

A SHORT NOTE ON THE ROSS FOUNDATION

AND

THE DISCOVERY AND USE OF ALBUCID SOLUBLE (sodium sulphacetamide) IN OPHTHALMOLOGY

BY

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The W. H. Ross Foundation for the Study of the Prevention of Blindness (Edinburgh) was registered on March 15, 1935, and was later extended to all Scotland. Mr. William Henry Ross, O.B.E., was born in 1862 and was educated in Edinburgh. He made a remarkably successful career with the Distillers' Company, which in a large measure he created by assembling in one company many distilleries which had previously been in competition with each other. Mr. Ross became chairman of the company in 1925, but after 10 years lost his sight and for this reason resigned his chairmanship. He died in August, 1944, having seen his Foundation at work for 9 years and being much gratified thereby. He evinced a spirit of devotion to the public interest throughout his life. Not only was he generous in thought; he was equally so in action.

His reaction to the experience of blindness was a desire to be of service to others. While his sympathies were naturally drawn to the assistance of those who were already blind, he came to realize that the prevention of blindness offered a greater prospect of securing valuable and lasting benefits for the community. His attention had been drawn to the fact that there was a pressing need to deal with the dangers to sight incidental to the many kinds of industrial employment, and he became thoroughly alive to this aspect of ophthalmology.

This being so, the writer put forward a scheme for the study of the causes and prevention of blindness, and Mr. Ross decided to endow a foundation for this purpose, to be called "The W. H. Ross Foundation for the Study of the Prevention of Blindness". Three honorary trustees were appointed to give practical effect to the scheme envisaged:

A. H. H. Sinclair, M.D., F.R.C.S.E., F.R.S.Ed., then President of the Royal College of Surgeons and Surgeon-Oculist to H.M. the King in Scotland.

W. H. Fraser, W.S., of Messrs. Fraser, Stodart, and Ballingall, Writers to the Signet, 16 Castle Street, Edinburgh.

H. J. Ross (now Sir Henry Ross, and chairman of the Distillers' Company) son of the founder.

Dr. Sinclair was appointed chairman of trustees by the founder, and the general lines of procedure were communicated by him to the founder and the other trustees. The substance of these proposals may be stated briefly as follows: All research undertaken under the auspices of the foundation would in the first place be initiated by the foundation. It was recognized that the academic centre in Edinburgh, the Eye Department of the Royal Infirmary there, and the large and varied industries of the city and surrounding country, provided unique advantages for the successful pursuit of the project in view. The scientific studies which would be

fundamental to this work could be adequately undertaken only under expert guidance and with the resources of fully equipped laboratories: this advantage was secured in the Medical School of the University of Edinburgh. The work would be carried out by trained departmental assistants together with a selected oculist. Experts would be encouraged to publish the results of their work under their own name in a journal of their own choice, the only proviso being an acknowledgment that the work had been carried out under the auspices of the Ross Foundation. Two reprints of each published paper would be gladly accepted by the foundation. Clinical research would be undertaken in the Royal Infirmary of Edinburgh and elsewhere, under the guidance of heads of departments. All expenses would be met and honoraria given by the Ross Foundation as each case required. Industrial undertakings would be kept in view for early action.

It was decided that an advisory committee should be formed and that in the first instance the members of the honorary staff of the Eye Department, the Royal Infirmary, should be members *ex officio*, with Dr. Sinclair as convener and Dr. C. W. Graham as hon. secretary. The first meeting of the advisory committee was convened on March 29, 1935, to consider preliminary arrangements.

It was realized that the problem of the prevention of blindness could with advantage be divided into two parts: one dealing with industrial injuries, either by improving existing preventive measures or devising new ones, and the other with scientific experimental research.

It was decided to have a statistical survey made of such diseases and conditions arising from injury as occurred in considerable numbers in the routine work of the Eye Department of the Royal Infirmary. At the same time it was proposed that a broad analysis should be made of the causes of blindness found as a result of the examination of persons who had appeared before the medical officers of the Regional Clinic for the Blind in Edinburgh. A certifying clinic for admission to the Blind Register had been established in Glasgow in 1929 and clinics were later established at Edinburgh, Dundee, Aberdeen, Dumfries, and Inverness. This arrangement embraced the whole of Scotland.

Early in 1937 it became evident to the advisory committee that continuity of progress demanded the services of a suitable ophthalmologist who could devote his whole time and energy to the work of the foundation and the trustees agreed that a salaried ophthalmologist be appointed. Colonel R. M. Dickson, O.B.E., R.A.M.C., who had first class testimonials from the War Office and from the late Sir William Lister and Sir John Parsons, and had had wide experience in ophthalmology both in the United Kingdom and in India, was appointed in October, 1937.

In 1937 the Foundation was fortunate in securing from the trustees of the Lister Memorial Trust the lease of a small self-contained house, 20 Lauriston Place, as office and headquarters. This office lies near the Medical School and the Royal Infirmary and no outlay on building was necessary.

In 1939 a supplementary deed of trust was granted by Mr. W. H. Ross, with the consent of the trustees, enlarging the scope of the operations of the foundation. The title was altered to meet this development and now reads: "The W. H. Ross Foundation (Scotland) for the Study of the Prevention of Blindness". In view of the extension of the activities of the Foundation to Scotland as a whole, it was resolved that additional members be appointed to the advisory committee by the trustees, and the Department of Health for Scotland appointed a liaison officer.

The first scientific investigation under the auspices of the Ross Foundation was made by Dr. A. J. Rhodes, senior assistant, Department of Bacteriology, into the bacteriology of the coal mine and coal-miners (Cameron, 1939).*

The coal face was found to be sterile when the coal was broken off it, but coal which was being conveyed in small trucks to be taken to the surface very quickly became infected with bacteria.

The conjunctival flora of 658 healthy coal mine-workers from four different pits has been examined. In two pits the on-cost-worker evidently harboured a more profuse flora than the other workers. Apart from this, below-ground workers did not harbour flora essentially different from those of surface workers. The following potentially pathogenic organisms may be found in all groups of workers in significant quantity: *Streptococcus viridans*, *pneumococcus*, *Diplobacillus of Morax*, haemophilic bacilli, and *B. coli*.

It is considered that the conjunctival flora of coal-miners is potentially dangerous and that the source of infection in hypopyon ulcer is from organisms already present in the conjunctival sac. Those most liable to contract the disease are those most exposed to corneal trauma—the miners and brushers.

Hypopyon ulcer is frequently spoken of as the "pneumococcal ulcer", and certain workers have found these organisms in 60–70 per cent. of cases (Duke-Elder, 1938). In this series of cases, however, pneumococci occupy a relatively unimportant place (11.6 per cent.). My observations show that, rather than being a condition of almost specific (*i.e.* pneumococcal) aetiology, hypopyon ulcer may be associated with a wide variety of organisms. Further, with the exception of *Streptococcus haemolyticus* and *Staphylococcus aureus*, all the organisms isolated in this series are those that I have previously demonstrated (1939a, b) in normal conjunctival sacs. There would not appear to be any valid reason why these two organisms also should not occur in healthy sacs.

It may be said that my investigation tends to lessen the emphasis to be placed on the purely infective element in hypopyon ulcer, for it would appear that, although in certain cases recognized pathogenic organisms may be responsible, in others organisms usually regarded as commensals may be isolated. In the latter cases it is probable that the influence of the traumatizing particle itself, or the powers of resistance to infection of the corneal tissue, are more essential factors in the causation of the ulcer than the presence of bacteria.

In the pathogenesis of any one case of hypopyon ulcer, therefore, three variable factors must be considered: (*a*) the bacterial flora of the conjunctival sac of the traumatized eye; (*b*) the nature of the traumatizing particle; (*c*) the resistance of the corneal tissue to infection.

On the outbreak of war in September, 1939, Col. Dickson was recalled to the army. The chairman at that time represented the Royal College of Surgeons on the Board of Management of the Royal Infirmary of Edinburgh, and he resigned this position with much regret in order to be free to undertake the work of the foundation, which he directed until Col. Dickson's release from the army in 1941.

Albucid

Late in 1939 the chairman became interested in the treatment of mustard gas injuries to the eye and proposed to Prof. Clark of the Department of Pharmacology and Materia Medica that a research be instituted on this subject under the auspices of the Ross Foundation. No form of treatment was then known that would influence the destructive effects of the gas on the conjunctiva and cornea. The chairman appointed Dr. G. I. Scott as oculist in this research.

**British Journal of Ophthalmology* (1949), 33, 368.

After 6 months' intensive study the results of the research proved highly successful and the report made by Prof. Clark so impressed the War Office that the experiments were repeated on a large scale at the Gas School at Porton, and Dr. G. I. Scott, now Major Scott, R.A.M.C., was seconded for the ophthalmic part of the investigation. The results of the research were confirmed, but their publication had to be postponed until after the war.

The effectiveness of albucid soluble (sodium sulphacetamide) in lesions of the eye was clearly demonstrated in this research. Its great importance in the first-aid treatment of industrial eye injuries is discussed below.

The following letter from Lieut.-General Sir Alexander Hood, C.B.E., K.C.B., Director-General A.M.S., is a testimony to the value of the work:

Arthur H. H. Sinclair, Esq., M.D.,
F.R.C.S.E., F.R.S.Ed.,
The Ross Foundation,
20 Lauriston Place, Edinburgh.

The War Office,
London, S.W.1.
23rd May, 1947.

Dear Dr. Sinclair,

Will you kindly convey to the Governors and workers of the Ross Foundation and to their collaborators in the University of Edinburgh the genuine appreciation of the very great debt that the Services and the whole country owe them for their valuable work in the problems of counteracting infections of the eye following mustard gas.

Provisionally we were not called upon to avail ourselves of Albucid on a large scale for the treatment of mustard-gas lesions, but it was a tremendous asset to know that we had to hand a compound such as this available, if required.

I am well aware of the value of Albucid and how it is proving itself in the industrial world not only in the alleviation of distress but in reducing the man-hours lost through infections of the eye.

To you, as Chairman, our thanks are specially due for the initiation, organization and effective pursuit of this work on this important research.

The practical application of this research to the mitigation of suffering is worthy of the highest praise. The Ross Foundation could not have done more to fulfill the aims of its Founder, and is to be congratulated sincerely in fulfilling so amply his great object.

Yours sincerely,
(signed) Alex. Hood.

Soon after its discovery sodium sulphacetamide came into use in the Royal Infirmary of Edinburgh for the treatment of hypopyon ulcers, which had hitherto been treated by cautery, the thermophore, or pure carbolic acid. *Paterson (1931) tabulated the results of treatment as follows:

Average stay in hospital	29.4 days
Average time off work	6 months

In 182 cases treated in the Royal Infirmary, Edinburgh, the degree of visual acuity achieved after treatment was:

Below 6/60	6/60—6/24	6/24—6/12	Over 6/12	Enucleated
96	62	53	33	18

†Cameron (1949) writes:

From 1942 to March, 1947 (when he left the Infirmary), sodium sulphacetamide was used in routine treatment of hypopyon ulcer and almost entirely replaced other drugs. After penicillin came into general use it was given to supplement sodium

*Paterson, J. R., *Trans. ophthal. Soc. U.K.* (1931), 51, 341.

†Cameron, E. H., *British Journal of Ophthalmology* (1949), 33, 368.

sulphacetamide, but only in the now rarely occurring obstinate cases. Pure powdered undissolved sodium sulphacetamide was used, and also a 30 per cent. solution.

The majority of the cases were miners and, in 1946, 30 cases were admitted of which 21 were miners. Of these 21, only 3 spent more than 3 weeks in hospital; 8 were in the ward for less than 10 days. *No miner's eye has been lost since 1942*, as compared with 10 per cent. in 1931. Of the 21, 4 had vision of less than 6/60, 6 of 6/36 or better, and 9 of 6/18 or better (in two cases there was no record).

When Col. Dickson returned to the Ross Foundation from the army in 1941, sodium sulphacetamide was put into his hands by the chairman and he was informed of its great success in the treatment of corneal ulcers in the Royal Infirmary. It was decided to make a trial of its use in coal mines in the first-aid room. With the sanction of the Ministry of Fuel and Power and the collaboration of H.M. Divisional Inspector of Mines in Edinburgh, thirty collieries were selected for making a practical trial of the new eye drops, which was begun in December, 1941. The preparation known as Eye-Drops No. 1 (0.5 per cent. cocaine and hydrarg, perchlor, in castor oil, 1 in 3,000) was replaced by 10 per cent. albucid soluble (sodium sulphacetamide) eye-drops. It was explained to ambulance room attendants that early treatment was essential as the danger of ulceration increases with the lapse of time.

Results in these thirty collieries after 12 months' experience were as follows:

1,832 eye injuries were treated with albucid soluble eye-drops: 95.86 per cent. of the patients returned to work without any loss of time: during the 12 months only 54 persons injured failed to report at the ambulance room: all had to be paid compensation and they represent a loss of working time of over 4 years.

The value of the albucid treatment in preventing infection in collieries was so evident that it was important to encourage its use in the wider field of industry in general. Thirty factories were selected for trial by H.M. Medical Inspector of Factories in Scotland. In these factories different manufacturing processes were carried on and a medical officer was available to supervise the treatment and the keeping of records. Engineering was largely represented, chiefly iron and steel works. The other industries were chemical works, including factories which make explosives and synthetic products, ship yards, rubber works, and tobacco factories. All the works were visited after 6 months' trial; the results are summarized below:

Total number of employees	121,775
Eye injuries treated	11,953
Patients returned to work without loss of time..	98.87 per cent.

Complete records of employees off work on account of eye injury before the introduction of the new treatment are not generally available, but it is recognized that there has been a decided saving of working time. At one factory in which accurate records were kept before and after the use of albucid soluble eye-drops, there were *ten times the number of employees off work before the new treatment began*. The conditions in this factory were otherwise precisely the same, the same medical officer and the same nursing staff being in attendance.

Sodium sulphacetamide is now very generally employed in the ambulance rooms of Scottish mines and factories, and is also being employed in the Welsh mines.

In 1953, on visiting the ambulance room of Falkirk Iron Company, Dr. Sinclair was informed by the nurse in charge that sodium sulphacetamide (albucid soluble) had been used there since April, 1943, and that since then no case of corneal abrasion treated by albucid had developed an infected corneal ulcer.