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LORD KELVIN'S EARLY LIFE.

Lord Kelvin's Early Home. Being the Recollections of his Sister, the late Mrs. Elizabeth King; together with some Family Letters and a Supplementary Chapter by the Editor, Elizabeth Thomson King. Pp. xii+245. (London: Macmillan and Co., Ltd., 1909.) Price 8s. 6d. net.

THIS fascinating volume gives us a vivid picture of the home life of the remarkable family into which Lord Kelvin was born eighty-five years ago. It is mainly the work of his eldest sister, Mrs. Elizabeth King, who kept many notes and casual diary records, and it has been lovingly edited by her daughter, who has added a brief supplementary chapter. Of that family Lord Kelvin was the last survivor.

Its head was James Thomson, born in 1786, the son of a farmer in county Down, who died in 1849 when professor of mathematics in Glasgow University. His "forbears" had come more than a century before from Ayrshire in the "killing time" of Claverhouse, and the farm on which they settled remained in their possession until 1847, when James Thomson's eldest brother was obliged to leave it for Belfast in the distressful days of the Irish famine.

James Thomson was the Benjamin of the country farmhouse. There were four older children, the youngest ten years older than him. His sister taught him to read, "using handkerchiefs with mottoes and verses printed on them composed by the patriots who brought about the rebellion of 1798." He taught himself arithmetic from a dilapidated copy of Bonycastle, with which he fortunately fell in, "not only mastering its contents, but supplying many pages that were wanting." While still very young he was sent to a day school, and he had no other teaching until he went to Glasgow College. Everything about the boy helped him to educate himself. There was an old sundial in front of the house which fascinated him, and which he tried to reproduce. But his new dials failed to tell the time of day. One very hot summer night, as he lay awake thinking on the problem in his bed out in a garden-house, the theory of dialling dawned on his mind, and he soon worked it out until he was able to make sundials to be placed horizontally, perpendicularly, or at any angle whatever. Some of the dials he made then still exist.

He came across the narrow seas to Glasgow College, as many Irish boys used to do before the Queen's Colleges were set up about 1846. He spent many winters there, taking his M.A., going through most of the medical classes, and the complete theological course with a view to entering the ministry. But when he left the university he was appointed teacher of arithmetic and geography in the newly established Royal Belfast Academical Institution. In a short time it became a college, having preparatory schools connected with it, and it was the forerunner of Queen's College, Belfast. James Thomson was appointed professor of mathematics in the college, in

NO. 2099, VOL. 82]

addition to his work in the school. He had found his vocation.

Some time after, when he was thirty-one years of age, he married Margaret Gardiner, daughter of a prosperous Glasgow merchant. She had come across the year before to visit a cousin, Dr. Cairns, a colleague of Dr. Thomson's in the institution. She became engaged to Dr. Thomson, and was married the year following. Their wedding journey was through the Highlands. The Scotch bride settled in Belfast, and died there after twelve happy years of married life. James Thomson brought the motherless family of six children to Glasgow University when he was appointed professor of mathematics in 1832. The eldest daughter, Elizabeth, whose notes and recollections are the basis of the book, was fourteen when they came to Glasgow; the youngest, Robert, was three. They had been seven in number when their mother died. After her death, and before they went to Glasgow, the youngest girl, named after her mother, faded and died. Mrs. Thomson's younger sister, Agnes, who had herself married in 1826, was left in charge of the family, and brought them over to their new home. The family were Elizabeth, aged fourteen; Anna, aged about twelve; James, aged ten; William, aged eight; John, aged six; and Robert, aged four. This younger sister, Agnes—Mrs. Gall—had been brought up in Glasgow by the elder sister, Mrs. Thomson, and felt for her the warm affection of a daughter.

The sixteen years in Belfast, with the young family growing about his knees, were perhaps the most epoch-making of his life. No family ever owed more to their father and mother. For many years, says the eldest daughter, they had no other teacher, except for French and writing, music and dancing. Dr. Thomson

'was in the habit of rising at four to work at his books. Some coffee and cream and a spirit lamp having been put ready for him, he made himself a cup of hot coffee before beginning. In these quiet morning hours he got through an immense amount of work before his professional duties began. His books on arithmetic, mathematics, geography, &c., went through very many editions which constantly needed revising and bringing up to date, so that he was occupied with them more or less to the end of his life. As professor of mathematics, during the winter months he lectured every morning from eight till nine, and from eleven to twelve in the forenoon. In the afternoon he was occupied with his school classes, and these ended he regularly went to the news room and the commercial buildings for a little while. Our mother was always waiting for his return, with the children about her. Very eagerly we listened for his knock, and ran to the door, and helped him to take off his things, and then heard some stories from him of what was going on in the world. After dinner we children came down again, and a bit of bright burning cannel coal was put on the fire, which blazed up and filled the room with dancing light; the globes were placed on the table, and we gathered round; little Willie and sometimes James also on the table beside the globes while our father explained their use and taught us to work out problems in them. William was scarcely four when he began to take some part in these cheerful after-dinner lessons, and from the very first he showed the wonderful mental capacity with

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which he was endowed. What lovely memories rise up as I recall that dear fireside of long ago—our father and mother sitting there among us.”

All his life Lord Kelvin used to testify that his father had taught him everything he had learned until he went to college in Glasgow. Here is another picture of the family:—

“It was the next winter that James (then eight) and William (then six) were first sent to some classes in the Institution for an hour or two in the day, and the delightful after-dinner lessons and readings with our dear father were continued with ever increasing profit and pleasure. As we dined at half-past four and the meal was quickly despatched, we had long evenings with him. He gathered us about him, and in every way strove to supply the place of our lovely mother. He was indeed both father and mother to us, and watched over us continually. William was a great pet with him, partly perhaps on account of his extreme beauty, partly on account of his wonderful quickness of apprehension, but most of all, I think, on account of his coaxing, fascinating ways, and the caresses he lavished on his ‘darling papa.’ When his father stooped to greet him the child would fling his arms about his neck, and smother him with kisses and stroke his cheeks endearingly. . . . I do not remember that any of us were ever in the slightest degree jealous of William on account of our father making him a little more a pet than the rest of us. We were proud of him, and indeed we thought the child petted the father even more than the father petted the child; but we saw plainly that the fondling of his little son pleased him. Willie always slept in a small bed in our father’s room—that is, after his early nursery days—because he had for some years a tendency to sleep-walking, which for a time caused some anxiety.”

Prof. Thomson’s first session at Glasgow brought something of a disappointment. In those days there was no arrangement for a pension when, through age or infirmity, a professor retired. The outgoing professor often made a private arrangement with the new-comer. Lord Kelvin’s sister tells us that under such an arrangement his father actually had at first to pay his predecessor more than the chair brought in.

“To mitigate the loss, he announced an afternoon course of lectures for ladies on geography and astronomy, to be given twice a week in his class-room. Such a thing had never been heard of before in the university, and it was extremely popular. The large class-room was crowded in every corner, and it was a novel and interesting spectacle to see bench rising above bench filled with fashionably dressed ladies, every one looking intent, and many taking notes. All the belles of Glasgow were among the students. This class was carried on for two or three years with undiminished popularity till the pressure of other engagements compelled my father to give it up, the regular mathematical class becoming so large as to give him quite as much work as he could undertake.”

New arrangements also were made with his predecessor, and the ladies’ classes had to be given up. The children’s education continued to occupy the father’s time.

“We did not go to school, but our father, as hitherto, took the general supervision of our lessons. William and James began Latin with him on the Hamiltonian system, and made rapid progress. They also attended the junior mathematical class as lis-

NO. 2099, VOL. 82]

teners, without being examined or writing the exercises. In a letter to William, dated May 7, 1886, Mr. Wallace, an old student of our father’s, writes:— ‘It was in a very large class that as a mere child (ten years old then) you startled the whole class, not one of whom could answer a certain question, by calling out, “Do, papa, let me answer.” The impression on my mind has never been effaced.’”

Mrs. King writes again:—

“Our first summer in Scotland was spent at Rothesay, and there our father devoted himself indefatigably to our education. Every morning the four elder children—ages fifteen, thirteen, eleven, nine—spent some hours with him in his study, and always after lessons he took us out for a walk, and made the walk a daily pleasure with his varied converse.”

Next session—1834—the aunt, Mrs. Gall, had to leave them to join her husband, and Elizabeth, now a girl of sixteen, became mistress of the house. It is most interesting to follow the course of their studies. The two girls read Latin (*Cæsar’s Commentaries*)

“with our father during his breakfast—our own porridge and milk having been despatched earlier. The two boys, James and William, went in the morning to college classes—the girls taught their two younger brothers piano, and writing, arithmetic, geography, also a little French and Latin, and read Goldsmith’s *History of England*. Nor was poetry neglected in this course of study. I got books from the college library to read about painting and about the lives and works of the old masters. After dinner our father gave us a short mathematical lesson, and after that he read aloud to us. During this winter he thus read the whole of Pope’s *Iliad* and *Odyssey*, several of the plays of Shakespeare, those also of Goldsmith and Sheridan, besides selections from the old poets. William had the strongest sense of humour of any of us, and not only enjoyed it himself, but set all the little party laughing mirthfully whenever a humorous passage occurred. Mrs. Malaprop and Bob Acres, &c., were most inspiring. Whilst our father read, Anna and I sewed—not fancy work, but flannel petticoats and the like—and our brothers lay on their backs on the floor with their arms extended, to give them a rest and help them to grow straight. The reading was followed by a lively tea, after which our father returned to his study, the two youngest children were taken up to bed, and the four elder adjourned to the drawing-room. James and William were attending Dr. Cooper’s natural history class, and in the evenings they retailed their lectures to their sisters after tea. William was not ten till the following June. I was James’s pupil, and Anna was William’s. About 9 o’clock James and William went to bed, and Anna and I went down to the study to our father, who took down a book and read to us—sitting on two stools at his feet. It was often the *Spectator* or *Rambler* that he chose for this purpose—sometimes Blair’s *Sermons*, which he considered pure English as well as profitable reading. In about half-an-hour we said good-night. A servant always came for our candle and took it to him that he might know that we were snug in bed.”

“I think it was about the end of 1836, when William was twelve, that James and William made electrical machines for themselves, having become much interested in the study of electricity at the natural philosophy class. James’s machine was larger and more carefully finished than William’s, but William’s, though rather rough, served every purpose to his own satisfaction. They made them entirely themselves. The chief thing that I remember

is the frequent shocks to which the family in general were subjected, and the collecting of electricity in their large Leyden jars. But their work was really serious, and was continually expanding. They went on to make voltaic piles and galvanic batteries, experimenting with metals and fluids, and on light and heat, and magnetic electricity. Soon William's attention was turned to the polarisation of light, and he pursued experiments in this field of inquiry with extraordinary eagerness and delight. The brothers contrived and themselves made most if not all of the apparatus they used in their experiments."

"Their happy winter workdays were pleasantly varied with summer rambles. Dr. Nichol, the famous professor of astronomy, had taught these classes in natural philosophy during the illness of the professor, and in summer he took James and William a two or three days' ramble over the volcanic region of the Siebengebirge, climbing the Drachenfels on their last morning."

All science was their province. Lord Kelvin always claimed that natural philosophy comprehended all the sciences.

"Before setting out on our travels in 1840," his sister writes that "William had got Fourier's 'Théorie analytique de la Chaleur' from the college library, and when studying the book one day he suddenly sprang from the stool on which he was sitting and excitedly exclaimed, 'Papa, Fourier is right and Kelland is wrong.' Our father was rather incredulous, but on examination he found that in the points in which Kelland had declared Fourier mistaken it was Kelland himself who was mistaken and not Fourier. He made the boy write an article for the Cambridge Mathematical Journal, and sent it to Gregory, the editor. It was shown to Kelland before it was published. At first he was very much annoyed, but after some expressions had been altered he was satisfied to let it appear. I may add that Kelland became very friendly with William, and as long as he lived the friendship continued."

In 1841 William went to Cambridge, and the story of his life there is well known.

"A brilliant university career was before him. He was also distinguishing himself as an oarsman. A nice second-hand 'funny' came in his way, which he did not lose the opportunity of securing. It was 27 ft. long, painted blue, and bordered with a band of gilding. It was decked or covered all over except a hole in the middle, where the rower sat, and it was so light that William could carry it himself if need were. He called it the 'Nautilus.' He became as enthusiastic in boating as he was in everything he set about, and he won many prizes in the races. Like a jockey, he used to regulate his food so as to form good strong muscle without increasing his weight. . . . When he won the Silver Sculls, it was better, he declared, than winning an examination."

The story of his second wranglership and subsequent first Smith's prizemanship has often been told. When the first list came out he writes to his sister that the principal thing he cared about in the result was the disappointment he was afraid papa must feel, "as I am afraid he had rather raised his hopes about it, though I tried to keep him from expecting too much before the examination, as I knew the uncertainty."

Next year came welcome compensation. At the age of twenty-two William was elected professor of natural philosophy in Glasgow, to the chair which he made so famous during the half-century of his occupation.

It was delightful, for his father, now his colleague, was becoming frail. He died of cholera in Glasgow two years and a half later. But he had seen in his declining years the splendid outcome of his long life-work. James Thomson's numerous text-books were excellent in their day. They had an enormous circulation, and were of the utmost service in the education of the time. But his greatest work was his teaching of his own family. While his most enduring monument is the splendid fame of Lord Kelvin and his elder brother, James Thomson, he did work not less memorable in shaping and developing the beautiful lives of all the six children, to whom he was father and mother in one. It was in that warm and loving home that Lord Kelvin and his brothers and sisters found the intellectual and moral nourishment that made them what they came to be in their day and generation.

W. J.

PROTOPLASM IN HARNESS.

Les Zoocécidies des Plantes d'Europe et du Bassin de la Méditerranée. By Dr. C. Houard. Two vols. (I. 1908, II. 1909). Pp. xvi+1248. (Paris: A. Hermann et Fils.) Price, two vols., 45 francs.

GALLS on plants, in at least the more conspicuous forms, must have been known to man from a very early period in his history, and the presence in them of living animals might have been expected to suggest inquiries as to their source and relation to plants, yet even after Malpighi had published the results of his study of various galls, and had been followed by Reaumur in his admirable "Mémoires," the interest in those curious growths long remained limited to a very few. To botanists they were little more than excrescences on, or defects of, plants, lessening their value as specimens, while zoologists were rarely attracted to the study of the makers, which belonged for the most part to mites, nematode worms, midges, and other groups difficult to study, and little attractive in themselves.

But the latter half of the nineteenth century was marked by an almost sudden outburst of activity, about 1870, led by Drs. F. Thomas, D. von Schlechtendal, F. Löw, G. Mayr, and others, resulting in numerous papers filled with descriptions of previously unknown galls, and gall-makers, and with life-histories disclosing new relations between plants and animals, as well as new cycles of development of the animals. Such discoveries as the surprising dimorphism so general among the Cynipidæ that gall the oaks attracted keen interest, which showed itself in an increase of workers, and in a more and more rapid advance in the study of galls, especially in faunistic researches, and in more accurate determinations of the gall-makers and of the influence on one another of host and parasite.

The diversities in structure among galls (the alterations induced by the gall-producers in some cases amounting only to slight enlargement of the parts involved, while in others they result in bodies of complex nature and definite specific forms), and the systematic relations among the numerous gall-bearing plants, and also among the gall-producers, support the