THURSDAY, NOVEMBER 29, 1883

SCIENTIFIC WORTHIES

XXIII.—SIR CHARLES WILLIAM SIEMENS,[1] BORN APRIL 4, 1823; DIED NOVEMBER 19, 1883

THE death of Sir William Siemens, coming as it did so suddenly and unexpectedly, has been felt as a severe blow and grief through a far wider circle than that of his personal friends. His work for the last five or six years has interested the general public to a degree that has perhaps never before been the lot of any man devoted to science as he has been. Not only the people of his adopted country, England, but the larger public of the whole civilised world, have been deeply interested in the electric lighting, the electric transmission of power, the electric railways, the regenerative gas furnaces, and the conversion of fuel into gas to feed them, and the prospect of smoke abatement by this mode of dealing with coal, and the improvements it has helped to make in the manufacture of steel, in all of which they have recognised Sir William Siemens as an originator, a devoted worker, and a friend. The Portrush and Bushmills electric tramway in the north of Ireland, one of the most splendid and interesting of his achievements, now carries passengers on a six and a half miles line of steep gradients and sharp curves, at a good ten miles an hour, solely by water power of the River Bush, driving, through turbines, a 250 volt Siemens dynamo at a distance of seven and a half miles from the Portrush end of the line. Just two months before his death he was present, and the writer of this article had the great pleasure of being present with him, at the formal opening to the public by the Lord-Lieutenant of Ireland, Earl Spencer, of this transcendent gift of science to mankind. His death is mourned as an irreparable loss, and the thought that advances in so many lines of beneficent progress, carried on by his untiring activity and his splendid zeal, are so suddenly stopped has caused most grievous disappointment.

William Siemens had the great characteristic common to all men who have left their mark on the world, the *perfervidum ingenium*, in which thought leads to instant action. When he was only twenty years old he came to England with his brother Werner, to realise an invention for electro-gilding; and, persevering through the complication of difficulties naturally met with by young men in a strange land, with little knowledge of its language, they succeeded in proving the usefulness of their invention, and getting it carried into practical effect through the wise and kindly appreciation of Mr. Elkington. Encouraged by this success, William Siemens returned a year later with his chronometric governor, an invention of remarkable beauty and ingenuity, in which, by the motion of a pivoted framework carrying an idle wheel geared to bevel wheels on two shafts in line, or geared to the outer and inner circumferences of concentric wheels, rotating in opposite directions on coaxial shafts, the movement of one wheel is caused to keep time with that of the other. We believe that although the invention was not a commercial success, and is not generally known in this country as practically realised except in its application to regulate the motions of chronoscopic instruments in the Royal Observatory of Greenwich, it may yet be destined to have large practical applications in engineering.

One of William Siemens's early inventions was his water-meter, which exactly met an important practical requirement, and has had a splendid thirty years' success. It realised curiously subtle hydraulic principles, which, even irrespectively of the practical value of the instrument, may interest readers of NATURE. Imagine a Barker's mill running absolutely unresisted. The discharged water must have approximately zero absolute velocity on leaving the nozzles; in other words, its velocity relatively to the nozzles must be approximately equal to the contrary absolute velocity of the nozzles. Hence the machine will rotate in simple proportion to the quantity of water passing through it. By an extension of similar considerations it is easy to prove that if the wheel, instead of being unresisted, is resisted by a force exactly proportional to the square of its angular velocity, its velocity must still be proportional to the quantity of water passing through it per unit of time. Thus, provided this law of resistance is maintained, the whole angle turned through by the wheel measures the whole quantity of water that has passed. Now think of the difficulties which Siemens had to overcome to realise this principle. What we have roughly called a Barker's mill must be completely inclosed in the supply water-pipes, its nozzles discharging into water, not into air. It must be of very small dimensions to be convenient for practice, and its bearings must be kept oiled to secure, not only that it may not be injured by the wear of running for years, but also that the constant frictional force of solid rubbing on solid may be as nothing compared to the resistance, proportional to the square of the velocity, exerted by the circumambient liquid upon a wheel with sharp edged vanes rotating in it. After a few years of trials, difficulty after difficulty was overcome, and the instrument did its work with the accuracy and convenience which met practical requirements. It was we believe the protection offered by the British Patent Law, which, in the case of this very instrument, allowed Siemens to work it out in England, and so helped him eventually to find his home among us, and to give us primarily the benefit of his great inventiveness in all directions; while the want of similar protection under German law at that time rendered it practically impossible for him to work out so difficult an invention in his own country.

In electric invention William Siemens has been associated with his brother Werner, and the world has profited largely by this brotherly cooperation of genius. More than a quarter of a century ago, they brought out what is now known as the Siemens armature. The writer well remembers admiring it greatly when he first saw it (he believes at the London Exhibition of 1862), mounted between the poles of a multiple steel horseshoe magnet and serving for the transmitter in an electric telegraph. That was what we may now call the one-coil Siemens armature. It suggested inevitably the mounting of two or more coils on the same iron core, in meridional planes at equal angles round the axis, and as nearly equal and similar in all respects as is allowed by the exigencies of

[1] The Steel Engraving, which was put in hand some time ago while the life which has now passed away was rich in promise as well as achievement, is not yet finished. It will be issued with a future number.—ED.

completing the circuits with the different portions of wire laid over one another, and bent to one side or the other, to avoid passing through the space occupied by the bearing shaft. The principle of electro-magnetic augmentation and maintenance of a current without the aid of steel or other permanent magnets, invented by Werner Siemens, and also independently by Wheatstone and S. A. Varley, was communicated to the Royal Society by William Siemens on February 14, 1867, in his celebrated paper "On the conversion of dynamical into electric force without the aid of permanent magnets." This paper is peculiarly interesting, as being the first scientific enunciation of that wonderful electro-magnetic principle, on which are founded the dynamo-electric machines of the present day. Soon after came the Paccinotti-Gramme ring, from which followed naturally the suggestion of the mode of connection between the coils of a multiple-coil Siemens armature, described in the Siemens-Alteneck patent of 1873, and made the foundation of the Siemens dynamo as we now have it, whether as given from the Siemens firm, or with the modifications of details and proportions, valuable for many practical purposes, which have been contributed by Edison and Hopkinson. The evolution of the Siemens armature, as we now have it, in this splendid machine, from the rudimentary type which the writer saw a quarter of a century ago, is one of the most beautiful products of inventive genius, and is more like to the growth of a flower than to almost anything else in the way of mechanism made by man.

Space prevents us from more than mentioning the works of William Siemens and his brothers, Werner and Carl, in land and sea telegraphic engineering, and their great achievements in Atlantic cable-laying. The *Faraday* bore particularly the impress of William Siemens's practical genius. It is remarkable that a ship capable of doing what no other ship afloat can do in the way of manœuvre, as has been proved by her success in the difficult and delicate operations of laying and lifting cables in depths of 2500 fathoms, and of cable repairing in all seasons and all weathers, should have been the work of a landsman, born in the middle of Europe, who early made himself a sailor in cable-laying expeditions in the Mediterranean and the Black Sea, but whose life has been chiefly devoted to land engineering and science.

On the 19th of this November the writer of the present article was accosted in a manner of which most persons occupied with science have not infrequent experience:—"Can you scientific people not save us from those black and yellow city fogs?" The instant answer was—"Sir William Siemens is going to do it; and I hope if we live a few years longer we shall have seen almost the last of them." How little we thought that we were that very evening to lose the valuable life from which we were promising ourselves such great benefits. May we not hope that, after all, the promise was not vain, and that, although Sir William Siemens is gone from among us, the great movement for smoke abatement, in which he has so earnestly laboured during the last three years of his life, may have full effect.

Just nine days previously, the writer had received a letter from Sir William Siemens, saying nothing of illness, but full of plans for the immediate future: chiefly an address to the Society of Arts, and the realisation at Sherwood of his method for the smokeless supply of heat to a steam boiler, by the combustion of hydrogen, carburetted hydrogen, and carbonic oxide, obtained from the conversion into these gases of the whole combustible material of the coal, together with some hydrogen and oxygen from water, and oxygen from air, in his gas-producing kiln. "The producer will be in full operation at Sherwood by that time" were almost the last words received by the writer from his friend, kindly inviting him to come and see the new method in operation at the end of the present month. A short time before, in travelling home from Vienna, where they had been associated in the British Commission for the Electrical Exhibition, Sir William Siemens had told the writer that without waiting for a perfected gas-engine to use the products of combustion as direct motive agent, and so give the very highest attainable economy, he expected by using the gas from his producer as fuel for the fire of a steam-boiler, even on a comparatively small scale, like that of his appliances at Sherwood for electric lighting and the electric transmission of power, to be able to obtain better economy of coal for motive power than by burning the coal directly in the usual manner in a furnace under the boiler. And further, what is specially interesting to persons planning isolated installations for electric light, he believed that the labour of tending the producer and boiler and steam-engine would be on the whole considerably less than that which is required on the ordinary plan, with its incessant stoking of coal into the furnace under the boiler, as long as steam is to be kept up. There is something inexpressibly sad, even in respect to a comparatively small matter like this, to see the active prosecution of an experiment so full of interest and so near to a practical solution, suddenly cut short by death. But the great things done by Siemens with gas produced in the manner referred to above, first in the gas glass furnace, described with glowing admiration by Faraday on Friday evening, June 20, 1862, in his last Royal Institution lecture, and more recently in connection with another great and exceedingly valuable invention, the Siemens process for making steel, by using the oxygen of iron ore to burn out part of the carbon from cast iron, and still more recently in the heating of the retorts for the production of ordinary lighting gas, by which a large increase has been obtained in the yield of gas per ton of coal used, are achieved results which live after the inventor has gone, and which, it is to be hoped, will give encouragement to push farther and farther on in practical realisation of the benefits to the world from the legacy of his great inventions.

A most interesting article on the life and work of Sir William Siemens in the *Times* of November 21 concludes with the following words, in which we fully sympathise:—"Those who knew him may mourn the kindly heart, the generous noble nature, so tolerant of imperfect knowledge, so impatient only at charlatanism and dishonesty; the nation at large has lost a faithful servant, chief among those who live only to better the life of their fellow-men by subduing the forces of nature to their use. Looking back along the line of England's scientific worthies, there are few who have served the people better than this her adopted son, few, if any, whose life's record will show so long a list of useful labours."

In private life Sir William Siemens, with his lively bright intelligence always present and eager to give pleasure and benefit to those around him, was a most lovable man, singularly unselfish and full of kind thought and care for others. The writer of the present article has for nearly a quarter of a century had the happiness of personal friendship with him. The occasions of meeting him, more frequent of late years, and more and more frequent to the very end, are among the happiest of recollections. The thought that they can now live only in memory is too full of grief to find expression in words.

WILLIAM THOMSON

In addition to the above notice by a master-hand we give the following details of Sir William Siemens's life and of the sad and solemn closing scene.

CHARLES WILLIAM SIEMENS was born at Lenthe, in Hanover, on April 4, 1823; he was educated at Lübeck, the Polytechnic School of Magdeburg, and had the advantage of sitting for a couple of sessions under Professors Wöhler and Himly at the Univerity of Göttingen, finishing his academical career at the age of nineteen. He stayed one year at the engine works of Count Stolberg, and when twenty years of age landed in England to introduce a new process of electro deposition, and, as stated above, was so successful that he made England his home. Another early invention of the two brothers was one which Faraday lectured upon at the Royal Institution one Friday evening under the title of the "Anastatic Printing Process of the Brothers Siemens."

Between his twentieth and thirtieth years he was mainly engaged in problems connected with mechanical engineering, improving the chronometric governor, bringing out a double-cylinder air-pump and a simple water-meter which has been extensively used both in this country and on the Continent. When twenty-four years of age he constructed a four horse-power steam-engine, with regenerative condensers, in the factory of Mr. John Hicks, of Bolton, and the Society of Arts acknowledged the value of the principle by giving him their gold medal in 1850. At this time also he made a modification of Grove's secondary battery, to which he referred two years ago at the Jubilee Meeting of the British Association. When just over thirty years of age he received the Telford prize and premium of the Institution of Mechanical Engineers for his paper "On the Conversion of Heat into Mechanical Effect," in which he defined a perfect engine as one in which all the heat applied to the elastic medium was consumed in its expansion behind a working piston, leaving no portion to be thrown into a condenser or into the atmosphere, and advised that expansion should be carried to the utmost possible limit. In taking up the question of heat he adopted the dynamical theory as the result of a study of the works of Joule, Mayer, and others, and we find him when thirty-two years of age exhibiting two steam-engines with regenerative condensers, the one of twenty and the other of seven horse-power at the Paris Exhibition of 1855.

Between his thirtieth and fortieth years he read several papers before the Institution of Civil Engineers on electrical subjects, and before the Institution of Mechanical Engineers upon the various inventions which he had already brought out. During this period also was established the firm of Siemens Brothers, which has become so famous for their machines, and submarine and land lines, four Transatlantic cables, the Indo-European line, the North China cable, the Platino-Braziliera cable, and others. In 1860, when engaged in superintending the electrical examination of the Malta and Alexandria telegraph cable, he thought of using the increased resistance of metallic conductors due to rise of temperature as a means for measuring temperature, and brought out next year a pyrometer based upon this principle.

He was now also engaged with his brother, Mr. Frederick Siemens, upon that invention with which his name has since been mainly connected—the regenerative gas furnace. By means of this furnace, which is now used all over the world, two evils which formerly appertained to heat furnaces are cured, viz. the discharge of the products of combustion at a very high temperature and in an incompletely combined state. Another advantage of this furnace is the very high temperature that could be attained by its use, and from the very first its author looked upon it as capable of accomplishing what Reaumur, and after him Heath, had proposed, namely, to produce steel on the open hearth. It was in 1862 that Mr. Charles Atwood made the first attempt to produce steel in this manner at Tow Law under a license from Mr. Siemens; but, though partially successful, it was afterwards abandoned; after one or two other disappointments, Mr. Siemens had to take the matter into his own hands, and having matured the process at his experimental works at Birmingham, he laid the foundation of an industry which now employs thousands of workmen at the works of the Landore Company, Vickers and Co. of Sheffield, the Steel Company of Scotland, and others, about half a million tons of mild steel having been produced last year in Great Britain alone. This steel is now used almost exclusively in Her Majesty's dockyards in the construction of the boilers and hulls of ships, and its use in private yards is extending rapidly.

On February 14, 1867, he brought before the Royal Society the paper on the conversion of dynamical into electrical force referred to by Sir William Thomson.

Not only to these large applications of electricity did Sir William Siemens direct his attention but to electro-metallurgy and horticulture. Those who were present at his lecture to the Royal Institution on March 12, 1880, will remember the stream of light which poured forth from his electric furnace when the lid was taken off the crucible to pour the fused steel into the mould, and the result of his experiments on the influence of electric light upon plant growth in the exhibition of peas, roses, lilies, and strawberries at this early season with the fruit partially developed. But the space at our disposal will only allow us to remind our readers of others of his inventions, his bathometer for measuring the depth of the sea, and his attraction meter (*Phil. Trans.*, 1876); the selenium eye, which was sensitive to variation of colour; the regenerative gas burner, and regenerative gas and coke stove; the hypothesis of the conservation of solar energy; all of which have appeared from time to time in these columns. The last time Sir William Siemens lectured in public in this country was at the Institution of Civil Engineers on March 13 last, on "The Electrical Transmission and Storage of Power," the evening the attempt was made to blow up the offices of the Local Government Board by dynamite, when, although a portion of the glass was shattered in the theatre of the Institution, the lecturer resumed the thread of the discourse after a moment's pause as though nothing had occurred.

Sir William was a member of nearly all the scientific societies of Great Britain; he was the senior member of council of the Institution of Civil Engineers; he was elected a member of the Royal Society in 1862, and had twice served on the council of that body. He has been President of the Institution of Mechanical Engineers, twice of the Society of Telegraph Engineers, of the Iron and Steel Institute, and last year, at Southampton, of the British Association; whilst at the time of his death he was Chairman of the Council of the Society of Arts. He was made a D.C.L. of Oxford *honoris causâ* in 1870, an LL.D. of Glasgow in 1880, of Dublin in 1882, in which year the University of Würtzburg also bestowed on him its honorary Ph.D. He was elected with Sir Henry Bessemer, the first honorary members of the Gewerbe-Verein of Berlin, besides being a corresponding or ordinary member of several learned societies in Europe and America.

He received prize medals at the Exhibitions of 1851 and 1862, and a *Grand Prix* at the French Exhibition of 1867 for his regenerative gas furnace and steel processes. In 1874 he was presented with the "Royal Albert Medal," and in 1875 with the "Bessemer Medal" on account of his scientific researches and his inventions relating to heat and metallurgy, whilst only last week the Council of the Institution of Civil Engineers awarded him the Howard Quinquennial Prize for the advances he had made in the manufacture of iron and steel. He has received recognition of his services to pure and applied science from the Emperor of Brazil, the Shah of Persia, and from France both under the Empire and the Republic, whilst in March last Her Majesty was graciously pleased to confer upon him the honour of knighthood.

It was whilst returning from the monthly meeting of the Managers of the Royal Institution on November 5 that he met with the accident that accelerated his death, which took place on Monday, the 19th inst.

In accordance with the desire of the whole community, the public ceremonial performance of the last sad rites took place in Westminster Abbey on Monday last before the remains were conveyed to their resting-place in the cemetery at Kensal Green. The Prince of Wales placed his name at the head of the requisition submitted to the Dean of Westminster, asking that a public funeral might mark the recognition of Sir William Siemens's claims to be held in remembrance as a public benefactor, while few were more deeply affected at the graveside than the men who came to show their respect to a kindly master.

At the Abbey, according to the *Times* report, the distinguished public personages and representatives of scientific bodies assembled in the Jerusalem Chamber or in the Abbey, members of societies not attending in official capacities having places assigned them in the sacrarium or transepts, the choir and seats under the tower being reserved for presidents, vice-presidents, members of council, and officers of the societies invited to be present. The ancient tapestried chamber which has of late years been the scene of several such sad gatherings was filled—indeed, crowded—with the many warm friends and admirers of the deceased. His Royal Highness the Prince of Wales was represented by one of his grooms-in-waiting, Mr. Andrew Cockerell. The German Ambassador, Count Münster; the Chancellor of the Exchequer, Mr. Childers; the First Commissioner of Works, Mr. Shaw-Lefevre; Lord Bramwell, and Lord Claud Hamilton were also present; together with Mr. F. R. Pickersgill, Keeper of the Royal Academy, representing the President, Sir F. Leighton; Sir Douglas Forsyth, Sir Theodore Martin, Sir J. M'Garel Hogg, M.P., Sir Henry Tyler, M.P., Major-General Sir Andrew Clarke, General Crofton, Major-General Pasley; Mr. Fung Yee, secretary to the Chinese Legation, and others.

Taking the scientific Societies and their representatives in the order in which they were marshalled to join the procession, there were as pall-bearers—Prof. Huxley, President of the Royal Society; Sir Frederick Bramwell, predecessor of Sir William Siemens in the office of Chairman of Council of the Society of Arts; Mr. Brunlees, President of the Institution of Civil Engineers; Mr. Percy Westmacott, President of the Institution of Mechanical Engineers; Prof. Sir W. Thomson, for the British Association; Prof. Tyndall (Royal Institution); Mr. Willoughby Smith, President of the Society of Telegraph Engineers and Electricians (a society of which Sir William was the first president); and Sir James Ramsden (in the unavoidable absence of Mr. B. Samuelson, M.P.), representing the Iron and Steel Institute. The Royal Society was further represented by the treasurer, Dr. John Evans, and the secretaries, Prof. G. G. Stokes and Prof. Michael Foster; and among other well known members of this, the oldest of the learned and scientific societies, were Sir Joseph Hooker, Sir Frederick John Evans, K.C.B., Mr. Norman Lockyer, Mr. Warrington Smyth, Dr. Hopkinson, Prof. W. G. Adams, Prof. Bartholomew Price, Prof. Chandler Roberts, Prof. R. B. Clifton, Prof. Carey Foster, and Mr. R. W. Mylne. The Society of Arts was represented by the following Members of Council:—Sir Frederick Abel, C.B., F.R.S., Mr. A. Carpmael, Mr. Andrew Cassels, Lord Alfred S. Churchill, Sir Philip Cunliffe-Owen, Mr. B. F. Cobb, Mr. H. Doulton, Capt. Douglas Galton, C.B., F.R.S., Admiral Sir Edward Inglefield, C.B., F.R.S., Mr. T. V. Lister, Mr. Owen Roberts, Lord Sudeley, and by Mr. H. Trueman Wood, secretary, Mr. H. B. Wheatley, assistant secretary, Mr. Howard Room, and other officers. Of the Institution of Civil Engineers there were past presidents—Sir John Hawkshaw, F.R.S., Sir Charles Hutton Gregory, K.C.M.G., Mr. Hawksley, Mr. Bateman, Mr. Barlow, Mr. Abernethy; vice-presidents—Mr. Edward Woods, Mr. G. B. Bruce; Mr. Charles Manby, honorary secretary; Sir John Coode, Mr. Berkley, Dr. Pole, Mr. Hayter, Sir Robert

Rawlinson, C.B., Mr. E. A. Cowper, Mr. Rendel, Mr. B Baker, Sir James N. Douglass, and Mr. J. W. Barry, members of Council; and Mr. James Forrest, secretary, and Mr. H. E. Eaton, assistant secretary. The Institution of Mechanical Engineers sent—Mr. Ramsbottom, a past president, for long mechanical engineer to the London and North-Western Railway Company: Mr. Rennie and Mr. T. R. Crampton, vice-presidents; Mr. W. Anderson, Mr. Kitson, Mr. Peacock, Mr. Richardson, Mr. J. Tomlinson, jun., Mr. Tweddell, and Mr. Price Williams, members of Council; Mr. W. R. Browne, secretary, and Mr. A. Bache, assistant secretary. Prof. Bonney's name may be given as one of many connected with the British Association; and as members of the London Institution those of Mr. Warren De La Rue, F.R.S., Mr. W. Bowman, F.R.S., its honorary secretary; and Dr. Gladstone, F.R.S. From the Society of Telegraph Engineers there were—Mr. Latimer Clark, Lieut.-Col. Webber, R.E., C.B., past presidents; Mr. Spagnoletti, Prof. D. E. Hughes, F.R.S., and Sir Charles Bright, vice-presidents; Mr. Stroh and Mr. H. C. Forde, of the Council; and Mr. F. H. Webb, secretary. The Iron and Steel Institute, of which Sir W. Siemens was a past president, was also represented by Mr. W. Whitwell, Mr. G. J. Snelus, Mr. Edward Williams, Mr. T. E. Horton, Mr. Daniel Adamson, Mr. E. Windsor Richards, and Mr. J. S. Jeans (secretary). The Royal Astronomical Society had a fitting representative in the Astronomer Royal, Mr. W. H. M. Christie, a vice-president. Mr. Horace Jones, president, and Mr. Mac Vicar Anderson, honorary secretary, of the Royal Institution of British Architects, and Dr. W. H. Perkin, F.R.S., President of the Chemical Society, represented those bodies. For the Royal Meteorological Society, there were the President, Prof. J. K. Laughton; Mr. G. J. Symons, F.R.S., the honorary secretary; the Hon. Rollo Russell, Mr. R. J. Lecky, and Dr. J. H. Gilbert. From the Institute of Naval Architects there were two vice-presidents—Mr. N. Barnaby, C.B., Director of Naval Construction; Mr. James Wright, C.B., Engineer-in-Chief at the Admiralty; and Mr. George Holmes, secretary to the Institute. The Society of Engineers was represented by the President, Mr. Jabez Church, Mr. Nursey, of the Council, and Mr. Bartholomew Reed, secretary. There were also present representatives of the Geological Society, the Chemical Society, the Physical Society, and the Society of Chemical Industry. The German Athenæum in London was represented by a deputation, headed by Count Victor Gleichen, its honorary president, and including Mr. Alma Tadema, R.A., Mr. Carl Haag, Dr. Hess, Mr. F. Rosing, Mr. E. Meyerstein, honorary secretary, and Mr. C. Sevin.

Sir Henry Bessemer wrote to the secretary of the Iron and Steel Institute expressing his deep regret that an attack of bronchitis prevented him from being present.

Forming a long procession, the occupants of the Jerusalem Chamber filed past the Westminster Schoolroom, and, meeting the family mourners at the entrance from Dean's Yard, took their appointed places, and followed the coffin through the cloister to the Canons' door, in the south aisle of the Abbey. The coffin was covered with wreaths sent from nearly every country in Europe.

A great part of the large assemblage joined the procession formed after the Abbey service and accompanied the remains to Kensal Green. At the cemetery there were also present very many of the workmen from the telegraph works at Woolwich. A bank of grass and flowers breast high encircled the head of the grave, and the sides of the interior were hidden by fern-fronds and flowers.

The inscription on the coffin was simply—

C. William Siemens,
Died 19th Nov., 1883.
Aged 60 years.

THE FOREST LANDS OF FINLAND

Finland: its Forests and Forest Management. Compiled by J. C. Brown, LL.D. (London: Simpkin, Marshall, and Co., and William Rider and Son, 1883.)

AT a time when renewed effort is being made in our own country to stir up interest in the subject of forestry, it is instructive to notice what progress is being made in woodcraft in other lands. Sir Richard Temple brought before the Social Science Congress at its recent meeting the condition of our home and colonial forestry; next year an international forestry exhibition is to be held in Edinburgh; and Sir John Lubbock has given notice of a motion affecting forestry for next session in the House of Commons.

Dr. Brown divides his book into three parts, dealing respectively with the lakes and rivers of Finland, its forest economy, and its physical geography, including geology. The first part, though decidedly interesting, savours rather too much of the guide-book style, and is interspersed with adventures and scriptural quotations. Water occupies two-fifths of the area of Finland, which is called by its inhabitants "The Land of a Thousand Lakes," and most of the internal communications of the country are effected along its lakes and streams. Another poetical designation, "The Last-born Daughter of the Sea," refers to the recent upheaval of the Finnish area, a rising which is still in progress, as is proved by the continuous shallowing of the waters on the Baltic coast-line. The country abounds in interesting glacial phenomena, but we must confess to a feeling of disappointment with the geological as well as with the first portion of the work. Moreover, ordinary care has scarcely been exercised, otherwise we should not read of "palatal mansions," of boulders "marled or variagated" by lichens, of "moluscs," "mamifers," and "carnivori," nor yet of "the old Taurentian formation," to say nothing of the excessively vague notion conveyed by such an expression as "pre-Adamic times."

The second part, dealing with forest economy, occupies rather more than half the book, and constitutes presumably the *raison d'être* of the whole. Forest products form more than half the total value of exports from Finland, and it is estimated that 64 per cent. of the entire surface of the land is covered with forests, which up to quite recent times were subjected to the most reckless waste. Finland is the only country in Europe in which *sartage*,