate their ideas into action and imprint their personalities on the Company.

In 1881, Burroughs, armed with a large supply of samples, set out to get business overseas. Spain and Portugal were the first of the Mediterranean countries he visited, Turkey and Egypt the last; then India (for a year), Australia, New Zealand, and finally, eight months in the United States. One result was the establishment in 1886 of the first Burroughs Wellcome & Co. branch – in Melbourne, Australia. Burroughs was away from England for two-and-a-half years. The excellent shipping facilities from England encouraged him to concentrate on developing export business. It was Wellcome, however, who, frustrated by the stamp duty on the products they were importing from America, was determined to establish manufacture in England. At one stage, Burroughs was keen to move production entirely to the USA, but Wellcome's calm wisdom and logic won the argument. The new Company therefore set about manufacturing, to a standard of quality and consistency hitherto unknown, the compressed products they had previously imported. This was achieved by scientific formulation, the use of purified ingredients and specially devised machinery of rare accuracy – operated and maintained by highly qualified engineering staff. It was claimed that the products from these machines could provide a range of dosage from one thousandth of a grain to sixty grains or more (0.060mg to 3.6g).

The first factory was established by the Thames at Wandsworth, but a much larger site was secured in 1889 at the former Phoenix Mills, Dartford, and was named the Wellcome Chemical Works. To this day the Dartford site has remained the main production centre of the Group.

They were exciting years. A newspaper report at the time said: 'The firm took Dartford by the shoulders and gave it a vigorous shaking'. The two partners initiated a uniquely close relationship between Burroughs Wellcome & Co. and the Borough of Dartford which has been further strengthened over the years.

Henry Wellcome looked after the business at home and set it on a sounder basis than the restless Burroughs could ever have done. He cultivated physicians and chemists, issued a first price list in 1881 and introduced a system of regular mailings to doctors. He was among the first in Britain to employ pharmacists as representatives and to give them a thorough technical training and product knowledge. As early as 1884 the Company was issuing 'directions for use' circulars in three languages – English, French and Italian. Such was the early success of the partnership that the firm soon had to



Left: First Chemical Works, Wandsworth, 1883–89
Below: Site of the original Phoenix Paper Mills, Dartford

Above: Snow Hill Buildings, business headquarters of the firm from 1883–1941
Right: The Chemical Works of Burroughs Wellcome & Co., 1890

extend its original premises in Snow Hill on the edge of the City of London. It was one of the first business houses in London to use the new electric light.

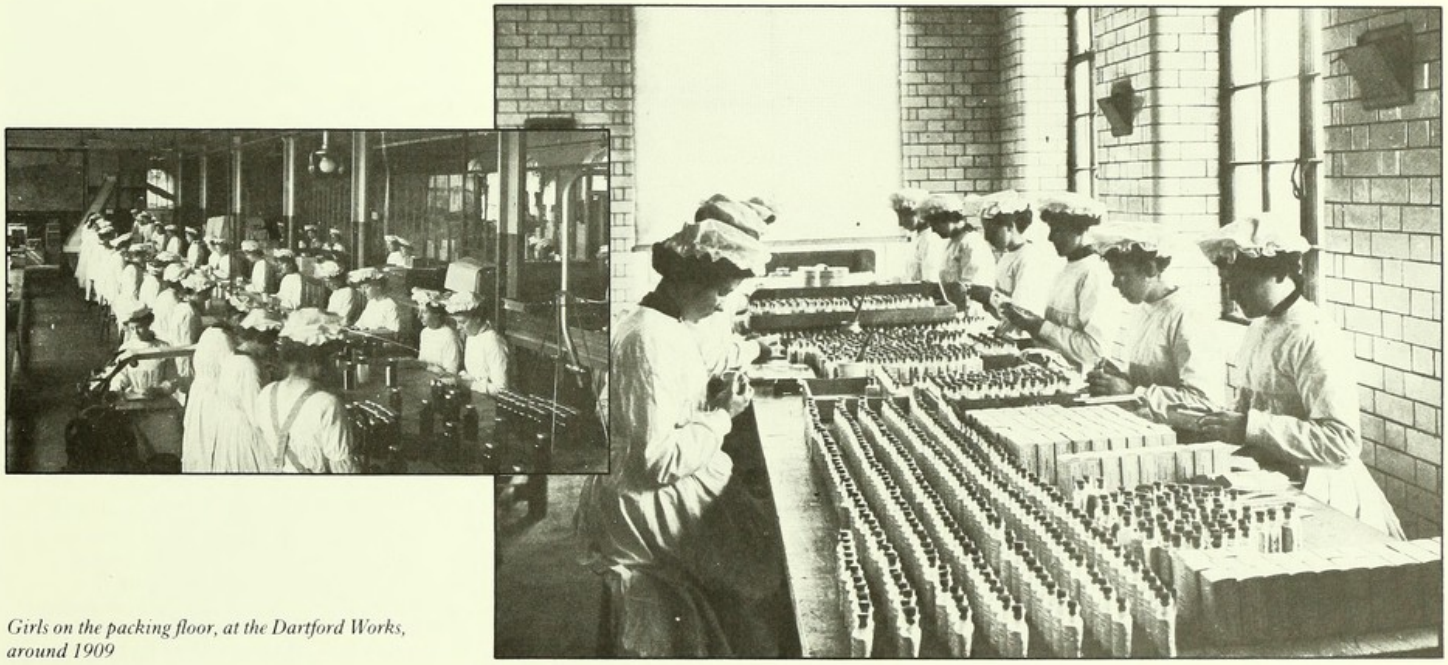
The Company's major products around this time included an extensive 'Tabloid' range of ethical medicines for the doctor, as well as 'Kepler' Cod Liver Oil and Malt, Toilet Lanoline, Hazeline Snow, saccharin – first as 'Tabloid' brand and then as 'Saxin' – atomisers for sprays, artificial ear drums, tea in 'Tabloid' form and tonics and laxatives with such bizarre names as 'Tabloid' Livingstone Rouser and 'Tabloid' Forced March (they both worked!). A growing range of medicine chests added colour to the range. Whatever the product or presentation, the quality had to be the very best. Groups of pharmacists were personally conducted by Burroughs and Wellcome over the production facilities at Dartford.

Burroughs and Wellcome both became popular figures with the professions, and the Company itself was soon highly regarded. A light-hearted expression of this appeared in the *Chemist and Druggist* of 25 February 1893, which published a selection of Valentines from pharmacists to manufacturers. Most companies had to be content with publication of one or two of these; Burroughs Wellcome & Co. were featured in sixteen, of which a typical example ran:

Oh, Burroughs! Oh, Wellcome! Oh, Blest!
Thy charms are tabloids compressed.
In Snow Hill they're made,
And for every trade
They're the purest, tho' dearest, p'r'aps best.

Oh, Burroughs! Oh, Wellcome, divine!
Thy tabloids, like stars, ever shine
In Europe, in Asia,
And fair Australasia,
In Africa, like my Valentine.

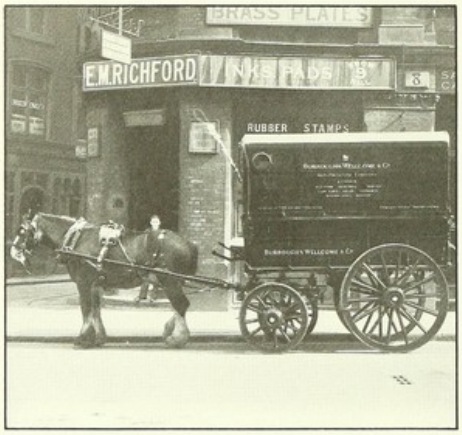
Hundreds of awards for excellence were won by the Company in scientific and trade exhibitions throughout the world. Gold medals, grand prizes, diplomas of honour and other distinctions followed each other in quick succession. Photographs of some of these exhibits show an outstanding originality of design and display. At the annual congress of the British Medical Association Wellcome invariably gave doctors impressive souvenirs.

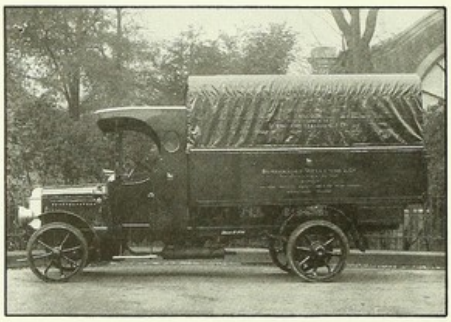


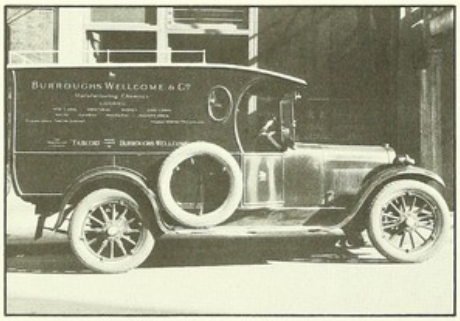
Girls on the packing floor, at the Dartford Works, around 1909

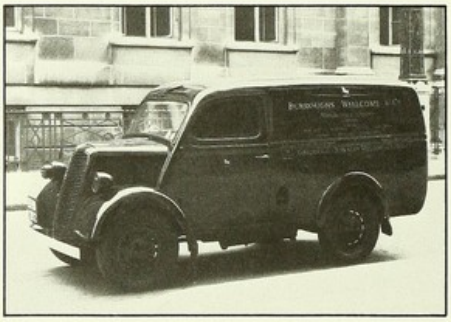
Top left: Maintenance workers at the factory
Top right: BW exhibit at Chicago Exhibition, 1893 with Henry Wellcome wearing hat on left of picture
Above: One of the earliest exhibits–International Medical and Sanitary Exhibition, London, 1881
Left: BW reps at British Medical Association meeting, Carlisle, 1896. (George Pearson, seated extreme left, was General Manager of the firm from 1905 to 1940.)

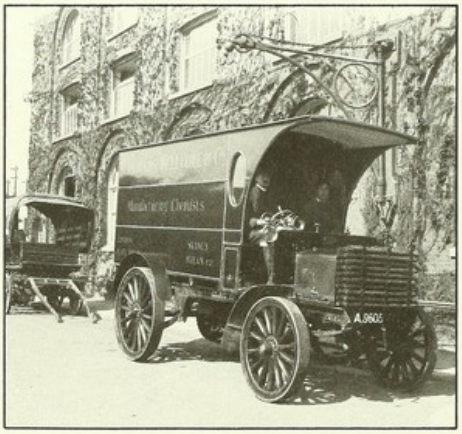
A group of BW & Co. products issued between 1880 and 1945



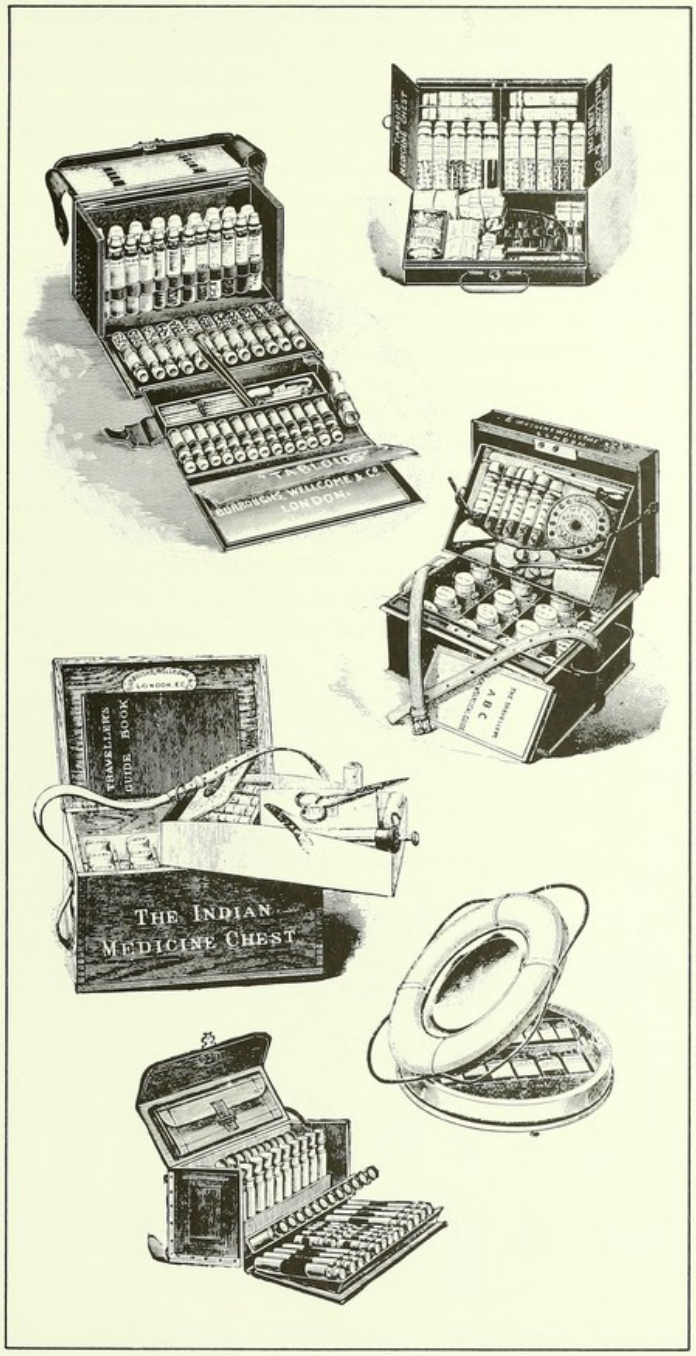








Today's transport of medicines compared with the past



THE MIDDLE YEARS

Wellcome's best years in terms of business success were from 1895 to 1920. He was in the driving seat and the Company prospered at home and abroad. Much of the rapid expansion which occurred in the first two decades of the 20th century came from new markets overseas. Always international in outlook, Wellcome studied at first hand the needs of each country. He established 'associated houses' in South Africa in 1902, Italy in 1905, Canada in 1906, USA in 1906, China in 1908, Argentina in 1910 and India in 1912. In 1924 he consolidated all his separate enterprises – namely the nine Burroughs Wellcome companies or associated houses located throughout the world and his various research and scientific establishments and his museums – under one private company, which he named The Wellcome Foundation Limited. With this done he appeared to lose much of his former commercial drive. Although he himself was governing director, he left the business side largely in the hands of George Pearson, his deputy and general manager. Consequently, the years between the wars were a period of some stagnation. The research skills were still there, the quality of product remained, but the old magic of motivation and leadership from the top had gone. These were restrictive and frustrating years for employees. The Company appeared to become complacent and to

Sir Henry (seated) with Thomas Nevin and George Pearson in America in 1935

live largely on tradition. Perhaps, above all, it was a period in which flair and initiative were discouraged. Little money was spent on plant or equipment or on overseas expansion; no Wellcome subsidiary was opened between 1912 and 1954.

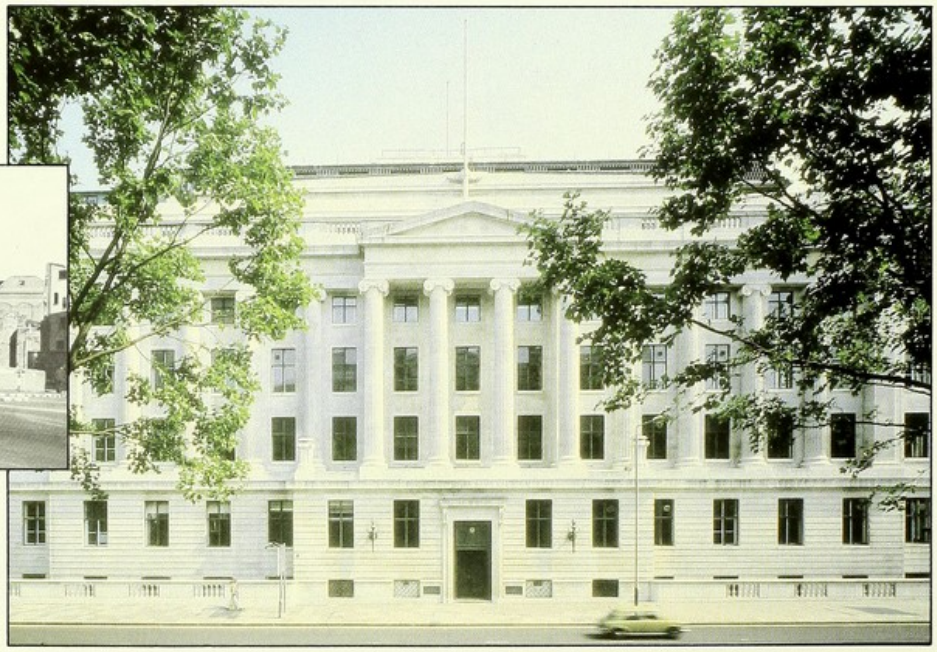
Meanwhile, Henry Wellcome's energy was directed to building up his historical medical collection on which he was spending vast sums of money and much of the Company's profit.

The Wellcome Research Institution in Euston Road, London (now the Wellcome Building and headquarters of the Group) was originally built as a museum to house this collection, with laboratories for research. When it was opened in 1932 it had cost £250,000. It was to prove a valuable investment when, in 1941, enemy action destroyed the Snow Hill Buildings in London, from which the Company had operated since its beginning.

During this period Wellcome fortunately took an active interest in the development of the US company, which he visited every year. He encouraged expansion in this area against the advice of George Pearson, who ruled the Company with iron discipline. One suspects that Wellcome found in Thomas Nevin, his chief executive in America, a warmth and enterprise lacking in Pearson in England. He wrote, looking back on the early years of the US company, 'I was strongly and repeatedly urged to cease expenditure for this American propaganda and to abandon the USA enterprise as hopeless.'

In 1932 and 1933 economic depression was worldwide but nowhere more severe than in the USA. Wellcome chose this time personally to plan the scientific and trade exhibit of his Company at the Century of Progress Chicago Fair in 1933. (It ran over into 1934.) He decided to have the largest exhibition of his products in the whole history of the Company. He took the best possible position in the Hall of Science and made ample use of it. There were twenty-four moving dioramas, 'whisking visitors to all parts of the globe' or featuring the use of 'Tabloid' medicine chests in the great expeditions of the previous fifty years. It was described by reviewers as 'one of the most thrilling displays we have ever seen. Wherever the British Lion goes, there goes the Unicorn which represents Burroughs Wellcome & Co. You will always find the two together, whether it is in the heart of darkest Africa or at either of the two Poles,' and so on in lavish praise. Henry Wellcome was 80 years old at the time and it is fitting that when he returned with enthusiasm to the active business scene, he should have provided the highlight in what were otherwise undistinguished years for the Company.

A period of stagnation and relative decline then ensued which lasted until 1950. Only the US and Australian companies continued to grow.



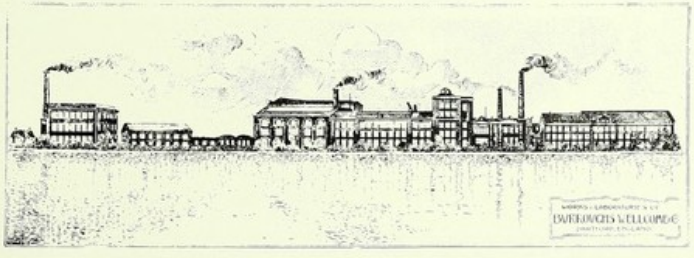
Above: End of an era. Snow Hill Buildings were damaged by bombs and destroyed by fire in 1941
Right: The Wellcome Building, Euston Road, London. Headquarters of the Wellcome Group of Companies.

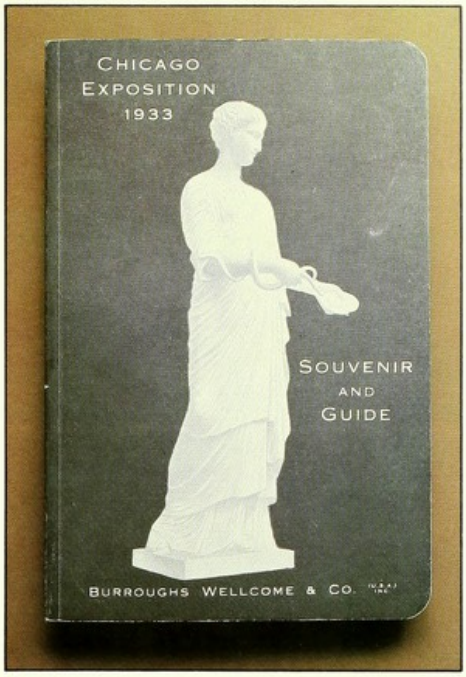
When Wellcome died in 1936 it was found that inadequate provision had been made for the payment of death duties and money was short. The overseas companies operated as largely independent units and useful dividends were paid to the parent Company by the United States and Australian houses. The research laboratories, though remaining eminent in the development and production of vaccines and sera, had failed to keep abreast with the chemotherapeutic revolution. By the late 1940s other companies were marketing synthetic drugs of enormous market potential, while Wellcome's share of the world markets fell year by year. There was a feeling in some of the research laboratories that if there were any results from research which the Company might utilise then so much the better, but that this was not their main objective.

Mr T.R.G. Bennett succeeded George Pearson in 1940. He was a man of considerable initiative and business acumen who tried for the first time to bring together the constituent parts of the Foundation and inculcate a sense of common purpose. However, the money was simply not available to finance his expansion plans against the restrictions of wartime and post-war readjustment.

By 1948 a fairly critical position had been reached and Mr H.E. Sier, an accountant, was appointed to replace Mr Bennett as Chairman. Mr C. Gordon Oakes and Dr Denis E. Wheeler were appointed joint Managing Directors. By 1953 when Mr Sier retired and Mr (later Sir) Michael Perrin took over as Chairman, a more stable financial position had been reached and the stage was set for a remarkable recovery.

Below: Artist's impression of Works at Dartford (late 1890s)





Below: One of the two Wellcome stands at the Chicago Exposition, 1933-34


Will
of
Sir HENRY S. WELLCOME, M.D.

Legacy of an inspired millionaire

While he was alive Henry Wellcome was able through his successful business activities to contribute widely and wisely to the advancement of knowledge concerning the prevention of disease. His work has continued since his death, not only through the research activities he himself initiated in the Company, but also through the far-reaching provisions of his will. By the operation of the will, the Wellcome Trustees became the sole shareholders of The Wellcome Foundation Limited with an obligation to devote all income to specified charitable purposes, namely research in medicine and allied sciences and the maintenance of research museums dedicated to these sciences. The Wellcome Trust, the name by which the Trustees became subsequently known is registered as a charity and continues to pursue these objects.

To this end the Wellcome Trust distributed £56m between 1936 and 1979, more than half of this within the last ten years. During the early years of the Trust's existence, the Trustees were faced with the payment of heavy death duties. Furthermore, the abnormal activities of the Foundation during the war and the period of adjustment after it meant that dividends were limited. Now, because of the increasing success of the business, it has been possible for the Trustees to accelerate the pace of funding. The Wellcome Trust is today the largest British charity supporting medical research.

Although the last will and testament of Sir Henry, setting out the provisions for the establishment of the Wellcome Trust, is dated 29 February 1932, he had the germ of the idea twenty-eight years earlier. Interviewing Henry Dale, who had applied for a position as a pharmacologist on his staff, Wellcome said, 'I have taken legal advice and have my will in draft and it is being considered by Counsel. I tell you quite frankly what I am doing. After my death I am determined that this business shall go on. I have arranged to put it in the hands of a board of Trustees who will see that it goes on and that its resources are used to support such laboratories as that in which I have asked you to become a member.' Sir Henry Dale, Order of Merit, Nobel Laureate, Fellow of the Royal Society and its President from 1940 to 1945, one of this century's most eminent scientists, was named by Wellcome as one of the original five trustees and was later to be Chairman of the Wellcome Trust for twenty-two years. Mr L.C. Bullock, a solicitor and senior partner in the City of London firm of Markby, Stewart and Wadesons, who drafted the will and was also one of the original trustees, recalled later the prodigious amount of time and trouble devoted by Wellcome to details of his will. 'He personally spent the greater part of every day for a fortnight altering, amending and re-drafting.'

The impact of the will in 1937 was considerable. It was reported in

Painting of Henry Wellcome with below his Armorial Bearings

the world's medical press as well as in the national press of many countries. The *British Medical Journal* in its main editorial commented: 'The Trust has every appearance of being a big undertaking, bigger in the next generation than it can be in this. Upon the Trustees, especially those representing medicine and the ancillary sciences, a great responsibility will rest for the worthy investment of the sums which periodically become available . . . The acceptance of the Trust could only be regarded as a public duty – a duty not only to the past, to carry out the wishes of the testator of a philanthropic vision, but also to the future, to the various work with unimagined possibilities which may be started as a result of this inheritance. In undertaking the duty, which will not be an easy one, the medical trustees will enjoy the confidence of all their scientific colleagues, and may add another noteworthy chapter to their own eminent services to medicine.'

In fact the Wellcome principle is a simple one: all money made out of the company's operations in the relief of suffering and disease shall be used to further the relief of suffering and disease.

The objects for which the Trustees were empowered by the will to use their funds were described in meticulous detail, but they can be summarised as follows: First, the advancement of medical and scientific research which may improve the physical conditions of mankind; and second, the establishment, endowment and future maintenance of new research museums or libraries and support for acquisition of books, manuscripts, documents, pictures and other works of art, and objects for conducting research in the history of medicine.*

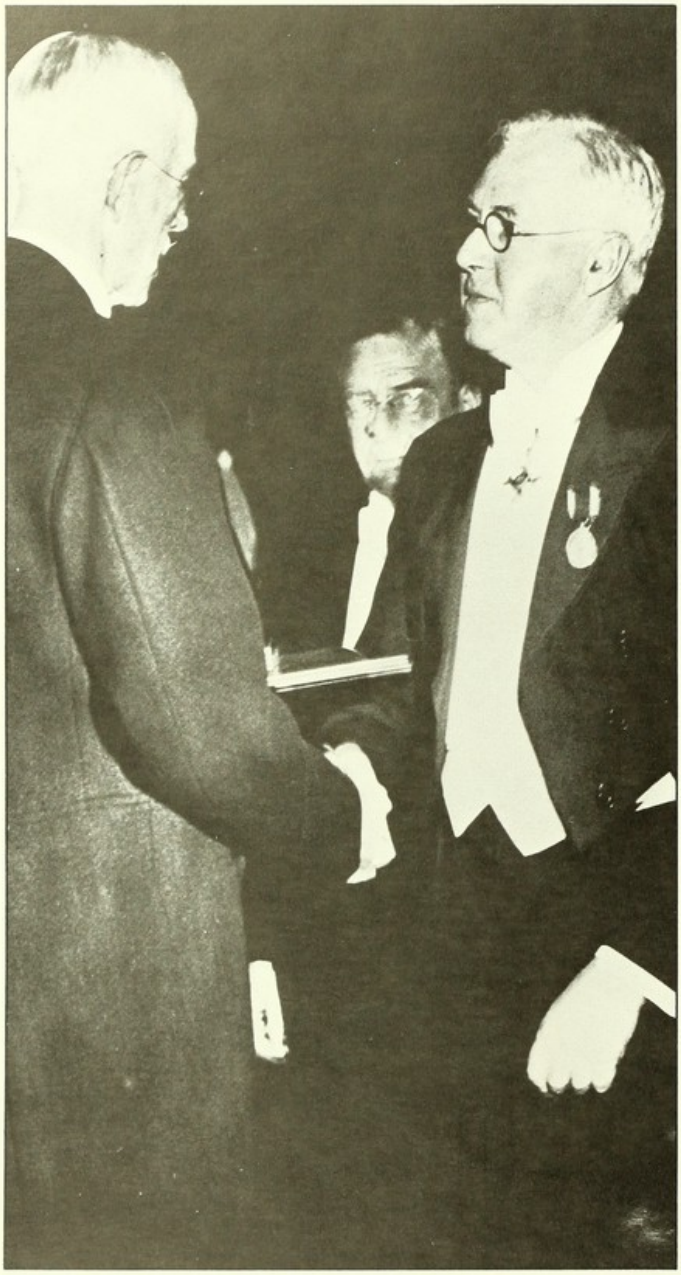
The policies and the decisions of the Trust have been shaped by the men appointed originally by Wellcome in his will and by successors appointed by the continuing Trustees.

Since 1937, eighteen Trustees have served or are now serving the Trust. It would be difficult to exaggerate the value and significance of Sir Henry Dale's service to the Trust. He was uniquely suited to the Chairmanship by reason not only of his scientific knowledge and experience, but also because of his close association with Sir Henry Wellcome over so many years. Lord Piercy, CBE, took over as Chairman in 1959 and was in his turn succeeded in 1965 by Lord Franks, OM, GCMG, KCB, CBE.

*Further details will be given in the booklet entitled 'Henry Wellcome: The Man, his Collection and his Legacy', to be published by the Wellcome Trust towards the end of 1980.

Sir Henry Dale

The Right Honourable Lord Franks



Presentation, by King Gustav V of Sweden, of Nobel Prize for Physiology and Medicine to Sir Henry Dale and Professor Loewi in 1936

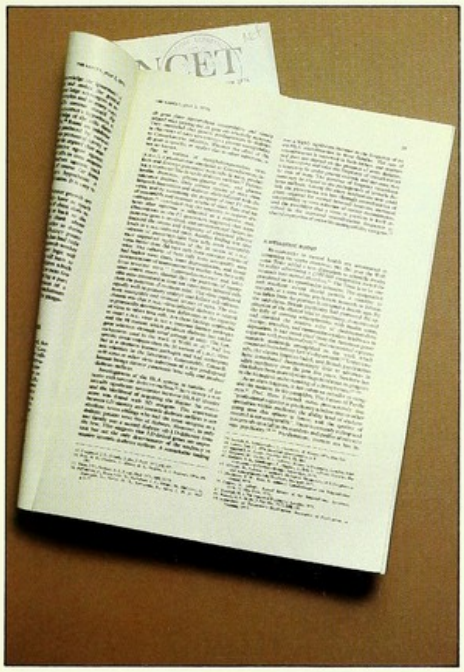
The programme of the Trust is administered by its Director, Dr Peter Williams, assisted by medical, scientific, veterinary and other professional and administrative colleagues. The Trustees have been over the years flexible in their philosophy of funding, depending upon their assessment of the priority of needs at any particular time.

Up to the early 1960s, more than half the funds were allocated for buildings and equipment for universities. Between 1946 and 1966, 105 new laboratories and extensions were built with grants from the Trust. Expensive and sophisticated tools such as electron microscopes were provided to many universities in the United Kingdom and elsewhere. The Trustees originally gave preference to areas of study in which Wellcome was particularly interested – pharmacy and pharmacology, veterinary and tropical medicine and the history of medicine. As more money became available, experimental physiology, clinical biochemistry and biophysics were added to the list.

A lack of funds to train veterinarians in fundamental research was evident, and the Trustees designated, in 1968, several areas for special attention, including parasitology, pre- and post-natal studies, nutrition and metabolism. More recently, toxicology, dermatology and mycology have been added. Veterinary scholarship and fellowship schemes were also initiated and in the last ten years approximately £100,000 per annum has been spent on these programmes alone. Early in 1979 the Trustees announced a competitive award for research in veterinary medicine totalling up to £150,000 over the next five years for work in any field linking animal and human medicine in the United Kingdom. The budget for veterinary medicine is now £700,000 per annum.

Research into tropical medicine has always held a special interest for the Trustees because of Sir Henry Wellcome's own active interest in this field, and within recent years plans have been announced to intensify this programme. The Trust now allocates over £1 million pounds a year to tropical medicine. Some of this money goes to laboratories in Kenya, Brazil and India, mainly for work on nutrition, anaemia, schistosomiasis, leishmaniasis and gastro-intestinal diseases. A major scheme has enabled the London School of Hygiene and Tropical Medicine to co-operate with the Harvard School of Public Health in projects on Chagas' disease in Brazil, nutrition in Jamaica and schistosomiasis in Sudan.

The increased interest of the World Health Organisation in tropical medicine research and the re-entry into the field of the Rockefeller Foundation provide great possibilities for expansion. The Trust is planning its tropical role in close co-operation with these two organisations, with the aim of concentrating on those



Left: Editorial mention in the 'Lancet' for the Trust's major award in the field of Mental Health

Major Award for

Research in Veterinary Medicine

The Wellcome Trustees have decided to make available in 1980 a major grant of up to £175,000, over a period of not more than 5 years, for the support of research in Veterinary Medicine. While not specifying any particular topic, the Trustees would hope to promote work in an important, but neglected, field of veterinary research, and to encourage interdisciplinary collaboration between Universities, or between Universities and Research Institutes, in the United Kingdom.

Application forms are available from:

The Grants Section,
The Wellcome Trust,
1 Park Square West,
London NW1 4LJ.
Tel: 01-486 4902.

The closing date is 25th February 1980. Prospective applicants who require further information should contact Dr. K. B. Sinclair at the above address.

The Wellcome Trust

An example of the Trust's growing support of research in veterinary medicine (from the advertisement columns of the 'Veterinary Record')

aspects that are neglected by others and which require special attention. On the home front, in order to avoid duplication of effort, there is similar liaison with other medical charities and with the Medical Research Council.

Another important method of financial assistance by the Trustees is the establishment of Wellcome Senior Research Fellowships in Clinical Science which give men and women of exceptional ability the opportunity to develop their special talents. Since 1962 nearly forty of these fellowships have been awarded, and the programme has recently been extended to the basic biomedical sciences. The Trustees have also established special fellowship arrangements in surgery, pathology and epidemiology in order to recruit and train research workers.

The international outlook of the Trust is reflected in the scheme of travel grants which has continued since 1955. These grants provide assistance with travel and living expenses for short visits to encourage collaborative research and the development of new techniques. They are a major contribution to liaison in international research. Major developments in this field were announced in 1978 and 1979. The Trustees set aside £150,000 a year to encourage exchange visits of established research workers between various developed countries and the United Kingdom and Ireland. One of these research travel grant schemes is run in co-operation with the Burroughs Wellcome Fund in the United States. The Trust has established similar schemes with organisations in Australia, Canada, New Zealand and South Africa. This enables common research problems and progress to be discussed and new techniques to be studied. In the words of Lord Franks, they provide 'a simple mechanism for research workers to keep in closer touch through periods of joint endeavour.'

Research exchange with Europe has not been neglected. The earliest arrangement was in 1957 with the Carlsberg Foundation of Denmark and since then thirty-two exchange fellowships have been granted jointly with that organisation. Similar arrangements have been made with research-funding organisations in many European countries. Since 1957, more than seventy-five Fellows have gone from Britain to Europe, and nearly 250 Europeans have come to Britain.

The major part of the Trust's funds, however, continue to be used to maintain the strength of academic medical research in the United Kingdom. This is especially important when inflation, and sometimes Government policy, have effectively reduced the resources of the universities, the Research Councils and the Health Service in Britain.

Top: The Wellcome Institute for the History of Medicine (Library)
Right: The headquarters of the Wellcome Trust – 1 Park Square West, London NW1

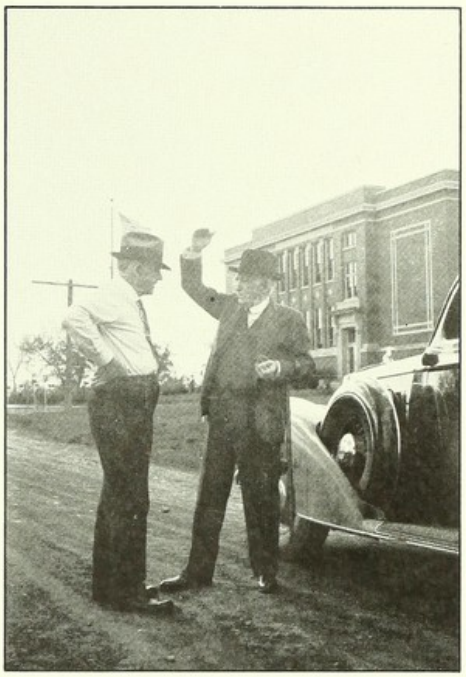
The selection by the Trustees of areas for special attention, such as ophthalmic medicine, the vascular system of the brain, the metabolic effects of infection and the pathology of trauma, has created considerable interest in medical circles as have their major awards in the field of mental health, in which, as with tropical medicine, the Trustees have established an advisory panel of experts.

An advisory panel on the history of medicine was created in 1968 to help the Trustees to formulate and carry out policy in a field in which Sir Henry Wellcome had a special interest. Since then the main policy has been to promote the study of medical history as an academic discipline. The Wellcome Institute for the History of Medicine, containing Sir Henry Wellcome's enormous collection of books, objects and works of art, is financed by the Wellcome Trustees who have decided to transfer the museum collection on loan to the Science Museum in South Kensington. The Museum's expertise and experience will ensure the proper cataloguing and care of the collection and will enable it to be displayed to a much wider public than would otherwise be possible. The Trustees have also encouraged studies in the history of medicine by establishing units at various universities in the United Kingdom.

In addition to the philanthropic activities financed by the Trust, a significant contribution to the progress of medicine in the United States is being made by Burroughs Wellcome Co., USA, out of its own funds. This was the brainchild of William N. Creasy, then President of the United States company. He established, in 1955, with the help of Sir Henry Dale, the Burroughs Wellcome Fund. This is a non-profit foundation funded entirely by the United States company to provide financial aid for the advancement of medical knowledge. Its major activity has been to offer competitive clinical pharmacology awards and, up to 1979, thirty-one of these Burroughs Wellcome Scholars in Clinical Pharmacology had been nominated, at a cost of over four million dollars.

What would, however, have given Sir Henry Wellcome especial pleasure is the Wellcome Memorial to his parents, built out of a sum of 250,000 dollars bequeathed by him for this purpose. It is in Garden City, his childhood home in Blue Earth County, Minnesota, and takes the form of a library, auditorium and gymnasium attached to the consolidated school. A sum of 150,000 dollars was set aside in the will for the maintenance of the building but a substantial proportion of this is now used to provide Wellcome scholarships to enable pupils of the school to go on to college.

When the building was completed and the Wellcome Trustees handed over the money, a local trustee of the fund, Dr Charles Code of the Mayo Clinic, said, 'For Garden City, it's a dream come true.'



Left: In the early 1930 s Sir Henry Wellcome reminisces outside the Consolidated School in Garden City with his boyhood friend George Palmer
Below: First page of a four-page advertising feature in 'The Times' to coincide with the one hundredth anniversary of the birth of Henry Wellcome


ANTARCTIC
EXPEDITION
BRITISH
1910
H.M. STANLEY
SULPHUR CO.

From missionaries to mission control

Both at the White House in Washington, when Theodore Roosevelt was President, and at 10 Downing Street in London, when Gladstone was Prime Minister, there was an indispensable piece of equipment – a 'Tabloid' medicine chest provided by Burroughs Wellcome & Co. The Houses of Parliament in London still have a permanent Wellcome medicine cabinet, first presented by Henry Wellcome in 1908 and replenished every year.

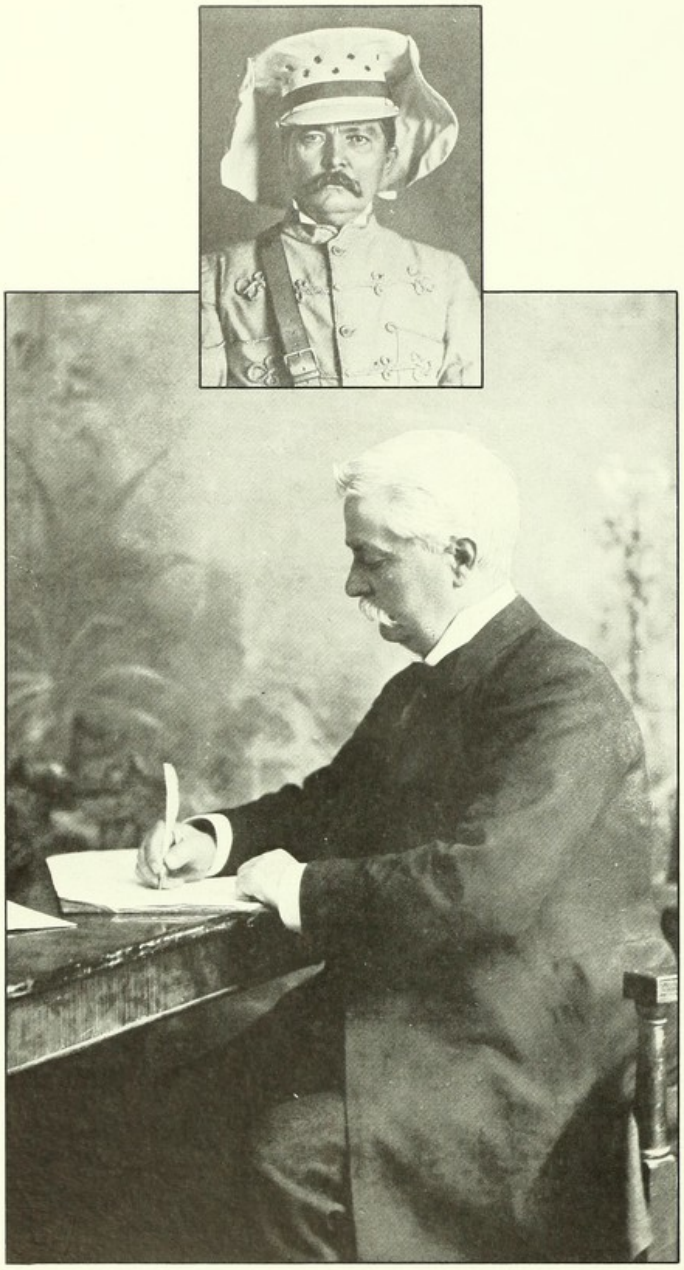
It was Henry Wellcome's idea to establish a medicine chest department in the company. It was he who pioneered work in the provision of compact packages containing essential medicines which would retain their potency and stability in all extremes of climate, although it was Burroughs who coined the phrase 'a Surgeon can now carry the physics of a whole regiment in his cocked hat.'

Wellcome had a missionary background, and a missionary zeal to travel. He knew that in Burroughs Wellcome compressed medicines he had the answer to the problems described so vividly by H.M. Stanley. 'When I think of the dreadful mortality of Captain Tuckey's expedition in 1816, of the Niger expedition in 1841, of the sufferings of Burton and Speke, and of my own first expeditions, I am amazed to find that much of the mortality was due to the crude way in which medicines were supplied to travellers. The very recollection causes me to shudder.'

It was soon after the return of Stanley from a particularly hazardous mission in Africa that he made the acquaintance of Burroughs Wellcome & Co. Henry Wellcome designed the first medicine chest (The Congo Chest) for Stanley, who wrote later, 'As soon as I came in sight of their preparations and their work I found the consummation of my secret wish. On my later expeditions I had all the medicines that were required for my black men as well as my white men, beautifully prepared and in most elegant fashion, arranged in the smallest medicine chest it was ever my lot to carry into Africa.' It is perhaps not surprising that Stanley became one of Wellcome's closest friends. It has even been suggested that at the peak of Stanley's fame only the Royal Family had direct access to him; anyone else had to channel requests through Henry Wellcome!

There was a wide range of medicine chests, the kit and content depending upon the part of the world to be visited, the climate and the type of disease likely to be encountered. A tribute to the invulnerability of the products to external influences was paid by the official analyst of the *Lancet* when he tested the contents of one medicine chest which had remained for four years in a swampy forest region of Central Africa, more than once under water. He reported that 'the 'Tabloid' medicaments were in a perfect state of preservation.'

Wellcome's medicine chests have accompanied pioneers of



Two photographs of Sir Henry M. Stanley (1841-1904), the famous explorer and friend of Wellcome

tropical exploration through the jungles of equatorial Africa, Asia and South America as well as travellers in the temperate zones. They played a vital role in polar discovery, being the first medical outfits to reach both the North and South Poles. They met the needs of the great aviators during their pioneering flights. They went to Alaska and to the Gobi desert, they climbed the heights in expeditions to the Himalayas and, in particular, in the conquest of Everest.

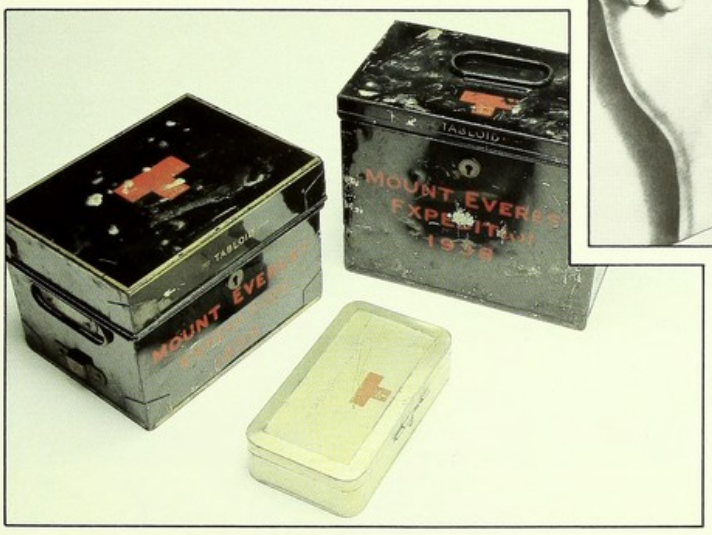
On less hazardous missions they were used by members of the Royal Family, including Edward VII and George V, foreign dignitaries, tourist cricket teams and passengers on ocean liners. The medical officer who accompanied Theodore Roosevelt in his post-presidency travels in uncharted areas of Brazil wrote, 'I wish to inform you that the equipment was most satisfactory in every way. The 'Tabloid' and 'Soloid' products, in addition to being convenient and compact, are extremely accurate and reliable. In this expedition your products never failed us and are the most practicable it has been my pleasure to use.'

One of the most illustrious names in the history of travel is that of the Swede, Dr Sven Hedin. He started his travels in 1885 through Persia and Mesopotamia and in later years spent much time in the inhospitable regions of central Asia. He was the first white man to explore Tibet, and when he presented to the Tashi-Lama his 'Tabloid' medicine chest, 'my trusted companion which has served me in illness and hardship', the spiritual chief of the Buddhist religion sent excitedly for two monks of the medical faculty to write down in their language the contents of the various boxes and the use of the medicines. The hypodermic syringe had a remarkable fascination for all of them.

Admiral Peary, first to reach the North Pole, Captain Amundsen, first to reach the South Pole, Scott of the Antarctic, Nansen, Shackleton, all carried and subsequently paid tribute to their medicine chests. Scott wrote his tribute after his voyage in the *Discovery* in 1901, but even in the explorer's final journey the 'Tabloid' medicine chest survived and is still intact in the Wellcome Collection.

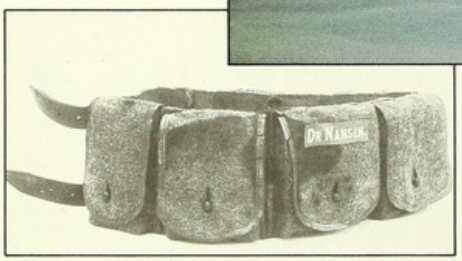
Rear Admiral Byrd's 1928-29 Antarctic expedition (three vessels and three aeroplanes) included a comprehensive supply of Burroughs Wellcome medicaments and bandages in first aid kits and medicine cases of different sizes. A small pharmacy was fitted up, the furthest south in the world, personally named by Byrd the 'Wellcome Dispensary'. 'Epivax', the Wellcome canine distemper vaccine, was most certainly the first of its kind in polar regions. It was used to vaccinate Wally Herbert's team of forty huskies in his famous 3,800-mile trek in 1968 from Point Barrow in Alaska to Spitzbergen.

Top left: First Aid Kit prepared for King Edward VII, 1904
Top right: 'Tabloid' Medicine Chest presented to King George V
Bottom left: Mount Everest Expedition, 1936 and 1938
Bottom right: 'Tabloid' Medicine Chest on Scott's Last Expedition to the Antarctic



Centre: The smallest Medicine Chest in the world. This tiny gold chest containing a supply of twelve 'Tabloid' brand medicaments was part of the equipment of the Doll's House presented to Her Majesty Queen Mary

Below: Wally Herbert and his huskies on the 3,800-mile British Trans Arctic Expedition, 1968-69



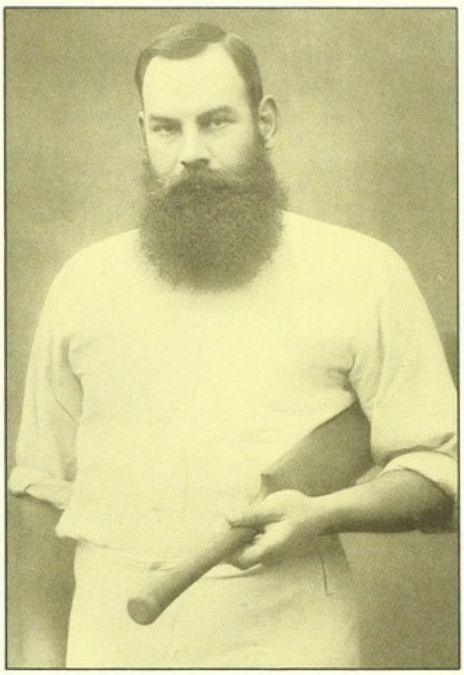
Sir Ernest Shackleton

Still from the film, Scott of the Antarctic (1948)

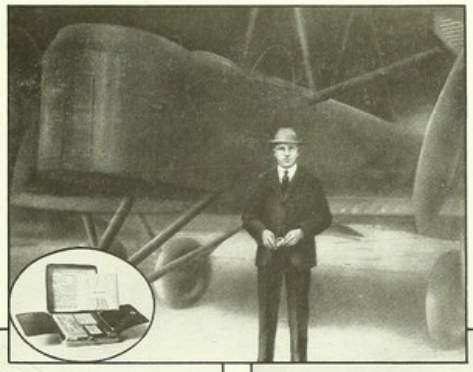
It is natural that Wellcome kits should be first in the air, as they were specially designed for lightness and compactness. All the men whose names live on as pioneers in the conquest of the air carried 'Tabloid' first-aid equipment – Blériot, Cody, Jules Védrines (the French pilot and first to deliver letters by air), Commander Read of the United States Navy (the first man to cross the Atlantic but not non-stop); Alcock and Brown, who made the first non-stop flight and perhaps said it all when they reported "'Tabloid' First Aid Equipment – the only possible medical outfit for an aviator'; Lowell Smith and his companions flying in four machines all similarly equipped, who made the first round-the-world flight in 1924; Sir Alan Cobham, who in 1926 flew from England to Australia and back, his 'Tabloid' First Aid Kit being replenished by Burroughs Wellcome Australia for the return journey!

Perhaps the most historic flight of all was that of Charles Lindbergh who flew solo non-stop across the Atlantic in 1927 in *The Spirit of St Louis*. Among the many meticulously careful preparations he made was the inclusion of a 'Tabloid' first-aid outfit. The R34 Airship was similarly equipped on its Atlantic crossing in 1919.

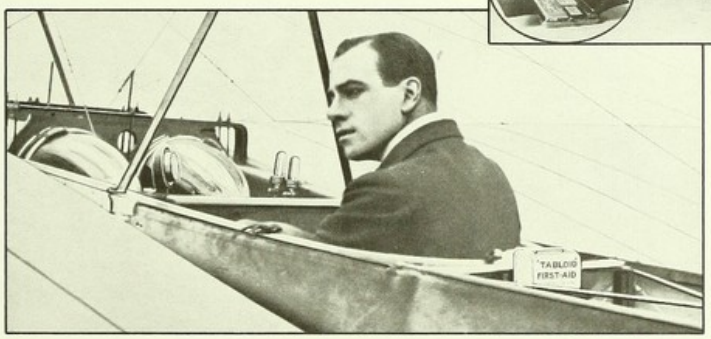
Wellcome himself took a keen interest in the design of medicine chests and had one specially made in 1922 as a wedding present for Princess Mary (the late Princess Royal). It was an upright folding

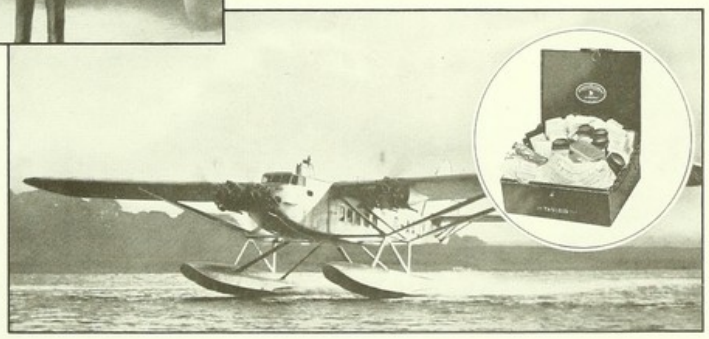


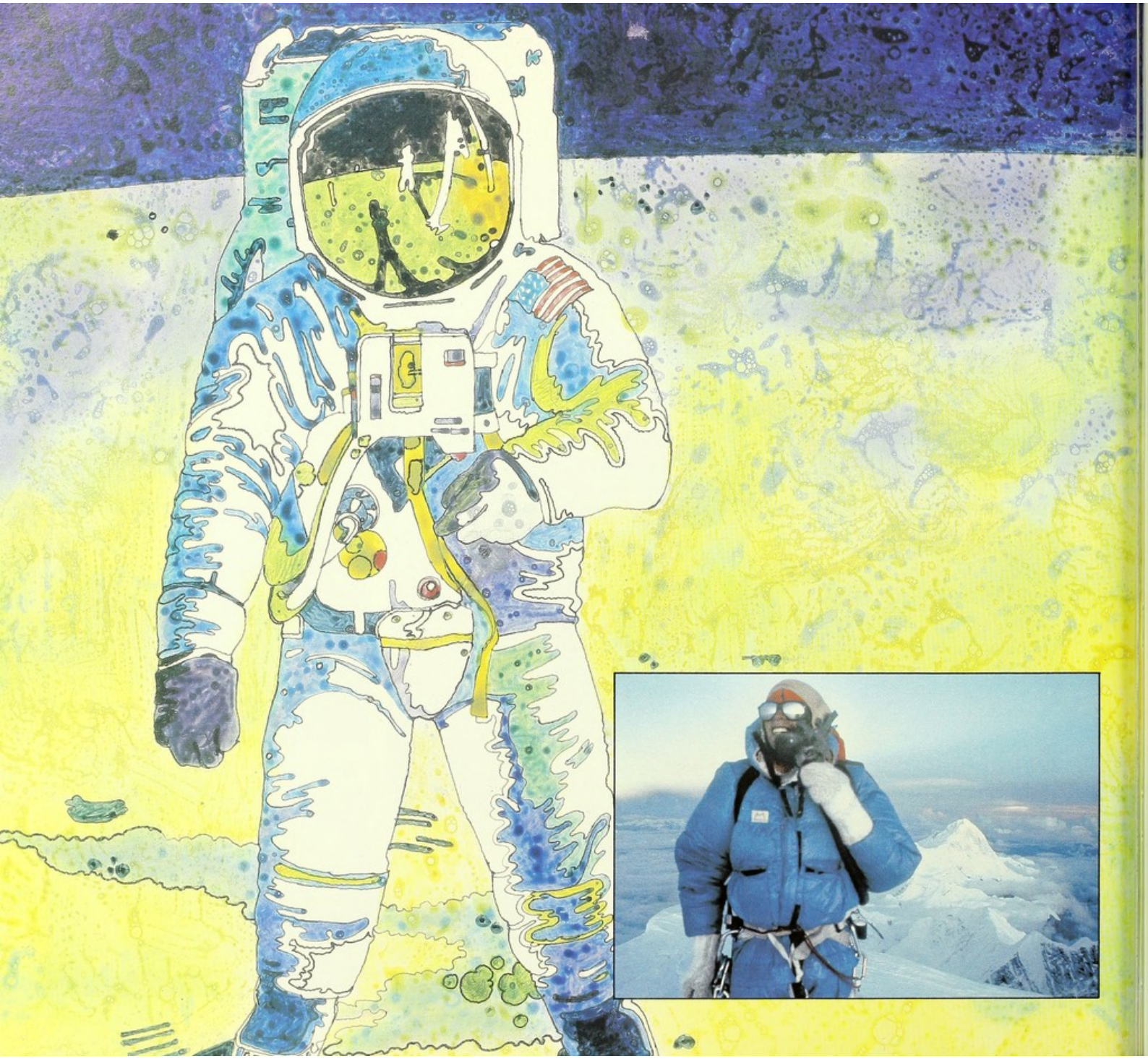
Right: The famous Dr W. G. Grace, one of five doctor brothers who almost certainly would have prescribed some of the BW range of products. W. G. scored 161 runs in his first test match for England in 1880, against Australia on their first English tour.



Far left: Louis Blériot
Centre: John Alcock
Right: Jules Védrines 1911
Lower left: Grahame-White
Lower right: Sir Alan Cobham's seaplane, 'Valetta'







cabinet, twelve inches high, nine inches long and three inches deep, covered with blue crushed morocco, and fitted to the instruction of Sir Stanley Hewitt, the Household Physician. Her Royal Highness, it is recorded, took it with her on her honeymoon.

The medicine chest was not the Company's only traveller's aid. The 'Tabloid' photographic outfit was an important accessory of explorers, missionaries and war correspondents. Although the Company disposed of its photographic department in 1948, it still has special memories for older photographers and members of staff.

The Company has continued its medical support of explorers into the age of space travel. Apollo Space Ships carried the Wellcome product 'Marezine' (known as 'Marzine' in most other countries) as a precaution against travel sickness. Indeed, when one of the earlier astronauts took his famous space walk in June 1975 he carried a special kit enabling him to inject 'Marezine' through his space suit. 'Actifed' was the most widely used product in space for the relief of nasal congestion and according to the transcript of a conversation between the Space Commander of Apollo 12 and Houston, Texas, it certainly worked. 'Neosporin' has also been included to clear up bacterial infections of the eye, and, on one mission, Skylab carried a medical kit which included seven products provided by Burroughs Wellcome Co., USA.

By a strange coincidence, the Company found that history had repeated itself when it supplied twelve cases of medical products to the Transglobe Expedition which sailed from Greenwich on 2 September 1979 to attempt the first polar circumnavigation of the world. This was exactly what it had done sixty-nine years earlier when Captain Scott's vessel 'Terra Nova' sailed down the Thames also bound for Antarctica. On that occasion, too, twelve medical cases had been provided.

Far left: Moon landings from Apollo 12
Far left, inset: Chris Bonington, CBE, on Everest

Below: Prince Charles sets the Transglobe Expedition on its way from Greenwich, London, September 1979


The Story of the
Garden College
and its Work

Across the frontiers of tropical medicine

Left: Reproduction of a laboratory bench in the Wellcome Tropical Research Laboratories in Khartoum in the early years of the century.
The handwritten document is one of Balfour's memoranda to Henry Wellcome.

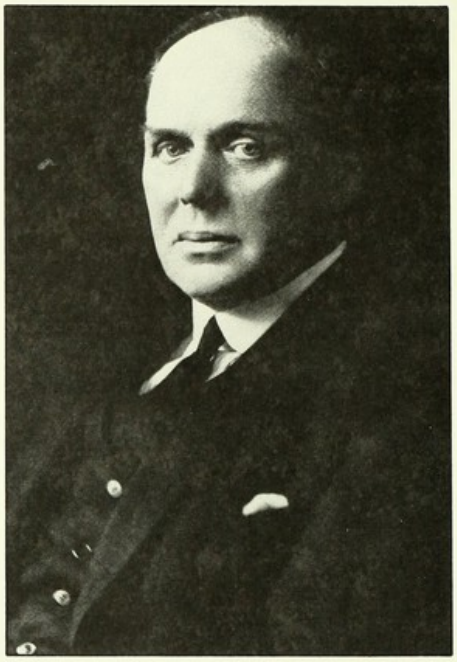
When Henry Wellcome set out in 1879 to explore the cinchona forests of Central and Latin America, he could hardly have foreseen that his name would one day be associated with major contributions to the conquest of tropical diseases. Malaria, yellow fever, schistosomiasis, leprosy, leishmaniasis and a variety of diseases caused by internal parasites were to come within the scope of Wellcome research and enterprise. Today there is no tropical country in the world where Wellcome medical and animal health products are not in constant use.

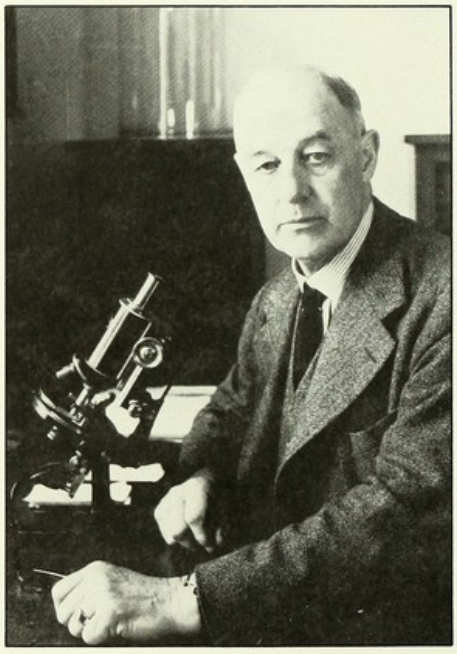
Henry Wellcome's interest in tropical medicine was probably stimulated by his friendship, towards the end of the century, with Stanley and other African explorers, and it was consolidated when he visited the Sudan in 1901. He was one of the first civilians to enter Khartoum after Kitchener had recaptured the city. He quickly saw the need to direct scientific research towards the improvement of hygiene and the elimination of disease. He offered the Sudan Government fully equipped research laboratories, to be housed in the Gordon Memorial College in Khartoum, where they remained for the next thirty-five years. The official opening of the first Wellcome Tropical Research Laboratories was in 1902. The first Director, appointed by Henry Wellcome himself, was Dr Andrew Balfour, a scientist subsequently to become a giant in the field of tropical medicine. Balfour, as Medical Officer of Health, as well as Director of the Laboratories, organised the health service of Khartoum and succeeded in transforming the dusty, ill-kept, insanitary mud huts into a model settlement from which he eliminated malaria.

He was, in fact, the first scientist to benefit from Wellcome's famous maxim 'Freedom of Research – Liberty to Publish' and a continuous stream of publications flowed from his pen. The beautifully illustrated reports of his work became known and consulted in every part of the world. This Wellcome encouraged.

The Laboratories expanded their work and in 1907 Wellcome attached to them a floating laboratory, believed to be the first of its kind in the world, to carry research to regions otherwise inaccessible. It was used to collect, study and deal with material on the spot. On its maiden voyage on the Nile, under Dr C.M. Wenyon (later FRS), there was no need to search for specimens. Insects and humans, vectors and victims, swarmed aboard in embarrassing numbers. Research done in this period formed the basis of Wenyon's 'Protozoology', a classic work in two volumes subsequently published in 1926. In 1913 Wellcome founded in central London the Wellcome Bureau of Scientific Research to co-ordinate the work of his separate institutes and laboratories. Investigation into tropical diseases was high on the priority list. Dr Balfour was the obvious choice as Director-in-Chief.

Below: Floating Laboratory on the Nile, 1907





Top right: Sir Andrew Balfour (1873-1931)
Lower right: Dr Charles M. Wenyon, FRS (1878-1948)

As an extension of its research activity, the Bureau was a source of information to medical men, sanitary administrators, visiting scientists and others concerned with tropical medicine.

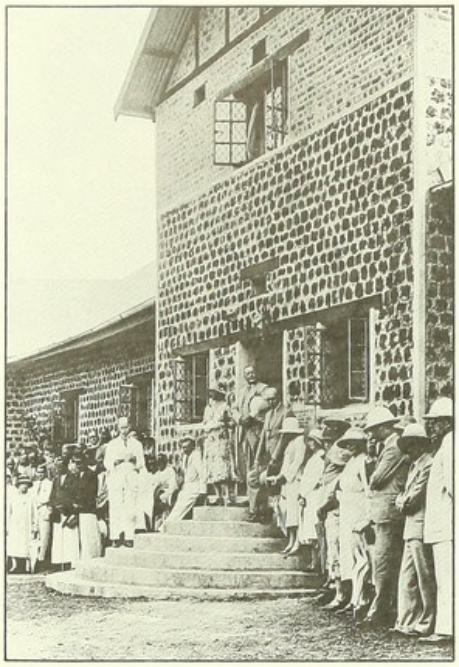
The onset of the First World War gave Henry Wellcome another opportunity to show his initiative and enterprise. To support the war effort he handed over to the Government the staff and the facilities of the new laboratories. On Dr Balfour's return from war service, during which he travelled extensively on medical missions in tropical and sub-tropical areas, he set the laboratories once more on the course for which Wellcome intended them.

Four major events were to mark the decade after the war. First, Dr Balfour resigned in 1923 to become Director of the London School of Tropical Medicine. His place was taken by Dr Wenyon, who had already made a name for himself in tropical medicine and was to have as distinguished a career with Wellcome as had Balfour.

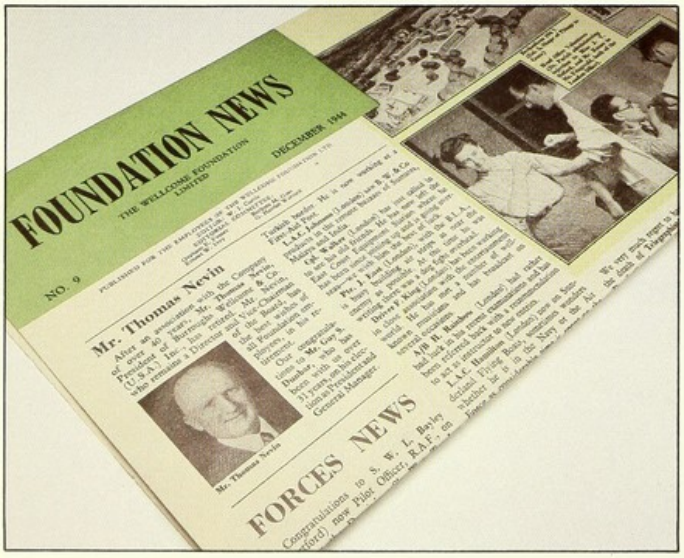
Second, the Wellcome Bureau of Scientific Research was incorporated as part of The Wellcome Foundation and eventually became the Wellcome Laboratories of Tropical Medicine.

Third, Dr C.A. Hoare, FRS, began his monumental work on trypanosomiasis and during his association with the Company (fifty-seven years to date) went on to publish 179 papers, of which only thirteen were of shared authorship.

Above: Henry Wellcome in 1879 'on the hurricane deck of a mule' travelling through Central America with his companion, J. Baiz
Top right: Some of the series of Balfour's classic reports on the work of the Wellcome Tropical Research Laboratories, Khartoum
Lower right: Henry Wellcome with the staff of the laboratories in Khartoum. Dr Balfour, the Director, is on Wellcome's right



Official opening by H.R.H. Princess Alice, Countess of Athlone, of the Lady Stanley Women's Hospital & Maternity Centre, at Mukono, Uganda in 1931



A wartime issue of the house magazine shows Miss Joyce Oxford, a member of the staff, being vaccinated in 1944 with 'Wellcome' Yellow Fever Vaccine by Dr H. J. Parish, then Clinical Research Director at Beckenham

Fourth, the first initiative by the Wellcome Laboratories of Tropical Medicine in yellow fever was taken. Dr G.M. Findlay made numerous journeys to different parts of the world to study the disease. In 1928, as a guest scientist, Dr E. Hindle, FRS, began work on yellow fever, and, under the auspices of the Yellow Fever Commission of the Colonial Office, carried out the first preventive vaccinations on monkeys with formalinised virus. The manufacture of yellow fever vaccine on a laboratory scale was initiated by Dr Findlay after he had studied methods of research and manufacture at the Rockefeller Institute in the United States. In the 1930s, manufacture of an effective yellow fever vaccine was started on a commercial scale, and a number of service personnel were vaccinated. This experience of vaccination with Wellcome yellow fever vaccine (today marketed as an egg-adapted vaccine under the name 'Arilvax') was to stand the country in good stead in the Second World War.

750,000 civilians and members of the armed forces travelling to areas of risk were vaccinated by Dr J.C. Broom and his colleagues, free of charge, in the Wellcome Research Institution. Those protected included several members of the Royal Family, the Prime Minister, and generals who were to become household names. Remarkably, a single vaccination now gives protection for ten years, a great advance upon the early material.

The Wellcome Foundation also played a part in 1944 in helping to protect the allied forces in Burma and New Guinea against a tropical disease known to the British as scrub typhus (the Japanese called it tsutsugamushi). Less well known than malaria, typhoid or cholera, scrub typhus was just as deadly, and capable of jeopardising the whole campaign in south east Asia. Something had to be done and scientists at the National Institute of Medical Research in London developed a vaccine which promised to give adequate protection against the disease. The Wellcome Foundation was asked by the British Government to produce the vaccine on a commercial scale, the first 100,000 doses being required urgently to protect troops at the battle-fronts before the monsoon season, when risk of the disease was greatest. All available resources were mobilised. With the help of the Royal Engineers and the Pioneer Corps extensive new laboratories at the Wellcome Veterinary Research Station in Sussex sprang up almost overnight. Technicians were recalled from the Army and specially trained to assist in various stages of the work. The Air Ministry helped by transporting special equipment from the USA, as well as one of the strangest of transatlantic cargoes – a large number of cotton-rats essential for production of the vaccine. For security reasons a code-word was coined for the operation and

Left: Poster advertising the need to vaccinate against Yellow Fever
Below: Interior of Dispensing Department, Mengo, Uganda

'Tyburn' joined the ranks of 'Mulberry', 'Pluto' and 'Fido' in the official vocabulary of the war.

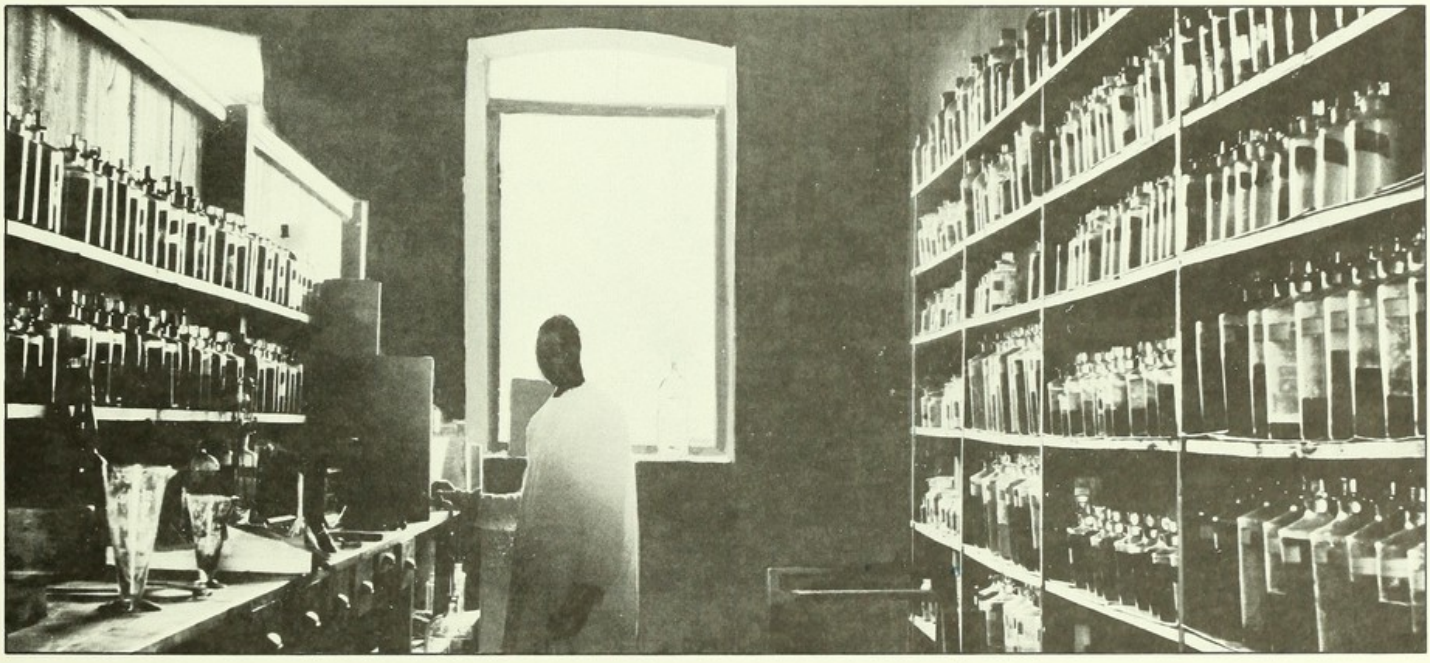
As a result of this collaboration, the urgently needed 100,000 doses were prepared, packed and shipped to the Far East before the monsoons arrived.

THE NEW ERA IN TROPICAL MEDICINE

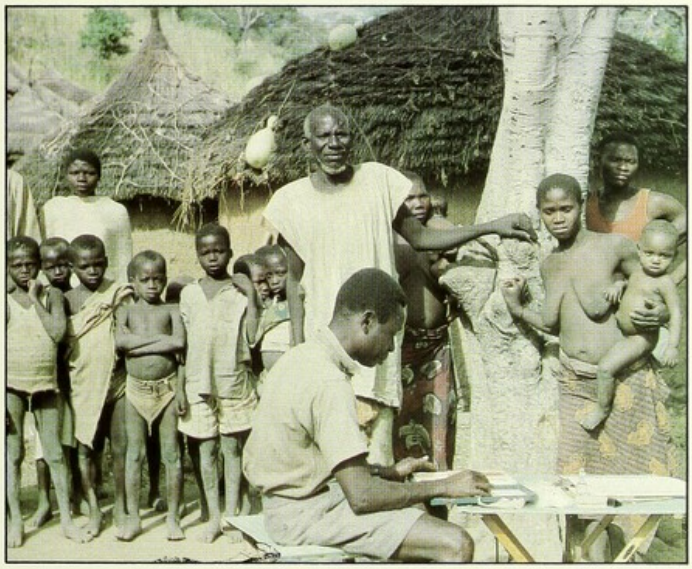
The death of Sir Henry Wellcome in 1936 did not affect the emphasis on research into tropical diseases. The era of chemotherapeutic medicine, which has been described as drugs tailor-made for the disease, was about to open.

In 1938 a sulphonamide derivative ('Sulphetrone') was synthesised in the Wellcome Chemical Research Laboratories in London and shown to have some effect in the treatment of leprosy. Although it was later superseded by another derivative, this Wellcome drug marked an important development in the treatment with an antibacterial agent of a hitherto resistant tropical disease. Exactly twenty-five years later, Wellcome introduced the world's first systemic *antiviral* drug ('Marboran'), this time for the prevention of smallpox by administration to contacts in the initial stages of the disease.

Work on organic antimony compounds led to the introduction of



Top: Nicaragua postage stamp encouraging antimalaria campaign and naming Wellcome's product 'Daraprim'
Centre: Malaria survey in Bauchi plateau, Central Nigeria
Lower: Boy being dosed with 'Maloprim'



Left: Malaria survey in Enugu Ezike, S. Nigeria
Left inset: Surveillance in Southern Cameroon, Case detection agent enquiries about the health of the family

sodium stibogluconate ('Pentostam'), still today's specific drug against leishmaniasis in humans and small animals.

The 1940s and early 1950s were rich in contributions by the Wellcome Group of Companies to research and development in tropical medicine. With the emergence of new compounds from research planned and co-ordinated between Wellcome Laboratories in the United States and in England, coupled with a concerted drive on overseas sales of existing Wellcome products, the basis for the Group's current strength in tropical medicine was set. It was realised that the attack on tropical diseases had to be many-pronged, involving disciplines such as chemistry, protozoology, helminthology, bacteriology, biochemistry, virology and immunology, as well as extending into veterinary, agricultural and industrial areas. Close collaboration between the various research units of the Foundation was essential if a global research policy was to be successful.

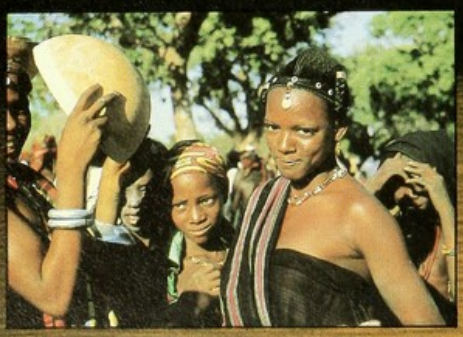
An exciting and dramatic collaboration between the Wellcome Research Laboratories in the United States and the Wellcome Laboratories of Tropical Medicine led to the marketing of pyrimethamine ('Daraprim') which set a new standard of protection against malaria.

Work on the chemotherapy of intestinal parasitic nematodes led to the use of piperazine ('Antepar') for threadworm and roundworm infections. Other specific drugs emerged from Wellcome research, such as bephenium ('Alcopar') for the treatment of hookworm in humans and 'Frantin', successful against the hitherto untreatable nematodiriasis of lambs; thenium closylate ('Ancaris') for hookworm in dogs; bunamidine ('Scoloban'), safe and effective in the control of hydatid disease and noted for its activity against tapeworm in dogs and cats. Assessment of all these anthelmintics was carried out by laboratory research workers who spent a considerable time in tropical countries to monitor performance.

The introduction of co-trimoxazole ('Septrin') in the mid-1960s opened up a whole new area of opportunity for Wellcome worldwide. This remarkable antibacterial, used largely against genito-urinary infections and bronchitis in the western world, is also extremely useful in the tropics for the treatment of salmonellosis and typhoid.

Nine major tropical diseases of humans and of animals are currently under investigation by Wellcome research scientists – malaria, schistosomiasis, hookworm disease, pinworm infection, filariasis, Chagas' disease, babesiosis, anaplasmosis, theilariasis.

Despite the great strides towards eradication of malaria, it remains one of the world's worst killers. Permanent eradication of mosquitoes from infested areas still seems a long way ahead, and



although the new insecticide permethrin ('Stomoxin') is playing a major role in limiting their activity, and 'Daraprim' is making a major contribution in protecting the human being, there is a growing realisation of the need for a third technique, possibly in the form of a vaccine. Scientists at the Rockefeller Institute have succeeded in cultivating *Plasmodium falciparum*, so opening up after many years of frustration the prospect of an effective malaria vaccine. Wellcome scientists are following up this discovery, and, building on Wellcome expertise in parasitology and immunology since the beginning of the century, are working towards the development of a vaccine in humans – in collaboration with the Medical Research Council of Great Britain and Guy's Hospital Medical School in London. There is probably no single answer to malaria but if it is successful, this work will offer a valuable third prong to the attack.

Chagas' disease (also known as South American sleeping sickness) affects an estimated thirty million people in Central and South America. As its most common effect is debilitation over a long period of time, it is the cause not only of much personal distress but also of considerable economic loss in those countries in which it is endemic. The search for an effective vaccine is being carried out in a special purpose-built laboratory at the Wellcome Research Laboratories in Beckenham.

A landmark in international collaboration was established in 1978 when the World Health Organisation made available to Wellcome funds for initial studies into filariasis, one of the most debilitating of diseases in tropical and subtropical areas, with the objective of developing a new drug for treatment.

It is, however, not only the diseases of greatest prevalence that interest Wellcome. In the case of Pig-bel, for example, (an exotic disease which claims several thousands of lives each year in the Highlands of Papua New Guinea) joint research between scientists in Adelaide University and the Wellcome Laboratories at Beckenham resulted in the identification of the disease and the development of a specially prepared clostridial vaccine, now adopted as part of Papua's health care programme.

The Wellcome Group meets the health needs of the developing countries by more than merely matching their product requirements, important as that is. Health programmes are worked out in collaboration with government authorities – involving supply of antibacterial compounds, anthelmintics, biologicals, insecticides, even diagnostic reagents such as schistosomiasis skin-test antigen; industrial products such as disinfectants for improvement in hygiene facilities. With many of these, suitable labour-saving equipment is supplied, such as fogging devices for insecticides,

Far left, top to bottom: Engorged mosquito. Insecticidal fogging of Tifa-Lagos in Nigeria. Fogging machine. Fulani women in Eastern Sokoto, Nigeria.

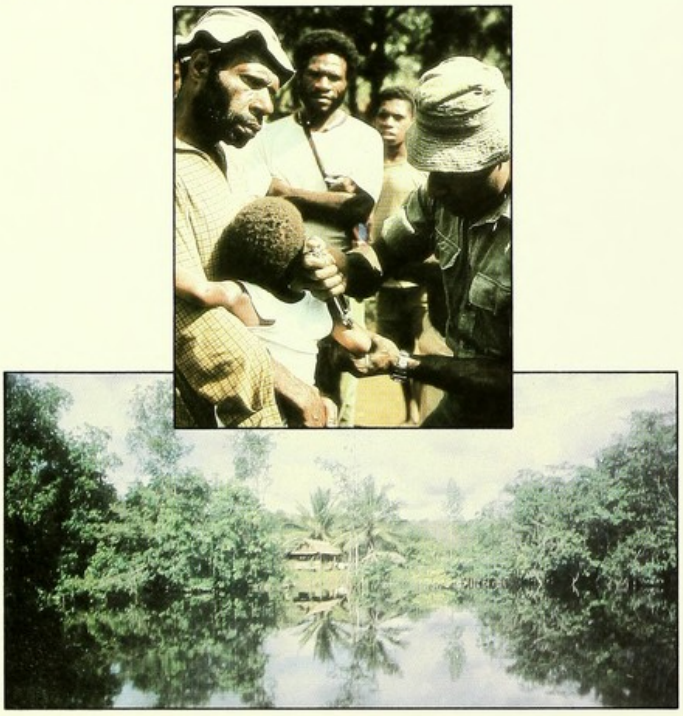
Left: The wood rat concerned in the transmission of South American sleeping sickness

Pig-bel Disease can now be prevented by use of Wellcome clostridial vaccine. It has been the cause of illness and death, particularly among children, in the highlands of Papua New Guinea through eating infected pork meat. The bamboo strips worn around the neck of these two men indicate the size of their pig herds.

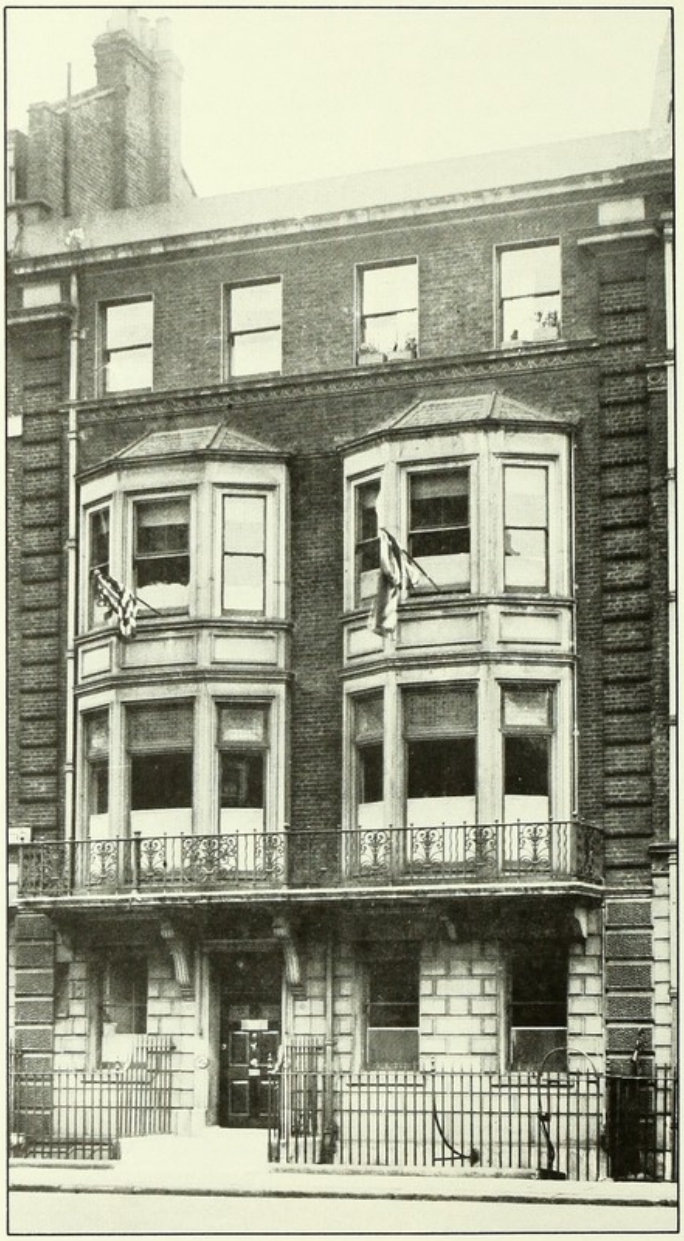
spray races for cattle dips, and automatic dosing equipment for vaccines and anthelmintics.

To ensure that developing countries obtain maximum benefit from use of the Company's products, there is backing by its medical and veterinary advisers.. In countries of the greatest need, these experts make frequent tours and are occasionally stationed permanently in the territory.

The research, development and testing which lie behind Wellcome products cost a great deal of money and on a 'price per product' basis this can make competition with pirate operators, with imitation products, difficult in some developing countries. Nearly 100 years ago Henry Wellcome was faced with the problem of inferior imitations of the compressed tablets which he marketed under the 'Tabloid' trade mark. Quality won. Progress in improving human and animal health may, however, be inhibited if a purchaser chooses the immediate and tempting course of buying solely on price without regard to quality and efficacy.



Top: Injecting a child with Wellcome Pig-bel vaccine in New Guinea
Below: A rain forest in Guyana

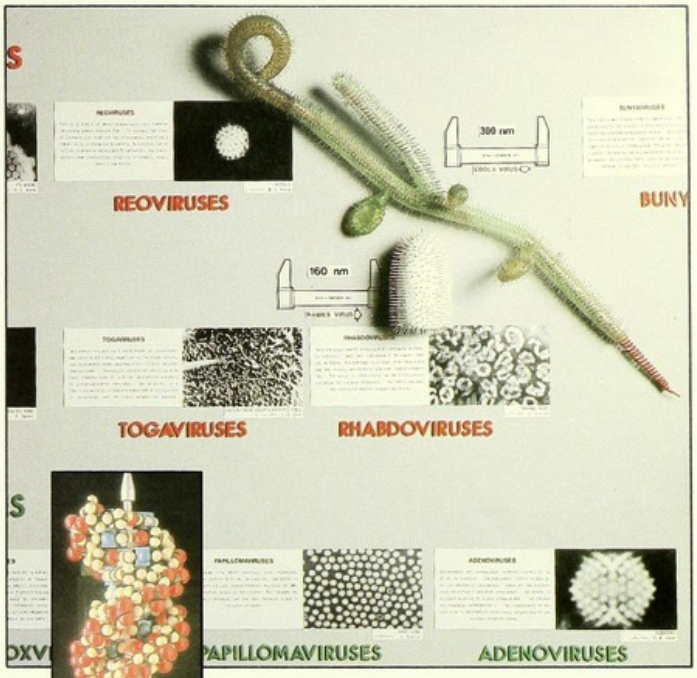


Site of original Wellcome Museum of Medical Science, 10 Henrietta Street (now Place), London W1. It was originally named the Wellcome Museum of Tropical Medicine and Hygiene.

WELLCOME MUSEUM OF MEDICAL SCIENCE

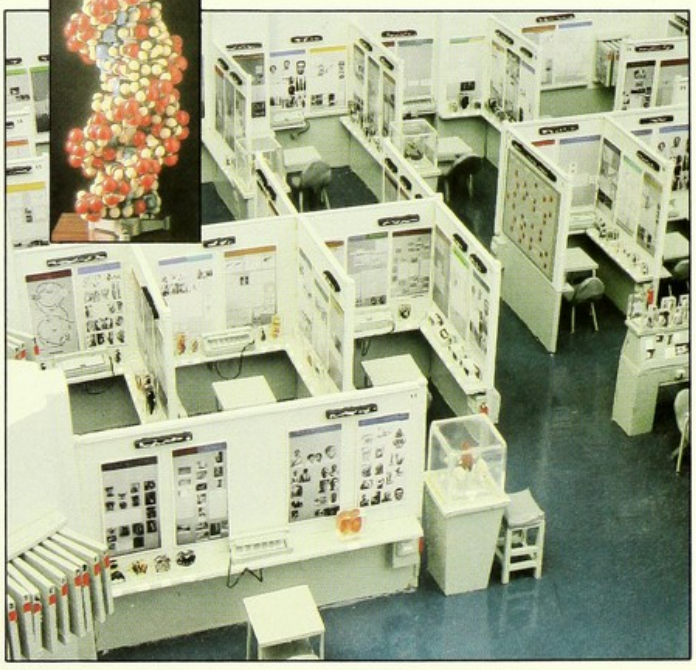
No account of Wellcome and tropical medicine would be complete without mention of the Wellcome Museum of Medical Science. First established in 1914 by Henry Wellcome and housed in the Wellcome Building since 1932, the WMMS is designed to provide visitors from the medical and allied professions with visual representations of nearly every known disease.

In keeping with Henry Wellcome's original wish, there is a heavy emphasis on tropical diseases. The museum is primarily a teaching aid at postgraduate level. In 1979 it attracted 17,000 visitors. Scientific papers are published and constant attention is given to improving techniques in presentation of material and specimens. The most striking recent addition is the first model of Ebola virus to be displayed anywhere in the world.



Top: Part of a panel on viruses, showing among others, models of Rabies virus and the prominent Ebola virus
Centre: DNA model, in side view
Lower: Section of present museum

Below: Interior of original museum



Animal health is also Wellcome's business

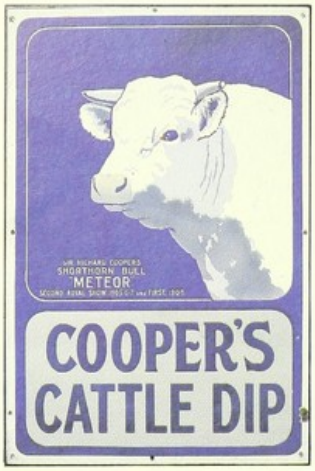
In 1843, ten years before Henry Wellcome was born and three years before the birth of Burroughs, William Cooper arrived in Berkhamsted, thirty miles north of London. He had been working in veterinary practice in Wales and set up his plate in the town as one of the first veterinary surgeons to qualify under the regulations of the newly established Royal College of Veterinary Surgeons. In the same year he completed the development of the first effective sheep dip, and this led to the founding of what was to become one of the great veterinary and agricultural businesses in the world. More than 100 years later, in 1959, as Cooper, McDougall & Robertson Ltd, this company was acquired by The Wellcome Foundation. The Wellcome Group had gained a business whose name to farmers all over the world was legendary.

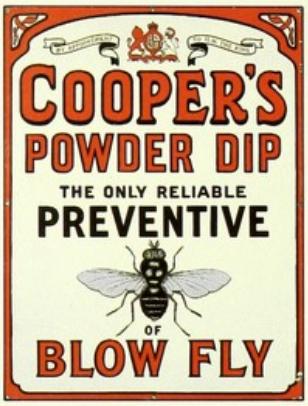
The logic behind the merger of the two companies was sound. Their ranges of products were complementary; Wellcome's emphasis was on biologicals, Cooper's on dips and dressings, based on modern insecticides. Each had an anthelmintic range, and there was a common interest in the manufacture of foot-and-mouth disease vaccines. Wellcome, dominant in the animal health field in the United Kingdom, had barely penetrated the major overseas markets. Cooper, who had been operating in Argentina, Africa and Australasia since the end of the 19th century, had successful companies in almost every country engaged in rearing livestock.

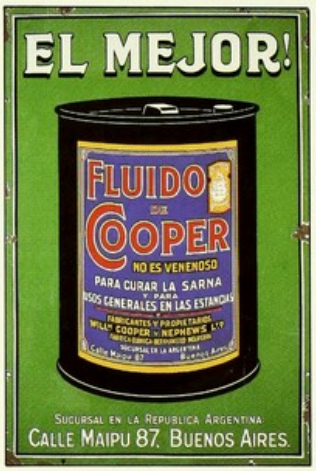
Moreover, both were companies with a tradition of marketing high quality products based on sound research and development. There were, indeed, remarkable similarities between the two men, William Cooper and Henry Wellcome. Each had a scientific bent, each showed a similar combination of enterprise and caution; each engendered tremendous loyalty in his staff; each was a publicist (William Cooper wrote his own copy, designed his own labels and posters and was not above attaching them to farm gates on his rounds as a veterinary surgeon). Both were tenacious, with a strong vein of obstinacy.

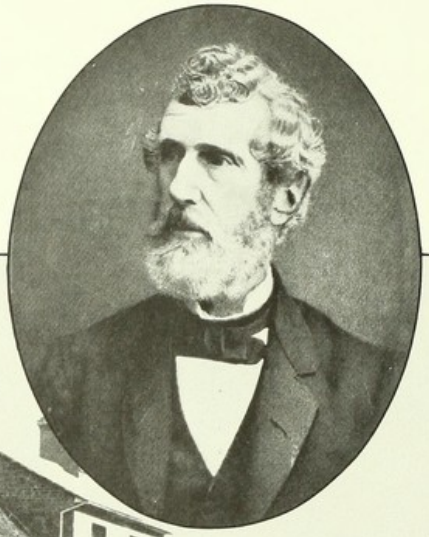
As far back as 1900, Burroughs Wellcome had made a modest but not unimportant entry into the veterinary field. Its medical products price list for 1900 included a range of sixteen veterinary 'Tabloid' brand hypodermic products. They comprised drugs such as morphine, digitalin, ergotinine, atropine and cocaine, then commonly used by veterinarians.

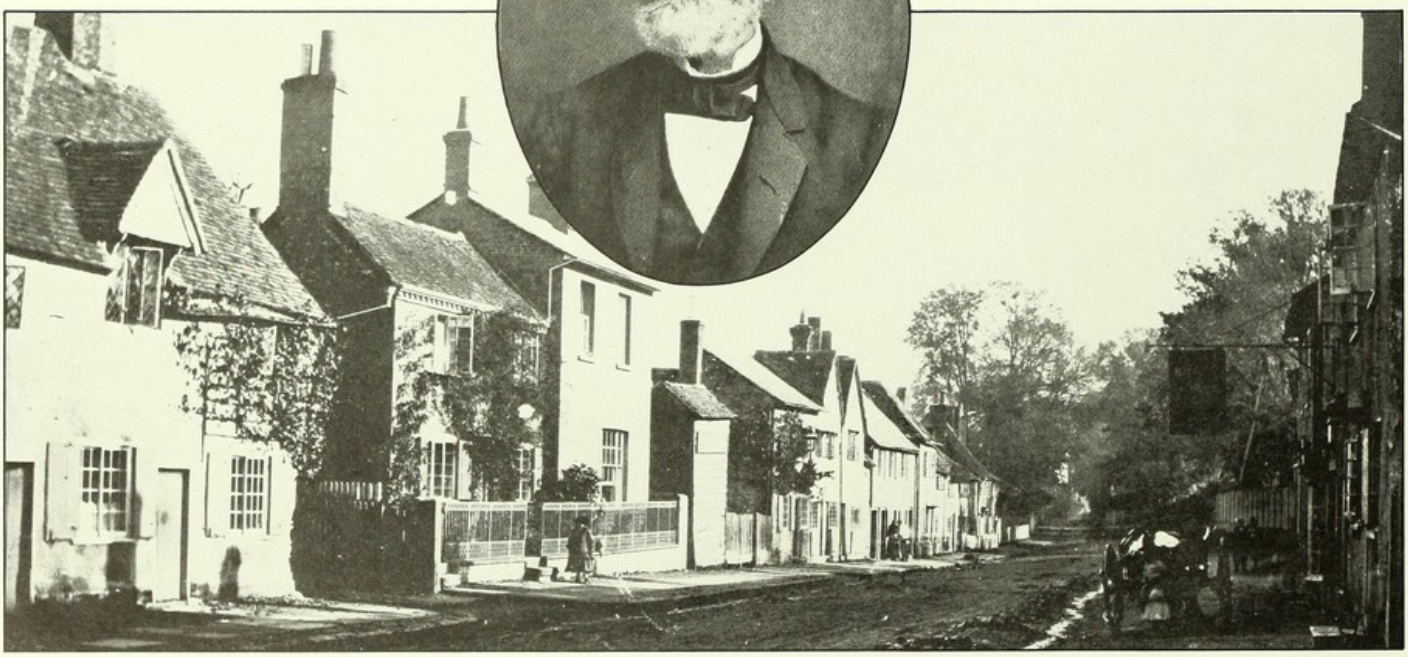
The 1920s were to see the first real progress towards the development of a thriving veterinary business, initially based on biologicals. In 1922 a young Scottish veterinary surgeon, Thomas Dalling, joined the Wellcome Research Laboratories at Beckenham as superintendent of the large stable of serum-producing horses. (He later











Top: Specimens of four famous Cooper posters
Centre: William Cooper (1813-85)
Lower: Berkhamsted at the turn of the century

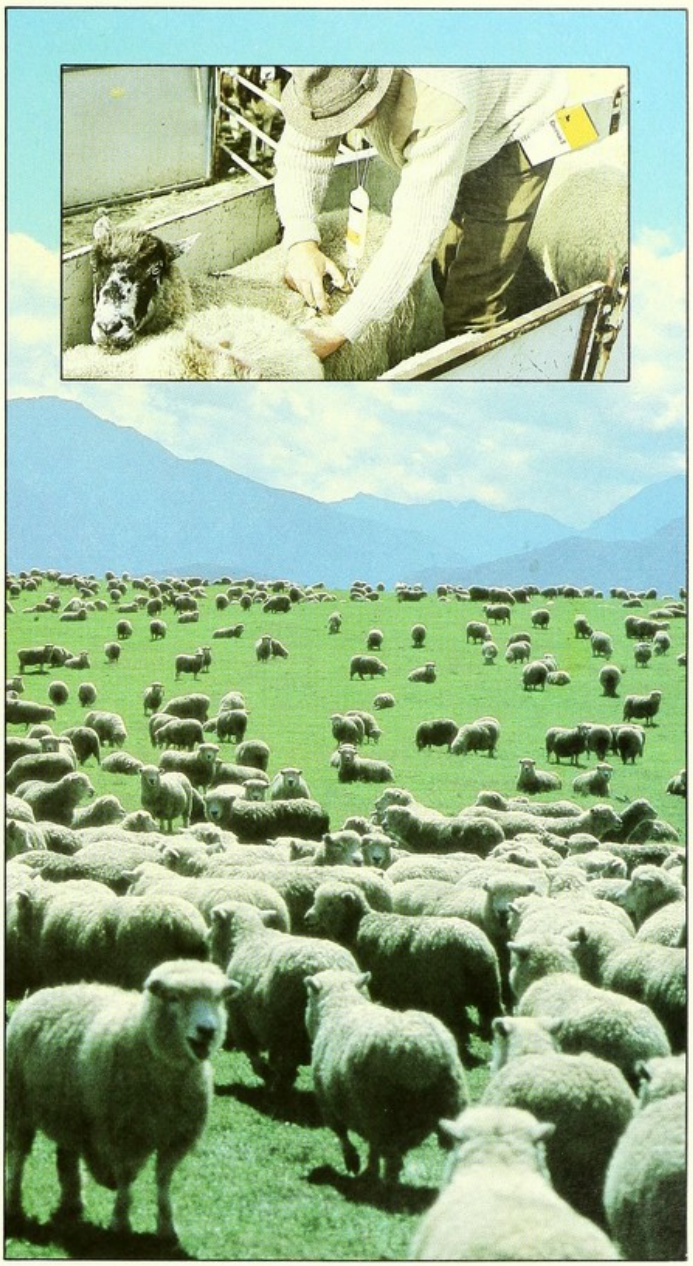
became Sir Thomas Dalling, Chief Veterinary Officer to the Ministry of Agriculture and Fisheries in Britain and subsequently Veterinary Consultant to the United Nations Food and Agriculture Organisation). Dalling brought with him experience of lamb dysentery, one of the scourges of the great sheep-rearing area of the Scottish borders with a mortality rate sometimes reaching 30 per cent of the young lamb flock. He had suspected that an organism of the gas-gangrene type, *Clostridium welchii*, was involved.

A research team which he headed at Beckenham discovered that while the strain of bacteria isolated from dead lambs behaved like the gas-gangrene organism, it was, in fact, a previously unknown variety of the microbe which killed the lamb by producing a different toxin. Other workers isolated a whole series of strains concerned with sheep diseases. Dalling demonstrated that antitoxin developed in the pregnant ewe following vaccination at the appropriate time and that this was transmitted to the new born lamb in the colostrum (the first milk) on the day of its birth. It was a classic piece of research and, fifty years later, lambs are still being protected by this method. There is, however, one important difference – protection against a number of diseases is now achieved by injection of a multivalent vaccine. Wellcome are undisputed leaders in this field – its vaccine 'Covexin' protects against *eight* lethal bacterial infections of sheep and lambs.

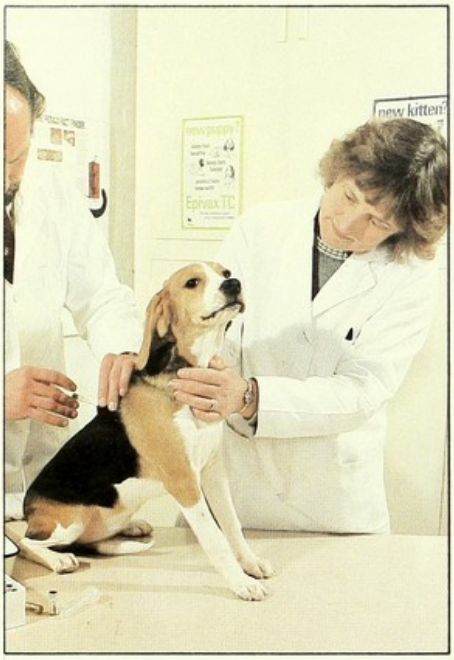
Another area of veterinary research initiated in Dalling's time at Beckenham (one with considerable impact upon human medicine) was the discovery that the disease known as 'yellows' in dogs was due to *Leptospira icterohaemorrhagiae*. Methods of prevention were developed in the Wellcome Research Laboratories. This organism causes Weil's Disease in man and its presence was diagnosed by Dr C.M. Wenyon and Dr J.C. Broom. Broom was recognised as an outstanding authority on this disease and his crowning achievement was to identify the other serious leptospiral infection transmissible from dogs to man – that of *L. canicola*.

As a result of the work of Broom and his colleagues, Wellcome research was able to develop the first *Leptospira canicola* vaccine in the world. Today, in 'Leptovax-plus' veterinarians have available from Wellcome a combined vaccine, highly efficient against both forms of canine leptospirosis – an important development in the control of animal diseases transmittable to man (zoonoses).

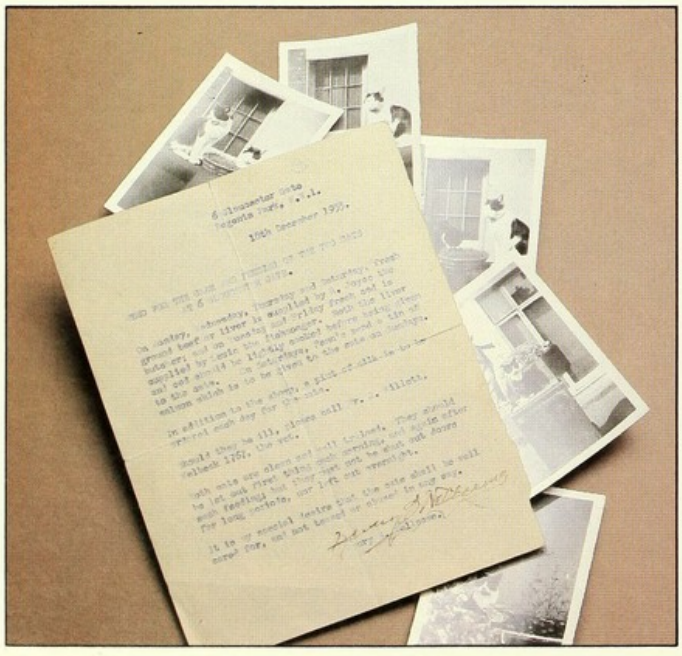
Wellcome have made an equally important contribution to the treatment of animal diseases caused by viruses. While the first methods of preventing canine distemper were worked out by a doctor/veterinary surgeon team in the Medical Research Council (Sir Patrick Laidlaw and Major G.W. Dunkin) with money put up by *Field* magazine, Dalling and MacIntyre completed their work by



Sheep scene in New Zealand where the products of Wellcome and Cooper are widely used
Inset: Vaccinating with 'Covexin 8'



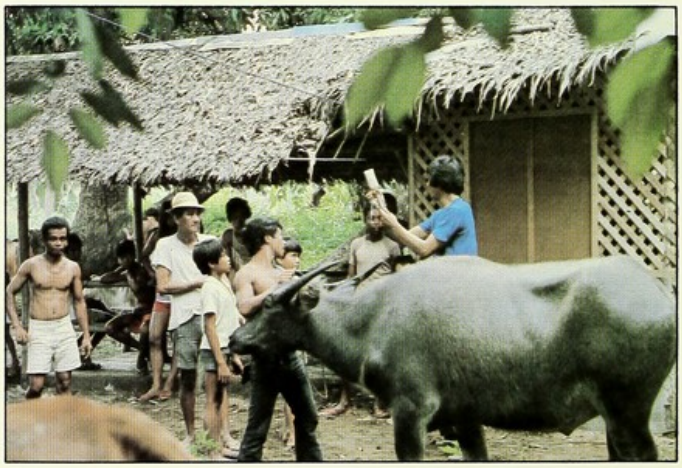
Above: 'One of the Family' leaflet used by veterinarians
Left: Puppy being injected with 'Epivax-double Plus'
Below: Memo from Sir Henry on the care of his cats



producing in 1928 the appropriate prophylactics on a commercial scale. Twenty five years later the first live distemper vaccine, grown in eggs, to be produced in Europe, using the strain of virus isolated and attenuated by Haig in Onderstepoort, South Africa, was issued from Beckenham.

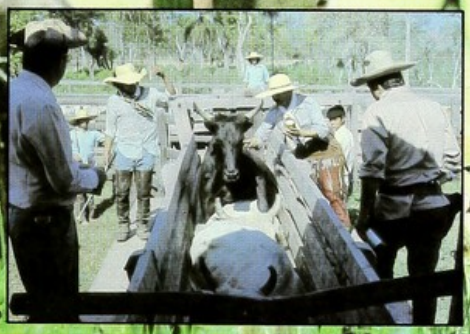
For poultry, the first officially-licensed Marek's Disease vaccine in the world ('Marivax') was issued from Beckenham. So, too, was the purified tetanus vaccine ('Thorovax') which could be safely injected into valuable racehorses, with a greatly reduced risk of causing abscesses or muscle damage.

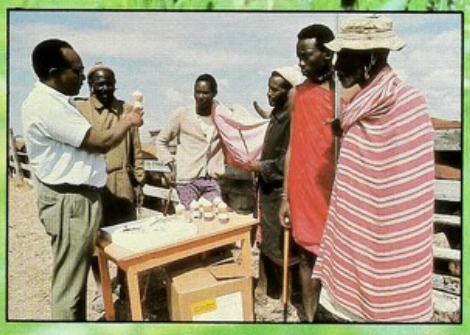
The Wellcome Group has also made a valuable contribution to the prevention of foot-and-mouth disease in cattle and pigs. The Wellcome vaccine is the world market leader, produced in eight factories, that in Brazil being the largest of its kind in the world. The Company set up a far-reaching collaborative arrangement with the Animal Virus Research Institute at Pirbright and established a laboratory and production unit there. This is the only laboratory permitted by the British Ministry of Agriculture to work with all types and subtypes of virus. It also maintains strategic reserves of exotic vaccines for the European Commission for the Control of Foot-and-Mouth Disease. Similarly, a production unit was established in Kenya on a 50 per cent ownership basis with the Government for the



Above: Protecting buffaloes against Foot-and-Mouth Disease in Indonesia where the disease has been eradicated by Wellcome vaccine from economically important regions

Right: Cattle around the world protected by Wellcome products.
From top: Nigeria.
Corral in Brazil.
Dipping bath in Indonesia.
Masai cattle owner in Kenya.
In the English countryside.

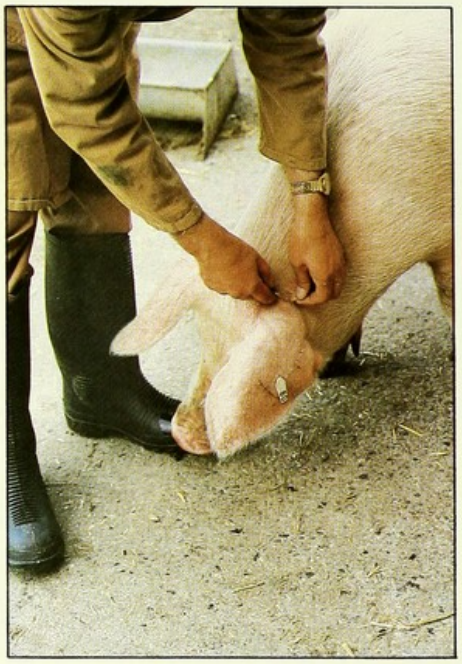




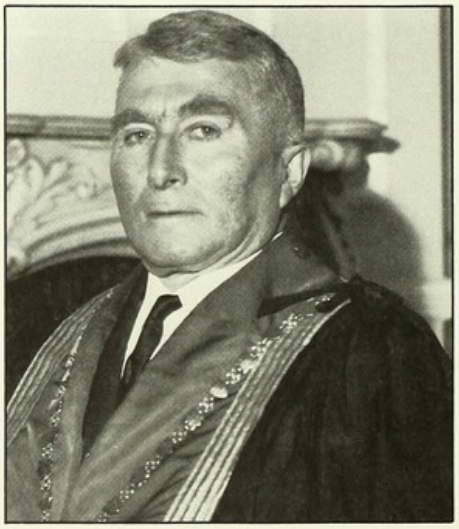
manufacture of FMD vaccines for sale throughout East Africa. Wellcome FMD vaccines are used in the national control campaigns of more than forty countries.

Fundamental and applied research is carried out into vaccine-virus strain development, vaccine formulation, production process development and quality control. Not least, laboratory support is provided for field studies throughout the world. A fairly recent development has been the issue of Wellcome Foot-and-Mouth Disease Oil-Adjuvant-Vaccine specifically for the protection of young pigs.

An important event in Wellcome veterinary history was the purchase in 1943 of a 325-acre farm for the Wellcome Veterinary Research Station at Frant in Sussex, primarily for the breeding of laboratory animals. For the next thirty years it was the focal point of Wellcome veterinary pharmaceutical research. One of the early triumphs was in 1946 when Wellcome was the first company in the world to introduce single-dose tubes of penicillin for intramammary use against streptococcal mastitis. This emerged from work by Douglas Stephenson and his colleagues in the pharmaceutical development laboratories at Dartford and from field investigation at Frant. Today this is still the standard method of introducing anti-bacterial drugs into the bovine udder.



Right: Vaccinating sow with 'Gletvax' against E. coli infection in her piglets



Above: Sam Hignett, CBE, FRCVS, in his robes of President of the Royal College of Veterinary Surgeons, 1973-74
Left: Cotia in Brazil, site of the Wellcome Foot-and-Mouth Disease Vaccine unit, largest of its kind in the world

Above: Piglets contentedly suckling a sow vaccinated with 'Gletvax'
Left: Working in the new Veterinary Entomology laboratory, Berkhamsted

Another major contribution associated with Frant was a series of residential refresher courses which continued regularly between 1946 and 1965 under the direction of the head of WVRS, Mr Sam Hignett, CBE, FRCVS. Although these courses were originally intended for veterinary surgeons demobilised at the end of the war, their reputation spread and they soon took on an international flavour. Veterinarians attended, as guests of the Company, from Australasia, the Americas (notably Argentina), Africa, Europe and Ireland. More than one contemporary director of veterinary services in the developing countries attended a Frant refresher course.

After the merger with Coopers in 1959, there was a gradual coalescence of research effort within the Group and Dr R. F. Montgomerie, FRCVS, who had succeeded Dalling at Beckenham in 1937, became the first Director of Veterinary Research of the joint operation. Dr Montgomerie was the first President of the British Veterinary Association to come from a commercial organisation, an appointment with which Sam Hignett was later honoured. Hignett became also the first President of the Royal College of Veterinary Surgeons to be elected from industry. In 1966 he received what is regarded as Britain's highest award to a veterinarian – the Dalrymple Champneys Cup and Medal.

Coopers themselves had a long history of successful research in the animal health field, especially in developing methods for the control of external and internal parasites. The Cooper Technical Bureau was formed in 1919 and became the acknowledged world centre of expertise on the development and field use of sheep and cattle dips (without which the agricultural economy of the world would probably collapse). By coincidence the Cooper Technical Bureau was first located in London within a few hundred yards of the Wellcome Bureau of Scientific Research. It moved to a new building in Berkhamsted in 1940.

The amalgamation of the veterinary research staffs of the two organisations was completed in 1973 with the closure of the Frant operation and the formation in Berkhamsted of Wellcome Research Laboratories incorporating the Cooper Technical Bureau and the Cooper Research Station. Last year, in the same area, a Wellcome veterinary entomology laboratory was opened to offer greatly improved facilities for the study of external parasites and their control. This is intended to be the world centre for the study of cattle tick control, a field in which Cooper scientists have been pre-eminent.

The years 1970 to 1980 have seen a rapid expansion of the Company's animal health business, starting with the issue, at the beginning of the decade, of antibacterials ('Tribrissen' and

Dosing with 'Tribrissen' Oral Paste

A dew drop containing larvae of one of the parasites which 'Systamex' eliminates in sheep and cattle

Protecting with 'Coopex' the oak timbers of Nelson's flagship, 'HMS Victory'

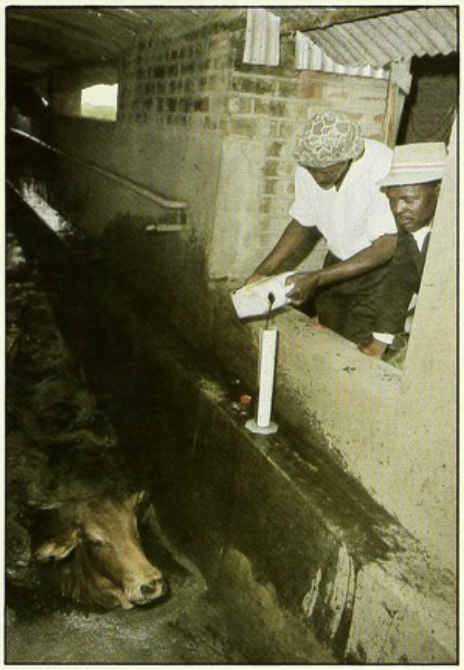
'Trivetrin'), based on trimethoprim and a sulpha drug. These are used for a wide variety of bacterial diseases in all animal species and have become increasingly essential to veterinarians because of their success without the development of resistance.

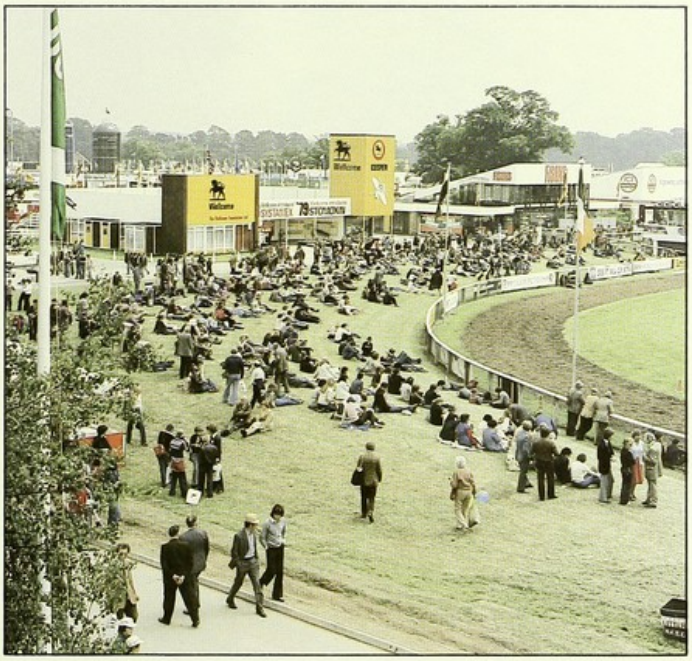
In 1971 diamphenithide ('Coriban'), discovered in the Wellcome Laboratories, was introduced as the first chemical effective in sheep of all ages against larval *Fasciola hepatica* (liverfluke). In the same year the Company introduced the first commercial vaccine for the control of foot rot in sheep. A few years later, with the marketing of the vaccine 'Gletvax', Wellcome made a major step forward in the prevention of *E.coli* infections in young pigs.

Because of the great technical expertise within the Group in the development and international marketing of veterinary pharmaceuticals, anthelmintics and insecticides, the Company is well equipped to enter into licensing arrangements with other organisations. Oxfendazole, an outstandingly safe and effective broad spectrum anthelmintic for sheep and cattle, was discovered by the Syntex Corporation in the USA, and has been jointly developed and marketed by Wellcome in most countries of the world as 'Systamex'. Permethrin, a new synthetic pyrethroid originally synthesised in the Rothamsted Experimental Station, was developed and marketed by Wellcome under licence from the National Research Development Corporation as 'Coopex' (for industrial and public health use) and as 'Stomoxin' (for agricultural use). The characteristics of this broad-spectrum insecticide are very high level of activity and long residual action allied with safety in use. Amitraz, a cattle tickicide discovered by Boots and particularly effective against resistant ticks, is marketed by Wellcome with outstanding success in Latin America and African countries under the names 'Triatox' or 'Triatix'.

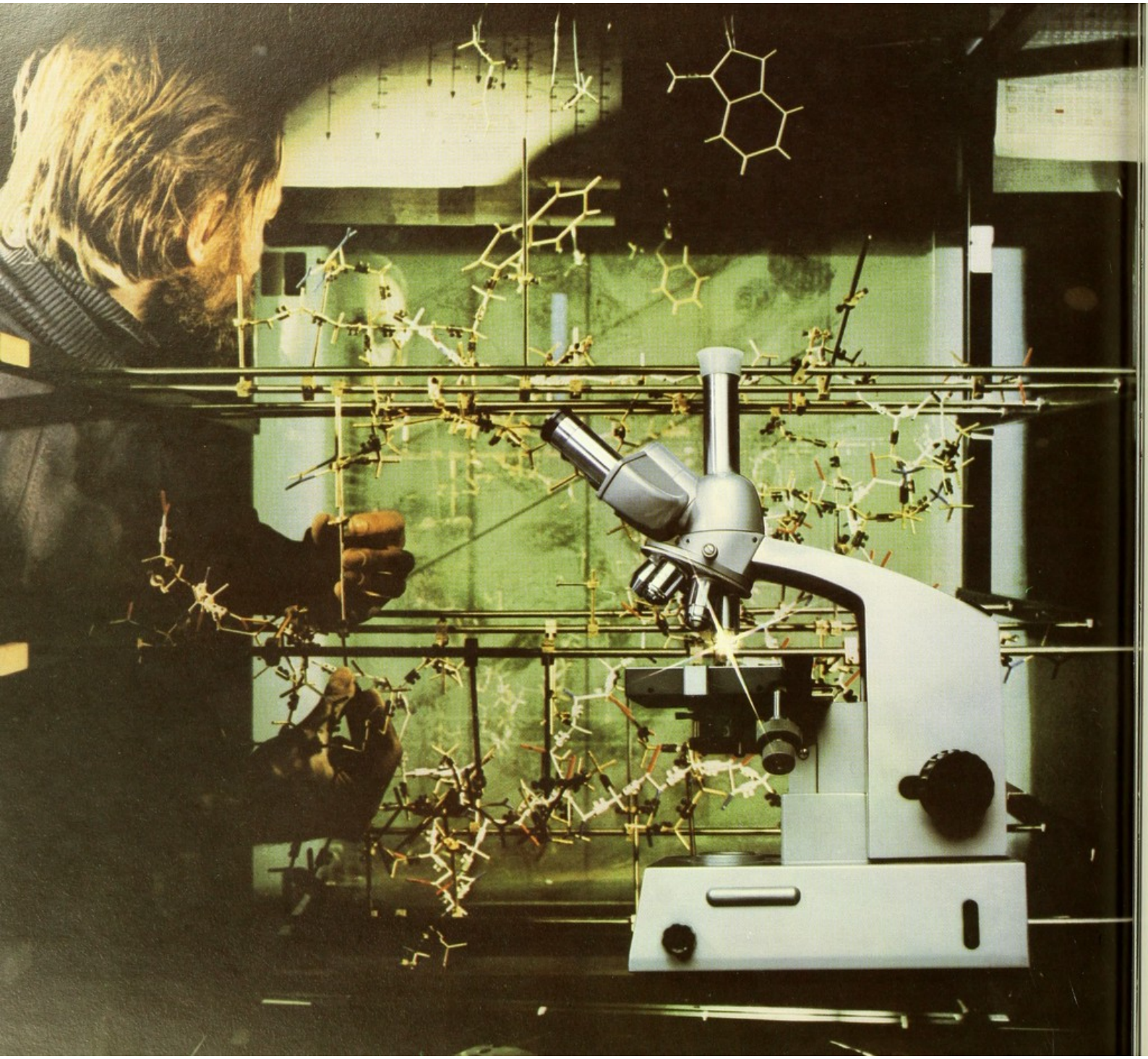
The importance placed by the Board of The Wellcome Foundation on animal health is demonstrated by the purchase last year of the Jensen-Salsbery Laboratories Division of Richardson-Merrell Inc. in the United States. This will enable Wellcome to penetrate effectively for the first time the largest animal health market in the world.

Behind the whole range of products is the technical expertise of a team of over 100 veterinary surgeons and scientists of other disciplines. Many of them are based permanently or part-time in the stock-raising countries of the world. There are laboratories in Kenya, Australia, New Zealand, South Africa, Argentina, Uruguay, Brazil and Paraguay, as well as in the United Kingdom. They play an important part in meeting the need for the supply of food to a rapidly growing world population and ensuring the best use of the animal health products of the Group, whether they are marketed under the Cooper or the Wellcome label.





Top, left & right: Anti-tick measures – dipping and spraying.
Left: The Wellcome Exhibition Stand overlooking the Main Ring at the Royal Agricultural Society's Annual Show on the permanent site at Stoneleigh, Warwickshire
Right: Headquarters of Jensen-Salsbery, acquired in 1979



The unending search

Left: Use of molecular models in drug design

Henry Wellcome offered his scientists freedom of opportunity in the reaching of defined objectives relevant to his business, good facilities and organisation and freedom to publish their discoveries. This policy attracted to his laboratories many young scientists who subsequently achieved international recognition for their work. It allowed, for example, in the space of a few years in the early part of the century, the appointment within the Wellcome Physiological Research Laboratories, founded in 1894, of a team of exceptionally gifted young men whose names seventy five years later are still household words in medical research. It was this small team of twelve, seven of whom became Fellows of the Royal Society, which, together with appointments within the Wellcome Chemical Research Laboratories, founded in 1896, first raised the reputation of Wellcome's laboratories to international status.

Henry Wellcome's recognition of the brilliant scientific potential of his fellow student at Philadelphia, Frederick Power, bore fruit twenty years later, when he established the Wellcome Chemical Research Laboratories and persuaded his friend to come over from America to be its first Director. In eighteen years' work in these laboratories, Dr Power was associated with seventy-five scientific papers in chemistry, pharmacology and pharmacognosy. He made exhaustive investigations of the constituents of over fifty different plants, essentially those used in medicine at that time. His most widely known research was concerned with the examination of the seeds of chaulmoogra, and the identification of two different ingredients. These had some success in the treatment of leprosy until replaced more than thirty years later by the first sulphone derivatives – also discovered in the Wellcome laboratories.

If the name of Dr Power is given special prominence, it is because he set a pattern of work and a standard of publication that were emulated by scientists in Wellcome laboratories down the years. It is therefore not surprising that he played a major role in revising both the British and the American Pharmacopoeias, or that Wellcome scientists today sit on many committees which set the standards of quality and safety of medicines.

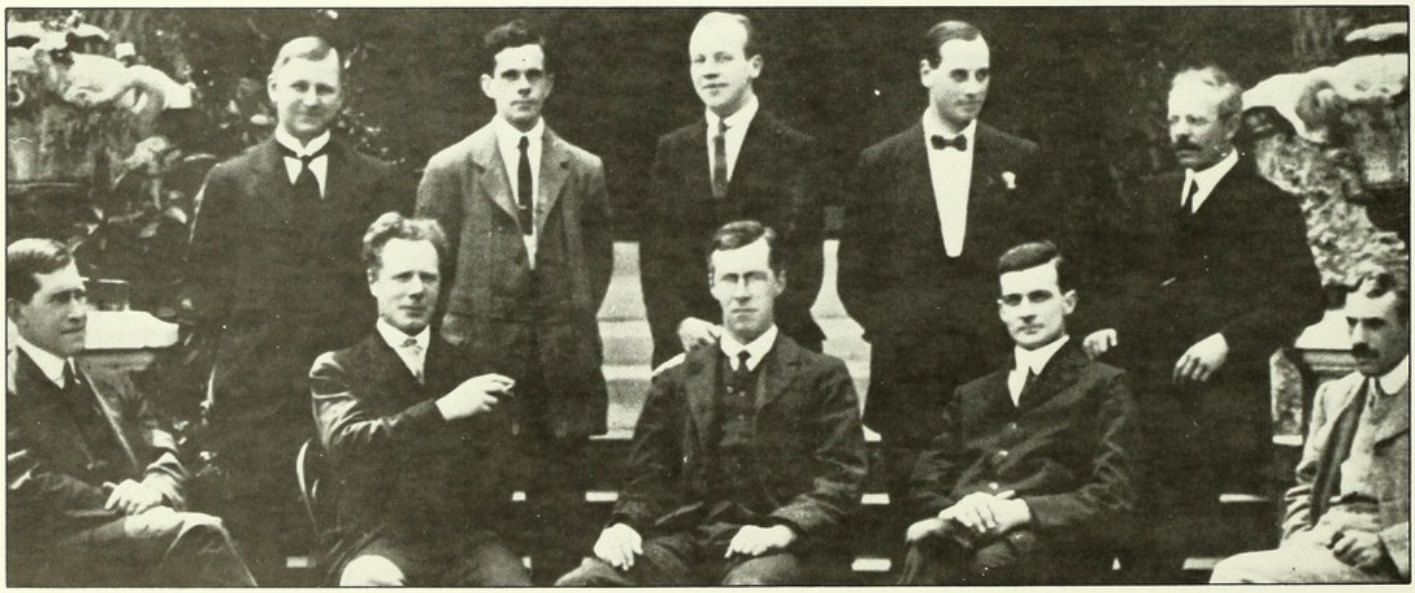
From 1914 when Dr F. L. Pyman (later FRS) became the Director of the Wellcome Chemical Research Laboratories, activities were focused more on synthetic drugs and alkaloids. He himself continued fruitful studies into the ipecacuanha alkaloids and Dr Harold King proceeded to important work on the resolution of the optical isomers of hyoscine. During the First World War, the Company, at the request of the Government, undertook the replacing of important drugs of German origin that ceased to be available. The Wellcome Chemical

Left: Dr Frederick Belding Power, Director of the Wellcome Chemical Research Laboratories, 1896 to 1914

Works manufactured aspirin following upon successful development work in the Wellcome Chemical Research Laboratories. The latter were also able to formulate a method which enabled Wellcome to produce by 1915 the organic arsenical 'Kharsivan'; this was approved by the Government as equal in all respects to the German product salvarsan for the treatment of syphilis.

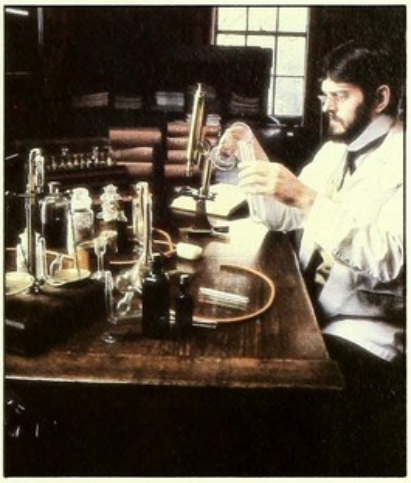
From 1919 to 1944 the Laboratories were directed by Dr T.A.Henry whose monumental publication on the Plant Alkaloids remains today as the standard work on the subject (it reached its 4th edition in 1949). Under his directorship, work turned towards the chemotherapy of tropical diseases, notable successes being the synthesis of the N-glucoside of p-aminophenyl stibonic acid ('Neostam') and later of a pentavalent antimony for the treatment of kala azar ('Pentostam').

Meanwhile, at the Wellcome Physiological Research Laboratories, another major step had been taken. In 1901 Henry Wellcome succeeded in obtaining, despite substantial initial opposition from the Royal Colleges of Physicians and Surgeons, the registration of the Laboratories as a place where experiments on living animals might be performed–under, of course, carefully controlled and supervised conditions. No laboratory attached to a commercial firm had previously been registered.



The scientific staff of the Wellcome Physiological Research Laboratories, 1914. Front row (left to right): G. H. J. MacAlister, G. Barger, H. H. Dale, R. A. O'Brien, H. J. Sudmersen. Back row: G. S. Walpole, A. T. Glenny, J. H. Burn, J. B. Buxton, A. J. Ewins

Left: Wellcome Chemical Research Laboratories, King Street, 1899-1932
Below: A typical laboratory of the period

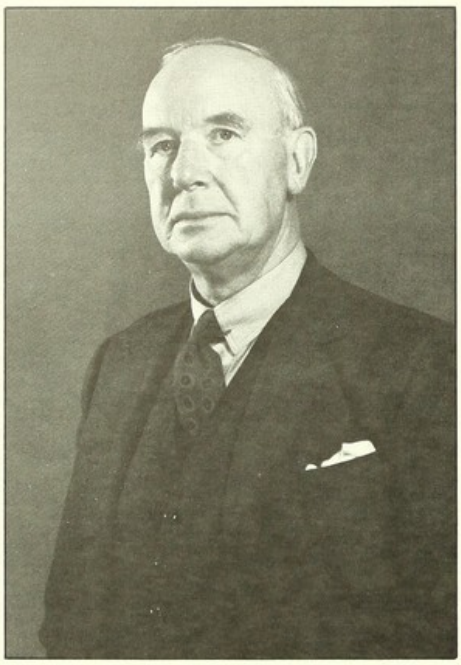


Loading Belladonna leaves after harvesting on the Materia Medica Farm at Dartford (1908)

At the suggestion of Henry Wellcome at the beginning of the century, investigation into crude ergot was initiated by Dr G. Barger before Henry Dale joined the Wellcome Physiological Research Laboratories, but it was the team of Barger, Dale, A. J. Ewins and P. P. (later Sir Patrick) Laidlaw, which discovered important information about the ergot alkaloids. Ergotoxine was discovered to have the then curious property of reversing the pressor action of adrenaline. It was the first of the adrenergic blocking agents and by its use it was shown that sympathetic nerves could produce both vasoconstrictor and vasodilator responses. Histamine, now known to be an important mediator of tissue response to injury, and more particularly of allergic reactions, which themselves had been the subject of pioneering studies by Dale, was isolated from ergot extracts and its pharmacological effects were analysed by Dale and Laidlaw. Interest in adrenaline and histamine led to the synthesis and study of other amines, and papers by Barger and Dale describing this work were published in 1910 and 1911. It was recognised that certain of these amines had the property of reproducing by peripheral action many of the effects of stimulating sympathetic nerves. Dale coined the word 'sympathomimetic' to define this action and a number of the compounds described, notably tyramine, have become valued and much used tools that have contributed substantially to the understanding of the physiology of the adrenergic nerve mechanism and to the finding of new medicinal substances which interfere with this mechanism.

This did not exhaust the excitements that stemmed from the study of ergot. In 1914 Ewins described his identification of acetylcholine in a particular ergot extract. In the same year Dale discovered that this substance had both muscarinic and nicotinic properties, by which it stimulated the effects of different groups of efferent nerves. This was the first step towards the building over the next two decades of the modern concept of the chemical transmission of nervous stimuli and the special role of acetylcholine in this regard, a work which led to the award of the Nobel Prize to Sir Henry Dale and Professor Loewi in 1936. (Henry Dale directed the Physiological Research Laboratories from 1906-1914 and was Chairman of the Wellcome Trust from 1938-1960).

Shortly before the First World War three members of this great scientific team (Dale, Barger and Ewins) departed to form the nucleus of a research group then being built up by the Medical Research Committee (later to become the Medical Research Council). War-time conditions curtailed many research activities, the staff being much reduced and effort being concentrated on the high demand for vaccines, antitoxins and sera for the Forces.

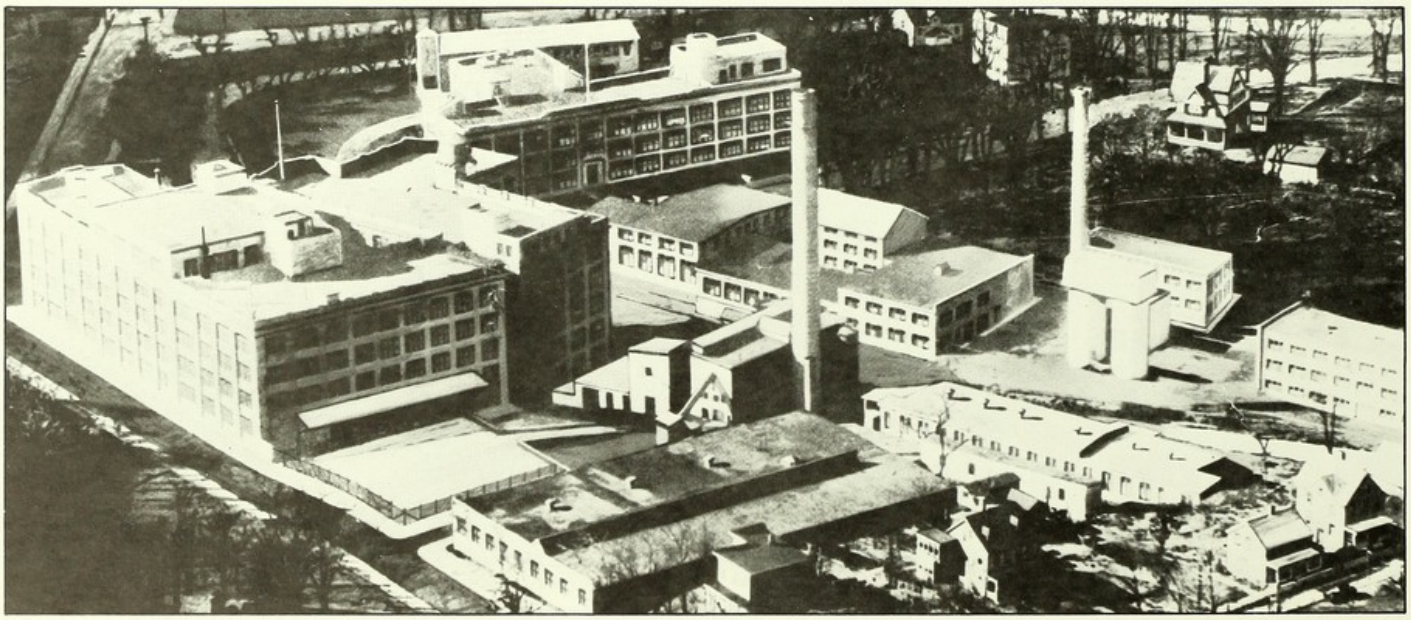


Left: Dr Sydney Smith who isolated from the leaves of Digitalis lanata the cardiac glycoside Digoxin (1980 marks the 50th anniversary of this major discovery)

Dr J. W. Trevan joined the Wellcome Physiological Research Laboratories in 1920 and was its Director from 1941 to 1953. Mention is made in another chapter of his major contribution to biometrics. His inventiveness extended in many directions – to increase the accuracy of experimentation he invented the micrometer syringe and a simple but highly accurate deflection balance, again incorporating the micrometer principle. He was first to demonstrate the fundamental concept that the penetration and hence the action of a drug depend largely on its state of ionisation; this was shown in studies of the relation of hydrogen ion concentration to the action of local anaesthetics.

Perhaps the outstanding single piece of research work from the Company in the 1920s and 1930s was the isolation in 1930 by Dr Sydney Smith, working in the Development Laboratories, of one of the glycosides of *Digitalis lanata*, a variety of foxglove. The properties of this leaf in the treatment of congestive heart failure, usually as a crude preparation, had been known for some time. It is a classic example of Wellcome's philosophy in pursuit of excellence – purification, formulation, analytical control and precision of standardisation. Fifty years later 'Lanoxin' brand digoxin is still the chosen digitalis therapy in a large part of the world.

In the intervening years two important developments relating to



The Wellcome Chemical Works and Research Laboratories at Tuckahoe, New York (1925-71)

digoxin occurred. The first was the scientific approach of selecting for cultivation strains of digitalis giving maximum yields of digoxin. The second was the appreciation in recent years that the bioavailability of digoxin and hence the reproducibility of its therapeutic action and safety were highly dependent upon the particle size of the formulation. The present Wellcome 'Lanoxin' product set a new high standard of bioavailability.

Another outstanding example of the initiative of the Company was shown by its ability to manufacture insulin on a large scale at Dartford in 1923, within a year of its discovery by Banting and Best in Canada. This was the first insulin to be produced in Britain, and the Company, in both the UK and the United States, has played a leading role in the development and improvement of insulin products over the years. Major improvements have also been made in increasing the product yield from pancreas and in increasing the accuracy of its assay.

Insulin gave rise to an unusual collaborative arrangement – the British Insulin Manufacturers – set up during The Second World War primarily to secure an adequate supply of pancreas, but also becoming involved in joint research, development, analytical and standardisation programmes.

In the Burroughs Wellcome company, USA, research activity, largely in chemistry, was being introduced by 1928 and by 1944 a small but highly significant team had emerged and had published 148 scientific papers. The earliest leaders were Dr J. S. Buck, whose synthetic chemistry ranged widely over many important medicinal fields – papaverine, sympathomimetics and novel anaesthetics, and Dr L. Reiner, who was then concerned mainly with the chemotherapeutic action of arsenicals. The high pharmacological reputation of the research group was built up by Dr E. J. de Beer, who joined the Company in 1934. His earlier contributions included studies of anaesthetics, analeptics and sympathomimetic amines and their antagonists, in association with the chemical group by then led by Dr R. Baltzly. His team became responsible in the late forties for introducing important new pharmacological agents. The appointment of Dr George Hitchings in 1942 was to have yet more dramatic consequences.

RESEARCH SINCE 1944

When in 1944 Dr C. H. Kellaway joined the Company to succeed Dr Wenyon as Research Director-in-Chief, research was being conducted at Beckenham, in the Wellcome Research Institution in London, at Dartford, in the Development Laboratories at Tuckahoe in USA, and at Esher, Surrey, (the Wellcome Entomological Field

Left: A 'Lanoxin' advertisement in the medical press
Right: Dr Charles H. Kellaway, FRS (1889-1952)

Laboratory, 1920-1948). At Beckenham most of the staff of the Wellcome Physiological Research Laboratories had continued to be engaged either with or in relation to biological products produced there or with the bioassay of insulin and other therapeutic products made at Dartford. An active chemotherapy group was, however, established within the Department of Pharmacology and this was enjoying its proximity to the small Chemical Research Laboratory that had recently been established at Beckenham. Extensive studies of sulphonamides, sulphones and stilbene derivatives gave way to an examination of the antibacterial action of compounds modelled on the known chemistry of penicillin. Research within the Wellcome Research Institution was almost exclusively devoted to tropical medicine, but research at Tuckahoe was beginning to expand into various therapeutic fields.

Dr Kellaway appreciated that as the Wellcome research organisation had increased in size there had been a tendency for units and even for departments within them to work independently. His major contribution was by resolution and improved research management to overcome and indeed to reverse this tendency. He also appreciated that increased resources for chemical and pharmacological research had to be found if Wellcome was fully to use the current opportunities of finding new medicinal substances among the products of chemical synthesis, on the scale embarked upon by other companies. A new building for the Wellcome Chemical Research Laboratories was therefore erected at Beckenham in 1946 to accommodate not only several times the earlier number of organic chemists but also a much enlarged antibacterial chemotherapy section. Further, this move of chemotherapy, together with the transfer of the bioassay function to Dartford, allowed the much needed expansion of pharmacological research. New and exciting products were shortly to come out of this new building.

Before this, however, the Company had undertaken the manufacture of penicillin at an early stage of its development, but the effort was still-born, based as it was on the bottle system of cultivation, already obsolete by the time the building to house it was completed. Nevertheless, the work of the antibiotic research unit continued and from it emerged polymyxin, the second successful antibiotic to be discovered in the United Kingdom. After several years of patient research, it made its niche in this country and even more so in the United States as an outstanding topical antibiotic, effective against many bacteria insensitive to penicillin and many later antibiotics.

This was a supreme example of successful team effort involving

Part of the administrative headquarters of Group Research and Development in the mansion at Beckenham

groups headed by experts in many different scientific disciplines including chemistry, chemotherapy, mycology and industrial fermentation.

Full justification of Dr Kellaway's policies was provided by the success of the chemical team led by Dr D. W. Adamson working in close association with a pharmacological group under Dr A. F. Green. Within the period 1946 to 1951 they discovered no fewer than five novel compounds that became marketed products. The first of these discoveries was procyclidine ('Kemadrin') which for many years has been used in the management of Parkinsonism and to control drug-induced extrapyrimidal syndromes. Another was diethlythiambutene ('Themalon') which, because of its powerful analgesic/hypnotic properties, made it particularly suitable for canine surgery, especially as its actions could be readily terminated by nalorphine, which, as 'Lethidrone', had recently been made available by the Company. The most important of the compounds discovered was triprolidine which, under the name of 'Actidil' or with L(+) pseudoephedrine as 'Actifed', has given Wellcome an outstandingly powerful and specific antihistamine and a nasal decongestant used extensively for the past twenty-five years in most countries of the world. The systematic synthesis and pharmacological study of a large number of related compounds designed on the basis of a structural hypothesis had also been amply justified.

Meanwhile at Tuckahoe, where research facilities had also been expanded, the team engaged on pharmacodynamic research, in which key roles were played by Baltzly and de Beer, had also been successful. The independent synthesis by Dr A. P. Phillips of suxamethonium (marketed as 'Anectine') provided a much needed requirement for a short-acting neuromuscular blocking agent for use in situations where tubocurarine, already pioneered by the Company, had too great a persistence of effect. Anectine continues to be a very important relaxant in anaesthesiology, especially in the United States.

Methoxamine ('Vasoxyl'), a sympathomimetic vasoconstrictor agent, was discovered and continues to be used in hypotensive states and paroxysmal atrial tachycardia. Further, an original method of testing antihistamine and bronchodilator activity led to the discovery in 1947 of cyclizine which, as 'Marezine' inside and 'Marzine' outside the USA, has long been recognised as an outstanding remedy for motion sickness. Cyclizine was also found, in studies conducted on each side of the Atlantic, to control the emetic action of morphine and similar agents and this led to its incorporation into 'Cyclimorph' and 'Diconal'. In the latter, cyclizine was combined with dipipanone, a powerful analgesic that was discovered shortly after cyclizine in the

The new physical chemistry laboratory, opened in 1979, at the Wellcome Research Laboratories, Beckenham

Wellcome laboratories in the United Kingdom. A fourth discovery of the American group was chlorcyclizine ('Histantin') whose greater persistence of antihistamine action made it a more convenient peripheral antihistamine preparation to use than cyclizine itself. Though for several years it was among the more popular of early antihistamines, it was later superseded by 'Actidil' as a major Wellcome product.

When Dr Sydney Smith retired from the directorship of the Wellcome Chemical Research Laboratories, Dr Kellaway took a further integrating step. The Wellcome Chemical Research Laboratories and the Wellcome Physiological Research Laboratories were combined to form the Wellcome Research Laboratories, which became responsible first to Dr Trevan and then to Dr Adamson when he became Research Director in 1953. The policies begun by Dr Kellaway were continued by Dr Adamson but, thanks to the success of earlier research, with a greatly increased expenditure.

Further integration of research was achieved by the creation of a Therapeutic Research Division under Dr R. S. F. Hennessey, which incorporated the Chemical and Pharmacological Laboratories in Beckenham and the Wellcome Laboratories of Tropical Medicine in London, and later (1965) by the physical move of the latter to Beckenham. New research buildings sprang up to house increasing numbers of scientific staff in all disciplines both at Beckenham and at Tuckahoe. Instrumentation grew in sophistication and cost. All the extra accommodation did not, however, represent increasing primary research – much had to be given up to escalating requirements of toxicological and pharmacokinetic studies of new therapeutic agents and to the ever advancing exactitude in the standardisation, analytical control and safety determination of biologicals.

From Beckenham came the notable chemotherapeutic contribution of the synthesis of bephenium and thenium by Dr F. C. Copp in 1955 (see chapters on Tropical Medicine and Animal Health) and the biological studies that led to the development of trimethoprim and co-trimoxazole in collaboration with Dr Hitchings' group.

A special interest in autonomic pharmacology and in hypertensives arose from the finding of a series of potent and long-acting ganglion blocking agents derived following observations made on a forerunner of procyclidine and triprolidine. None of these drugs achieved an important place in medicine since the opportunity arose of finding more acceptable drugs for the treatment of hypertension, that is of agents that specifically blocked the release of the transmitter noradrenaline from adrenergic nerves. This opportunity was rapidly

Dr John Vane, Director of Group Research and Development in Wellcome, makes a presentation to Dr George Hitchings, on his retirement

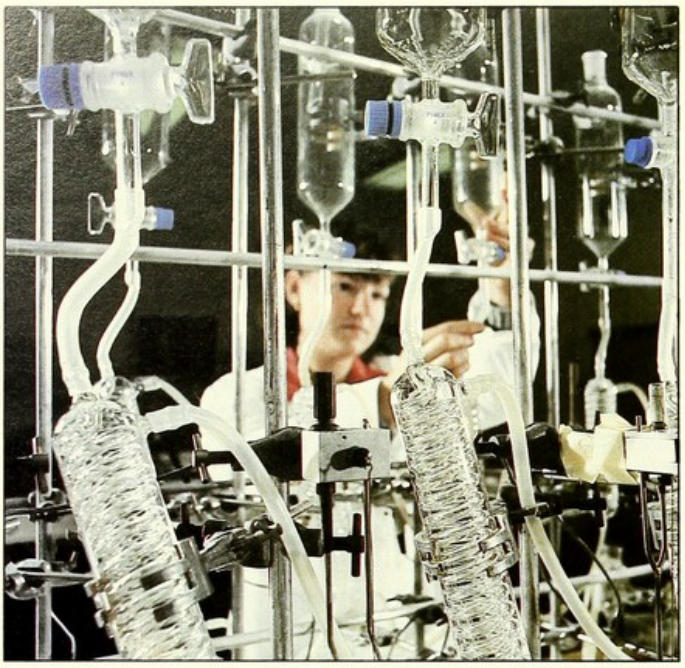
turned to success by the closely co-ordinated efforts of a chemical team and a pharmacological team. Bretylium was soon found (1957) but its use for the treatment of hypertension was curtailed by the introduction of superior products for this purpose by other companies and then by Wellcome's discovery in 1960 of bethanidine ('Esbatal').

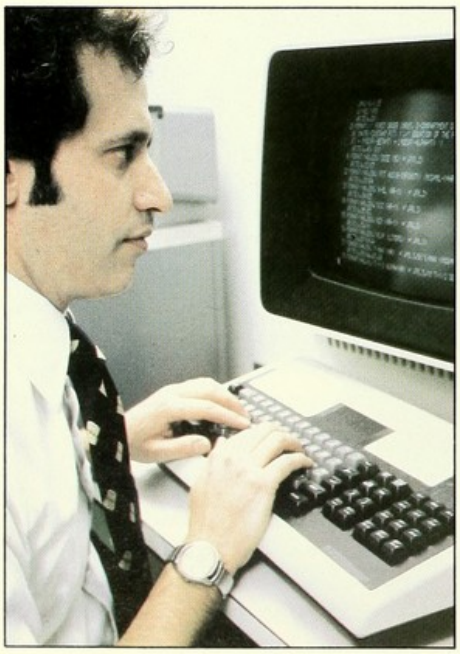
The success of the team led by Dr George Hitchings has been outstanding. He joined the Tuckahoe laboratories in 1942 with a PhD in biochemistry. With two assistants, Gertrude Elion and Elvira Falco, he developed a systematic study of nucleic acid metabolism in micro-organisms and in man. How successful he was to be over the next thirty years is demonstrated by the fact that no other scientist in the history of the industry has received honours on anything like the same scale. These came from many countries of the world including the rare distinction of being elected a Foreign Member of the Royal Society. Hitchings certainly fulfilled Henry Wellcome's early expressed ambition for his scientists – 'If you have an idea, I'll give you freedom to develop it.'

From the work of his team came the discovery of drugs for the treatment of leukaemia, bacterial and protozoal infections, gout and other conditions of hyperuricaemia, and for protection in organ transplantation. Underlying most of these discoveries is the principle that 'every cell is susceptible to attack at some point or several points critical for its survival and replication, because each cell has a characteristic biochemical pattern.' The first pay-off from this programme was the previously mentioned discovery of the antimalarial pyrimethamine ('Daraprim'), a success in which Dr L. G. Goodwin (later FRS), working in the Wellcome Laboratories of Tropical Medicine, played a major part. Another example of the pioneering work of the team was the synthesis of 6-mercaptopurine, one of the first effective drugs with tolerable side effects for the treatment of malignancy. After investigation at Tuckahoe and the Sloan-Kettering Institute, it was marketed as 'Purinethol' in the United States ('Puri-nethol' in most other countries) to offer the physician a weapon most useful for the treatment of acute leukaemia in children. Another purine, thioguanine, from the same stable is currently used in the treatment of various types of leukaemia.

One of the most exciting research developments – scientifically, medically and commercially – in the whole history of the Company is the allopurinol story. This resulted from the team's search for inhibitors of xanthine oxidase that might thereby enhance the therapeutic action of 6-mercaptopurine. These inhibitors proved also, to have the more important effect of preventing the formation of uric acid. Allopurinol ('Zyloric' or 'Zyloprim') is the first compound

Left and right: Vectors of malaria and Chagas' disease, respectively, in the Parasitology Department, Beckenham





Above: Exploratory research at Beckenham
Left: Pharmacokinetic data being analysed on a remote terminal to the main computer of Burroughs Wellcome Co. (USA) at Research Triangle Park in North Carolina

found to have this property and is the drug of choice for the treatment of gout and other conditions associated with urate disorder.

Azathioprine ('Imuran') was synthesised by the team in a search for a drug that released 6-mercaptopurine slowly after administration. The latter had been found to depress antibody production and to prolong the survival of kidney grafts in animals, but azathioprine was found to be superior to 6-mercaptopurine in this respect and to be less toxic. A report on this finding led rapidly to its first successful use in realising the survival of human renal transplantations in Boston, Edinburgh and Paris. It became the first compound to be accepted as effective in preventing graft rejection in humans and in the fifteen years that have elapsed, few kidney transplants have been undertaken without azathioprine cover to prevent rejection. The use of the drug has been extended to patients suffering from severe forms of various autoimmune diseases. Interestingly, over the six years during which the Food and Drugs Administration in the USA were satisfying themselves on its safety, 'Imuran' was provided free by Burroughs Wellcome Co. to almost every recipient of a kidney transplant in the United States.

One of the highlights of United Kingdom-United States research collaboration was the development of co-trimoxazole ('Septrin', 'Septra' or 'Eusaprim'). Research by Dr S. R. M. Bushby and his colleagues at Beckenham on the pyrimidines during the 1950s identified the antibacterial potential of trimethoprim. Hitchings and his colleagues showed that this was due to its antimetabolite properties at one stage of metabolism within the bacteria, confirmed that sulphonamides attacked bacteria at another stage and postulated that a combination of trimethoprim and sulphonamide would have a powerful synergistic action. This was confirmed in laboratory studies and subsequently in clinical trials. 'Septrin' found a world-wide market for the treatment of urinary tract and respiratory infections, of gonococcal urethritis and of typhoid and paratyphoid fevers and certain skin infections. With allopurinol it has played a major role in transforming the Group into one of the largest British pharmaceutical companies.

Dr J. R. Vane, FRS, who, as an outstanding pharmacologist, joined the Company in 1973 to become Group Research and Development Director, has played an active part in initiating or encouraging work in new fields and in addition, on the basis of his own personal expertise, has further developed the Company's interest in the prostaglandins. A notable success has been the discovery of prostacyclin, the most potent of known inhibitors of platelet aggregation, which has a physiological role in preventing thrombus formation in mammalian vascular systems. Prostacyclin is already

showing potential value for the treatment of occlusive peripheral vascular disease and as an adjunct to the use of extracorporeal circulatory systems.

Dr J. W. Black, FRS, famed for his major contributions to the discovery of beta-blocking and H_2-receptor blocking agents, was recently appointed Director of Therapeutic Research at Beckenham, adding further vigour to the search for novel medicinal agents.

In 1975 Dr Pedro Cuatrecasas succeeded Dr Hitchings as Vice-President for Research at Burroughs Wellcome Co., USA. The chemotherapeutic approaches of his predecessor have been actively continued and considerable hopes are attached to a new antiviral agent developed in collaboration with Beckenham. Meanwhile, pharmacodynamic screening by Dr R. A. Maxwell's group has revealed a number of compounds that are being evaluated clinically. Based on his own personal expertise, Dr Cuatrecasas is leading a team dedicated to finding how hormones, and in particular insulin and enkephalins, exert their action on cells, in order to design compounds that will imitate their action.

The Group research and development budget during centenary year will be in the region of £40 million, an essential expenditure which will enable Wellcome to maintain its special reputation for intiating research and ensuring high standards of quality control, safety evaluation and clinical investigation.

There are major diseases yet to be conquered and methods of prevention and treatment still to be improved. Yet only one compound in several thousands synthesised is expected to be marketed. It will cost several million pounds and take up to ten years before its issue as a product. As Sir Henry Dale once wrote, 'The research function must never evade the challenge of investigating difficult areas. Fundamental research having no foreseeable immediate effect must not be allowed to fall into arrears through neglect. We must not allow short cuts, shelving exceptions, discounting difficulties, making premature claims in the hope that we may be able to reach some dramatically practical result without submitting to the full exacting discipline of science.'

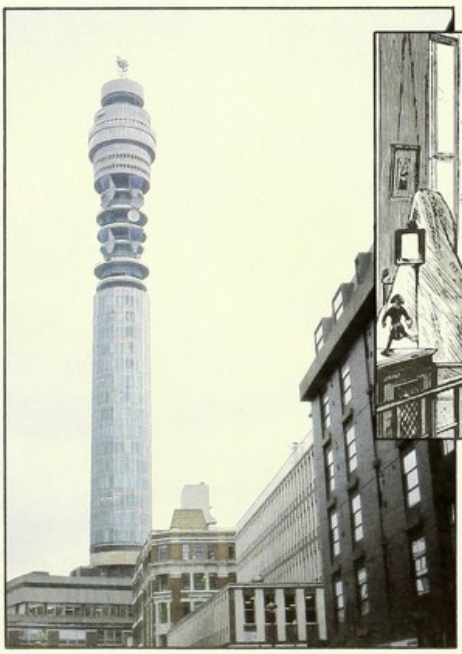
Work on prostacyclin in the Wellcome Research Laboratories, Beckenham

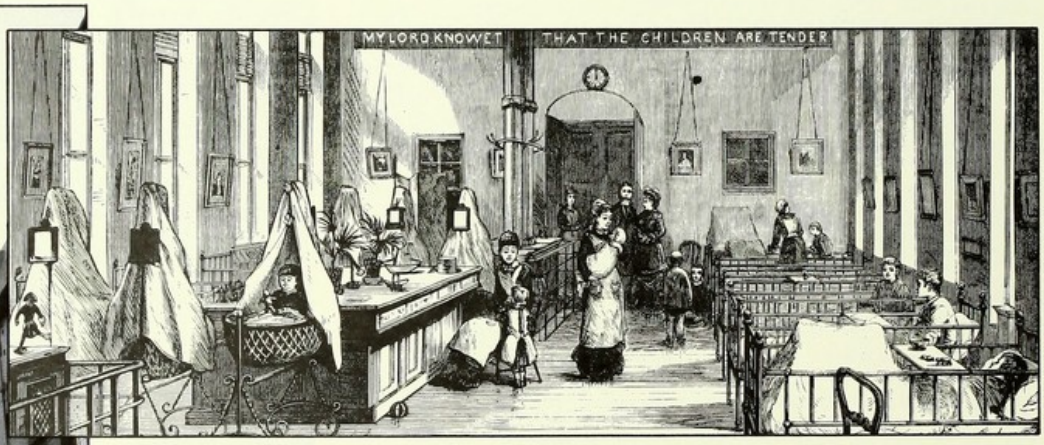
MEDICAL BIOLOGICALS

Henry Wellcome was ever alert to scientific developments, and discoveries in the fields of bacteriology and immunology provided him with the type of challenge he could not resist. The diphtheria bacillus had been found in 1883 and its exotoxin described in 1888. In 1890, it was shown that sub-lethal amounts of the toxin, when injected into animals, stimulated the production of an antidote in the serum (antitoxin) which, when injected into other animals, provided protection against lethal amounts of the toxin. In 1891, antitoxin produced in a sheep was successfully used in Germany to treat a girl with diphtheria. Since diphtheria was the commonest cause of death in European and North American children (it was responsible for over 8,000 deaths a year in England and Wales alone during the 1890s), attempts were made in many countries to produce small amounts of antitoxin. Some was produced in Britain and used in the treatment of a few patients in 1893. Henry Wellcome, however, realised the need to produce large quantities of standardised antiserum on a commercial basis and this could not be done without the deployment of a team of scientists to generate knowledge on how to produce a substantial amount of the diphtheria exotoxin, use it for the immunisation of large animals, extract substantial amounts of the serum and ensure that it was sterile and potent at the time of issue.

It was primarily for the purpose of producing large amounts of high quality diphtheria antiserum that the Wellcome Physiological Research Laboratories were established in 1894; they were one of the earliest research laboratories set up by a pharmaceutical company. Initially, they consisted of modest premises in Charlotte Street, London W1. Nearby was a stable for eight horses for the production of diphtheria antiserum. The first batch of antiserum from these horses was issued in 1895. Demand for Wellcome antiserum soon exceeded the production capacity of the facilities, especially after Ehrlich, in 1897 in Germany, had reported on a standardised method for producing antiserum. It was compounded by the fact that the energetic and effective W. H. Park had been appointed head of the diphtheria diagnostic laboratory in New York in 1894 and, since diphtheria was rampant in the city, he was constantly seeking substantial amounts of the Wellcome product. As a result, Wellcome transferred his Physiological Research Laboratories in 1898 to a ten-acre site, with stables and other buildings, at Brockwell Hall, Herne Hill, in South-East London, and appointed Dr Walter Dowson its director in 1900. Dowson was succeeded by Dr Henry Dale in 1906.

The first research biologist appointed to the Laboratories was John Mellanby (later FRS). He spent several years studying the globulins and other proteins in horse serum. He described a method





Above: Children in the ward of the East End Hospital in London in 1878–unprotected against diphtheria, poliomyelitis, tetanus or whooping cough, infections which are now easily prevented.
Left: The first Wellcome Physiological Research Laboratories in 1894 were near the site of the present Post Office Tower in London

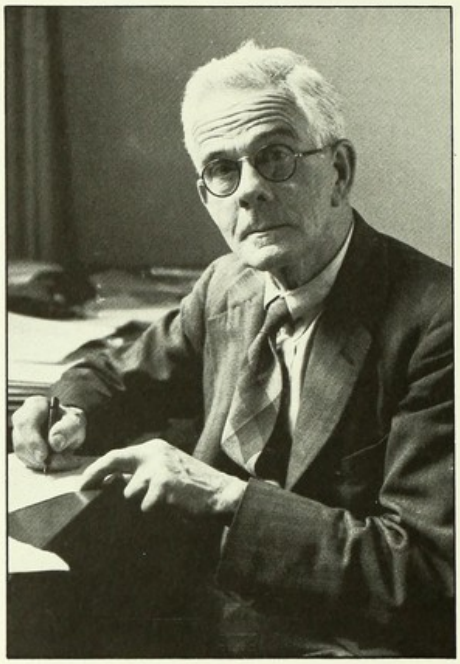
Right: Horses which produce life-saving antitoxins being exercised at the stables in Beckenham
Inset, from left: Purity testing during manufacture of Diphtheria Toxin at Beckenham in 1943. Centre: Manufacture of polio vaccine. Right: Awaiting his dose of Wellcome Polio Vaccine (Oral) on a lump of sugar

for concentrating diphtheria antitoxin without denaturation of the protein by treating the serum with alcohol at low temperatures, a method later developed and extended by Cohn.

Mr A. T. Glenny joined the staff as a young man and controlled the production of antisera at the Laboratories for over forty years. In 1904, at the age of twenty-two, he followed up a report that diphtheria toxin could be detoxified by the addition of formalin without loss of antigenicity, and became the first to use formalinised toxin for the purpose of immunisation of horses for antitoxin production.

During the First World War, greatly increased production demands were met; large quantities of tetanus and diphtheria antitoxins, anti-gas gangrene sera and typhoid vaccines were made available for the Forces.

The opportunities for new ventures developed from 1922, when the Physiological Research Laboratories had been transferred from Brockwell Hall to a 108-acre site at Langley Court, Beckenham, Kent. Glenny and his staff contributed very substantial advances in vaccine and antisera production and standardisation in immunisation procedures, both for medical and veterinary purposes. Glenny and Südmersen were the first to enunciate the principles of primary and secondary stimulus in immunisation in 1921. In 1923, Glenny, Allen and Hopkins were the first to suggest that diphtheria toxoid be used



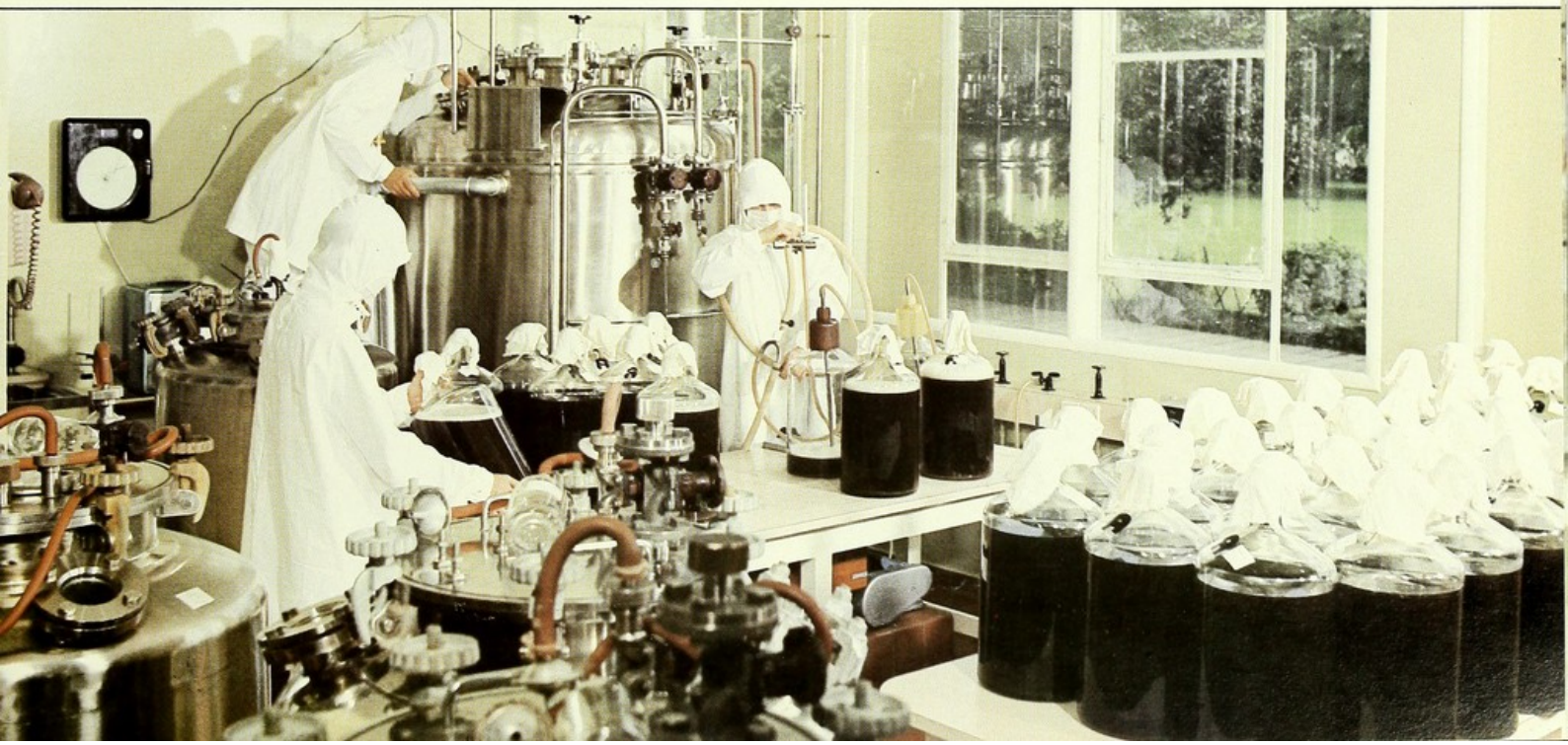
Right: Dr A. T. Glenny, FRS (1882-1965)

Above: Senior scientific staff at the Brockwell Hall laboratories in 1920. Dr J. W. Trevan, later FRS, extreme left of middle row. Notice that three of the ten senior staff are ladies – unusual at that time.
Left: The Wellcome Physiological Research Laboratories, Brockwell Hall, Herne Hill, London (1899 to 1922).

Left: Volunteers from staff being injected against yellow fever with 'Arilvax' in the Clinical Research Division at Beckenham
Below: Large-scale production of anaerobic vaccines (1971)

for the active immunisation of healthy children as a preferable alternative to the use of heterologous antiserum for the treatment of children after they had developed diphtheria. Glenny and his colleagues discovered the adjuvant effect of alum on diphtheria toxoid in 1926, advocated the human use of toxoid antitoxin floccules (TAF) in 1927 and developed the highly antigenic alum precipitated toxoid (APT) which became the standard preparation for diphtheria immunisation both in this country and abroad.

There is little doubt that contributions made by Wellcome research staff to knowledge of the development of safe and effective diphtheria vaccines, how they should be used for the protection of children, and the control of disease in the country made it possible for health authorities to undertake mass vaccination campaigns with success at a time when morbidity and mortality from diphtheria were of general concern. The Director of the Wellcome Physiological Research Laboratories between 1914 and 1941, Dr R. A. O'Brien, and, in particular, Dr H. J. Parish, Clinical Research Director at Beckenham, were instrumental in bringing about that campaign by their rational programme of clinical research. Almost all the vaccine used in the massive campaign in Britain in 1940 was produced at Beckenham and for his original work in the field of immunology Glenny was elected a Fellow of the Royal Society. His other honours



included the Jenner Medal in 1952 and the Addingham Medal in 1955, the latter bearing the inscription: 'To the individual who has made the most valuable discovery for relieving pain and suffering in humanity'.

Successful studies on tetanus prophylactics between the wars saved many lives in the Second – both in the forces and in civilian personnel. Thanks to collaboration between Brigadier Boyd, in the War Office, and O'Brien and Glenny at Beckenham, immunisation of the army against tetanus was introduced just before the outbreak of war. Thirty million doses of Wellcome Tetanus Toxoid were produced for the protection of the armed forces throughout the war. (Brigadier Boyd, later Sir John Boyd, FRS, became Director of the Wellcome Laboratories of Tropical Medicine, 1946-55, and, on retirement, a Wellcome Trustee from 1956 to 1965). Vast quantities of life-saving tetanus and gas gangrene antitoxins were also produced.

Yellow fever vaccine was produced by the Wellcome laboratories during the war, but Beckenham was shortly to embark on the study of other viruses and to produce many other important viral vaccines. To immunise against poliomyelitis, the decision was made to produce Sabin-type attenuated live poliovirus vaccine rather than killed vaccine of the type originated by Salk. The Wellcome Laboratories were the first in the world to be licensed to issue oral poliovirus vaccine on a commercial scale. Other vaccines followed, such as 'Almevax', which was developed from a strain of attenuated rubella virus (RA27/3) vaccine from the Wistar Institute at an early stage when it had been used in only a few children. This was the first vaccine prepared on human diploid cells rather than animal-derived tissue to be licensed for use in Britain, so eliminating potential dangers of exposure to animal-derived pathogens.

In the development of bacterial vaccines, the work of the Laboratories had shown the importance of antigenic competition which necessitated a balance of diphtheria, pertussis (whooping-cough) and tetanus antigens in the triple vaccine administered to infants ('Trivax').

The Biological Division at Beckenham, with research biochemists, bacteriologists, virologists and immunologists on its

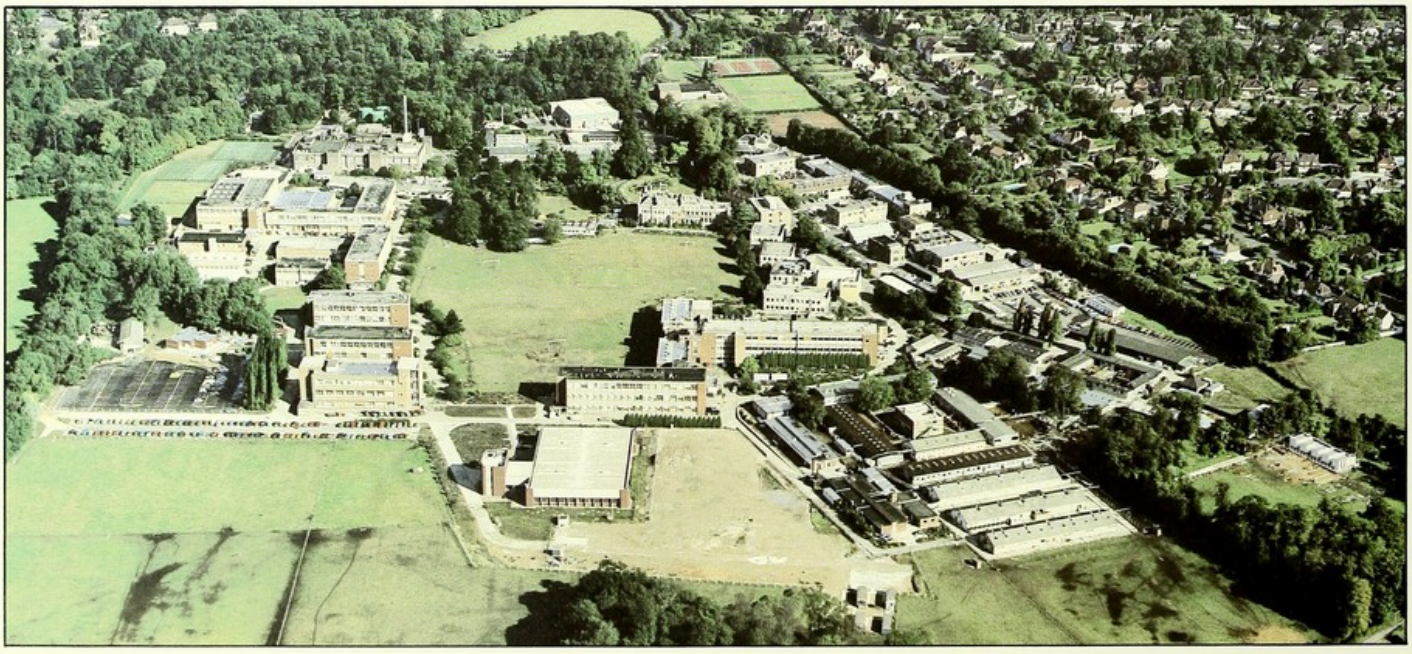
Left: Assessing the inhibitory effects of an antiviral compound (acyclovir) at Beckenham
Left, inset: Working under sterile conditions in Virology (Research and Development), Beckenham

Right: Harvesting virus in the production of rubella vaccine ('Almevax') at Beckenham

Above: More than 1500 hospital laboratories world-wide utilise a clinical chemistry quality control programme provided by Wellcome Reagents Limited

Left: Technique of fluorescence microscopy

Below: Aerial view of the Wellcome Research Laboratories, Beckenham



staff, was soon to extend its activities to a small range of diagnostic preparations. These had initially been standardised for use within the Laboratories but were made available free of charge to other laboratories on request. Demand became such that the supply of diagnostics pioneered by Harry Proom and his colleagues established a firm basis for a commercial operation which has grown and developed into Wellcome Reagents Limited, a self-contained unit with headquarters at Hither Green, supplying over 400 products. Much of its success in recent years is due to the development of haemagglutination and latex haemagglutination test kits used for thyroid antibody assay, pregnancy testing, coagulation disorders and the detection of hepatitis antigen. The growth in demand for these reagents continues apace in an increasing number of countries and new aids to medical diagnosis are still being devised.

Right: Model of haemoglobin molecule
Below: Research Triangle Park, administrative and research headquarters of Burroughs Wellcome Co. (USA)

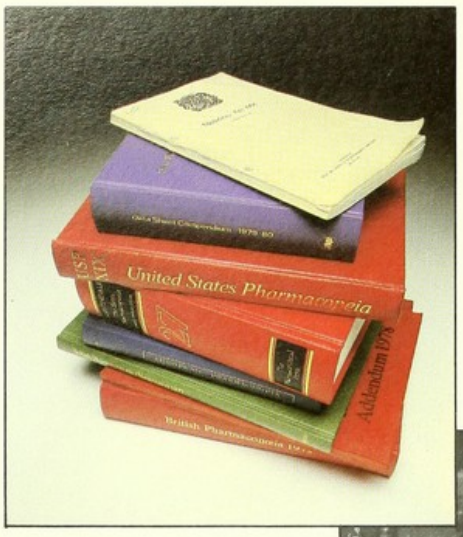

Wellcome
Group Code of
Good
Manufacturing
Practice

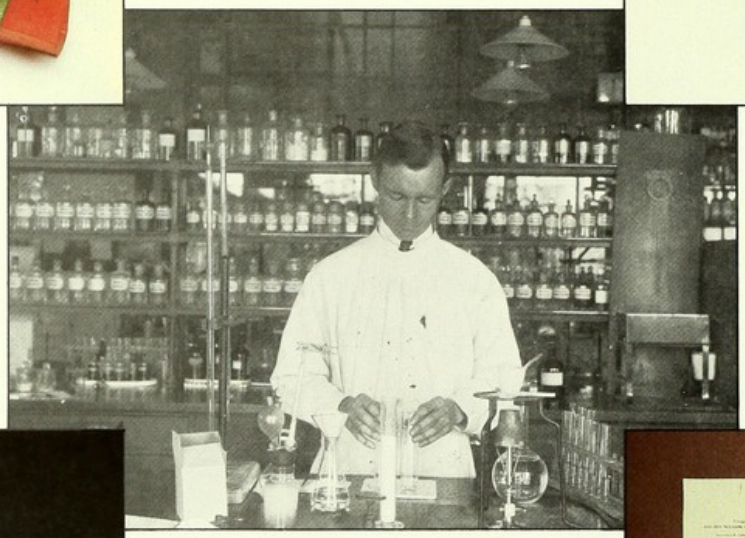
The pursuit of excellence

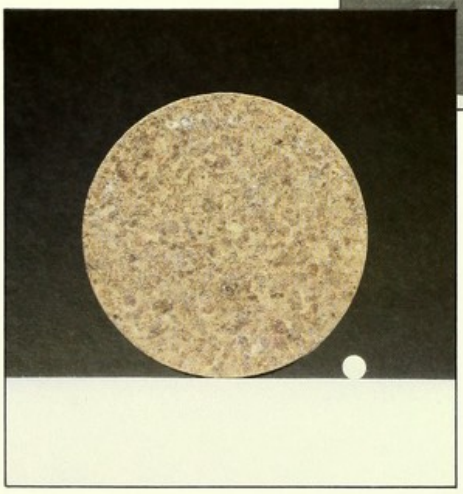
Henry Wellcome loved to devise and use expressions such as 'Products of quality', 'Weapons of precision', 'BP (British Pharmacopoeia) or better', and 'Beware of pirates and imitators', indicating that he placed considerable importance on craftsmanship and on the quality of materials and products. He was a perfectionist and assumed or expected all members of his staff to be of a similar mind. He demanded a high standard of work from all his employees, from the printer and binder of his diaries and other publications, from the stablemen in charge of the serum-producing horses and from the technicians who mounted specimens in his museums. The same attitude extended to the chemists who manufactured his drugs, to the analyst who assayed his products for purity and potency and to the pharmacist responsible for the formulation and presentation of his medicines. He hoped and expected his research scientists to bring fame and credit to his research institutes by virtue of the excellence of their work and the value of their contributions to scientific and medical knowledge. Wellcome's pursuit of excellence never faltered. It was conveyed to all his staff and, as a result, it became an integral and enduring part of his company's philosophy and practice. It became a basis for the establishment of standards and minimum requirements for medicinal products. Since then, the standards of testing medicinal products for quality (including potency, toxicity and stability) have evolved and kept pace with new technological advances. The principles so often expressed by Wellcome regarding the importance of quality have been so universally accepted that they have become the motivating force behind enactments which established drug regulatory bodies in most countries of the world.

Wellcome's determination to have only products of the highest quality linked with his name stemmed from an innate pursuit of excellence and the practical need to improve the quality of medical products. For instance, at the time he established his research laboratory to produce horse diphtheria antiserum, no tests were available anywhere for assaying the potency or, indeed, the quality of the serum produced. He therefore initiated research to devise such tests and John Mellanby, FRS, the first research biologist appointed to the laboratories, was given the responsibility of studying the globulins and other proteins from horse plasma and serum.

Research in developing new methods for producing improved biologicals was actively encouraged. For example, Dr P. Hartley (later Sir Percival, FRS), during 1920 and 1921, developed a medium for the production of diphtheria toxin. He also pioneered the freeze-drying of sera and other protein at low temperatures before he left to take charge of the Standards Laboratory at the National Institute for







Top left: Books concerned with regulatory controls
Top right: Handsome recognition from the Milwaukee County Pharmacists Association, 1934
Lower left: Large and little. A coffee and milk 'Tabloid' preparation for the First World War and a Glyceryl Trinitrate 'Tabloid' for angina ('Trinitrin')
Lower right: Announcement of The Royal African Society's Award of a Gold Medal to Sir Henry Wellcome, 1934
Centre: Chemist in the original Wellcome Chemical Research Laboratories

Medical Research. In 1936, Dr C.G.Pope developed a method for concentrating diphtheria antitoxin fractions from horse serum by preliminary digestion and heat denaturation of unwanted proteins.

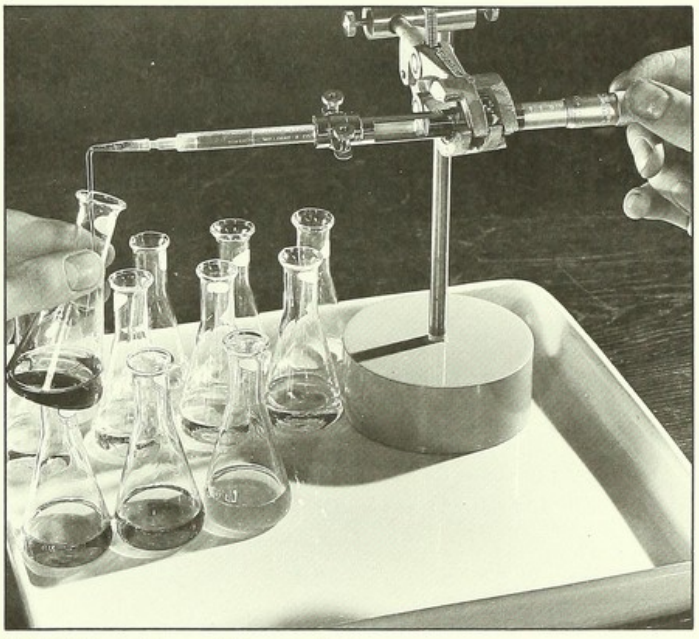
An early contribution to the science of biometrics was made by Dr J.W.Trevan who, in 1927, was confronted with the need to standardise insulin prepared from bovine pancreas. There was no chemical analytical method available and assay by biological testing appeared unreliable when it was found that the response of mice and rabbits varied from animal to animal. Trevan overcame the problem by applying statistical parameters to the results of the effects of insulin on a number of animals, an approach which has since been widely adopted for measuring activity of many other substances of undefined chemical composition including vaccines, antisera, vitamins and hormones. The extent of his contribution to biometrics and, in particular, to biological standardisation, was recognised by his election to FRS. Furthermore, he played a leading role in introducing sound statistical procedures into pharmacological research in Britain and subsequently abroad.

It was also appreciated from the work of Dale and his colleagues at the WPRL that crude medicaments with a possibly wide range of activities and variable potency should, whenever possible, be refined with the aim of producing a narrow and more specific activity of a predictable nature and extent. For example, at the turn of the century, Wellcome introduced standardisation of alkaloids based on assay of the active principle rather than, as was common practice, relying on the total alkaloid content.

Another development of far-reaching importance initiated by Henry Wellcome was the introduction of analytical control procedures at different stages of manufacture from raw material to the finished product. Responsibility for such testing was placed outside the control of the head of production, which meant that only the chief analyst, as opposed to the production manager, could authorise the issue of any batch of material for therapeutic use. Dr Graham Foster, who occupied the position of chief analyst for many years at Dartford, also served on the Pharmacopoeia and Pharmaceutical Codex Committees and played a prominent part in the compilation of the first British Veterinary Codex issued by the Pharmaceutical Society of Great Britain in 1953.

Another aspect of the early endeavour to improve the quality of issued medicinal products was the encroachment by Wellcome research staff into the field of clinical medicine in order to collect information on the safety and efficacy of their vaccines. For instance, Dr O'Brien was the first person in Britain to use the Schick Test and was a pioneer advocate of active immunisation against diphtheria. In

Importance of one aspect of development work–acceptability of product to 'patient'. The uncoated tablets caused cats to salivate but sugar-coating on the tablets prevented it



Dr J. W. Trevan's famous Micrometer Syringe

Above: Instrumentation in one of the modern analytical laboratories, Dartford
Left: Mass spectrometry in the Physical Chemistry Laboratory, Beckenham
Below: Checking eye drop containers after storage in the pharmaceutical development laboratories, Dartford
Opposite: Testing suspensions for separation in the pharmaceutical development laboratories, Dartford

course of time Dr H.J.Parish became well known for his clinical investigations of the efficacy and safety of Wellcome vaccines in children, regarding these as essential in order to have information on the quality of the products issued by the Company.

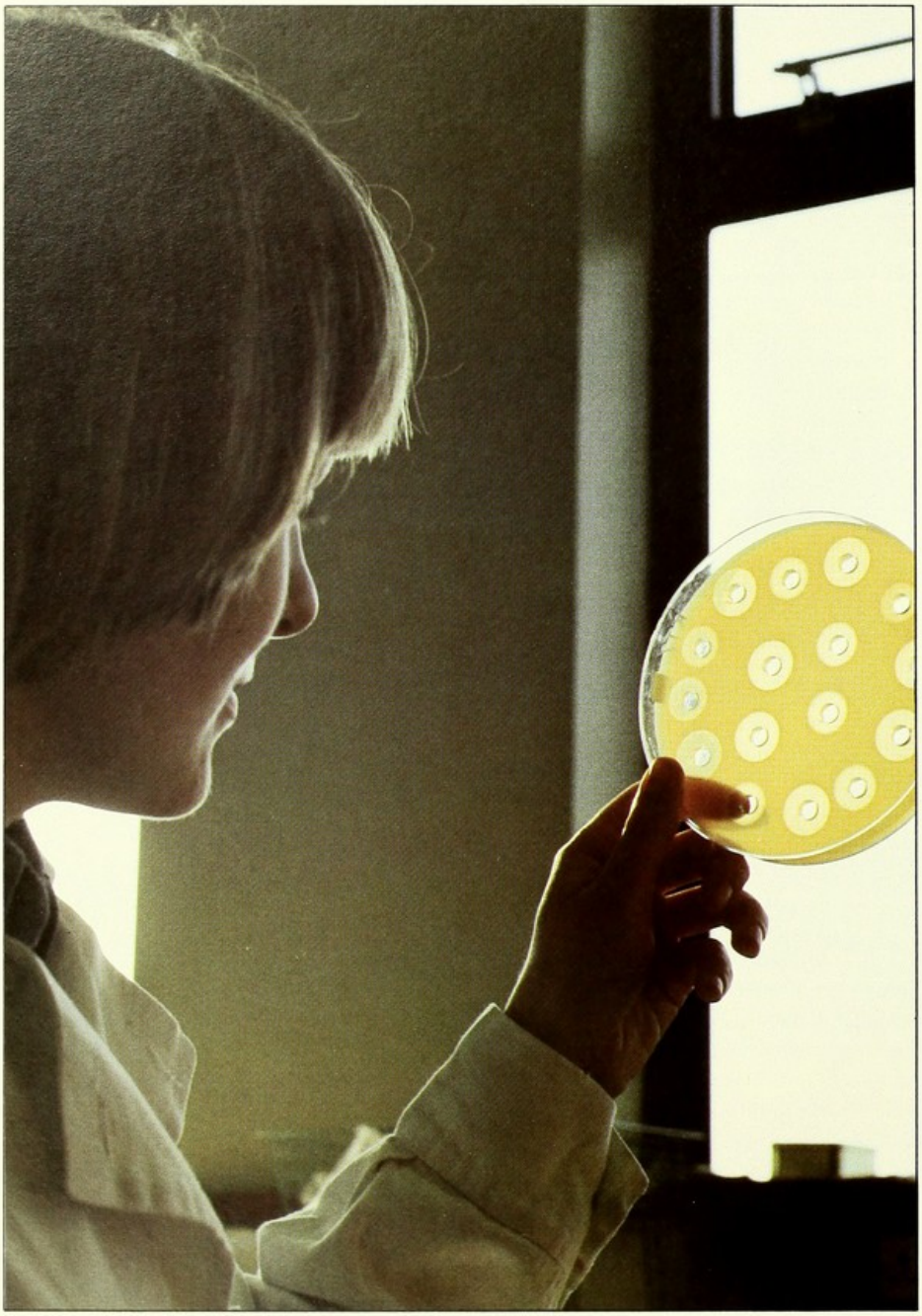
This work with biological products between the two world wars was extended to other products with the appointment of Dr F.Prescott in 1941 as clinical research director, based in London, with a remit to monitor the effects, beneficial and otherwise, of the Company's products in human subjects. This work increased and with the recruitment of more medical staff a Medical Research Department, which was later developed into a Clinical Research Division, was formed to evaluate new medicinal products, collect information on the safety and efficacy of materials on the market and to advise the Company on the nature and extent of information to be provided with each product.

The rigorous manufacturing standards and the extensive quality control procedures to which Wellcome products are subjected are set out in the Wellcome Code of Good Manufacturing Practice. This code applies to all manufacturing companies of the Wellcome Group irrespective of country or of whether the product is for human or veterinary use. The code provides standards for premises, equipment, documentation, training and every aspect of manufacturing procedure. Wellcome staff are members of pharmacopoeial committees concerned with the establishment of international standards for purity, analytical procedures and the potency and toxicity testing of biological products. Today the Wellcome Group employs nearly 1,000 staff on quality control and quality assurance alone.

A number of different laboratories within the Group are involved in optimising the chemical processes, in devising the best formulations to achieve maximum stability and acceptability to the patient, in working out stringent analytical specifications and procedures and ensuring that no batch is issued for sale unless it fully passes all tests.

As one example of these extensive testing procedures, checks conducted during the manufacture and packing of a batch of Septrin tablets total 2,000, at least half using automatic equipment to confirm high uniformity of weight and hardness during production of the tablets, and over 300 carried out 'on line' during the actual packing operations to ensure the highest possible reliability of the finished pack and its contents.

Accurate analytical testing, however, is not enough. Quality has to be built in throughout the production stages by the soundness of the production procedures and documentation, the high standards of premises and equipment, the training, diligence and meticulous



Above: Working in Virology (Quality Control) at Beckenham
Left: Examination of Sensitivity Disc for effectiveness of antibacterials
Below: Microbiological assay of potency of antibiotics in 'Otosporin' drops

attention to detail of everyone involved. This is what is known by 'total quality assurance'. Effectiveness in this total field is monitored by an International Division which, as part of its responsibilities, regularly reviews the technical and production operations of every unit within the Group and also its manufacturing agents around the world.

Playing an equally prominent part in the maintenance of standards in the industry generally and in the protection of the products and the Company's reputation in particular are those employed on patents. Within the Patents and Agreements Division of the Group R&D function, Wellcome staff are ever vigilant in the scientific detection of unlawful copyists of patented products.

The Trade Marks Department within the Secretariat similarly maintains a constant watch for infringement of trade marks and for counterfeit products round the world in order to protect the Group's markets and reputation.

Henry Wellcome's 'pursuit of excellence', a phrase which he loved, related to all his endeavours and not solely to quality of products. This is still the aim of the Company and lies behind its every activity, whether in research, development, production, marketing or publicity. It is of paramount importance that the physician should be able to prescribe, and the patient to receive, products of precision, efficacy and safety.

Quality Control Laboratory, Wellcome New Zealand Limited

At work and at play

'There's a time for work and a time for play' was a favourite expression of Henry Wellcome. It was embossed on the Company's programmes and publications for social events and outings at the turn of the century. Its first appearance followed the formation in 1899 of the Wellcome Club and Institute at Acacia Hall, Dartford – one of the first industrial sports and social clubs to be established in Britain.

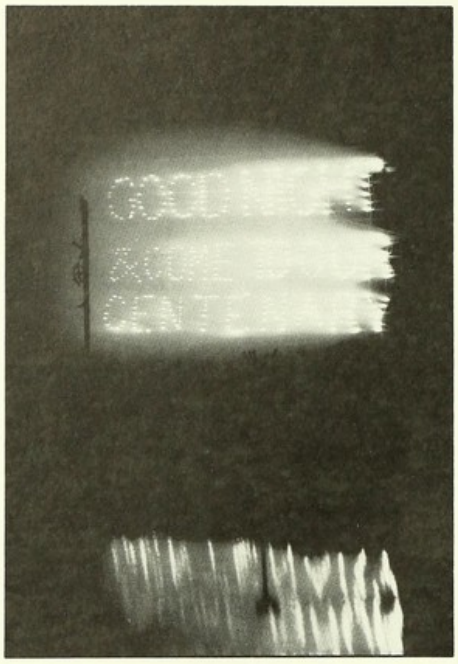
The care shown by the original partners for their employees was accompanied by a consistent demand for skill and discipline at work. Mrs Goodhind, an employee of the time, described the conditions when she was interviewed some years ago: 'To get into the factory at Dartford you had to be "just so". They didn't take anyone and it was quite a sought after job, 8.30 to 5 with just a lunch break. Seven shillings a week, and we *were* happy.' Mrs May Bermingham, who, as Miss May Preddy, worked at a later period (1908 to 1920) said, 'Working conditions would be foreign to the modern miss. No make-up allowed, no jewellery, no talking, no coffee or tea breaks. Girls sat on stools watched over by a supervisor perched at a high desk on a raised platform. At one time one could go to the cloakroom only at normal work breaks, but even then – no talking.' Some of these rigid rules persisted until just before the Second World War, and had as their basis the fear that the attention of the worker might be distracted in the middle of some important operation.

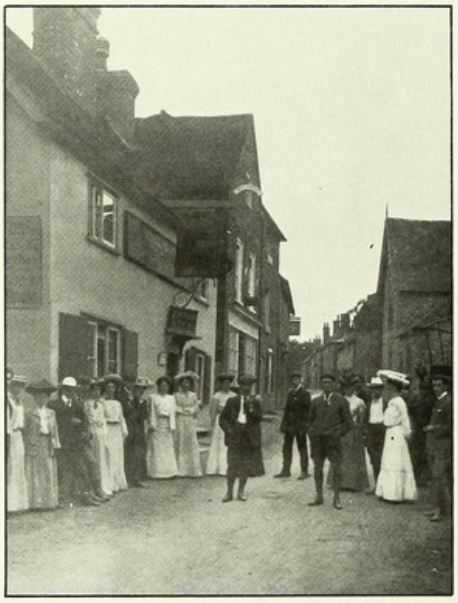
While Burroughs appears to have been the leading partner in employee welfare, Wellcome himself was never far behind. The annual outings were continued after the death of Burroughs; and the Wellcome Club was a practical example of his concern. The primary purposes of the Club were 'to promote harmony and social intercourse, to encourage mental and physical recreation and provide employees with a pleasant resort outside business hours.' At the opening of the Club in 1899 over 1,000 guests lunched in a large marquee after a service of inauguration in Dartford Parish Church and the opening by Wellcome of the gates of Acacia Hall estate using a golden key presented by the employees. There followed an afternoon of speeches and sports, and an evening of music and fireworks.

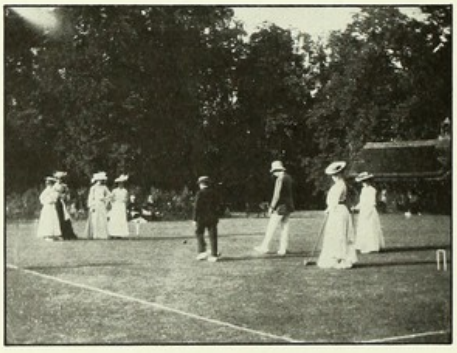
Even this occasion was dwarfed six years later when, in the same place, the Company celebrated twenty-five years in business. More than 1,000 employees mingled with distinguished guests. The London contingent travelled by special train from Cannon Street Station to Dartford. There was a full programme of almost every conceivable athletic and aquatic sport. The climax was a fireworks display ending with the words clearly outlined against the darkening sky 'We are twenty-five. Good night and come to our Centenary.'

Today, recreational facilities throughout the Group have kept pace

Right: End of 25th Anniversary celebrations, with fireworks display
Far right, top: Attractive maypole scene on same day
Far right, centre: Outing to hostelry in Kent in early 1900s
Far right, bottom: Croquet on the lawn at the Mansion, Beckenham (with chapel in the background) nearly twenty-five years before it became the site of the Wellcome Physiological Research Laboratories
Bottom left: Tent Fete at Dartford, 1905







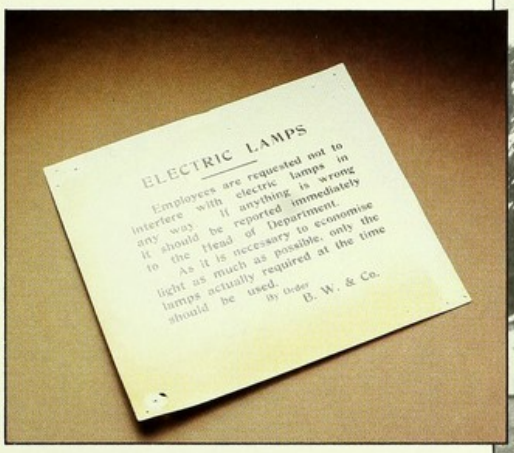
with changing needs but have never departed from Wellcome's original concept – 'I want the Club to be a resort and meeting place ... where all shall be knitted closer together in personal friendship.' Despite the discipline at work, and the quaint and sometimes irksome rules for employees, there was from the very beginning tremendous loyalty to the Company. It cannot be entirely explained by the difficulty of getting employment at the time. It was much more. It related, as it does today, to the type of product manufactured and its concern with saving life and improving health, to the standard of excellence which the Company has always set for its products, and not least to the continuous determination of the Company to make work and the opportunities for advancement as attractive as possible. The fact that all the distributed profits of the Company go to a charity, the Wellcome Trust, gives an added sense of corporate pride.

In 1945 it was decided to appoint, at the Wellcome Chemical Works in Dartford, the Company's first training and education officer. His brief was, through explanation, to develop understanding and co-operation at work, to break down the barriers of a 'them and us' attitude, and to improve communication at all levels. Much of this was achieved by the introduction of training schemes, well ahead of their time, which set a pattern in their field. High standards of management were demanded, and the general skill of *all* employees was improved by systematic training. This was a key factor in the successful expansion of the Company overseas.

At the laboratories in Beckenham it was clearly recognised that the research scientist depended not only on his own intellectual and physical resources but also on the team of assistants he was called upon to lead. Here again, greater attention was given to the recruitment and training of technicians and this developed into comprehensive schemes covering all grades of staff.

The policy originated by Burroughs in encouraging further education has continued and developed down the years throughout the Company. Courses now extend to study for doctorates, diplomas and degrees in marketing and management, languages, accountancy and many other qualifications.

The development of personnel activities was given further impetus in 1957 by the appointment to the Board of a full-time Personnel Director. A series of management courses was set up at Tunbridge Wells in Kent in the late 1950s. They involved more than 400 managers and other staff from all over the world and were designed to improve international communication and staff development throughout the expanding group. This continuing emphasis on consultation and training has played an important part in the quality of human and industrial labour relations within the



Above: BW offices in Snow Hill, Holborn, were among the first in London to be lit by the 'new Electric Light' Right: Ladies in fancy dress at one of the early Dartford garden parties

Company. Great care was taken to meet the changing social scene and industrial legislation of the '60s and '70s. In particular, special attention was devoted to smooth working relationships with the trade unions. In the early '70s, comprehensive consultation and negotiating machinery was set up.

Although the first Works Council was established as long ago as 1917, only rudimentary consultations were in evidence in the 1920s and 1930s, and it took the resurrection of the Works Council in 1949 to play its part in the general improvement of labour relations. Two-way communications have indeed replaced the old-time supervisor, as changing times and social attitudes have demanded.

In welfare, too, the Company has an enviable record. Sick pay schemes and holidays with pay were introduced at a very early date and managers were encouraged to watch over the welfare of those for whom they had responsibility. The care of Silas Burroughs and Henry Wellcome for employees and their desire to be in the forefront of industrial welfare have continued down the years. The National Cash Register Company, which in America at the turn of the century had promoted welfare work on much the same lines as Burroughs Wellcome, paid the Company the compliment of holding their annual convention in January 1903 in the Wellcome Club and Institute at Dartford, and visited the Works in June of the same year.

Right: Conning Tower, near Bournemouth
Below: A traditional garden party still held at Beckenham and other sites

From the press of the day it is evident that for overall conditions of employment, Burroughs Wellcome was regarded in the same light as the great Quaker companies of the era. This was reflected in one of H. G. Wells' novels, (*H. S. Markham Esq.*, published in 1915), where Burroughs Wellcome are referred to as being model employers, together with Cadbury and Lever Brothers.

The whole employment philosophy was given further impetus after the death of Wellcome. His will established a staff welfare fund which is still maintained for the alleviation of hardship and distress of employees *and* their dependants. In essence, the Fund gives assistance or facilities above those which the Company would normally provide. One of the best examples of its benefit to employees was the purchase of Conning Tower, a large private house in Poole, near Bournemouth, in 1955 'to accommodate employees in need of rest and recuperation.'

The Company has a progressive outlook on pensions. Henry Wellcome himself, as long ago as 1920, set up the first Wellcome Pension Fund. In the formation Deed he gave £110,166 to found the scheme. Since then various improvements have been made in pension benefits and they now compare with the best in the country. Similarly, pension schemes, suitably adapted to local conditions, have been established throughout the Group. The Company has also been in the forefront in endeavouring to protect existing pensioners from the effects of inflation.


Septrin
Lanoxin
Daraprim
INSULIN INJECTION B.P.
80

The past thirty years

The growth of the Company in the past three decades has been dramatic. In 1950, as described earlier, the Company had come through a long period of stagnation and relative decline and sales were less than £9 million per annum. It was only partially deployed internationally and its product range was incomplete. Today sales are over £400 million per annum, of which 38 per cent occur in the Americas, 29 per cent in Africa, Asia and Australasia, 18 per cent in Europe, 15 per cent in the UK. Its share of the world market has steadily increased and in recent years the percentage increase in exports has been double that achieved by the British pharmaceutical industry as a whole. The Queen's Award for Export Achievement was obtained in 1970, 1971, 1976 and 1979; and in 1971 also for Technological Innovation.

Wellcome is now a truly international company trading in virtually every country of the world. A steady stream of major new products, the life blood of any innovative company, has emerged from high investment in a well-directed programme of research. Large-scale capital expenditure in factory plant and equipment in the UK and in more than twenty production units overseas has enabled the Group to meet an increasing demand for its products. Human and veterinary vaccines and medicines, diagnostic reagents, insecticides, industrial and dairy hygiene products and equipment are all playing their part. Acquisitions, enterprise in marketing and selling, and increased activity in every medical and veterinary market of any size in the world have all contributed to the corporate success.

This remarkable transformation did not happen overnight or by accident. It was the result of a carefully planned long-term Board strategy supported by the singular devotion of many experts and senior managers throughout the Group. The first objective was to increase revenue as all the other parts of the strategy depended on finance being available. This was achieved by introducing a much greater sense of commercial awareness throughout the Group and by improving the marketing and selling of the Company's existing range of products. This was successful in that sales increased by 75 per cent between 1949 and 1952.

Mention must be made of the crucial role of the United States company during this period and of the importance within that company of its 'Empirin' range of analgesics. Without the revenue brought in by 'Empirin' the parent Board would have been hard put to find the finance needed to implement its strategy for expansion.

The second objective was to increase and improve the product range both from new research products and by diversification through acquisitions. As already described, the Company was late in entering the potentially lucrative research field of chemotherapy.

Left: Production of 'Linctifed' Expectorant at Crewe

Below: Production of 'Septrin' Paediatric Suspension at Dartford

The first steps to remedy this were taken by Dr Kellaway in the late 1940s and were vigorously followed by Dr Adamson when he became Research Director in 1953.

A steady stream of commercially important synthetic drugs began to emerge in addition to important newcomers to the range of medical and veterinary vaccines. The late 1960s were particularly important with the marketing of 'Septrin' and 'Zyloric', but the increasing requirements imposed by governments world wide on the testing and marketing of new drugs have slowed progress in the '70s. The majority of the top products in the company today stem from this thirty-year period of research.

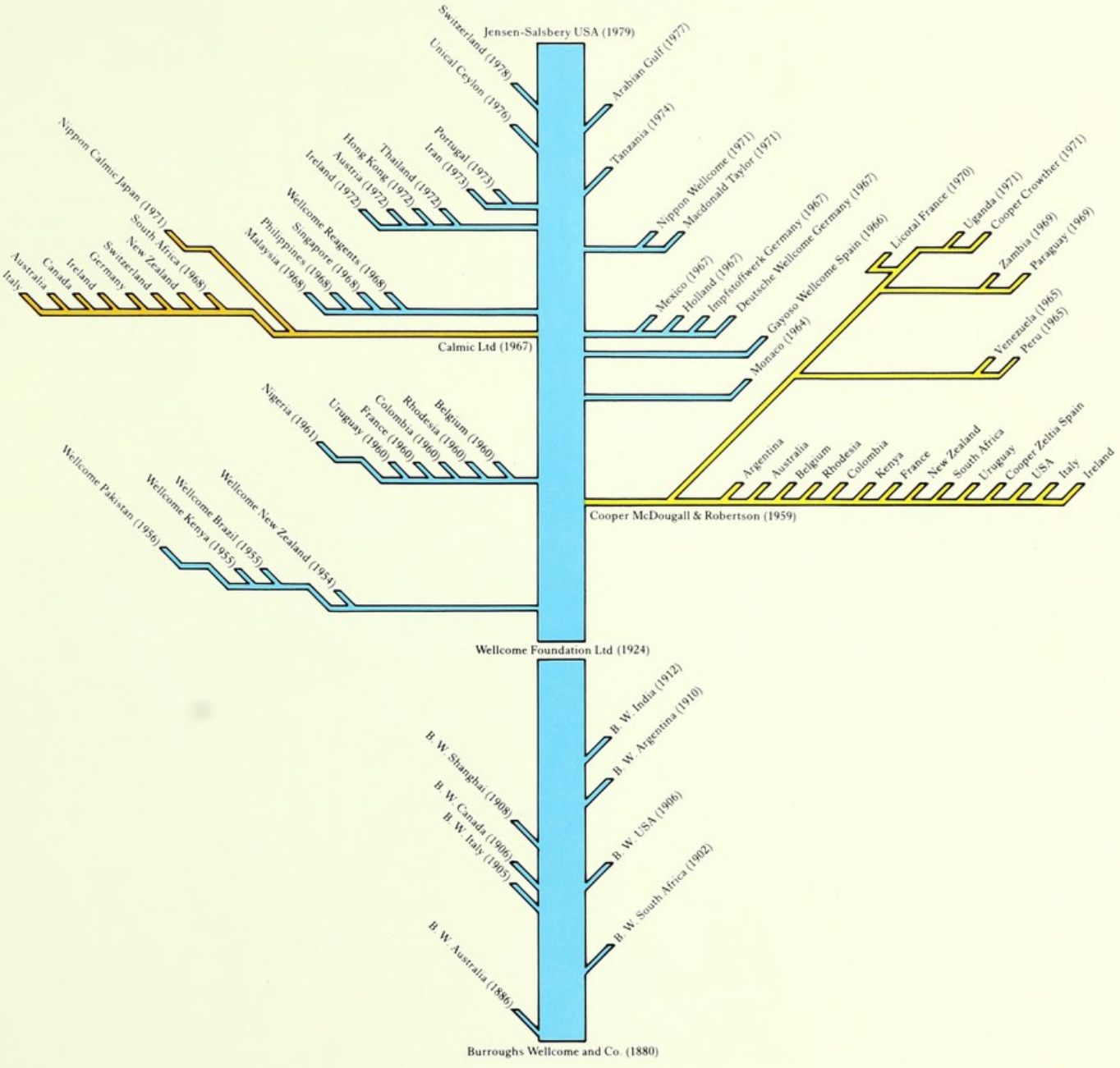
Along with basic new discoveries went imaginative development work into formulations which would extend the uses of these discoveries. Cyclizine, first marketed as 'Marzine', the travel sickness remedy, was combined with ergotamine tartrate to yield 'Migril', commercially much more important as a treatment for migraine. 'Actidil', a potent antihistamine used for the treatment of hay fever, was combined with other drugs to create the 'Actifed' range of cough-cold remedies which achieved major commercial importance.

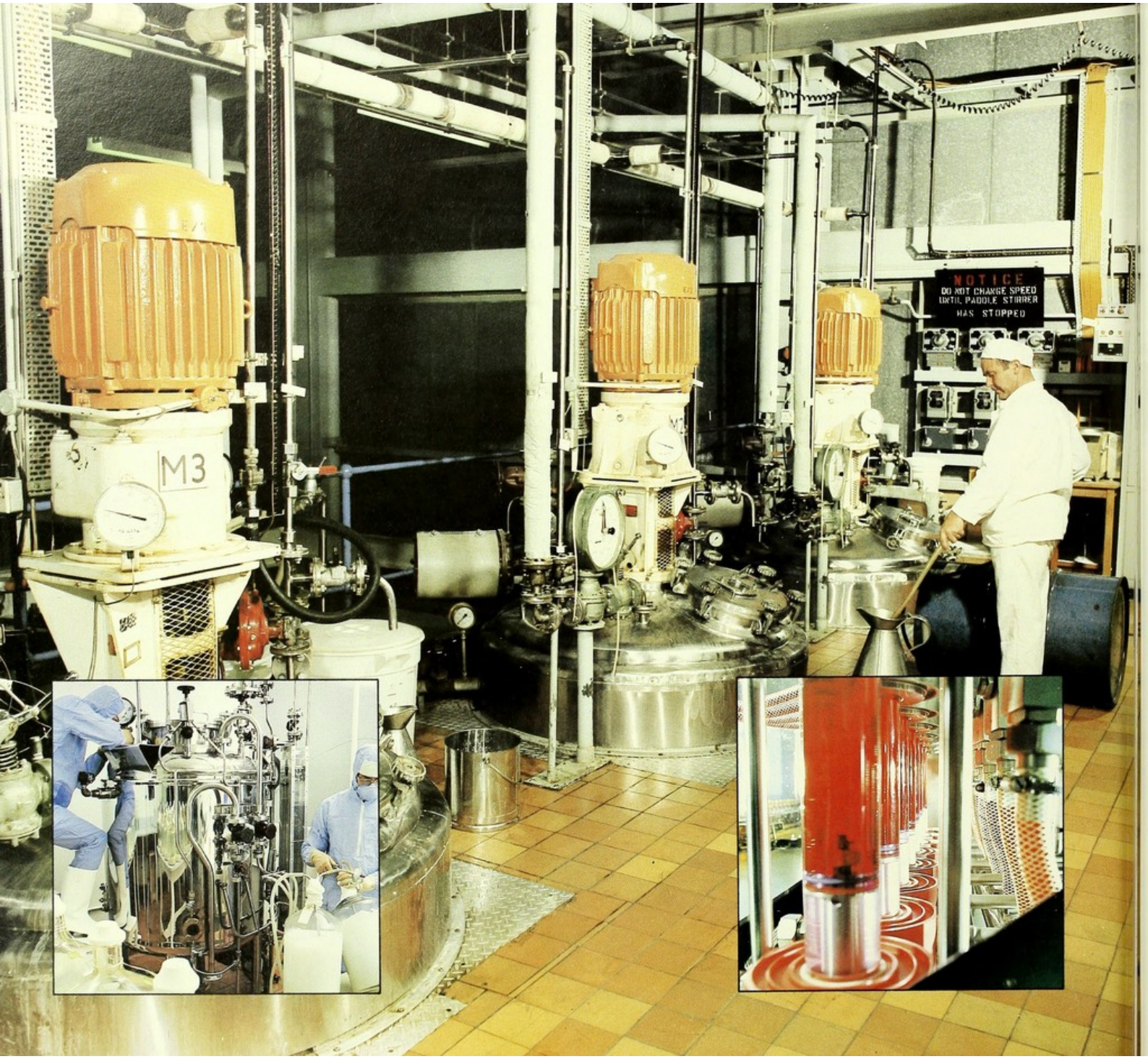
The third objective of the Board was to increase market penetration overseas. The successes of Research and Development not only greatly increased sales and revenue in existing territories, thus liberating more funds for expansion, but steadily over the years created a more balanced product range which made easier the opening up of new territories overseas. In 1950 there were only eight associated houses, with manufacture in only four. By 1979 these had grown to sixty significant subsidiary companies and five associated companies as shown opposite.

The first major step was the acquisition in 1959 of the long-established company of Cooper, McDougall & Robertson Limited. This, as described earlier, not only opened up an important network of overseas trading companies, but provided additional animal health products to those in the Wellcome range. The acquisition therefore also satisfied the second objective of the Board. The next stage was a major expansion into Europe. Before 1960 there was only one Wellcome company in Europe (Italy) in addition to the UK, but between 1960 and 1970 a further seven establishments were opened and four between 1970 and 1979. Likewise between 1954 and 1960 important companies were created in New Zealand, Brazil, East Africa and Pakistan and in the 1970s many companies were formed in South East Asia.

In most new territories the first step was to work through local agents and only when the business had built up to a certain level did Wellcome create its own company. A great deal of the success in

Growth of an International Company




M3
NOTICE
DO NOT CHANGE SPEED
UNTIL PADDLE STIRRER
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building up these overseas companies and working out suitable arrangements with the local distributors was derived from the drive and enthusiasm of Dr Fred Wrigley, who joined the Board as Sales Director in 1957 and retired as Deputy Chairman in 1974. The creation of so many overseas companies, many with their own production facilities, might have been expected to reduce direct export from the United Kingdom but, in fact, vigorous development of new markets, particularly in the Middle East, and the greatly improved product range with the new research products introduced in the late 1960s resulted in direct exports continuing to increase.

In the middle of this activity another British company, Calmic Limited, with overseas connections, was acquired, in 1967. This company with its headquarters and production facilities at Crewe in Cheshire had a useful range of medical and consumer products and a hygiene service. Smaller companies, those of Hadleigh-Crowther, specialising in dairy hygiene products, and Macdonald Taylor in surgical dressings, were purchased in 1969 and 1971 respectively.

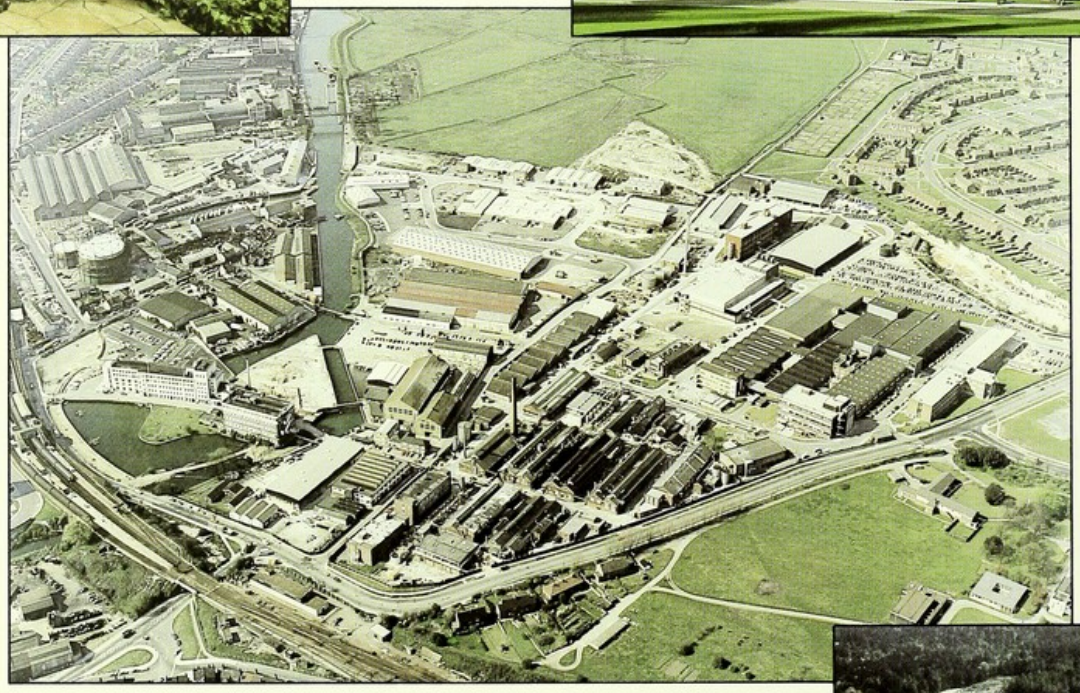
During this thirty-year expansion period changes in the top organisation of the company were made in good time to accommodate the success achieved and to create the framework for further success. Under the Chairmanship of Sir Michael Perrin (1953-70) company activities which had operated largely independently of each other were made to feel themselves part of a single organisation. In 1967 three deputy chairmen were appointed, the late Dr D. E. Wheeler (formerly Managing Director) to co-ordinate central group activities such as research and development, production and finance, Dr Fred Wrigley to co-ordinate medical sales and Wellcome companies world wide and to be Chairman of Calmic, and Mr A. A. Gray to be responsible for all veterinary sales world wide and to be Chairman of Cooper, McDougall & Robertson. Regional managers were appointed for the major regions of the world to co-ordinate all companies in their region whether Cooper, Calmic or Wellcome, and central marketing functions were set up. When Mr A. A. Gray took over the Chairmanship in 1971 a fully regional structure was set up with Main Board Directors responsible for all activities in their region. Mr A. J. Shepperd, the present Chairman, succeeded Mr Gray on the latter's retirement in 1977. He introduced further changes in the regional structure and gave explicit acknowledgement to the importance of overseas markets by creating an export division with responsibilities for increasing sales in those territories where the Group does not manufacture. The Company has been quick to identify the medical, veterinary and hygiene needs of the Middle East and elsewhere and to achieve significant sales.

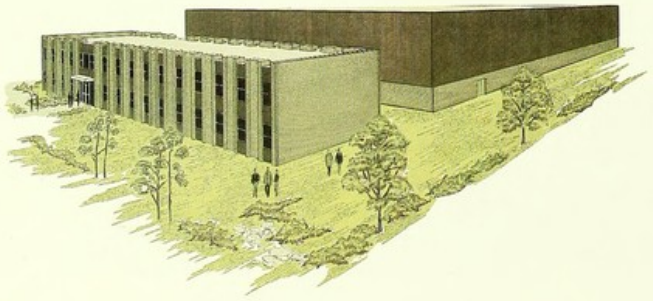
Stemming from these Board changes during the past fifteen years

Left: Liquid Production Area, Dartford
Left, insert: Production of 'Actifed' Compound Linctus at Crewe
Inset, far left: Diphtheria Vaccine production, Beckenham

Above: Manufacture of 'Myleran' tablets, a cytostatic agent
Right: Stage in the manufacture of a Wellcome Insulin at Dartford

Left: Nairobi, Kenya
Right: Impression of new Chemical Research Laboratory, Beckenham (Completion 1981)





Above: Aerial view of Wellcome Production Centre, Dartford
Left: Impression of new headquarters and production centre of Wellcome Ireland Limited at Tallaght, Co. Dublin, to be opened 1980
Right: BW Co., USA, Production Centre, Greenville, N. Carolina

and to meet the ever increasing needs for senior managers in the overseas companies, there was tremendous activity in developing, promoting or recruiting and then training suitable staff.

A carefully planned extensive programme of capital expenditure accompanied and assisted the growth of the Group. The Research Laboratories at Beckenham had to be modernised and extended to meet the demand for the virus vaccines, the growing sophistication of research and increasing government requirements world wide. Dartford, still the main production centre for the Group, was in urgent need of modernisation and expansion if it was to support rapidly increasing world sales. Nearly half the buildings existing at Dartford in 1950 were demolished or downgraded to other duties and additional buildings erected to treble the facilities on the site.

Expenditure is still continuing. The Crewe site has been modernised and extended to become Wellcome's second largest manufacturing unit in Europe. Production facilities have been installed in Mexico, Nigeria, Brazil, New Zealand, Pakistan and existing production facilities completely rebuilt, extended or relocated where necessary in Belgium, Italy, Australia, India, South Africa, West Germany and Spain.

Perhaps the most radical single change in the Group has been the move of the United States company from Tuckahoe, New York, to two

Right: Packing Hall, Wellcome Pakistan Limited, Karachi
Centre: Burroughs Wellcome Inc., Montreal, Canada
Below: Administrative Headquarters of UK and Ireland zone at Crewe Hall, Cheshire. The Jacobean exterior has been restored

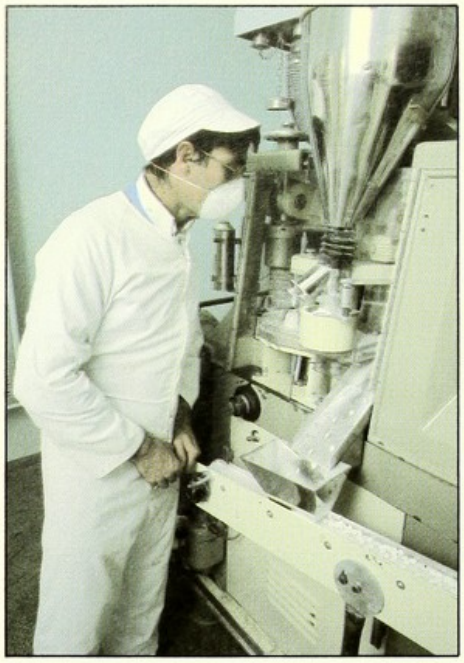
sites in North Carolina. This was a brilliant exercise in industrial relocation and owes much of its success to the individual commitment to the project of Mr F. A. Coe, President of the United States company. The company had outgrown its site in Tuckahoe where it had been based since 1925. An extensive survey indicated that, on the grounds of land values, building costs and labour availability, the company should move to North Carolina. Production transferred to Greenville in 1970 while Administration and Research moved to Research Triangle Park in Raleigh in 1971. An added attraction of the Raleigh location was its proximity to three major universities which offered two medical schools and a school of pharmacy. The whole operation was a tremendous feat of organisation involving the smooth transfer of 339 familes from New York to North Carolina with the loss of only a few key employees who preferred not to move. In the decade since the move was made, Burroughs Wellcome Co., USA, has continued its dramatic growth. It now employs 3,300 people and continues to make a major contribution to Group profitability.

All this planned growth needed money, a great deal of money, which as a private company Wellcome could not obtain from the stock market. Fortunately an understanding had been established between the Board and the shareholders of the Company, the

Right 'Drapolene' production at Crewe
Below right: Some of the major products of the Group

Right: Deutsche Wellcome, West Germany
Lower right: Wellcome Australia Ltd.

Left: Assembly hall at Crewe
Left:, inset: Last stages in packing at Dartford before shipping



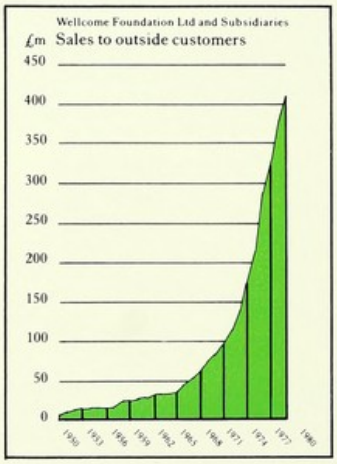
Left: Tablet manufacture at Dartford
Bottom: Production of 'Zyloric' at Dartford

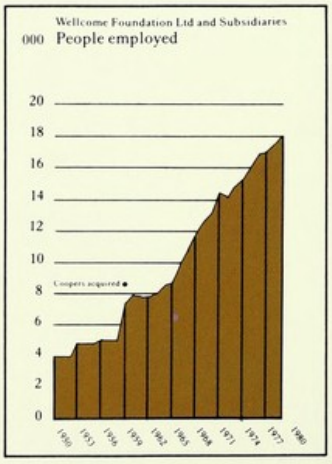
Wellcome Trustees, during the early days of Sir Michael Perrin's Chairmanship, and the normal commercial needs of ploughing back into the Company a substantial proportion of the profit of a company such as this were fully understood and accepted. In fact, between the years 1950 and 1979 nearly 70 per cent of the net profit of the company after tax was ploughed back and not distributed to the shareholders. Without this the Company would not have been able to grow at the pace achieved. The Chairman in the 1957 Annual Report stated:

'I believe that this period (1953-57) will be seen, in the future, as one in which the preparation for further growth and development has been of even greater importance than the improvement which has certainly taken place in the sales and profits of the Group.'

These words proved prophetic. In 1966 and 1968 respectively the Company launched the two major products, 'Zyloric' and 'Septrin.' Because of the foundations laid, it was able successfully to exploit their tremendous commercial importance on a world-wide basis. The result was dramatic, as a glance at the diagrams below will show, and the Company 'took off.' The Wellcome Trustees have got their reward for patience and understanding by greatly increased distributions in recent years.

A commercial realism, a vibrancy and vigour have come into the pursuit of business throughout the world that would have brought a glint into the eye of Silas Burroughs and a very personal satisfaction to Henry Wellcome.





Our business is prospering.
I trust that with united feelings
and united strength we may
realize our best hopes

Yours ever sincerely

Henry S. Wellcome

'Our business is prospering. I trust that with united feelings and united strength we may realise our best hopes.' A letter from Henry Wellcome to Silas Burroughs 28 July 1887.

'Grace with virility and verve...'

The Unicorn was first registered as the house mark of the Company in 1908. It has been variously described, both within the Company and outside it, as 'a Symbol of Excellence', 'a Mark of Distinction', 'a Symbol of Strength and Purity' or occasionally, less accurately, 'that horse'.

Why Henry Wellcome chose this mythical beast as the permanent mark of Burroughs Wellcome & Co., and later The Wellcome Foundation Limited, is not clear. Possibly the historical lore of the Unicorn appealed to him, as he was almost certainly aware of the most popular of the legends – that the horn acted against any poison and that in powdered form it was a valuable addition to medicinal preparations.

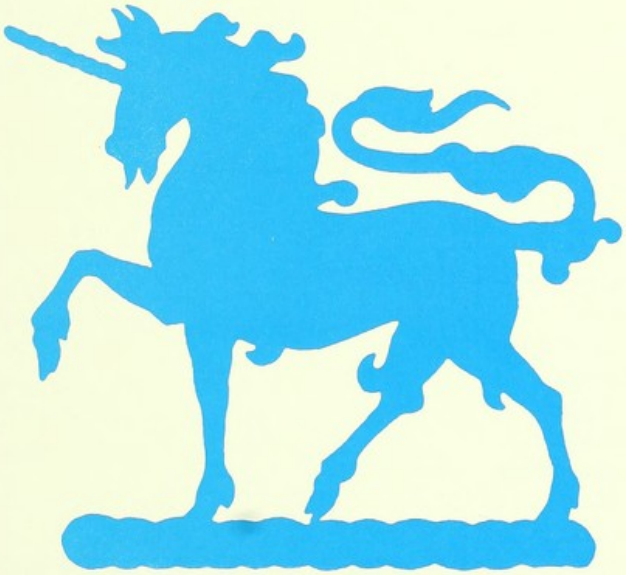
What *is* known is the outline of the design required by Wellcome. With the passion for detail which characterised most of his activities, Henry Wellcome gave clear specifications to the designers. (He had more than one artist working on the project). He wanted 'delicacy and refinement, and grace with virility and verve, and the possiblity of fleetness and an expression of alertness which were supposed to be characteristic of the beast'.

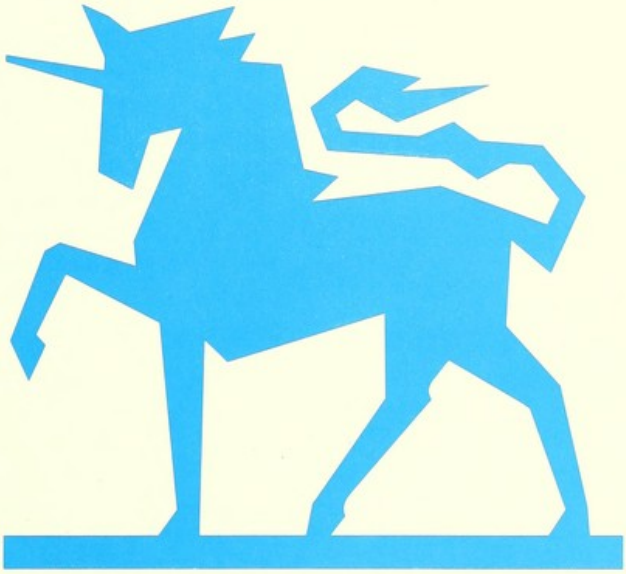
It was a tall order, but one which, after several attempts, a Mr Scobie of the College of Heralds finally met, although not entirely to Wellcome's satisfaction. Even in his acceptance of this design, cabled from overseas, Wellcome had to point to several minor modifications which were required.

> 'The horn is not quite as perfect as it was. The shaping of the upper part of the right hind leg is not quite satisfactory and the hooves require very slight modifications; the chest is a little exaggerated. Generally speaking it is very effective and has good spirit. I have cabled the word "yes".'

In 1968, when the Company's corporate image was examined by design consultants, the Unicorn did not escape intact. It emerged a more streamlined creature, nearer in fact to that which Henry Wellcome had sought sixty years earlier.

Of the distinctive marks carrying the reputation of pharmaceutical products to the furthermost parts of the globe, few can be more widely known than the proud, symbolic Unicorn of Wellcome.





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