

## Historical Perspectives

### Andrew Balfour, of Khartoum

# A pioneer of tropical medicine worldwide:

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## ABSTRACT

This is an archival account of the career of Sir Andrew Balfour in Khartoum, Sudan during the period 1902 to 1913. As the first director of the Wellcome Tropical Research Laboratories in Khartoum during the period, Andrew Balfour was tasked with establishing the laboratories and at the same time he was engaged in founding the health services in Khartoum. Balfour worked in close collaboration and support from Henry Wellcome and Reginald Wingate, the Governor General of the Sudan. The energetic and meticulous sanitary work of Balfour had a remarkable impact, with Khartoum declared mosquito-free by 1910. Establishing a research base in the laboratories was met with many challenges but eventually Balfour managed to recruit a team of dedicated researchers and to produce well-circulated publications in tropical medicine. Balfour's work in Khartoum later lead him to a distinguished career in tropical medicine. In 1923 he was appointed the first Director of London School

of Hygiene and Tropical Medicine. He was also elected President of the Royal Society of Tropical Medicine and Hygiene (1925-27).



Sir Andrew Balfour, KCMG, CB, LL D (1873–1931)

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### How to cite this article:

Adeel AAA. Andrew Balfour, of Khartoum: A Pioneer of tropical medicine worldwide. Sudan J Paediatr 2013;13(1):63-74.

### Background and appointment

The development of the Wellcome laboratories in Sudan and its contribution to the evolution of tropical medicine worldwide has previously been reviewed by the author in the biographies of its first three directors [1]. The first director appointed to establish these laboratories was Andrew Balfour [2,3]. He deserves a special attention because his work in developing health services and medical research has really set the stage for the subsequent directors and formed a model for other tropical medicine institutions at the international level.

Andrew Balfour was born in Edinburgh in March 21st 1873. His father was Dr T A G Balfour, a well known practitioner in that city. At an early age Balfour established a reputation for being a man of many talents. During his student days he was a boxer and rugby player who appeared for Scotland against England on many occasions. He was also a novelist. His first novel, "By Stroke of Sword", published in 1897, was a story of romance and adventure in the high seas and Spanish America. After graduating at Edinburgh in 1894, he joined his father's medical practice, but soon he realized that he had more inclination towards public health than to clinical practice. Thus he entered Cambridge University in 1885 and obtained the D.P.H. degree in 1887, followed by a M.D. degree for which he was awarded a gold medal for outstanding research work. Then he obtained a BSc in public health. The first tropical experience of Balfour was a typhoid camp in Pretoria during the period 1900-1901. This was the experience that left its stamp on his future career and which he vividly described:

" There one saw the disease at its worst, witnessed wretched, stuporous patients in stinking Khaki taken from trains and ambulance wagons , heard the droning buzz of accompanying cohorts of filthy flies, saw peeling and crusting lips, teeth coated with sores, and tongues dry as those of parrots. One witnessed, all

too frequently, the horror of excessive meteorism, the shock of haemorrhage, the tragedy of perforation.." [4].

Balfour emerged from his South African experience with the South African Medal and three clasps. In September 1902, he was appointed as first Director of the Wellcome Laboratories in Khartoum. He started his work in London by meeting with Henry Wellcome and inspecting the furniture and equipment purchased by Wellcome for the Khartoum laboratories. He was impressed by the high quality of equipment and the excellent furniture made of English oak and Indian teak baked for several months to withstand the hot climate.

Wellcome was well known for his flair for publicity and his creation of an acceptable public image, which he missed no chance in presenting to the public. Wellcome found the occasion of departure of Balfour to Khartoum as an opportunity to give a dinner in the Prince's Hall, Piccadilly, London on December 8th, 1902 for which he invited celebrities in the fields of politics, medicine, science, business and his close friend Sir Henry Stanley ,the famous explorer. The occasion was well covered by the Press [5]. It was a chance to introduce the young Balfour to all these celebrities and at the same time to give them a chance to say what they expected of him. Wellcome spoke of how he was struck by the appalling conditions in the Sudan and how he thought that by donating the laboratories he was offering a means of improving the health and well-being of the inhabitants of Sudan and mankind and at the same time he thought that the laboratories would provide a valuable opportunity for someone pursuing a research career. Balfour responded by thanking Henry Wellcome. He expressed his anticipation of hard and troublesome work in Khartoum but he promised to do his best so that "... even a Scotsman could do no more". For Henry Stanley this dinner was his last public appearance. He gave a moving speech on his memories of African

exploration and how he thought at one time that the “plagues of the Dark Continent” would never make it habitable. He was gratified to see that such a laboratory being erected. Dr Patrick Manson (then at the height of his fame) commended the intelligent perception of Wellcome in establishing such a laboratory at a time when Africa was undergoing an “enormous pathological revolution”. He expressed confidence in

the abilities of Dr Balfour but he warned that people should not be too impatient to see results of his work.

### **Establishing the Khartoum Laboratories**

The Gordon Memorial College had already been officially opened on November 8th 1902 (Figure 1), but finishing of the laboratories and fitting the furniture and equipment was pending his arrival.



**Figure 1 - Inauguration of the Gordon Memorial College, 8 November, 1902.**

It was a difficult start due to lack of skilled labour and the long distance from suppliers. Yet on 1st February 1903 (eight days after his arrival) Balfour started to work on examination of pathological material from patients and plants. For the first year his staff consisted only of two Sudanese laboratory attendants and Mr Newlove, who arrived in April 1, 1903. The laboratory buildings consisted of a suite of five rooms on the East Wing of the Gordon Memorial College building: a kitchen for preparation of media,

separate Bacteriological and Chemical rooms, a chamber specially prepared as a photographic dark room and a cold storage room and a museum room. Adjoining these were the Director's Office and an Economic and General Museum. Balfour was soon able to recruit a team of scientists: Dr William Beam, Research Chemist joined in 1904, Harold King, Entomologist joined in 1906; later on, James Thompson Senior Assistant Chemist; J Goodson Assistant Chemist; Captain Archibald RAMC, Pathologist joined in 1908

and Captain Fry RAMC, Protozoologist in 1910 (replaced by Captain O'Farrel RAMC in 1912). Newlove stated as laboratory assistant and later on became sanitary inspector in 1906, and two other laboratory assistants, George Buchanan and Alexander Marshall were recruited (Figure 2). In 1910 the name of the laboratories was officially

changed, at the request of Henry Wellcome from "The Wellcome Research Laboratories" to "The Wellcome Tropical Research Laboratories" (WTRLK), although the latter name had in fact been used in the laboratory reports published by Wellcome since 1904 [6, 7].



**Figure 2- Staff of the WTRLK, 1910. FRONT ROW (from left to right): Dr J Thompson (Senior Assistant Chemist)- Captain Fry RAMC (Protozoologist)-Andrew Balfour(Director of Laboratories)- Mr Henry Wellcome - Mr James Currie (Director of Education Department ,Sudan Government) William Beam (Research Chemist)- Mr Harold King (Entomologist). MIDDLE ROW: Mr JJ Vitale (Senior Clerk)-Mr J Goodson (Assistant Chemist) - Captain Dr Archibald RAMC ( Pathologist)- Mr George Buchanan (Senior Laboratory Assistant)- Mr Alexander Marshall (Senior Laboratory Assistant). BACK ROW: Laboratory Attendants: Mohamed Ibrahim, Abdullahi Nurin, Omar Kuwais, Bashari Mohamed, Mahdi Sharaf El-Din, Said Yunis, Adam Farah El-Dar, Ali Nimir FRONT: Nicola Effendi Hakim, (Senior Clerk) .**

Source of Photo: Wellcome Images

At the time of arrival of Balfour in Khartoum, Ross had just been awarded the Nobel Prize. The work of his Mosquito Brigades in Sierra Leone, Lagos, the Gold Coast and Ismailia (1899-1902) was published and widely distributed in the tropics. It was no wonder then that Ross enthusiasts were eager to see mosquito brigades working in Sudan. In May 1903, Colonel M Talbot, RE who was Director of the Survey Department in the Sudan wrote to the Governor General about his concerns:

“Do you think enough is being done to worry the mosquitoes? I think most persons are still blind or deaf to the beauties of the mosquito theory and I don't think that the medical officers can do much unless cordially supported by laity....How much does fever cost us a year and how much have we spent in trying to prevent it, except in the matter of building.. This zeal on my part is due partly to the discovery that doctors don't hunt for mosquitoes as part of their regular work and secondly to my being a brand new convert to Ross's opinions from reading his books while up the White Nile. It is the hope that he may convert them in the same way as he has converted me, that makes me wish to see his pamphlets scattered broadcast in the Sudan.” [8].

Balfour soon received his invitation of “cordial support” to which he responded with an enthusiasm which initiated one of the most effective mosquito control programmes of the period. A small mosquito brigade was therefore formed on the lines suggested by Major Ronald Ross consisting of Mr Newlove, the laboratory assistant, and two Sudanese workers. Every morning the brigade began to visit and examine systematically all water collections in the town beginning on the river front and working day by day till the whole town was covered. In the afternoon the men again went their rounds, the water collections were re-inspected and any found to be infected were thoroughly oiled.

Gradually the number of workers in the brigades

was increased, by 1909 there were seven Sudanese inspectors controlled by two British sanitary inspectors, one of these was responsible for Khartoum, the other for Khartoum North, while the steamers and boats were looked after by a special Sudanese inspector. The town of Omdurman has never been included by Balfour in these activities, perhaps due to lack of funds available for mosquito control, which were less than £100 per year. Regulations for measures to control breeding of mosquitoes were formulated and strictly implemented in houses, steamers as well as in agricultural schemes. These measures proved their effectiveness for, by 1905 people in Khartoum were able, for the first time, to sleep without bed nets [10]. In his Fourth Report of The Wellcome Tropical Research Laboratories [7], Balfour relates the following story to illustrate the effectiveness of his control programme:

“One morning a female *Stegomyia* had the impertinence to bite me on the hand in my office at the Gordon College. Next day the insult was repeated. I was much surprised, for we are far from the dockyard, which is, as a rule, the only place where these mosquitoes are now to be found, and there only very occasionally. “Sending at once for an Inspector, I asked him to make a careful search in the grounds of the building. He did so and he reported that he found nothing. He then expressed a wish to inspect the laboratories. I said “By all means, but you'll find nothing there. “ I followed him into our bacteriological room, and, with unerring instinct, he made for a “burma” or red earthenware vessel upon a stand. “Oh,” I remarked,” you need not trouble to look there, it's always empty.” “Not of mosquitoes, doctor,” was his reply, and then gentlemen, the murder was out. There were soda-water bottles lying in water to keep them cool in that “burma,” and the water had not been changed for days, and was swarming with a lively brood of *Stegomyia* “wrigglers” and nymphs, while new-born “imagines” were clinging

to its sides prior to their first flight upon the blood quest. The culprit was a clerk, who, against orders, had adopted this method of storing his drinks, and had taken no precaution against mosquito invasion. I fined him, but I had also to fine myself, for I was primarily responsible, and I do not doubt that in the Inspector's mess there was much joy over my delinquency"

When former President of the United States, Theodore Roosevelt visited Khartoum the Daily Mail (March 1910) wrote that he was "... greatly interested in the research laboratories where tropical diseases are investigated, and expressed his admiration for the work of Dr Balfour, who banished the malarial mosquito from Khartoum"



Figure 3: Clip from "The Daily Mail", 16 March 1910

That success was greatly appreciated to the extent that the United States Congress invited Henry

Wellcome to give an account about the work of the Wellcome laboratories in Khartoum in a Hearings before the Committee on Foreign Affairs, House of Representatives, to authorize a permanent annual appropriation for the Gorgas Memorial Laboratory [9].

### Establishing Sanitation Work in Khartoum

When Balfour took office as Director of the WTRLK, the government departments in Sudan were just being structured. There were considerable overlaps and gaps in the distribution of responsibilities among the different government institutions. In the absence of clear official policies and regulations, the running of government machinery depended to a great extent on personal relationships. As governor-general, Wingate had absolute power, referring only in major matters to the British representative in Egypt, Lord Cromer. Balfour took full advantage of this situation. Through the close relationship with Wingate he was able to extend his sphere of influence to territories which frequently caused him friction with other government officials. Balfour refused to allow the Wellcome Laboratories to be incorporated in the medical department after it was formed in 1904 but he assumed the post of Medical Officer of Health of Khartoum under the authority of Khartoum Province. However, he restricted his sanitary activities to Khartoum and Khartoum North, continuing to completely ignore the town of Omdurman on the west bank of the White Nile although it fell within the boundaries of Khartoum Province [10]. Gradually, Balfour established what he proudly called a "sanitary tyranny", enforced through his four British Sanitary Inspectors whom he described as a "mounted force" because they were on saddle most of the time. The responsibilities of these sanitary inspectors included, besides mosquito work, running of the conservancy system, registration of milk vendors and frequent check of milk by chemical and bacteriological tests,

refuse destruction , control of mineral water factories, inspection of markets and slaughter houses , house-to-house inspection, watching and regulation of “noxious trades”, poisoning of stray dogs, attending prosecutions and giving evidence. By supervision of filtration and constant bacteriological checks, Balfour was able to provide the population of Khartoum with exceptionally pure water supplies from bore holes in Burri village near Khartoum and from the Blue Nile. Some of the measures employed by Balfour as MOH of Khartoum were rather extreme, and drew criticism from other doctors as expressed by Christopherson RAMC, director of the medical department, who in a letter to a friend wrote:

“ I feel that I am doing the Collar work and that someone else is doing the parade work...Well what happened was this ! B has been lately terrifying everybody on account of a case or two of Cerebro Spinal meningitis [sic] which occurred here ( we have it every year in one part of the Sudan or another)..... Balfour was writing reports, isolating battalions- spraying with antiseptic lotions hundreds of soldiers’ noses and throats daily- looking down microscopes and looking up the records of other outbreaks- surrounding houses with gaffirs [guards] ( whereon of course all the patients’ friends ran away and would have spread it if it had been possible). The 4 sanitary inspectors kept galloping up to the patient’s house (where there was one) to enquire how it was getting on and then galloped to the Gordon College to report to Balfour and then galloped back to the mudiria [governor’s office] to write a report and then when one patient died- the MOH and assistant MOH, 4 Sanitary Inspectors most of the Conservancy officials- the Sub-Mamour [administrative assistant] and a posse of Police and Gaffirs pulled down the house and burnt all valuable furniture and fittings usually found in a Soudanese gentleman’s house and his clothes and marched off the patient’s family and relatives for 4 generations back and neighbours to the old Khartoum

jail and kept them- hugely delighted- for 10 days- at Government expense and nothing happened...”[11].

Although Balfour in the main used his “mounted force” for ground operations, under certain circumstances he resorted to using the Floating Laboratory as a naval unit:

“A certain company took up the question of converting the “Sudd”, that matted growth of papyrus, vossia grass, reeds and bushes, into fuel, and sent a steamer, an old ferry-boat, South to experiment. One morning our inspector at Khartoum North rang me up in alarm and well nigh despair . The ferry-boat had returned full of “Sudd” and full also of mosquitoes, which were flying ashore in a black cloud, seeking whom they might devour. Prompt action was necessary. The inspector was ordered to engage special men on the spot, take the laboratory steamer, and tow the offending craft down the Nile to the lonely and sandy Tuti Island where the cargo was discharged and the holds oiled. It was a cheerful task. The ferry-boat had no helm and she and the steamer went waltzing down stream, while the unfortunate experimenter tore his head in despair, and eventually invaded my sanctum to find out how he really stood, and to learn the enormity of his methods.” [8].

Yet it remains undisputed that under Balfour, Khartoum enjoyed an exceptionally high standard of sanitation. By 1910, he was able to tell the Conference of Sanitary Inspectors’ Association in London:

“ So far as communicable diseases go, I doubt if a healthier city than Khartoum exists in Africa at the present moment.” [8].

It is true that Balfour restricted his efforts to Khartoum and Khartoum North, yet his work set a standard for the whole country.

### **Establishing Research**

In contrast to his involvement in sanitary work, Balfour viewed routine clinical work as an unnecessary burden. He seemed to welcome pathological specimens only

as long as they fitted into the Pathology Museum or were relevant to research which he believed was the “true function “ of the laboratories. Balfour did not manage to make scientific discoveries of lasting value during his work in Khartoum. In this respect he had many constraints. First of all he was too busy with the sanitary and administrative work that he accepted. Professional isolation due to distance from well established scientific institutions in Europe was another disadvantage . Balfour’s research suffered many set-backs. In 1908 a fire broke at the laboratories destroying valuable research material on sleeping sickness, all office papers for five years, the bacteriology laboratory and manuscripts of which he kept no duplicates. Wellcome was very quick in replacing all the equipment and refurbishing the buildings, however the research material collected over years was difficult to replace. He also had difficulties in breeding and maintaining laboratory animals. On his return from annual leave in 1909 he found that all the guinea-pigs he kept for trypanosomiasis research had died due to inadequate feeding. Even his extensive mosquito work was done on a rather empirical basis and did not produce new discoveries, other than confirming the views of Ross. Thus in spite of the apparent effectiveness of the mosquito work in Khartoum, Balfour could not provide Ross with scientific data which the latter needed for his statistical models for predicting outbreaks of malaria. Of all the reviews published on Balfour’s research work in Khartoum, the following lines in the BMJ (JUNE 15 1912) seem to give an unbiased and fair judgment:

“It is with some trepidation that one turns for review the pages of a report such as the Fourth Report of the Wellcome Tropical Research Laboratories. One feels almost unconsciously that the ground is delicate, and that allowances of some kind or another have to be made. In the first place, it cannot be ignored that Khartoum is not London and that the conditions of

research are essentially different in the two places. At the same time, it must not be forgotten that almost all the greatest discoveries in tropical medicine have been done on the spot, so to speak, although it is true that many of them required the work of European authorities to interpret their intrinsic importance and their bearings on science and medicine in general. Partly on this latter account, it is, unfortunately, not an uncommon habit of these stay-at-homes savants to belittle the efforts of their more enterprising, if in many cases, it must be admitted, less able scientific brethren.”

After establishing the research base at Khartoum, a need was felt to reach out for the provinces. Travel by camel and mules was onerous and dangerous. It was difficult to perform scientific work in a dusty tent using unstable tables or boxes for benches.

“.. reminded one more of a laboratory at home than the accommodation one would expect to find on one of the upper tributaries of the Nile in some remote corner of the Sudan. “ [12]. The laboratory soon proved its value in enabling researchers to collect data from remote areas for ethnological, pathological, parasitological and entomological studies.”

One of the favourite methods employed by Wellcome for indirect advertising for his firm was free distribution of drug samples in “Medicine Chests”. The list of recipients of these chests included King Edward VII, King George V, Gladstone, President Roosevelt and M. H. Stanley the African explorer and rescuer of Dr Livingstone. His chests went to the North and South poles, to Everest and on the flights of pioneer aviators. Each time one was presented, Wellcome made sure that everyone knew about it [13]. Wellcome, likewise used his skills as a publicist to draw attention to the Khartoum Laboratories named after him. Late in 1904 the first of a series of reports by the Wellcome Research Laboratories in Khartoum was published at the expense of Wellcome. The First Report covered

the period between February 1, 1903 and February 1, 1904. The quality of illustrations and coloured plates show that Wellcome spared no expenses to obtain the best human and technical resources for production of these reports. Wellcome prepared the list of recipients of complimentary copies, later supplemented by Wingate, Currie and Balfour. The list of recipients of leather-bound copies included HM the King, the Czar of Russia and the Emperors of Germany and of Japan, among others. Another exhaustive list included more than 1200 personalities from ambassadors of foreign countries to prominent businessmen in China, together with editors of 181 journals and newspapers, and 67 libraries of universities and societies in US and Britain [14]. Complimentary copies were sent from Wellcome's Office at Snow Hill with a note: "On behalf of the Department of Education of the Sudan Government". It seemed that the philanthropy of Wellcome was not well known outside the English-speaking world: before forwarding the report to the Czar, the Russian envoy wrote inquiring why a report by the Sudan Department of Education be sent by the firm of Mr Wellcome. He was told the whole story, and that was perhaps why he was sent the complimentary copy in the first place. After success of the First Report, the Second Report was published in 1906. The Third Report was published in 1908, together with a Supplement: Review of Some of the More Recent Advances in Tropical Medicine etc. By A Balfour and R G Archibald. With each new issue the size of the reports was expanding, for this reason the Fourth Report which appeared in 1911 was issued in two volumes, A-Medical and B-General Science, again with a supplement. These reports were well received and presented to the public, particularly by the British Press. In those years, the Sudan enjoyed a happy relationship with the British press, Balfour and Wellcome judiciously cultivating public opinion. On receiving the Second Report of the Wellcome Research Laboratories the Daily Mail wrote (25

September 1906):

"All Africa is going to be made perfectly habitable to the white man. Its agricultural, industrial and commercial resources will become available. The Niles and their tributaries will team with commerce of a numerous and happy people.." Mr Henry S. Wellcome, who made this statement to the representative of the "Daily Mail" is the well known American chemist and bacteriologist of Snow Hill buildings, Holborn Viaduct. Six years ago, Mr Wellcome went out to the Sudan. "Disease was rampant," he said. "People, live stock, and growing crops were perishing almost without a finger lifted to stay the calamity, I was granted permission to found what have been named the 'Wellcome Research Laboratories'..."

With the issue of the Fourth Report, a pamphlet was distributed, including a price list for the Publications of the Wellcome Tropical Research Laboratories and the following announcement: "The great cost of production of these Reports, especially in their present voluminous dimensions, necessitates making a charge for them now and henceforth. The price fixed is as moderate as is consistent with the cost of publication, and any profit made will be devoted to a special fund towards the cost of future publications of the Laboratories."

The work of Balfour as MOH for Khartoum was very demanding. At times he had to wake up at 3 a.m. to check latrine bucket collectors, he had to visit homes of patients with suspected communicable diseases and to supervise all aspects of sanitation in a town under construction in the tropics. Moreover, he had to report on routine laboratory investigations and conduct research. Even during the annual leave that every British official had to take Balfour worked very hard on production of the laboratory reports. He did this with the obsession of a perfectionist till he had to interrupt his work due to exhaustion, but soon would be back again, writing to Wingate:

"I am "sound as a bell" & have merely been suffering

from nerve strain. I feel just about all right again and am busy with the Report. It is being pushed forward as rapidly as possible but in some ways it's just as well I arrived on the scene for there were all kinds of delays owing to difficulties about illustrations. I regret that it has been so long in appearing but it runs to about 230 pages and contains 20 coloured plates besides numerous figures etc." [15].

By 1909, Balfour started to suffer severely from the strain of work and at the same time he began to feel that the laboratories had outgrown the budgetary allowances allotted by the government to the laboratories. Although he had the sympathy of Wellcome and Wingate, it was apparent that the continued budget deficit did not allow the government to meet all the ambitious demands of Balfour. He was trying to address all these problems when he wrote to Wingate:

".... The routine work has very greatly increased I felt there was no use striving to accomplish the impossible. As an example the research on trypanosomiasis, which had to be abandoned for the present & yet is of great importance especially in view of the news from Bahr el-Ghazal. As a matter of fact the research work tends to get more & more "scrappy", a fact I deplore but am powerless to remedy at present without curtailing the general usefulness of the laboratories & that would be a sad thing. It may be, one has not so much energy as of yore, I believe this is true, but one gets older & the Sudan is a trying place for scientific research. We have established a certain standard of work I should be very sorry depart from it. It was very kind of you to send me Mr Wellcome's letter and your reply thereto. Apart from his eulogies, what Mr Wellcome says is very true & I told you the finance people have not the vaguest notion of what scientific work means or what it entails. I can furnish proofs of this statement if desired. It is perhaps unreasonable to expect them to possess such knowledge but I feel they might have

more confidence in the assurances given them as to the paucity of funds & staff.... Take the laboratories in the Philippine Islands, the Malay Federated States etc and it will be seen how we lag behind. We have grown and require to be fed & the food for an infant will not serve an adult...." [16].

Besides these constraints to his professional aspirations, Balfour had reason to believe that continued living in Sudan would have adverse effects on his health. He was asthmatic and the dusty weather of Khartoum was a very strong stimulant for asthmatic attacks. Moreover, he happened to prick his finger with a contaminated needle while inoculating a rabbit's brain and he had to go to Cairo for a course of anti-rabies vaccination. Thus, Balfour started to have second thoughts about his work in Sudan. During his directorship of the WTRLK, Balfour had gained the admiration and confidence of Wellcome, who understood his ambitions and frustrations and supported his appeals to the governments for more budgetary allowances. Eventually, Wellcome offered him the position of Director-in-Chief of the Wellcome Bureau of Scientific Research which he intended to establish in London in 1913. Balfour accepted the offer and submitted his resignation, which was accepted with regret. Before leaving the Sudan, the last task undertaken by Balfour was to submit to the Sudan Government a master plan for future development of the laboratories, including buildings, staff, and research policies stressing integration with agricultural and veterinary workers and taking into accounts the experience he acquired during his 10 years in Khartoum. He did not forget to reiterate his strong conviction of the wisdom of spending more on sanitation and research, citing an example from India: " 'During the proceeding years', says the recent Blue Book on the progress of Sanitary Measures in India, ' the imperial grants for sanitation have aggregated 181 1/2 lakhs (£ 1,210,000) and for research work 15 lakhs (£ 100,000).' These grants were in addition to the very

considerable sums expended by local governments, municipalities and district boards. India will reap her reward, and it will be a rich one, for, after much tribulation, it has at last been recognized that both sanitary progress and clinical work are dependent upon organized research, and, once this great truth is realized, half the battle is won. In some respects it may fairly be claimed that the Sudan, thanks largely to the generosity of Mr Wellcome, has lead the way. It is, however, imperative, if not to keep the lead, at least to keep abreast of the developments elsewhere. “[17]. From his summer resort in Erkowit Wingate wrote him emotional farewells:

“ I cannot tell you how much I regret, as time approaches, your impending departure from us. It is when you are actually gone that we shall feel your loss most acutely, but, on the other hand, from the point of view of your health you are wise to take this step, especially when you have an appointment so much to your liking to fall back on .”[18].

In May 1913, 10 years after his arrival, Balfour left Khartoum, a town that he participated in building and in which he established his career in tropical medicine and in association with which the world became familiar with his name to the extent that journals like the Lancet referred to him as “Andrew Balfour of Khartoum” .

### **The legacy of Balfour in Khartoum**

By the time Balfour left Khartoum the WTRLK were well established on the international level. Balfour started the laboratories with an annual budgetary allowance of about £ 800, when he left this allowance was already increased to £ 6,460 which was a considerable amount of money for Sudan, which, up to that time was still dependent on the bounty of Egypt to cover its annual budget deficit. It is doubtful if any other person without the clout and administrative skills of Balfour could have erected such an institution under such circumstances.

After leaving Khartoum, Balfour pursued a very brilliant career path in tropical medicine which he held many distinguished posts and received many honours. In 1923 he was appointed the first Director of London School of Hygiene and Tropical Medicine. He was elected President of the Royal Society of Tropical Medicine and Hygiene (1925-27). In 1930 Balfour was created Knight. However, in spite of all these commitments Balfour never ceased to be interested in health and medical developments in Sudan. He used his influence to support the establishment of the Kitchener School of Medicine in Khartoum. He was also one of the most active members of the Governing Body of the Gordon College in London which he joined on his resignation and which he continued to serve until his death in 1931.

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19. Wingate to Balfour, 27/3/1913. SAD 185/3/11.