APPENDIX TO ANNUAL REPORT.

MEMOIRS.

SIR DAVID BREWSTER was the second son of James Brewster, rector of the grammar school of Jedburgh, who was well known and much esteemed as one of the best classical scholars and teachers of his day, and a man of sterling worth. David was born in the Canongate of Jedburgh on the 11th of December, 1781. The characteristic gifts which distinguished his later years can be traced from a very early age. Along with three brothers of excellent abilities, he always kept a high place in his classes, and was much looked up to by his schoolfellows. A dilapidated pane of glass in his father's house, carefully observed and experimented upon, paved the way for future discoveries and researches in refracted light, while the beauty of the scenery and the legendary lore amidst which he was reared produced the intense love of nature, art, and poetry which blended so remarkably with the "sterner stuff" of science.

Jedburgh and its neighbourhood were noted for the number of intelligent and scientific residents, many of them possessing inventive genius. David Brewster was not slow in availing himself of the advantages of such society, but the greatest help he received, which was indeed the foundation of his truest education, was from James Veitch of Inchbonny, a small but beautiful property, half a mile from Jedburgh. He followed the occupation of a wheelwright, which he could not be persuaded to relinquish; but threw into his ploughs and his wheels the skill and originality of his remarkable talents. The intervals of business, however, were spent in that wonderful process of self-education, which, as in many other cases, resulted in an amount of knowledge of almost every branch of learning and research, which made him universally esteemed, and brought him into scientific and friendly relations with many contemporaries eminent in science and literature. James Veitch's workshop was a gathering-place for all the young men in the neighbourhood who were athirst for

knowledge, besides being a favourite resort for some of maturer years and well-earned distinction; and amongst others, of several intelligent and scientific French prisoners of war. Astronomy, mechanics, mathematics, and theology, were amongst their favourite topics, and David Brewster must have formed one of the quaint and varied group from a very early age, as it is recorded that at ten years old he had finished the construction of a telescope, under his friend's auspices, an occupation in which he delighted for many years. At the age of twelve, he went to the University of Edinburgh, where he pursued his studies with characteristic diligence, soon becoming the friend and companion of the eminent professors of his day—Playfair, Robinson, Dugald Stewart, and others; and at the age of nineteen, he became M.A. Destined for the Scottish Church by his father, he studied divinity with close attention, although his holiday time was spent in scientific research, of which there are interesting records in a long and close correspondence with his early friend at Inchbonny. He made his first scientific discovery in 1800, while studying his favourite science of optics. The year after, at the age of twenty, he commenced his independent literary career, by becoming the editor of the "Edinburgh Magazine." To all his other labours he added those of tuition, entering the family of Capt. Horsbrugh of Pirn, and afterwards of General Dirom. A tendency to nervous faintness, and a consequent dread of speaking in public, which was increased by overwork, caused him much suffering in preparing for the clerical profession. He however preached often, his ministrations were much liked, and he accepted a presentation to the living of Sprouton in 1808. This was in the gift of the Duke of Roxburgh, but being under litigation, Brewster withdrew his claim, rather than cause any disputation of his right. It was not till 1809 that he felt free to follow the bent of his own genius, and devote himself to literature and science. In 1810 he married Juliet, the youngest daughter of James Macpherson, Esq., M.P., of Belleville, translator of Ossian, and settled in Edinburgh, where four sons and one daughter were born.

The "Edinburgh Encyclopædia" was at this time, and for twenty succeeding years, the most arduous and anxious of his undertakings. Although commanding admiration for its intrinsic merits, the dilatory conduct of publishers and contributors marred its success, and taxed the editor's strength to the utmost, who had to make up for the negligence of others. Many painful circumstances and broken friendships took place; while in a pecuniary sense the undertaking was a complete failure, and till a compromise took

place, a few years before his death, was a constant cause of anxiety and apprehension. He also continued to edit the "Edinburgh Magazine," under different forms, for many years. In 1811 he brought out a new edition of Ferguson's "Astronomy," contributing an Introduction and twelve supplementary chapters. In 1812 he wrote the article "Burning-glasses" for the Encyclopædia, containing the description of a polyzonal lens which he had invented the year before, when examining the experiments of Buffon. Soon after, he published a "Treatise on new Philosophical Instruments." Still later, he edited a translation of "Legendre's Geometry;" four volumes of Professor Robison's "Essays on Mechanical Philosophy;" and "Euler's Letters to a German Princess," with notes, and a life of the author.

In 1814 he travelled in France and Switzerland, becoming acquainted with many foreign *savants;* was received with distinguished honour by the French Institute, and made many interesting observations, nothing being lost on his enquiring mind. In 1815 he became a Fellow of the Royal Society of London, for which he had begun to contribute a long and important series of papers, principally on light; he received three of its best medals, and a prize from the French Institute, of which he afterwards became one of the eight Foreign Associates. Indeed, honours and rewards flowed so rapidly upon him that it is impossible to specify all, but the large book in which the letters, diplomas, burgess tickets, announcements of medals, &c., are collected is a remarkable one for size and interest. In 1816 Brewster invented the kaleidoscope; but by mismanagement he reaped no practical benefit from an invention which spread over Europe and America with a rapid *furore* which is now scarcely credible, but which was quickly pirated. In 1820 he was elected an Honorary Member of this Institution, in the objects of which he ever took a lively interest; and, in 1821, he was much occupied in founding the Royal Scottish Society of Arts, of which he was named "Director."

In 1823 he changed his residence to Allerly, a small property which he purchased not far from his early haunts, and became one of the remarkable circle which gathered round Abbotsford in the days of Sir Walter Scott. He met with a sore bereavement in the sudden death, by drowning, of a favourite son, and not long after, his early friend, Mr. Veitch, passed away from his useful and laborious life. Brewster's mind had been much impressed by the decline of science in England, and the various causes leading to this effect—a subject upon which he wrote and spoke with the utmost energy during his whole life. He was the first to propose a "British

Association for the Advancement of Science," a plan which was warmly taken up, and quickly resulted in a brilliant and successful meeting at York, in September, 1831. An annual meeting has taken place ever since in different towns of the United Kingdom, at one of which its originator made his last public appearance thirty-six years afterwards. Many of the advantages to science which he anticipated were worked out by this Association. In 1831 Dr. Brewster received the Hanoverian Order of the Guelph, and was shortly after knighted. In 1833 he offered himself for the vacant chair of Natural Philosophy in Edinburgh, and his undeserved failure was a serious disappointment, especially as his affairs had become extremely embarrassed. In 1836 the gift from Government of a well-earned pension, and, in 1838, his presentation to the Principalship of the United College of St. Salvator and St. Leonard, in the University of St. Andrews, relieved him from pecuniary difficulties. He threw himself with his accustomed ardour into the duties of his new office, and although incurring much unpopularity by the much-needed reformation of many old abuses, his residence of twenty-three years at St. Andrews was marked as a useful and happy era of his life. In 1843 Sir David Brewster took a prominent part in the disruption of the Church of Scotland; and in consequence of his adherence to the Free Church, an attempt was made to eject him from his Chair as Principal, which proved unsuccessful.

His busy pen had produced, at different times, a "Treatise on Optics," his first "Life of Sir Isaac Newton," "Letters on Natural Magic," a "Treatise on Magnetism," "The Martyrs of Science," besides many serial contributions; and in 1844 he became a regular contributor to the "North British Review" for twenty years. In 1850 Sir David Brewster lost his wife, and the following year his eldest son. In 1851 he was appointed a juror of the Great Exhibition in London, and he presided at the Peace Congress. The year after he was chosen President of the Working Men's Educational Union, and received from the Emperor of the French the decoration of the Legion of Honour.

In 1852 a visit to Ireland introduced him to the great telescope at Birr Castle, where he visited with delight its noble architect; making many astronomical observations, and never tiring of the mechanical wonders so peculiarly interesting to the early telescope maker. One of the many subjects which Brewster studied with his peculiar gift of absorbed energy was the "Plurality of Worlds,' writing a review of Dr. Whewell's celebrated essay for the "North British Review," which he afterwards expanded into a popular

volume called "More Worlds than One; the Creed of the Philosopher, and the Hope of the Christian." His second and larger "Life of Sir Isaac Newton," after years of steady work, was published in 1855. He had unusual facilities for correct information, as the valuable collection of the Newton MSS. belonging to Lord Portsmouth was placed at his disposal, and his early and passionate admiration for the great master of science made it, more than any of his works, a true labour of love, and a successful vindication of an unjustly traduced memory.

In the same year Sir David Brewster fulfilled with much interest his duties as juror for the department of optical instruments in the Paris Exhibition. In 1856 he went to the South of France with his family; and in the spring of 1857 was united, at Nice, to Jane Kirk, second daughter of Thomas Purnell, Esq., Scarborough, by whom he had, in 1861, a daughter, Constance Marion. After his marriage he visited Rome, Florence, Padua, Treviso, &c.; and one of his greatest interests was following the traces of his favourite "martyr of science," Galileo Galilei.

While attending the meeting of the British Association at Aberdeen in 1859, he received by telegram the tidings that he was appointed principal of the University of Edinburgh. It was not, however, for some time that he could decide on its acceptance; but the pain of leaving his old St. Andrews home once over, he thoroughly enjoyed the resuming of old interests, and forming new friendships in his Alma Mater. From this time he resided part of the year in Edinburgh and the rest at his beloved home at Allerly, which was near enough to the University to permit of a regular attendance at college meetings, going and returning in one day—a practice which he continued till within a short time of his death. In October, 1859, he presided as principal at the first meeting of the General Council of the University of Edinburgh, where he declared his old college friend, Lord Brougham, duly elected as Chancellor, who in his turn afterwards appointed him Vice-Chancellor. Brewster's career in St. Andrews and elsewhere has been sometimes characterised by ruggednesses of temper and undue severity of judgment; but it is gratifying to find that the eight years of his connection with the University of Edinburgh were unclouded by any jars or misunderstanding, and his loss was afterwards felt by "each member of it as that of a valued and respected friend." His whole character became greatly mellowed, and after years of doubt and struggle on religious subjects, his acceptance with the heart of those gospel doctrines, some of which he had held intellectually all his life, was remarkably full

and clear, holding "the faith once delivered to the saints" with the simplicity of the child and the reasonableness of the sage.

In 1860 he was made an M.D. of the University of Berlin, an honour which gratified him exceedingly, as it was in recognition of the services he had rendered by his discoveries "to the sciences auxiliary to medicine." He had previously been made a Chevalier of the Prussian Order of Merit. In 1864 a severe illness of a prostrating nature, arising from an organic disease of the heart of old standing, brought him very near death; but he again rallied, and being in London at the time, under the medical care of Dr. Sieveking, at that gentleman's request he presided at a meeting which resulted in the formation of the Edinburgh University Club, of which he was the first president. In the same year he was appointed President of the Royal Society of Edinburgh. Although the aged frame, in spite of the iron strength of his constitution, was now shaken by frequent illness, yet the energy and vigour of his mind were as unclouded as ever, while his habits of constant and persevering work were continued so near the last breath of eighty-six years, that it may literally be said that "he died in harness." It was with all the animation of youth that he came forward in 1867 again to vindicate the fame of his beloved master, in the well-known "Newton-Pascal Controversy." At the meeting of the British Association at Dundee in September of that year, he fainted in the first public meeting, and although well enough to read several Papers on that and various scientific subjects, yet he never again completely rallied. For some months the flame of the taper fluttered, but the light of faith grew ever brighter and steadier. He expired at Allerly, surrounded by his family, on the 10th of February, 1868, "at peace with all the world," as he touchingly said, and filled with "the peace of God." He was buried in the old churchyard of Melrose Abbey, and on his tombstone are graven the simple and suitable words, "The Lord is my Light."

Besides the books, pamphlets, and serial writings to which allusion has been made, the catalogue of his printed contributions to the different scientific societies and their organs of communication, which is preserved in the library of the Royal Society of Edinburgh, gives tangible proof of the passionate industry which, with the daily exercise of the most minute powers of observation, formed the secret of his successful researches.

His principal observations and experiments were in the demesne of polarized light, in which he made many original discoveries, although some of his theories, such as the red, blue, and yellow

colours of the spectrum, have been disproved by subsequent researches. By patient observations he improved on the discovery of Wollaston and Fraunhofer, by increasing the 600 black lines already observed in the solar spectrum to the number of 2000. One of the subjects which most interested him in his later years was that of film forms, making many experiments on the tints of the soap bubble, and the beauties of decomposed glass, while an unfinished Paper on their nature was his latest legacy to science. He was well known as an inventor of philosophical instruments—the subject of his first book—amongst others, several kinds of micrometers, the lithoscope, the kaleidoscope, and the lenticular form of the stereoscope. There is also undoubted proof that the polyzonal lens now used in lighthouses, along with the lenticular apparatus called the "holophote," was invented by him, although afterwards independently discovered by M. Fresnel, who at once got it introduced into France. It was owing, moreover, to the persistency of Brewster's efforts that, after being thwarted for many years, it was at last adopted in the United Kingdom.

He was often himself unfortunate in missing the practical advantages and the deserved credit of his inventions, while he was too keen in their defence and too ready to take up scientific gauntlets; but he was ever warmly interested in the inventions and discoveries of others. The reform of the Patent laws, the introduction of scientific education into schools, and the recognition by the State of science and scientific men as mighty engines for the practical good of the country—as in France—were among his constant and not always unsuccessful aims. One of his latest efforts was to send a Paper on Scientific Education to the Journal of the Inventors' Institute, of which he was President, along with a few farewell lines, expressive of his warm interest in its objects and designs. Another was to petition Lord Derby on behalf of the widow and children of a prematurely deceased scientific *confrère*, the successful result of which arrived the day after the death of him who had made the appeal.

MR. JAMES MELVILLE BALFOUR, the youngest son of the late Rev. Lewis Balfour, D.D., was born on the 2nd of June, 1831, in the manse of Colinton, near Edinburgh, where his father was minister of the parish for the long period of thirty-seven years. He received his education at the High School and University of Edinburgh. He early showed a strong inclination and remarkable