SECTION I.

PERSONAL AND BIOGRAPHICAL.

NOTES AND RECOLLECTIONS.

By Mrs Laurence Humphry.

My father's descent can be traced back to Gabriel or Gaberill Stokes, son of John Stokes, born 1680, who appears to have inherited good brains. He was a well-known engineer of Dublin, where he lived in Essex Street. He suggested a plan for supplying that city with water without the use of pumps, wrote a Treatise on Hydrostatics, and designed the Pigeon-House Wall in the Harbour. He was Deputy Surveyor General for Ireland, and maps exist in the Record Office of Dublin which are countersigned by him.

The history of the Stokes family, previous to 1618, is involved in obscurity. There was a very ancient family of that name who lived in Gloucestershire and owned a good deal of land in that County. Two representatives of that family were living in 1876, Dr Thomas Stokes, of Mailsworth, and his nephew Adrian Stokes, of Southport, both advanced in life and both without issue. Dr T. Stokes possessed an old parchment pedigree, by which his descent could be traced back to the year 1312. It gives the name in different forms as de Stokke, afterwards Stokys. On the tomb of Adam de Stokke in the parish church of Great Bedwyn, Wilts., is the figure of a Crusader with the legs crossed. Dr T. Stokes expressed his belief that the family about whom this

memoir is written was a younger branch of his own family. One of the grounds of his opinion was that the Irish branch possessed a seal bearing bezants and a crescent used by Dr John Stokes, Scholar and Fellow of Trinity College, Dublin, not a man likely to use a seal to which he was not entitled.

The Irish branch of the family never rose to high rank or wealth, but, what is of greater importance, they have been distinguished by a more than ordinary degree of intellectual power. Gabriel Stokes married Elizabeth King in 1711; in the muster-roll of their descendants during three generations there are five professors, five fellows and eight scholars of Trinity College, Dublin, and some of them have earned a name likely to endure. In more recent times Margaret Stokes, the Irish antiquary, and the Celtic and Indian scholar Whitley Stokes, children of the eminent physician, Dr William Stokes of Dublin, have been celebrated.

Sir George Gabriel Stokes' father was Gabriel Stokes, Rector of Skreen, a village twelve miles south of Sligo, and Vicar-General of Killala; he married Elizabeth, daughter of the Rev. John Haughton, Rector of Kilrea, County Derry, while she was still very young. They had eight children, of whom two died in infancy. Those who lived were

John Whitley, born 1800, Archdeacon of Armagh, Rector of Aughnacloy; who obtained mathematical honours during every year of his course at Trinity College, Dublin; married Caroline Elrington, daughter of the Bishop of Ferns.

William Haughton, born 1802, died 1884; 16th Wrangler, Fellow of Gonville and Caius College, Cambridge, examiner in the Natural Science Tripos at Cambridge in 1865 and 1866; Rector of Denver, Norfolk.

Henry George, born 1804; Rector of Ardcolm, County Wexford, musical, who did well at Trinity College, Dublin, and wrote *The Secret of Life* in blank verse, privately printed; married Ann Maria, daughter of the Rev. W. Hickey.

Elizabeth Mary, the maiden sister, who died in her ninety-fourth year in 1904; it was to her care that George Gabriel, eight years her junior, the youngest member of the family, was specially committed, and a very close friendship existed between them throughout their lives.

Sarah Ellen, born 1813; who married her cousin, Hudleston Stokes, of the Madras Civil Service, and lived for many years in India.

George Gabriel, born August 13th, 1819, died Feb. 1st, 1903, the subject of these recollections.

He was thus one of a large family living in a country village near the sea. The home-life in the Rectory at Skreen was very happy, and the children grew up in the fresh sea-air with well-knit frames and active minds. Great economy was required to meet the educational needs of the large family; but in the rustic simplicity of a place where chickens cost sixpence each and eggs were to be bought at the rate of five or six a penny, they were easily provided with food. No coach or vessel came near Skreen, so that it was an out-of-the-way, quiet place.

All the children were much influenced by their mother, a beautiful and somewhat stern woman, of whom they stood in awe while they were deeply attached to her. Her husband, her senior by many years, was a man of rather taciturn nature, who had been a scholar of Trinity College, Dublin.

His sister Elizabeth Stokes wrote, some years before her death, that she was away when her brother George was born, having been sent on a visit to England; she first saw him when he was a few months old:

"Such a pleasant-faced, plump, very fair, rosy baby. His cap, for babies in those days always wore caps, had half fallen off his head, showing his pretty hair. He grew into a dear good child, a little passionate, but with a strict sense of honour and truthfulness, I do not think he ever told a lie.

"We had a very large, handsome Newfoundland dog, called Brontë; he and George were great friends. They used to run about, his arm in Brontë's mouth. The child had an enquiring mind and asked many questions, as, for instance, 'But, William, is the hawk a bird, and does he really eat mice?' One day my mother discovered him on the floor measuring a dead bird, and saying to himself, 'That's right,' probably comparing it with some description which he had read. My mother found him very slow in learning to read: she was teaching him out of *Cobwebs to Catch Flies* in words of one syllable, a book which was probably too childish for his mind. One day he asked her if he might read the Psalms instead, and she

thought that she would try him; he got on at once and she had no further difficulty. I believe that he was very well grounded in Latin grammar by my father before he went to school.

"When a very little boy he had small-pox. We other children were never kept from him, and I used to play draughts and cat's cradle with him to amuse him. George thought that I was playing the latter so that he might win, which did not suit his strict sense of honour. One day he pretended to be a bird, and William said that he ought to eat a worm; he naturally objected, but when William told him it was the right thing he opened his mouth. It was a trial on William's part of George's steadfastness to his principles.

"You ask about his dress. Very little boys were not dressed like little men in those days, as they are now. They wore jackets and kilts, a much prettier dress, I think. George had a very pretty nankeen kilt worked all round in green shamrocks by my aunt Truelock. Another dress was of green plaid. The disloyal people were called 'White Boys': George did not like to go out with his pinafore on, for fear he should be taken for a 'white boy.'

"Walking on the road one day, in passing the smith's forge, a bar of iron just turning from red to black attracted him. He clasped his hand round it and got a bad burn; he shivered with pain, but never cried. He was so brave that my uncle George called him 'Wellington.'

"He was exact even when a child; one day on being sent to see what o'clock it was he said, 'I can't tell you what o'clock it is now, but when I was at the clock it was such an hour.'

"He was very absent-minded sometimes. I remember one day when sent on a message he said, 'I forget who sent me and what it was about.'

"He had a tender heart; on hearing a little poem read out from *Rhymes for the Nursery*, by Ann and Jane Taylor,

> 'What! go and see the kittens drowned
> On purpose, in the yard!
> I did not think there could be found
> A little heart so hard,'

he burst into tears. One day when reading the twenty-second chapter of Genesis, he was so amused by the names Huz, Buz, and Pildash, that to keep himself from laughing he had to twist about; for he had a high sense of reverence. I do not think that he ever enjoyed riding; but he owed much to my brother William, who trained him to be hardy and brave and to have good walking powers, as William took him with him when he went out shooting. When quite a little boy he used to amuse us by dancing like a dancing dog, his arms up and his hands hanging like paws, and also by repeating the 'Three Blind Mice' in character, and he did both very well.

"He learnt arithmetic from the Parish Clerk, George Coulter, who used to say with delight that Master George had soon found out new ways of doing sums far better than those given in Voster's *Arithmetic*; and clever people were surprised by the questions which he used to solve by the arithmetical rule of False Position. There is a tradition that he did many of the propositions of Euclid as problems without having looked at the book."

In 1832, at 13 years of age, he was sent to the Rev. R. H. Wall's school in Hume Street, Dublin. There he remained for three years, attending school as a day boy, and living during term time with his uncle, John Stokes, a course probably necessitated by the many calls on the limited incomings at Skreen. He pursued the usual school studies, and attracted the attention of the mathematical master by his solutions of geometrical problems. While there the news reached him that his father had suddenly died from heart failure. This made a great impression upon him. I remember that in 1901, when I was wearing a pair of small and unremarkable silver buckles he, usually most unobservant of details in dress, looking earnestly at them requested me not to wear them again, as they were knee-buckles worn by his father on the morning when he was found lying dead in 1834.

While at Dr Wall's school he took lessons in riding; the horse tripped, threw him, and he broke his arm; he had the good sense to go straight to his cousin Gabriel Stokes in Harcourt St. to get it set, instead of returning home and frightening his mother, who was then residing with his Uncle John. He was much interested when the Röntgen Rays shewed the fracture years afterwards. His sister Elizabeth found him caterpillars, and he had the pleasure of seeing "thirteen turn into butterflies" during his convalescence.

In 1835, he went to Bristol College, a school that no longer

exists, of which Dr Jerrard, his brother William's friend and a mathematician of some note, was principal. In making his first crossing from Waterford to Bristol the packet "Killarney" nearly sank, and William gave a great account of his coolness in face of danger, telling how the boy took off his great coat so as to be ready to swim.

He remained for two years at Bristol College; he considered that when there he owed much to the teaching of Francis Newman, brother of the Cardinal, a man of charming character and great attainments, afterwards made manifest in many ways, who was then Lecturer in Elementary Mathematics, and subsequently corresponded with him on mathematical subjects when both had become famous. Distinction awaited him at this school, as at the previous one, for proficiency in mathematics, although he said that he had not read so far as some of the senior boys. I have in my possession Roscoe's *Life of Lorenzo de' Medici*, a "Prize presented to George Gabriel Stokes for eminent proficiency in Mathematics at an examination held at the Bristol College in January, 1837, by J. H. Jerrard, D.C.L., Principal." In a letter to him of date June 30, 1837, expressed in frank and intimate terms, Dr Jerrard writes, "I have strongly advised your brother to enter you at Trinity, as I feel convinced that you will in all human probability succeed in obtaining a Fellowship at that College."

In his early days he is related to have been somewhat rash on foot and in the water; he had various narrow escapes amongst the mountains of Westmorland and Cumberland, and he was a venturesome swimmer on the North Coast of Ireland.

He is said to have been even more silent in early life than in later years. This characteristic is supposed to have originated when his brothers laughed at him before he went to Bristol and warned him not to give "long Paddy answers"; in consequence he formed the habit of simply answering yes or no. As a little boy he was subject to violent though transient fits of rage; but this tendency was so completely overcome that in later years, though eager, he was almost uniformly calm and even in temper. He had a real love of Botany and a practical knowledge of it: in youth and early manhood this formed a distraction, and he was in the habit of searching for flowers during his walks. In later years he became more and more engrossed by work and thought, and

usually walked with his eyes upon the ground, even passing people he knew well, close enough to brush against them, without perceiving them.

Between the ages of sixteen and seventeen he was keen in the study of butterflies and caterpillars. One day while he was at Cambridge, returning from a walk, he failed to respond to the salutation of some ladies of his acquaintance; when asked the reason of such odd behaviour he answered that he could not bow, as his hat was full of beetles.

He entered the University of Cambridge in 1837, at the age of eighteen years. In his undergraduate days sports were not the fashion with reading men, who took "grinds" or country walks instead. This habit he maintained in youth, and until long past middle life long walks were the custom, both summer and winter, at a pace of nearly four miles an hour. At eighty-three years of age he still went the Grantchester "Grind," of three or four miles, and other equally long walks as his afternoon exercise. When he was an undergraduate everybody dined very early, and he maintained the practice, doubtless conducive to work, for many years afterwards.

My father told me that he never read more than eight hours a day, even before an examination, and held that this was enough for anyone reading mathematics: he added laughingly that he had never been reduced to binding his head up in a wet towel.

Mr Glazebrook, who had undertaken to write an article in *Good Words* for May, 1901, asked me to obtain some information for him; my father in response wrote the following short paper.

"I entered Pembroke College, Cambridge, in 1837. In those days boys coming to the University had not in general read so far in mathematics as is the custom at present; and I had not begun the Differential Calculus when I entered College, and had only recently read Analytical Sections. In my second year I began to read with a private tutor, Mr Hopkins, who was celebrated for the very large number of his pupils who obtained high places in the University examinations for Mathematical Honours. In 1841, I obtained the first place among the men of my year as Senior Wrangler and Smith's Prizeman, and was rewarded by immediate election to a Fellowship in my College. After taking my degree

I continued to reside in College and took private pupils. I thought I would try my hand at original research; and, following a suggestion made to me by Mr Hopkins while reading for my degree, I took up the subject of Hydrodynamics, then at rather a low ebb in the general reading of the place, notwithstanding that George Green, who had done such admirable work in this and other departments, was resident in the University till he died. My earlier papers are mostly on Hydrodynamics, and have for the most part been printed in the *Cambridge Philosophical Transactions*. Perhaps the most important of these papers is one in which the equations of a viscous fluid are applied to the determination of the resistance of the air to pendulums. In 1849, when thirty years of age, I was elected to the Lucasian Professorship of Mathematics, and ceased to take pupils. The direction of the Observatory was at that time attached to the Plumian Professorship; and the holder of that office, Professor Challis, used to give lectures in Hydrodynamics, Hydrostatics, and Optics, as had been done by his predecessor Airy. On my election Challis, who was desirous of being relieved of his lectures on Hydrostatics and Optics, so as to be free to take up the subject of Astronomy, which was more germane to his office at the Observatory, agreed with me that I should undertake the course of lectures which he himself had previously given. This turned my attention to the subject of Optics. Having casually heard in 1851 that there was something peculiar about the solution of quinine, I procured some and examined Sir John Herschel's papers on the subject in the *Philosophical Transactions* for 1845. The peculiarity of that phenomenon, taken in connection with the remarkable analysis of light which Herschel had discovered, in relation to the epipolic dispersion of light, but had left unexplained, intensely interested me. At first I took for granted that the blue light coming from the solution could only have arisen from light of the same refrangibility in the incident beam. But in following out the necessary consequences of this assumption, I was compelled to make suppositions as to the behaviour of the fluid towards the incident light, which were of so complex and artificial a character as to bear no resemblance of truth. In thinking over the matter it occurred to me that if we may suppose the blue light given out by the solution to be an effect of the rays of higher refrangibility incident upon it, everything

would fall into its place, and the whole of the phenomena be explained in the simplest manner. Such an idea, when once it had occurred to the mind, can be confronted with observation without any difficulty; and experiment showed that the suggested explanation was the true one. A new field of research was thus thrown open, on account of the facility with which the presence of invisible rays of high refrangibility could be made evident. The first of my papers on this subject is published in the *Philosophical Transactions* for 1852, and was rewarded by the Royal Society by the award of the Rumford Medal. In 1849, and for many years after, most of the Professorships in the University, the Lucasian among them, were very inadequately endowed. Accordingly I did not deem it to be inconsistent with the retention of the Professorship at Cambridge to accept a few years later a Lectureship in the Royal School of Mines, though it obliged me to live in London for some part of the year. I resigned this on being appointed as additional Secretary to the Cambridge University Commissioners of 1856."

His writings were chiefly memoirs on mathematical and physical subjects. He specially mentions another publication belonging to pure mathematics; it related to a determination "which was believed to be novel at the time*, of the curious way in which the coefficient of a Bessel's function of a mixed imaginary changes with the argument of the variable, when the function is expressed in a form convenient for calculation for large values of the variable, by means of a semi-convergent series."

This account of the detection of the change of refrangibility of light may be compared with a contemporary memorandum, endorsed "A Discovery," and evidently written as a provisional record, which has been found by Prof. Larmor among his papers.

"I discovered on Monday, April 28th, 1852, that in the phenomenon of interior dispersion a ray of light actually *changes its refrangibility*. In sulphate of quinine (a solution of about $\frac{1}{250}$ part in which is dilute sulphuric acid) the violet rays of a certain refrangibility produce the interior dispersion noticed by Sir D. Brewster, while the invisible, or at any rate barely visible, rays beyond the extreme violet produce the narrow band of light described by Sir J. Herschel (*Phil. Trans.* 1845). The dispersed

[* It was so. See *Math. and Phys. Papers*, Vol. IV. pp. 80, 298.]

ray is compound, although dispersed from a ray of definite refrangibility. In alcoholic tincture of laurel leaves, rendered almost colourless by exposure to the light, a dispersed blood-red ray is produced not only by the red rays but by the indigo; that is to say, *a part* of the compound dispersed ray is blood red. The red component of the dispersed ray appears to be of definite refrangibility, the refrangibility, however, being a function of the refrangibility of the ray from which it was dispersed.

G. G. STOKES."

This fundamental and entirely unexpected discovery fixed the attention of the scientific world and brought him the award of the Rumford Medal of the Royal Society in the same year. At the meeting of the British Association at Belfast in September, 1852, he delivered one of the two evening lectures, on that subject: the occasion is thus described by his sister Elizabeth.

"We fixed upon Friday for our journey to Belfast that I might go to George's Lecture, and I had that great pleasure, the pleasure of seeing the very high estimation in which he is held. He spoke for about two hours and was listened to with the deepest attention, and such stillness, except a burst of applause now and again. He was most perfectly at his ease, and spoke so distinctly that I did not lose a word. When he had concluded Col. Sabine rose and said he was sure he was only fulfilling the wishes of the ladies and gentlemen present in conveying to him their sincere thanks for his kindness in coming forward, and for the very clear explanation he had given of his discovery; that he felt sure there were but few present who could follow the subject in all its details; yet he was also sure there were none who had not derived pleasure and profit, and that many would look back with delight to their presence there that evening, as they watched the onward progress of him whose present discovery was but a first step, of him who, if God is pleased to spare his life, promises to be one of the first scientific men of his age or of any other; that his countrymen have good reason to be proud of him, and so on. Had Col. Sabine been his father I think he could not have taken more deep interest in him than he appeared to do."

He considered that many of the men who worked under him in later years had been much overtrained, and that this

tended to weaken their minds and diminish their power of originality. He had heard of a machine for stuffing live fowls to which he likened the process, and sometimes said, "They are stuffed, they won't do anything more, the thinking has been done for them." He considered this to be the reason why some of those who took very high places in the Mathematical Tripos did so little afterwards. In crossing the fen to Newnham one day I asked him if he thought that there were many "mute inglorious" mathematicians in the world, for instance Newnham millers, who might have done great things, but, for want of opportunity, only counted their sacks and did their accounts. He replied that that kind of genius wanted a good deal of help and cultivation to bring it out; he thought that in the past men of great ability in these directions might easily have been buried and lost, but that now a clever National schoolmaster would discover boys who had ability. But he considered that this sort of power was slow in its development.

He was of course acquainted with a number of foreign languages, that is, he knew them sufficiently to follow the meaning of scientific literature with mathematical signs to guide him; but it was very difficult to him to speak in any foreign tongue. It was interesting to see him sit down with a pamphlet in an unknown language; he took a dictionary and hammered away, "finding the Latin by the sense, not the sense by the Latin."

The days of the Smith's Prize and Bell Scholarship Examinations were always marked days with us, as the house was turned upside-down; we lunched in the drawing-room, and the dining-room mahogany supported the elbows of those who were examined. If they were in awe of my father during their papers, he was quite afraid of them at lunch. He considered it a part of his duty to help to relax their mental strain, and used to lament that he found it so difficult to entertain them and did not know what to say. It once happened that during the recreation interval in the garden after lunch two candidates ran away. It was particularly unfortunate, as one of them had done rather well. The event was long spoken of in the family with bated breath, and afterwards the garden gate was kept locked on these occasions.

He often regretted his habit of silence; sometimes when asked why he had not taken pity on an uncomfortably shy person, he

would answer that he wished to speak, but that he could think of nothing worth saying. Though silent he was very sympathetic, and almost everyone felt keenly attracted to him; even children, whom it might have been thought that his abstractedness would have daunted, went to him at once. His little grand-daughter was quite devoted to him, and would coax him to take her to see the ducks, tortoises, and gold-fish in the Botanical Gardens.

Had he not married, he might have had a lonely old age; for people did not often visit him socially, even his old pupils. He used to be disappointed on Ray Club evenings when few men came. He would prepare things to show with an eager expression and be ready and anxious to talk about them; and then members did not come, or if they came were more interested in other subjects.

There was something intensely attractive in his personality, in the mixture of calm and activity in his body and mind, in his strength and gentleness, dignity and humility of character, wisdom and absolute simplicity, firm faithful nature and simple courtesy. He was constant in his willingness to give his time and his services, and had a deep regard for the lives and interests of other people. His appearance was a true index of the mind within, which in moments of intense feeling or thought seemed to shine through his bodily frame. His smile was most attractive, coming suddenly upon a gently grave face in a glow of kind sweetness, which gave the impression of light. In stature he was rather short than tall, firmly and strongly knit, strong rather than graceful in person, his head very large but so well moulded and proportioned that it did not seem too large for his height, very finely shaped over the forehead, with a splendid sweep of brow; the eyes rather small than large, of a grey blue tone and bright; his complexion clear and slightly ruddy, giving an impression of health. He used to fluff out his hair, always curly and in later years like a silvered halo round his head, when his problems were too distracting; "making his fur fly," we said. Perhaps the Lowes Dickinson portrait in the Combination Room at Pembroke College* is most like his expression when in deep thought. But he was apt to look bored when being painted, and

* This portrait has been reproduced as a frontispiece to Vol. IV. of the *Mathematical and Physical Papers*.

to draw down the corners of his mouth. Thus the portrait by Herkomer at the Royal Society is not satisfactory to those who knew him best; but the busts by Hamo Thorneycroft in the Hall of Pembroke College and the Fitzwilliam Museum, and the medallion by G. W. de Saulles, all done at the time of his Jubilee, are beautiful and true portraits. The medallion by Hamo Thorneycroft in Westminster Abbey is also an excellent memorial. Possibly few men have been photographed so often, and the idea of sun-pictures was always attractive to him; some of the results were very successful, for instance, Mrs Frederic Myers' photograph, reproduced, by permission, in Vol. V. of the *Mathematical and Physical Papers*.

Perhaps his silence was most painful to him when some foreigner came from a distance on purpose to meet and talk with him. It might have been imagined that polite and sociable Frenchmen, interested in the same subjects, and coming with the express object of conversing with him, would have vanquished any degree of reserve; but they were not always successful. Yet he very much enjoyed talking, and hearing conversation. It seemed on the whole easier to him to converse with women than with men—that is among unscientific people—and during the last few years of his life, when less busy, he showed much pleasure in the society of ladies. He would often sit at tea-time amused by the chat, and then would suddenly launch into the conversation. The absence of obligation to talk inclined him to do so.

But anyone evincing a real desire for information or advice was always sure of attention and kindness. He had none of the impatience of ignorance and stupidity that is often shown by clever people, nor did he seem surprised by absence of the most ordinary knowledge, provided there was no pretence and no humbug of any kind; these however he did not expect, and he was never on the watch for them. I do not remember having heard him speak of any one as stupid, though if questioned he might say 'Well, perhaps not very bright.' Nor indeed did he often refer to men as having great intellectual power; but of one of the younger scientific men he once remarked, 'The breadth of his knowledge amazed me, but he is so modest that he will never get credit for all he knows.' The differences in the quality of his silence were very interesting, also the way in which his strong character could be displayed through silence and be keenly

felt. If his silence were one of disapprobation it was known at once; and few people have exerted a more potent influence by well-chosen words than he wielded by this power of silence. It was rarely that unkind and unjust things were said before him; inaccurate people became more exact in his presence.

He seldom gave opinions upon the characters of persons, and only when asked to do so, when he would give his unvarnished opinion, but with pain if it were of an unfavourable nature; beginning, "I am disposed to think," and springing slightly on his chair, just hitching it a little, his two hands holding the seat in a way he had when something was drawn from him which he must say because he thought it true, but did not wish to say lest it might be lacking in charity or justice.

It was curious that with this fixed habit of silence he could speak with great ease when formal speech was needful, not only on scientific matters and business, but quite unexpectedly on subjects of a far lighter nature. For instance, he had taken me as his lady to a City dinner, and after it had begun a message came asking him to make one of the speeches of the evening, as the person chosen to do it was prevented from being present. It was reassuring to see him eating his dinner very calmly, and not appearing in the least dismayed. He made a very good after-dinner speech, clearly spoken in well-chosen language, with no harping on previous jokes but with jokes of his own, courteous and easy, neither too long nor too short, and without any of the hesitation which is not unknown on such occasions. For although shy he was not a nervous man.

His marriage was a singularly happy one. He first met Miss Robinson, daughter of the Rev. Thomas Romney Robinson, Astronomer of the Armagh Observatory, at a Meeting of the British Association, and had some difficulty in re-discovering her, as he imagined her to be a daughter of Sir David Brewster. It was but a cursory first interview, but he was so much charmed by her appearance and her manner that he cherished the hope that this might be the lady of his affection. They next stayed together at Lord Rosse's; report said that he proposed to her in the tube of the Great Telescope, but this is absolute fiction.

Dr Thomas Romney Robinson was the son of Thomas Robinson, portrait painter, pupil and friend of Romney, to whose life by

Hayley he considerably contributed. Bishop Percy, who wrote *Reliques of Ancient Poetry*, took a great interest in him as a boy, and helped in his education. He was elected in 1814 a Fellow of Trinity College, Dublin, and for several years lectured in Dublin University as Deputy Professor of Natural Philosophy. He became an eminent and active scientific man and a prominent Fellow of the Royal Society, and in various ways was a very remarkable man.

In connection with his work as a teacher he published a volume entitled *A System of Mechanics*, in 1820. After nine years' residence in Dublin University, and some sojourn in two country parishes, he was appointed head of the Armagh Observatory, where he produced *The Armagh Catalogue of Stars*, in a large volume of more than 900 octavo pages. In recognition of the excellence of this work he received the Copley Medal from the Royal Society in 1862. He worked upon the improvement of the Mural Circle, and had a great share in the construction of the Great Melbourne Reflector, and in the invention of the Robinson or Cup Anemometer. When the Board of Trade established seven first-class meteorological stations, Armagh was selected as one of the seven. But the work of the Observatory was much crippled by the disestablishment of the Irish Church in 1868, which reduced the income from £216 to £60, besides preventing for the future the liberality of the Archbishops of Armagh, whose incomes also were much reduced. He held many other medals and was a knight of the Prussian Order *Pour le Mérite*. He was President of the British Association.

In addition to his scientific knowledge Dr Robinson was a linguist, with a good knowledge of Greek and Latin authors; besides reading Spanish, French and Italian, he had great love and admiration of the old Icelandic Sagas in the original. He was one of the early and devoted admirers of E. FitzGerald's work. He was a most charming man and a delightful talker, for joined to an extraordinary memory he had a most eloquent tongue. He married first Miss Rambaut, the mother of his children, and secondly Lucy Edgeworth, half-sister of Maria Edgeworth, and the original of "Lucy" in her novel *Harry and Lucy*. There is an interesting account in Maria Edgeworth's *Memoirs* of a visit to the Observatory.

Dr Robinson died in February 1882, having nearly reached the age of ninety. My father was to have written an obituary

notice of him for the Royal Society, but the years which followed were very busy ones, and he never did this piece of work.

It may be imagined that my father found this bright and talkative Irish home-circle very pleasant after his quiet and lonely college life, and that he gained in his future father-in-law a most affectionate and congenial companion.

His suit was successful; but on one occasion a letter of fifty-five pages about his scientific preoccupations gave room for misunderstanding, and it seemed that the engagement might terminate. The passages printed below are chosen from many letters that were written at this period. At first sight it seemed as though even these were of too intimate a nature for publication; but on thinking the matter over and taking advice from friends the letters were so unlike ordinary love letters, so dignified and impersonal in their expression, that, written, as he said, to explain his character, they must be of legitimate interest to others as containing the only self-revelation that he apparently ever consciously made. They are remarkable also from the curious place which he assigned to his original investigations; it almost seems as if he considered them the height of dissipation, and everything else a duty. He evidently thought that his correspondent had not been unjust in thinking his nature deficient in warmth at this period, and that he was conscious of a too overwhelming absorption in his investigations and experiments. Nor is this surprising, when we consider that this period coincided with the development of some of his most striking discoveries. As she felt this anxiety when about to sever herself from her old home, she was wise and true in expressing it at the risk of pain to them both. He never afterwards heard of a broken engagement without pain, holding that if not two, anyhow one person usually suffered acutely. Even if he hardly knew people, he grieved at such news.

But his patience, sweetness, and good sense convinced her that she had been right in her first decision, and she stood firm. They were married in 1857, and went to Switzerland for their honeymoon. The following entries from my mother's journal are characteristic: 'George is so fond of lightning'; later, 'he puts his head under all the waterspouts he can find'; then, 'he flew about, now up, now down, trying to find a better path; he quite enjoys dangerous places and looks so happy where his neck might be broken.' Their first Cambridge residence, in 1858, was in tiny

G. G. Stokes in 1839 Aged 20 Years

rooms over a nursery gardener's, now 'Willers',' some way out, on the Trumpington Road.

Then after a brief sojourn in London lodgings, while he lectured at the School of Mines, they took a small isolated house in Cambridge, Lensfield Cottage (recently re-named Stokes Lea), in which the remainder of her life and most of his were passed. It was gradually enlarged to meet the needs of a larger family party, but always retained its simple cottage character.

His fellowship at Pembroke was vacated by marriage, but twelve years later, in 1869, his College was enabled to re-elect him under a new Statute.

My mother, though not educated in the modern manner, was cultivated in her tastes, a great reader of good English prose and poetry, as well as of the *Belles Lettres* of France and Italy. My father never wrote anything not purely scientific without consulting her, reading the proof-sheets to her and accepting many of her suggestions. He read over his Gifford Lectures on Natural Theology in this way to an audience of two. These lectures gave him great difficulty, and he felt much hampered and handicapped by the terms of the bequest, which prevented him from treating the subject from the standpoint of revealed religion.

He took great pleasure in his wife's music; though no executant, she played with taste and feeling and with sweetness of touch. He especially delighted in Handel, always his favourite composer; before deciding whether he would go to a concert he often asked whether there would be any Handel in the programme.

In later years she went very little into society with him, never having recovered from the shock of their younger son's sudden death. But although he greatly missed her company abroad, perhaps the quiet of home was more restful to him on that account, and he always returned to it as a peaceful haven, sure that she would be there and ready with loving sympathy for all his work.

This is perhaps the place to insert the letter in which long afterwards he communicated to his wife the news that he had been recommended for a baronetcy of the United Kingdom.

Lensfield Cottage, Cambridge.
24 *May*, 1889.

Dearest Mary,

.....On arriving I found a letter which surprised me. It was marked private, "Salisbury" was in the corner, in the same hand as the direction, and it was sealed with the seal of the Foreign Office.

Here is a copy:—

May 22, 1889.

Dear Professor Stokes,

I am glad to be able to inform you that in recognition of your remarkable distinction as a man of science, as well as of the high official position that you occupy, the Queen has been pleased to confer upon you a Baronetcy of the United Kingdom. It gives me much pleasure to be the medium of making this communication.

Believe me, yours very truly,

SALISBURY.

I had a mixed feeling about it. It is of course a very high honour, but there is something of a white elephant about it, more especially looking to the time when I am gone....At the same time I felt as if on public grounds I ought to accept it, or more strictly not to decline it; for from the words of the letter it would seem to be a *fait accompli*....

My own feeling was that there was an awkwardness for myself, and still more for Arthur, in having a Baronetcy without means to support it. On the other hand I felt it a sort of public duty not to decline, even if it were open to me to do so, which from the words of the letter seemed very doubtful. For it was through me an honour to science, of which I am *pro tempore* the representative, as being President of the Royal Society, and an honour to the University; and I felt that there might also be a political motive in it as a set off against the recent attack on the representation of the Universities, which was defeated in the Commons by a good majority, 91. I thought however I would consult Sir George Paget confidentially. He felt the awkwardness as to money matters, but thought I ought not to decline. I was thinking of further consulting Professor Browne, but Isabella suggested Sir Thomas Wade, which at once commended itself to me. I had a long talk with him. He did not think the money objection was at all serious; he thought I ought not to decline without some very strong reason; and supposed that it would appear in the *Gazette* to be published to-day—the Queen's birthday. I don't think that you had much idea on July 4, 1857, that you were going to be a Baronet's wife.

Probably few people have been more completely absorbed in their experiments. In fact his devotion to them sometimes gave rise to misapprehension. In his college days, when convalescent from a long fever, he began to experiment on chlorophyll. A friend calling to enquire found him absent and asked his bed-maker if he were better. 'Yes,' said she, 'he is getting strong again, but (tapping her forehead significantly) 'the poor young gentleman is always playing with green leaves.' When sitting with his family he might be seen trying the different way in which he saw colour with his two eyes,—engaged at his 'blinkings,' as his children called it. He would eagerly seize upon any brilliant piece of knitting, etc., which he found lying about, and he became devoted to a shawl of his wife's, on which he founded a series of experiments. Many of his most interesting experiments were made in a narrow passage room behind the pantry, which was his study until Lensfield Cottage was enlarged. He had a shutter fitted into the small window, and a bracket was fixed before a slit cut in the shutter on which to place crystals and prisms; in these simple and narrow surroundings he carried on his work, so that it was aptly said, "that if you gave Stokes the Sun there was no experiment he could not do for two-pence."

As a child I loved to watch him working at experiments in his study; I can still see the Rembrandt effect of the strong light and shade cast upon his face, when he opened the shutter from time to time to alter the position of the things resting on the bracket, and the absorbed and delighted expression of his countenance.

He rejoiced in silent companionship, often taking one of us on his long quick walks, perhaps not saying a single word for miles. Then some day his interest would be aroused by something heard or seen, and he would have a sudden fit of eloquence. One day it would be caused by the humming of the telegraph posts*, on

[* See the fundamental memoir "On the Communication of Vibration from a Vibrating Body to the Surrounding Gas," *Phil. Trans.* 1868, *Math. and Phys. Papers*, Vol. II. pp. 299—324.]

several occasions by the beauty and interest of rainbows, especially by one near Bray Head when we were sitting close to the cliff's edge and saw a far larger part of the arc than is usually seen. He then told me that he once had to speak at one of the Royal Academy dinners, and took as his text the help which Science might be to Art, criticising a fine landscape on the walls, much spoilt to him by a rainbow with its colours in the wrong order. He said that Millais stood up and owned to the rainbow, which he said he would amend, and made a very amusing speech.

Another time when we were at Malahide I went with a cousin to post letters late in the evening, and we noticed something curious in the sky; she said that it was only sea-fog arched by the wind, but it appeared to be something more, though even if it were only sea-fog I was certain that my father would want to know why it arched like that. He came out at once and said that it was a lunar rainbow, and that he had seen one only once before in his life; he was delighted at not having missed it, and walked and talked until quite late.

After taking his degree, he was once observed at a party given at the Cambridge Observatory employing himself by making waves with the spoon in his tea-cup, watching their formation in abstracted silence*; he acquired a habit which he never lost of stirring his tea an immense time.

A favourite amusement of his was making a musical note on the edge of his finger-bowl at dessert; his mind seemed divided by interest in the number of different notes which could be produced, and how they were made, and by the peculiarities of the shivers in the water to which the vibrations gave rise. The different bowls gave different results, so that at one period he was constantly tuning; he was always much interested in the subject.

He never worked in the garden, but used to stroll in it, picking off the dead flowers from the geraniums, one of his favourite plants. He loved brilliant colours intensely; and my mother and I used to be amused at the vehement colours he wished us to select when we had patterns of dress stuffs. He

[* The illustration mentioned by Helmholtz, in his great memoir of 1858, on vortex motion, namely, the formation of half vortex-rings by drawing a semi-immersed spoon through liquid, will come to mind.]

would say of some portentously powerful specimen, "Now, that is a nice quiet colour, *don't* wear dunduckety-mud-colour," an expression which he often used, and applied to Morris' wall-papers. I used to say that he would like us to be dressed in the colours of the spectrum, a different one each time. He delighted in stained glass, and was very much interested in the optical reasons which caused the beauty of fine old glass. He talked quite a long time about it once in King's College Chapel. I begged that he would write it down, but fear that he never found time to do so. It was about the juxtaposition of certain colours and in certain quantities giving satisfaction, and the immense help which was given by the thickness of the leads in old glass, because they prevented the rays from the different colours from blending before they reached the eye, so that they arrived fresh at the brain and gave full sense of pleasure. He thought that the leads ought therefore to be thicker the further the windows were from the eye, and that the want of leads was one reason why Munich-glass is so unsatisfactory. I dabbled a little in stained glass, and he used to prowl round my painting table, looking at the light through the little glass samples which are the pallet of a glass painter. He was pleased at having bits of his favourite colours cut off, and carried them away to his study as precious possessions. When we walked home from Pembroke Chapel on Sunday evenings in summer he would lament that the Chapel had no colour, and wish that the windows were full of rich glass, and the panels on the walls were filled with fine painted colours. He took the greatest delight in bright sunsets; he used to watch to see if there were going to be any glow, and often walked with me up to the turn, and past the nursery garden where he lodged when he was first married, as we got a fine clear view of the west from that place. The Krakatoa sunsets interested him very much, and also the splendid colour prints of them in the *Report* published by the Royal Society, which were made by Mr Dew-Smith at Cambridge; he said that they were the finest colour prints that he had ever seen.

He was much interested too in some colour photography shown at a Soiree of the Royal Society. One print was of a cockatoo with its yellow crest; one of a horse all dappled like a ripe chestnut. Much consideration was given to a photograph sent him in which the chimneys of some houses had come out red.

One day he talked a long time about colours and Chevreul's work on colour, because he found me admiring Chevreul's fine head by Roty on a medal of the Académie des Sciences. It was a pity no one was there who understood; but when those who understood were there he often said nothing.

One Hallow E'en as we children sat burning nuts and salt he came in and threw our precious salt upon the fire by pinches till it was all gone, saying as he watched it burn, 'how beautiful'; then suddenly noticing our disappointment he went to his study for materials for finer flames. When we blew soap bubbles in the garden, if he were passing he almost always joined our game, he was so much interested in the colours and the varying duration of the bubbles. He was interested in iridescent glass too and bought vases of that sort.

I am inclined to think that one of the exciting causes of his experiments was a natural love of pure and beautiful colour; and in looking through the fourth volume of his *Collected Papers* for reminiscences of past years it was interesting to find the following passage at p. 264, "I had no sooner looked at the spectrum than the extreme sharpness and beauty of the absorption bands of blood excited a lively interest in my mind, and I proceeded to try the effect of various reagents." In another place he speaks of the beautiful celestial blue given by quinine,—which gave the clue to one of his greatest discoveries. He never got tired of that particular blue, and always kept a large bottle of quinine in his dressing-room as a family tonic, often calling us when he was doling it out to sympathise with him over the lovely mysterious colour. The exquisite crystals of carbolic acid also attracted his admiration.

He was very keen about the Academy and the Winter Exhibition of Old Masters, and always went to see the pictures, sometimes several times. His favourite time for seeing them was before breakfast, as soon as the Exhibition opened*; he looked at them for an hour or two, took a late breakfast and looked at them again, until people began to arrive, when he departed to his work. It was serious to play games with him, for in backgammon he would pause to calculate chances and in bowls to consider the mysteries of bias. He not only worked but played strenuously, thoroughly, and with enthusiasm.

* He had then a room at the Royal Society, next door to the Academy.

He would be quite interested in little things; and when I wondered why the hats of an acquaintance were so distractingly lovely, he asked to have the lady pointed out, and after watching her narrowly, told me that fundamental lines of beauty were involved and that the hats illustrated the principle of double curves.

He was always very measured in his words, and this habit came out strongly when he wrote testimonials. Moderation in speech and conduct was one of the touchstones of his character, as also that outcome of moderation, tolerance for the opinions and views of others; but he had one or two strong expressions, such as 'I own it amazes me,' and would speak of 'astounding notions.'

Perhaps because Skreen had been so quiet, and economy in his early days so urgent, he had the freshest pleasure in shows and exhibitions of all kinds, and often went on the pretext of taking us children. One of my early recollections is his taking me to see the Chinese giant Chang, and the terrible grief it was to me to find that my father was not far taller, and how amused he was to find the cause of my woe. I remember, too, our going to see Japanese tight-rope dancers. He was greatly interested in watching their progress across the Guildhall, and the wonderful way in which they gracefully balanced themselves with paper fans and umbrellas. He was evidently quite excited at seeing principles of equilibrium so daringly demonstrated, and was surrounding the tiny figures with imaginary angles, which they ought not to be able to transgress.

Many years afterwards we had a very entertaining afternoon at the American "Wild West" show: he might have been a schoolboy, aged twelve, out for a holiday, he so enjoyed himself. I gently tried several times to dislodge him in order that we might visit some Irish cousins, great friends who lived near Earl's Court, but at each effort he said, "I think the next scene will be interesting. It would be a pity for you to miss it." So we stayed on till the end of the performance. He confessed afterwards that he had spent the whole of another afternoon there by himself; this too at a very busy time in his life. I used to tell him that it was in vain to try and persuade me that he spent all those long days in the august shades of the House of Commons and Burlington

House; then playful questioning would elicit that he had been to see the oddest things. He used to say, "I was passing and I thought I would just go in for a few minutes and see what it was like," and further enquiry would perhaps reveal that he had sat out several hours all by himself. He did not go to the theatre, probably from habit and bringing up; but he never objected to other people liking to go. His objections were without prejudice, for he once took me to see moving photographs at one of the large Music Halls in London; but when some of the rest of the entertainment seemed decidedly unexpected, on looking round at him I saw that he was quite uncomfortable, and he said that, to make sure, he had been that morning all the way to this Music Hall, and had asked the Hall Porter if the afternoon performance would be the sort of thing to take a lady to see, and that the porter had said that the most particular lady could not object.

It was striking that, having lived so long in the world, he still always expected all sorts of people to adhere to the truth, even to their own disadvantage. This was so much the case that regular scamps used to get money from him by their plausible tales. He had certain cottages to sublet which were leased to him with his house; but he permitted such obviously unsuitable people to have them, that at last my mother persuaded him to put the matter into the hands of an agent. One man, afterwards discovered to have been in jail for getting money on false pretences, used to waste a great deal of his time by talking for hours upon religious doubt; but he did not at all enjoy this sort of person being unmasked.

He was occasionally very dilatory about business, and would take quite a dislike to something he had to do. Having received Sir Isaac Newton's manuscript papers (mainly those on optical subjects) to arrange and catalogue*, he kept these precious documents so long that there was some anxiety as to whether they had been overlooked, and after letters had been written to him on the subject in vain, other members of his family had to be approached; but this was during the busiest time in his life. It was noticeable how he would occasionally put off some big

[* The Portsmouth MSS., now deposited in the Cambridge University Library. A catalogue with descriptive preface was published in 1888 by a University Syndicate consisting of Lnard, Stokes, Adams, and Liveing.]

piece of work which he knew he ought to grapple with, even sometimes making other tasks in order to excuse himself. If he had only been given a few of Newton's papers at a time he would probably have got through them all by degrees: but, with numerous other matters pressing for attention, he sometimes got daunted by a large piece of work and quite began to hate it, naturally more so the longer it was deferred.

It was the same with the editing of his own *Collected Papers*: he felt it most distinctly a great bother. Sometimes we asked him where he had arrived in them and coaxed him to go on with them, but he would complain that it was very hard work, as so much new work had been done since he first wrote his papers*; yet all the time he was writing ardently on religious questions.

He occasionally developed marked preferences for people. He scarcely ever saw one lady friend without saying kind things of her afterwards. When one of my husband's friends came from town to vote, and had lunched with us, my father pronounced emphatically that he had a fine presence, looked as if he had good ability and seemed a very nice man. No one would have guessed that all these kindly observations were being made. He did not often take these keen fancies for people, seldomer against them; but if there were anything droll in manner, if they poured out torrents of words, or gave an impression of special vanity or egoism, he would be very much entertained, as appeared in little amused twitches of his mouth, and reined-in smiles, with a certain twinkling of the eyes. We were often amused by the details he noticed in people staying in the house, a keen observation of which they were quite unaware because of his silence and apparent absence of mind.

In spite of his resolution and decision of character, he would occasionally find it most difficult to make up his mind about some trifle, as for instance, on which day to make a journey, or some similar matter in which the *pros* and *cons* seemed to balance about equally; he would hesitate, and rehearse his reasons again and again.

He would occasionally take very unexpected things much to heart; once he was quite annoyed with me, in connexion with

* The delay was occasioned largely by his scruples about completing them and bringing them into line with more recent advances: thus the volumes contained a considerable amount of very valuable new work.

the proposal to legalize marriage with a "Deceased Wife's Sister," because, walking with him to the station when he was going up for a House of Commons debate on that question, I asked him why there was to be no Bill for "Deceased Husband's Brother." He was quite shocked and quoted texts from the Old Testament and Jewish customs, and was not pleased at my quoting that "the seven had her." But he was a little ruffled that day, for all his feelings were against people intermarrying in this manner. He had felt obliged to read up the subject, and had come to the conclusion, against his wish, that the Law needed alteration, and that he must not vote against the change, and might even feel obliged to vote in favour of it, dead against his inclination and bias.

He never could have done all he managed to do as Member of Parliament, Lucasian Professor, Secretary or President of the Royal Society, and doing them all so hard, if it had not been for his wonderful power of napping soundly on every likely or unlikely occasion, in the House, in the train, at concerts or evening meetings; yet he always managed to be awake when he ought to be. He was never heavy after sleep, but wakened from these short naps quite refreshed, and fully alive to all that was going on. At night, too, he slept most excellently, never being kept awake by business, importunate letters, or such things.

Another cause of his enduring hard work, as well as much dining out, was his excellent digestion. Even when travelling and happening upon strange or tough fare, it never seemed to make the slightest difference to his health. He would get bad chills, wet feet, rush to catch trains after dinner, and do anything or everything that usually bowls over the average or even the strong man, with perfect impunity.

He hardly ever ate luncheon until he was eighty, and then under protest. He usually breakfasted at nine o'clock, and had nothing more until dinner at five o'clock. Then, as dinner was gradually pushed to a later hour till it reached half-past seven, on pressure being brought to bear he would accept a cup of tea and a biscuit or piece of dry bread if it were taken to him.

After dinner he drank strong tea—two large cups at least at about nine o'clock, and if he meant to sit up until half-past two or three o'clock, as frequently happened, he liked to have a "Brown Jenny" and a kettle left with him, and would brew

himself terribly strong tea late at night to keep himself awake; it never seemed to affect his nerves. As a rule he did not go to bed before half-past twelve or one, except in Vacation if he happened not to be very busy. It should be added that when he was at home his breakfasts and dinners were not fancy, light meals, but real and solid; though when he travelled backwards and forwards, questioning would bring out that he had dined at the Athenæum on two poached eggs, cheese and beer, or on sausage rolls at the railway station. He drank two glasses of beer with his dinner at home, besides a glass of port at dessert.

When we were children we used to make him sing a drinking song in praise of beer. He had only one other song, an imitation of a very highly sentimental one, which a sister used to sing when he was young. They were sung to an accompaniment of strumming on the table and were performed with great expression and fun. When past eighty he performed them both for the edification of his little grand-daughter.

In the year 1877 an Irish cousin came over to spend a long visit with us. On hearing her express a wish to study Euclid my father suddenly announced that he was going to try her paces, and would take her for an hour every evening when he was at home, and that I might come too. He read through the first book of Euclid with her during the month of her sojourn with us. It was apparent during the first lesson that I was keeping them back, and that it was better to withdraw; but I felt most wretched and abased at losing the chance of learning from him. That night when bidding him good-night he kept my hand in his and said he wished to talk to me. He first spoke of things not mathematical which he wished me to study. He then gave me the most beautiful account of the growth of knowledge, and said that even the wisest people knew very little. He spoke of himself as only apprehending slightly in advance of others, as standing on the edge and looking into the unknown, and said that people were then only born who would perhaps know far more than anyone yet dreamt of. Then after speaking of human knowledge as it had been and as it was, he passed on to imagine it in an infinite degree, and from that to Divine Wisdom as the root of all things which are or can be, and yet as willing to dwell in every creature who in humility desired true wisdom.

When a baby sister died he took me into the room where she lay dead,—for he thought it well to accustom people to the notion of death early in life in order that they might cease to dread it,—and spoke of the immortality of the soul. He always inspired a feeling of calm and security. One knew that his mind and heart had some resting-place far from the troubles and changes of the world.

When it was becoming customary for the University Professors to admit lady students to their lectures someone wrote to him asking for permission for the ladies to attend his lectures also. He said that he had almost decided to refuse; but I begged that he would take them, and asked him how he would feel if a Mrs Somerville had asked him to teach her, and he would not. At last he promised to admit them, and he became much interested in his lady students, and always knew how much they understood. He was much amused by one. After the first lecture he said, "She frowns"—after the second, "She is frowning horribly!"—after the third, "Her forehead is one mass of corrugations; she won't be there next time!" and she was not. But some of the ladies got on splendidly, and he was much pleased when a Newnham lady who had attended his lectures brought him some original work which he approved.

I wonder if those who worked with him had any idea how merry he could be. His humour was somewhat peculiar to himself, and perhaps not quite developed in proportion to the rest of his mind; and the things which amused him did not always amuse others, though they laughed with him because of the sympathy which he always inspired. His fun belonged to a different order from that usual to a grown-up person. Of course this does not apply to his scientific jokes. It was interesting to see him with Professor Clerk Maxwell, whose sense of humour was of a very high order, and very varied. They were greatly attached to each other, but it is doubtful whether they had much meeting-ground upon the humorous side of their characters.

My father delighted in playing with my little white Pomeranian, a dog called Pearl, of whom he made a great pet. This was a dog of acute instincts, who in illness used to creep to my mother; but when in high spirits he would fawn upon my father, begging for a game of romps, and then there often ensued wild races round the garden. As children we sometimes thought that it was papa

who had "fits of the funnies," and sometimes that they originated with Pearl. My father and I were walking with Pearl one day when he was run over by a cart, and he carried the dying dog home most tenderly. Then we buried him in the garden, but first my father went to the house for something white to wrap the little dog in, because he thought it would be so sad to see the dark earth fall upon his pretty white fur.

I remember one delightful day when we had to walk from Port Ballintrae, near the Giant's Causeway on the coast of Antrim, to Portrush, where we were to attend a picnic and then walk back. Before going he was anxious to make some experiments on waves in a cave near Portrush, which could only be reached by boat at high water, or at low water by wading. It was such a pretty cave that he offered to carry me in on his back, and it may be imagined that the offer was accepted. He tucked up his trousers and waded in with a stick. We had a most delightful time in this lovely cave. He worked away at his waves, so that we waited rather long, and the tide was quite high when we set off back again. The rocks and stones were slippery with seaweed, and I made him laugh unguardedly. Presently, plump we went in, and being wet all over thought we might just as well amuse ourselves in the water awhile. Anyhow, with the best intentions we had safely avoided that picnic, a severe form of entertainment even in Ireland.

He was very fond of walking on the Velvet Strand near Malahide when we stayed with his sister Elizabeth, and we often walked all along it and back with bare feet. I was for burying our boots and setting up a stone to mark the spot, but he thought it more prudent to retain them, so that in case we saw correct persons approaching they might be hastily resumed.

He said that he dreamed a good deal until he went to school, but little afterwards; he thought that frequent dreams showed that the mind wanted exercise. Yet in after-life, when his mind was certainly busy enough, he sometimes had queer dreams. Once, for instance, that he arrived at the North Pole, where he found a young lady sitting on a large iceberg, very elegantly dressed, and sheltering herself from the rays of a hot sun with a pink parasol; he then quoted

> The sun's perpendicular rays
> Illumined the depths of the sea,
> And fishes cried out in amaze,
> Oh! bless us, how hot we shall be.

In spite of this dream, he maintained that the South Pole would be much more interesting to explore than the North Pole and would give a better scientific return.

He used sometimes to be rather entertained by his travelling experiences, and by the way in which persons who recognised him through having seen his photographs introduced themselves. One occasion in particular amused him, when a fellow traveller, after a long conversation, glancing at the name on his hat-box, congratulated himself on having had the honour of making the acquaintance of the illustrious author of *The Art of Memory*.

Every Long Vacation we spent about a month with his brother, William Stokes, Rector of Denver, near Downham Market in Norfolk, a very charming old man, a delightful talker and a member of the "Family," an old Cambridge Dining Club. He was a gentleman of the old school, who always wore a top hat, a very high stock collar, and Wellington boots. His tastes were scientific, and being much the elder brother he found it difficult to remember that little George had become a most eminent scientific man; and certainly he was never reminded of it by my father, who used to venture to differ from him in the most deferential and gentle manner. While there we went for long drives, drawn in the old carriage at the very slowest rate by the ancient and fat horse, to visit the fine churches and view the flat and picturesquely wooded country.

Later in the Long Vacations we always went over to stay at the Observatory at Armagh, and afterwards went with the Armagh party to some seaside place, oftenest the magnificent neighbourhood of the Giant's Causeway, or occasionally some other equally quiet locality. My father got through a good deal of work at these times, giving the morning and evening to it, spending the afternoon in long walking expeditions, and climbing, if there were anything to climb. He would scramble along the Spanish Path and other dangerous cliff paths on the face of the Causeway rocks, to my mother's considerable anxiety, showing us afterwards from the sea the little thread-like tracks he had been along.

There was a cave called the Land Cave which we always visited after storms had been ploughing up the Atlantic. It had a sort of window opening into it from the land, so that we could

see the great waves come in, making the cave dark; it was striking to see such great masses of water fall without sound upon a bed of foam. He made a good many wave-observations there, not about steep sea-waves, for that was much earlier, but I think he was trying to find out the relation of the waves to one another and why the ninth wave was so much larger than the others. He told me that he was nearly carried away by one of these great waves when bathing as a boy off the coast of Sligo, and this first attracted his attention to waves. Once after a great storm we found a number of the shells of the Ianthena Communis, a sort of purple snail with a nautilus-like float. He said it was a member of the same family from which the Tyrians made their purple dye: we tried to dye linen and wool with them but only succeeded in dyeing our cuffs well. We often explored the coast and looked for the fairy pools in the rocks where the water was so clear that you could examine the sea-anemones and the waving seaweed. He delighted in the unusual geology of the place with its strange basaltic columns, and would wonder if they went under the sea and came out at Staffa and Iona. The fisher folk, fine manly fellows who sailed along that inhospitable shore at great personal risk, would bring us their queerest fish, like the Gar-fish with its pale green bones and the Devil-fish. They used to come for advice as to how to race their heavy boats and make them slip through the water, and those who took the "Professor's" advice won at the regattas and got their fish first to market. He visited one of these fishermen often during one vacation; the man had lost his eye in a fight, and was suffering great pain of body and agony of mind.

Foreign travel was not then so much the fashion as it is now; and after his wedding tour in Switzerland he only once or twice went abroad in order to represent the University or receive a degree.

My mother sketched well in pencil. After an illness in 1880 she went to stay at Hastings and writes from there in April, "The waves are so flat and undefined to-day I can get nothing sure out of them." He was evidently working at waves that year, and employing her to sketch them.

About the year 1882 we had much amusement over some experiments he made while on the Madras Harbour Commission,

which sat to discover how the Harbour should be rebuilt, so that the tremendous seas coming into the Bay of Bengal should not sweep it away. He had a long wooden trough made, and got heavy little bricks—of lead, I think—with which to build the harbour, my part being to demolish his work with waves of varying magnitude, while he timed the resisting power of the uncemented harbour, building it at different angles. The work of wave-destruction was done with a rake without teeth, which fitted the width of the trough. We used this apparatus near the garden tap, which was provided with a hose, and we usually worked with bare feet, as boots soon got soaked through upon the sopping grass. Previously, in 1873, when we were staying near Portpatrick in Wigtonshire, he had studied with intense interest the action of the waves in demolishing the harbour that had been constructed at great cost on that exposed coast.

In 1874 we ascended Slieve Donard when staying at Newcastle, County Down, getting a magnificent view of shining ranks of great cumulus clouds beneath, when he talked a good deal about cloud-formation. He usually talked far more in vacation than in term time; he was less busy; then too he loved the beauty of nature, and it seemed as if the novelty of things round him kept his mind at its out-posts where things enter by the senses, and so made communication easier to him.

He was much interested, as also was Prof. Clerk Maxwell about the same time, in cat-turning, a word invented to describe the way in which a cat manages to fall upon her feet if you hold her by the four feet and drop her, back downwards, close to the floor*. The cat's eyes were made use of, too, for examination by the ophthalmoscope, as well as those of my dog Pearl: but Pearl's interest never equalled that of Professor Clerk Maxwell's dog, who seemed positively to enjoy having his eyes examined by his master.

He always took the keenest interest in thunderstorms, and used to make us anxious by the way in which he stood out in the garden to watch them, especially in the great storm of 1889, of which his house and the Roman Catholic Church seemed the centre. He would go any distance to see houses and trees that had been struck, and did his best to extract their sensations from people who had been rendered unconscious by lightning.

[* A few years ago this subject excited attention in France, and the dynamical explanations were set forth afresh in the *Comptes Rendus*.]

He was very much interested about earthquakes and earthquake waves. When Mont Pelée in Martinique erupted, and 40,000 people were killed, and St Pierre destroyed, he sat for long spells thinking about it and the conditions of the earth which caused it. He bought all the newspapers with accounts of the disaster, but considered that the account given in *Pearson's Magazine* for September, 1902, written by an eyewitness, Captain E. William Freeman, of the steamship *Roddam*, was by far the best. He bought several copies at once to send to friends.

In 1902 he was also strongly attracted by photographs sent him by Mr F. H. Neville and Mr Heycock, showing the structure of thin sections of an alloy quenched at different temperatures, and would sit looking at them and comparing them for long times. Even in his latest days he was always ready for anything new.

It was interesting to notice in my father's discussions with scientific men the horror he had of theorizing from unproved facts; he would always say, "But have you proved your facts?" and then would often show them that this had not been done. He could not bear "scientific romancing," as he called it.

He had a strong admiration for Charles Darwin's character and patient research, but could not understand the way in which, as he thought, scientific men had accepted the theory of evolution before the chain of evidence was completed: he used to say that this surprised him exceedingly, and that he knew of no similar instance in the history of scientific thought.

When we were children our great day was Sunday, because my father was usually at home on that day and less busy. He would take us for long walks on those afternoons, and read and talk with us in the evening. He was always very fond of reading aloud. He did not read poetry well, always, whatever the line, bringing out the last word strongly to make sure of the rhyme, which had a jingling effect; he read us one or two of Keble's Hymns every Sunday evening. But he read prose beautifully, and in particular interpreted *The Pilgrim's Progress* for us in the most charming way; he had an immense admiration for it, and illustrated it by his own experiences in travelling and walking amongst the mountains. When he came to the Fair and Flourishing Professor, I called out "That's you, Papa"; and we all laughed so much whenever he came to the name, and he had such

difficulty in keeping his own countenance, that the reading had to be abandoned for that evening; for he said that it was a book which should be read with gravity, as it was written by a good man about holy things. So he told us instead the story of Bunyan's life, and of how he had suffered for the right to think as he chose, and how he had long lain in Bedford Gaol, not far from Cambridge.

We often walked round by the Roman Road to Trumpington, and often to the Observatory to see Professor and Mrs Adams. He was also very fond of taking the Cherryhinton round, to hear the larks sing in the fields, which have since been covered with houses. Or we would walk by Madingley and Girton, when he would sometimes repeat Gray's *Elegy* by Madingley Church, I think the only piece of poetry not a hymn which he knew by heart.

He had had very little time for general reading; but he had a very high opinion of books like Hooker's *Ecclesiastical Polity* and Locke's *Human Understanding*, which he had chosen in early years as Pembroke College prizes. Once when we were reading a *History of the Inquisition* he took it up and became quite absorbed, speaking often of it afterwards with horror. He spent a good deal of time in perusing doctrinal books which were sent him by the authors.

He had two really wicked characteristics, that he would never allow anyone to help him with his work, not even permitting invitations to be answered for him, and that he kept every single thing he received by post, even advertisements. His study was enough to drive any housemaid "wild." He used gradually to acquire tables from the rest of the house, until there were as many tables as the room would hold, with narrow passages between, through which to squeeze if you could. On these tables papers were piled a foot or more deep. It may be imagined that, keeping everything, he could find nothing. One remembers the hunts there used to be before he went to London, every person in the house sometimes enlisted. It always began by his hunting alone and refusing all help rather fiercely. Then gradually, as the quest grew more desperate, the rejected suitors fell quietly into the ranks. Sometimes it was grim earnest, and the necessity was urgent; as for instance when one of the Gifford Lectures was missing, and it was nearly time to catch the only

train that would connect with the mail, if he were to arrive in Edinburgh in time to deliver it. At last it was discovered, but only in the nick of time, in the round basket of an aged relative, which was called ever after "the magpie's nest," and came in for first search on subsequent occasions. When the study and the inner study had reached a state of repletion, my mother would wait for the Royal Society day, Thursday, for then he was often away for two nights or so, don apron and sleeves, and fall upon those rooms, when clothes-baskets full of unnecessary matter would be removed. Then for a long time afterwards we were considered the cause of the disappearance of every missing object or paper. We often presented him with letter-cases and other domestic inducements to tidiness, but they were usually found empty, or with things quite unimportant inside. Those home-comings after clearances always reminded us of the scene in the *Antiquary* when Oldbuck finds his study being cleaned. But we endeavoured not to be caught red-handed, and even if we had safely finished, hung the head and went softly.

I used to go with him to his lecture-room sometimes to help to look for things, or to assist in hanging strings and wires to break the echo to which it was subject.

Then of course both in his lecture-room and in his study at home he made strange infusions which smelt horribly, horse-chestnut bark and leaves and all sorts of other things, at one period bullock's and sheep's blood for his experiments, not even fresh but kept for ages in soup plates close to where he wrote. He never seemed to notice bad smells; once when we had the planks up in the dining-room for a horrible smell which he said only existed in our imaginations, we found a dead mother rat and her young immediately under his chair. After this, it seemed right to be more firm, as these things, though inoffensive to him apparently, might harm his health.

The late Queen's Jubilees were occasions which he thoroughly enjoyed, for like all Irishmen of his way of thinking, he was a very loyal subject. I accompanied him to the first in 1887, which was also the jubilee year of the electric telegraph, and he enjoyed it keenly, from the Procession to the cruise in the Admiralty launch around the fleet at Portsmouth and the illumination of the fleet in the evening: getting back to bed at three o'clock in the morning was not of the slightest consequence in his eyes.

It was the same at the Naval Review, after the King's Coronation, to which my husband accompanied him: he would not hear of going home until everything had been seen and done.

Lord Kelvin's visits were occasions of enjoyment to him, and great were the discussions between them, which anything served to begin; for instance, the eggs were always boiled in an egg-boiler on the table, and Lord Kelvin would wish to boil them by mathematical rule and economy of fuel, with preliminary measurement by the millimetre scale, and so on.

He had no love of sport of any kind, and I think the nearest he ever got to fishing was once on the coast of Antrim, when he got limpets and baited my hook, and took the fish off the hook, carrying the seventeen home in his silk pocket-handkerchief.

The absence of mind which was noted in him as a child remained in later years. Once after he had been spending several days as a guest in a country-house, when we enquired if he had liked his hostess, he said she was very kind and pleasant; but we found that he had never discovered whether she were the wife or daughter of the house.

Naturally people often came to see him on business, and it was very interesting to observe his method of getting through that kind of work. He had a way of reducing business to its simplest expression, and then sticking to the point whatever other people said. His charity was that which thinketh no evil, and he was so far above the petty jealousies of everyday life, that even when in the midst of them he would be totally unconscious of their existence. This must often have been useful in keeping the mind in a serene state of calm: still, it must occasionally be easier to decide or guide, if the conditions of other people's minds can be clearly seen, even if they prove an unpleasing prospect. He was so totally unaware of small-mindedness that it made him quite sad to have it pointed out.

Perhaps what most differentiated him from other men in his tone of mind was the blending of the active and the passive attitudes towards life; one does not often find the resolute active enthusiastic spirit blended with calm aloofness and power of cool judgment. It seemed that at any moment and in the hurry of business he could withdraw into himself to decide on the best course of action or of thought.

He naturally much disliked to find that others had been

angry with him for doing business in what he considered the right way. On one occasion in particular I remember that a gentleman came to see him about the publication of a friend's work through the Royal Society. It was interesting to hear the different lines of argument, my father's very simple, quietly and calmly repeated opinion, that the work was not good enough, the visitor's varied arguments becoming finally rather heated. When the visitor finding it useless had gone, I asked him if he had happened to notice that the man had left in a very bad temper. My father hitched his chair and got rather red, and seemed aware for the first time that this had been the case. He said, looking most uncomfortable, "I thought that he seemed a little warm, but that he could not possibly be angry with me about what was purely a matter of business." Then he became somewhat roused and said, "It is most unjust!" We then went out walking, and he talked for a long time on the subject, but naturally without any personal bias. He gave me a most eloquent lecture on the Royal Society, its foundation, growth, position in England, position in the world, and spoke of the misfortune which it would be to Science if it ever departed from its isolated position, or got entangled socially or politically, or ever published anything for any reason than its first-rate excellence. When he ended, for it lasted from before we left Lensfield Cottage until past Trumpington, he remarked that he gave up an immense amount of time to the improvement of hopeful work, but that he could not make bad work good.

The same personal feeling which some people have about others or themselves was applied by him to institutions or societies, a strong sort of intimate affection and regard. He naturally felt it particularly towards the Royal Society, with which he had so long an official connection. Elected Fellow in 1851 he was made a Member of the Council in 1853, and was appointed one of the Secretaries in 1854, an office which he held until 1885, when he was elected President. He remained President for five years, and for two years longer was a member of the Council, on which he had therefore sat for thirty-nine consecutive years when he withdrew in 1892. In the following year the Council took the first opportunity that was open to them, to confer on him the Copley Medal, which is the crowning award of the Society.

In later years, as he grew older, the continued marks of special

appreciation from learned societies, such as the Arago Medal from the Institute of France, specially struck and sent over with the deputation to his Jubilee celebration, and last of all the Helmholtz Medal from the Berlin Academy, gave him great pleasure and satisfaction.

Besides the Royal Society he had this feeling of great affection and keen personal gratitude in a high degree for Pembroke College. He often told us of all he owed to Pembroke, and of how his re-election to a fellowship had helped him and given him ease and liberty for his own work and investigations. He always delighted in speaking of the great and good men who had belonged to his College: and one of the books which he was reading a short time before his death was the *Life of Bishop Ridley*. When any Pembroke man did well in the mathematical examinations, Tripos or Smith's Prize, it gave him the most lively pleasure. He delighted in showing friends over the College, and would often say, "Don't take them to Pembroke. I will show them that myself," and this even when he was very busy.

When he had business to do with people he almost always went to them instead of their coming to him. Whether it was because he was prompt and got to them while they were still meditating on coming to him I don't know, but it would happen with persons far younger than himself.

People may hold different views with respect to the amount of time which he gave to the study of the question of Conditional Immortality and cognate theological topics, on which it is well known that he held opinions of his own. To some it may seem that as nothing can ever be proved objectively about these things, however interesting, it was time taken from what was the real work of his life, the search for absolute truth regarding Natural Phenomena, truth which is capable of being demonstrated. Indeed, considering the enormous amount of time and thought which he gave to correspondence and discussion relating to religious questions, and in science to improving the work of others, it must always seem amazing how he found time for his own investigations.

His attitude to the Royal Society is brought out in the following letter to his father-in-law, which has been passed on to me by Professor Larmor.

Lensfield Cottage, Cambridge,
1*st December*, 1877.

My dear Dr Robinson,

Somehow or other time has slipped by and I have not yet sent you the plottings I contemplated. My hands have been as usual full with one thing or another and this matter I felt did not press.

And now I must ask you to excuse me if for the present I drop anemometry and pass to a subject concerning myself and my family, about which I must come to a decision before long, though there is no occasion for an immediate conclusion.

I have now held the Secretaryship of the Royal Society for a long time, having yesterday been re-elected for the 23rd time, and having therefore entered on my 24th year of office. I don't look on a post of that kind, which is continued by re-election, and which is hardly regarded as honorary (though since the raising of the stipend from £100 to £200 I think there is a very fair remuneration), like a professorship which one is expected to hold for life, or so long as one's powers last. I have always felt that I ought to anticipate rather than otherwise any wish on the part of the Society for a change in the office.

I have no reason to suppose that any such wish is felt at present in my case. I asked Mr White confidentially if he had heard any expression of a wish that I should make way for fresh blood, and he said not; that on the contrary the Fellows seemed to be very well content with me. Still I can't help thinking that for a non-life office 24 years' tenure is a very long one.

What precedes is by way of introduction to the immediate question. When the office of President was last vacant there was a division of opinion as to whether there should be an understanding that the office should be held for a limited number only of years, say 4 or 5, or whether when we had got a President we had best keep him so long as he is fit for work and does not feel the duties too onerous.

The majority of those who had to decide were in favour of the shorter tenure. Such was Hooker's view when he took office. He himself considered that 5 years was about the thing.

He has now intimated to the Officers, and expressed his intention of intimating to the new Council, his wish that that

view should be acted on. As yet it has not gone beyond the Officers.

Before the meeting of the Council yesterday Sir Joseph Hooker told me that the Officers were strongly of opinion that I would be the proper person to succeed to the office. After the dinner Huxley, sitting behind me on a sofa where we were by ourselves, strongly pressed it upon me to express my willingness to accept the office.

Among other solutions there is one which will occur to everybody. For a combination of exalted social position with the highest moral and intellectual qualities the Duke of Devonshire stands pre-eminent. He is universally respected, and if we come to have a nobleman at all I think that he is *par excellence* the man.

I think, however, that many would feel that our President ought to be a man who would really work for the Society, and *that* we could hardly expect of a man in the Duke's position. Though in good health he is getting advanced in years, and I confess I much doubt whether he would *now* consent to take the office.

Then there is Spottiswoode, who was one of those talked of on the last occasion. Of the two I am probably the better known as a man of science, but he has the advantage of a fortune which would enable him to show hospitality to distinguished foreign *savants*, which his residence in London would enable him to do.

However as the office *has* been pressed upon me by my colleagues, and I think it probable that the Council might make the same suggestion, at least if they had any inkling of what had been in the minds of the Officers, the practical question is (supposing at least the Duke not available) what answer I should give.

Of course I feel that it would be a great honour, the highest or one of the highest scientific posts in the country. But then I have a wife and family depending on me, and mainly a life income, and the Presidentship would involve of course the surrender of the £200 which I should have so long as I held the Secretaryship, besides some positive outlay (though not to any great amount) attending the position. Besides I am naturally of rather a retiring character, and should feel not a little out of my element in being brought so prominently forward. On the other hand, if I am deemed the fitting person (and I am not the one to judge of that) my duty to the Society of which I have so

long held the Secretaryship would seem to require me to consent; and having now an endowed professorship and a fellowship as well, I ought to be able to dispense with the salary of Secretary.

I have now pretty well put before you the *pros* and *cons*, and should be glad to know your feeling in the matter.

Yours affectionately,

G. G. STOKES.

P.S. I mean to sound Cambridge F.R.S.s. to see whether there is anything of a general feeling here in favour of the Duke of Devonshire.

Although of a very quiet and silent disposition, he by no means liked being alone; he would often bring his work into the drawing-room in the evening, and had a folding-table kept close to the door of that room so that he could work in family surroundings. He did not like the talk to stop on his account; indeed his power of concentration prevented its being a worry to him; it just seemed to reach him as a cheerful and soothing buzz. Still it was interesting to note that one never knew when he was listening; and the most unexpected subjects occasionally arrested his attention, when he would launch suddenly into the conversation in the intervals of his work.

He had a great love of parties and public functions of all kinds, and rarely refused invitations. I used laughingly to tell him that whether it were a wedding or a funeral did not make the slightest difference. This keen sympathy with human joys and griefs was characteristic of him; it was felt even towards those with whom he was but slightly acquainted, and he sometimes expressed a wish that he had the power of conveying his sympathy in words.

When friends were ill he would often go to see them and sit with them quite a long time. His fondness for frequent church-going on Sunday seemed to have its root in this same turn for companionship and good-fellowship, especially when linked by union of action or idea. But we used to wish that after the labours of the week he would not go three or even four times to church the same day,—including the University Sermon, of which playful questioning would sometimes reveal that he had heard remarkably little. He rarely went to church on week-days except on special occasions, Ash Wednesday, Good Friday, etc.

It was one of the greatest disappointments of my youthful life that I never went with my father to visit Skreen. He had been there once alone when I was too small to go, and he used often to talk to me of his happy child-life, and of returning to visit the dear place again, and always I begged that we might go there together. It seemed odd that we never went, as for many years a good part of every Long Vacation was spent in Ireland. At last, one Long Vacation, he said that he would take me to visit his old home. Then, just as it was all settled, they sent him piles of papers to look over from the Royal Society, and our interesting plan fell to the ground. It was very disappointing, for had we walked together in those old places always so dear to him, he would have told me much about his early years, and I should perhaps have better understood how he came to be all he was. His early life always seemed more interesting to him than his undergraduate days. What probably made it difficult to extract reminiscences from him about his past life was that he did not feel interested in it, as most people would, because it was a part of himself. He was always much more inclined to talk about things quite outside himself than of things connected with him, and this not perhaps so much from natural shyness and reticence as because he was not very much interested in the latter. Anything in the shape of natural phenomena was a different matter, and on such he would enlarge at great length, even to the uninitiated.

As the amount of writing he had to do grew steadily greater, one shoulder grew somewhat higher than the other; he had slight congenital malformation of both little fingers; they crooked inwards, and this served to make writing more difficult to him. At last he consented to try the key-board of a writing machine, and tapped away one Long Vacation until he was sure that he could acquire the art. This typing machine was a great boon to him and to his correspondents, as his handwriting had become very difficult to read.

The impersonal quality of mind already mentioned is perhaps rare, even amongst men of thought. It gave him great restfulness in active affairs, and saved him much wear and tear. He was not troubled by fear of what others might think of his actions and his work, and this gave simplicity and unity to his life. It was not

solely strength of character, but arose in great measure from conscientiousness and the continual habit of feeling himself in the presence of God. It was very interesting to be quietly at home with him during the time his Jubilee was being celebrated by the University. He was so absolutely simple about it all, enjoyed it all so thoroughly and in such a perfectly un-selfconscious way. He thought it most kind of people to take so much trouble in getting it up, and in coming such distances in order to be present; but there was no mock modesty; he accepted their judgment as it was offered. This mixture in his character of profound modesty and humility with perfect consciousness of his own place in the scientific world was remarkable. He thought very little about himself, but when he did think he thought truly and impersonally. Naturally, during his Jubilee he subtracted a great deal from himself and placed it to the count of science. Anyhow, he went through those days most peacefully and emerged from them quite fresh. The following morning he was off early for the annual official Visitation of Greenwich Observatory.

The crowning pleasure in receiving his honours was that my mother, though in weak health, experienced the joy of seeing them bestowed upon him. She died the following December, and afterwards he lived with us.

It has been remarked that he was the first President of the Royal Society, and, far more curious, the first scientific man, who represented either University in Parliament since Sir Isaac Newton; and he was elected after an interval of two centuries, *minus* two months, succeeding Beresford Hope in 1886 when sixty-seven years of age.

It was also subject of remark that, in those times of Irish political disturbance the "House" at last saw a silent Irish member; Sir George Paget, in seconding his nomination, had said that the House would have an opportunity of seeing how good a thing a good Irishman is. It may be remembered how Macaulay records the fact that, when his great predecessor Sir Isaac Newton was Member for his University, he made no speeches: "he sat there in his modest greatness, the unobtrusive but unflinching friend of civil and religious freedom." It has been said that Newton only once opened his lips in the House of Commons, on which occasion he rose and said, "Sir, would you have a window

opened?" Had my father spoken on this subject, he would certainly have asked to have the window shut; for, considering what a hardy man he always was, he had the most curious dislike of open windows all his life.

He had grave doubts as to whether he should accept the invitation to stand for the University. He felt that there were many objections to it, one of them being that the President of the Royal Society should be entirely outside politics; but though he never wavered in his personal political views he felt that the representative of one of the ancient Universities held an exceptional position, and, consenting to stand, he was elected without a contest. He very much enjoyed the debates; certainly he was in the House during a very interesting time in politics, especially for an Irishman. It interested him greatly to hear Gladstone; and, having gone into Parliament with a perfect horror of his politics, it was amusing to note the gradual change that set in, and the enormous admiration which he felt for Gladstone's eloquence and power, and the sense he had of the strong personal magnetic influence which he exercised.

One day especially his silence in the House was remarked. Some scientific question had come up, and still he said nothing. When we afterwards asked him why, he answered that he had been prepared to rise, but that another person had obviously wished to speak and had said enough, although he had treated the subject from a different stand-point from that which he should have himself adopted. Only one member beat him in regularity of attendance, Sir Richard Temple, who, however, lived in London.

To some it may seem a pity that he entered Parliament; for he was so conscientious that what had probably only been intended as a general retainer became a close tie, and his silent services in the House were given at the cost of a great deal of time, which was taken from his own work, while his constant attendance involved considerable bodily fatigue. Altogether, as years ran on, he was left very little time for himself; when his services were requisitioned to assist scientific investigations, the appropriateness was obvious; but Church reform, questions of belief, politics, University legislation, etc., all claimed his time and involved continual committees, and constant streams of letters which he always most dutifully answered, and to very dull people, often at great length.

He was very ambitious about everything he did, and desired to do it thoroughly well and to excel; but because he was not ambitious in the ordinary way and for the usual objects, people were not probably quite aware of it. It was this mixture of intense but exalted ambition joined with great conscientiousness which spurred him on; for though he was eager and energetic by temperament and custom, yet there was a substratum of inertia and procrastination which he always fought against. Often after dinner, reading the newspaper and the subsequent games of backgammon, still basking by the fire, he would say, "How lazy I feel, but I must go and work!" then with a little discontented grunt and lazy stretch he would pull himself together and go. He sometimes spoke of this native slothfulness, but indeed it did not get much chance, and only got its head up in occasional procrastination.

He always had a difficulty in lecturing, and felt considerable anxiety about it. Even his professorial lectures, to which it might have been thought he would have become accustomed by long use, worried him, and he was anxious as to whether he was getting on too quickly, whether his class were following his lectures and his experiments, and was evidently always afraid of sinking his level by the staleness of custom. On our walks, when it was noticeable that he was deeply pondering and must not be disturbed, after he emerged from his long fit of abstraction he would not infrequently say that he had been thinking about his lectures and deciding on his course, and how he should present his subject attractively; and afterwards he would sometimes show that he was depressed about his lectures and thought them a failure. On the other hand, he would be quite gay when he had a specially nice class, and would thoroughly enjoy his course. But any single lecture or course of special or popular lectures was a thorn in his side, and worried and tired him more than anything else. It seemed that he thought that other people had some extremely high standard, would expect so much, and be so likely to be disappointed.

He was always ready to enter into correspondence with anyone on religious subjects, even with uneducated people, and felt great compassion for those who endeavoured to lead upright lives, though unaided by faith in any revealed religion. But he

could think of the complete annihilation of evil-doers with what seemed a curious indifference; it appeared that he regarded it as a simple and an almost satisfactory arrangement. When asked how the good who loved bad people were going to manage to be happy in Paradise, he would answer that we only love people for the good we find in them, and that if we were once for all convinced that there was no good in them we should cease to love them. It was in vain to argue the absolute mixture of good and evil in ourselves, and all the difficulties which come from people who are bad because they never really had any chance to be good, and how some spiritual Purgatory might fit the real state of a real world far better, or to use a better word, a state of spiritual evolution after death. But if any came to him with difficulties of conscience or belief he would give much time to writing or talking with them, and would as it were take them by the hand and endeavour to lead their minds into some quiet place.

His views with respect to the condition of the soul after death formerly gave much offence in certain circles; he began such considerations long ago, when thirty-two years of age. On several occasions I have heard him preached against by the clergymen of the churches which we chanced to attend in Vacation. It was curious to note the unruffled calm with which he would listen on such occasions. Once I heard a very humorous sermon preached in the University Church by an Irish Bishop who referred to "the process of ossification which goes on in a Senior Wrangler's heart," and saw Mrs Adams, Mrs Cayley, and my mother peeping at one another under their bonnets.

He was a great student of the Bible, particularly of the New Testament, which he often read in Greek. He would often speak of the journey to Emmaus as a passage which particularly attracted him. Two subjects, already referred to, interested him particularly. One was the question of the Immortality of the Soul, on which he held the belief that it does not inherit immortality as a right, but as a supernatural gift from God, and that Christ died to obtain it, but could only obtain it for those who were good, or being bad had repented before death. The other subject was the State of the Soul between Death and Judgment. This period he believed to be passed in a state of absolute unconsciousness, which he illustrated by having experienced fainting-fits. He held that the soul would awake to

the Judgment and gain Eternal Life or absolute annihilation according to its deserts. This seems a rather dreary creed, not likely even to be very consoling for those who were good. But like some other theologians his actions and his character quite belied his creed. Had he become a lawyer, as he was once advised, and had he attained the Bench, I cannot imagine his calm condemnation of even the most hardened sinner to mortal death. It seems certain that he would always have wished him to be imprisoned and to have another chance of being better. Once near the end of his life, on being asked if he did not think that Paradise would consist in a greater power of devoted love and in being always with those we love without any fear of separation, he answered that he thought that perhaps the Soul would be so absolutely centred in God and in worship of His perfection that it would have no perception of anything else.

As a member of the Lay House of Convocation he entered into questions of Church Reform, and was very anxious that some abuses should be corrected, particularly the disparity in the endowment of livings and the difficulty in the removal from their charges of clergy who led evil lives. He desired the necessity for signing the Thirty-nine Articles to be abolished and the Athanasian Creed to be altered. He wrote a short paper on Polygamy in connection with Christian Missions; it seemed to him wrong that women and children should suffer from the introduction of Christian teaching on the subject of Marriage, and he thought that a man who already had several wives ought not to put them away, for he had entered into a bond with them before he was taught Christianity.

In the spring before he died my husband and I were pruning the lower branches of our copper beech, and we noticed that the young leaves exposed to the light were of a copper-brown colour while those sheltered from the light were of a soft bronze-green shade. It seemed to be the action of the light which gave them their deep colour: we thought that he might know why, and that anyhow it would interest him. He had appeared rather slack the day before, and also that morning, saying that he began to feel old and inactive; but when we took some leaves up to his room he at once became quite keen. He said that he did not know the reason, but that he would try and find it out. Soon he came out

on to the lawn, almost running in his eagerness to gather more leaves; and he tried experiments with them for several days, but said that he had not been able to discover the cause. In 1872 he had worked very hard at elm-leaf experiments.

He talked much with us during the last few months of his life. He told us that he had never had any experience of what is called conversion. It seemed that he had grown up from childhood with a steady desire to do what was right. He appeared to have inherited his tender conscience and high principles, and to have been carefully trained to subdue himself while still very young, for the home-life was the reverse of pampering, and both boys and girls grew up hardy in body and simple in their tastes.

He took to his bed only a few days before his death, but he had been failing noticeably for some months previously. He was very patient and struggled on, giving his lectures and doing his other work as long as he was able. He managed to be present at the Annual Dinner of the Cambridge Philosophical Society, held on that occasion in his own College, about a month before his death, although very ill at the time. He made an admirable speech, recalling with charming simplicity and courtesy his life-long connection with the College, to the Mastership of which he had been called on the last day of his eighty-third year, and with the Society through which he had published so much of his scientific work.

We thought that he had received some special illumination towards the close of his life; he spoke very little about dogma, but much of the nature and attributes of God, and of how men may attain to live a higher kind of life while they are still on earth. He thought less and less of the differences in religious opinion; not that he ever minded such differences, for I remember years before how it grieved him that Mr Huxley should be so misunderstood, as he regarded him with strong affection and admiration, considering him one of the truest people whom he had ever known.

He quite realized his own condition and knew that he had not long to live; but he evidently wished to live longer and do still more work, for he was very happy and energetic, and his faculties were quite unimpaired.

Near the end he was conscious that his life was rapidly drawing to a close, but his mind remained clear; only during the last few

hours he wandered slightly, and imagined that he was addressing the undergraduates of his College. "Speak," he said, "to the young men," and then, "the way of purity, that is the only way." But he awoke from the state of lethargy into which he had fallen, and during the last half-hour of his life, and when he could no longer speak, he smiled occasional assurance that all was well with him. There was hardly any struggle at the last. It seemed that he had walked with God, and that he was now gently taken away from us.

As he lay dead he looked as though he had seen peace, and yet as if by taking rest in the deepest sleep he was only preparing for some fresh activity. On the night of February the 4th his body lay in the Chapel of Pembroke, where he had so often worshipped; and on the following morning, after a short service, it was borne according to ancient custom round the court of the Chapel, and thence to the University Church.

The University, which had honoured him while living, honoured him dead, and a great company was collected in the church to do him reverence. But I do not remember anything more, except that some of those who most loved him and the members of his College still continued with him and followed him, until after the final prayers his body was laid beside that of his beloved wife, and near two of his children in the Mill Road Cemetery.

So sweetly disposed was he to all with whom he came in contact, that people while they revered were scarcely ever afraid of him, and on entering his society were at once without fear of being misconstrued or misunderstood. He was very decided in his opinions, and having so much business to transact, must often have clashed with the opinions of others; yet I believe that, though anger might be felt towards him at the time, it may be truly said that he made no lasting enemy. The words of Francis Bacon seem to sum up his whole character,—"Certainly it is Heaven on earth to have a man's mind move in Charity, rest in Providence, and turn upon the Poles of Truth."