1
A traveller of intelligence

Wandsworth, now an inner London borough, was once a picturesque town on the river Thames about four miles southwest of London. In the eighteenth century it was a parish in Surrey, and the gentle rural landscape was scattered with estates owned by nobles and gentry, such as the Archbishop of York and Earl Spencer. Windmills were dotted here and there and the sound of milling never ceased. After the industrial revolution the windmills were replaced by modern flourmill factories, but the peaceful landscape with its grazing cows remained untouched. The River Wandle flowed gently northwards across the fields to the Thames.

Residential areas were developed on the left bank of the Wandle, the town hall and hotels were built during the nineteenth century, and the population increased. On late Victorian maps you can find names such as 'Wandle Terrace', which suggests a residential area.

Alexander Williamson senior

On 10 July 1820 in a small church in this beautiful town, a young man from Elgin, Scotland, married a daughter of a merchant and fellow countryman, William McAndrew. The young man was Alexander Williamson and the bride's name was Antonia McAndrew; they were both 34 years old. Alexander was a young man with hopes and dreams. His grandfather had been a very successful Elgin merchant dealing in gloves, and his father had come to London and taken up a job as a clerk in the East India Company. Alexander was the fourth of nine children. He was lucky to have an opportunity to work for the Company, following in his father's footsteps and those of his godfather and maternal uncle, Alexander Gray, who was a well-known doctor

working for the Company in Calcutta. Alexander Gray later founded Dr Gray's Hospital in Elgin.

Alexander Williamson senior was a strong-willed young man with a quick and ingenious mind. It did not take long for him to be noticed by his seniors in the East India Company, and his direct superior, James Mill (1773–1836), took him under his wing. Mill was a high-flyer in the Communications Section of the Company, but he was better known in Britain and abroad as a social thinker. A graduate of Edinburgh University, Mill met the utilitarian Jeremy Bentham (1748–1832) in 1808, and became both friend and disciple, helping to spread Bentham's philosophy and establish the 'Philosophical Radical' movement.

Williamson senior respected Mill as if he were an elder brother, and was clearly influenced significantly by utilitarianism. Mill's thought was rooted in moral philosophy, which aimed to make sense of politics, economics, law and culture from the point of view of human nature, tracing social development according to a set of rules. His wife Antonia was well aware of her husband's nature and gave him unfailing support. She seems to have been an attractive woman with a strong will and great intelligence, and was loved by many. While in Wandsworth the couple were blessed with two children, Antonia Helen (1823–1896), named after her mother and her father's sister, and Alexander William (1824–1904), named after his father and grandfather. The Williamsons hoped their children's lives would be happy and fulfilled.

Cheerful voices in Park Gate House

In 1825, a year after their son's birth, thinking of the health of his wife and children, Williamson senior bought a large house with its own grounds near Brighton, 50 miles south of London (Fig. 2.). He installed the family there and came to see them frequently from London. It was not until 1841 that the railway between London and Brighton was opened, so he travelled by coach. The house, Park Gate House, was in the small village of Ringmer, near Lewes, to the northeast of Brighton, and stands there still today, a typical Georgian-style house with a beautifully symmetrical front, set in green surroundings.

Soon after they moved James (1826–1833) was born. Alex was very happy to have a younger brother. Park Gate House was always filled with children's voices and Williamson senior took great pleasure in going to see his family from London. The only worry Williamson senior had was his eldest son Alex's health. From his birth he was delicate and sickly.

Fig. 2 Park Gate House. Courtesy of Taira Sato.

Alexander and Antonia hoped that Alex would grow strong, and he was fed with donkey's milk for a while as it was believed to be similar to human milk and very nutritious.

It was Alex's eyes that caused him the most serious problems. Both his doctor and his parents were so concerned about a recurring eye infection that they failed to realise that he was generally unhealthy. It was not until Alex was 16 that his doctor recognised the importance of improving his general health. He ended up losing the sight in his right eye, and he also lost full use of his left arm, possibly due to it being bandaged for too long to cover an abscess. Despite these difficulties, he managed to establish himself in the academic world. This was testament to his strength of character, but also thanks to the unfailing support and encouragement of his sister Helen. George Carey Foster, who worked under Alex at the University of London in later years and became a professor of physics, wrote about Helen as follows:

> She combined admirable accomplishments with much force of character, and intellectual independence with great kindness of heart. She was untiring in acts of well-considered and persevering benevolence. Although this lady's career forms no part of the subject of this notice, her qualities of heart and mind are not without interest as throwing an indirect light on the moral and

intellectual characteristics of the home in which she and her illustrious brother grew up.[1]

Words like 'well-considered', 'untiring in acts' and 'benevolence', used here to describe Helen, were also apt descriptions for Alex.

The establishment of UCL

In 1831 Williamson senior purchased a large house with a garden in Wright's Lane in Kensington and moved his family back to London. The house was situated in a quiet residential area on the south side of Kensington Gardens, only seven or eight minutes' walk from Kensington Palace. He chose this area because the family of James Mill, for whom he had such great respect, lived nearby.

In 1826, five years before this move, Williamson senior had made an offer of financial support in aid of an educational project planned by James Mill and the 'philosophical radicals', namely to establish a university within London itself.

The initial idea for creating a new institute for higher education came from a Glasgow-born poet, Thomas Campbell (1777–1844), who was also an ally of Bentham. He approached Lord Henry Brougham (1778–1868), a statesman who shared the same beliefs, advocating the necessity of establishing an institute of higher learning in London for the middle classes, for effectively and multifariously teaching, examining, exercising and rewarding with honours, in the liberal arts and sciences.

Lord Brougham, who had helped to found an influential magazine, the *Edinburgh Review*, responded immediately and started raising money by asking liberals and utilitarians for their help. James Mill was also involved in this effort of founding a new university and worked tirelessly at fundraising. Williamson senior, who was Mill's friend and shared his views on education, became a major contributor.

Preparations for establishing a University of London went smoothly. A ceremony to lay the foundation stone at Gower Street, where the university would be located, took place on 30 April 1827 and construction work began thereafter. It took one and a half years for the building to be completed, and lectures started on 1 October 1828 (Fig. 3). The University of London was created in response to the wishes of a bourgeois middle class, and the core founders were utilitarian and liberal educationalists. Unlike the more traditional universities of Oxford and Cambridge, London was to be open to people of all faiths, and its distinct

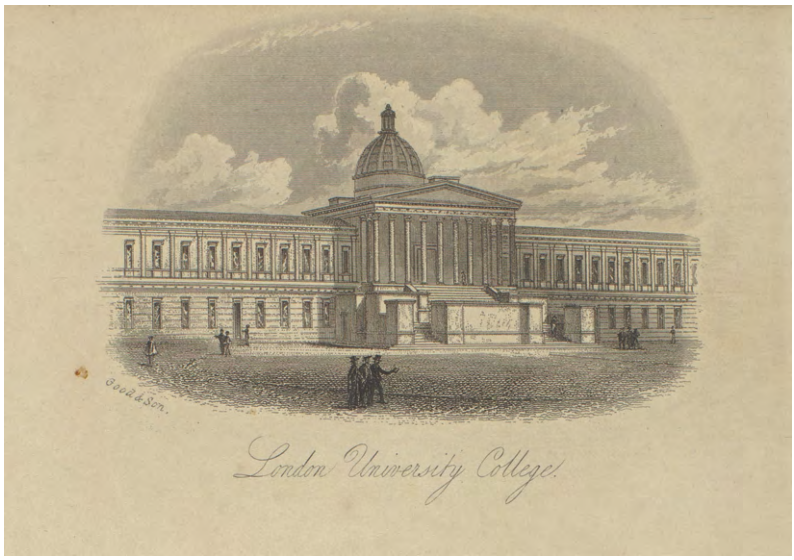


Fig. 3 UCL in *c*. 1828. Courtesy of UCL Special Collections.

characteristic was to be its teaching of practical sciences and technology in response to the demands of the time. It was an institution well suited to an age of 'progress' and 'sciences and technology', symbols of nineteenth-century European civilisation after the industrial revolution. When King's College, affiliated with the Church of England, was established, the name of the university was changed to University College, and in 1836 both institutions came together to form the University of London. They would play a significant role in modern higher education in the United Kingdom.

Father's wish

Williamson senior would often visit James Mill's house and they had many discussions on religious, social and educational issues. James's son, John Stuart Mill (1806–1873), who later became the most prominent utilitarian thinker of the nineteenth century, was also studying under his father's guidance. Then in his twenties, John Stuart Mill was a most gifted young man. While working for the East India Company as a clerk like his father, he published some papers in the *Edinburgh Review* that attracted considerable attention among the philosophical radicals. It is probable that, having formed a good relationship with the young Mill,

Williamson senior asked him for advice regarding Alex's education. He had lost his second son James to illness in 1833, so all his hopes and aspirations naturally fell on the first born, Alex. Years later, in 1887, Alex looked back on this period and remembered:

> When I was a small boy, I was once walking with my father in some fields northward – in what is now Gordon Square. I do not know what my age was, but I know that there was a paling about *so* high, and I could just look over it, so I don't suppose that I was very old. A dome was visible; I could see it across the palings. I was told 'That is London University, and when you are old enough you will go and study there.' My father was one of those who originally contributed money towards the building of it. My father did not at that time know how fully his wish would be realized for I have been a student here, I believe I may say in the best sense of the word, although my student career began by my appointment as Professor of Practical Chemistry.[2]

The reason that Williamson senior decided to move his family back to London in 1831 was perhaps because his son Alex had reached school age. Seven years later he suddenly resigned his post at the East India Company, soon after Alex started to attend Kensington Grammar School. Williamson senior was 52 years old. He had looked up to James Mill as a father or elder brother, and Mill's death in 1836 may well have been the reason for his resignation. Persuaded by John Stuart Mill, who had lived in Paris, to visit France, he decided to take the whole family to Paris. John Stuart Mill was at that time deeply absorbed in Henri de Saint-Simon's (1760–1825) philosophy of history and socialism in France, as well as Auguste Comte's (1798–1857) positivism, particularly after reading the second volume of Comte's *Cours de philosophie positive* (published in 1835). Comte was originally a mathematician, but advocated positivism in the field of philosophy to overcome the crises in society after the French Revolution, and by doing so he established sociology as a discipline. For Comte, civilisation had proceeded through three stages – a theological stage in which natural phenomena and man's place in nature were explained as the result of supernatural or divine powers, a metaphysical stage with a more enlightened view that sought explanations in terms of natural material powers, and a third scientific or positive stage in which natural phenomena were explained by experimentally tested facts and subsumed within general laws and theories. He also had an interest in education. He considered that the

positivist approach in teaching and the education system would be a potent tool for social and political reorganisation. In later years Alex would become deeply influenced by Comte's philosophy.

A dream born in Heidelberg

From Paris the Williamsons moved to Dijon, in southeast France, and Alex attended college there. He then started spending winter months in the city of Wiesbaden, 250 miles away from Dijon, to study German. Wiesbaden had a mild climate and was well known as a spa resort. Alex's German improved considerably while he was there and it is thought that it was probably around this time that he started to show an interest in becoming a chemist. In 1840, at the age of 16, Alex entered the University of Heidelberg. The oldest university in Germany, Heidelberg was established in 1386, and was known as a humanistic institution of higher education during the Reformation in the sixteenth century. It subsequently experienced a difficult period and was nearly closed down, but after 1803, when Heidelberg became a part of the region of Baden, it was re-established and began to flourish, producing such philosophers as Wilhelm Windelband and G.W.F. Hegel.

Following his father's wishes, Alex went to Heidelberg to study medicine. He studied anatomy under Friedrich Tiedemann (1781–1861) and chemistry under Leopold Gmelin (1788–1853). He found Tiedemann's lectures tedious and uninspiring, but was enthused by Gmelin's teaching, in particular the extra classes he offered in his own laboratory. Alex was fascinated by his experiments and became a frequent visitor to Gmelin's laboratory. Gmelin was known for his attempt to systematise chemical theory using the concept of chemical equivalent, and his name survives in 'Gmelin's test', which is still used today to diagnose liver diseases.

Gmelin gave kind guidance to Alex but was totally against his idea of giving up medicine and becoming a chemist. He argued that it would be extremely difficult for someone with Alex's disabilities – the problems with his eyes and arm – to succeed as a chemist. Alex, however, turned a deaf ear to his teacher's advice. When Alex's father learned of his son's intentions he was also strongly opposed. For Williamson senior, the term 'chemist' meant nothing but shop windows with shining glass bottles; he misunderstood the term 'chemist' and thought his son intended to be a dispenser or a pharmacist. 'Chemistry' as a science was not widely understood by the public in the Britain of the time. It was the Irish aristocrat Robert Boyle (1627–1691) who elevated its status to one

of the pure sciences. Before Boyle chemistry was not regarded as a proper 'science'. Chemistry had been closely associated with alchemy from the Middle Ages but Boyle, in his book *The Sceptical Chymist* (1661), moved it into the realm of science by introducing modern experimental methods. He encouraged chemical research based on strictly controlled experiments in the same way as astronomers and physicists were carrying out their work, and he argued that chemistry should be an independent subject in natural sciences and that its aim should be to unlock parts of the mystery of the universe and to seek truth for the sake of truth.

Boyle was one of the founders of the Royal Society. In 1645 a number of young scientists, including Boyle, formed the 'Invisible College', which became the core of a formal academic group in 1660. It received royal approval two years later to become the Royal Society. Members are known as 'Fellows', and there were 55 Fellows at the time of its foundation. Boyle was asked to be the President of the Royal Society in 1680 but he declined and conceded the honour to Sir Christopher Wren. He died in 1691, having devoted his entire life to chemistry in its early days.

But we have digressed.

Even in the nineteenth century, in England chemists did not enjoy a high status, so Alex's father was still concerned about his son's choice of subject. But much to his father's unease, Alex was totally committed to his research in chemistry. He created a private laboratory in his house in Heidelberg and devoured every chemistry book he could lay his hands on. Gmelin soon recognised Alex's true enthusiasm and ability, and tried to persuade his family to accept his desire to be a chemist, writing to Alex's mother, Antonia, to say her son would certainly be a chemist.[3] Alex's father reluctantly agreed, bowed to Gmelin's word and gave his permission. In later years when Alex reminisced, he never failed to mention Gmelin, commenting that 'I had the good fortune to obtain an unusual degree of personal kindness and instruction from that distinguished chemist'.[4]

Professor Liebig's laboratory

Having graduated from Heidelberg University, Alex, on Gmelin's recommendation, moved to Giessen, then the Mecca of research in chemistry. This old town, in the state of Hessen, is located at an important crossroads about 35 miles north of Frankfurt. The university was established in 1607 in the centre of the town. Its reputation was due to

the presence of Justus von Liebig, the Professor of Chemistry. He was elected as professor at the young age of 21, and he initiated a completely new method of teaching chemistry, which was to instruct students through practical experiments. Students first of all studied quantitative and qualitative analysis, followed by experiments analysing organic compounds; only then were they given their own topic of research. Liebig pioneered the new field of organic chemistry and was instrumental in its rapid progress. His reputation spread not only in Germany but also all over Europe, America and beyond. Various German dialects as well as many European languages were heard in his laboratory. Even in Britain, where there was very little interest in chemistry at the time, Liebig's name was well known.[5]

Liebig went to Britain in 1837 and gave several lectures, which encouraged some to engage with his work. He discussed the importance of chemistry for agriculture and industry, and in Britain, then in the midst of an industrial revolution, his chemistry started to draw the attention of the rising bourgeoisie. With the support and sponsorship of Prince Albert, who was keen to promote science education, the Royal College of Chemistry was established in 1845, and the first president was one of Liebig's leading pupils, August Wilhelm von Hofmann (1818–1892).

Four years previously, in 1841, Thomas Graham (1805–1869), Professor in Chemistry at UCL, had laid the foundation for the promotion of chemistry in Britain by establishing the Chemical Society. Graham was from Glasgow and was known as a researcher at the interface between physics and chemistry. Having done pioneering work on the diffusion of gases and dissolved molecules in solution, he moved on to research into colloid chemistry. He became a professor at UCL in 1837, the year that Liebig made his first visit to Britain. So, around the time that Alex was in Giessen completing his last research project, chemistry in Britain was finally poised on the threshold of a new era.

At this time many young chemists were arriving at Giessen. Often, like Alex, they were very much attracted by Liebig's 'pleasing manner' and his affectionate human qualities. In later years, Alex wrote with fond memories of

> the most efficient organisation for the promotion of chemistry which had ever existed … A little community of which each member was fired with enthusiasm for learning by the genius of the great master, and of which the best energies were concentrated on the one subject of experimental investigation.[6]

While in Giessen, Alex lodged at the house of Dr Hillenbrand, Professor of Literature at the university. Alex was a very serious student: rising at six every morning, he never missed a single seven o'clock lecture. His only distractions were walking, and occasional picnics and dances with his friends. He had a good voice and took delight in singing with other students. He obviously enjoyed his student life in Giessen and managed to produce many papers. The liberal atmosphere of the research environment in Giessen gave Alex the chance to approach some problems outside the world of chemistry, which led him to challenge his former teacher Gmelin's theory of galvanism, for example. His ground-breaking paper on a general theory of electricity was much praised by Liebig. In addition, he published his first papers on bleaching salts, the nature of ozone and the composition of Prussian blue. Liebig awarded Alex a doctorate in 1845.[7]

Alex's father paid a visit to Giessen around this time and sought Liebig's views on his son's future as a chemist. According to Alex's diary, Liebig's assessment was:

> That my knowledge and practice in chemistry is now sufficient to enable me to conduct any research … It is only necessary by reading the chemical journals to keep myself in the current of progress of the day. That the great want of the English chemists consisted in the one-sidedness of their acquirements. They are able to analyse a mineral but are not men of general scientific attainments, which in order to teach the application of chemistry to the different arts should be the case.[8]

And he resolved:

> to apply the next year a time to making my knowledge in Physics, Maths, Technology be as complete and '*grundlich*' [thorough] as possible, ceasing for the time to pursue experimental researches in chemistry.[9]

Liebig explained to Alex's father the necessity of general scientific attainments and the importance of a liberal arts education for enriching humanity. Acting upon Liebig's advice, Alex temporarily abandoned experimental chemistry and concentrated on the study of mathematics, physics and literature. Five times a week for his cultural enrichment he attended Professor Hillenbrand's evening lectures on the history of German literature. He found these lectures 'profitably filled up an hour'.[10]

First steps towards atomic theory

After two productive years in Giessen, Alex's next destination was Paris. John Stuart Mill, who had known him since childhood and recognised his talent, strongly advised him that in order to master advanced mathematics the best option would be to go to France and work under Auguste Comte. Having arrived in August 1846 and taken up residence at 8 rue des Francs-Bourgeois, Alex lost no time in going to see Comte at 10 rue Monsieur-le-Prince.

Comte's fame was increasing day by day thanks to the publication of his six-volume *Cours de philosophie positive* (Course in Positive Philosophy) in 1842 and *Discours sur l'esprit du positif* (A General View of Positivism) in 1844. However, at the time that Alex sought his guidance, Comte was still coming to terms with the sudden death of his beloved Clotilde de Vaux and was facing a philosophical turning point. As is well known, her death was a driving factor in Comte starting to advocate a 'Religion of Humanity' in 1847.

Comte classified science into six basic disciplines and ranked them in hierarchical order: mathematics, astronomy, physics, chemistry, biology and sociology. Mathematics was given highest place because it is the most abstract and general, and the most exact, of the sciences. He considered that all basic sciences were a product of human spiritual activities, and each of them progressed through theological, metaphysical and positive stages, so for him the systematisation of the social sciences was essential if the present age was to reach the positivistic stage.

Alex studied mathematics under Comte three times a week, and had many opportunities to discuss and debate with the other students who frequented Comte's apartments. Thus he learned much from Comte's positivism and he began to consider how to reflect these views in both his own chemistry and his ideas about education in general.

Alex then set up a laboratory at his residence in Paris, and succeeded in producing urea and carbonic acid by the direct oxidation of an amide. He reported these results to the Italian Scientific Congress in Venice in 1847. In Paris he also had the great good fortune to meet Auguste Laurent (1807–1853) of Bordeaux University, and Charles Frédéric Gerhardt (1816–1856) from Montpellier, because both these chemists were working on the question of atomic and molecular weight, a basic challenge for chemical structural formulae. It was here that Alex made his first steps towards an atomic theory. He wrote to a friend:

> I have been engaged in extensive research, whose object is to elucidate some obscure, though fundamental, chemical phenomena, my views on which were suggested and gradually developed by my former studies.[11]

He does not say exactly what he meant by 'some obscure, though fundamental, chemical phenomena' but it might have been the question of 'the interchange of atoms among neighbouring molecules'.[12] Most chemists at the time accepted John Dalton's static atomic theory that molecules determined the type of matter and the atom explained the composition of elements. However, the existence of the atom was not something chemists could prove by their experiments, and opinions among chemists were divided; some denied its existence but Alex was of one of those who positively supported the idea.

The shoots of positivistic thought

Alex was in Paris during the 1848 Revolution, known as the February Revolution, when King Louis Philippe was overthrown, and on 27 February the Second Republic was born. For a while people in Paris enjoyed a sense of liberation and freedom, but it did not last long and was replaced with a growing sense of dissatisfaction towards the new government. This saw riots staged by workers on 23–26 June, known as the 'June Days uprising'. Many workers were shot dead or arrested by the National Guard. In Paris many buildings and open public spaces were reduced to ruins, and the romantic ambience that once filled the city disappeared. Theatres were closed and artists fell on hard times.

The realist landscape paintings by Millet and Corot of the Barbizon School; the realist novels of Flaubert, influenced by his understanding of positivism; the literature of Balzac, which dealt with man as his theme; and Comte's positive philosophy and sociology – all these came into existence during this chaotic historical period in France. They all shared a sense of crisis that an organic reorganisation of their society was essential. Experiencing life as a student in the midst of these events, Alex's attitude to both the life of the mind and mathematical theory was influenced to an incalculable degree by Comte's method. As he wrote to his father:

> If my experience of Comte's superior powers were insufficient to convince you that his lessons were worth their price, John Mill's

saying that he 'would prefer him to any man in Europe to finish a scientific education' ought to carry the point.[13]

The move to UCL

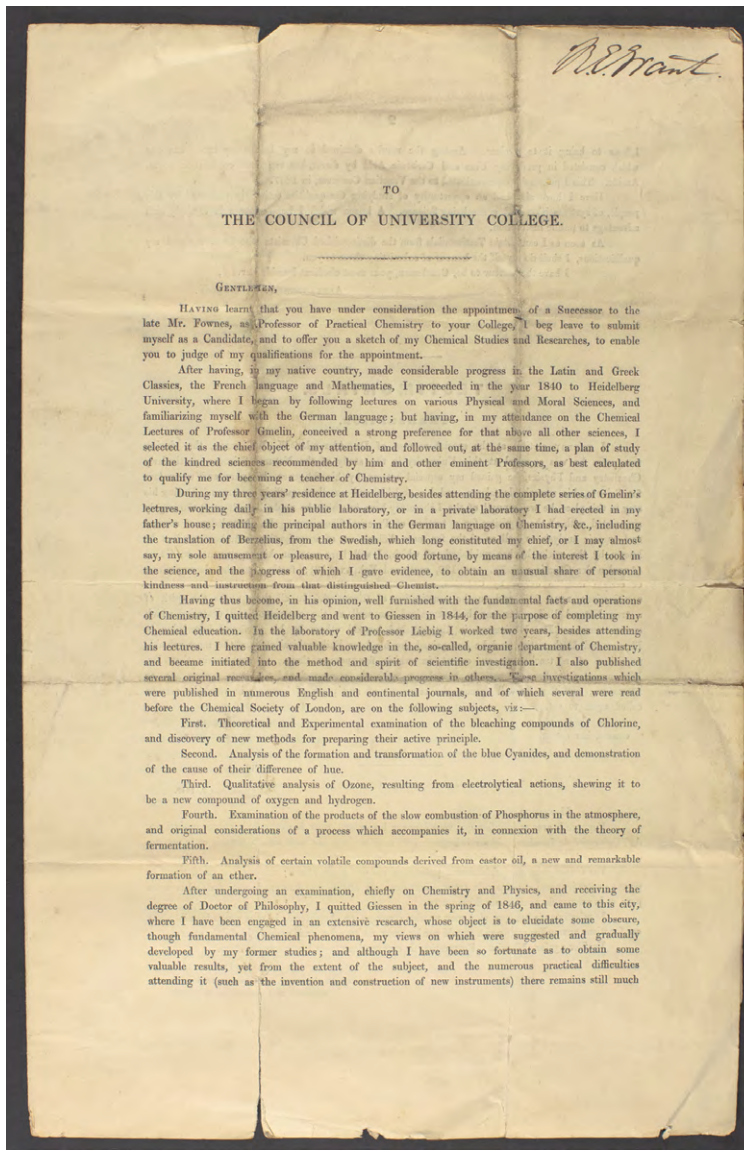
Early in 1849, by which time Alex had lived in Paris for almost three years, Thomas Graham of UCL came to Paris and had a meeting with him. Although Alex was only 25 years old, he had already gained a reputation as a talented scholar in the field of organic chemistry and Graham strongly encouraged him to apply for the post of Professor of Analytical and Practical Chemistry at UCL. George Fownes, who had occupied the position since 1845, had died at a young age in January 1849, and the professorship had become vacant. Graham had at one stage been critical of Alex's interpretation of ozone and ever since then Alex had thought of him as an opponent, so he was most appreciative of Graham's suggestion. He acted swiftly and sent a formal letter of application to the Council of UCL on 26 April (Fig. 4). In that letter he wrote:

> Among the results obtained in my laboratory here [Paris], was one which consisted in producing urea and carbonic acid by direct but regulated combustion of amide. This I personally communicated to the Venetian Congress in 1847.
>
> Here I have also had an opportunity of studying the qualities eminently possessed by this people, of systematising and generalising science. A lesson which I hope to be able to apply with advantage to public institution.[14]

He sounded very confident and added at the end that letters of recommendation would be sent from eminent chemists who knew him well. True enough, from the beginning to the middle of May, letters started arriving from Germany, France and Italy. There were at least 17 of them, from the likes of Liebig, Jean-Baptiste Dumas, Gerhardt, Hermann Kopp, Comte, Gmelin, Laurent, Henri Victor Regnault, Théophile-Jules Pelouze and Hofmann. Liebig wrote:

> Williamson gained my especial esteem by his diligence, his pure and warm love of science, his remarkable talents, and his amiable and excellent qualities as a man. During his stay in this place, he was a pupil of the Laboratory here, in which he made himself most thoroughly acquainted with all the requisites for a teacher of

Practical Chemistry … Dr Williamson is distinguished beyond others by his profound knowledge in Physics and Mathematics, and he has gained, by his later Philosophical studies, the most valuable requisites of a teacher to an extent in which few possess them.[15]



TO

THE COUNCIL OF UNIVERSITY COLLEGE.

GENTLEMEN,

HAVING learnt that you have under consideration the appointment of a Successor to the late Mr. Fownes, as Professor of Practical Chemistry to your College, I beg leave to submit myself as a Candidate, and to offer you a sketch of my Chemical Studies and Researches, to enable you to judge of my qualifications for the appointment.

After having, in my native country, made considerable progress in the Latin and Greek Classics, the French language and Mathematics, I proceeded in the year 1840 to Heidelberg University, where I began by following lectures on various Physical and Moral Sciences, and familiarizing myself with the German language; but having, in my attendance on the Chemical Lectures of Professor Gmelin, conceived a strong preference for that above all other sciences, I selected it as the chief object of my attention, and followed out, at the same time, a plan of study of the kindred sciences recommended by him and other eminent Professors, as best calculated to qualify me for becoming a teacher of Chemistry.

During my three years' residence at Heidelberg, besides attending the complete series of Gmelin's lectures, working daily in his public laboratory, or in a private laboratory I had erected in my father's house; reading the principal authors in the German language on Chemistry, &c., including the translation of Berzelius, from the Swedish, which long constituted my chief, or I may almost say, my sole amusement or pleasure, I had the good fortune, by means of the interest I took in the science, and the progress of which I gave evidence, to obtain an unusual share of personal kindness and instruction from that distinguished Chemist.

Having thus become, in his opinion, well furnished with the fundamental facts and operations of Chemistry, I quitted Heidelberg and went to Giessen in 1844, for the purpose of completing my Chemical education. In the laboratory of Professor Liebig I worked two years, besides attending his lectures. I here gained valuable knowledge in the, so-called, organic department of Chemistry, and became initiated into the method and spirit of scientific investigation. I also published several original researches, and made considerable progress in others. These investigations which were published in numerous English and continental journals, and of which several were read before the Chemical Society of London, are on the following subjects, viz:—

First. Theoretical and Experimental examination of the bleaching compounds of Chlorine, and discovery of new methods for preparing their active principle.

Second. Analysis of the formation and transformation of the blue Cyanides, and demonstration of the cause of their difference of hue.

Third. Qualitative analysis of Ozone, resulting from electrolytical actions, shewing it to be a new compound of oxygen and hydrogen.

Fourth. Examination of the products of the slow combustion of Phosphorus in the atmosphere, and original considerations of a process which accompanies it, in connexion with the theory of fermentation.

Fifth. Analysis of certain volatile compounds derived from castor oil, a new and remarkable formation of an ether.

After undergoing an examination, chiefly on Chemistry and Physics, and receiving the degree of Doctor of Philosophy, I quitted Giessen in the spring of 1846, and came to this city, where I have been engaged in an extensive research, whose object is to elucidate some obscure, though fundamental Chemical phenomena, my views on which were suggested and gradually developed by my former studies; and although I have been so fortunate as to obtain some valuable results, yet from the extent of the subject, and the numerous practical difficulties attending it (such as the invention and construction of new instruments) there remains still much

Fig. 4 Williamson's letter of application to the Council of UCL for the Professorship of Practical Chemistry. Courtesy of UCL Special Collections.

Liebig's highest possible praise of Alex was more than enough to convince the Council members of University College. Out of four candidates, Dr John Percy and Alex were shortlisted. While the Council took note of Alex's physical disabilities, they unanimously elected him as their new professor on 16 June. William received official notification of his appointment from the Council on 18 June and he returned to London a week later. He wrote to the Secretary of the Council, Charles C. Atkinson, the same day, expressing how delighted he was to accept the offer: 'I will now start my preparation for the work so that I will not fail your trust placed on me.'[16] Atkinson had served the Council as Secretary since 1835. Alex was overwhelmed with emotion at the thought of a new life at UCL. His father's wish, which he had heard so often in his childhood, had come true.