

OBITUARY NOTICES OF FELLOWS DECEASED.

THE REV. DR. PEYTON BLAKISTON was the youngest son of Sir Mathew Blakiston, Bart., of Sandybrooke Hall, Derbyshire. He was born in 1801, and was educated first at Eton, afterwards at Trinity College, Cambridge. From thence he migrated to Emmanuel College, where he was elected to one of the Dixie Fellowships. Having taken holy orders he became vicar of Lymington, and held that preferment for several years. His health, however, broke down, and symptoms of pulmonary disease having manifested themselves, he resorted to Paris, and placed himself under the care of the celebrated Louis, who told him that he could not expect ever to be able to discharge the duties of a public preacher. With a decision that was characteristic of him, he at once resolved to abandon the clerical profession and adopt that of medicine. For this he had always manifested a predilection, having whilst at Lymington established and devoted himself to the support of a provident dispensary.

He resigned his living, and with a wife and children returned to Cambridge, and subsequently to Paris, and devoted himself with great energy and determination to medical studies. As soon as he obtained his diploma of M.B. at Cambridge, he established himself at Birmingham, where he speedily acquired the confidence of the public and great popularity with his professional brethren. As a member of the Philosophical Institution of Birmingham, he delivered lectures on chemistry and physical science, and did good service to his profession by the application of his scientific knowledge to the elucidation of the laws of sound and the use of the stethoscope, which was then obtaining the general notice of the profession. In 1841 he took his degree of M.D. at Cambridge, and became physician to the Birmingham General Hospital. At Birmingham he published a Treatise on the Influenza of 1837, and a volume of "Practical Observations on Certain Diseases of the Chest and on the Principles of Auscultation." This volume he dedicated to his old master, Louis, and his friends and former pupils, the late Dr. W. Allen Miller and William Bowman. This volume was a valuable contribution to medical science and practice, and displayed not only a well trained philosophical mind, but also an acute careful clinical observer. In 1843 Dr. Blakiston became a Fellow of the Royal College of Physicians, and in the same year was elected a Fellow of the Royal

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Society. In 1848 the state of his health compelled him to seek a more genial climate than that of Birmingham, and he removed to St. Leonards-on-Sea, where he enjoyed a large and lucrative practice till 1871, when he retired from professional labours. During his residence at St. Leonards, he published a volume entitled "Clinical Observations on Diseases of the Heart and Thoracic Aorta," and which comprised the results of his experience in a practice of more than thirty years. After retiring from practice, and while residing in London, he published a volume of lectures on "Modern Society in its Religious and Social Aspects," and a little work entitled "Clinical Reminiscences." Throughout his whole career Dr. Blakiston manifested great independence of character, a high sense of the duties and responsibilities of both professions of which he was a member, and great activity and energy in advancing their best interests. As a physician he showed much skill in the application of his acquirements as a physicist to the diagnosis of disease and evidence of carefully trained power of observation. Never seeking to win popular favour or applause for himself, he was remarkable for the interest that he manifested and the pains he took to promote the advancement of those young men of ability and promise with whom he was brought into contact. He possessed considerable general culture and artistic tastes, and his writings are scholarly, clear, and refined in style and imbued with an elevated tone. With great kindness of heart and general geniality of manner, in conversation he displayed a keen sense of humour; and, with much wit, often a degree of abruptness and sharpness of retort, sometimes a little too much for sensitive people. During the last years of his residence in London, the state of his health precluded his going much into society or taking any active share in public matters, but he felt and manifested to the last a vivid interest in all the religious, social, and scientific topics of the day. He died suddenly on the 17th December, 1878, at the age of 77.

WILLIAM FROUDE was born in 1810, and was the son of the Venerable R. H. Froude, Archdeacon of Totnes. He was educated at Westminster and Oriel College, Oxford, where he obtained a First Class in the Mathematical Class List of 1832. Froude adopted the profession of a civil engineer, and became a pupil of Mr. H. R. Palmer, and in 1838 an assistant of Mr. Brunel, under whom he was engaged on the works of the Bristol and Exeter Railway, and on other work. For family reasons he retired from active professional work in 1846, and from that year until 1870 he occupied himself in various scientific investigations at his own expense.

Among these may be especially noted the following:—The law which governs the "Discharge of Elastic Fluids under Pressure through

Short Tubes or Orifices," on which a paper by Froude was read at the Institution of Civil Engineers, June 15th, 1847. Herein attention was called to the misconception on which was based a then generally received theory of the flow of gases. This received theory treated elastic fluids as though they were under virtually the same conditions as inelastic fluids. Froude tested by the best means in his power the result of his more correct views by experiment on the flow of air into a more or less complete vacuum.

Another subject of inquiry in which he put his views on paper (though he did not publish them) was the resistance experienced by a plane moving obliquely through a fluid. Here, as in the previous case, Froude detected and expounded quantitatively the want of correctness of the existing theory, and suggested an improved and much more correct interpretation of the experimental data. The correct theory on the subject is scarcely yet determined, though it is in course of determination by that doctrine of stream lines by the appreciation of which Froude worked so usefully.

The important bearing of the resistance experienced by an oblique plane upon the consideration of the flight of birds was a constant subject of thought to Froude. He studied the attitudes adopted by birds, especially sea fowl, in soaring, and made many measurements and quantitative calculations on the subject, but never felt satisfied that there might not be cases not to be accounted for by his interpretations.

On his voyage out to the Cape in 1878-9, and at the Cape he pursued his observations, and he wrote long letters on the subject to friends in England. One of his last acts before he was laid up in his short final illness was, though suffering from feverish cold, to measure accurately two albatross obtained for the purpose.

We will now give an outline of the investigations into the rolling and form of ships, by which Froude obtained a high position among men of science. At the request of his friend Mr. Brunel, his attention had been given to the problems connected with the rolling of ships during the construction of the "Great Eastern" ship, and in 1861 he placed before the Institute of Naval Architects a paper embodying the elementary principles by which the rolling of ships is governed.

In this paper he dealt especially with the leading phenomena of cumulative rolling, and in successive papers at the same Institution, and in *Naval Science*, he considered the modifying influence of the frictional and other resistances. He also dealt with the cases of abnormal forms of ships.

As a preliminary to the discussion of the subject of the rolling of ships, Froude had put into mechanical language the essential features of the trochoidal sea wave. He, from the first, verified the principle of the subject by experiments with variously formed models. The

consideration of the great advantages of introducing resistance as a check to rolling, led him to urge the adoption of bilge keels on an enlarged scale. The advantage of such large bilge keels was especially noticeable in the behaviour at sea of the Indian troop ships.

Contemporaneously with his investigations on rolling, Froude had been pursuing the subject of the resistance of ships, and by experiments in models tried first on a small scale and subsequently with models 6 feet and 12 feet long, had satisfied himself of the correctness of a definite law which he propounded for the relation between the resistance of a vessel and that of her model, and his law was simply that the resistance varied as the cube of the linear dimension at speeds proportional to the square root of the linear dimension. A correction had to be applied to allow for the increased arduity of surface friction on a short surface like a model as compared with that on the much larger surface of a ship.

Froude, convinced of the value of model experiments as a measure of the resistance of ships, at the desire of Mr. E. J. Reed, who had examined the experiments and their results, made a proposal to the Admiralty to conduct a series of experiments on models for them. The proposal was accepted, and in the year 1870 the experimental establishment near Froude's house at Chelston Cross, Torquay, was constructed. The main features of this are a covered waterway along which models made of hard paraffin are drawn by steam-power at regulated speed and their resistance automatically recorded. There are machines for shaping the models and appliances for testing the effect of model screw propellers and for making other observations.

At this time, also, the loss of Her Majesty's ship "Captain" led to the appointment of the Committee on Designs of Ships of War, of which Froude was a member.

As a work undertaken for this Committee, he tried a variety of experiments with models of Her Majesty's ship "Devastation" to exemplify the probable effects of bilge keels in the rolling of that ship, and shortly afterwards, at the request of the Admiralty, he determined by still water rolling experiments with several of Her Majesty's ships the resistance which the forms of their hulls offered to rolling whence might be inferred their probable behaviour at sea.

Proceeding a step further, Froude devised automatic recording apparatus for continuously registering the rolling movements of a ship at sea, both in relation to the vertical and in relation to a line perpendicular to the mean wave surface on which the ship at each moment was placed. From the record given by this instrument the form of the waves in which the ship had been resting could be deduced with accuracy.

Following up these experiments on rolling, Froude conducted experiments at sea in Her Majesty's ship "Greyhound," and sub-

sequently went on the experimental cruizes of Her Majesty's ship "Devastation," when valuable observations were made on her rolling and general behaviour at sea.

His services as a member of the "Inflexible" Committee in 1877, were the latest practical application of his studies of the rolling question.

Another outcome of the Committee on Designs was an important experiment on the resistance of a full sized ship which was conducted under Froude's superintendence.

The "Greyhound," a corvette, was towed at various speeds, and her resistance measured by a special dynamometer. The result was valuable as verifying the result of the experiments with models, and it was also valuable as calling attention to the great difference between the power delivered in a ship's engines, and the power usefully employed in propelling the ship.

The causes of this difference, especially that of the detrimental action of the screw propeller, when placed immediately behind the ship, was a matter to which Froude paid great attention, and the several ways in which the engine power is used or wasted, was the subject of one of his later papers read before the Institute of Naval Architects.

At the establishment at Torquay there have been in progress a series of experiments in the forms of ships from which valuable general results have already been obtained, and for the Royal Navy all the proportions and forms have been subjected to the investigation given by Froude's experimental apparatus at Torquay.

In 1875, as President of the Mechanical Section of the British Association, Froude, in his address explained in an intelligible form the bearing of the stream line theory on the question of the resistance of ships. This address he afterwards delivered as a lecture at the Royal Institution.

It has been said above that propulsion was a subject carefully considered by Froude. In connexion therewith, he was requested by the Admiralty to design a dynamometer, capable of testing the power delivered by large marine engines. The novel and ingenious instruments he thought out to meet the extreme conditions of transferring to a resisting lever the rotative force of 2,000 or 3,000 horse-power was described by him at the meeting of the Institution of Mechanical Engineers, at Bristol, in 1877.

He also had occasion to investigate the elementary principles determining the proportion of screw propellers; and his paper on this subject, read at the meeting of the Institute of Naval Architects in 1878, was the last of his published contributions to science.

Froude's investigations had been recognised by his election, in 1870, as a Fellow of the Royal Society, and by his receiving in 1876 the

Royal Medal from the Royal Society, and the honorary degree of LL.D. from the University of Glasgow. Although his health had suffered from domestic sorrows, it might have been expected that more years of work were in store for him, to be rewarded by new discoveries in his favourite studies. Yet these hopes were destined to be summarily disappointed. He went, in the winter of 1878, on a pleasure cruise in Her Majesty's ship "Boadicea," and while at the Cape was attacked by dysentery, and died, after a short illness, on May 4th, 1879. Froude's character was one in which a rare degree of modesty and disregard of self was combined with a singular charm of voice and manner. This enabled him so to act in many difficult positions that he secured for himself a prompt recognition of the great scientific knowledge and powers of mind with which he was endowed. Those who would desire to learn something of his character and work, as depicted by himself, would do well to read the evidence given by him before the Royal Commission on Scientific Research, on May 29th, 1872.

BARON JOHN BENJAMIN HEATH, Grand Officer of the Order of the Crown of Italy, Knight Commander of the Italian Order of Saints Maurice and Lazarus, Knight Commander of the Russian Order of St. Anne, Consul-General for the Kingdom of Italy, was born at Genoa on the 6th June, 1790; his father, Mr. John Heath, having been many years established as an English merchant in that Republic. A few months after his return to England, in 1798, Mr. John Heath sent his son, then only eight years of age, to school at Harrow, under the care of Dr. Drury, then head master of that school, whose wife was sister to Mr. John Heath. He passed about eight years at Harrow, where he was for some time fag to Lord Byron. On leaving Harrow he was sent to Hall Place School, near Fooks Cray, in Kent, to learn arithmetic, English grammar, and other matters which at that time were much neglected at our great public schools. He married, in 1811, Sophia, daughter of Robert Bland, M.D., of London, by whom he had a numerous family, of whom seven, *i.e.*, four sons and three daughters, survive him.

In November, 1816, he was appointed Consul-General for the Kingdom of Sardinia, and in 1861 became Consul-General for the Kingdom of United Italy; so that at the time of his death, in January last, he had held his Consular Commission rather more than sixty-two years. After fifty years of Consular service he was created a Baron of the Kingdom of Italy by King Victor Emmanuel II, and the title was made hereditary through the male branch.

Baron Heath continued the business of his father, as a merchant and foreign banker, in London, and was still at the head of the house of Heath and Co. at the time of his death. He was for fifty years a

director of the Bank of England, and was Deputy Governor of the Bank, with Mr. William Cotton as Treasurer, in 1844, when Sir Robert Peel passed the new Bank Act; the two Governors of the Bank materially assisted Sir Robert in preparing the details of that most useful measure.

Baron Heath was for many years a member of the Court of Assistants of the Grocers' Company, whereof he was Master in 1829, when he presented the Company with his unpublished book, called "Some account of the Grocers' Company," which is a history of the Company from its institution more than five hundred years ago. As a testimony of their appreciation of this work, the Court presented him with a splendid piece of silver plate.

Baron Heath was elected a Fellow of the Royal Society in 1843; he was an accomplished musician and a good linguist, and took much interest in literary and archæological pursuits, in following up which, he became a member of several learned societies; he was also a member of the Roxburghe Club, of the Philobiblon Society, and the Dilettante Society; he possessed a well-selected library and a large collection of autographs, in which he took great pleasure.

Baron Heath died on Thursday, the 16th January last, after a few days' illness.

PROFESSOR KELLAND was the son of the Rev. Philip Kelland, who at the time of the birth of his son was rector of the parish of Dunster, in Somersetshire. Afterwards it would appear that he removed to Landcross, in Devonshire. Though an Oxford man himself, his father sent his son Philip to Queen's College, Cambridge, where he greatly distinguished himself among his contemporaries, and in 1834 stood at the head of the honour list as Senior Wrangler and Smith Prize-man. Among those whose names appear on the same list were the Rev. Dr. John William Donaldson, the author of the *New Cratylus*, and editor of "*Pindar*;" and Mr. Main, who became first assistant in the Royal Observatory, Greenwich, and subsequently Director of the Radcliffe Observatory, Oxford. The latter subsequently married Mr. Kelland's sister, and between the two old college friends there existed the closest intimacy until Mr. Main's death. Mr. Kelland, who had taken orders in the Church of England, became a tutor in Queen's College, and continued such for the next three years. It was in 1838 that he was appointed to the Chair of Mathematics in the Edinburgh University, as successor to Professor Wallace. For the chair there were a number of candidates, including Mr. Gregory, the author of "*Gregory's Examples*," and Mr. Edward Sang, and a warm controversy seems to have been carried on as to the respective merits of the rival candidates. Against Mr. Kelland, Sir William Hamilton, then the occupant of the Logic Chair, was in arms, and in June, 1838,

the great metaphysician and philosopher wrote a pamphlet addressed to the Lord Provost and Town Council, in whose hands was the patronage of the chair, "on the election of a Professor of Mathematics," in which he spoke very strongly in favour of the qualifications of Mr. Gregory as against those of Mr. Kelland. Once in the *Senatus*, however, Mr. Kelland's gentlemanly manner, not less than his eminent ability as a teacher, soon converted former opponents into friends. That he bore no malice—as indeed his nature was incapable of doing so—to those who had opposed him is shown from the way in which he speaks of Sir William Hamilton in connexion with later fights, both in the *Senatus* and between that body and the Town Council. "I can say" (he remarks), "who was witness and part-actor in all these contests, that never did Sir William exhibit a shadow of self-seeking. Not for his comfort or his gain he contended; and although my own department was the object of some of his best known attacks, I can say that never for one moment did I feel towards him other than the warmest personal regard—nay, more, attachment. He was indeed one of my kindest, steadiest friends." On the retirement of Sir William Hamilton as secretary of the *Senatus*, another controversy arose. The Town Council proposed that the office should be merged in that of a general secretary to the University; but the *Senatus* carried the day, and appointed Mr. Kelland their secretary—a position he filled in a highly satisfactory manner until 1867. Official duty as well as inclination, therefore, led him to take an active part in the movement then going on in favour of University reform, which resulted in the appointment of the Commission of 1858, and the ultimate release of the University from what the Professor described as the "somewhat imaginary despotism of the Town Council." When Professor James D. Forbes, who occupied the Natural Philosophy Chair, was laid aside from work through ill-health, Mr. Kelland came forward, and, with the assistance of one of his students, discharged the duties of the chair from 1852 until 1856. As a teacher he was exceedingly popular with his students, and that the Mathematical class did not fall off in his hands he proved with justifiable pride in the speech already referred to, by an allusion to the fact that whereas in 1838 he enrolled 111 students, in the past year he enrolled 373.

The year after he came to Edinburgh, Professor Kelland was elected a Fellow of the Royal Society of Edinburgh, in whose welfare he ever took the greatest interest, and to whose publications he largely contributed. He became in time one of the vice-presidents, and last year he was chosen to succeed Sir William Thomson in the presidential chair, and opened the session in November last with the customary inaugural address. The deceased Professor was also, for about ten years from 1850, an active member of the Society of Arts, and he was president of that Society also in the session 1853-4. An institution

in which Professor Kelland took much interest was the Life Association of Scotland, of which he was one of the original founders. In connexion with the business of that institution he was induced in 1858 to take a trip to America, and while there he improved the occasion by making himself better acquainted with Transatlantic science and the state of education in the primary and secondary schools of the United States. A few of the results of his observations he gave to his friends in the shape of a small volume entitled "*Transatlantic Sketches*," which is written in a light conversational style. As stated above, Professor Kelland was a clergyman of the Church of England, and he occasionally officiated in St. James' and other Episcopal Churches. Preaching, however, was, in the opinion of his friends, one of the few accomplishments in which he did not excel. Professor Kelland was twice married—first to Miss Pilkington, of Dublin, and subsequently to Miss Boswell, the only daughter of the late Captain Boswell, R.N., of Wardie. His widow, three sons, and two daughters survive him. In politics he took little interest; and it is said that the only occasion on which he was known to vote was at the first School Board election, when he voted for the lady candidates.

The class-room was undoubtedly Professor Kelland's proper sphere. As a teacher he has been equalled by few and surpassed by none of the many colleagues alongside of whom he has laboured. In the Royal Society he was always regarded as an authority on mathematical and physical subjects. His notes, though not numerous, were much valued, and his criticisms were listened to with respect. But he had little ambition to shine as an explorer, whatever his capacity might be. Fate had made him a teacher, and to that work he bent all his energies. His function was less to make discoveries than to methodise, adapt, and disseminate the discoveries of others. This implied that he should be a student as well as a teacher, and one chief cause of his success in the latter capacity was his perseverance in the former. None who witnessed it can have forgotten the enthusiasm and delight with which he first assimilated and then reproduced in his class the doctrine of Quaternions developed by Sir William Rowan Hamilton upwards of twenty years ago. Then he was both student and teacher at the same moment. The members of his class were his fellow-students. His morning demonstrations were instinct with the freshness of the evening's discoveries, and his face beamed with delight and his eye twinkled with triumph as his rapid fingers worked out the beautiful results on the board. As a teacher his one fault was that he rushed forward somewhat too rapidly for the majority of his hearers. One reason of this was, that he assumed rather too high a standard of attainment on the part of entrants to the University. Another reason of it was that he had a large amount of work to do and little time in which to do it. He therefore carried on the few rather than the

many. But those who had the needful ability, and had the power of work in them, followed him with the utmost interest, and generally pronounced him, when in his prime at least, the best professor in the Faculty of Arts. Personally he was much beloved by his students. He was a man of genial temperament and kindness of heart; and he was ever ready to help deserving students, and to encourage those whom difficulties might have deterred from persevering in their work. When acting as substitute for Professor Forbes in the Chair of Natural Philosophy, he discovered a power of popular lecturing of which he did not seem to have been himself aware, and which was quite new to his friends and even to his students. The lectures he frequently delivered before the Philosophical Institution were one result of this discovery. Of all the departments of physics with which he dealt, Acoustics was the one in which he took the greatest delight, probably because his skill as a violinist went hand-in-hand with his ability as a mathematician. Perhaps the most successful of his lectures were those on the lives and labours of eminent natural philosophers, as Kepler, Galileo, and Newton. The literary finish, the sparkle of wit, and the soundness of judgment by which these lectures were characterised make it a cause of regret that his efforts in literature were generally so strictly professional. Of his contributions to the Proceedings of the Royal Societies of London and Edinburgh and to the Philosophical Society of Cambridge, twenty-six papers are particularly specified in the catalogue of the first-mentioned scientific body. He published works on "The Theory of Heat," in 1837 and 1842; treatises on "Algebra," in 1839 and 1860; and in 1873, an "Introduction to Quaternions," conjointly with his colleague, Professor Guthrie Tait. The introductory and valedictory addresses which he occasionally delivered to his classes, sometimes dealt with the question of University reform. On this subject his views inclined to Conservatism. Two of these lectures were published—the one in 1854, entitled "The Scottish Universities suited to the Scottish People," and the other in 1855, with the title, "How to improve the Scottish Universities." Almost his latest work, and that which is most worthy of his reputation as a mathematician, is the article on "Algebra," contributed to the ninth edition of the "Encyclopædia Britannica." He was elected a Fellow of the Royal Society in 1838.

Sir THOMAS LARCOM, who died at Heathfield, Fareham, Hants, on June 15, was the last survivor of that remarkable band of officers of the Royal Engineers, many of whom were Fellows of this Society, whose names will never be forgotten in connexion with the Ordnance Survey of Ireland. That Survey, the model in its grand comprehen-

siveness of the Survey of Great Britain, is perhaps, considering the period at which it was executed, the highest result of British practical science of which this country can boast, and was the work of no common men. As they have been removed one by one from among us, notices of Colby, Drummond, and Portlock have appeared in our pages; Murphy was drowned in the Euphrates on Colonel Chesney's Expedition; Robe, Sir William Reid, and Dawson passed away long ago. Of these General Colby was the master and tutor. Selected in 1824 by the discerning eye of the Duke of Wellington for the task of executing the Survey of Ireland, and leaving it completed in 1846, his success was what might have been expected from the well-proved fertility of his inventive genius, his extraordinary force of character and self-devotion, the high moral tone which was sure to propagate itself amongst his staff. If others invented, enlarged, improved, suggested, executed,—to Colby, the Commander-in-Chief, the main credit of the Survey must always belong.

The only officer of this band to whose career, as a whole, that of Larcom bears any similarity, is the lamented Drummond; but Drummond's early death prevented the full development of talents which would certainly have raised his already great fame to a still higher level than it actually attained; Larcom was permitted for a period of more than forty years to become identified with what may be called his adopted country; and his memoirs would be to a very great extent a history, for his period, of Ireland itself. Like Drummond, the work which he accomplished on the Irish Survey pointed him out as the proper person to organize and administer various branches of the Civil Service; and like him, he was made Under-Secretary for Ireland, with the marked approval of the public. It is of this varied service that we must make a brief sketch.

Sir Thomas Larcom resembled Generals Colby and Portlock in one respect, rather than Drummond. Like the two Generals, he was the son of a distinguished sea officer; and the sense of duty, the undaunted energy, the practical sagacity which all three inherited, may very clearly and very similarly be traced in their career. His father, Captain Joseph Larcom, R.N., who saw much active service, was best known by the office he held for some years as Commissioner of Malta Dockyard, on his way home from which post he died in 1817. Sir Thomas was born in 1801, joined the corps of Royal Engineers at Chatham, with a high reputation from Woolwich, in 1821, and served his first two years at Gibraltar. His early character, on its scientific side, was formed under men of genius, General Mudge, R.A., the successor of General Roy in the first operations of the English Survey, and Sir Charles Pasley, the founder of the Engineering School at Chatham. Under these officers, while learning the rudiments of his profession, he imbibed his full share of that combined military and

scientific zeal which grew out of the experiences of the Peninsular War, and was perhaps best represented before the eyes of later generations by Sir John Burgoyne, one of Larcom's truest friends. In 1824, Larcom commenced his labours in the Ordnance Survey of England, but was selected by Major Colby for the Irish Survey in 1826. Here he found himself happily coupled with one who had been known to him from boyhood, the late General Portlock, in those arduous operations of the Trigonometrical Survey by which Ireland was connected with the sister island in a network of triangulation. In 1828 he was entrusted by General Colby with the central organization at Dublin of the whole Survey. To him was assigned, under the immediate command of his chief, the task of examining and comparing all the plans and documents as they were sent in from all portions of the Survey, of compiling them into county maps, engraving, and finally publishing them. To him fell the training and discipline of an army of draftsmen, computers, engravers, and printers, a large proportion of whom were men of his own corps. While in this position, he deserves the credit of adopting and of adapting every invention, such as that of electrotype, by which economy could be secured and production multiplied; and every Continental improvement, such as that of Contouring, a novelty at first warmly opposed, but gradually triumphant. In the course of a very few years the establishment at Mountjoy, in Phoenix Park, was without an equal in the world, the pride of Ireland, the admiration of scientific travellers. It was afterwards transferred to Southampton under the able superintendence of his brother officer, Sir Henry James.

But Larcom was not only distinguished as a scientific man, he was pre-eminently the literary man of the party; and his mental activity was early displayed in promoting that enlargement of the original idea of the Survey which General Colby was wise enough to encourage. In the preface to the "Memoir of Templemore," the General says:—"Lieutenant Larcom conceived the idea that with such opportunities a small additional cost would enable him, without retarding the execution of the maps, to draw together a work embracing every description of local information relating to Ireland. He submitted this idea to me, and I obtained the sanction of the Irish Government for carrying it into effect. To him I have entrusted the execution, and this volume is the first public result." Colby himself, as his biographer, General Portlock, admits, "was not an antiquarian;" Larcom was. He applied himself to the study of the Irish language, in order to qualify himself for his self-imposed task; and under his enthusiastic guidance competent persons searched every record, and made every personal investigation necessary for the historical and literary branch of the Survey. A vast body of information, of the highest value, was gradually collected; much of it already digested;

the ideal would shortly have been realized, but, from motives of economy, the Government suspended operations, and the organic whole, to Larcom's intense disappointment, was not to be the crowning glory of the Ordnance Survey. Its component parts, however, were in time undertaken by various scientific bodies, some of which took their rise from these very operations now suspended. Years afterwards, the President of the Royal Irish Academy, the present distinguished Bishop of Limerick, referred to Sir Thomas Larcom in the following words:—"For my own part, I do not hesitate to express my belief that to the individual who planned and organized it [the Survey, as to its literary, historical, and statistical branches] we are indebted for some of the most important advances which have been made within the last quarter of a century in the studies relating to the history, the languages, and the antiquities of Ireland. To Lieutenant, now Major-General Sir Thomas Larcom, belongs this honour." ("Proceedings of the Royal Irish Academy," VII, 437.) During the eight concluding years of the Irish Survey, Larcom had the entire executive charge of it, his chief's presence being required in London for the English Survey.

In 1846, when the Irish Survey was completed, Larcom was finally adopted into the Civil Service of Ireland, as a Commissioner of the Board of Works; but he had already been an Assistant Commissioner in special connexion with the works systematized by way of relief to the sufferers by the Irish famine. The immense labours of that and the next year, which were required of him as the chief director of these works, nearly brought him to the grave; and indeed it would have been impossible that he could have carried them through, had not his previous employments given him a minute acquaintance with every necessary detail. In 1832 he had prepared for Government the plans required for the Irish Reform Bill; in 1836 he had prepared the topographical portion of the Report on Irish Municipal Reform, when elaborate plans and maps of sixty-seven towns were prepared and presented in the space of one month; in 1837 and 1838 he had executed, with a view to commencing the Irish Railways on a scientific plan, the first general map ever made in Europe on which the ground was completely delineated as one whole. In 1841 he had been a Census Commissioner, and made the great statistical advance of including in the Report an account of the classification and condition of the population as well as its numbers, an extension of the old method since adopted in Great Britain and on the Continent. In 1842 he had been a Commissioner to inquire into the state of the Royal Irish Society, and in 1845, for purposes relating to the new Queen's Colleges.

For none of these Commissions or other work of the sort would he ever receive any remuneration; and to this resolution he adhered,

when, in subsequent years, he collected Returns of agricultural produce for the Government, when he was made Chief Commissioner for inquiry into the Irish Poor Law in 1848, and in the next year held the same place in the Commission for the reform of the Dublin Corporation. The importance of the Reports of the Boundary Commissions, over which he presided, may be judged by the fact that the Unions and electoral districts of Ireland were remodelled in accordance with the suggestions contained in them. In 1850 he became Deputy Chairman of the Board of Works; and in the year following, a member of the Senate of the Queen's University.

It will thus be seen that in the process which placed Ireland, during a rapid course of scientific inquiry and judicious improvement, far ahead of the larger island, Larcom was certainly one of the principal agents; and, indeed, it would be difficult to mention any one name more immediately concerned in producing that result. It was almost, then, a matter of course, that when a vacancy occurred in the Irish Under-Secretaryship, he should be selected for that post in 1853; but it distinguishes him from all others who have held it, that the office was for the first time made non-political and permanent, in order to keep him at the helm; while since his retirement, after a service of nearly seventeen years, its permanent character has been, perhaps unfortunately, abolished. During the Viceroyalty of Lords St. Germans, Carlisle, Eglinton, Kimberley, and the Duke of Abercorn, the subject of this memoir passed through the several gradations of military rank till he became Lieutenant-General, and was decorated with the K.C.B. It was during the latter part of this time that the Fenian Insurrection threatened, developed itself, and—greatly owing to General Larcom's incessant vigilance and consummate precautions—was quelled. The interruption it caused to the steady flow of Irish prosperity, which had set in after the famine and subsequent emigration, was a serious grief to the Secretary who had done so much in the previous years to remove the incumbrances of ages, and to foster the material prosperity, the education, and the social improvement of the Irish people. To name in this sketch the numerous instances of the sort, which are indeed well known, would be quite beyond our limits. For some time before his retirement he had begged to be relieved from an office which had begun to overtax his energies; but he could not be spared; nor was he the man to desert his duty as long as it was believed by his superiors that his services were necessary. When he retired, in 1869, the Government of the day bestowed on him the Baronetcy he had so well deserved, the Irish Privy Councillorship, and a pension equivalent to his pay. The exhaustive minutes drawn up by him for successive Governments, many of which furnished the speeches of Ministers and Viceroys, form of themselves a history of the progress of Ireland; but, perhaps the best tribute to

his unwearied diligence and great powers of administration, is the saying which grew to be proverbial, not only in Ireland but beyond it, that whatever the changes of Lord-Lieutenants and Chief Secretaries—and he served with some excellent ones—Ireland was always really governed by “Larcom and the Police.” It may be questioned whether it was ever better governed. The meaning of the expression was this:—Ireland had a long breathing-time from the troubles which had so often marred her prosperity; religious and political differences were restrained by the strong hand from disturbing the peace; and the grievances which were inseparable from such a past history were mitigated by the general sense entertained of the perfect fair dealing which prevailed at head-quarters.

This, at any rate, was the interpretation put upon his services by those best able to judge. On his resignation, Addresses, accompanying splendid gifts in plate, were presented to him by the leading noblemen, gentry, magistrates, and scientific men of Ireland; and the following sentences may be quoted:—

“Under six successive administrations, you have discharged the duties of your office with credit to yourself and with advantage to the country, with exemplary diligence and fidelity, for the preservation of social order, and the promotion of national prosperity.

“We also desire to express our grateful appreciation of the earnest and efficient manner in which for a period of forty years and upwards you have laboured in different departments of the public service to make known and turn to good account the national resources, to advance science and literature, and collect materials for the elucidation of the ancient history of Ireland.”

It will be gathered from the sketch of Sir Thomas Larcom’s life here presented, that he was too busily occupied in administrative labours to leave behind him any extensive contributions to literature. He was rather the instigator and pioneer of scientific research, the founder or co-founder of scientific Societies, the dispenser of assistance to them from his position in the Government. But, besides the volumes of the “Irish Ordnance Survey,” which have been mentioned as chiefly compiled by him, his edition of Sir William Petty’s famous “Down Survey,” is a work of merit; and he contributed several articles to the “Aide Mémoire,” as well as very interesting and better-known memoirs of his friends Drummond and Portlock to the “Professional Papers of the Royal Engineers.”

SIR JOHN GEORGE SHAW-LEFEVRE, K.C.B., was the second son of Charles Shaw-Lefevre, Esq., of Heckfield Place, Hants, for many years Member for Reading; the eldest son, at an early age, became Member for the County of Hants, and filled the office of Speaker of

the House of Commons from 1839 to 1857, when, on his retirement, he was raised to the Peerage under the title of Viscount Eversley.

The second son, John, was born in 1797, and was educated at Eton and Cambridge. At the University his career was most honourable; though of feeble health, which at that time never permitted him to work for more than six hours a day, he was Senior Wrangler in 1818, a year remarkable for the number of men of ability who passed in honours and who subsequently distinguished themselves; he was elected Fellow of Trinity in the following year, and was called to the Bar by the Inner Temple in 1824. For some years he practised as a conveyancer with success; but after a time was gradually drawn away into political employment. In 1832 he was employed by the Government of the day to arrange the divisions of counties for representation under the Reform Act. In the same year he was elected member for Petersfield by a majority of one, but was unseated on a scrutiny. Shortly after he was appointed Under Secretary of State for the Colonies, by the Secretary of State, Mr. Stanley, afterwards Earl of Derby. In 1834 he undertook the work of Poor Law Commissioner, under the Act passed in that session for the amendment of the Poor Law. His work involved the entire organisation of the new system, the arrangement of Poor Law Unions over the whole country, and the building of workhouses, in the face of vehement opposition from a large part of the Press and the public. He held this post for seven years, till 1841, when the work began to tell upon his health, he then exchanged this office for that of Secretary of the Board of Trade, which he held till the year 1848, when he was appointed Clerk of the Parliaments, an office which he held till his final retirement in 1875, four years before his death. His official duties connected with these offices formed, however, but a small part of his work; he was employed by successive Governments in a great number of Commissions and Inquiries involving great labour. In 1834 he was one of the Commissioners entrusted by Lord Glenelg with the foundation of the Colony of South Australia; he was also one of the Founders of the University of London, and in 1842 succeeded the late Sir John Lubbock as Vice-Chancellor of the University, a post which he filled for twenty years till 1862. In 1842 he was a member of a Commission to inquire into the recent losses of Exchequer Bills; in 1843 he was appointed member of the Emigration Commission; in 1846 he was employed by the Government on a mission to Edinburgh, which resulted in founding the National Academy in that city; in the same year he was employed as arbitrator to settle the questions in dispute between the Colonial Office and the New Zealand Company. About the same time he contested the representation of the University of Cambridge in the Liberal interest, but without success. Shortly afterwards he was appointed a member

of the Ecclesiastical Commission, and for many years was one of the Commissioners for managing the estates of the Bishops and Cathedral bodies. In 1848 he again went on a mission to Edinburgh, and reported upon the vexed questions of the Annuity Tax and the Fishery Board. In 1851 he was appointed member of a Commission to inquire into the appointments to the Civil Service of India, the other Commissioners being Lord Ashburton, Lord Macaulay, Mr. Melville, and Professor Jowett, and the result of their labours was the establishment of competitive examinations for the entry into the Indian Civil Service. In 1853 he was one of a Commission to inquire into the Inns of Court; their recommendations, however, involving an entire reconstitution of these bodies and the utilization of their great income for the purpose of legal education, have not as yet been carried out, although some stimulus was given to changes in this direction. In 1858 Sir John Lefevre was appointed member of an Executive Commission with Sir Edward Ryan, to carry out arrangements for insuring competent appointments to the Civil Service in England; for some years this was confined to requiring pass examinations as the test of competency, but later the principle of competition was introduced, of which he was always a warm supporter. For many years, in conjunction with Sir Edward Ryan, he elaborated the system of competition and carried it out universally throughout the Civil Service. He was also a member of the Commission for restoring the Standards, for the Digest of the Statutes, and for inquiry into the Endowed Schools. It was on work of this kind that his qualities of patient inquiry, quickness of insight, and powers of persuasion were so conspicuous, and led to his services being so frequently called in aid by the Government. All this work on Commissions and Inquiries was undertaken without claim for pay or reward; but in 1857, the distinction of the Order of the Bath was conferred on him. His numerous official duties did not prevent his devoting his spare hours to literary and scientific work, and even to work of other kind. He was one of the first Directors of the London and North Western Railway; he was one of the Founders of the Athenæum Club and of the Political Economy Club. He was a Fellow of the Royal Society (elected 1820) and a member of many other learned societies. In addition to his mathematical acquirements, which he maintained to the latest period of life, he was able to devote much time to literature. He had a great facility for learning languages, and, besides that of Hebrew, mastered all the languages of Europe; he commenced to study Russian after the age of 65, but even after this found time to acquire a most extensive knowledge of its literature. In 1875 he was compelled by a severe attack of illness to retire from office, but he continued to devote himself without remission to his literary studies; he died on the 20th of August, 1879, at the age of

83, after a short and painless illness, in the full possession of all his faculties, with undimmed memory and intellect, with unabated interest in public affairs, and retaining to the last that ever-ready fund of sympathy and that sweetness of character which so much endeared him to his friends and relations.

SIR THOMAS MACLEAR, the eldest son of the Rev. James Maclear, of Newton Stewart, Tyrone, Ireland, was born on the 17th of March, 1794. At the age of fifteen he was placed under the care of relatives in England, and educated for the medical profession, studying at Guy's and Bartholomew's Hospitals. He had excellent prospects in London, but, preferring a more quiet life, he obtained the appointment of House Surgeon to the Bedford Infirmary, and at this place, in the society of the late Admiral Smyth, he had opportunities of employing himself occasionally in the practice of astronomy, a science for which he had early shown a predilection. In 1823 he moved to Biggleswade, and here erected a small observatory, in which he spent most of the time he could spare from the practice of his profession. In 1825 he married Mary Pearse, daughter of one of his Bedford friends.

In 1833, probably through the recommendation of Admiral Smyth and Sir John Herschel, he was appointed Astronomer at the Cape of Good Hope. He reached his new sphere of labour in January, 1834. Less than a fortnight later Sir John Herschel arrived at the Cape to make the survey of the southern heavens, which occupied him four years, and the two astronomers assisted each other during this period with heart and hand. The transit instrument and the mural circle were kept in constant use by Maclear and his single assistant, the result being that in the clear skies of the Cape observations accumulated far beyond the limited powers of reduction.

In the early part of 1838 he commenced his great undertaking, the verification of Lacaille's arc of the meridian, the field-work for which was completed in 1847. It has formed the basis for the survey of the colony, and has given to it a character and completeness which might otherwise have been wanting. The results of this important geodetic operation were published in two quarto volumes in 1866, under the editorship of Sir George Airy. In 1849 Maclear's means for extra-meridional observations were increased by the mounting of a 7-inch Merz refractor, he having previously been limited to the use of a Dollond achromatic of 46 inches focal length. Many valuable series of observations of comets when beyond reach at the European observatories were thus obtained, and have been of the greatest assistance in the accurate determination of their orbits. Between the years 1849—1853 the whole of the stars of the British Association Catalogue having south declination were observed by Maclear with the meridian instruments. The reduction of these observations, as of others, was much

delayed by the amount of time and attention given to work connected with the verification of Lacaille's arc, so that it has happened that the present astronomer is now engaged upon the formation of a catalogue from them for the epoch 1850.

In 1859, Maclear visited England for a few months. He returned to the Cape in the following year, and after this time his attention was mainly directed to the reduction of his previous observations. He reduced the series made in the interval 1835-40, which, after revision by his successor, Mr. E. J. Stone, has been formed into a catalogue for 1840, containing 2,892 stars. He also partly reduced the observations in the years 1856-60, a work completed by Mr. Stone, and published as the "Cape Catalogue for 1860," which contains 1,159 stars. Amongst his miscellaneous astronomical work was the determination of the parallaxes of α and β Centauri, confirming for the first of these stars the result of his predecessor, Henderson.

Maclear continued closely occupied with his astronomical duties until 1870, when he retired from the direction of the Cape Observatory, still continuing to reside in the vicinity, and taking a very lively and active interest, as he had previously done, in every matter tending to promote the well-being of the colony, in which he was greatly esteemed and respected. Latterly, his sight failed him, and for several years before his death he was quite blind. He was much interested in the exploration of South Africa; and the last occasion on which he left his house was to attend a meeting in Cape Town, when Stanley visited the colony. He died at his residence, Grey Villa, Mowbray, Cape of Good Hope, on July 14, 1879. He was elected a Fellow of the Royal Society in 1831, Member of the Academy of Sciences of Palermo in 1835, and a Correspondent of the Institute of France in 1863. For his verification and extension of Lacaille's arc, he received the Lalande Prize from the French Academy of Sciences in 1867, and a Royal Medal in 1869 from the Royal Society. Maclear was knighted in 1860.

In proof of the estimation in which Sir Thomas Maclear was held in the Cape Colony, it may be mentioned that the following resolution was agreed to in the House of Assembly on the 17th of July last:—"That this House desires to express its deep sense of the signal services rendered by the late Sir Thomas Maclear, Knt., F.R.S., F.R.A.S., to the general cause of Astronomical and Geographical Science while in charge of the Royal Observatory, Cape Town, and also to the material interests of the colony in the practical application of his researches; and, furthermore, its high appreciation of his devotion for a long period of years to the cause of South African exploration and civilization; and that this Resolution be recorded in the journals of the House."

MR. ANTHONY MERVYN REEVE STORY-MASKELYNE was born May 8th, 1791. He was descended from the family of Story, who were settled at Know, in the county of Cumberland, but being Jacobites were obliged to leave that part of the country after the Rebellion of 1715. Mr. Story-Maskelyne's grandfather settled at Oxford soon after 1715, and died there in 1751. He had a son, William Story, who was born in 1734, and became rector of Hinton-Martell, county Dorset, on the presentation of the Earl of Shaftesbury. This gentleman was the father of the subject of the present memoir. Mr. Story-Maskelyne lost his father early in life, but his mother survived her husband till 1827. The care and education of her son fell to her, and Mr. Story-Maskelyne often spoke with pride and gratitude of her devotion and judicious management. When he went up to Oxford and entered at Wadham College he found himself far behind the scholarship of the place, but with a spirit for work and a passion for knowledge with which his mother had inspired him, he would tell with some humour of his first essay for a scholarship, when, on a friend inquiring "how he had done," the answer was that he had made four false quantities in the first two lines of an ode of Horace. But this remark was the spur to that undaunted effort which resulted in the remarkable success of a "double-first." When Mr. Story-Maskelyne took his "double-first," in 1810, aged just nineteen, only three men before him had won that honour, Sir Robert Peel, Mr. C. Bathurst, and the Rev. J. Keble; and when we remember his imperfect preparation for Oxford and his final success, we can only be astonished at the labour and the ability which were required and expended to achieve it. The late Warden of Wadham, Dr. Symons, was his tutor, and may well share the praise of such work. Mr. Story-Maskelyne, having selected the bar as his profession, was called in 1816, and went on the Western Circuit for five or six years. He was elected a Fellow of the Royal Society in 1823. Tempting offers came to him afterwards. By his degree, he had made himself a man of mark, and among others the Lord Shaftesbury of that day proposed to him to bring him into Parliament for one of those boroughs which, before the Reform Bill, were at the command of their "owners." This Mr. Story-Maskelyne declined, for the acceptance of the offer would have bound him to a party—perhaps almost to the opinions of his patron, and it was the characteristic of his mind then, and till the last, to be the independent master of his own opinions. But it is most probable that his marriage with Miss Margaret Maskelyne, the only child of the Rev. Dr. Maskelyne, F.R.S., Astronomer Royal, gave the turn and character to his career which continued to the end. Mr. Maskelyne's marriage took place in 1819, and the ancient patrimony of the Maskelynes at Purton and Bassett Down came with his wife, as sole heiress, to him.

But perhaps the withdrawal of Mr. Maskelyne from all public and county business may have another explanation, at least supplementary to that to which we have here ascribed it. His tastes were those of an educated and well-read gentleman. To him the treasures of the great minds of Greece and Rome were as completely open as are those of our own language to us, and we know that to within a very few years of his death he still enjoyed the beauty and wisdom laid up in their works, and found his rest and enjoyment there. Perhaps with such tastes and such occupations, a want of sympathy from others or a want of congeniality of taste in others, led him to separate himself from those useful and honourable men to whom this country owes so much for their care of our national and county affairs.

Mrs. Story-Maskelyne died in 1858, so that her husband has survived her twenty-one years. She inherited from her father much of his great ability, and was enabled to correct the press for the last publications he wrote. But her kindly heart, and a charity that checked all expression, all feeling of an unkind thought, are the great charms by which she is best remembered now.

SIR JAMES MATHESON, Baronet, was the second son of Captain Donald Matheson, of Shiness, in the county of Sutherland, and was born in 1796. He was educated at the High School and University of Edinburgh, and after a few years' business training in London, he went out to the East, and engaged in mercantile pursuits. He was one of the founders of the eminent house of Jardine, Matheson, and Co., in China. In 1836, during a visit to this country, he published a volume on the China trade, which threw light on a subject not then much understood. In 1842, he finally retired from business with an ample fortune, and in the following year married Mary Jane, daughter of Mr. Michael H. Perceval, a member of the Legislative Council of Quebec.

Having acquired the estate of Achany in his native county, Mr. Matheson in 1844 purchased from the Seaforth family the Island of Lewis, in the Hebrides, and made it for the most part his home. It was his earnest desire to improve the condition of the large population on this estate, and with large-hearted and liberal plans he entered upon his self-imposed task, employing the most able assistants whom he could find to carry out his projects. Large outlays were made in the construction of roads and bridges over the whole island, in draining and reclaiming waste land, in establishing steam communication with the south, and in promoting education. Scarcely had he begun these various works when, in common with Ireland, the west Highlands were visited by the potato disease, and many thousands of persons on his property were threatened with famine. His untiring

efforts at that time, and the munificent provision which he made for meeting the distress, can never be forgotten. They were not unobserved by Her Majesty's Government, and in recognition of his generous conduct he was created a baronet.

Sir James entered Parliament in 1843, as member for Ashburton, and in 1847 he was returned for the combined counties of Ross and Cromarty, for which he continued to sit until 1868. He was elected a Fellow of the Royal Society in 1846. He died at Mentone on the 31st December last, aged 82. Lady Matheson survives him.

JOHN MIERS was born in London on the 25th of August, 1789. He entered his father's business as a jeweller, but evincing a decided inclination for scientific research, devoted himself in his leisure hours to the study of the physical sciences, and especially of chemistry and mineralogy. At this early period of his life he undertook a series of experimental researches in the endeavour to demonstrate the compound nature of azote, which resulted in the publication of two papers on this subject in Thomson's "*Annals of Philosophy*," in the year 1814; he also took a leading part in the foundation of the "*Philosophical Society of London*"—an institution with which many young men who in after years distinguished themselves in science were connected. At this time he made the acquaintance of Michael Faraday.

In 1818 he married, and shortly after, at the invitation of his friend. Lord Cochrane (afterwards Earl Dundonald), proceeded to Chili to assist in the erection of extensive machinery for the reduction and manufacture of copper; an enterprise in which both were interested. Landing at Buenos Ayres, he traversed the Pampas and the Cordilleras, and, during six years' residence in the country, devoted his leisure time to the study of its Flora and Fauna. Although at this time unacquainted with the elements of botany, he gradually acquired a practical knowledge of the science by numerous dissections and observations upon the plants of Chili in the living state. He returned to England in 1825, and during a stay of a few months obtained personal introductions to Robert Brown and Dr. Lindley, who encouraged him in his studies. In 1826, shortly after his return to South America, was published his "*Travels in Chili and La Plata*," in two volumes, a work which was for long regarded as a standard authority on the geography of the countries and customs of the people with which it dealt. He twice again traversed the Pampas, and afterwards resided for seven years in Rio de Janeiro, where he had contracted to erect a Mint for the Brazilian Government, and where, although incessantly engaged in his professional duties, he added largely to his botanical and entomological collections.

Mr. Miers returned to England finally in 1838, and from this period

the commencement of his scientific career may be dated. He contributed numerous papers on the botany of South America to the "Transactions" and "Journal" of the Linnean Society, the London "Journal of Botany," and the "Annals and Magazine of Natural History." He also published several larger works, which although consisting in great part of reprints of his smaller memoirs, are enriched with many additional observations, and with numerous plates executed from his original drawings, and many of them drawn by himself on the stone. His "Illustrations of South American Botany" appeared in 1850, and his "Contributions," in three volumes, followed in 1867, 1869, and 1871; the third and concluding volume of the latter work is occupied exclusively with his "Monograph of Menispermaceous Plants," and is the most valuable of his contributions to science. His latest volume, a "Memoir on the Apocynaceæ," was published in 1878, when its author was in his 89th year.

Mr. Miers was elected F.L.S. in 1839, and F.R.S. in 1843, and was a member of several foreign learned Societies. He served as Juror in the Brazilian Section of the International Exhibition of 1862, and for his services the Emperor conferred upon him the Cross and Grand Cross of the Imperial Order of the Rose.

As a botanist, Mr. Miers was distinguished by the extreme carefulness and accuracy of his observations and descriptions, and the great beauty and fidelity of his drawings and analyses. He was to the last an opponent of the theory of Evolution. In private life he was ever regarded with affection and esteem by all who knew him.

In June, 1879, he was compelled by failing health to desist from active work, and after several months of ever-increasing infirmity, borne with unflinching patience, breathed his last on the 17th October, 1879, in the 91st year of his age.

His extensive botanical collections have been bequeathed to the British Museum.

CHARLES MURCHISON was born in Jamaica in 1830. Some time afterwards, his father, who belonged to a Scotch family, and was nearly related to Sir Roderick Murchison, left the West Indies, where he had been practising as a physician, and returning to his native land went to reside at Elgin. At the age of fifteen Charles Murchison went to the University of Aberdeen, and two years afterwards began the study of medicine in Edinburgh University. Even as a student he displayed the same qualities which characterised him in after life, manual dexterity, retentive memory, clearness of thought, and plainness of exposition, combined with great energy and industry. These qualities not only enabled him to gain many distinctions in the classes he attended, and to take his degree with the highest honours,

but they obtained for him so much esteem amongst his fellow students as to lead to his election as one of the Presidents of the Royal Medical Society. Before taking his degree he had obtained the Licentiatehip of the Royal College of Surgeons, Edinburgh, and had acted as House Surgeon for Mr. Syme. After his graduation, at the age of twenty-one he became Physician to the British Embassy at Turin. In the following year he returned to Edinburgh and acted for a while as resident Clinical Physician in the Infirmary. After resigning this appointment he studied for a short time in Dublin and Paris. He then entered the Honourable East India Company's service, and soon after his arrival in Calcutta, was appointed Professor of Chemistry in the Medical College. During the Burmese War he was attached to the Army Medical Staff, and in 1855 he returned to London. Very soon afterwards he was appointed Lecturer in Botany at St. Mary's Hospital. He was subsequently connected with King's College Hospital, the Middlesex, St. Thomas's Hospital, and in the latter two schools held the appointment of Lecturer on Medicine.

In addition to these appointments, he held for many years that of Assistant Physician and afterwards of Physician to the London Fever Hospital, an office which demanded much time as well as much labour.

The subjects to which Murchison devoted his attention as an original observer were botany, pathology, and medicine. Botany was the subject which he first took up. He began to study it while in Aberdeen, and prosecuted it vigorously in Edinburgh under Professor Balfour, in whose class he obtained the medal for the best herbarium. Three years afterwards he contributed his first original paper on "Glandular Organs in Plants" to the Botanical Society of Edinburgh. As his attention became directed to other subjects, his botanical studies were more or less interrupted. He continued them in Burmah and again resumed them when he became Lecturer on Botany to St. Mary's, at which time he contributed several original papers to various journals, but they were almost entirely discontinued after he ceased to lecture on botany, his powers then becoming more concentrated on the subjects of pathology and medicine.

His first original pathological observations were made during his tenure of office as House Surgeon under Mr. Syme, and were embodied in his thesis on "The Pathology of Morbid Growths," for which he obtained a gold medal at his graduation.

From the time of his connexion with St. Mary's Hospital, his interest in pathology remained undiminished up to the time of his death. His contributions to the "Transactions of the Pathological Society" were very numerous, and his services to this subject were recognised by his appointment, in 1877, as President of the Pathological Society. His most valuable contributions to medicine were his works on "The

Continued Fevers of Great Britain," and on "The Functional Diseases of the Liver."

The opportunities for observation which his position as Physician to the London Fever Hospital afforded, were used by him so diligently that he was able in this work to lay down the distinctions between the various continued fevers as regards their causes, symptoms, and pathological conditions with great clearness and accuracy; and thus he contributed in no inconsiderable degree to the general acceptance of the views now held regarding the etiology of typhoid fever, and which have already been of such service in regard to its prevention.

His work on "Disease of the Liver" was characterised, like all his other writings, by such careful observation of facts and accuracy of statement, as to render it a most useful aid in the diagnosis of the diseases of which it treated.

As a teacher of clinical medicine, Murchison has left few equals in this country. The system he followed was modified on that of his old teacher, Dr. Hughes Bennett. The essential part of the plan was first to excite the attention of the students by skilfully putting questions, and then to satisfy the desire for information which he had thus awakened, instead of at once stating to them facts in which they took no interest. The extent of his knowledge and his methodical habit of mind, combined with the admirable plan of teaching which he adopted, left a deep impression on the students whom he taught, and his personal influence will long be felt in his writings. He was elected a Fellow of the Royal Society in 1866.

ARTHUR HAY, 9th Marquis of Tweeddale, President of the Zoological Society of London, was born on the 9th November, 1824, the second son of his father, the previous Marquis, who was a Field-Marshal, and a well-known Peninsular veteran. In April, 1841, Lord Arthur Hay, as he was then called, obtained a commission in the Grenadier Guards, and, on obtaining the rank of Captain in 1842, proceeded to India as Aide-de-camp to his father, who was at that time Commander-in-Chief at Madras. It was at this period of his life that Lord Arthur Hay made the acquaintance of the late Dr. Jerdon, the distinguished Indian naturalist, who was then Assistant-Surgeon at Fort St. George. The two saw much of each other, and worked together at various branches of natural history; and the friendship thus formed was renewed when Dr. Jerdon retired from the Service and returned to England in 1869. At the commencement of the Sutlej Campaign of 1845-46 Lord Arthur Hay was appointed Aide-de-camp to Lord Hardinge, the Commander-in-Chief, and was present on his Staff at the decisive battle of Sohraon. On the 9th March, 1846, the Treaty was concluded by which the whole of the hill territory west of the Sutlej and

Cashmere was handed over to the British; and a few days afterwards the second Treaty, by which the Kashmir portion was transferred to the Maharajah Golab Singh, was executed. Shortly after this, Lord Arthur Hay, with other officers, among whom were Lord Elphinstone, Lord James Brown, Captain H. Bates, and Lieutenant A. Hardinge, obtained leave to visit this part of the Himalayas; and, after being received with marked courtesy by the Maharajah at his ancestral residence of Jummoo, they crossed by the Banihal Pass into the valley of Kashmir. After spending a month there, Lord Arthur Hay and Lord Hardinge started for Ballastan, or Little Tibet, viâ the Kishengunga Valley and the Dessai Plains, and, after visiting Skardo, travelled on to Leh, in Ladakh, and thence through Rupshu to cross the high pass, the Parang La (19,000 feet), finally ending their tour at Simla. The party met with a good deal of trouble and vexatious delay in this latter part of the journey, which at that period was of a venturesome, if not of a dangerous nature. Lord Arthur Hay was, throughout this journey, engaged in his favourite study, and made a large collection of the birds of the country.

During his stay in India, Lord Arthur Hay, although much interested in natural history, and on terms of intimacy with Dr. Jerdon, Mr. Blyth, Sir Walter Elliot, and other Indian naturalists, gave very little of the results of his studies to the public. We can only find published during this period the two articles in the "Madras Journal," which stand at the head of the subjoined list.

During the next period of his life, Lord Arthur Hay, who assumed the title of Viscount Walden in 1862, on the death of his elder brother, Lord Gifford, was too much engaged with his military duties and other matters to be able to do much scientific work. In 1854 he accompanied the army sent out to Turkey, and thence to the Crimea, and took part in the campaign which resulted in the fall of Sebastopol. In 1866 Lord Walden finally retired from active service, and commenced anew a collection of birds and ornithological books in a house which he built for himself at Chislehurst, and which was for the ten following years his habitual residence. He became a frequent contributor to "The Ibis," to the Zoological Society's "Proceedings" and "Transactions," the "Annals of Natural History," paying special attention to the birds of India and the Eastern Archipelago. In 1868, Lord Walden, upon the death of Sir George Clerk, was elected President of the Zoological Society of London, of the Council of which he was already a member, and retained this office, discharging the duties with the greatest zeal and success, until his death. He was elected a Fellow of the Royal Society in 1871.

On the death of his father, at a very advanced age, in 1876, Lord Walden succeeded to the peerage and estates, and transferred his home and collections to the ancestral seat of Yester, in East Lothian,

where he subsequently passed the greater part of his time. During the past two years Lord Tweeddale devoted special attention to the investigation of the avifauna of the Philippine Archipelago. Mr. A. H. Everett, a well-known collector, was specially engaged to visit the different islands of this group, and make collections of their birds; and the results were given to the public in a series of thirteen papers published in the Zoological Society's "Proceedings," the last of which was finished only a few days before the death of the author.

Another important piece of ornithological work recently undertaken by Lord Tweeddale was the editing, with notes and additions, of the part relating to the birds of "Blyth's Catalogue of the Mammals and Birds of Burma," which was left in a very unfinished state at the author's decease. Under Lord Tweeddale's "able and conscientious treatment," to use the words of Mr. Grote, the catalogue became a complete list of all the known Burman species, and a most useful work to ornithologists.

Lord Tweeddale died at his English residence, Walden Cottage, Chislehurst, on the 29th December, 1878, after a very short illness. His collections of birds and scientific books are bequeathed to his nephew, Mr. Robert Wardlaw Ramsay, a well-known member of this Union.

JOHN WATERHOUSE was born at Halifax, Yorkshire, on the 3rd August, 1806.

Very early in life he evinced a decided preference for scientific studies; his school training increased this preference and enabled him to obtain a sufficient knowledge of mathematical science, which he turned to good account in after years in various branches of physical research.

A certain weakness of constitution which prevented him in his youth from great bodily exertion, only seemed to stimulate his mental activity; and when in search of change of climate, with a view to invigorated health, he undertook a voyage round the world, his acquirements enabled him to keep a journal abounding in facts and observations which, had his modesty not shrunk from appearing in print, would have proved the record of a "Scientific Expedition." During the voyage, his love of nature, and the wide range of his scientific tastes acquired an increased stimulus; and when he returned home his experience in observation, and his knowledge of natural phenomena in different parts of the world, enabled him to enter with renewed pleasure into the less active study of the physico-mathematical sciences.

He established an astronomical and meteorological observatory, and in 1874 published a quarto volume on the "Meteorology of Halifax," which will continue to be a model for all such local observations.

Practical botany also engaged his attention, and his gardens were distinguished throughout the neighbourhood for the rich variety of their contents, especially in rare plants and exotics, of which he was justly proud.

His favourite studies were astronomy, geology, electricity, and light, He took part in the early progress of photography, and in the discovery by the Rev. J. B. Reade, F.R.S., of the method of taking portraits first upon leather, and afterwards upon paper, instead of silver plates or glass; and also with the chemical means of giving permanence to such images. He was an adept in working with the microscope, was extremely fond of music, and a good player on the violoncello, while in practical applications few men could handle their tools better than he, for in addition to his scientific acquirements he was a good mechanic, and many of his turnings in ivory were almost Chinese in their beauty and skilful execution.

Those who knew him best can best appreciate the many-sided features of his genius, and will long remember the evenings spent at Well Head, where, although reticent in public, he would converse with ease upon the most abstruse departments of mathematical or physical investigation with an originality of illustration which showed that he was practically, as well as theoretically, acquainted both with the facts and principles of science. He interested himself actively in the spread of scientific knowledge, was an early supporter of the Halifax Mechanics' Institute, and delivered lectures to the local Literary and Philosophical Society, of which he was one of the founders and for many years the President. He also enriched the museum with many choice objects of natural history, collected during his travels. His disposition was generous, and needy investigators were on many occasions assisted by his bounty. As a magistrate he was for many years Chairman of the County Bench at Halifax, and a Deputy-Lieutenant for the West Riding, whereby he proved himself a worthy descendant of a family which for four hundred years had been intimately associated with the prosperity of the town and neighbourhood. In later years a stroke of paralysis, which compelled his retirement into private life, only made him appreciate the more his beautiful gardens, until a severe form of the malady prevented all mental occupation, and finally terminated his life on the 13th February, 1879, in the 72nd year of his age.

He was elected into the Royal Society in 1834, and was a Fellow of the Royal Astronomical, the Royal Microscopical, the Geological and other Societies.

ERNST HEINRICH WEBER, the third child of Michael Weber, Professor of Positive Divinity at Wittenberg, was born on the 24th of June, 1795. He was a vigorous, cheerful boy, fond of active sports as

well as of study, and made rapid progress at the Fürstenschule at Meissen, and in his sixteenth year left school to begin his studies at the University of Wittenberg. About this period he contracted a friendship with the celebrated Chladni, who was a frequent guest at his father's house, and this intimacy lasted as long as Chladni lived.

Weber's studies at Wittenberg soon met with a serious interruption. The estates from which the University derived its revenue were laid waste in the campaign of 1813; then followed the siege of Wittenberg; and, at length, when in January, 1814, the town fell into the hands of the Prussians, the University itself was removed to Schmiedeberg for two years. On this migration to Schmiedeberg, Weber went to Leipzig, where he worked under the anatomist Rosenmüller, and through Chladni's introduction, was brought into scientific intercourse with the physicist Gilbert. He went rapidly through the various medical courses, and soon passed his examination in comparative anatomy. On the 6th of June 1815, he took the degree of M.D. at Schmiedeberg. Before he had completed his medical studies the fate of the University of Wittenberg was decided with that of Saxony. On its abolition, his father and five other Professors accepted a call to Halle; but Ernst Heinrich chose rather to go to Leipzig, which even then, though only containing 25,000 inhabitants, ranked as one of the great cities of Germany. Here he entered on medical practice as assistant to Professor Clarus, without however giving up his favourite pursuits. He had already, in 1817, completed his "*Anatomia Comparata Nervi Sympathici*," which he sent in as his inaugural dissertation. The explanatory plates to this work he himself engraved on copper. The publication of this book at once brought his name into prominence, and he shortly afterwards received the offer of an Extraordinary Professorship of Anatomy at Bonn; but a similar appointment being offered him at Leipzig, he chose the latter.

In addition to the performance of the duties of the chair, he went on with his scientific investigations, amongst which was a research on the organ of hearing of fishes—in the course of which he made several discoveries. In 1821, on the death of Professor Rosenmüller, Weber became Ordinary Professor of Human Anatomy at Leipzig. About this time he married the sister of his friend Schmiedt, and with her lived happily for upwards of fifty years. It was at this period that, in conjunction with his brother, Wilhelm Weber, he entered on the classical researches which led to the establishment of the celebrated theory of waves. In company with his wife and his brother Wilhelm, he made an excursion amongst the Alpine lakes in order to observe the motions of waves on a large scale. The observations made in this journey led to his making a series of experiments in his father's house; and for four years Weber walked regularly every week to Halle and back for the purpose of prosecuting this investigation. Among the most

remarkable experiments might be mentioned those on waves of water in troughs, by means of which he found that the particles near the surface move in circular paths, while those deeper in the liquid describe ellipses, the horizontal axes of which are longer than the vertical. By another series of comparative observations on water and mercury, the law was established that waves move with equal rapidity on the surfaces of different mediums, while the rapidity increases in both cases with the depth of the liquid. These and a multitude of other facts have been of the utmost value in relation to the theory now accepted in explanation of the phenomena of light and sound.

This important research was followed by other observations and results published in various papers, as, for example, that entitled "Ausdehnbarkeit und Elasticität der Haarö." This latter led him to the discovery of the so-called tension of organic substances. In the paper "Ueber einige Einrichtungen der Wirbelsäule" ("On some Peculiarities in the Mechanism of the Vertebral Column") he showed how much the study of the structures of organs is aided by their being observed during movements resembling those occurring in life, as well as when in a state of rest.

In 1830 appeared his edition of Hildebrandt's "Anatomic," of which he wrote anew a considerable part. In that work he examined carefully into the trustworthiness of the methods usually adopted in anatomical investigation, especially the use of the microscope, at that time a very imperfect instrument. As he carefully separated theories from established facts, he succeeded in arranging everything in its proper place, and showed the meaning of many experiments which his predecessors had passed over in silence.

It was at the time of the appearance of the "Handbuch der Allgemeinen Anatomie" that the political calm which had prevailed since the fall of Napoleon came to an end. About this time the Saxon Government took occasion to make considerable alterations in the constitution of their Universities, but unluckily limited themselves to changes in the administration of the funds, overlooking the necessity for providing such means for the Professors as would admit of their giving themselves up entirely to their calling. The excitement caused by these changes in the old statutes was great, but happily only of short duration, for they were set aside by the events which led to a democratic constitution of the State. When the new constitution was established, and the Chambers again met in order to arrange the various details of the administration in accordance with the new principles, the affairs of the University soon came under discussion. The general feeling towards the institution was decidedly favourable, as was to be expected from the liberal tendency of the time, and most fortunately for the University, it was represented in the Upper House by E. H. Weber. His views on University affairs were presented to the

Lower House in the form of a memorial, and these views had all the more weight from the fact that, instead of pressing the urgent need of more space for his own department, he insisted specially on measures of more general usefulness, such as the establishment of a library and the arranging of a collection of casts. The second Chamber cordially voted to the University 10,000 dollars, in addition to the sum originally proposed by Government.

The city of Leipzig soon had reason for joining in the approbation of his colleagues when he succeeded in preventing the increase of taxation which it had been contemplated to impose on the mercantile class, and he finally won the hearts of all Protestant Saxony by the manly, yet temperate language which he made use of in the discussions on the subject of religious education. On his return to Leipzig the citizens received their delegate with great demonstrations of respect, and he was even conducted into the city through a triumphal arch.

Weber took an active part in the establishment of the Polytechnic Society, and of the Scientific Society of Leipzig, as well as of the Professorium. He instituted microscopic work in the University, and, in conjunction with the medical faculty, introduced improvements into the medical examinations.

After the death of Kühn he undertook the regular discharge of the duties of the chair of Physiology.

In 1850 he followed up his research on the theory of waves by an elaborate series of experiments, designed to study the wave movement in the arterial system, and explain the fact that the pulse-beat is felt in the chin a fraction of a second sooner than in the foot. The results showed that the pulse-beat travels with a rapidity of about thirty-five feet per second, and that in general the rapidity of a wave in small elastic tubes is not affected by the increase of pressure on the walls. The results obtained by these experiments were published in the treatises "*De Pulsu Arteriarum*," "*De Utilitate Parietis Elastici Arteriarum*," and, above all, in that entitled "*Die Anwendung der Wellenlehre auf den Kreislauf des Blutes*." These experiments gave a new direction to the study of the subject of blood dynamics. Weber subsequently explained the difference between absorption by the veins and absorption by the lymphatics, and on another occasion he was able to determine with certainty, the manner in which the excretory ducts of racemose glands end, and the relation between their alveoli and the blood current.

Weber also made a series of most careful observations on nerve trunks, and published their results in a series of treatises beginning with that entitled "*De Subtilitate Tactus*," and ending with "*Die Lehre vom Tastsinn und Gemeingefühl für Aerzte und Philosophen*." He also published some interesting results of experiments on the mechanism of the ear, as well as on the microscopic phenomena visible

on bringing together alcohol and resin suspended in water in capillary spaces. In 1851 appeared his book "*Annotationes Anatomicæ et Physiologicæ*," a work which contains accounts of his most valuable investigations.

Weber lived in intimate friendship with his two brothers—Wilhelm, his fellow worker on the theory of waves, and a younger one, Edward, who also settled in Leipzig. He lived to the advanced age of 83, and died on January the 26th, 1878, at Leipzig.

E. H. Weber was elected a foreign member of the Royal Society in 1862.

In BENNET WOODCROFT the Society loses a man who occupied himself rather with the application of scientific principles to practical purposes than with theoretical investigations. He was born at Heaton Norris, Stockport, on the 29th of December, 1803, and in due time entered into partnership with his father, who carried on the business of a dyer and velvet finisher at Salford. Previous to this he had acquired a practical knowledge of the art of weaving, and had also studied chemistry under Dalton, of whom he became a favourite pupil. About 1843 he commenced business in Manchester as a consulting engineer, and shortly afterwards removed to London. In April, 1847, he was appointed Professor of Machinery at University College, which post he held until July, 1851. He was not a successful lecturer, for although his views were clear and decided, and he possessed the mechanical faculty in a high degree, he lacked the power of sustained exposition necessary to a successful lecturer. Upon the passing of the Patent Law Amendment Act in 1852, Woodcroft was appointed by Lord Cranworth, then Lord Chancellor, to the post of Superintendent of Specifications, a somewhat anomalous title which in no way indicated the responsible nature of the duties he was afterwards called upon to perform. On the retirement of Mr. Edmunds, he became, August 1st, 1864, Clerk of the Commissioners, which placed him in sole control of the department. He retired from the public service March 31st, 1876, and his death occurred February 7, 1879, at his house in Redcliffe Gardens.

In many respects it would have been difficult if not impossible to have found a better man to place at the head of the Patent Office than Mr. Woodcroft. Himself an inventor, he had an extensive acquaintance with inventors; he knew their peculiar needs, and he possessed an intimate knowledge of the patent laws. His name will always be associated with the great work of printing and indexing the patent specifications—a series of records which present an unbroken view of the industrial progress of the nation for more than two hundred and fifty years. He displayed the keenest interest in all that related to inventions, and he spent much time in clearing up doubtful points in

the history of various arts, especially those of steam navigation and the manufacture of textile fabrics. The results are partly embodied in the "Sketch of the Origin and Progress of Steam Navigation" (1848), and "Brief Biographies of Inventors of Machines for the Manufacture of Textile Fabrics" (1863). Very little of the material collected during the later years of his life has, however, been given to the world. The peculiar bent of his mind showed itself also in the formation of the Patent Office Museum, which was first opened to the public in June, 1857. The collection is small, but it embraces a number of machines and models of the highest historical interest, many of which would have been destroyed or suffered to fall into decay but for Mr. Woodcroft. Forming part of the Museum, was a collection of portraits of inventors and authors of discoveries in connexion with the useful arts. A considerable portion of his private fortune was expended in the purchase of portraits and objects for the Museum, but partly in consequence of the want of a proper building, the Museum has not attained that importance which was hoped for by its founder. The late Prince Consort took a warm interest in the scheme.

Mr. Woodcroft's inventions embraced subjects connected with weaving, marine propulsion, and dyeing. His "tappet" for looms, which was patented in 1838, is now in universal use in looms for weaving a certain class of goods. From an early period in his life he had paid great attention to the subject of marine propulsion, and in 1832 he obtained a patent for his well-known increasing pitch screw propeller, which Lord Brougham, in the course of a judgment in the Committee of Privy Council, spoke of as "a very refined and ingenious contrivance." In all the screws previously suggested the blade had a uniform pitch or incline, but Woodcroft's screw is formed by a blade so coiled round a shaft or cylinder that the angle of inclination of the worm with the axis continually decreases, and the pitch or distance between the coils continually increases throughout the whole length of the shaft upon which the spiral is formed. In consequence of this elongation of pitch each successive part of the spiral begins to act before it is overtaken by the current given to the water by the action of the preceding part, and consequently every part meets with resistance from the water. In this way a proportion of propelling power is gained and loss from slip is avoided. He also patented a "varying pitch" screw propeller, the object of which was to enable the angle of the blades to be altered at pleasure, according to the varying circumstances of wind, currents, or tonnage. In the course of his business as a dyer, he had been struck with the difficulty of printing calico with indigo, in consequence of the rapid oxidation which takes place, and he made a series of experiments on the practicability of carrying on the operations in an atmosphere of

coal gas. The results were embodied in two patents, granted respectively in 1836 and 1846. Although a considerable saving of indigo was effected and much better work produced, the process was not a commercial success.

He was elected a Fellow of the Royal Society in 1859.