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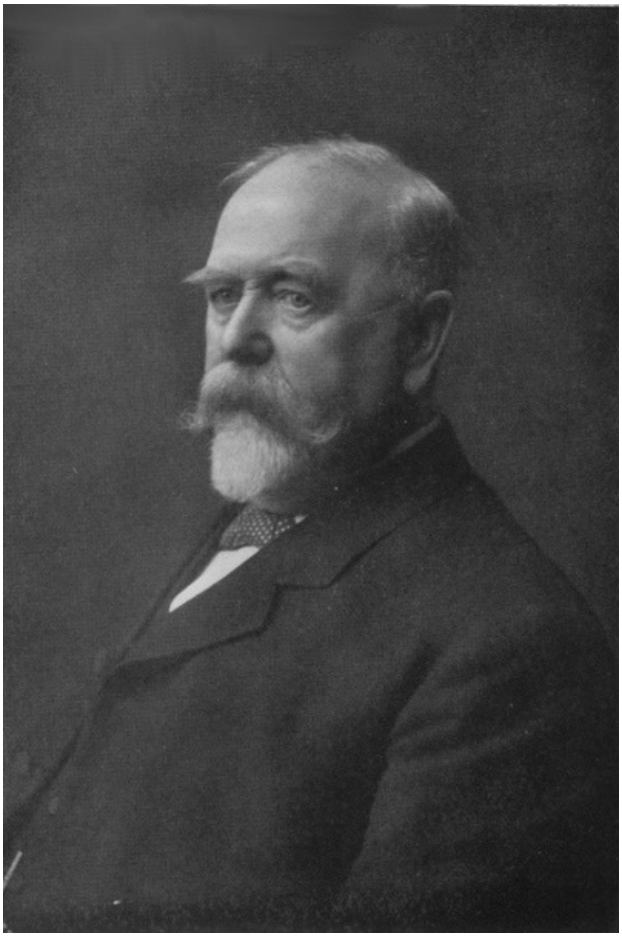
JAMES GEIKIE

THE MAN AND THE GEOLOGIST



[Photo by John Horsburgh.

PROF. JAMES GEIKIE, LL.D., D.C.L., F.R.S.

JAMES GEIKIE

THE MAN AND THE GEOLOGIST

BY

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AND

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Of the Geological Survey of Scotland

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PREFACE

This biography of Prof. James Geikie is based upon his own letters, papers, and diaries, and upon information supplied by many of those who were closely associated with him, both during his earlier days on the Geological Survey and the later in Edinburgh. Much of the material was sorted and arranged by Mrs Geikie before it was placed in my hands, and to her I am indebted for many notes, memoranda, and verbal statements which supplemented the documents supplied. Mrs Geikie had herself composed, for the use of the family, a brief account of her husband's early days, and on this manuscript the first chapter is largely based; without its aid the composition of that chapter would have been very difficult.

For later years I am under great obligations to Prof. Geikie's many friends and correspondents, at home and abroad. Correspondents across the seas, especially, deserve warm thanks for their willingness to trust valuable original documents to the post, at a time when the phrase "perils of the sea" had taken on a new meaning. It is satisfactory to be able to state that in no case was such material lost as a result of hostile action. Prof. Stevenson of New York and Prof. Chamberlin of Chicago must be specially mentioned as having supplied much material. It should perhaps be added that the circumstances under which the book was written made it impossible to obtain letters or information from many continental geologists, who, in happier times, would doubtless have been glad to render assistance. [Pg viii]

A large amount of material was also kindly supplied by geologists and others in this country. Among those who have taken a keen interest in the progress of the work, and have rendered notable assistance, mention may be made of the following friends and correspondents of Prof. Geikie:—Dr John Horne, who supplied many letters and much detailed information—to his kindly and unfailing help this memoir of his old friend owes much; Dr Peach, whose accounts of early days on the Survey were most helpful; Mr Lionel Hinxman, Mr H. M. Cadell, and many others, to whom application was made in regard to matters of detail. Among the last mention may be made of Dr W. B. Blaikie of Messrs T. & A. Constable, Mr T. S. Muir of the Royal High School, and Mr John Grossart. To all who have rendered assistance I desire to offer most cordial thanks, and trust that they and others will feel that the biographical sketch, in however imperfect a fashion, does present a lifelike picture of one who rarely failed to inspire affection and admiration in those who came to close quarters with him.

Marion I. Newbigin.

Edinburgh, *October 1917*.

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CHAPTER I

Boyhood and Youth

1839-1861

James Geikie was born on 23rd August 1839, in a house in Edinburgh which was later pulled down to make room for the University Union. He was the third son and the third child in a family of eight, consisting of five sons and three daughters, and was baptised as James Murdoch Geikie. He abolished—to use his own word—the Murdoch in boyhood.

His father was in business in Edinburgh, but by taste and inclination was a musician, and in later years, after retiring from business, devoted himself entirely to music, and was the author of a number of compositions, sacred and secular. A little anecdote, recalled by his son in later years, suggests that it had always been his ambition to be a professional musician, and that he had been thwarted in youth. The story relates that one day he said to James somewhat sadly:—"If ever you have a son who wants to make music his profession, do not oppose his wish." In the fulness of time, it is interesting to note, one of James Geikie's sons did express this desire, and his father [Pg 4] scrupulously observed the injunction of the long-dead grandfather. The point is not without importance, from more than one aspect, and is at least a partial refutation of the pessimists who, like Samuel Butler, maintain that each generation repeats the mistakes of the last in dealing with youth.

Another artistic strain in the family was represented in the person of Walter Geikie, an uncle, who was a well-known painter of Scotch scenes and left also some good etchings. Of him James Geikie, in an undated fragment of what was apparently intended to be a history of the family, says:—"Of my Uncle Walter I will say nothing: the Life prefixed to his etchings having already forestalled anything I could tell. He was a capital mimic and possessed of boundless good nature. Had he been longer spared he might well have become famous in his profession, but Death, to whom the genius and the numbskull are one and the same, carried him off in the year 1837—two years before I was born." James, it may be noted here, had himself considerable skill as a draughtsman, as both his published works and his geological note-books show clearly, which adds interest to this note upon his artist uncle. Another uncle, who was a minister and went out to the United States when James was young, was the father of Cunningham Geikie the divine, author of a widely-read *Life of Christ*.

The latter lived with the Geikie family in Edinburgh for some time in his student days. The MS. [Pg 5] from which the above quotation is made, which is annotated in pencil by its author, is, as stated, a mere fragment and undated. Internal evidence, however, suggests that it may have been written about 1856, the writing and composition recalling some extant letters of this period, and it shows, as further quotations will indicate, that its author, with all his obvious immaturity, was even then feeling after a style.

James Geikie's mother was a Miss Thom, a daughter of a merchant captain, who was born in Inverness but established himself at Dunbar. Here he married the daughter of a local shipbuilder, whose family was connected by marriage—to quote again the MS. already mentioned—with "that Roderick MacKenzie who suffered his head to be taken from him that he might save that of Prince Charles Stewart"; a fact of which the boy James confesses himself very proud. In his later days Captain Thom often visited his married daughter, and the important part which he played in developing the imagination of the children is suggested in the following sentences (from MS.): —"My Grandfather Thom when I first knew him had not ceased to plough the sea for his living. He was of a middle stature, well-made, and muscular. I can still see his fine head nearly bald—what hair he had was of a beautiful silver white—his Roman nose. I can still at this late period follow him in his walks. I see him sitting with his old cronies—relics of fights by land and sea—on that seat between the two old trees—long since pulled down to make way for those [Pg 6] improvements, so-called, which have altered entirely what in my young days went by the name of 'The Meadows.' His stories of adventures with the robbers of the sea are rife in my memory. His voyages to places whose very names smack of fairy-land—his hairbreadth escapes—his deeds of daring—the recollection of all these rises vividly before me at the mere mention of his name. I looked upon him as another Sinbad—a second Robinson Crusoe; and my acquaintance with his queer old friends served to heighten the romantic colours in which I viewed him! Alas! all these school-boy dreamings are past; but they will sometimes flit before me as I lie gazing up into the

deep blue of a summer sky, recalling the old days which have gone away into dim forgetfulness: and they will sometimes come again as I sit alone musing by the winter fireside. Verily there is a something—call it what you will—about the past which renders it infinitely more endearing to us than all the brightest dreams of the future."

The only comment which it is necessary to make upon the above is to repeat that it was apparently written when the boy was about seventeen, and thus, as we shall see, at a period when he was engaged in uncongenial work, and when his future was uncertain: these facts help to explain what the James Geikie of a later day would have contemptuously denounced as the "high-falutin" style.

In addition to the visits of Captain Thom to Edinburgh, family intercourse was kept up by return visits of the children to Dunbar, where the ships appealed strongly to the imagination of [Pg 7] James. He was fond of saying in later years that he used to watch them dipping below the horizon and longed to follow them to see what lay beyond; and the *Wanderlust*, so early developed, lasted till the end of life. In a letter to one of his sons, written to Egypt in 1901, he says:—"Old man tho' I am, I'm just as keen to knock about the world as ever I was. It is like renewing my youth even to think about it!"

In connection with the seafarer's blood which he inherited from his mother's side, it is also of interest to note that James was an excellent traveller both by sea and land; the sea had no terrors for him, and his voyages were a source of continuous pleasure, both at the time and in recollection.

As to his immediate intellectual heritage, it seems probable that James took the majority of his qualities from his father's side. But his mother, of whom he was very fond, was a woman of great ability and much ambition for her clever sons, whom she spurred on in their careers. Her extraordinary skill as a needlewoman, and her capacity for hard work, are enshrined in the family traditions, and it is probable that James took from her his remarkable perseverance and his manual dexterity. The father was full of *bonhomie*, probably as deeply impregnated as his son with the *joie de vivre*, and like him more desirous of a full life than given to the narrow concentration which achieves a particular purpose at the expense of so much.

From his father James seems to have inherited his imagination and the touch of constructive [Pg 8] genius which enabled him to do such noteworthy work; but one can well believe that the instinct which led the son to interleave his scientific observations in his geological note-books with verses, prevented the father from devoting himself as whole-heartedly to the pursuit of worldly prosperity as his wife may have thought desirable in view of the large and growing family.

It is at least certain that money was not very abundant in the early days, though the house contained many books, and there seems to have been much music and liveliness, the father, like the son, being a capital story-teller. He must also have been a traveller in his day, for James in a letter to his brother William speaks of him as going off to the Continent in 1858, a much rarer adventure for a man of moderate means then than now. The occasion was a musical festival at Bonn, and was apparently taken advantage of to the full, the tour being extended to Paris and elsewhere.

Details in regard to the early life of James Geikie are scanty. These were days long before the time when conscientious parents recorded in neatly kept note-books all details as to the growth and development of their offspring; while with babies following each other at regular intervals throughout a long period of years, the mother had probably little time to put on record any signs of precocity in the elder boys, if such existed. Two little stories, however, emphasise the [Pg 9] statements made above as to the effect on the children's imagination of Captain Thom's yarns. When very small James, in company with his brother William, who was two years older, set off to walk down to Joppa, some three and a half miles from Edinburgh, to see the world, and incidentally to visit an aunt who lived in the district. The two arrived very tired, only, after a meal and a rest, to be ignominiously taken home again by their aunt. In those days communications between the shore and the city were difficult, and the party had to trudge back on foot, the small James, whose ambition on this occasion had somewhat outrun his strength, having to be carried most of the way.

But this inglorious finale did not quench the ardour of the youthful pair, who were probably slow to grasp the attitude of grown-up people towards displays of initiative on the part of the young. Next time they planned to make a voyage on their own account, and to place the water between them and over-zealous family affection. They were so far successful as to reach Leith and find their way on board a ship. But alas! even here they were met by a display of the adult passion for interference, and were taken home by a sailor who, regardless of the soul within, maintained that their diminutive stature debarred them from seeking life and adventure on the high seas. As one of the grandfather's most popular stories related how he had sunk a pirate boat in the Bay of Naples, by means of a small gun loaded with scrap iron, and how in consequence he had been fêted by the Neapolitans, and had had his portrait painted, one can imagine that the [Pg 10] brothers were very bitter at this second check to their own ambitions. James had to wait many years before he faced Italian pirates and brigands, and then it was the milder variety which requires to be treated with another metal rather than iron, and cannot be disposed of by Captain Thom's summary methods.

Another story of childhood is interesting because it shows how completely the boy was the father of the man. At some unknown but early date he had a serious illness. So desperate seemed his condition that the doctor, speaking in the presence of the apparently unconscious boy, permitted himself to tell the mother that recovery was practically impossible, and was not to be

desired, as the child would be feeble-minded. After the doctor had left, the poor mother came back into the room crying, but little Jamie found strength to whisper feebly: “I’ll no dee yet, mother.”

Long years afterwards, in a bad illness some four or five years before his death, somewhat similar incidents happened. One day after he had seen the doctor exchange a grave glance with the nurse, he managed, after the doctor had left the room, to say: “Tell him I have a return ticket.” On another occasion one sick-room attendant volunteered to another the statement that she did not think the professor would last till the morning, and was considerably startled to hear the apparently dying man, who was lying with his eyes closed, say distinctly, if feebly, “The [Pg 11] professor will last till the morning, and he’ll last till he sees you out of the house.” Needless to say he did more than this, for he lived to tell the tale with his old glee and vivacity. Perhaps the medical science of a later date will be able to find an explanation of this power of resistance, and of its association with the nervous temperament rather than with strong physique. Meantime it is interesting to have another confirmation of the frequent experience that in a death-struggle, whether with internal or external foes, the “muscular Christian” can often give a less good account of himself than the nervous one. The boy, who if he lived was to be feeble-minded, not only lived but added notably to the world’s stock of knowledge.

Only one early letter has been preserved, and it gives no clue as to its date, beyond the fact that it is printed in childish capitals, which are, however, wonderfully straight, and shows an uncharacteristic uncertainty as to spelling. It reads:—

> Dear Father and Mother,—We are very much disappointed, at youre not leaving London on Saturday. We hopet to have the pleasure of seeing you pull down the pears for us but since you have not come, we will have to bigin ourselves and take them down. We are all in good health we wer all up at the castle with Thom to day and saw Mons Meg. Write us soon and let us know when yoo ar really to leave.—Your affectionate son,
>
> James M. Geikie.

James Geikie’s early education was obtained at a private school, where he seems to have been unhappy. The master was brutal in his methods, and ill-suited to have charge of a delicate, [Pg 12] nervous boy. The climax came when one day he approached James from behind, and seized his ear roughly between his finger and thumb, giving it a painful wrench. The boy, maddened with pain and fright, sprang up, and seizing the nearest object, which happened to be an inkpot, flung it at his assailant. He then made for the door, his exit closing one educational chapter. Afterwards, in 1850, when he was eleven years of age, he went to Edinburgh High School, then under the rectorship of Dr Schmitz. Here James Geikie seems to have distinguished himself chiefly in classics. The classical master was Dr Boyd, who evidently perceived his abilities, for he told him that he expected to hear of him in later years either as a poet or as a literary man.

Under Dr Boyd James Geikie gained a prize for a translation from Virgil into English verse, and his knack of verse-making seems to have been carefully fostered. A number of his verse translations have been preserved, some written out in his brother William’s extraordinarily neat hand, others printed by James himself at a later date.

On the whole, however, it would seem as though the education of the boys was carried out more outside school than in it. In those days Scottish schools were unaffected by English traditions in the matter of sport. There were no organised games, and the boys obtained exercise in whatever way pleased them best. The Geikie children kept many pets in their garden, and James’s considerable manual dexterity was often called upon in connection with the welfare of [Pg 13] these. A family tradition led the children to give those of their pets who died before their time an elaborate funeral, and James’s skill in coffin-making is still lauded by the remaining members of his family.

Of more importance for his future career were the long excursions by which the boys as they grew satisfied their *Wanderlust*. Edinburgh is, of course, even to-day singularly favoured by Nature in the number and variety of the possible excursions within easy reach of the town, and in those days conditions were still better. In later years, when he took his geological students over Arthur’s Seat, James Geikie used often to lament what he regarded as the spoiling of that park by the construction of roads, which for him took away the feeling of wildness, and part of the impressiveness of the wonderful volcanic scenery. He did not live to see a further stage in which the citizens were shut off by the exigencies of war from the enjoyment of the most attractive part of the park.

A little anecdote that he often also told on his excursions is not without interest. As a boy he was lying on the hill one day reading a book when he was accosted by a party consisting of a tall gentleman, a little lady, and a group of children. The gentleman asked the way to the top of the hill, and James not only volunteered to guide them, but ultimately carried the smallest girl pickaback up part of the climb. The party had a pleasant stroll, and parted the best of friends. As the boy came down the slopes towards Holyrood, however, he found a considerable crowd [Pg 14] waiting, and learnt that his help had been asked by the Prince Consort, that the lady was Queen Victoria, and the little girl he had carried the Princess Alice.

One motive for the long holiday rambles seems to have been butterfly-collecting, if one may judge from the enthusiasm with which in later years, when himself the father of growing boys, he entered into the pursuit for their sakes. Some of his letters written to his sons during his travels on the Continent and in America are thoroughly boy-like in their enthusiasm for the beautiful creatures, and in their descriptions of the efforts necessary to obtain perfect specimens. But like many an Edinburgh boy before and since, he was keenly interested in fossils and in the rocks and

minerals represented in the neighbourhood of his native town. Fossil-hunting expeditions to the famous limestone quarries of Burdiehouse and Gilmerton, and to the coprolitic shales down on the shore at Wardie, were often undertaken in company with two future colleagues on the Geological Survey—his eldest brother Archibald, later Director of the Geological Survey, and now Sir Archibald Geikie, and the boy who afterwards became Prof. John Young of Glasgow. James was considerably younger than either, and, as he himself indicates in a Memoir prefixed to Dr Young's *Essays and Addresses* (1904), was only allowed to accompany his seniors occasionally and as a special favour. Indeed, throughout all this early period it seems clear that "Jamie" was [Pg 15] only a little boy, not of great account in a family whose hopes were concentrated on the eldest son. The latter seems to have settled his own career early, for it is recorded that one day while walking up the South Bridge with his little brother, he said:—"Do you see that big building with the iron gates? I am going in there, and one day I shall be a professor there." The little brother's feelings at the time are not recorded, but it seems probable that no one in the family contemplated that the great iron gates would open for him also as a professor.

With two older brothers, and two more following after, it is not to be wondered at that James Geikie's school-days soon ended. In 1853 he left the High School, and at the beginning of 1854 was apprenticed to Mr Thomas Constable, the printer. His life here does not seem to have been happy. The confinement and long hours did not suit his health, the occupation did not appeal to his tastes, and among his chief consolations seem to have been occasional geologising holidays and books. These he read on his way to and from his work, for the family by this time lived on the other side of what, despite the past tense of the MS. quoted on p. 6, is still called The Meadows, and this open space had to be crossed daily.

In October 1855, however, his brother Archibald joined the Geological Survey, and this, which opened a possible avenue of escape for James, then only sixteen, marked an important turning-point in his career. Of the period as printer it is only necessary to add that, much as he disliked it at the time, he was fond of saying in later years that it was a useful experience, for it gave him a [Pg 16] knowledge of the routine of printing work which stood him in good stead in his own constant proof-reading.

He stayed at Constable's till the summer of 1858, and some letters to his brother William have been preserved which give interesting glimpses of his character in this period of drudgery and development. William had gone out to relatives of the family in the United States, and the letters were written to him there. His death, it may be noted, took place as the result of an accident, shortly after the date of the last of the letters. Some extracts from them may be quoted:—

HOPE PARK, *31st Dec. 1856*.

I have met with very little in my daily routine, since I went to Constable's, that could entertain you, and will therefore skip over my past years and come to the *pint*, as Cousin Archie used to say. When you left you'll remember I was still *daidlin' mong drudgery*. I had to do so for a good while after that, till so it chanced I was *promoted* to a *frame*. I got on pretty well, considering the long hours, and badly ventilated room, which were playing the very mischief with my health, so I hung on (if you'll excuse the expression) until summer had come with its usual slackness in trade, and then I got rest. But summer, alas! like everything beneath the sun, is perishable, and so the crows' nests began to peer through the thinly clad trees once more, and autumn coming sighing and weeping, but bringing with her, as her recompense and consolation, the richly laden field and the clear cloudless moon.... Well I went back to the office, and winter, and spring, and summer and autumn passed away, and "the new year's coming up" (of which I wish you and all the *natives* very many happy returns), and here I am at home away from the office again. The late hours (9 to 10) have knocked me *up* (or, as you are a bit of a Yankee, "*down*" if you like) and I have got leave for a week or two, which I intend spending with Archie. [Pg 17] He, the Professor, delivered a lecture at Penicuik the other day on the "*Geology of the District*."

Aug. 1858.

I am home at present on the sick list, and it is not likely I'll be back to office before the end of autumn. We have glorious weather here at present,—and if I go to the country I have not the slightest doubt but I'll enjoy myself. B——'s master has failed; but the General is not as yet out of his employment altho' he expects soon to be so. I wish I were out of mine; I verily believe it will land me in a premature grave. It never has agreed with me.

Mother is anxious to go off to the country with me. We are just looking about for a place. Perhaps Melrose or Lanark, but lodgings in both places are dear. I go at any rate with Archie next month to Fife; to be located probably at Aberdour; where I will be able to prosecute my geological studies, for I hope, if I am spared, to be able to join the Survey.—My dear Willie I will now close. I never forget you nor ever shall. You become all the dearer the further and longer you are away. God grant that we meet again on earth, if not we are always sure of meeting in a far better place.—I am your affect. brother,

JAMIE.

The gloomy prognostication that his work at the printer's office would land him in a premature grave was not fulfilled, but the statement helps to explain why he left the work in the same year as that in which the letter was written, having apparently never returned to the office after writing it. In order to leave he broke his apprenticeship, and this was strongly opposed by his employer, who told him that a man who changed his profession would never succeed, a prophecy —in any case somewhat extreme—which was not fulfilled in this case.

But after leaving the printing-works there was still another interval of waiting before the boy settled down to his life-work, and found his vocation. He did not finally enter the Survey till [Pg 18] October 1861, a few months after his lifelong friend Dr Young. The period of waiting was spent partly at the University, where he attended among other classes Prof. Allman's natural history course, a subject with which geology was then united. He was also in a lawyer's office for a time, while waiting for a vacancy on the Geological Survey.

To enter this he had to pass what was called a “Qualifying Examination,” which then included what the profane called Civil Service “tots.” These were long sums in compound addition, which had to be done within a limited time and with great accuracy. Though the operation became more or less mechanical to those who practised it assiduously, it presented considerable difficulties to those who were not accustomed to such work, especially when, like James Geikie, the victim had not what are called “business” instincts. The difficulties were, however, overcome, and in October 1861, as already stated, he entered the Geological Survey, forming a member of the small Scottish staff, which consisted of Messrs H. H. Howell, Archibald Geikie, Dr Young, and himself, with the addition, a few months later, of Mr (now Dr) B. N. Peach. Of this band only Sir Archibald Geikie and Dr Peach now survive.

With this appointment to the Survey the period of uncertainty and waiting ended, and James Geikie, at the age of twenty-two, entered on his life-work, and henceforth found his way clear before him.

CHAPTER II

[Pg 19]

First Years on the Geological Survey

1862–1864

James Geikie was connected with the Geological Survey for a period of twenty years, for he only gave up the work, with great reluctance, on his appointment to the Murchison Chair of Geology in the University of Edinburgh in the year 1881. It seems only fitting, therefore, that some general account of his life while a member of its staff should precede any detailed description of the occupations of the successive years. The Survey years were singularly happy ones, were perhaps the most fruitful in original work, and definitely determined the whole future course of his life.

From the official standpoint the tale of events is soon told. In 1861 he was appointed Assistant Geologist. Six years later, when for the first time the Scottish Survey was organised as a branch separate from the English one, he was made one of the two geologists of the staff. Two years later, that is in 1869, he was promoted to be District Surveyor, which made him second in position after the Director, who was then his brother Archibald. The post of District Surveyor he [Pg 20] held till 1881, when the posts of Director and the Professorship at Edinburgh became simultaneously vacant by the promotion of his brother. It was intimated that the two appointments would not again be combined, and, though as stated with great reluctance, James gave up the Survey to take the Chair.

Of great interest in its effect upon his future work was a change in the policy of the Survey which practically synchronised with his appointment. Previous to this time, the loose superficial deposits in Scotland had been ignored by the surveyors, who confined themselves to mapping the solid geology, *i.e.*, the actual rocks, which in many parts of Scotland are mantled by a thick covering of drift or peat. It was decided, chiefly on economic grounds, especially in connection with agriculture, that not only should these superficial deposits be in future mapped along with the solid geology, but that the areas already surveyed should be re-mapped, with the object of adding the omitted beds. As already stated, Dr Young and James Geikie joined the Survey in 1861, and Mr Peach at the beginning of 1862. All three soon after their appointment were entrusted with this work in Fife and the Lothians, which had already had their solid geology mapped. It was a kind of mapping which could be done with considerable rapidity, and therefore involved frequent changes of quarters. Thus, as Prof. Geikie says in the account already mentioned, which he contributed to the Memoir attached to Prof. Young’s *Essays and Addresses*, [Pg 21] “in a year or so we [Young and himself] had tramped carefully over the major portion of Fife and the Lothians.”

For all three novices this introductory period seems to have left delightful recollections. In the Memoir already quoted, Prof. Geikie says:—“Those were halcyon days, and I am sure Young enjoyed them to the full. Often in subsequent years, after he had finally settled in Glasgow, he would recur to them, recalling with delight old scenes and old faces which he and I had known together. The life of a field-geologist is, from many points of view, an enviable one, and could youth and strength endure, one might well be content to follow it to the end.”

Though spoken but of one member of the trio, one may suspect that the statements had a wider application. In the case of James Geikie, but recently liberated from distasteful drudgery, having changed a life of close confinement for the open air which he loved, with reasonable prospects for the future opening out before him, it would have been strange if the “premature grave” of the letters of a few years’ earlier date had not disappeared into the background, and life become suddenly a great good, for youth and strength were both there, as yet untouched by time.

Though the three new members of the Survey were all engaged on the same kind of work, it must not be supposed that their work was done in common. Each had his particular task assigned to him, and though they often met, sometimes indeed lodged together, as was the case, for [Pg 22] example, with Young and Geikie at Peebles in the early part of 1863, and Peach and Geikie in the spring of 1864, it was only their leisure hours which were spent in each other’s company. One may, without incurring the reproach of cynicism, suspect that this greatly increased the joys of companionship. If they had worked together, or even in couples, the inevitable rubs and

difficulties of daily work, however congenial, might have checked exuberant intercourse. But meeting as they did when the day's work was over, or only at intervals, with the tie of common interests, with many experiences to hear and to tell, the companionship became one of the great joys of life.

The brief account in the Memoir of Young is impregnated through and through with the recollection of this gladness of comradeship, and a few more phrases may be quoted to emphasise the point still further:—"Seated by a cosy peat fire, enveloped in clouds of tobacco smoke, confabulating, discussing, speculating, laughing over quaint scenes and droll experiences, life (if we had only known it!) had not much better to give." We read also of the wine of life, and can feel that the writer of the account, who was then a man of sixty-five, could, despite the forty odd years which lay between, still feel its flavour upon his palate as he wrote. Some of the jokes and quips and tales of those old days have become Survey property, transmitted by word of mouth from generation to generation, forming part of that invisible strand which binds together [Pg 23] the members of an organised body, so that while the individuals come and go, are separated by the seven seas, by life and by death, the spirit remains. For each individual in turn youth goes and strength decays, but something remains; and if in their dumb northern fashion the individuals in this case generally passed away without leaving enshrined either in art or in the written word a direct record of all they felt and did, it may yet not be amiss to indicate the enthusiasm, the devotion, and the joy that went to the making and colouring of those maps, and were embodied in those formal records.

But the immediate purpose here is only to suggest that those early days were for James Geikie a conscious escape from prison, a conscious means of self-realisation, and that it was probably the accident that his first official field-work was given to the drifts which determined the trend of his future scientific work. He states, it is true, in a short account of his career which appears in the *Geological Magazine* for June 1913, that his interest in the superficial formations, especially boulder-clay and the associated gravels and sands, dated from his school-days. One may well believe that, like many another born in a region where the till is abundant, he early succumbed to the fascination of that untidy but delightful occupation of digging stones out of the tenacious clay with nature's weapons, washing them in the nearest stream, and then following with loving finger-tip those scratches and striations which bear so romantic a message. Like many others he [Pg 24] doubtless pressed the cherished pebbles against his cheek, and verified practically, long years before he wrote it down in a printed book, the statement that they are smoothed and polished. Like many another also he probably early got into trouble for transferring in the course of his investigations more of the sticky tenacious deposit to his garments than was good for them, and was often under the sad necessity of discarding a proportion of the much-loved and much-fingered witnesses of an earlier age, because their abundance made the collection grow with unreasonable rapidity. But there is reason to believe that his early interest in the rocks was not confined to glacial phenomena, but was disseminated among a variety of geological subjects; and it seems probable that the concentration of attention, throughout long years, on the Ice Age was largely due to the effect of his first work on the Survey, and to the flood of pleasurable emotion with which that work was accompanied.

But it must not be supposed that his work, even in the early years, was confined to the mapping of the superficial deposits. So early as 1863 he was already doing solid geology, and thereafter went on with the mapping of solid and superficial deposits at the same time. But while he did much good work quite apart from glacial questions, and was interested in many kinds of geological problems, it was the history of the Ice Cap of Europe which especially appealed to him. His holidays—brief in early days—were devoted to the study of glacial phenomena outside his [Pg 25] own region. His leisure hours, spent by some of his colleagues in fishing or other forms of sport, or in visiting, were largely devoted to keeping himself abreast of the literature of the subject; and this was also one of the motives which led him to study languages so assiduously, with the result that he was able to make first-hand acquaintance with the papers of all the continental geologists who wrote on his own subject.

If, however, throughout his long life his geological first love commanded his unswerving devotion, it was not because the charms of other paths did not appeal to him. Some of the letters speak of an ardent desire, apparently never gratified, to deal thoroughly with Carboniferous problems, to which his attention was drawn during his prolonged and toilsome mapping of the Lanarkshire coalfield; and in an interesting letter to the writer, which dates from the early part of 1909, he speaks of other questions which had also always attracted him. Some passages from this letter may be quoted:—

> Curious how the revision of old charts of the Mediterranean have re-awakened my interest in the structure of that basin or series of basins! At one time I had a notion of writing a detailed memoir on the subject, but I found it would be necessary to visit many parts of the Mediterranean coast-lands which I had not seen and to revisit other parts which I had looked at. I still think there is much interesting work awaiting investigation there—the Italian geologists seem to me to have missed the meaning of some of the evidence which their own maps supply! If I were only twenty years younger I believe I should start off at once—that bothering glacial work quite drew me away from the Mediterranean problems. Now there is no hope for me, unless on the other [Pg 26] side of time I may be permitted to resume investigations. In that case I shall be independent of railways, steamboats, and even motor cars, while I presume no hotel accommodation will be required. Perhaps by means of telepathy I may be able to communicate results to you as Editor of the Magazine. Unfortunately, however, it would seem from the records of the Psychical Society, that when one becomes disembodied and is interviewed by his bereaved and sorrowing friends he is invariably found to have become little better than a drivelling idiot, having lost any sense he may at one time have possessed. Instead of enlightening you on the origin of the Mediterranean, I may be anxious rather to get you to inform my wife where she will find the discharged account of some nefarious tradesman who is dunning her for a sum of 2s. 6d. which I had already paid.

The letter shows that he realised what his devotion had cost him; but when we reflect not only upon what he himself accomplished but on the extraordinary stimulus which his conclusions, some of which were at first fiercely criticised, gave to the investigation of glacial problems by others, here, on the Continent, and in America, we can hardly believe that he regretted seriously his own whole-heartedness. The period of his working life, from 1861 onwards till his death, witnessed an extraordinary change in the views of geologists upon problems connected with ice, saw an enormous output of material in the way of papers and articles and books, and the world has to be grateful to James Geikie for both directly and indirectly opening its eyes to much that was previously hidden.

His glacial work and its significance are alike discussed by Dr Flett in the second part of this [Pg 27] volume, and need not be treated here, but a word or two is necessary to explain the intense interest which glacial problems aroused among all the Survey men during the period we are considering, and in James Geikie in particular. A quotation from a letter of thanks written by Charles Darwin, after receiving a copy of the second edition of *The Great Ice Age*, will throw some light upon this. The letter is dated 26th October 1876, and Darwin says:—"The subject [*i.e.*, the Ice Age] is one which fascinates me, chiefly owing to a little incident which I will mention as showing the grand progress of geology. When I was a boy an acute old gentleman who had attended to geology and natural history showed me a boulder in Shropshire, and assured me solemnly that the world would pass away before any one could explain how this great stone came from Cumberland or Scotland. This made a deep impression on me, and you may believe how delighted I was some forty years ago when floating ice action was first broached, to be followed some years afterwards by glacier action."

We see from this letter that the thought of the mystery of the great boulder haunted Darwin for years, but the young geologists of the Survey were confronted not with one boulder, but, day after day, week after week, with an accumulation of only half-explained mysteries. When they started work the view that a large part of the British Islands had been covered by land ice, and that the boulder-clay was the record of its passage, had, after a period of neglect, again come into prominence; but it was very far from being universally accepted (see the historical [Pg 28] discussion in Part II.). Then, and for many years to come, the view that the boulder-clay, erratics, and so forth had been dropped by floating icebergs still commanded many followers. The suggestion that there was not one Glacial Period only but a series of advances and retreats, with well-marked interglacial periods between, had yet to be born. Thus the subject was a burning one at the moment, and in their meetings, whether in the field or, when the field-work was done for the season, at headquarters, the members of the Survey had much to discuss and to tell, many fragments of evidence to piece together. They seem all to have been greatly interested in the subject; but that James Geikie made it so peculiarly his own was partly due to the constructive imagination which enabled him to visualise, in a series of brilliant flashes, not the country as he saw it, but the former conditions to which it bore testimony. This constructive imagination was aided also, as has been indicated, by constant toil and by ceaseless comparison, by means both of personal visits and through the writings of others, of local conditions with those of other regions and of other lands.

It is also not without significance to note that his own first work, and indeed generally most of his Survey work throughout his period of service, lay in what is described as the peripheral area of the old glaciation. In any area which is or has been glaciated it is possible to distinguish between a central area where erosion is at a maximum, and where the evidence of the existence [Pg 29] of former ice-sheets is almost necessarily masked by the work of later glaciers, and a peripheral area where ice work takes the form of deposition. In this latter area it is often possible to unravel the complex evidence to an extent sufficient to determine the question whether more than one Glacial Period existed or not. It was to this problem that James Geikie devoted much of his attention, and this fact must be regarded as largely explained by the other that his geological field-work was done in Lowland rather than in Highland areas.

In so far as the details of the Survey work go, we may note that theoretically the summer was devoted to field-work and the winter to indoor work, at first either in London or at the Industrial Museum in Edinburgh, and later, after the establishment of the Survey Office in Edinburgh, at that office. But this general scheme was modified considerably by circumstances. Summer and winter, notably, had a somewhat different sense from that which the calendar gives. For example, an entry in his official diary for 1863 states, under date 17th February:—"Pack-up in Office for country;" while in the same year field-work seemed to continue, with short interruptions, till December. In the following year, 1864, a start was made even earlier, on 1st February. That somebody was taking too optimistic a view of Scotch weather is, however, obvious from the entries in the diary, where "snow," "snow," "snow and rain," "wet day," "snow, 8 or 9 inches" [Pg 30] follow each other with a steady persistency, which justifies the brief entry on 14th March: "Begin to grow desperate—lock up my razors." At this time Mr Peach and James Geikie were endeavouring to map the Ochils from Kinross as a centre, and Dr Peach informs the writer that the two made strenuous but mostly ineffectual efforts to get on with their outdoor work at a time when rocks and superficial deposits alike were concealed in a thick mantle of snow. Apparently, however, there were some alleviations, for one of the tantalisingly short entries in the diary mentions a "Pisgah view of Ochils," obtained apparently from Rumbling Bridge; while Dr Peach states that out of working hours the two toiled hard at their German.

The mode of study took a direction which had some influence on James Geikie's future, and is of interest on this account. The first impetus to the study of the language came apparently from Dr Young, who was very friendly with Dr Schmitz, the Rector of the High School, whose daughter

he married at a later date. Young had apparently a good knowledge of the language, and he, early in their association, urged upon Mr Peach the necessity of acquiring at least a reading acquaintance with it, and recommended the learning of German poetry as a capital means of obtaining a vocabulary. By the spring of 1864 Mr Peach had already a considerable repertory, and his recitals roused in James Geikie his old passion for verse-making. The songs were first put into rough English, with many jokes about their sentimentality, and then James Geikie turned the rough translations into English verse. This was the beginning of a pastime which he carried on during a large part of his life. A selection of the verses was published in 1887 as *Songs and Lyrics by Heinrich Heine and other German Poets*. In the preface the author says that all the renderings there given were done "for his own amusement in those 'brave days of youth,' when difficulties and impossibilities are hardly recognised." Many of the verses were published practically unaltered after more than twenty years' interval, for most of them were made in very early days. They occur in letters, in note-books, diaries, and in various other places among his papers of the later sixties, and were evidently a true labour of love.

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As frequent mention has been made of the diaries, it may be well to state that these for the most part contain little or nothing save the barest records of mapping done, hours of work, memoranda as to expenses, and so forth. Those of the first year or two, however, not unnaturally, since the work was entirely new, are a little fuller. That for 1862, if it ever existed, does not seem to have been preserved; but 1863 contains one or two interesting entries, which emphasise still further the point already made as to the enthusiasm, plans, and ambitions with which the Survey was entered. On its first leaf the following lines are written:—"Was not so old last year as I am this—fact for the curious biographer who is no doubt destined to reap immortality by the interesting use he will make of the copious entries in this diary." But as for many weeks afterwards the "curious biographer" finds no written word beyond the statement that drawing pens were bought at an outlay of 1s. 6d., it is to be feared that no superstructure in regard to an expectation of future fame can be built upon the entry. The corresponding page on next year's diary is more prosaic, for it bears only a series of "Memoranda" which include an injunction to get a wife when income allows, and to have only three children, two boys and one girl. Rather oddly there is a letter extant which announces the birth of his third child, many years later, and bewails the fact that it is another boy, when a girl would have "rounded off the family so nicely." The much-loved daughter did not appear on the scene till many years afterwards.

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From the 1863 diary two short entries may be quoted, for they stand side by side on the same page, and are in many ways very characteristic of the man. The first relates to a day spent in indoor work, though with the careful corollary that this was not due to the weather. Opposite this formal entry is written:—"Mouth filled with cursings and my heart with evil thoughts, all owing to the squalling and girning of an ill-natured, red-headed, unwashed, petted, fractious imp—the son and heir of our landlord, the shepherd." Some of the epithets have been omitted—the provocation was doubtless extreme!

The following day was spent in the open air, and opposite stands this:—"Meet J. Y. on top of Black Law; walk back to Summerhope by way of the old churchyard. Exquisite moonlight night. Scene inexpressibly sad—feel of course very sentimental; and have a whole troop of depressing thoughts and reminiscences,—some of which cause me to heave sighs like the bellows of the Village Blacksmith. The ingenious biographer will never guess what these sighs were for, nor have I any intention of enlightening him."

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Finally, we may note that the holidays of the years 1863 and 1864 were both spent in Scotland, the first on the shores of the Solway and on the coast of Ayrshire; the second on the Moray Firth, then north to Brora and south-west to Fort William and Oban. Both seem to have been largely devoted to geological work, but were on a less ambitious scale than many of those of later years.

The late spring and summer of 1864 saw James Geikie beginning work in Ayrshire, where he was stationed for some years. With the end of 1864 we may say that his introductory period of life on the Survey closed.

CHAPTER III

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"The Great Ice Age": (1) Years of Preparation

1865-1871

The year 1865 saw James Geikie, as already stated, doing Survey work in Ayrshire, and this, with its continuation, the laborious and sometimes tedious mapping of the Lanarkshire coalfield, kept him in the west till 1872. Of these years of patient toil, diversified by independent research upon the drifts, by geological holidays, and by the making of translations of Heine and other German poets, comparatively little has been preserved. His correspondents in these early days were chiefly the members of his own family, and most of his letters have been destroyed, except where the presence of some cherished verses determined their preservation. From the scanty records in the diaries, from the few letters that remain, and from the published account of his surveys, it is, however, possible to indicate broadly the course of his daily life.

In 1865 he was stationed in South Ayrshire, Girvan and Cumnock being two of his centres there. The most notable event of the year, however, was a visit to Norway in July to August. Unfortunately, only the barest notes of this visit remain, and, except for the descriptions of fiord

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scenery in *Prehistoric Europe* and elsewhere, we do not know what impressions were obtained.

It was apparently chiefly a steamboat journey, with short excursions to glaciers and other areas of special interest to the traveller. Boat was taken from Newcastle to Aalesund, then *viâ* Molde and Christiansund (where a brief note records an exquisite sunset about eleven, with sunrise following at one) to Trondhjem. After a day in this town the journey was continued to Rödö and Melövar. From this point a trip was made in a boat with four men for twenty miles up the fiord to visit the Fondalen ice-field. Several days were spent here, and various glaciers were visited and presumably studied. A return was then made to Melövar, and the steamer journey continued to Tromsö. After a day here James Geikie went on to Skjervö, where he arrived at 2 A.M., as is carefully recorded, and put up at a merchant's house, no inn being available. Here he was most hospitably received, and enjoyed his brief glimpse of a Norwegian interior. Next day a boat was taken across the fiord to the Jökul-fjeld, and an apparently profitable excursion, which included icebergs and icefalls among the objects seen, ended at a fisherman's cot at midnight. Next day was spent idling about, because the wind was adverse, which suggests that the boat was a sailing-boat, and the start was not made till evening, so that the whole night was passed on the [Pg 36] water, Skjervö not being reached till six in the following morning. Two days were spent here, and then the steamer taken to Loppen, from which an excursion was made to Bergsfiord, where the glacier was visited. Another excursion was made to Öksfjord, and the steamboat rejoined as far as Hammerfest, the furthest point reached. On the return journey the call at Christiansund permitted of an expedition, taken in company with the geologist Dr Dahll, during which a "fierce controversy" took place. Finally, a Dutch steamer brought the traveller from Bergen to England after what must have been a most instructive tour.

The following year, 1866, found him still in Ayrshire. Little record of it is left, beyond the tale of work, and the publication of his first scientific paper. By this time he had moved to the north of Ayrshire, where he was also in the following year. This year, 1867, witnessed the appearance of his first glacial paper, this being "On the Buried Forests and Peat Mosses of Scotland, and the Changes of Climate which they indicate," a subject which was to engage his attention more or less closely for the remainder of his life. His spare time was still occupied with the translations, many examples of which occur in his letters to his sisters. Occasionally his muse took less serious forms, as may be seen from the lines given on next page, which appear in a letter much of which is taken up with translations from "that lugubrious poet in whose stanzas the word *weinen* is rarely omitted—it may be sweetly rendered by the English whining." The lines mentioned follow [Pg 37] some criticisms of the habits of the inhabitants of an Ayrshire town, where the society, in James Geikie's words, was "eminently peeous and drouthie." The lines are as follows:—

> Takin' toddy a' the week,
> Comes the Sabbath day,
> Then to Kirk three times they gang,
> And sleep the fumes away.

In the same letter he complains that in this particular town the invariable question put to you by strangers whose acquaintance you make is, "What church do you attend?" He adds that he had not acquired the reputation of a regular church-goer, so that one suspects that something less than the three times a day had to suffice in his case. From this period probably dates an anecdote which he used to tell himself of a somewhat unfortunate visit to a place of worship where, tired out by his week's work in the open air, and not perhaps greatly interested in the discourse, he fell asleep so soundly as ultimately to fall out of the pew—at the end of which he was sitting—headlong into the aisle. He had the presence of mind to remain there with his eyes closed, and was carried out by sympathetic acquaintances, who thought he had been suddenly overtaken by serious illness. But when the feet of the young men were already at the door, the apparently unconscious patient opened his eyes and winked at one of his friends to indicate that the fate of Eutychus had not overtaken him on this occasion. The bearer opposite, with an [Pg 38] innocence which did credit to his piety, had not thought of the obvious explanation of the accident, and in his astonishment nearly dropped his burden. History does not, unfortunately, tell whether his loyalty enabled him to keep the matter to himself and so preserve his friend's reputation. For these, it must be remembered, were days when a geologist invariably ran the risk of being suspected of "unsoundness," by the mere fact of his occupation, and was, therefore, one for whom jesting on the threshold of a church was particularly dangerous.

In this year of 1867 Mr (now Dr) John Horne joined the Survey, and very shortly afterwards made James Geikie's acquaintance. There thus began a friendship which lasted to the end. Almost from the first Mr Horne shared Geikie's enthusiasm for glacial work, and so early as 2nd April 1868 a letter from the latter to one of his sisters records the fact that "Young Horne has got me a lot of information, and I shall certainly get a lot more." From this time, indeed, James Geikie constantly asked his colleagues for notes about the glacial phenomena in the areas they were respectively surveying, and for friendship's sake was freely supplied with these. Thus in the course of time he acquired a large amount of detailed information about the different parts of Scotland, with answers to many questions which cropped up in the course of his own investigations. It was not till his early papers, and especially the publication of *The Great Ice Age*, [Pg 39] had attracted the attention of a wider circle of geologists, that this correspondence was enlarged to include most parts of the civilised world. As we shall see later, his early foreign letters gave him great pleasure, even though, until he realised the value of a feeling for languages and a good stock of dictionaries, he had often to ask for help in their translation.

A few lines from a letter to Mr Horne, written from Eaglesham on 8th May 1868, may help to show the kind of work he was doing, and reveal also those characteristics which made his colleagues willing to give him all the help they could:—

DEAR YOUNG MAN,—I hope you are still in the land of the living and the place of hope wherever that may be. These lines I write unto you not that your joy may be full but that you may know that I take (I won't say a fatherly) interest in your welfare, but any other kind of interest you like but self-interest. What are you about, and how do you like the work? Is the Drift blinding your eyes and do you yet see as through a glass darkly? I suppose your Boulder-clay in the high grounds will give you no bother. If you get any gravel will you be so good as let me know whether it occurs in valleys whose watershed is over or under 1000 feet?

Mr Horne was then working in the Nith valley, being stationed at Thornhill. James Geikie by this time had moved from Ayrshire into Renfrewshire and Lanarkshire.

But the great event of 1868, apart from the publication of two more glacial papers, was a trip up the Rhine and on to Switzerland, of which one of the note-books contains a very full and jovial record, which has been supplemented by the recollections of some of the surviving members of [Pg 40] the party, who were all Survey men. The record is too long to quote in full, but certain passages may be given. The opening gives so lively a picture of the party, and of the rollicking spirits with which they started, that it cannot be omitted. In connection with the informality of tone, it must be remembered that the diary was only a private record of a gay holiday. It is interspersed, quite characteristically, by very neat diagrams and sketches, and details of the geological observations, which were no doubt worked up afterwards.

Wednesday, 29th July 1868.

Edinburgh to London—Peach, Skae, Horne, and Archie in company. Arrive infernally hungry and dirty at St Catherine's dock. Have to swear at a cabman, etc. This of course was Thursday, 30th. Friday, 31st—Start in the *Orion* for Antwerp—ship none of the best, but passable. Of course a number of English on board. None of them I know. Have a kind of luncheon and satisfy hunger pangs. Brisk breeze gets up towards the afternoon, and puts to flight notions of dinner in the respective buzzums of Skae, Horne, and Archie. Peach and I wait so long that our hunger vanishes. Ladies laid out in corpse-like fashion all over the deck, and a good deal of basin work performed. Two very pretty English girls on board—as pretty I think as I ever saw before. Both hold up for a while, but after a time they give in and close up their eyes like daisies. Skae off to bed—Horne having meanwhile mysteriously disappeared. Archie follows suit. I smoke, and Peach in despair hovers about the door of the feeding saloon in hopes of being able to see something like preparations for tea. Tea at last! Only 5 out of nearly 150 passengers sit down—one of them a lady. Peach and I make a furious onslaught to make up for loss of dinner. Horne, to our surprise, enters, tastes a cup of tea and beats a hasty retreat. The place is close and [Pg 41] stifling, and the sounds issuing from the surrounding berths make appeals which cannot be resisted. Peach and I make for the deck, where the fresh air revives us, and I finish off my meal with a pipe.

There follow, by one of the sudden transitions in which the diary abounds, notes on the colour of the water, and on the jellyfish seen.

A night's sleep seems to have restored the party, for they landed at Antwerp the following morning apparently all in good spirits, and after a stroll round the town took train for Cologne, passing Liège, "which lies beautifully in a lovely wooded valley," *en route*. After a short visit to Cologne—"here I was pleased to find Heine's good Christopher in the Dom"—the party went on by boat to Königswinter. "Sail up the Rhine not very interesting, but the evening is exquisite and the flat country looks well." At Königswinter they spent some days—very hot ones—climbing the Siebengebirge and geologising, with lighter intervals. One of the interludes may be mentioned:—"Peach swam across the Rhine in twelve minutes (before breakfast)."

After a day or two at Königswinter the party went down the Rhine to Bonn, to see Prof. Zirkel there and to visit the museum. Bonn is somewhat briefly dismissed:—"This is a lost day. I hate Bonn ... hooked it back to Königswinter—and loafed about." At Bonn the party met Sir Roderick Murchison, then Director-General of the Geological Survey, profanely called "the Duke" in the diary, for his mannerisms made a strong appeal to the sense of humour of the more lively [Pg 42] members of the party. The veteran geologist—or at least so the juniors asserted—graduated his greetings in careful accordance with the official position of each. But the old chief's genuine interest in geology was shown by his eager questions about the recent results of the Survey work in the Southern Uplands.

Finally Königswinter was left, "with regret," for the Laacher See, a detailed visit to the Eifel country being one of the great objects of the tour. James Geikie's early work in the Ochils had aroused his interest in volcanic phenomena, and his geological notes in regard to the next section of the tour are singularly full.

The party took steamer to Brohl, and then drove to the lake, being, as is carefully recorded, cheated both by the boatman who took them off the steamer and by the driver. Perhaps the fact accounts for the next entry:—"I have seen prettier places than the Laacher See." The party had an introduction, obtained presumably through Prof. Zirkel, to one of the fathers at Laach Abbey, and he and a companion accompanied them on a tour round the lake, in order to point out the objects of geological interest. A trip to the Bausenberg was also made. Next day the members of the party walked to Niedermendig to see the famous quarries there. Here they tasted the beer stored in the caverns, and characteristically—for James Geikie did not have to wait for Mr Chesterton to sing the merits of beer—the diary devotes nearly equal space to the geology and the beverage. "It was deliciously cold and I like the flavour. I had heard much of the coldness of [Pg 43] this beer, viz., that no one could drink more than a small glassful at a time. But I found no difficulty in taking down a good pint, and if I had not had the mine to get out of, I could easily have stowed away double the quantum."

Some other interesting excursions were made in the neighbourhood of the Laacher See, in company with the friendly monks, and then finally the party set off in a farm wagon for a thirty-mile drive to Daun, in the heart of the Eifel country, over very rough roads. The vehicle was cheap, but this seems to have been its only merit, and the driver, a prosperous peasant with money in the bank, as he explained to them, had the disadvantage of not knowing the way. The journey took over twelve hours, and when the tired party reached the village it was to find that it was market-day there, and rooms were difficult to obtain, so that the weary scientists had to seek lodgings where they could, some in an inn, where they were “nearly eaten up with fleas,” and others in a private house. After a day here, another long drive was taken to Bertrich, where the better hotels, an indirect result of the local medicinal springs, revived the drooping spirits of the diarist. Unfortunately the bill next morning proved that the presence of the visitors had another effect also, and the tone of the diary again becomes subdued, till, after a long drive, the Moselle was reached, and its scenery had a restorative effect.

At Cochem the geologists engaged a boat and two men to row them forty miles down the [Pg 44] Moselle to Coblentz. The first twenty miles, it is carefully explained, were delightful; but darkness came on long before the destination was reached, and it was midnight before an unwilling dockkeeper allowed the boat to enter Coblentz. But in spite of the fatigue and tedium of the long journey, the diarist expresses himself as highly delighted with the trip.

Coblentz did not make a favourable impression on the travellers, and the diary contains some caustic remarks on the Prussian soldiers, with whom the town was full, and on the Prussian officers whose manners at table in the hotel were a trial to persons accustomed to place reliance upon a fork rather than a knife as an implement for conveying food into the mouth. The subject is one which recurs more than once, for James Geikie, who was singularly susceptible to feminine charm, seemed to resent strongly the general lack of it among the German ladies met with, and could not reconcile himself to the sight of a Fräulein disposing of peas by a method whose only advantage was its rapidity. If the sound reflection that a lady who habitually uses a broad-bladed knife for this purpose is rarely so clumsy as to slit her mouth completely from ear to ear in the process occurred to him, it evidently afforded no consolation, and he found it difficult to sit out a meal in a German hotel if peas entered into the menu. He himself attempted no missionary work, however, though he records meeting two “Yankees,” one of whom “had induced one or two German ladies to use their forks instead of their knives for pitching in the victuals. They were [Pg 45] surprised, they told him, that the fork could do the work so nicely!”

At Coblentz two of the party, Messrs Horne and Skae, turned back, while the rest went on to Goarshausen, where they passed a delightful couple of days. “It is one of the prettiest spots in all the Rhine country.” The next stop was at Heidelberg, where the customary sights were visited, and the scarred countenances of the students commented on with true British disgust; the journey was then continued *viâ* Basle, Berne, Thun, and Interlaken to Grindelwald. Here the famous guide Peter Michel was engaged, and the party spent “a most interesting day” on the glaciers. “The ice phenomena were well seen, but best on the lower glacier.” So successful was the excursion that it was resolved, though all were inexperienced, to make the crossing of the Strahlegg to the Grimsel. Bad weather made it necessary to stop two nights at the Bäregg hut, and of these and the day’s imprisonment an amusing description is given. On the second day the weather cleared and the chalet was left at five, and, after a tiring day, the party reached the Grimsel at six in the evening, some of the members being much fatigued. Some interesting observations were made *en route*. From the Grimsel the party made their way down the Rhone valley to Lake Geneva, and at this point the diary ends abruptly. The excursion, it is clear, was one of great interest, and coupled with the previous visit to Norway, must have played an [Pg 46] important part in helping James Geikie to visualise the Europe of the Ice Age.

The next three years, 1869, 1870, and 1871, were spent for the most part in hard and continuous work on the coalfields, though in all three years the published papers, no less than the letters, show that all the energy which could be spared from the daily routine was being given to glacial work.

In the spring of 1869 James Geikie started work at Carluke, and an entertaining letter to his mother has been preserved, dated from here on 4th April. It is long and largely about family affairs, but a few quotations may be made, for the tone throws light upon the character both of mother and son. The letter begins abruptly as follows:—

> This being a day of rest not only for the beasts that do the work of men, but also for the men that do the work of beasts, it behoveth me thy son to throw aside the cares of the world and the many humbugs that do so easily beset me, and to refresh my soul and peradventure thine also by inditing these few words, to the intent that thou, O my maternal parent! may know of a surety that I thy son am well, and that thy two daughters who sojourn with me here in the wilderness are even as I am....
>
> Write unto me, O my maternal parent! and tell me how it fareth with thy trees which yield fruit of their kind, and with the flowers which thou dost tend in the house that is heated with pipes and hot water in the pipes. And say unto my paternal parent that he hath forgotten me—that I am even as one of the dead—that I long to see the writing of his hand.
>
> Here many friends visit me not—but I am not grieved—and my waistcoats grow tight about me....
>
> Thy daughters salute thee and the paternal—so I salute ye all in like manner. My blessing abide with ye—and in the bonds of love I subscribe myself.—Yours affectionately.

Other family letters in the same year are written from Hamilton, one, dated 19th July, [Pg 47] containing the information in regard to his translations that “I have so many now that I think if I go on for a month or so longer I shall have enough to make a small volume.”

The allusion to fruit-trees, in the letter quoted above, it is interesting to note, was especially to a pear-tree which grew in the garden of the house in Duncan Street where the family lived at this time. The house is one of two which a few years ago were converted by the Edinburgh School Board into a special school, and in the course of the alterations the jargonelle pear-tree, which figures in many of the family letters, was cut down. It seems to have been a prolific bearer in its prime, and in one of his letters James Geikie alludes to receiving a basket of the fruit, and at the same time to the prolonged silence of the members of the family, which he explains as the result of the "pear-disease," *i.e.*, the absorption of his sisters in the task of consuming the fruit. He himself sends some rhymes in return for his share.

The year 1870 finds him still busy on the coalfield, his diary for that year being full of notes of appointments with people connected with the pits, while he seems to have been constantly moving from place to place in Lanarkshire.

Two letters from Prof. Ramsay in July of this year have an historical interest. The first suggests a joint tour on the Rhine to solve a geological problem, and is followed almost at once by another, [Pg 48] saying, "Now I fear my Rhine journey is blown to the winds.... This most wicked and accursed war will upset half the Continent of Europe, and it is by no means impossible that we may be dragged into it"—upon which one feels disposed to make the comment that if we had been it is possible that infinite suffering might have been saved forty-four years later! A letter from James Geikie to Mr Horne, written later in the same year, says:—"My holidays, I think I told you, were all botched. I could not get abroad, and I had nowhere particular to go at home."

At this time he was stationed at Salsburgh by Holytown, where he made several friends, notably Dr Grossart, with whom afterwards he kept up a correspondence for many years.

In the letter to Mr Horne quoted above he says:—"I have been doing a little at those German translations, and have now finished the volume, and am on the outlook for a publisher who won't cheat me. I wish to have the thing published this winter"—a wish which was not, however, fulfilled for many winters. In the same letter he adds:—"I am still among coal ... but Xmas is coming, and then one will have an opportunity of washing the dirt away. I like this place very well. The house is clean, and the district is moory—just on the outskirts of the great coalfield. I mean to work out as much as I can from here so as to shorten my stay in Glasgow, of which (I) got tired. After all there is nothing like the free fresh air of the country." [Pg 49]

The next year, 1871, saw the finishing up of the coalfield work, and simultaneously the beginnings of a gathering together of the accumulated mass of glacial material which was a year or two later to take shape in *The Great Ice Age*. Letters in the early part of the summer to Mr Horne contain detailed plans for a tour in the Hebrides "for the purpose of ascertaining the direction of ice-striæ, and quizzing the drifts." It proved impossible for his friend to join him, and the tour was made in company with Mr William Galloway, one of many friends made in the west.

Mr Galloway has kindly supplied a few notes on the tour. The two sailed from Glasgow to Stornoway by the Crinan Canal, and walked to the north point of the island, carrying their belongings with them. Both had a special purpose in view, James Geikie being engaged, of course, in studying glacial action, while his friend had been commissioned to investigate the possibility of establishing a meteorological station at the lighthouse on the Butt of Lewis. On their way back to Barvas they came across an old highland woman who made cups and saucers of unbaked clay. James Geikie was much interested in her work, and ordered a set. It was despatched to Lady (then Mrs) Ramsay, the wife of Prof. Ramsay, then Senior Director of the Geological Survey (*cf.* Part II.), as a sample of prehistoric ware from the Outer Hebrides. The joke was explained later, but not before, or so it is asserted, some high archæological authorities in [Pg 50] London had been taken in by the "primitive" appearance of the work.

The travellers, presumably on the homeward journey, began a joint composition in heroic verse describing their adventures; but this masterpiece seems never to have been committed to paper, and perhaps never progressed very far.

The tour was apparently short, for James Geikie writes from Bathgate, under date 28th November:—"This last year has been a year of close work and some anxiety, and not having had any holiday to speak of I feel jaded and down in the mouth."

In all his letters of this year he speaks of his laborious work among the collieries, and his note-books are filled with the usual details of appointments made and notes of information received from different quarters. The following spring saw him in more congenial surroundings in the Border counties, and this chapter may fitly end with the completion of his coalfield work. It may be added, however, that letters from Ramsay, received at the close of the year, and dealing with the problems raised by James Geikie's paper on "Changes of Climate during the Glacial Epoch," a paper of which Ramsay thought highly, show clearly what the years of preparation had done for him, despite their almost ceaseless toil.

It must not be supposed, however, that life was made up of nothing but toil, alleviated by occasional holidays. For many years a considerable amount of the Survey work was done in [Pg 51] London, and parts of many winters were spent there. In addition to the Survey men, James Geikie had a considerable number of friends and acquaintances in London, his father's musical connections opening various musical and artistic circles to him. Both in scientific and artistic circles his social gifts were much appreciated, and he himself must have found the winter glimpses into a wider social life than he could find either in the country districts or in the smaller towns of Scotland a most welcome change.

CHAPTER IV

[Pg 52]

"The Great Ice Age": (2) Publication

1872–1874

In the year 1872 James Geikie was somewhat late in beginning field-work, but the end of April saw him established at Kelso. An interesting letter to his friend Dr Grossart at Holytown, dated 4th May, may be quoted as showing his feelings in regard to his new sphere:—

I found I could not make out a flying visit to Salsburgh before leaving the west country for good. But I hope to see you some time before the year is very old. I have been knocking about a good deal since I saw you, but, praise be thankit! I have at last got back into the country. And what a lovely country it is! Coming so soon after Airdrie and Coatbridge it looks quite like another world. I can hardly believe that I am in the same planet where coal and iron are being worked. Here is nothing but the sandstones below the limestones and the Old Red with its trap rocks. The people too are as sleepy and old-fashioned and "respectable" as the rocks they live upon or rather *above*. This is the kind of land that would be after your own heart. Here are old abbeys and tumble-down castles, and every field and stream has some old-world story connected with it. At first I hardly could thole the quiet of Kelso. I have lived so much of late amongst smoke and din that for a week or so I felt like a fish out of water. The big market-place here, with nobody in it, was depressing to look at. I didn't like the [Pg 53] way either that the shopkeepers rushed upon me when I ventured into their shops—it looked for all the world as if they never had had any customer but me since the New Year. And yet they tell me that Kelso is a thriving country town. It may be so—very likely it is so—but it seems to one newly come from the stirring "west" like a dead-alive place.

What are you about? How does the great "work"[1] progress? I have been compelled to drop scribbling for a little, having rather overdone it this winter in Bathgate and Edinburgh. But the smell of the spring woods and hedges has set me up again, and I meditate an early assault on pen and ink.

[1] A book on *The History of the Shotts* upon which Dr Grossart was engaged. It appeared in 1880.

A letter to Mr Horne, from Kelso, in the same month of May, strikes a somewhat similar note:—

Here I am, in the midst of green trees, purling brooks, whistling mavises and love-sick young ladies. I feel quite a new man now that I am released from the presence of coal smoke and pits; up to any amount of fun as of yore.

In the same letter he speaks of the reception met with by his glacial papers:—

I have had some very gratifying letters from Sweden and Switzerland from geologists there—saying how much they are pleased with my results, and giving me more notes which help out my conclusions. It seems they have interglacial periods in Sweden also. Of all places in the world I had also a letter from a Prof. Szabó of Pest in Hungary. So that you see a prophet is not without honour save in his own country.

Another letter, also written from Kelso, on 15th June, says:—

Man—I feel awfully tempted to go to Sweden, where I have the promise of meeting with a warm welcome from some of the geologists. But I can't go, and have reluctantly had to delay a visit till next year. I continue [Pg 54] now and again to get a gratifying letter about my papers which cheers me up amazingly. Woodward the editor[2] writes to-night congratulating me on the wind-up, and saying that everyone speaks highly of my lucubrations. After trying my hands at many things I think I have at last got into the right groove. The noble hammer-bearing fraternity have not heard the last of my "theories." ... What a fertile source of amusement this blessed Glacial Epoch has been!

[2] Of the *Geological Magazine*, in which the glacial papers had appeared.

The summer holiday this year was spent in Lewis, but the chief record which remains is that contained in papers contributed to the *Quarterly Journal of the Geological Society* and the *Geological Magazine*. In September he writes from Norham an affectionate letter to Dr Grossart, expressing longing for a "haver," and giving news of his glacial work. The letter goes on:—

How does the *magnum opus* progress? I am still working away at mine—nearly finished—both me and my book. I got some very startling facts this summer in the island of Lewis which I shall send to the London Geolog. Society—the facts, not the island.

A month later he writes from Duns to Mr Horne in regard to some specimens which he wants for a course of lectures to be given to working-men at the Museum of Science and Art during the winter. In this letter he speaks of being attacked by a form of nervous prostration which renders him incapable of continued work, so that the *magnum opus* is at a standstill. The task was evidently proving more severe than he anticipated, and the illness was prolonged, for in a letter [Pg 55] to Dr Grossart, written from Edinburgh on 4th January 1873, he says:—

This winter things have gone back with me. I was laid up most of November and December, but am now all right again. But this enforced idleness has kept back my book, which the longer I stick at it seems to grow and grow till I begin to get frightened at its dimensions. This summer, however, I hope to send it to the printer.

In the same letter he speaks of his lectures at the Museum of Science and Art, and also of another on the "Antiquity of Man in Britain," which he was to give at Birkenhead at the beginning of February. The lecture, which was duly delivered and also published, dealt with a subject to which he had been led by his glacial work. It was one in which his interest increased as time

went on, and in later years “Man during the Ice Age” occupied a good deal of his leisure, up to the very end.

At Duns James Geikie made a number of friends, and indeed throughout his work in the Border counties he seems to have met with much hospitality, and this even before his sojourn in Jedburgh led to his acquaintanceship with the family in which he found his wife, and to the region becoming a second homeland for him. During his stay at Duns the book was progressing steadily, despite his hard work in the field. In June he was writing to Mr Horne and Prof. Ramsay for information in regard to certain special points, and the latter was very anxious for James Geikie to accompany him on a geologising holiday to the Rhine, to investigate some disputed questions. [Pg 56] This proposal was not accepted, however, apparently because James Geikie was dissatisfied with the only information he could obtain about glacial deposits on the south side of the Alps, and made up his mind to seek satisfaction by a personal tour to the district. This trip is mentioned in a letter written to Dr Grossart from Kelso on 20th July, in which he says:—

> My summer has been spent in a ram-sham desultory sort of way. I have hammered out the geological structure of the Cheviots, which is something interesting and new, and I have also got some interesting glacial results. I have had a hard time of it with the lawyers though, having been summoned twice to London to give evidence before Committees of Parliament about that confounded Edinburgh water of which every honest man in Edinburgh is heartily sick. I know I am. But that is over now. In a fortnight I start for Italy, and am going to make a long tour of it: Paris, Geneva, Martigny, Aosta, Turin, Bologna, Verona, Venice, Trieste, and Vienna, then back through the Tyrol and down the Rhine to Rotterdam, Amsterdam, etc., and home. I shall be a fortnight or three weeks scouring along the foot of the Piedmontese Alps looking at the glacial things.
>
> My book is finished and off to the printers at last. But I fear that it will be delayed by the engraver, who does not get on with the illustrations as fast as I could wish. Anyhow I hope I shall be able to send you a copy this winter.

No detailed account of the Italian trip has been preserved, but various letters make allusions to it. Thus writing to Mr Horne from Jedburgh on 17th September, he speaks of his visit to Lake Como, ending up:—“Alas! all the sunshine is over, and here I am in dull Scotch autumn, thinking sadly that the world and one’s destinies are not more amenable to one’s wishes. But Scotland is [Pg 57] not so bad after all.” His next visit to the lake was made in company with his wife and her sister, and during the trip he told how on his first visit he had lost himself in the Alps at dark, and after some difficulty and various adventures reached a little hamlet. Here there was no inn, but the priest of the village kindly put him up for the night, the two conversing in Latin in default of any other means of communication.

He speaks also of his Italian tour in a letter to Dr Grossart, dated from Jedburgh on 11th October, in which he says:—

> Did I write you giving an account of my Italian trip? I know that I meant to do so. I enjoyed myself amazingly, and picked up a lot of wrinkles which will stand me in good stead. Ods man! but it was hot spielin’ the hills with the thermometer 94° in the shade. God knows but I thought it not far short of 500° in the sun.... I’m going to take it easy this winter—if I can. I have now got my *magnum opus* off my hands, and hope to send you a copy next month. It makes some 500 pages of demy 8vo!—a wiselike size!... The illustrations will please you, I hope. They have been beautifully engraved.... The country here is looking beautiful—woods having all their autumn colours on. I don’t wonder that emigrants who were born on the Jed, the Teviot, and the Tweed should aye have such intense longings to get back again to their native howffs. It makes one young as a boy to wander up the sweet glens and ravines in this lovely district. If I were in love I’m afraid I should use up whole reams of paper in the composing of passionate songs and sonnets. But not being so I can only croon as I trot along the half-forgotten words of some old Border ditty.

Some other passages in this and other letters suggest that with the finishing of the great book, and the lifting of the strain, the young man felt *désœuvré*, was beginning to think that youth was [Pg 58] slipping away and he was perhaps not getting the best out of life, and was liable to alternate fits of depression and of a cynicism which was probably largely a pose intended to hide his true feelings. In brief, he was becoming aware that it is not good for man to dwell alone, and the Glacial Epoch, whatever its charms, proved a chilly substitute for the kind of companionship which his affectionate spirit craved. A few extracts from a letter, undated, but written from Jedburgh, apparently about the same time as the foregoing, may help to make the position clear. The letter may be entitled—anything more specific being avoided—“To a Young Man contemplating Matrimony,” and the quotations must necessarily be disjointed:—

> You know your own affairs best. But if I were in your place, and the girl were a really good girl and suitable, hang it I would propose and get her.... Something like fate whispers in my ear, “Jim, my boy, you’ll never have a wife, altho’ you should live to the age of Methusaleh.” ... With the uncertainty of temper and feeling that I have, I seriously doubt whether I would be other than miserable if I were to marry. So lest you should get into the same state, O young man! either flee temptation or be bold and seize the tempter. What more can I say. Perhaps you were only laughing when you wrote me, and are now laughing at me and my soft-heartedness. All right, laugh away. I have had my day, and some time you shall have had yours also.

Perhaps it may be added that when this letter was written its author was thirty-four. His marriage took place some eighteen months later, after an engagement which had lasted more than six months. He was destined to experience nearly forty years of happy married life, to see [Pg 59] his children grow up, to welcome the advent of his grandchildren—either it was not fate who did the whispering, or she displayed a more than feminine contrariness.

Other letters during the autumn months give merely notes on the progress of the book, which was unexpectedly delayed, and information as to his prospective plans for the winter in Edinburgh. One to Dr Grossart, dated from Jedburgh on 22nd November, may be quoted as summing up what is said in various other letters which have been preserved:—

With this I send you a short lucubration of mine on the Island of Lewis, the chief point in which is the proof given that the Outer Hebrides were overflowed by land ice from the mainland!

I am happy to say that I am nearly out of the hands of the printer. My book has swelled out beyond what I intended, making close on 600 pages. The illustrations, which have kept back the printing, are now finished, and I expect to have a bound copy in my hands in ten days or so. It won't be published, however, much before Xmas, as we have made arrangements with an American firm to publish it at the same time in Yankee land. This is a great stroke of good luck, as it will lessen the cost of production and make the book payable. Some of the maps I believe you will find very interesting. In fact, I have so written the book that whether geologists accept all my general conclusions or not, they will at least know a good deal that they did not know before, after they have perused it.... I am booked for a series of lectures this winter at the Museum of Science and Art, my subject being the Carboniferous Epoch. I am going to treat it in a pictorial way, trying to reproduce for them the kind of scenery and climate then enjoyed in Britain. I have also a lot more literary work in hand—*A Manual on Coal-Mining*—in which I do the geology and an engineering celebrity does the practical part. This and other matters keep my hands full. Nevertheless I have still an occasional dig at my German Songs. (Strange mixture! you will say. But then man is a queer mixture altogether.) Some time or other the Songs will [Pg 60] see the light—but as I look on that matter as pleasure, and the scientific work as business, the Songs must stand aside till their betters are served. Write and give me your news. You see, like an old bachelor I have nothing to write about but myself. So you must under the circumstances excuse the egotism.

The book appeared early in the New Year, and the fact that the author was then in Edinburgh and must have presented copies to his nearest friends in person, no doubt accounts for the absence of many letters acknowledging receipt among his papers. Two notes from Prof. Ramsay, to whom, as his "dear friend and teacher," the book was dedicated, may, however, be quoted. Both are dated from Jermyn Street, and are written on successive days, 20th and 21st January 1874. The letters are as follows:—

My Dear Geikie,—I have got your beautiful vol. quite late in the day and am now engaged in physically cutting it up. Your dedication makes me so proud that since reading it I have held my head quite like the Duke of Argyll, and I only hope it will not fall off behind. I must close, and will take the book home with me to read the dedication aloud in an impressive way after dinner.—Ever sincerely,

Andrw. Ramsay.

My Dear Geikie,—I will read all your book, mair by token that I read 4 chapters of it last night after dinner and liked them all. The plan is good and it is admirably written, as indeed it was sure to be.... As for your converting every reader to all your views, that is not likely as long as the Duke of Argyll remains alive. When a man does anything really in advance he may be well pleased if in 10 or 14 years he gets a fair proportion of the best men on his side. So no more this bout. From yours consumedly,

Andrw. Ramsay.

In May of the same year Ramsay writes again, saying:—"I am delighted to hear of the success [Pg 61] of your book, which indeed I never doubted, for I always considered it a first-rate production, though I have only read it by snatches."

But though James Geikie had lingered long in the company of the Ice Maiden, he had not given her that embrace which is fatal to the earth-born, and the summer of this year brought him other thoughts than those of glaciers and moraines, brought him to a new phase in his life which demands another chapter.

CHAPTER V

[Pg 62]

Marriage and Life at Perth

1875–1877

In the spring of 1874 James Geikie returned from Edinburgh to the Cheviot region. Before starting his field-work he made a brief visit to the Continent, in regard to which his diary only contains records of dates and places. The motive of the visit is of interest as throwing light on his strong family feeling. At his instigation his youngest sister had gone to Germany to improve herself in the language. On arriving in the place arranged, however, she found herself very uncomfortable and unhappy, and informed her brother of the fact. With characteristic energy he set off at once, met his sister, arranged for her transference to more congenial surroundings, and in a little more than a week was back to work again.

Shortly afterwards he went off to Jedburgh to take up again his survey in the Cheviots. Here he made many friends, and during his stay in the region acquired an intense love for the scenery of the hills, whose long gentle slopes and soft melancholy always appealed to him more than the stern grandeur of the Highlands. This feeling was perhaps not wholly æsthetic, however, for the [Pg 63] district soon acquired associations for him which are briefly hinted at in the diary for the year. This—of somewhat unusual form—is adorned, oddly enough, with a portrait of John Stuart Mill as frontispiece. The philosopher's serious, intellectual countenance has, it is to be feared in derision, been decorated by the owner of the diary with a long pipe. It would indeed be difficult to imagine two men of more different type; for James Geikie, the utilitarian's long years of waiting and longing would have been as intolerable as the brief fever of the last days.

The entries in the diary are as usual short in the extreme, but under 12th August, which it is carefully noted was a wet day, the diarist was at a picnic in the Cheviots. He adds the word "lost"? to the laconic entry. Later entries record calls made to Crailing Hall with brief comments. About this time James Geikie was writing to his friend Mr Horne, saying:—"John Horne—come to

the Cheviots.... I'll do what I can in the way of introductions." Much of the letter is occupied with geological matters, and the writer goes on to express a hope that he won't be asked to give a course of lectures to working-men during the coming winter:—"I want all my time for literary work this winter, seeing that I have agreed to write two books—one for a London house, the other for an Edinburgh one. Besides, I have at last made up my mind to go and get married, and as soon as I come across a likely girl, will lose no time in taking the grand header. I hope never to [Pg 64] see another autumn as a bachelor. So what with hunting libraries for notes, and hunting up families for a nice wife, I have my winter's work laid out before me."

It will appear from this letter that James Geikie did not keep his heart on his sleeve. The letter is not perhaps wholly candid, but candour was doubtless not to be expected at such a time.

A few details may be added to make the story clear. None of the towns or hamlets at the foot of the Cheviots was near enough to form a good centre of work, and the region being given up to large sheep farms, habitations of any kind among the hills are few and scattered. Among James Geikie's acquaintances in the Jedburgh district was Mr Simson, Oxnam Row, to whose farm on the lower slopes were added the hill grazings higher up the Kale Water. Here, right among the hills, was the old farmhouse of Buchtrig, in the occupation of a shepherd and his wife, but with some rooms so furnished as to permit of the family making occasional visits to the region. Through Mr Simson James Geikie was able to arrange for accommodation here in the early spring of 1874 to facilitate his work. A few notes of his visit are left in his own handwriting, in what he styles a "Copy of a Fragment of some very ancient Manuscript." This opens as follows:—

It happened once upon a time that a certain youth, who dreamed strange dreams and wandered about the hill-tops and sojourned in lonely places, came unto a lonely dwelling among the mountains and there abode for many days. And an old woman ministered unto his wants with fear and trembling, for she looked upon him as [Pg 65] one that was beside himself. "Verily," said she unto herself, "he looketh for some hidden treasure, and is a magician who smiteth the rocks with a hammer and writeth strange incantations and evil words in a book." And she looked, and behold he brought with him from the mountains pieces of stone which he treasured and laid in safe places.... Now after many days the old woman, who was called Katie, put away her fear, for the young man seemed not to hold communication with the Evil One, neither was the smell of brimstone perceived in the place. And so she showed him much kindness, and baked cakes of flour upon the girdle and brought these to him, and eggs, yea, and much fine butter.

In the early summer of the same year James Geikie went for his holiday to Skye and Lewis. Not long after his return he was invited to the picnic already mentioned, which, owing to the weather, was adjourned to Buchtrig farmhouse. The picnic was given by Mr Simson, and included his sister, Mrs Johnston, Crailing Hall, and her three daughters, with two of whom James Geikie was already acquainted. The MS. may be allowed to take up the story at this point:—

And so the days passed away, and the young man went into a far country, yea unto the furthermost isles of the sea. But in the fullness of time he returned, and found the place which had been a desert now filled with the hum of voices and laughter of damsels. And he looked, and behold there were chariots and a wagon filled with good things. And he entered into the house where he had sojourned aforetime, and lo! a fair damsel met him and bade him welcome. And she said unto him, "Enter now, and embrace my sisters and my mother, yea and my mother's brother's wife and her daughter." And it was so. And when the young man entered into an upper room, behold a maiden stood near the window.... And his eyes followed her whithersoever she went—and he spoke unto her presently as one speaketh unto an old friend. And the sound of her voice was like the music [Pg 66] of the birds in spring, and the heart of the young man began to sing a new song. Listen and ye shall hear what the young man sang: Here ends the Manuscript.

This happened in August, and before Christmas James Geikie was engaged to Mary, youngest daughter of Mr Johnston, Crailing Hall, to whom he was married on 8th July 1875.

But in addition to what we may call the major associations with the Cheviot region due to these incidents, he had many minor ones of a pleasurable nature. He came into contact with all sorts of people in the course of his wanderings, and in that sparsely peopled district it was easy to make acquaintances. Among his temporary dwelling-places in the hills was the little inn, called Carter Bar, which then stood on the slopes of Carter Fell, and was but little more than a rest-house for drovers going over the border into England with their sheep. On one stormy day in spring James Geikie was returning to this poor shelter over the moor, when he encountered an old lady, somewhat oddly dressed, drenched with rain, and struggling against the wind. He went to her assistance, and she was glad to accept the offer of his arm to help her back to the inn. Here she borrowed dry garments from the hostess, and sat and talked over the fire with her new-found friend, who found her full of Border lore, while he no doubt contributed his full share to the conversation. Eventually, her own garments being dry, and she herself refreshed, the old lady drove off in a waiting carriage, urging James Geikie to come to see her. She proved to be Lady [Pg 67] John Scott, a well-known Border personage, famous for her antiquarian tastes, her Scotch songs, and her great individuality of character.

Another similar meeting which led to a long friendship, though it took place several years later, may fitly find a place here. This was with Sir George Douglas, of Springwood Park, Kelso, the author of *The New Border Tales*, *Poems*, and a number of other works, many referring to the Border region. Sir George has kindly supplied the following notes upon the subject:—

I owed my acquaintance with the late Prof. Geikie to a chance meeting. Starting on a solitary walking-tour, in the summer vacation of the year 1878, I called at the Collingwood Arms, Cornhill, for tea, and found him there. He was not yet professor at that date, but was a member of H.M. Geological Survey, the work of which had brought him to Cornhill, where he was waiting for a train to Tweedmouth. He was then in the early prime of manhood, and his work being of a more active nature and taking him more into the open air, the cheery vigour which at all times characterised him was more pleasantly noticeable than ever. I remember that his beard,

which he afterwards wore close-cropped, at that time descended over his chest and was of a golden colour. I believe that we began by talking of inns, for I remember that he poked some good-natured fun at the commercial travellers of those days ("bagmen," as he perversely preferred to call them), and told me two or three amusing stories of experiences with them. But, ere long, we were talking of literature, and especially of poetry—the poetry of the day. Here was a delight for me! I was at the poetry-reading age, and had just left Cambridge, where I had primed myself with Swinburne, William Morris, the Rossettis—that is, with such of their works as had at that date appeared; and not only with these, but with such poems as the "Angel in the House," "White Rose and Red," "The Human Tragedy": the works of lesser masters, then on their probation, [Pg 68] and now, it may be, seldom heard of. Well, here in a wayside inn at the extremity of Northumberland, I had chanced upon an unknown traveller who had all these authors and books, so to speak, at his fingers' ends. One would have liked, at that age, to pose him, to make some pedantical allusion, as to a matter of common knowledge, to something of which he had not happened to hear. But it was vain to hope to go beyond him. And, if we were fairly evenly matched in our discussion, it must be borne in mind that I was, as it were, staking my all in it, whilst he was merely gambling with his small change. For of course he never professed literature, but merely turned to it for a change of idea in hours that were not occupied by science. What was really remarkable in this conversation, I should say, was the readiness and whole-heartedness with which he threw himself into it, the stimulus given by his never-failing interest and occasional enthusiasm, the fine good-nature with which he unquestioningly put himself on equal terms with one who was many years younger than himself, and whose opinions, however confidently expressed, must often have been crude and immature. Neither then, nor at any subsequent time, was there anything whatever that was pedantic or academic about Geikie. When I met him next, I was approaching the middle term of life, but the recollection of that single conversation suffices to make quite clear to me the power which he wielded over his students and the popularity which he enjoyed among them. I doubt if the very best that was in him really made itself felt upon the lecture-platform. It was in the give-and-take of life—in his Saturday geological tramps and other more informal relations with his students, if I may hazard a guess—that the man really stood revealed. He could impart life and glow to his subject, as perhaps few can. But he did so best, if I may pretend to judge, when he was talking rather than lecturing.

I had evidence of this later. On parting after our two or three hours' talk at Cornhill, we had exchanged cards, and when I heard that, in order to be near Mrs Geikie's relations, he was renting Kalemouth on Teviot, four or five miles from my house, during one summer vacation, I hastened to renew acquaintance with him. Since our former meeting ten or twelve years had passed, and though it had remained delightfully memorable to me, I did not presume to suppose that he would remember it, nor was any allusion made to it. Being such [Pg 69] near neighbours throughout that summer we met often, and it was then that I really got to know the character and qualities which had been merely suggested at Cornhill. From the geological point of view, Prof. Geikie knew the Borderland as no one else knew it; but he had also a remarkable knowledge, not only of its scenery, history, and tradition, but also of its people, collectively and individually; and this gave us a strong interest in common.

Some other moorland experiences were of a more humorous nature. Thus one Sunday night he was walking back from Crailing Hall to his lodgings at Morebattle, and came in the dusk past the hamlet of Cessford. He was carrying a small handbag, and as he passed the cottages a woman ran out and called out in a loud whisper:—"Man, man, can ye gie me half a pound o' tea?" She had mistaken him for a pedlar, perhaps not unwilling to earn an ungodly penny. The situation appealed strongly to his sense of humour, and he rated the woman severely for tempting an honest man on the "Sawbath" day, and told her to go home and make porridge. For him the jest was doubtless seasoned by the fact that rigid "Sabbath-keeping" did not appeal to his tastes, and that he was an inveterate tea-drinker—making up for enforced abstinence while out on the hills by copious draughts at night. Thus to bring down, as it were, two birds with one stone—the rigid Sabbatarians, and those who trace the degeneracy of the Scottish people to the substitution of tea for the ancestral porridge—must have been a real joy to him. The occasion perhaps permits of the comment that though a Scotsman, he was a Scotsman with a difference, and had wandered [Pg 70] too far, alike in mind and in body, to have any intense attachment to the pattern of the parish pump.

The spring of 1875, which saw him still working in the Cheviots, brought him his first great honour—the fellowship of the Royal Society of London. A note, undated, written from Morebattle to his future wife, immediately after he had received the news, is full of justifiable pride and joy:—"I suppose I am the youngest F.R.S. on the roll ... you will believe me, I know, when I say that I am pleased as much for your sake as my own, that my work is recognised. It is no small honour to be elected F.R.S. out of 57 candidates for the 15 vacancies." The note encloses two letters, one from his old friend and honoured chief, Prof. Ramsay, saying:—"You came in triumphantly yesterday for the Royal Society, having the largest number of votes of any candidate," and another from Mr H. W. Bristow, the Director of the Geological Survey of England and Wales, which shows clearly with what friendly feeling James Geikie was regarded by his English colleagues:—

28 Jermyn St., S.W.,
17th April 1875.

My dear James Geikie,—It gladdens my heart as one of your "Royal" sponsors, to congratulate you upon your election into *the* Society, which I hope you may live long to adorn. Etheridge[3] is also very full of rejoicing, and I only regret that the earliest announcement of the glad tidings did not reach you from one of us.—Believe me, your faithful confrère,

H. W. Bristow.

[3] Mr R. Etheridge, another member of the Survey staff.

As the Survey work in the Cheviot region was finished in the year that James Geikie married, [Pg 71] his friend Prof. Ramsay so arranged matters that it was possible for him to take a house at Perth, which remained his headquarters for six years after his marriage, that is until he went to Edinburgh to take the Chair of Geology.

At Perth Mr and Mrs Geikie made many friends, and the former threw himself actively into the life of the place, taking especially a great interest in the Perthshire Society of Natural Science, of which he became president later. This brought him into contact with Sir Thomas Moncrieffe, also at one time president of the Society; Mr Andrew Coates, who took a very great interest in the establishment of the excellent Perth Museum; Dr Buchanan White, and others. James Geikie also gave courses of lectures to ladies on geology during his stay in Perth, and generally did not a little to stimulate an interest in natural science in the town.

The year 1876 was a very full one. In spring he paid a short visit to Norfolk and Suffolk to study some interesting glacial results which his colleague Mr Skertchly had obtained there. At the same time he was working at *The Great Ice Age*, which had done so well that a second edition was required. Under date 27th June he writes to Mr Horne:—"My new edition will be out, I expect, in October—the first of the season! It is in the printers' hands now, and we are settling about the size of page and type. Printed the same size of type as last, the volume would be 900 [Pg 72] pages, which shows that I have made some additions!"

At the beginning of July Prof. Ramsay wrote to ask him if he would be willing to go to Gibraltar to assist in an investigation of the water-supply there, the work to count as a piece of Survey duty. The invitation was promptly accepted, and on 11th September James Geikie left Perth on his long journey to the South. He stopped a couple of days in London, and did not finally reach Gibraltar till 19th September. Here he remained till 25th October, much longer than he had expected, and in addition to doing a large amount of geological work, in what both he and Prof. Ramsay found most oppressive heat, received much kindness and hospitality from the civil and military officials, and made many interesting excursions. It was apparently the first time he had seen subtropical vegetation, and his letters to his wife are filled with accounts of all he saw, written in a spirit of almost boyish glee, and accompanied by much groaning over the heat, and the resultant thirst. Even bathing afforded little refreshment, for he says ruefully:—"Even in the water one has much the feeling that a herring must have when it is newly put into a pot upon the fire. All the springs," he adds, "yield half-warm water—everything indeed is baked, blistered, and boiled."

The abundant hospitality, delightful though it was, naturally took up much time, the hosts perhaps not fully realising that the two geologists had a fairly heavy piece of work on hand, and [Pg 73] James Geikie complains that it was difficult even to find time to write letters to his wife, in the midst of the ceaseless round of work and pleasure. An interesting fact, which he does not fail to record, is that at a Mess dinner at which he and Prof. Ramsay were the guests of honour, the military band played Scotch music in compliment to their nationality, and among the airs James Geikie recognised a selection arranged by his father for a Scotch regiment many years before.

Among the excursions was included one to the African coast, where the two made a short stay in Tangier: the diary, with characteristic orderliness, records the purchases made here for the people at home. But in addition to making these, the two found time to study the geology of the coast between Ceuta and Cape Spartel.

A letter to Mr Horne, written from Perth on 18th November, not long after his return home, makes some mention of the tour, and of the other events of a crowded summer.

> I heard all about your Shetland work. It did my heart good, and right glad I am that it has been done by a Survey man.... You would hear about Skertchly's find. I was down there again ten days ago at Ramsay's request, to see the evidence again.... In my new edition, which is out (and selling well!), I go much more fully into the English Drifts. I got to-day a long letter from Darwin, along with a copy of his new edition of *Geological Observations*. His letter is very complimentary, and of course that is gratifying to me, for I look upon Darwin as a real genius.
>
> I enjoyed my Gibraltar trip very much. Ramsay was very jolly and in excellent spirits all the time. We did have some fun, I can tell you. Also we crossed over to Africa and had a run amongst the Moors. The result of our [Pg 74] Survey was so far satisfactory as it enables us to say very positively what is best to be done in the matter of the water-supply.

There are two letters from Darwin about this date. One has been already quoted (p. 27). In the other, which is taken up largely with a geological discussion, he says:—"Allow me to tell you with what extreme pleasure and admiration I have just finished reading your *Great Ice Age*. It seems to me admirably done and most clear. Interesting as many chapters are in the history of the world, I do not think that any one comes nearly to the glacial period or periods. Though I have steadily read much on the subject, your book makes the whole appear almost new to me."

In this month of November also another sign of appreciation of his work reached James Geikie in the offer by the University of St Andrews of its LL.D. degree, which was conferred the following year. About the same time he was approached informally to know whether he would care to have a knighthood. This was at this date a much rarer honour than it became later, and the young couple decided that their income was not large enough to support it. Very many years later, after his retirement, James Geikie's friends again urged his claims to the title, but the matter was dropped at the outbreak of the war, and death came not long after.

Other letters of the same autumn refer to the "Ice Age," and to the report upon the Gibraltar [Pg 75] work. In addition to the *Memoir* upon the question of the water-supply, a general article on the geology of the region was contributed to the *Quarterly Journal of the Geological Society*. Rather curiously, even at Gibraltar Geikie found evidence of use to him in connection with his glacial work.

In the early spring of 1877 his eldest son was born, and the summer saw him wandering about

the Hebrides, of which he sends so racy a description to his wife that large extracts from the letters may be given:—

OBBE, HARRIS, *7th July 1877*.

This is written out on the hill-side—I will tell you why presently. Yesterday we walked from Tarbert, twenty-three miles, by a wild and lonely track-road, through a desolate and dreary region—nothing but bare rock, and a little heather and grass growing in rocks and crevices. It was all very interesting to me, however, as every square yard of rock was marked and scored and smoothed by the great ice-sheet that flowed out from the mainland. We took our time by the way, making notes and sketches. Every now and then we passed standing stones and ruins of Picts houses. At each bend in the track there were always two or three cairns of stones, which mark the spots where coffins have been rested. When the Harris folk bury anyone they have to carry the body often for many miles, as there is only one burial-place for the island. The poor people must rest by the way, therefore, for refreshment. Much whisky and kebbocks of cheese and scones go down, and then they raise a cairn to mark the spot. We met no one all the way for fourteen miles.... The road wound along the sea coast, across which we had lovely views to the islets that dot the horizon. You have no idea of the lovely shades of blue and green and saffron and orange and gold that streak and flush the sea—the water is so clear and crystalline, too, that one feels as if he should like to throw his knapsack down and take a header! There are few or no houses. We passed the ruins of several villages, but the poor people were driven out some forty years ago, and most of them emigrated to Canada. I believe they were very unwilling to clear out, and the soldiers [Pg 76] had to be marched upon them. It is very sad to see their poor huts, all roofless, and grass and nettles growing over them. As we had much to look at on the road it was nearly ten o'clock before we came to Obbe, and we passed the inn—not knowing it. Losh keep us a', what an inn! It was a mere hut—just like that used by the "natives." There are only two rooms—a kitchen and a double-bedded room. The peat-reek circulates freely through the whole cottage, and the walls are mouldy and damp. We had a peat fire in our room, and did what we could to make ourselves jolly. But salt ham is not good to feed on after a long walk. However, we were satisfied, and after a while got to bed.

To-day we started to climb Roneval, the highest mountain in South Harris. It has been polished by ice all over, a splendid confirmation of what I had already described in my book. What a magnificent view I had from the top! Far away to the west was St Kilda and the little island of Berneray. Southwards stretched the various islands of the Outer Hebrides—North Uist, Benbecula, South Uist, and Barra. How plainly seen they all were—high mountains with broad plains at their feet, over which were dotted lakes innumerable. In the east, Skye with its wonderful Coolins lay spread out before us; and north of Skye I could see our old friend Ben Slioch, and the mountains of Loch Maree and Loch Torridon. Harris, of course, lay under our feet: and you can form no idea of its sterile desolation. Endless round-backed hills and rocks, scraped bare of any soil, and supporting hardly a vestige of vegetation; great rocky mountains, smoothed and polished all over and equally bare and desolate, with blue lakelets scattered in hundreds among the hollows and depressions of the land—such is the appearance of Harris. Then there lay the great blue sea shining like sapphire in the sun, and flecked with tiny sails where the fishermen are busy at their calling.—I began this letter outside to escape the peat-reek, but the midges have driven me in again!

LOCHMADDY, NORTH UIST,
Tuesday, 10th July 1877.

We got here yesterday, after a long and very tedious sail in an open boat. With a good wind we should have crossed the Sound of Harris in two hours—instead of which we were nine hours. We kept dodging about from [Pg 77] islet to islet, sighing for a breeze, but no breeze would come—what little wind there was being in the wrong direction. We landed hungry as hawks, or any other animal of prey, and found a very comfortable inn. Of course we were offered the usual ham and eggs, but prevailed upon the landlady to give us fish instead. This place is like the sweepings of creation. It is made up of irregular bits of land, all jumbled about in a shallow sea—or of bits of sea running into the flat land in all directions—so that to get to a place one mile in direct distance you may have to walk five or six or even ten miles, if you can't get a boat. It is a land of desolation and dreariness. Bare rocky hills form the eastern coast, and from the foot of these the low undulating rocky and peaty land stretches for some ten or twelve miles to the Atlantic. The land, as I have said, is everywhere intersected by the sea, and sprinkled with innumerable lakes and peaty tarns. Along the flat Atlantic coast there are dreary stretches of blown yellow sands that form hills like those of Barry, near Carnoustie. Near these are a few huts and a kirk and manse! Not a tree, not even a bush higher than heather is anywhere to be seen—peat and rock and water—water and rock and peat—that is North Uist.... I have been vastly pleased with what I have seen, and will have a lot to tell geologists that is new.

CAIRNISH, NORTH UIST,
11th July 1877.

This place is still further out of the world than Lochmaddy. We walked to it to-day accompanied by one of the Inland Revenue officers, a very good intelligent fellow, who is quite an antiquarian and takes an intelligent interest in geology. He knew of me quite well and had read my "great work." The road lay for twelve miles through bogs, morasses, rocks, and lakes, and passed over as dreary a stretch of country as I ever set eyes on. The sky was cold grey, and the wind too was none of the kindest. Here we found a wretched inn, where we were waited on by a great hulking Heeland lassie with a back as broad as a barn door, and bare feet which haven't been in a tub since the day she saw the light of this weary world. She is shy, the dear creature, and has not one word of English. When I ring for her with the bell that lies on the table, she looks into the room with a grin on her face. I want salt, so I take up a bit of the Australian meat and dab it on the side of the plate. She [Pg 78] twigs at once what I want, makes a guttural sound, and in half-an-hour or so returns with a soap-dish full of dirty salt. However, she gives us good scones and not bad tea, and strong peat-reekie whisky. The landlord has been a soldier, I think, for he speaks of Hyderabad. Fancy a man coming from the sunny plains of India to this fearful howling wilderness. It would make a fine penal settlement. You see poor, ragged, dirty women bending under their creels of peat, and men digging the mosses as for dear life. It is hard living for them, poor devils. There is no shelter in the land, even the heather is low and stunted, and the wind howls in from the Atlantic with a long melancholy sough that is depressing in the extreme. No sportsman ever comes here, for there is nothing to shoot. It is said that there are fine trout in the lakes. It may be so; but the man who could fish such peaty holes and feel happy in the occupation, could only be an escaped convict or downright lunatic. The inn at Lochmaddy was snug, if the country was miserable. Here everything is in keeping.... Most of the houses are mere stone-and-mud huts with mud floors and heather roofs. Cattle enter them freely and mingle with the family. I was amused with an old man who came up to us and asked our friend the Inland Revenue man what we were doing. He took us for drovers come to buy cattle. When he heard that we had come to look at rocks

and stones he said—"We were great fools, and must be very idle, and light in the head." And indeed when I looked round the miserable dreary wilderness I was half inclined to agree with him. Who but a geologist would ever think of visiting such a land. Well, it won't be my fault if I ever revisit the place.

LOCH BOISDALE, *15th July 1877*.

Some days have passed since I last had an opportunity of writing to you. We have had much walking and no time to write since we left Cairnish in South Uist. We started from Cairnish about twelve o'clock on the 11th in a broken-down gig with a one-eyed horse, which was led or rather pulled along by a native named Angus Macdougall.... North Uist and Benbecula are separated by an arm of the sea which is some five miles in breadth, but is so shallow that at low water it can be forded. What a peculiar scene it was! A long stretch of mud-flats and sand-banks broken here and there with reefs of tangle-covered rocks and low green islets on which a few black cattle were grazing. Men and women were busy cutting the tangle for kelp-burning, the [Pg 79] smoke of the fires rising here and there from various points of the dry land on the Benbecula coast. Heavy drizzle wetted me through and through, and it was most cheerless. At the opposite side of the ford we reached a little inn, as dirty and clarty as all the inns are. We now got out of the trap to walk, as we wished to save the poor horse as much as possible, for the weary tramp before us. At the pace we went we calculated we should reach Loch Boisdale about two or three in the morning. Benbecula is about eight or nine miles in length, and is perhaps the dreariest bit of land I ever traversed. It is nothing but a big peat-moss, with a lot of lakes or boggy holes running through it in all directions. Indeed there is about as much water as land. Cultivation is a mere parody, everything bespeaks poverty. The people are as usual haggard and ill-clad, and dirty in the extreme. Things looked a little better as we got near the shore at Creagorry. Here our friend Mr Carmichael met us and took us into his house.... It was pleasant to get into a real house again and to sleep in a clean comfortable bed. Next morning we were up at three o'clock in order to catch the early ford between Benbecula and South Uist.... The ford between Benbecula and South Uist is not nearly so broad as the North Ford, but it is deeper. We got across about half-past four, and then I got out to walk so that I might make observations as I went along. It rained heavily for the first six miles and then cleared off, so that I had time to dry again. The road goes through much the same kind of scenery as Benbecula, but there are fine mountains immediately to the left, and these we gradually neared, and skirted the base of them for many miles. I saw so much glacial geology that I did not feel in the least degree fatigued.... As we took our time by the way, stopping to look at this, that, and t'other thing, it was nearly eight o'clock when we reached a place called Askernish about six miles or so from Loch Boisdale.... At five we set off again, and loitering by the way to chat and smoke and do geology, we did not get into Loch Boisdale until nine o'clock at night, having been out since four o'clock in the morning. So off to bed somewhat fagged. Next morning we were astir by six o'clock and set off in a boat for a sixteen-miles sail up the east coast to Loch Eynort, intending to land there and climb Ben More, the highest hill in South Uist. It was wet [Pg 80] and cold, but we determined to go on. The cliffs are wild and dreary, and fearful places to be wrecked upon, for deep water runs up to the very rocks. We landed at a place where Prince Charlie lay in hiding while the King's cruisers sailed past. It was a picturesque spot. Wild bare mountains cleft by mountain-torrents surrounded the small glen, down which leapt a noisy stream, on the bank of which were one or two thatched cots. The shepherd came out and asked us to drink milk. It was a picturesque interior that we were introduced to. There was the peat fire in the centre, dogs, cocks and hens, cats, and a small pig crowded round the fire, and the wife and lassies were bustling about. The spinning-jenny stood in a corner. None of the women looked well. They were all white and haggard. Carmichael told me afterwards that they wanted me to prescribe for them, as they had imagined I was a medical man! Poor things! I could not help thinking they were consumptive. Yet they all seemed happy enough, and certainly though I have seen much poverty all through these islands, yet I have not noticed any of that squalid misery which is so common in our large towns. The people are poor, but they always have something to eat. Their wardrobe can't cost much, for they make everything themselves, and what they make seems to last half a lifetime. But to return to the shepherd's house, we got our milk and after sitting for a while rose to go. They are very polite these Highlanders, much more so than most country folks in the mainland of Scotland. I was only sorry I could not speak Gaelic, for few of them had more than one or two words of English. The shepherd told us it had been a bad year for the sheep, but not so bad, he thought, as it seems to have been on the mainland. We bade good-bye and sailed into Loch Eynort at a wild part of the coast, where we landed and dismissed the boatmen and boat. But mists hung heavy on all the hills, and after much climbing we were compelled much against our will to give up all hope of getting to the top of Ben More. However, we managed to see a good deal, and then struck right across the mountain tract to the flat ground of the east coast, along which we had walked the day before. Just before we got down to the road, the mists cleared away, and the mountain-peak shone brilliantly forth; but it was now too late to think of climbing Ben More. We had been tramping over rock and bog and hill and dale for six hours, and we had still some twelve miles to walk [Pg 81] before reaching Loch Boisdale, and were reluctantly obliged to abandon Ben More. But I was able nevertheless to make out all the main geological points that were important—so that, after all, we did not lose much.... I shall be right glad when my face is homeward turned. It is so wet and dismal it makes one dull whether he will or no. But I have very much enjoyed my visit, and have gathered material for a great geological paper, which will bring me much credit, I know.

The rest of the year 1877 was occupied with the writing of the Hebrides paper, published in the following year, and in various geological controversies, especially in regard to the superficial deposits of Norfolk and Suffolk. These years at Perth were thus a period of severe and productive work, for after long days in the field he would sit and write far into the night. He kept himself also carefully abreast of all recent work in his own subject, and with the help of grammars and dictionaries, read in the original the papers of all his foreign confrères, Norwegian, Danish, Swedish, etc. The Norwegian geologist, Dr Amund Helland, afterwards professor at Christiania, it may be noted, paid a visit to the house at Perth in 1877, and James Geikie and he became great friends. A couple of years later they paid a visit together, an enjoyable and profitable one, to the Färoe Islands.

CHAPTER VI [Pg 82]

LAST YEARS ON THE SURVEY

1878–1882

The spring of 1878 saw James Geikie engaged in active correspondence with Prof. Ramsay in regard to their joint paper on the Gibraltar work, and also occupied, in his own words, in fighting with wild beasts at Ephesus and elsewhere, that is to say, in sundry controversies over glacial matters.

His happiness at home was clouded by the severe illness of his little son. In his letters he speaks of being knocked up with night-nursing, for he walked up and down the greater part of the night with the child in his arms during the most anxious period. Happily the baby made a good recovery, and in a letter to Mr Horne towards the end of the year he says:—"'The boy' is hale and flourishing, and a great amusement in the evenings when I come home. I prefer his company even to that of a pipe! Excuse the 'eavy fawther.'" He was very fond of children at all times, and his own were a source of great joy to him.

In summer he went back to the Cheviot region for a couple of months to finish off his work there, and revisited Buchtrig. It was during this visit that he met Sir George Douglas (*cf.* p. 67). In August he went abroad with his wife and her sister, the baby, now quite recovered, being left with his grandmother. The tour was *via* the Rhine to Switzerland, and then across the St Gothard by carriage into Italy. Some interesting letters to the home people record the experiences met with, but as the ground covered is very well known they need not be quoted here. During the course of the tour some geological observations were made bearing on points treated in *Prehistoric Europe*, which was being written during this year. [Pg 83]

Signs of overwork and some worry were, however, observable as the year went on. In an undated letter to Mr Horne he complains of not feeling good for much:—"I was busy at a new book, but being in the blues now for some time, the MS. lies aside, and I sometimes wonder whether I shall ever finish it. I thought my trip abroad would have cleared up my faculties, but no such luck!"

Among his causes for anxiety were his own future and that of the Survey. Prof. Ramsay's health was breaking down, a fact which grieved James Geikie very much, and the possibility that difficult days for the Survey and its members were coming loomed ahead. In an unwonted fit of melancholy he says in the same letter:—"It makes one sad to think that the 'brave days of old' are all passing or past away. One gets sick of the strife and din and wishes for peace and rest, which, however, will only come when one shuts his eyes for the last time." He found also that his distance from a good library was a great drawback in his work. The letter, with all its sadness, speaks of the pleasure which he found in the company of the "small chick," who seems to have had a potent charm wherewith to dispel his father's clouds of gloom. [Pg 84]

Among the letters of the spring of 1879 are several to Mr Lamplugh, now of the Geological Survey. In regard to these Mr Lamplugh says:—"I do not know that they contain anything that is now of sufficient consequence to warrant their reproduction. But they illustrate very well the kindly attention and trouble that the late Prof. Geikie was always ready to give to a beginner in science. I was under twenty years of age when the first of these letters came to me, and I have kept them as treasures from those days."

The letters in their friendliness and unaffectedness bear out this description, and some other letters of the same period show that while the writer was never deaf to the appeal of a common interest in the progress of knowledge, when to this was added the stronger appeal of friendship, he gave himself whole-heartedly. His friends Messrs Peach and Horne had written a paper on "The Glaciation of the Shetland Islands" for the Geological Society of London, and in this James Geikie took the keenest interest, giving advice freely both on the method of presenting the contents, and on the technical points connected with the effort to obtain for the paper a fair hearing and speedy publication. A hitch in the matter of publication brings from him a letter full of genuine and practical sympathy, combined with a whole-hearted espousal of his friends' cause. [Pg 85]

During this spring also he was still engaged, with varying fortunes, upon his *Prehistoric Europe*, a task of great magnitude on account of the enormous number of references and the labour which these involved. Thus a letter written early in March represents, as it were, the trough of the wave—he tires of the book at intervals, thinking it will never do, and throws it aside in a "kind o' scunner." Another letter at the end of May shows him on the crest of a new wave of enthusiasm. He had just received many new pamphlets from "furrin' parts," mostly inspired by his own glacial work, often accompanied by letters from the authors. Thus he says:—

> Dr A. Penck of Leipzig writes to the effect that it was the reading of *Great Ice Age* that first opened his eyes to the meaning of the Diluvium of Northern Germany. He says he has got evidence of three glaciations with intervening glacial deposits! He says he has all the burning enthusiasm of a convert! His letter has greatly gratified me, of course. I see he is an old hand and has done a lot of geological work. Then I have a long letter from a Dr R. Lehmann of Halle, who is also congratulatory at the success with which the German Drifts have recently been explained on the principles laid down in my book!! Also, some duffers have sent me their photographs! I wonder what has so suddenly wakened them up. Helland has a long and interesting paper on the German Drift which I suppose you will see: also a batch of papers on same subject from Prof. Berendt of Berlin. I don't know how I am to get through all the Swedish and Norwegian papers I have received. They are so hard to read. [Pg 86]

A postscript to this letter says:—"Pray excuse the exulting egotism of this epistle. I would not write so to anyone else."

But while glacial work was thus occupying most of his attention, lighter subjects were not altogether forgotten. In another letter to Mr Horne, written on Good Friday, he says:—

> In a few days I am going to ask you to do me a favour, which is to run your eye over some MS. I shall send

you. You need not read it all through—that would be too much of a good thing—but just dip into it here and there, and see what it is like. You will laugh when I tell you that the MS. is poetry, translations from the German. These have been lying beside me for some ten or twelve years. I was urged by several friends of good judgment to publish them long ago. But I would not be induced to do so, so I laid them aside until I had quite forgotten them and could read them and criticise them as if they had been the lucubrations of another man. They bore this better than I expected, and I gathered together all I could find and have had them copied out and stitched into a volume.

It is perhaps needless to say that this MS. was the translation of Heine's poems, of which mention has already been made here repeatedly. The intention to publish at this time was abandoned, partly because of the possible effect on the "new book," i.e., *Prehistoric Europe*.

During this spring James Geikie was also corresponding with Dr Helland on glacial topics, and had arranged to accompany him to the Färoe Islands, to study the glacial phenomena there. A [Pg 87] start was made at the end of May, and the two spent a delightful time together, Prof. Helland's knowledge of the language being a great help. James Geikie's paper on his observations was published a year or two later, and his note-books contain long descriptions of his experiences, with many sketches and diagrams. A more informal account is given in a letter to Mrs Johnston of Crailing Hall:—

I enjoyed my trip very much though I had to rough it more than most people would care to do. But what I saw was quite enough to make me forget all discomforts. Perhaps the most striking features of the Färoe Islands are their sea-cliffs. These range in height from 300 feet to 2000 feet. I sailed in a little boat round a large part of the coast-line and was very much impressed. The cliffs rise sheer up out of deep water, seeming in some places almost to overhang. Fancy the sun shining brightly on a great wall of brown rock 2000 feet high—a wall which shows an infinite number of little shelves and ledges, and all these ledges thickly set with sea-birds in myriads, while the air is filled with them, wheeling and screaming above you, and the water is alive with them swimming, diving, floating, and capering! The great Atlantic rollers come smoothly up to the base of the cliffs and sweep into the caves, only to rush out again with a hoarse roar, and a wild splash of spray and broken water.

Not very long after his return from the Färoes, at the end of July, his second son was born.

Several letters from Prof. Ramsay, on the Färoes work and other subjects, in the course of the summer show the friendly terms upon which the two were. Thus in announcing that he (Ramsay) had been chosen President of the British Association for the Swansea meeting in 1880, he adds: —"And unless you write the Presidential Address for me, I will take steps to have you dismissed [Pg 88] from the Survey!" Unfortunately for James Geikie, the time during which Ramsay had anything to say upon Survey matters was fast drawing to a close. A few days later Ramsay writes in jubilant spirits because their joint work at Gibraltar had proved correct, although certain borings had seemed at first to cast doubt upon some of their conclusions. Prof. Ramsay's feelings in the matter are expressed as follows:—"Ho ho ho! Ha ha ha! also he he he!" In the same letter Ramsay speaks of Prof. Penck's results, saying:—"It is a grand coup for you."

Among James Geikie's other correspondents this summer were Prof. Stevenson of New York, a very warm friend of later years after the two had met in the flesh, and Mr T. F. Jamieson, who like Ramsay was greatly interested in the Färoes work. Towards the end of the year he writes to Mr Horne:—

I have recently got heaps of new facts from Germany, France, and Austria, not to mention Italy, which will greatly aid me in working off my present book. That same book drags its slow length along, but I hope to finish it in time for publication next year.

After giving a general sketch of the contents of the book he goes on:—

My references to foreign writers will astonish you with their "learned profundity"—what do you think of Italian, Greek, Spanish, Austrian, German, Hungarian, French, Danish, Dutch, Russian, Swedish, Norwegian, and Icelandic references! The time I have spent over these with grammar and dictionary, and the trouble in having others translated for me by learned pundits, are such that I will never, I think, undertake anything of [Pg 89] the kind again. Sometimes two or three long nights' work is summed up in a short line; or even has no mention at all! I only hope the result will justify the time expended. It is all intensely interesting, however.

Perhaps it may be well to repeat in connection with this letter that this laborious work was the occupation of what should have been leisure hours, and that in addition to it James Geikie was putting in some eight or nine hours' work per day in the field or at office work, was carrying on an extensive correspondence, was lecturing in various parts of Scotland, and was writing scientific papers. Much of his writing had thus to be done by curtailing the hours of sleep, and most of those who came into close contact with him at this time regarded his capacity for work as something almost superhuman. But despite his heavy labours, this year seems to have been a happy one, and perhaps helped him to bear the period of storm and stress which was to come.

The chief incident of the following year, 1880, was the completion and publication of *Prehistoric Europe*, and the letters are full of allusions to it. Thus towards the end of January he writes to Mr Horne:—"Still grinding away at my tome. Got about a third to write yet. The thing swells out, I am sorry to say; there is so much more to tell than I had any idea of." The severity of the strain was, however, obviously telling upon him, for only a week or two later he says:—"All at present is at a standstill. My head has given up work, and I must leave it alone a little: been going at it early and late too much!" A little later he says again:—"I am going to rest and do nothing but [Pg 90] read. You have no idea what a loathing one takes to paper and pen sometimes! But doubtless you have the same."

It was nearly the end of July before the MS. was finally completed, and the nature of the effort

is indicated by the fact that the concluding sentences of the book were written in his sleep! He was working at it as usual till far into the night, and could not find a fitting sentence to round off the whole. After trying for some time ineffectively, he decided to leave the matter till the morning, and went off to bed, the time being 2 A.M. In his usual orderly fashion he had placed the last sheets on his writing-table, putting two books on top to prevent the papers from being scattered by a chance draught. In the morning he found them scattered over the table, to his great disgust, for it was a stern household regulation that papers were *taboo* for all hands save their owner's. The maid when taxed, however, denied indignantly that she had touched them, and when the injured author gathered up his treasures he was astonished to find, written in his own handwriting, though not with his usual neatness, the sentence which now stands as the final one. Evidently he had dropped to sleep and come down to complete the unfinished task in a subconscious condition. The story shows clearly that it was time the book was done with.

But the labour did not cease with the completion of the MS. The holiday, which began early in [Pg 91] August, was spent partly in London, looking up final references, and partly in South Wales, with a view to making out some further glacial points. A letter to Mr Horne suggests the mixed feelings which the completion of the task brought. He says:—"I am well pleased now to have the thing off my hands. I will not soon begin another such work. It is too much worry and labour—and yet pleasant withal." Later he writes:—"Now that my book is off my hands, time in the evenings hangs heavy on my hands"—the Nemesis, a psychologist would say, of overwork, for it was obviously the condition when nothing but work had become possible!

Various pleasant little incidents, however, occurred this autumn. Thus the French geologists, MM. Falsan and Chantre, sent him a copy of their Monograph on the old glaciers of the Rhone basin. In sending the book M. Falsan spoke with gratifying warmth of *The Great Ice Age*, and of the many new ideas which he and his confrère had obtained from its perusal. "I feel as if I shall get cocky," says James Geikie in a letter, "and, as pride goes before a fall, am beginning to dread lest *Prehistoric Europe* should be damned." M. Falsan also asked permission to translate *The Great Ice Age* into French, and there were German offers to translate both *The Great Ice Age* and *Prehistoric Europe*.

The latter appeared towards the end of November. Copies were sent, among others, to Charles Darwin and to Prof. Ramsay, whose letters in reply were a source of great gratification to James Geikie. Darwin wrote both immediately upon receipt, and later after he had read the book. In the [Pg 92] second letter he says:—"Yours is a grand book, and I thank you heartily for the instruction and pleasure it has given me." That this was not mere flattery is apparent from the keen discussion of certain special points in which he was interested.

The next year, 1881, was one of great stress, though the tale of its external events is soon told. That Prof. Ramsay's health was failing had long been known, and though his actual resignation did not take place till the end of 1881, the fact that it was impending was obvious long before. It was also known among the Survey men that his retiral would mean extensive changes, likely to affect directly and indirectly most of the members of the staff. As has been already stated, it led to James Geikie's resignation and his acceptance of the professorship at Edinburgh University. Something must therefore be said in regard to the reasons that induced him to leave highly congenial work for a post which was not, certainly at first, wholly so, and which further, at least in early days, did not materially improve his financial position.

It must be noted first that by this time he was the author of two bulky books (produced, as we have seen, at the cost of great and continuous toil) which had been hailed at home and abroad as "epoch-making." He had correspondents in most parts of the civilised world; men of mark in their own countries had publicly acknowledged him as a leader of geological thought, a fount of [Pg 93] inspiration, an opener up of new paths of research. At the same time, to those immediately above him he was a subordinate, with a very moderate salary, a recipient of orders, with little opportunity for initiating changes or improvements, and was living in a small provincial town, to some extent remote from the main current of public life.

Second, and this is a point which is much less familiar to the general public than in a democratic country it ought to be, his books were not of the kind which bring direct monetary reward to their author. His family was increasing, for his third son was born in this year of 1881; he himself was past forty, and the probability that he could continue to go on working for many years more at the rate at which he had been toiling during the last twenty was necessarily diminishing. Now it is universally admitted, as a general proposition, that when a man without private means has done and is doing important and highly specialised work for his country and for the world, work which does not bring direct pecuniary gain, then it is the duty of those in high places to see that he be established in such a position as to free him from financial anxiety for the future, to enable him to face his responsibilities with a calm mind, to obviate the necessity for his wasting his strength and intellect in hack-work in order to supplement his income. But, while this is admitted as a general proposition, there is always the possibility that petty personal interests will intervene in a particular case. James Geikie left the Survey partly under the pressure of such [Pg 94] interests, which seemed to threaten his prospects of immediate promotion, and partly under that of friends who thought that the professorship offered more scope for him. Whether he was right or wrong it is difficult to say, but there is evidence that at least at first he regretted his decision. He might have quitted the Survey of his own free will, and would certainly have done this with a pang, but the thought that his decision to leave was not wholly voluntary, made the pang excessively bitter.

Many of the letters of this year of anxiety are too intimate to be quoted. We shall only insert sentences and phrases to make the narrative plain.

One of the first indications of coming events was an attack upon *Prehistoric Europe* in the early part of 1881, an attack which it seems quite clear was not motived wholly by an honest desire to promote the cause of science. It was this element which made the matter so hard to bear.

> The affair has affected me more than I can tell.... You will laugh, but it is true all the same, that I can hardly eat or sleep. For the attack itself I don't mind, I know that my book is a bit of honest true work, and will outlive the attempts ... to stifle it.... I wish the snow would go and let me out to have a walk. Sometimes I wish that I had kept clear of writing books altogether.... I remember wondering once when Green told me that when he was vexed with anything a romp with his bairns made him quite hearty. It seemed to me overstrained. I don't think so now that I have bairns of my own. Their quaint and funny ways quite carry you out of yourself.... Dearly as I love life, I can already foresee that the time will come when I shall be glad to lie down and sleep the sleep that knows no waking.... Verily I do believe a good wife and loving mother is the only treasure of [Pg 95] treasures that is worth striving for in this world!... How much you and I have to be thankful for!

These are a few extracts written to his friend Mr Horne at the moment when the history of the incident was just becoming plain, and at a time also when Mr Horne's first child had just been born; they throw perhaps more light upon it and upon the character of James Geikie than any ordered narrative could do.

Later letters of the same spring emphasise the effect which the incident had upon him. "The whole thing," he writes in one letter, "has worried me more than I can tell;" but a journey south, where, *inter alia*, he lectured at Hull, and led a big geological excursion, helped to change the current of his thoughts, while his reception at Hull gratified him greatly. Fresh letters from continental geologists also, not only praising his book but discussing the bearing of his results upon their observations in various parts of Europe, must have helped to assure him that it was worth while to do honest work, despite detractors. Further, the family moved from Perth to Birnam, where they took a charming cottage at the foot of Birnam Hill, covered with roses, and with a large untidy garden. The early summer was brilliantly fine, and the fresh air and open life of the country must have made it easier to take a more philosophical view of the affair, unpleasant as it was.

The letters of early summer show at least a perceptible recovery of balance and cheerfulness. [Pg 96] His third son was born in June, and in answer to congratulations he says:—"A *third* boy was a great disappointment—a girl would have 'completed' all the family any reasonable man could desire!"

The arrival of the baby prevented him from accompanying Dr Helland on a projected trip to Iceland in early summer, but, rather curiously, an opportunity to visit the island occurred a little later in the same year, for he went to report on some sulphur mines.

On 17th September he writes to Mr Horne:—"I have just returned from Iceland, where I have had some very hard but very interesting work. What a country! Fancy me riding eleven hours over lava-beds, mountains, etc., devil a road or even path! However, all was fresh and new."

By this time the question of changes in the Survey was becoming acute, and James Geikie was beginning to debate with himself as to whether he ought to try for the Chair in Geology at Edinburgh for his children's sake. The indecision he found very unsettling. "I can settle to nothing—reading and writing are alike out of the question." More than a month later he writes: —"I am pulled two ways—my own desire and wish is to remain in the Survey." "My repugnance to that Chair," he says a few days later, "increases as the days go past."

Perhaps nothing, however, shows better his fundamental repugnance to all the weighing of questions of worldly advantage, to the scheming and plotting and wire-pulling which go to the [Pg 97] making of appointments, than a letter written to Mr Horne in the thick of the conflict. This begins with an account of information which had reached him in regard to the position of affairs as to the Edinburgh Chair, and glides off insensibly into an account of letters just received from Prof. Penck and Prof. Gandry, the one a German and the other a French geologist. Both letters contained much of great interest to him, and the letter becomes a full discussion of the points raised, the question of his own future meantime sinking entirely out of mind.

Obviously he wanted to be let alone and allowed to do his work in peace, to have reasonable security for his children. In one letter he laments his own lack of worldly wisdom, and his willingness to take advice from his various friends; and the rather pathetic balancing of the advantages of one apparently possible position against another, merely meant that his mind was set on other things altogether, and that in consequence he allowed himself to be swayed by the different influences brought to bear upon him. His own candour and frankness made him singularly willing to accept advice offered under the guise of friendship, without stopping to investigate the question whether his advisers were or were not wholly disinterested. But his unwillingness to be separated from his old colleagues remains the dominant note, even when he yielded to what seemed sound arguments brought to bear upon him. His instant response to kindliness is shown by the following quotation:—"Isn't old Ramsay a trump. He wrote me a short, [Pg 98] but such an affectionate letter that I declare I could not read it without wet eyes."

His final decision to apply for the Chair was due to the receipt of a private letter which informed him that the Home Office was prepared to appoint him immediately on his sending in an application, on the ground that he was the man obviously best fitted for the post. It was also indicated to him informally that the reputation which he had obtained owing to his books was such that any other testimonial was unnecessary. Inquiries had been made which had satisfied the Home Office that no other possible candidate had such high qualifications for the post. In announcing to his friend Mr Horne the receipt of this flattering though unofficial letter, James Geikie cannot forbear adding:—"I shall quit the Survey dead against my desires. But yet I feel I

am doing best for myself and for my children."

Both his natural modesty, and perhaps the painful memory of his controversy in the spring, made him uneasy about the fact that the appointment was made without, as he says, any chance being given to other possible candidates. Thus he forwarded the unasked-for testimonials, the writers including all the leading men of the day in his own branch of science. But amidst all the bustle of arranging about the testimonials, and about the leaving of his work and the finding of a house in Edinburgh, the note of regret recurs constantly. "I can't realise that I am leaving the Survey. How vexed I am—no one can tell."

Not all his own regrets, however, could quench his enthusiasm for the service he was giving up. [Pg 99] Thus he took up cudgels with the utmost vigour for his friends on the Survey, whose interests he thought likely to be affected by certain proposed changes. These changes he thought regrettable not only on this account, but also because they seemed to him contrary to the interests of the whole Survey.

His new work at Edinburgh was not to begin till the autumn of 1882, and though the house in Edinburgh was taken in spring, the family stayed on in the country all summer, partly to let the new-made professor finish off his Survey work, and partly that all might enjoy the country air. But the respite did not ease the pain of the prospective parting:—"It makes me sad at heart when I think that the old Survey days are for me so soon to end. So life wags—some day soon I shall be ending work for good and all, and then for a long rest, and no heartaches and no headaches. My heart gets heavy whiles at the thought of leaving the green fields over which I have wandered so long and happily. After forty years of life it is almost too late to change. But what I have done I hope will turn out for the best. Anyhow, I hope you fellows will not forget the old comradeship, but come often and see me. I can't yet realise that I am leaving work in the field, and going into town to become fat, greasy, and respectable." And so the summer months slipped away, and autumn brought Edinburgh and the new sphere.

CHAPTER VII [Pg 100]

Edinburgh and the Professorship

1882–1888

Official work in Edinburgh began with the delivery by the new professor of his inaugural address on 27th October 1882, the subject being "The Aims and Methods of Geological Inquiry."

In early days the class was small, and as the income derived from Sir Roderick Murchison's endowment was supplemented by the students' fees, then paid direct to the professor, their number was an important matter. Further, at the time of the appointment, as for many years later, geology was not compulsory for any degree, and was not even an optional degree for the ordinary course in Arts. This meant that the professor had not a status in the University comparable to that of those of the Arts professors whose courses were compulsory, or of the members of the Medical Faculty. On the other hand, it meant that the students who took the class did so from a genuine interest in the subject. The fact that Prof. Geikie soon acquired much weight in the Senate was due entirely to his strong personality, unassisted, at least at first, by [Pg 101] any advantages of position.

The letters of this first winter session are filled, as might be expected, with the business of settling down in Edinburgh, the buying of furniture and carpets, the "grind" of getting up the lectures, and recurring regrets at parting with old friends. A letter to Mr Horne, written at the beginning of January 1883, illustrates very clearly the dawning of genuine interest in the new work, still mingled with longings for the old. The following passages may be quoted:—

> I was at the office the other day.... But how the days flash by. And how the dear old days are gone when you and I and the others used to chaff and make a noise o' winter in that office. It makes me melancholy sometimes when I think of it all. I am Professor in Edinburgh University, but my heart is in the Survey with my old Survey chums. Here are tall hats, black coats, pompous windbags—and in a word, starch and humbug. My boy, I have been caught too old. Had I come here earlier I might have become "respectable" too—but it is too late! However, I get on well with my students who, being young, understand fun and such improvised nonsense as I endeavour to cheer them with. I fancy some of my colleagues would have their hair elevated if they heard me. I like the work much better than I expected, but eh man! I miss the freedom of the country.

The office alluded to above was, of course, the Survey Office, and Prof. Geikie's colleagues record that at first he found it difficult to keep away from it. He generally dropped in on his way to or from the University to see how things were getting on, and never missed an opportunity of meeting his old friends. When he began to have students' parties some of the Survey men were [Pg 102] generally asked also, so that the students might have an opportunity of coming into direct contact with the men who were making geology in Scotland.

Many allusions in the early letters show that the new professor found the task of arranging his class work irksome. In certain branches of geology he had himself taken little interest, having specialised early, and as at first he had no assistant, all the work fell on his own shoulders. For microscopic work and some aspects of mineralogy he had always expressed contempt, as being only suitable for the men who could not or did not work in the field; and these despised subjects he now felt himself constrained to "get up" for class purposes, and this necessity drew from him many groans. One must admit that there was a certain tragedy in this taking of a man of forty-

four off his own highly specialised work to grind up a subject of practically no use to him in that work; but such tragedies are frequent when original thinkers are placed in professorial chairs which demand much elementary teaching. Preparing for his microscopic class, he complains, means sitting up half the night, and is “fiddling work,” requiring little in the way of brains.

A letter to Prof. Stevenson of New York, dated 26th January 1883, is not without interest in the same connection, in showing the effect of this drudgery on his own work. In acknowledging one of the former’s publications, he says:—“I am sorry I have no papers to send you. My preparations for a new start as professor in our University here have absorbed nearly all my leisure time, so [Pg 103] that several papers I had chalked out have been laid aside for the present.” A letter to Mr Horne, written a few weeks later, while the author was invigilating a class examination, shows where his thoughts turned as soon as the strain was lifted for a moment. It records the receipt of a letter from Prof. Nathorst of Stockholm, who had been doing work in Spitsbergen, and had come independently to the same conclusion in regard to certain points as James Geikie. The latter adds:—“He says he is delighted that his conclusions, arrived at independently, should corroborate and support mine. Very nice.”

The same letter to Mr Horne contains an allusion to an odd form of compliment which had just reached the writer. A lady in Nova Scotia, apparently a total stranger, had written to ask if the author of *The Great Ice Age* would stand godfather to her baby. The cream of the jest was, however, that the said baby was not expected to enter this vale of tears till some three or four months after the date of the letter. History, unfortunately, does not record whether or not the infant put in an appearance, nor whether it had to be baptised as James or Jamesina, but the professor gave his consent without, as he says, any ungentlemanly reference to common proverbs.

At the close of this, his first winter session, the new professor took a party of students on a long geological excursion to the Border district, his old hunting-ground. During the course of the [Pg 104] excursion, which lasted several days, the party visited Buchtrig, whether wholly from geological or partly from sentimental reasons does not appear. Some fine tramps were taken over the hills, and the fact that the leader had himself worked out the geology of the district must have added much zest to the excursion.

In May the first summer class in geology was held, this being one of Prof. James Geikie’s innovations. It was well attended, twenty-six students taking part, and consisted of both indoor work and excursions. After this year this summer course became a part of the regular routine, and while it was a great improvement from the point of view of teaching, it naturally still further diminished the professor’s spare time, and placed him at a disadvantage, so far as independent work was concerned, with his colleagues of the Arts Faculty who then had only a short winter session.

The summer holiday was spent at Largo in Fife, and the summer was clouded by the death of Prof. Geikie’s father, who passed away at the age of seventy-three, having seen both his geologist sons established in positions of importance.

The work of the following session, 1883–1884, proved easier than the first, “but just yet the Chair is not a ‘bed of roses.’ It takes up more time than I had reckoned for.”

[From an etching by Mr William Hole, A.R.S.A.

A Study of Prof. Geikie in 1884.

Spring brought two distractions, the Tercentenary celebrations of Edinburgh University, and preparations for a visit to Canada and the United States in connection with the British Association meeting at Montreal. Of the former Prof. Geikie soon wearied, and voiced his weariness, and perhaps some remains of resentment in regard to those winter nights spent—fruitlessly from his point of view—in "getting-up" uncongenial subjects, in a series of verses. These at the time were shown only to privileged friends, but may be quoted here now for the sake of those who can see a joke, even if it is partly at their own expense. They make it clear that the author was not yet wholly reconciled to academic life. [Pg 105]

TO MY ALMA MATER ON THE COMPLETION OF HER 300TH YEAR

1.
Hail stately pile! hail treasure-house of lore!
Dear nurse of many a wit and many a bore!
What mingled thoughts have we in this late time,
Reviewing all the glories of thy prime!

2.
Three hundred years ago thou hadst thy birth,
And now thy name is known o'er all the earth:
In making ropes of sand once great thy skill—
Thy fame is now the scalpel and the pill.

3.
O Alma Mater, 'neath thy learned shade,
How many a plot against mankind is laid!
And ghouls in hundreds every year stalk forth,
To testify to all what thou art worth!

4.
Tramp! tramp! they come, the ministers of death,
At their approach the boldest holds his breath:
"Your money and your life!" they gleeful cry—
And awestruck patients pay their fees and die.

[Pg 106]

5.
These ghouls thy children are: nor these alone,
O bounteous mother, hail thee as their own!
Nursed in thine arms, the vacant—void no more—
In countless numbers issue from thy door!

6.
Confusion tightly pack'd within each brain—
Or air, compress'd, distending the inane,
Thine is the gas they own, and thine the lead,
The tongue untiring, and the addled head.

7.
To pulpit and to platform see them fly,
For, wind-distracted, they must speak or die;
Bored and perplex'd the audience shifts about,
Those only happy who can snooze it out.

. . . . .

11.
But I, unlucky, whither shall I go,
Who of this lore of thine so little know!
What academic prize to me shall fall,
Content to know a little, and not all!

12.
Forgive me, O my mother, if I still
Keep some brain-space for after years to fill!
Nor chide if I decline this awful cram
Of unassorted victuals for exam!

The spring brought also the offer of the honorary fellowship of the Geological Society of Stockholm.

In August he started for New York, this being his first journey across the Atlantic. He enjoyed the voyage very much, being one of the very few passengers who were able to appear at meals during a stormy period met with soon after leaving Ireland. Later the weather improved and the [Pg 107] party became very lively, Prof. Geikie participating in all the entertainments and gaiety which went on. "I feel already 20 per cent. better in mind and body," he says; "twenty years younger am I too, or I would not enjoy such high jinks as go on here." Several friends were made on the ship, and one of these, a Boston gentleman, showed much kindness to Prof. Geikie on his arrival in New York. Thanks to him, it was possible to see something of the city during a brief stay there, the incidents including a visit behind the scenes of a theatre, where the stage manager announced that he had read *The Great Ice Age*.

From New York the journey was continued to Chicago, which did not make a very favourable impression, and on to St Paul, much of geological interest being seen *en route*. From St Paul the party went to Winnipeg, the furthest point west reached. The crossing of the prairies made a great impression on Prof. Geikie. He says:—

I have often pictured the prairies to myself, but somehow the picture never comes up to the reality. How

strange it is to gaze over a seemingly limitless extent of grass-land as flat as any Scottish haugh-land. The sky was exquisitely bright—white clouds sailing over a delicate blue—but the colours of the prairie surpass my powers of description. The wild flowers fairly took my breath away—there were blues, purples, whites, and yellows, the latter predominating. Standing outside of the car one never tired watching the changing hues—here were broad belts of yellow, there patches of blue and white and purple. Or all the colours were commingled in a dazzling confusion. The rails are laid flat on the prairie and the sweet flowers grow up to the [Pg 108] rails. Butterflies in absolute clouds—great big fellows—danced and flitted about, and now and again a flight of birds appeared. But huts or houses were seen only at very wide intervals—sometimes many miles were passed without any sign of human habitation. I enjoyed the ride of 500 miles through the prairies much more than anything else I have yet seen. It was a new experience. What an expressive silence seemed to overhang the vast stretch of grass-land. A heavy storm of rain and sheet lightning suddenly came on and drove us into the car at sunset. When I woke this morning at four o'clock and looked out of the carriage window I saw an exquisite sunrise—a beautiful pink flushed all the east, and the prairie fairly gleamed with golden yellow and blue.

[Photo by Gutebrunst, Philadelphia.

PROF. GEIKIE IN 1888.

The notes on Winnipeg and on the journey thence to Toronto are interesting as showing how little future developments were expected at this date. Of Winnipeg, described as being "in the far west," Prof. Geikie says:—"Winnipeg is a surprising place for so far distant a region. Here are some 25,000 inhabitants: it is quite a considerable town—with churches, theatres, etc., etc., and a Scientific Society." Speaking of his journey eastwards he says:—

We left Winnipeg on Wednesday (20th) and travelled all day through rough rolling ground, very rocky and sprinkled with my friends—boulder-clay, morainic gravel and sand, and large erratics. The country was upon the whole rather dreary, dense thickets of spruce fir covering the rocky knolls, and swamps and morasses lying in the hollows. Here and there where the ground was more open the prairie flowers flourished, and butterflies and dragon-flies fluttered and darted about in the sunshine. Night overtook us while we were still in the same monotonous country. A number of British Ass. folk had joined us at Winnipeg, among them Prof. Ramsay,[4] a nephew of *my* Prof. R. The night we passed in the sleeping-car, and next morning found us still sweeping along [Pg 109] through the same kind of forest land. Very fine evidence of ice-work was seen all the way—just like what I know in Wester Ross and Sutherland. We breakfasted at a rough station in those dreary backwoods. Houses are few and far apart in such a desolate region, and I can't see how the railway can ever pay. We passed over 1000 miles of land, most of which seemed to me as barren and hopeless as the poorest tracts of the Outer Hebrides. The trees are small miserable sticks, and everywhere one sees rising above these small trees tall ragged and naked trunks, marked with fire, showing that much forest land must have been destroyed by fire in earlier days. We stopped at last at Port Arthur, at the upper end of Lake Superior, where we spent the day and night. This is a small backwoods town of some 2000 or 3000 inhabitants. The view over Thunder Bay is fine, and I enjoyed a walk into the country.

[4] Later Sir William Ramsay.

Next day the party sailed down the lakes to Owen Sound and took train for Toronto. From here Niagara was visited, and after that the journey continued to Montreal.

From Montreal Prof. Geikie went south to Philadelphia, where he found the heat very trying, and then back to New York and on to Boston. The latter town attracted him greatly. "I feel more at home in Boston than I have felt since leaving Auld Reekie. The people are more like our own people too." Here he met and made many friends, and tells an amusing experience with a

German lady doctor, who made wine from grapes grown in her own vineries. She and Prof. Geikie got on very well together, and the latter was invited to visit the vineries and taste the wine. Having received a private warning, the professor resolved to display extreme abstemiousness when confronted with the fluid, but the lady ceremoniously proposed the health of her guest from [Pg 110] across the seas, who felt constrained to return the compliment with a brimming goblet. Fortunately the proceedings came to a close soon afterwards, and Prof. Geikie and his friend were able to hurry home to the latter's house in order to correct the influence of the concoction with a modest "dram." They took a long drive afterwards, and no results followed, apparently, beyond the acquisition of a conviction that the climate of Boston was unsuited to the juice of the grape.

Shortly afterwards Prof. Geikie returned home, and in December he writes to Mr Horne bemoaning the amount of work which he found waiting for him. He says:—"But know one thing, O Horne, that here in Auld Reekie I am pestered to death with correspondence. People scribble on all sorts of subjects, and expect answers, and I begin to hate the sight of notepaper. And so the letters that I ought to write and like to write remain unwritten, while those I detest to write take up more time than I like to waste. You should have seen the piles waiting for me on my return from Yankee land—some of the rubbish is not answered yet." He goes on in the same letter to say:—"I find living in town more expensive than the country, there are so many calls upon one, and the class does not pay as well as I had hoped. But that is mending and I have good hopes." He also speaks of a "pot-boiler" he was busy with, to wit, his *Outlines of Geology*, which though far advanced at this time did not appear till more than a year afterwards.

The same note occurs in other letters of the following year, and a projected visit to the [Pg 111] Hebrides in the summer of 1885 had to be given up owing to "circumstances over which I have no control (*i.e.*, empty purse)." "Living here is not so easy as in the country," he adds again. But he also says:—"I have got into the ways of my new sphere and jog along very comfortably."

More interesting than the "pot-boiling" of which he speaks frequently, was his work in connection with the Scottish Geographical Society, in which he took an active part in the autumn of 1884. Thus in the letter already quoted he says:—"I have been sair taigled with that Geographical Society, but I think it will do; and I mean to work it to some purpose. We are going to bring out the first number of a Geographical Magazine in January, for which I have promised to write a short article on the Physical Features of Scotland."

At the first meeting of the Royal Scottish Geographical Society, it may be noted, which was held on 28th October 1884, Prof. Geikie moved—"That this meeting, recognising the scientific and general utility of a national society for the promotion of geography, resolves that a Geographical Society for Scotland be now formed." He was associated with the Society till his death, and took a very active part in its management, as Hon. Editor from 1888 onward, as a Vice-President, and for the period 1904–1910 as President. Beginning with the first number also he made frequent contributions to the *Scottish Geographical Magazine*, contributions of great [Pg 112] scientific importance, and in addition was always ready to put his knowledge and experience at the disposal of the Acting Editor. During a long period of years his work for the Society must have made large inroads upon his time and energy, and thus geography in Scotland, no less than geology, owes him a great debt of gratitude.

No very noteworthy events took place in the year 1885. The *Outlines of Geology* was finished, though it did not appear till after the New Year, and in autumn a visit was paid to Louisa, Lady Ashburton, who became a great friend of the family. The visit was to Lady Ashburton's country house at Loch Luichart in Ross, and was very enjoyable, many drives being taken to surrounding places. On the homeward journey Prof. and Mrs Geikie stayed with their friends Mr and Mrs Horne at Inverness.

The party at Loch Luichart was evidently a very gay one, and Prof. Geikie, freed from strain and at leisure, seems to have been full of life. Letters from members of the party, written on receipt of Heine's *Songs and Lyrics*, which saw the light in the autumn of 1887, are full of allusions to the visit and to the songs that had been sung during the drives, allusions which cast a pleasant light on the geologist's human side.

In the early part of 1886 the *Outlines of Geology* appeared, and was so successful that a second edition was called for less than two years afterwards. During 1886 also Prof. Geikie's fourth son was born.

As the year went on, signs of strain due to the process of adjustment to the conditions of town [Pg 113] life began to make themselves apparent, one of the most distressing symptoms being insomnia. A sleeping-draught which gave five or six hours of sleep was welcomed with a fervour which tells a pitiful tale. Perhaps in some ways even more serious for one who was lecturing daily was loss of voice, which occurred at Christmas. The brief vacation failed to produce permanent improvement, and the early part of the year 1887 saw a losing struggle between ill-health and James Geikie's strong sense of duty. As soon as the spring vacation freed him he went off to the Canary Islands to recuperate. A letter from Teneriffe, dated 18th April 1887, indicates a characteristically rapid rebound of spirits:—"This place is a paradise on earth!" The hotel (at Orotava) he describes as "simply fairy-like. It is bowered in trees, palms and others. Fountains and lakes are all round, lovely gardens one blaze of gorgeous colour, and rich green, cool colonnades with lounges where you can sit and dream and gaze on the sunlit sea. The mornings and evenings are simply heavenly."

During his stay Prof. Geikie climbed the Peak on foot, an exhausting excursion in the heat, and one for which he was probably not fit. His account of the effect of rising above the mountains

noontide cloud-cap is interesting:—“When we got above the clouds the sight was very grand. The upper surface is approximately level, and, rising above it, the higher ridges and mountains look so many islands in a tumbled and rolling sea. But such a sea! Imagine the sun blazing down from [Pg 114] a perfectly clear and cloudless sky—the mountain tops rugged and serrated, and coloured red and yellow—and the cloud-sea shining with the most silvery brilliance. Now and again the wind would cause the clouds to rise up like billows and roll for some little distance up the hill-slopes above the general level of the cloud-sea, but the invading billows were soon torn to shreds and disappeared.” Of the top he says:—“What a weird scene it was. Here were numerous extinct volcanoes, craters looking raw and red just as if they had vomited forth yesterday. The ground was sprinkled all round with slags and cinders and volcanic sand and dust, and not a blade of grass was to be seen.”

Prof. Geikie did a certain amount of geologising during his stay in the Canaries, and said in his letters home that he was greatly the better for his trip:—“My voice is as strong as ever, and I feel braced up in every way.” Unfortunately the improvement did not last after his return home. He had a disappointing summer, and with winter the insomnia returned. He could do little save his class work, and this was a sore struggle. But the fact of his being cut off from his own special work had the effect of turning his attention again to the German poems, and the book, as stated, finally appeared in the autumn of 1887. A good many of the letters acknowledging receipt have been preserved, for the poems had always been very dear to him. A pathetic letter from Lady Ramsay records the pleasure which the book gave to Sir Andrew Ramsay, now an invalid and sadly changed from what he had been in his prime. She had read some of the verses to him as he [Pg 115] sat in his bath-chair at Beaumaris, where the family were now living, and they had brought back some flashes of his old animation.

Prof. Geikie’s health continued to give cause for anxiety throughout the winter of 1887–1888, and in summer he and Mrs Geikie went to the Engadine, in the hope that the high altitude and bracing air would do him good. As the weather became colder they went down into Italy, coming home eventually by sea from Naples. Some charming letters to the boys, who were left at home, and to others of the family connection, have been preserved, but deal for the most part only with the usual incidents of travel in the Alps. “The boys” were by this time old enough to be keenly interested in butterflies, and their father gives some humorous descriptions of his attempts to increase their collections.

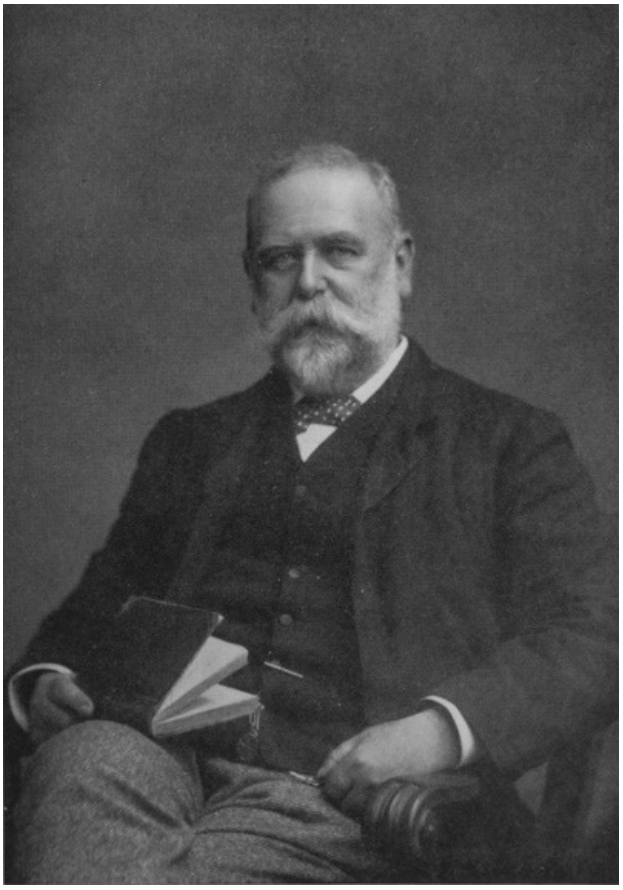
Among the minor incidents of the tour were a meeting with Huxley at the Maloja, and the delivery by Prof. Geikie of a lecture on the Ice Age at Pontresina to an audience of two to three hundred people. The latter part of the visit to the Engadine was marred by the cold, and the altitude did not seem to suit him so well as he had hoped. On the journey through Italy a stop was made on Lake Como, of which Prof. Geikie speaks with the same enthusiasm as of old. On the whole, the tour seems to have been very beneficial, and to have been an important factor in restoring him to health.

CHAPTER VIII [Pg 116]

Final Edition of “The Great Ice Age”

1889–1903

At the beginning of 1889 Prof. Geikie was awarded the Murchison medal of the Geological Society of London, “in acknowledgment of his important contributions to the geology of North Britain, and especially of his investigation of glacial phenomena.” A letter of cordial congratulation from his old friend Mr Whitaker on the award speaks of the writer’s own debt to the author, and of his adoption of a number of the latter’s conclusions. In this year also he was made a D.C.L. of Durham University.



[Photo by Elliott & Fry.

PROF. GEIKIE AT THE AGE OF SIXTY.

At this time Prof. Geikie had added to his university work proper a course for women, who were as yet excluded from classes within the building. At the end of the course, in the spring of 1890, he took the members of the class on a long excursion to Birnam, to give them an insight into field geology. The party was a gay one, and their doings were celebrated by the leader in a series of [Pg 117] verses, of which the first runs as follows:—

Of the Geologic Class
  Sing the glorious days' renown
When to Birnam it did pass
  From the tumults of the town—
A score of earnest students in their frocks,
  Behold the learned band,
  Each with hammer in her hand
  Prepared to pound to sand
    All the rocks.

Prof. Geikie's muse was also active the same summer at the dinner of the Edinburgh Royal Society Club, held in honour of Dr Nansen's return from Greenland, where he sang a song of his own composition which met with a great reception. Its *motif* was the joys of Greenland as a place remote from civilisation, and a lament over the fact that, except for that happy land, "the hale round world is tounifeed."

In this year also he was President of the Geological Section at the Newcastle-on-Tyne meeting of the British Association, and devoted his presidential address to the subject of "Glacial Geology."

In 1891 he returned to America, this time to deliver a course of lectures at the Lowell Institute in Boston. This gave him an opportunity to renew many pleasant friendships made during his previous visit, but his stay was somewhat marred by an attack of influenza. Among his papers are many notes of invitation and greeting, an interesting one being from Prof. William James, which contains careful instructions as to how the host's house might be found, accompanied by a [Pg 118] sketch-map.

The following year saw the publication of an important paper "On the Glacial Succession in Europe," in regard to which the author says, in a letter to his friend Prof. Stevenson of New York: —"I sincerely believe that the conclusions will stand, no matter how extravagant they may now appear to be." This year also he was President of Section E (Geography) at the Edinburgh meeting of the British Association, the subject of his presidential address being the "Geographical Development of Coast-lines." Among the foreign guests at this meeting was the Norwegian botanist, Prof. Blytt, who writes to thank him "most heartily for all your great kindness to me during my stay in your beautiful city."

By this time Prof. Geikie's university work had considerably increased, for in 1891 he had been

elected Convener of the Science Degrees Committee, and, after a Faculty of Science had been instituted by the Royal Universities Commission in 1894, he was elected Dean of the Faculty, a post which he held till a year before his retirement from the professorship. This brought him into contact with all the science students, and gave him much to do in the way of organising and arranging courses. As a result his feeling of strangeness to university life seems to have passed away entirely, and he became thoroughly absorbed in the life of the institution. The work of the Universities Commission also greatly improved the status of his subject, and his position as Dean [Pg 119] gave him much influence in moulding the policy of the University in regard to scientific education. A series of verses, apparently never published, but written in support of an appeal for more funds for university purposes, adopts a very different note from the earlier verses which we have quoted, and show that too much stress should not be laid upon those as representing more than a passing mood.

In 1893, in addition to various papers, a volume of collected essays and addresses was published as *Fragments of Earth Lore*. But this must have been merely a piece of byplay, as it were, for during 1892 and 1893 the laborious task of bringing *The Great Ice Age* up to date was being carried on. Thus on 29th January 1893 he writes to Prof. Chamberlin of Chicago, saying:—

> I have been busy of late in completing a new edition of my *Great Ice Age*. So long a time has passed since the publication of the last edition that I have found it necessary to rewrite the book. The labour of boiling down the evidence obtained by the geologists of Scandinavia, Russia, France, New Zealand, Italy, Spain, etc., has been very great, and has rather taken it out of me, so that for the present I am compelled to lay my MS. aside and do nothing!

But the interval of rest can only have been brief, for he writes again on 12th March, saying:—

> I am again slowly working at my book, in hope that I may have it in the printer's hands by the end of summer.... I have been truly astonished to find that the voluminous materials which have been collected during the last seventeen years in Europe, group themselves without the least difficulty into a coherent and intelligible whole. Until I had tabulated the results I was hardly prepared to find that the evidence from all parts of Europe [Pg 120] tallied so closely. Each bit of the puzzle seems to drop into its place with ease.

The hope expressed in this letter was not fulfilled, for nearly a year later, on 20th January 1894, we find him writing again to Prof. Chamberlin, saying:—

> In the course of week or two I hope to complete my new edition of *The Great Ice Age*. The revision has given me more trouble than I expected, chiefly on account of the large number of foreign papers which I have had to read and digest, for I was anxious to exhaust the evidence as far as I could....
>
> I am hoping to put the manuscript in the printer's hands by the end of March or middle of April. I give myself that additional time, for I wish to take another look at some of the deposits on the Baltic coast lands before finally parting with my MS. As soon as I get rid of my College duties I shall start on my flying visit to Denmark, etc. Some very remarkable evidence has turned up recently in Tasmania and Australia. Geologists will have to reconsider their notions as to glaciation of our Antipodes in the light of the newly discovered evidence. I much wish that I had a long purse, unlimited time at my disposal, and a younger earthly tabernacle, for under those happy conditions I should sail straight away for the South, to see what I could see.

Prof. Chamberlin was supplying a sketch of the glacial phenomena of North America, which forms Chapters XLI. and XLII. of the completed book, and the correspondence between the two went on during the greater part of this year, for the book was not published till autumn.

On 4th May he writes:—

> I have just returned from a few weeks' holiday in the Baltic coast lands of North Germany and Denmark, where I had another opportunity of studying the great moraines of the Baltic Glacier.... I am quite ready for press—all the maps are engraved—and am most anxious to have the book set up and corrected for press before [Pg 121] the end of July. I shall probably go abroad then: and it would be impossible to revise proofs away from my library.

In the summer Prof. Geikie had a visit from his friend Prof. Stevenson of New York. In an undated letter to the latter, apparently written in early summer, arranging details about the visit, he says:—

> I am sorry to hear about the nervousness. Having had it myself—for three years—I know what it means. But, courage! *mon ami*, with care you can stave off the enemy. The beast has been threatening me again for some months past. But the work which caused him to look in upon me, with his infernal grin, is now all but finished. In a fortnight I shall be a free man! Then geology may go hang till winter. I wish I had a long sail across the briny again, to Fiji or anywhere out of the busy haunts of man.

The summer holiday was spent at Traquair on the Tweed, and in a letter to Sir George Douglas written from there on 10th August, Prof. Geikie says:—

> I had thought at one time of going to the Continent, but here it is more restful and that is what I wish. I have no news of any kind, but am happy to say that I have at last escaped from the printer's devil. My *Penelope's Web* is out of my hands at last: and I shall do nothing for the next month or two save loaf about the hills.

But as always there were delays at the last, and a month later he writes to thank Prof. Chamberlin for some additional notes, saying:—

> The notes were quite in time to be inserted in the proofs. The book will not be "out" before October. The engravers have kept us back a little; but it is no joke revising the proofs of 850 pages.... You may be sure that [Pg 122] an early copy of my book will be sent to you as soon as I can get it out of the publisher's hands. I am sorry, however, that it is so big. I did what I could in the way of compression; but there is so much new to tell.

In the autumn a very pleasant incident occurred, and as it is recorded in letters sent to Prof. Chamberlin, they may be permitted to tell the tale:—

19th Oct 1894.

A short time ago I had a most gratifying letter from the Glacialists' Excursion-party of the Geological Congress. The party (thirty in number) embraced some of the best known European glacialists, and was under the guidance of Penck, Brückner, and Du Pasquier. They went over the sections showing the glacial succession in the Alpine Lands, and were convinced that Penck's interpretation of the facts were correct. In short, they admit that there have been at least three separate glacial epochs, and each separated from the other by long-continued valley-erosion during interglacial times. The letter sent to me was signed by all the excursionists. The evidence, indeed, is so striking that one wonders that Alpine geologists should have been so tardy in recognising it!

29th Nov. 1894.

I do not think there would be any impropriety in publishing the letter I received from the glacialists, and you are welcome to use it for the *Journal* if you think it worth while. The import of the letter appeared in some German newspapers at the time; but I never thought of publishing it here. Yet I see no reason why it should not appear in your *Journal*[5]—only, I may be accused of personal vanity in sending it to you. But there is really no vain-glory in the matter, all that the writers say is simply that I would be pleased to see that they had studied [Pg 123] the evidence adduced by Penck, Brückner, and Du Pasquier, and were convinced that the Alps had been glaciated three times. I therefore enclose a copy of the letter, the signatures being copied exactly as they are given. You will see the list includes some of the best known glacialists of Europe.

[5] *The Journal of Geology*, of which Prof. Chamberlin is joint editor.

COPY OF LETTER

Restaurant Schlossberg
am Starnberger See,
Sept. 23, 1894.

Dear Professor Geikie,—As members of the Glacialists' Excursion we have studied the superposition of three successive glaciations and their interglacial deposits on both sides of the Alps, and we desire to address our congratulations to the Author of *The Great Ice Age* and to express our regret that you were unable to be one of the party and see for yourself a series of exposures which would have a very special interest for you.—We are, with sincere regards,

Signed—

Albrecht Penck.
Eduard Brückner.
Léon Du Pasquier.
André Delebecque.
Hugh Robert Mill, London.
Dr Andr. M. Hansen, Kristiania.
Dr K. Keilhack, Berlin.
Dr S. Zimmermann, Berlin.
Professor Dr A. Jentzsch, Konigsberg.
Prof. Dr G. Berendt, Berlin.
Dr Grein, Darmstadt.
Leo Wehrli, Zürich.
Professor Dr Wahnschaffe, Berlin.
A. W. Pavlow, Moscow.
Dr Willi Ule, Halle a/S.
Prof. Dr Fritz Regel, Jena.
Prof. A. P. Pavlov, Moscow.
Dr Aug. Aeppli, Zürich.
Dr F. Mühlberg, Aarau.
E. Flournoy, Genève.
J. Lorié, Utrecht.
Immanuel Friedlaender, Berlin.
Prof. A. Woeikof, St Petersbourg.
Dr Hav. Pfeifer.
Dugald Bell, Glasgow.
Mrs D. Bell.
Dr Adolf Forster, Wien.
Dr A. Schenck, Halle a/S.
Bernard Hobson, Manchester.

The third edition of *The Great Ice Age* duly appeared in the autumn of 1894, and some extracts [Pg 124] from a letter written by Prof. Stevenson may help to show the impression produced on a fellow-worker by the contemplation of the toil involved. Prof. Stevenson says, under date 30th May 1895:—

I have been working away over your *Ice Age*. It is a wonder you were not frozen solid during the work. Collation and comparison of observations upon the American Carb.[6] are bad enough, but the conflicts are as nothing compared with those with which you have had to deal. I can well imagine that [you] felt as you penned the last chapter as Captain Marryat did once, when he closed the title of his last chapter with "And the author says 'Thank God.'"

[6] That is the Carboniferous beds of North America, the work upon which Prof. Stevenson was himself engaged.

The next few years were passed in the usual round of writing and teaching. In 1896 a third edition of the *Outlines of Geology* appeared, and in 1898 a number of lectures and papers were collected together in book form as *Earth Sculpture, or the Origin of Land-forms*, which ran through several editions.

In 1897 the Edinburgh Royal Society Club entertained Dr Nansen to dinner on his return from the *Fram* expedition, and Prof. Geikie, who was always the life of such gatherings, sang a song of his own composition which was greatly appreciated.

Among the letters of these years, which include many to American and continental friends, is one to Prof. Stevenson from which the following passages, as representing a considered opinion, may be quoted:— [Pg 125]

> It is certainly a pity that the men who can work and would fain devote themselves to original investigation, are often prevented doing so by the necessities of life. I am not so sure, however, that some of them would do work if they were placed in an independent position.... I'm much afraid that man on the whole is a lazy beast, and needs some kind of whip or bribe to make him live laborious days.

During the course of 1900 Prof. Geikie had a pretty compliment paid to him from across the Atlantic. On his first journey across he made the acquaintance of Mr Louis Elson, a professor of music at Boston. The friendship so begun was kept up in later years, and Mr Elson dedicated one of his books, *Shakespeare in Music*, to "Prof. James Geikie, LL.D., D.C.L., of Edinburgh University, with cordial remembrance of many pleasant conferences on this and kindred topics." Another American recognition of his work was the naming by the U.S. Geological Survey of Mount Geikie, in the Wind River range of the Rocky Mountains in Wyoming, in his honour. The mountain reaches a height of 12,546 feet. The information has been kindly supplied by Mr J. G. Bruce of the Forest Service, Lander, Wyoming.

In the spring of this year Prof. Geikie made a tour with a friend to the Pyrenees, a tour which made a great impression upon him, and seems to have been an unqualified success. Some charming letters to his wife describe incidents of the journey, the letters, like all similar family correspondence, being full of regrets that no members of his own household accompanied him. Though the visit was made very early in the season, in the month of April, and the snow still lay deep in the high valleys, the weather was almost perfect, and the two friends took many long excursions. Among these was one to St Bertrand de Cominges, which attracted Prof. Geikie strongly. In a letter written from Luchon to Mrs Geikie in regard to it he says:— [Pg 126]

> Yesterday we had a most interesting excursion to see an old fortified mediæval cathedral town. You would have enjoyed it. It was quaint and picturesque beyond measure. Evidently, now, cathedral and town are in a backwater—the flood of life has long gone past them. The church, however, contains magnificent wood-carving of the 13th century. It was the kind of town of which one sometimes dreams—hardly a town, but a sleepy village perched on a high rock with a wide outlook over the lowlands, and a grand view of the snow-capped mountains to the south. I saw one old house—or the top of it, rather—was for sale. It had quaint dormer windows and corbel gables, and was shut off from the narrow street by a high gate of weather-worn carved oak, hundreds of years old. I was tempted to buy it—when you and I tired of the world we could retreat to the seclusion of that sleepy old village, and dream the days away. The sun was as usual blazing from a cloudless sky, and as I leaned over the old battlements of the wall I could see that the wall from top to base was aflare with wallflowers and other plants, while mosses, ferns, and lichens were everywhere, every stone encrusted with moss and every crevice of the masonry stocked with flowers, etc.

In the same letter he says:—

> Walking in the scorching heat is most fatiguing. I had over twenty miles of such walking the other day, and will not repeat the experience. All the same I delight in the blaze—the heat and lightness seem to penetrate your skin and work their way to your very vitals. How one's blood courses! and how the old youthful feelings come back! [Pg 127]

Another passage from a later letter, written from Argelès, may be quoted, less for its description than for the light it casts upon the character of its author. It may be noted that by this time he was the father of the much longed-for "wee lassie," who had been born a few years before. He says:—

> The wee lassies are most delightful to look at. Many of them, as I have already mentioned, are little beauties. Such sweet, demure, kissable wee things they are, with their hair neatly done up, and hanging down in a plait behind. They are all bare-headed and all are dark. Brown to black hair, with soft liquid brown eyes, rich red lips, and a rosy flush in their tawny faces.... In years to come I will often dream of the bonny wee toddlers I stopped on the road to pet and fondle in these beautiful valleys. R. was as much struck as I with the children. But as I have my own wee lassie in my thoughts, he probably did not feel his heart in his mouth and his eyes water as the wee ones passed us on the road.

To these letters, written during the trip, may be added some extracts from one written to a member of the family circle after his return home. On 29th May he writes from Edinburgh:—

> Since my return from France I have been driven from post to pillar, doing my best to clear off arrears. Now I am in a way "redd up," and able to look round.... I feel quite rejuvenated with my trip.... I saw much that was very interesting to me as a geologist and much also that was beautiful, so that my memory is now stored with a fresh series of lovely visions—of picturesque and quaint people.... I have looked out one or two places to which some day I hope to take Mary and (if my purse is long enough) the wee lassie—that is when she is bigger! But half my life has been spent in dreams and plans for the future, and *some* only of these have been realised. [Pg 128]

The letter goes on to speak of that great May function in Edinburgh, the Commissioner's garden-party. Mrs Geikie and their eldest son were to go to this—"Stewart will go as 'Professor Geikie.' The professor himself can't be induced to go, and (as this is a holiday for him at college)

he is taking Mary Dorothea out to Mortonhall Golf Club-house for afternoon tea. The young lady has been looking forward to this treat ever since I came home."

The identity of the "young lady" will perhaps be apparent without explanation.

In 1901 Prof. Geikie was made an Honorary Member of the New York Academy of Sciences, his name having been brought up by his friend Prof. Stevenson. In writing to thank the latter he speaks of his hope of being again able to visit America, saying that as soon as "my lads clear out from the nest, it will be easier for Mrs Geikie and me to go off on a long holiday." The future careers of his sons were at this time occupying a large share of his thoughts, for the three elder boys were ready to begin life on their own account.

He had a few years before taken to bicycling, and was full of the pleasure and health he found in the exercise. During this year also his friend, Mr Elson of Boston, paid the family a visit at Beauly during the summer holiday, a visit of which Mr Elson speaks with both enthusiasm and gratitude in later letters.

The next year or two repeat the same tale of work and play, the latter including much bicycling, [Pg 129] and a visit to Norway in 1903. In 1903 he writes to his eldest son:—"To-day I am sixty-four, and feel no older than I was twenty years ago. Indeed I am younger than I was four or five years ago." Of work it need only be said that new editions of two of his books appeared in these years, *Earth Sculpture* in 1902, and *Outlines of Geology* (fourth edition) in 1903. Mention of an entirely new book may be reserved for the next chapter. A pleasant little incident of the summer of 1903 was a postcard from the Glacialists' Excursion of the International Geological Congress, who sent, from Telfs in Tyrol, "Greetings and best wishes to the Nestor of Glacial Geology." Such greetings were a frequent and always a pleasant experience.

CHAPTER IX [Pg 130]

Retirement from the Professorship and Last Days

1904–1915

During 1904 Prof. Geikie began to suffer from an affection of the knee which troubled him for some years, and proved to be a form of rheumatism. In October he writes to his son telling him of the progress of his new book, which was published the next year as *Structural and Field Geology for Students*, and in a few years' time ran into a second edition. With his usual optimism he hoped to have it out early in the New Year, if not before, but by the following April he was still busy with proofs, and publication did not occur till June. Writing in April he says:—"The last sheet of my book will be off to the printer to-morrow, and the book itself will, I hope, appear before the end of the month. I shall feel like a fish out of water with no scribbling on hand. Nothing like it for filling up vacant hours." When writing this letter he was on the eve of starting off for a visit to Ayr, in the hope that a course of bicycling would "supple" the leg. In this, however, he was [Pg 131] disappointed, and in summer he and Mrs Geikie went to Wildbad in Würtemberg, where he hoped to find a cure.

The baths, temporarily at least, did him much good, but his fellow-patients, mostly of German nationality, did not please him, and his letters are full of humorous complaints in regard to them. He was keenly interested also in the nature of the water, being convinced that its curative properties were not due to the constituents apparent on analysis but to some of the rarer elements, such as radium, present though undetected. The suggestion has been made and confirmed in regard to other waters since, but his keenness on the problem is of interest as showing that there was no failure of mental power. His letters to his doctor son on the physiological effects of the waters are full of his old *verve* and clearness of exposition. Characteristically, however, he breaks off the scientific discussion to speak of the "fat Fraus and Herren," whom he and his wife daily watch "as they slowly waddle and roll to and fro" near the Trinkhalle. His impressions he sums up in the following verses:—

> The typical Frau, to my British mind,
> Is preposterous in front and prodigious behind:
> Her digestion is sound—for, 'tis very clear,
> Her grub she dissolves in an ocean of beer.
> Her lord, who is equally round and obese,
> Rolls along by her side, with a grunt and a wheeze—
> Rolls along, did I say?—they do not roll far,
> But rotate within reasonable reach of a bar.

With perhaps some recollection of his early studies of Heine, he takes eye measurements of the [Pg 132] average German lady, and winds up with a vivid description of an ordinary German's meal, and a disgusted—"But the most of these people are gross eaters."

During 1906, as indeed until his death, he was carrying on a constant correspondence with Prof. Stevenson of New York, in which many questions—geological, social, political, personal, and so forth—came up for discussion. Thus in January 1906 he says, speaking of his sons and their careers:—"All the birds are out of our nest now, all save one wee lassie who remains to brighten our hearts with laughter and song." By this time his eldest son was established in a practice at

Ayr, the next two were working as mining engineers in Borneo, and the youngest was studying music in Germany.

During this year the rheumatic knee still troubled him, and a visit to Harrogate to try the waters there did not produce much permanent benefit. The summer was spent in Ayrshire, but was saddened by the sudden death of a favourite niece, who had been almost a daughter of the house during the long years when the family consisted only of boys, and was on holiday with her uncle and aunt at the time of the acute illness which caused her death.

In 1907 his eldest son was married, and there is a charming letter written to him on his wedding tour, with much wise advice about matrimony, mingled with personal experiences. Among other things the writer says:—"When I went on my honeymoon I took a geological [Pg 133] hammer with me, but the geology did not count for much. I think the hammer was used chiefly for digging up roots and ferns for your mother, or for knocking off bits of rock that were covered with gay lichens." The young couple had gone to Devonshire, and this sent the father back to Herrick, and that writer's description of "dull Devonshire."

In the autumn Prof. Geikie had the pleasure of meeting Prof. Stevenson of New York, who came to London for the Centenary Celebration of the Geological Society there. At the end of November he writes to his eldest son, saying:—"My work at College is easy this winter, for I feel in much better health than I have done for two or three years. My lameness is practically cured, and I begin to think that I may yet be able to go with May to her first ball, and dance a reel with the nicest-looking girl in the room—as usual."

In the spring of 1908 Prof. and Mrs Geikie and their daughter, together with a niece, went to Portugal, which they all enjoyed greatly. In the early part of this year also the first grandchild, a little girl, was born. Another event of the year was the translation of *Structural Geology* into French.

The correspondence with Prof. Stevenson was still going on, and there was an interesting letter from the latter in August. He was contemplating retiral from his professorship, while Prof. Geikie had no wish to give up his own post, and the two discussed the question of the desirable age for the event. Prof. Stevenson wished to have leisure to complete some private work of his own, and [Pg 134] his letter contains the following interesting passage:—

> You were a fortunate man: you struck out into an unexplored field and you lived to correct your own errors. Yours became the monumental monograph on the Glacial period: the volume is in all libraries and it never can be ignored safely by even the shrewdest and most unscrupulous of borrowers. A merciful Providence directed your steps toward a problem of world-wide interest. Your great-grandchildren will see your work quoted in all standard treatises. Like the rest of us you have brought many loads of bricks for the geological edifice, but, unlike most of us, you have shared in the work of construction.

The summer of this year was spent at an east coast watering-place, where the weather was wet and cold. Prof. Geikie was frankly bored, and expresses himself in a letter to his eldest son with a vividness which will appeal to all who have had a similar experience. The letter is long—its composition was doubtless the occupation of a hopelessly bad day—and we shall quote only some extracts:—"Our rooms are so small we are constantly tumbling over each other and gnashing our teeth at each other.... I have got to loathe that beach, and to hate the sound of the waves, and the smells of the village, and the raucous voices of the natives and their sluttish ways. I have been reading a very interesting book upon the cemeteries of Etruria. Some of the painted sepulchres must be quite cheerful, and I really think if one could hire such a tomb for the summer it would be better than taking a house in Caledonia stern and wild. Of course we should only sleep in the sepulchre—a good lamp would give all the light required. We should select one on a hill-side near [Pg 135] to which no motors could possibly come, quiet and retired, with only sheep and cattle for our neighbours.... From the doorway of the tomb we could feast our eyes on unrivalled scenery, bask in the sun, scent the soft zephyrs with the aroma of tobacco, and envy no man.... The geology would interest me, but what I would chiefly enjoy would be blue skies, warm sunshine, absence of whirlwinds and tornadoes, with none of that blighting easterly haar. No wonder the majority of Scotsmen are Calvinists and Radicals—their country is enough to make them that—and worse, if it were possible."

A little later in the letter, however, he admits to having had one really good day, when he and Mrs Geikie made an excursion together:—"We had a bag loaded up with grub, kettle, teapot, spirit lamp, etc., the weight of which was not inconsiderable. I would have dropped it, but your mother was so happy with the prospect of tea by the sad seashore, that my heart melted within me. (I must say, however, that my whole body was in a melting condition before we got back.)"

In 1909 his second grandchild was born, another girl, which brings from the grandfather the remark:—"Girls are far the nicest, especially when a father gets old and wants some one to bring him his slippers, or to fill and light his pipe. Boys are of no use in a family; they only make noises, damage the furniture, harass their mothers—and, in short, they are the very devil." Writing in [Pg 136] March to his son, he returns to the question of his resignation, saying:—"For myself, I don't feel like resigning just yet! I can walk like any other Christian, and enjoy my work as much as ever: and my class keeps up its numbers."

In the summer he had an invitation to go to Boston to be present at the inauguration of Dr Abbott Lawrence Lowell as President of Harvard University, and at the same time to deliver another series of lectures at the Lowell Institute in Boston. He refused the invitation, however, though with regret, for he shrank from the long voyage across the Atlantic. Another pleasant incident of the year was the publication of Profs. Penck and Brückner's *Die Alpen im Eiszeitalter*,

which was dedicated to “James Geikie, dem Verfasser von *The Great Ice Age*, dem Landsmann von John Playfair.”

One of the two authors of the book, Prof. Penck of Berlin, was, as has been indicated here, an old friend of Prof. Geikie’s. The two first met in 1883, and, as we have already stated, Prof. Penck had repeatedly acknowledged his scientific debt to the author of *The Great Ice Age*, while there was a personal tie in addition. In 1914 Prof. Penck received the Gold Medal of the Royal Scottish Geographical Society, and was Prof. Geikie’s guest at the time when the presentation was made.

In the summer of that fateful year, however, Prof. Penck was one of the foreign guests at the Australian meeting of the British Association, and was in Australia at the outbreak of war. In the opinion of his hosts, his behaviour, in an admittedly difficult situation, lacked the perfect [Pg 137] “correctness” which was desirable, and this both in Australia and on the homeward journey. Some indiscretions in the way of sketching and photographing in the vicinity of military works led to his being detained for a time in London on his return. During this period he corresponded with Prof. Geikie on geological matters. After the latter’s death he wrote to Mrs Geikie from Germany a letter which, in spite of the circumstances indicated above, and in spite also of certain phrases which jar, cannot be regarded as anything but sincere. We quote from it the following passages, which form a notable tribute. The letter, it should be stated, was written in English:—

> James Geikie belongs to those who have influenced most my scientific evolution. His clear way of seeing things and his reasoning made a convincing impression on me, and though I never listened to one of his lectures, I felt always to be one of his students. He was my master. His *Great Ice Age* showed me the ways to understand the glacial deposits of Central Europe: his *Prehistoric Europe* arose my interest for prehistoric questions: his views on mountains, valleys and lakes gave me the base for my morphological work. He made me also acquainted with English and Scotch, with the life on the other side of the Channel, with English poetry, for he was a poet himself. And now he is dead, and he died in the year of the great war, which breaks the strongest links between our peoples.
>
> I am not superstitious and I do not lay stress on this coincidence of facts. I hope what I believe he would hope too, that the struggle of the nations will have one day its end, and that peace will come again which unites the different nations for great scientific works. But while the peoples are still fighting, I must express my heartiest sympathy to my old friend’s wife.

Returning to the chronological order of events in Prof. Geikie’s last years, we find that the year [Pg 138] 1910 was an unfortunate one, for he had a sharp attack of pneumonia in the spring. From this he made eventually a wonderful recovery, but the process was somewhat slow. Before his illness he had begun the book which was published in 1913 as *Mountains: their Origin, Growth, and Decay*, but his health, and the time it took to collect the beautiful illustrations, delayed its appearance. A letter from his brother, Sir Archibald, in September 1910 to Mrs Geikie speaks of his wonderful recovery, and goes on to say:—“I hope he won’t overtax his strength at College. With so splendid an installation for the Geological Department the temptation to do so must be great. I don’t know of any college or university that is better fitted out for geological teaching than Edinburgh now is.”

In this year Prof. Geikie retired from the presidentship of the Royal Scottish Geographical Society, and his retiral was the occasion of the presentation of his portrait, painted by Mr A. E. Walton, R.S.A., to the Society, a replica being at the same time given to Mrs Geikie. The ceremony of unveiling took place in the Society’s Rooms on 7th November 1911, when Prof. Geikie’s old friend and colleague, Dr John Horne, gave a short address on the scientific career of the original of the portrait.

It may be noted here that the fact that Dr Horne had for many years been living in Edinburgh explains the absence of letters in later years, for personal intercourse had taken the place of [Pg 139] correspondence. Dr Horne retired from the Geological Survey in this year of 1911, and in a letter to Prof. Stevenson, Prof. Geikie speaks of a dinner given to him by present and former colleagues on the occasion of his retiral. Writing in March, he says:—“Last night Dr Horne (Geol. Survey) was entertained by his present and former colleagues. My brother, wonderfully hale and hearty, was in the Chair. Horne retires from the Survey in June. It seems a short time ago when he first started work in the Survey as a lad under my guidance. But upon reflection I see the ‘short time’ = 44 years! When I think of it, old age seems to have come upon me all at once.”

Other incidents of 1911 were a spring holiday in Devonshire and a summer one in Switzerland, while in autumn Prof. and Mrs Geikie were at the Centenary celebrations at St Andrews University. Of these, Prof. Geikie sends a lively description to his daughter. He enjoyed the proceedings very much on the whole, but found many of the meetings and entertainments too long for his taste and strength. Of one dinner he complains that the speakers “not only exhausted time but encroached upon eternity.”

Towards the end of the year, now that the question of resignation was beginning to demand an early decision, Prof. Geikie resolved to present to the University the large collection of books and pamphlets which he and his brother Sir Archibald had made for the use of the students of the geological classes. A letter from the Secretary of the University Court, written at the close of [Pg 140] December, says:—“The Court desires me to communicate to you, and through you to your brother, Sir Archibald, in conjunction with whom this valuable collection of scientific works was made, their most cordial thanks. The loyalty to ‘Alma Mater,’ on the part of Sir Archibald and yourself, has been warmly appreciated by the Court.”

The chief incident of 1912 was a visit to London to take part in the celebrations of the 250th anniversary of the Royal Society, of which his brother, Sir Archibald, was president. In the following year Prof. Geikie was elected President of the Royal Society of Edinburgh, an honour of

which he was very proud. He held this position while his brother was still President of the London Society—a somewhat remarkable coincidence. In writing to congratulate him on the appointment, Sir Archibald says:—"I hope it will not give as much work and worry as my Chair here has given me."

In the early part of 1913 Prof. Geikie delivered in Edinburgh the Munro lectures, which were published the following year as *The Antiquity of Man in Europe*, and of it his old friend Prof. Stevenson says:—"This is no old man's book." In 1913, as already stated, the book on *Mountains* was published, and was dedicated to the author's "Old Friends and Colleagues on the Council of the Royal Scottish Geographical Society."

The summer of 1913 was spent in Skye, and there Prof. Geikie employed his leisure, as so often [Pg 141] in holiday times, in writing verses. A few stanzas may be quoted:—

Tired of Auld Reekie's stink and din,
  My thoughts fly far away,
And bear me on until I win
  The shores of Broadford Bay.

O there, I know, the heavens are bright,
  Keen is the air and pure,
And calm the day, and still the night,
  And rest and sleep secure.

Auld Reekie, very dear art thou,
  And yet, tho' fair to see,
Ten months within thy gates, I trow,
  Are quite enough for me.

. . . . .

Ended at last the weary round!
  Good-bye to leaden skies:
With every mile we onward bound
  Our spirits higher rise.

Onward o'er straths, thro' mountain glens,
  Past shimmering lochs and streams,
Until we view, with all its Bens,
  The island of our dreams.

And there we live the life that's good,
  No care, no stress, no strain,
With heart revived and brain renewed,
  Lost youth comes back again.

But if, as these verses show, holiday times still as of yore brought a sudden rebound of spirits, the strain of life was obviously beginning to tell. A pathetic letter has been preserved which was written to an old student, now Dr M'Alpine of the Department of Agriculture, Victoria, in the [Pg 142] spring of 1914. In it the writer says:—"Edinburgh has changed much within the last thirty years. To me it is a very different place, for I have seen so many of my old friends and companions pass away. The ghosts of those I have lost crowd about me, and like every old chap I feel the pathos of life. But I cultivate the philosophy of Daft Jamie Gordon, and believe it 'as weel to dee goin' as sittin'.' So I work away and still find much to interest me in this workaday world."

In an accompanying letter Dr M'Alpine recalls an incident of his student days which made a great impression upon him. One day, while with a party who were being taken over Arthur's Seat by Prof. Geikie, the discussion turned from the igneous rocks of the hill to the evidences of former glaciation. Prof. Geikie carefully removed the turf from some rocks near the summit to show the finger-marks of the vanished ice, and then as carefully replaced the grass in order that the evidence of the past might be preserved. For one of his students at least the unconscious act read an unforgettable lesson of reverence.

This message from across the sea may serve to suggest how much gain came from those years which sometimes seemed to be spent largely in a weary round of drudgery. It is not only in his books that the dead man still speaks to the world. That, in fair weather and in foul, in the prime of manhood and when age was creeping on, Prof. Geikie led successive bands of often raw youths and maidens over those hill-sides, has helped to give them an interest which Nature alone could [Pg 143] not give, a charm which untrodden ways can never attain. On those grassy slopes an old man saw visions and young men dreamed dreams, and the dreams and the visions have become a part of our island heritage.

In the spring of 1914 Prof. and Mrs Geikie went to stay at Appin. A friend of the family, a keen entomologist, was to have been of the party, but was at the last unable to come. From Appin Prof. Geikie sent her a series of verses to console her for the disappointment, which was not, he says, really a disappointment, for a heavy storm had destroyed all insect life in her customary collecting-grounds. A few of the lines may be quoted:—

O come nae mair to Appin, lass!
Here things are at an unco' pass!
A tempest rages o'er the land,
Uprootin' trees on every hand;
Cauld rains and sleet in torrents fa'—
The hills are hidden, ane and a';
Naething but waves and clouds we find,
Naething we hear but screechin' wind.
Ahint the dykes, wi' heads downcast,
The kye seek shelter frae the blast;
Distracted wi' the wintry weather
The sheep are huddled a' thagether:
The birds, puir things, are blawn awa'—
Even the sea-mew and the craw.
You needna come to Appin noo
The wiley beetle to pursue:
Clockers and bugs o' every kind
Are bashed and batter'd by the wind,
And kill'd are a' the chrysalises—
Dear to the heart o' learned Misses.

To Appin also the family returned in summer, after Prof. Geikie's retirement from the Chair at Edinburgh, and it was there that they got the news of the outbreak of war. Prof. Geikie gave his last lecture at Edinburgh on 19th June, and his successor, a former student of his own, Prof. Jehu of St Andrews, was appointed shortly afterwards. [Pg 144]

The rest of the story is soon told, for Prof. Geikie's hope that his retiral from the professorship would give him time for his own work was not destined to be fulfilled. The autumn was spent—as all spent that fateful autumn—in watching and waiting, but unlike some of his fellow-countrymen, Prof. Geikie, if he never doubted of the ultimate result, was yet sure from the first that the war would be long and terrible. He was not well throughout the winter, for an attack of influenza in November weakened him, and he seemed to have lost his power of recovery. Later he suffered from his old enemy, dyspepsia, though there did not appear to be any particular cause for alarm. On the 1st of March he died suddenly as the result of a heart attack, some months before completing his seventy-sixth year.

He died as he would himself have wished to die, without any slow progress of decay, and without knowledge that the end was so near.

His contributions to science are discussed in the section which follows: his personal character should be apparent from what has been already said, without the need of an elaborate analysis. As a friend wrote to Mrs Geikie in the first days of her loss:—"There was always an out-of-door atmosphere about him, like a strong wind sweeping over the moors bringing life and health with it;" for the hills and open country which he loved had taught him much. [Pg 145]

In sum, he was through and through one of the island folk, a true native of "this little island, this England," with its wide, wind-swept moorlands, its disciplined freedom, its ordered life, and had in addition the strong individuality of the northerner to whom nothing comes without labour. Even the *milieu* in which he was born is significant, for it was that from which so many of the intellectuals of Scotland have come; and it is noteworthy that he remained a Scot to the end, at once fiercely critical of his country and fellow-countrymen, and full of intense love for the one and of profound sympathy with the other. He never, like some anglicised Scots, sold his birthright for a mess of pottage, or faltered in the conviction that he was the heir of a glorious heritage, won by the toil and sweat of generations, and the result was to give something of that poise and assuredness which those who are false to their own traditions can never possess. It will be clear also that there was nothing of the dry-as-dust pedant about him, for he was above all things a man, one for whom life in all its aspects was sweet. He gave freely—to the world of his labours, to his intimates of his affection, and he received much—honour from his fellows, and what he perhaps prized more, the love of those who knew the real man beneath the northern shyness and reserve.

All is transitory—his conclusions may be disputed, new lights may be thrown on problems which seemed to him conclusively solved; but the nation which can produce such men can never be poor, and his uprightness, steadfastness, and simplicity of character enabled him to leave an abiding imprint upon his day and generation. [Pg 146]

PART II
GEOLOGICAL WORK

CHAPTER X

The Glacial Problem before James Geikie

In 1861, at the age of twenty-two, James Geikie, as stated in Chapter II., became an officer of the Geological Survey and determined to devote his life to scientific work.

For seventy years, ever since the time of the great discussions about the theories of Hutton and Playfair in the closing days of the eighteenth century, the inhabitants of Edinburgh had been keenly alive to the attractions of geological speculation. These older controversies had died down, and the science was gradually establishing itself on a broad basis of recorded facts and observations. It was not yet included among the subjects which had a place of honour in the University curriculum, though the professors of natural history since the time of Jameson had delivered lectures on geology (or geognosy as it was often called). Prof. Edward Forbes, who succeeded Jameson, and Prof. Fleming (of the Theological College) were both accomplished geologists. The Edinburgh Geological Society had been established in 1834, and though it did not as yet publish *Transactions*, it included many active geologists in the list of its members. Geology, [Pg 150] with its mixture of open-air activities, hard facts of observation, and rich opportunities for speculative controversy, has always possessed an attraction for Scotsmen, and many of them have excelled in it. In the Scottish capital in the early sixties the burly figure of Hugh Miller was very well known. His writings, with their curious mixture of geological and theological matters, of fossil fishes and final causes, were very widely read at that time, and the sad tragedy of his death, the result of an overworked brain, was fresh in the memory of all.

A man of very different qualities, but a brilliant and thoroughly reliable geologist, who held a high place in the intellectual life of Edinburgh, was Charles Maclaren, one of the founders and for many years the editor of the *Scotsman* newspaper. His special field of work was the geology of the district around the Firth of Forth, a region filled with the most striking examples of geological structure and the effects of geological processes. Maclaren was constantly exploring the phenomena of this neighbourhood, and the results of his observations appeared regularly as articles in the *Scotsman*. No doubt this kept the science prominently before the public; few newspapers at the present time would venture to print columns of exact and rather technical description of the geological features of the district in which they are published. Maclaren died in August 1866, the year in which a second and much enlarged edition of his volume on the *Geology of Fife and the Lothians* was published. In the same year the *Transactions of the Edinburgh* [Pg 151] *Geological Society* began to appear, but the Royal Physical Society, a successor of the Wernerian Society, had for several years been issuing *Proceedings*. Archibald Geikie had read a paper on the Geology of Strath in Skye to the Edinburgh Geological Society in 1853, and among the geologists of note who attended the meetings were Rose, Dr Page, Prof. Foster Heddle, and Dr Hunter of Carluke. Dr Page, afterwards Professor of Geology at Newcastle-on-Tyne, was a well-known popular lecturer on geology, and did a good deal to keep alive an interest in the science.

In later years James Geikie often acknowledged his indebtedness to Prof. George Wilson, and the stimulus he had received from him when a young man bent on scientific studies. Wilson was Professor of Technology in Edinburgh University, a subject no longer included in the University curriculum. It seems to have comprised parts of dynamics, mechanical engineering and applied chemistry. Wilson was a man of great personal charm, exceedingly well informed, and always willing to help young students along the path of learning. He was interested in geology also, and undertook to write the life of Edward Forbes, but finished only the first six chapters, and the work was ultimately completed by Archibald Geikie.

Although James Geikie was always a great reader, it is not likely that he had more than an elementary knowledge of geology when he joined the Survey in 1861. Trained geologists, [Pg 152] however, in those days were much less common than they are now, and the Survey was prepared to enrol men who had a good general education and showed special inclination and aptitude for this line of work. Careful personal selection must have been exercised, for many of those who then joined its ranks rose subsequently to high eminence in science. In field geology no better training could have been given than was adopted for these young men. They were sent out day by day with surveyors who had acquired a knowledge of field work, and were inspected regularly by experienced geologists, who corrected their errors and helped to solve their difficulties. As already noted in Part I. (see p. 20), his first work was the addition of drift lines to the solid maps of parts of Fife and the Lothians, and the drifts of the low grounds of Central Scotland remained to the close of his life the subject which interested him above all others, and with which he had the fullest acquaintance in the field.

When Geikie began to map both the solid and drift geology of a hitherto unsurveyed district, he was sent to Ayrshire and West Lanarkshire, where he undertook the survey of a large area stretching from Eaglesham southwards to New Cumnock. His brother was mapping, or had already mapped, a broad strip extending inwards from the coast-line and reaching from near Largs in the north to Dailly in the south, while to the east of him was Peach engaged in the survey of Southern Lanarkshire. In those days a fairly large area (several hundred square miles) [Pg 153] was assigned to each geologist. The whole district had to be very carefully examined and the results recorded on topographical maps on the scale of six inches to a mile. Each geologist was expected to make a complete examination of his ground and to note all the particulars regarding it. Petrology was as yet in its infancy, and no very minute classification of volcanic rocks was to be expected; but the glacial geology and economic geology were to be carefully investigated and fossil localities noted, though, for the purpose of collecting fossils, the assistance of special officers was provided. The determination of all fossils requiring critical skill was in the hands of the Survey palæontologists. Each geologist surveyed from a hundred to a hundred and fifty miles in a field season, which, allowing for holidays, amounted to seven or eight months, and to do this required regular hard work, much strenuous walking, and the power of concentrating on the

general features, and not allowing one's attention to be absorbed by inconsequent details.

James Geikie seems to have had no difficulty whatever in picking up the essentials of field geology. He was very diligent and had sufficient physical strength for his work. In time he became a great walker, thinking nothing of covering fifty miles in a day. The open-air life suited him perfectly. He had one of the gifts most valuable to a field-geologist, sometimes described as "an eye for the country," the faculty of interpreting the geological meanings that underlie surface [Pg 154] features. Although never a professed palæontologist he had a working knowledge of Carboniferous fossils, and he was always a keen and critical observer of rocks both in a fresh and in a weathered condition. His early maps, judged even by the standards of the present day, were astonishingly good, and always give the impression that he went thoroughly into the evidence so far as it was available. He was cautious and thorough, and as a result of this his maps show very few deletions due to changes of opinion as fuller information was acquired during the progress of his work. From the first he exhibited great ability as a draughtsman, and his maps and sections are not only very clear, well-proportioned, and pleasing to the eye, but show also an individuality which arose from natural gifts, and was not acquired by copying models.

Although at that time geologists on the Survey were not moved about the country so frequently as is now the case, but settled down for several seasons in a well-defined area, James Geikie had no reason to complain of a lack of variety in the ground allotted to him. His early stations in Fife and Kinross included stratified and igneous rocks of Old Red Sandstone and of Carboniferous Age, and in Peeblesshire he made acquaintance with Silurian rocks, which at that time were still very imperfectly understood, and presented many difficult problems then unsolved. It was in Ayrshire, however, that his powers most fully displayed themselves, and the long period of field [Pg 155] work in that county from 1865 to 1872 undoubtedly saw the development of his abilities as a field-geologist. In after years many of the best illustrations both of structural geology and of glacial geology that enlivened his books and his lectures were culled from the note-books in which he constantly recorded the results of his observations in that field. From his letters it seems that he disliked the coalfield geology, which necessitated the examination of mining plans, frequent attendance at colliery engineers' offices, and great absorption in details which are of little general importance. But no one would have suspected this from his field maps, which, if we remember how rapidly his work was done, show much detail of underground structures taken from colliery plans.

In Ayrshire he had for colleagues Sir Archibald Geikie and Dr Peach; one of these was ultimately to select volcanic geology as his province, while the other attained great eminence as a palæontologist. Already James Geikie was absorbed in glacial geology; and each of the trio of geologists, though doing ostensibly the same work, had already chosen the special line of investigation in which he was ultimately to become a master. He had a great affection, too, for the warm-hearted, hospitable people of the west of Scotland, and in "braid Scots" used to relate many humorous episodes in which the sturdy farmers and "sma' lairds" displayed their pawky humour. No full or adequate account of the work he did in Ayrshire in these years has ever been published. The short descriptions of sheets 22, 23, and 19, published by the Geological Survey, [Pg 156] were in large part written by James Geikie, but, owing to the necessities of official publication entailing great brevity, they contain merely an outline of his main conclusions. The geologists who revised that ground forty years after the original survey are unanimous in regretting that more adequate description of the evidence which James Geikie had collected was not placed before the public.

After leaving Ayrshire he was transferred to Kelso, and subsequently to the district ranging from Perth to Dunkeld. From a geological point of view this ground was considerably less varied; but as his note-books show, he was by this time deeply absorbed in glacial and Pleistocene geology, and every scrap of information regarding the latest stages in the physical history of Scotland was most carefully recorded and its importance weighed. Many of the conclusions he had already arrived at in Ayrshire were confirmed by fresh evidence in these years. And the estuary of the Tay, with its rich succession of late-glacial and post-glacial accumulations, became of great importance in his interpretation of the "glacial succession," a subject to which the remainder of his life was devoted more than to any other.

The circumstances that determined his bent towards the investigation of glacial geology cannot perhaps be fully elucidated now in the absence of any statement from his own pen, but it is not difficult to find many reasons that may have influenced him. In considering this subject we may [Pg 157] glance briefly at the state of knowledge of this department of geology at the time when he began field work. The years 1861 to 1865 saw a very remarkable development of interest in glacial geology, occasioned by a sudden appreciation of the importance of many facts previously well known but imperfectly understood. Many active geologists in Scotland were coming for the first time to adopt the views which have ultimately obtained acceptance in regard to the Pleistocene history of Scotland, and the change of opinion which was going on was somewhat similar to the still greater change which took place when evolution first began to take the form of a working hypothesis or even an established law of Nature, and to sweep away a great many honoured and treasured theories that had long held sway over the minds of men.

The superficial deposits of sand, clay, and stones that cover the solid rocks in the lower grounds of Scotland, often to a depth of many feet, were considered by most geologists as being of somewhat mysterious origin. It was well known that they contained boulders transported from a distance. Around Edinburgh and Glasgow, for example, large blocks of rock which must have been carried from the Southern Highlands, fifty miles or more, were familiar to those interested in geology. That the surfaces of the rocks on which the drift or boulder-clay rested were striated,

grooved, and fluted, was also a well-known fact. Early in the nineteenth century a favourite [Pg 158]
explanation of these deposits, which had been supported by the celebrated Dean Buckland, was that they were the remains of the Deluge as described in Genesis. This theory, however, was soon discarded though the name “Diluvial,” still used by some writers to designate these strata, bears witness to the former acceptance of that hypothesis. For a long time they continued to be considered as flood deposits, laid down by “debacles” of obscure origin. No rational explanation for these powerful “waves of translation” could be formulated, and they failed completely to account for the remarkable scratched surfaces on which the boulder-clay rested. As the study of glaciers advanced, it became clear that moving ice, bearing debris with it, could produce striations exactly like those in question, and the boulder-clay gradually came to be considered a glacial deposit. Very important confirmation of this hypothesis came from the observations of Mr Smith of Jordanhill on the recent shelly clays of the west of Scotland. Many of the mollusca which these clays contained proved to be of species now living in Arctic seas, and the inference was obvious that at no very distant epoch a glacial climate had prevailed in Scotland. About the year 1837 Agassiz had been led by his investigation of the boulder-clay of Switzerland to the conclusion that at one time the glaciers had extended far beyond their present limits, and had covered the plains at the foot of the Alps with a vast confluent sheet of ice. Agassiz, in 1840,
visited Scotland with Dean Buckland, and as the result of his observations had not hesitated to [Pg 159]
declare that Scotland also had been swathed in an ice-sheet. British geologists, however, were slow to accept his conclusions, and the favourite explanation of the “drifts” was that they had been laid down at the bottom of a sea in which icebergs floated, transporting great rock boulders from one place to another.

In 1866 the veteran geologist Charles Maclaren, then at the age of eighty-four, published the second edition of his *Geology of Fife and the Lothians*, and in his account of the “alluvial phenomena” of the district he shows the transitional state in which opinion then was passing from the iceberg hypothesis to the land-ice hypothesis. “The dressed surfaces as well as the ‘Till’ or Diluvium [the lower boulder-clay] seem to have been mainly due to a great envelope of ice acting for ages; the newer alluvium, on the other hand [the upper boulder-clay], appears to have been chiefly due to icebergs and ocean currents. In thus attributing so much to the action of ice during a long glacial period, it must ever be borne in mind that oceanic currents preceded this ice action, and that similar currents must have been in existence to transport the icebergs to which we ascribe the erratic blocks and boulders. Alternate submergence and elevation of the north of Europe, combined with ice on land and ice on water (in my opinion), must satisfactorily explain these diluvial phenomena, which, as unsettled problems, are still engaging the attention of younger geologists.”

One of the ablest champions of the land-ice hypothesis was Robert Chambers, who was widely [Pg 160]
known as a historian and a member of the famous Edinburgh publishing firm. As early as 1852 he ranged himself on the side of Agassiz, declaring that floating icebergs and currents of water could not possibly be accepted as a satisfactory explanation of the boulder-clay and striated rock-surfaces. Mr T. F. Jamieson of Ellon was making a very careful study of the drifts of Aberdeenshire and the adjacent counties, and had little hesitation in accepting the theory of an extensive ice-sheet, covering these districts and filling up all the valleys, as the explanation most in accordance with the facts which he had observed. He admitted, however, that subsequently there had been a great submergence during which many of the uppermost drift deposits had been laid down.

Sir Charles Lyell, whose authority on questions of theoretical geology at that time was paramount, was also willing to accept the former existence of glaciers over very extensive regions of the British Isles, and described moraines that occur in the upland valleys of Forfarshire, though he considered the drifts of the lower grounds as mainly at any rate deposited in cold seas in which icebergs floated. Much more important than Lyell, or at least much more likely to exert influence on the mind of James Geikie at an early stage in his career, was Sir Andrew Ramsay, then local Director of the Geological Survey. Ramsay was a man after James
Geikie’s own heart, and there can be no doubt that his influence on Geikie was very great. We [Pg 161]
should not be far wrong, in fact, in regarding Geikie as the direct successor of Ramsay in the line of scientific thought. Through his whole life James Geikie hardly departed from the position taken up by Ramsay on glacial geology, though of course he developed many new and important fields of investigation. There was a remarkable similarity in their outlook; they both relied on very much the same class of evidence, depending specially on field geology as a basis, but prepared to build up far-reaching deductions from the facts they had observed. Most of the theories enunciated by Ramsay were strongly and consistently maintained by James Geikie up to the close of his career. Ramsay also was more than a glacialist. He left a deep mark in the study of physiography, the origin and history of British scenery, and in structural geology; and in these subjects also James Geikie found continual inspiration.

When Geikie joined the Survey, Ramsay was at the zenith of his powers. He had been for twenty years an active field-geologist on the Survey staff; had travelled very extensively over Great Britain on geological work; was a well-known man in London scientific circles; and from his official position had unrivalled opportunities of making himself acquainted with the field evidence bearing on all geological questions then under review. He was endowed with great energy and a
warm imagination; a genial and hearty comrade, very fond of a joke; well read in poetical and [Pg 162]
romantic literature; but withal a hard, untiring worker who never spared himself or any member of his staff where duty was concerned. The two men were in many ways alike, and no doubt they were very soon on terms of close friendship; and to the latest days of his life James Geikie spoke of Ramsay with deep affection and respect.

To the influence of Ramsay we must add that of his brother. Archibald Geikie was already widely known for his geological work, and second only to Ramsay as an authority on theoretical questions affecting British geology. He had been appointed to the staff of the Geological Survey in 1855, six years before James Geikie, and had rapidly risen into prominence. Although at first he had given his adhesion to the iceberg theory, his views had changed under the influence of Ramsay, and in a classic paper which he read to the Geological Society of Glasgow in 1862 he had described the glacial deposits of Scotland in an exhaustive manner. This paper, so full in its details and so lucid and moderate in statement, produced a great impression, at any rate in Scotland, and clearly marked out the way along which future progress was to be made. Though Sir Archibald Geikie subsequently made few contributions to glacial geology, deserting this field for the study of volcanoes, and of other parts of physical and historical geology, he did a very great service to science in so clearly defining his position on a much debated subject by publishing this paper.

As time went on, some of the younger geologists who had joined the Survey after James Geikie [Pg 163] became enthusiastic workers at glacial science, and came to earn a reputation only second to Geikie himself in this department of geology. Of these, we may specially mention Dr John Horne and Dr Benjamin N. Peach, both of whom became eminent authorities on the glacial geology of Scotland. In early years they were James Geikie's most intimate friends; their observations were always at his service, and their criticism and advice he greatly valued.

CHAPTER XI [Pg 164]

"The Great Ice Age" and "Prehistoric Europe"

The first edition of *The Great Ice Age* was completed in manuscript in 1873, and in the previous year James Geikie had already published a series of papers in the *Geological Magazine* which clearly outlined his main conclusions. All the essential features which were to distinguish his life-work in this highly controversial field are already recognisable in these papers. The principal characteristic of *The Great Ice Age* is its literary ability, the power of lucidly expounding intricate scientific theories and sketching the evidence on which they rest in a manner which equally avoids prolixity and obscurity. Although, as we have shown, he was by no means the first to champion the cause of land ice as against floating ice as the dominant factor in the production of the drift, he was immediately accorded the place of protagonist in this cause. In Scotland his views, at any rate among his colleagues on the Survey, were those generally accepted. In England also the Survey geologists were in agreement with him on most of the essential points, [Pg 165] though the submergence hypothesis and the efficiency of floating icebergs were long held in esteem in the sister kingdom, and have not yet completely fallen into disrepute. In Germany, Norway, Sweden, Holland, and in North America there had as yet been no general enlightenment on the real merits of this controversy. It may be noted that in the first edition of his *Great Ice Age*, James Geikie did not deny the fact that a great submergence accompanied the main glaciation of Britain. He accepted it indeed, though in later years he saw reason to modify this opinion.

The efficiency of land ice to explain most of the puzzling features of the drifts was the main thesis which the book was written to uphold. But there were many subordinate problems which came up for consideration. One of these is the amount of erosion which the ice-sheets and glaciers had produced. In this James Geikie followed very closely in the footsteps of Ramsay; on the origin of rock-basins, fjords, and sea lochs there is in fact practically complete agreement in their views. This is the more significant, because Ramsay was at that time far ahead of educated geological opinion on these matters, and it is only quite recently that his views have received acceptance in some of the most influential geological circles.

Another burning question which fell to be considered was the evidence for or against interglacial warm periods; a question which even at the present time is almost as keenly debated as it was in 1874 when *The Great Ice Age* was published. As years went past and successive [Pg 166] editions of the book appeared, the battle of land ice *versus* floating ice may be said to have been definitely closed; and James Geikie's name as an expounder of glacial geology came to be more and more closely associated with his views on the glacial succession (the question, that is, whether there was only one epoch of glaciation, or several epochs separated by periods in which the climate was much milder). On this subject, as on glacial erosion, James Geikie took up his position very strongly from the first and maintained it to the end.

In considering this branch of James Geikie's scientific work we may trace a considerable amount of influence exerted on his thought by James Croll, one of the most remarkable geologists that Scotland has produced. Croll was a man who started life in a very humble position; he educated himself, and by sheer power of intellect and dogged perseverance he attained eminence in scientific work. He was at once a metaphysician and a physicist, but it is only with the latter aspect of his teaching that we are here concerned. Though quite unschooled in mathematics he was daunted by no difficulties, and by laborious calculation he worked out intricate problems of astronomy; and the accuracy of his solutions was afterwards confirmed by professional mathematicians and astronomers. Croll saw at a very early stage that to land ice must be ascribed practically the whole of the glacial phenomena of Scotland. He inferred from a number of facts that the North Sea had been filled with Scandinavian ice during the maximum stages of [Pg 167] glaciation, and he suggested lines of research to James Geikie, John Horne, and Benjamin Peach

that led to important contributions to the literature of Scottish glacial geology. Croll pondered long and deeply over the causes of the Ice Age and the origin of changes of climate in general, and the result was a series of papers in which he maintained that changes in the eccentricity of the earth's orbit and the obliquity of the ecliptic, accompanied by other astronomical processes, might produce epochs of cold climate in one hemisphere with warmer conditions in the opposite hemisphere. These changes might under certain conditions be sufficient to account for the existence of ice-sheets. During the later years of his life Croll was a member of the staff of the Geological Survey of Scotland, and this silent, reserved, studious man was widely recognised as a most original thinker.

James Geikie was much attached to Croll, and while he never professed to be versed in the mathematical branches of science, he was prepared to accept the accuracy of Croll's theories. The other causes of glaciation which had been advanced by various geologists, such as Lyell's hypothesis of elevation and depression of the land, he believed to be quite inadequate, and in the first edition of *The Great Ice Age* he states Croll's hypothesis with evident approval, or at any rate regards it as the only explanation at that time offered which could be held to be at all in accordance with the facts.

From this position Geikie never receded. In subsequent years Croll's hypothesis was the [Pg 168]
subject of strenuous discussion. Eminent astronomers like Sir Robert Ball found in it a satisfactory explanation of Pleistocene glaciation. Equally eminent astronomers like Simon Newcomb after testing it found it wanting. The subject as a whole was beyond the scope of Geikie's work, which was geological rather than astronomical or meteorological; and in his later years he rather avoided the discussion of the causes of glaciation, but he made it clear that in his opinion, if Croll's hypothesis failed, no other explanation could be regarded as adequate.

As a corollary of Croll's theory, it followed that there had been more than one period of arctic cold in the northern hemisphere, and that intercalated between the cold periods there were epochs of warmer climate—interglacial periods, as they are now called. The evidence for the existence of interglacial periods had appealed to Geikie in his field work, and he had become convinced that in Scotland there had been at least one interval of mild climatic conditions separating two epochs of glacial severity. This may have to some extent predisposed him to favour Croll's hypothesis as being in greatest accordance with the geological facts. For it cannot be said that James Geikie was in a hurry to maintain the complexity of the Ice Age. In the first edition of his book, though much engrossed in the description of the beds intercalated with the boulder-clay and "till," and obviously inclined to attribute great importance to them, he says very [Pg 169]
little about warm interglacial periods, and the reader is not led to suppose that he considers the evidence as of overwhelming strength. Three years later the second edition of *The Great Ice Age* appeared, and we find that the author then took up a much more definite position on this subject, and has made a great advance in his treatment of it. But already in 1873 he was convinced in his own mind that several warm interglacial periods had interrupted the rigours of the Ice Age, though he did not attempt to enumerate the interglacial epochs in detail, or to state fully the conclusions at which he had arrived.

The post-glacial history of Scotland was a subject that early attracted James Geikie's attention. He had devoted much study to it, and was in after years to present a masterly analysis of its stages and sequence. To trace the connection between the Ice Age and the present day, and to show the changes which had elapsed since the ice-sheets melted from the surface of Britain, was to him one of the most alluring departments of geology. A good deal of work had been done by Scottish geologists on the study of the raised beaches of Scotland, but no general account of their relation to one another and to the glacial boulder-clay and moraines had appeared before the publication of the first edition of *The Great Ice Age*. That the sea-level had undergone alterations around our shores was sufficiently demonstrated by the raised beaches, of which three were very well known, the 100-foot, 50-foot, and 25-foot beaches. But some authors, such as Chambers and [Pg 170]
Mackintosh, were ready to find raised beaches anywhere; gravel terraces at all elevations, many of which are now known to have been the deposits of glacial rivers and lakes, and rock escarpments and platforms of very varied origin, were appealed to as evidence of former submergence beneath the sea. Prof. Geikie at this stage was not altogether free from a belief in the great submergence, or at any rate he was not prepared to challenge its champions; but he knew how little value was to be attached to some of the evidence cited in its support, and his own studies had led him to a fuller understanding and a more satisfactory appreciation of the meaning of the raised beaches and the light they threw on the varied conditions that had prevailed in Scotland during and subsequent to the melting of the great ice-sheet. In particular, he maintained that the higher beaches were associated with the deposits of clay containing glacial shells that were so well known through the researches of Smith of Jordanhill, and belonged to a time when glacial conditions had not completely ceased in Scotland. The 50-foot beach was associated with the oldest relics of man in the midland valley of Scotland, while the 25-foot beach and lower beaches were laid down in climatic surroundings differing little from those of the present day. Between the epochs of depression which these sea-terraces recorded there had been intervals when the land stood at a higher level, so that the earth movements had been of an oscillating character, and not merely a succession of uplifts with intervening pauses during which [Pg 171]
the beach-platforms were produced. The buried forests and the peat-bogs furnished additional evidence of the elevation and depression of the land, and hinted, not obscurely, at the probability that changes of climate had also taken place during post-glacial time, the warm continental epochs encouraging the growth of trees, while the cold, damp, insular climates were favourable to the accumulation of peat. Although these conclusions were only sketched out and not fully stated, it is plain to the reader that already Prof. Geikie had convinced himself of the importance

of these facts.

And in considering what is probably the most controversial problem which the student of Pleistocene and recent times must investigate, namely, the relation of prehistoric man to the glacial period, he followed the same line of thought, considering that the evidence of the mammalian remains found in caves and river gravels of Northern Europe pointed to the conclusion that there had been great variations of climate. The mixture of northern and southern types of animals was not to be ascribed in his opinion to migrations arising from seasonal changes, but was due principally to alternations of cold and heat, each enduring for a considerable time. He advocated also the existence of man in glacial times, and recapitulating views already enumerated in some papers which he had published in the *Geological Magazine*, he argued that the palæolithic gravels of England were to be regarded as glacial and preglacial, and not, as was widely believed, of interglacial and post-glacial age.

Lastly, we may mention a feature of the first edition of *The Great Ice Age* that was to become [Pg 172] more prominent in subsequent editions, the comparative description of the phenomena described by geologists of many different countries. For information regarding England he was largely indebted to his colleagues in the English Survey, principally Green, Tiddeman, and Whitaker. The Swedish, German, Norwegian, and continental deposits generally had perforce to be described from the literature of the subject, a literature already very extensive. Through his whole life Prof. Geikie was a diligent student of the literature of his subject. The most important European languages, as already noted in Part I., he could read with facility, and as he was in constant receipt of copies of glacial papers from their authors, much of his time was taken up with a study of the contemporary literature of glaciation. It was his familiarity with the work of other investigators in this field of scientific research that gave him his position as the representative British glacialist, and made his works so widely read and appreciated by foreign scientific men.

With the publication of the first edition of *The Great Ice Age* in 1874, Prof. Geikie's reputation as a glacial geologist of the first rank was at once established. The book had a cordial reception and a ready sale. Prof. Green wrote a long and very sympathetic review of it for *Nature*, and, whether its teachings were generally accepted or not, the author had the satisfactory proof that it had not been neglected by the rapid exhaustion of the first edition. Within a few months he had [Pg 173] to set seriously about the production of a new and enlarged edition. Much of its popularity was no doubt due to the clear and graceful style in which it was written. The more abstruse parts of the subject were not discussed with too much detail; great insistence was placed on the field evidence, and the discussion was such as could be followed by the general reader who had no special training in geological work. A studied moderation marked the conclusions arrived at, and no attempt was made to force a revolutionary interpretation of glacial phenomena into prominence. A great deal also was due to the fact that the book embodied not only its author's work and the hypotheses he favoured, but also the results of the observations of many of his colleagues on the Survey who had a very wide acquaintance with field geology, and were, on the whole, very well agreed regarding the interpretation of the facts. The author fully acknowledged his obligations to colleagues on the Survey staff, but at the same time it was clear that on this subject he was the leader and not merely a compiler of other people's results. The dedication to Sir Andrew Ramsay is especially significant, for from Ramsay more than from any other geologist had inspiration been received.

Probably the effect of the book was greater in foreign countries than in Britain. In Germany, Switzerland, Sweden, and the United States many geologists were actively prosecuting the study [Pg 174] of glacial deposits, and so clear and authoritative a statement of the observations and conclusions of the Scottish glacialists had much interest to workers in other lands. This appreciation the author valued greatly, and it was the cause of a great enlargement in the circle of his correspondents. He followed keenly the advance of glacial investigation in foreign countries, and especially the new evidence brought forward regarding changes of climate during and subsequent to the glacial period, and the early chapters in the history of man in Europe.

The second edition, which appeared three years after the first, showed that the author had been led to modify his views in several important respects. The great post-glacial submergence he now considered unproved, following in this the conclusions arrived at by Dr Jamieson of Ellon in his studies of the Scottish glacial deposits. He recognised also that the shelly boulder-clay of many parts of Scotland, such as Caithness, Orkney, Shetland, Dumbartonshire, and Ayrshire, was best explained on the lines suggested by Dr James Croll as the deposit of an ice-sheet that had invaded the land after travelling for a time over the sea bottom. In this we see the influence of Dr Peach and Dr Horne's work on the glaciation of Caithness, Shetland and Orkney, and of Geikie's own investigation of the glacial phenomena of the Outer Hebrides. These changes of opinion were undoubtedly well considered, and have been supported by subsequent discoveries. He also [Pg 175] took up a much bolder attitude on the question of interglacial deposits and the relation of man to the Ice Age. While still relying to the full on the evidence cited from Scotland in the first edition of *The Great Ice Age* in favour of the existence of more than one interglacial period, he adduced the results of Skertchly's work at Brandon as proving that the palæolithic deposits of south-eastern England are in places overlain by genuine boulder-clay. More prominence was also given to the continental evidence for interglacial periods, especially to that obtained in the Dürnten lignite of the north side of the Alps, and of the so-called Pliocene beds of Lombardy, which even in the first edition he had confidently claimed as being really interglacial.

The next important work from Prof. Geikie's pen was *Prehistoric Europe*, published in 1881. He continued to keep abreast of the rapidly increasing literature of his subject, and although the main lines of his treatment of it required little modification, he was continually adding to his

store of facts. *Prehistoric Europe* did not receive the same welcome as *The Great Ice Age*, and this could hardly be expected. Geologists were by this time familiar with the author's main conclusions, and the book in some measure takes us over familiar ground. But to the general reader it remains one of the most enjoyable of the author's contributions to the literature of science.

Having already expounded in his previous works the essential phenomena of glaciation, he devotes this book especially to the consideration of many questions of subordinate importance, [Pg 176] though in themselves deserving of full consideration. The interglacial problem, of course, comes up for treatment, but he has not much to say of it that is really new to his readers. It is interesting to note, however, that less insistence is now laid on the Scottish evidence in favour of interglacial periods, and the British evidence in general, and more is said of the interglacial beds of Germany, France, Italy, Switzerland, and other European countries. The feeling seems to have arisen in the author's mind that much of the British evidence was not so strong as to carry conviction, and the work of continental geologists was rapidly adding details of the highest significance to the store of accumulated observations in favour of repeated glaciations of Northern Europe. We may readily believe also that he felt it desirable to enforce on the minds of his readers the value of much recent research done by his fellow-scientists in other countries. Many British geologists assumed and still maintain a very sceptical attitude regarding the value of the British evidence for interglacial periods, and Prof. Geikie was undoubtedly right in appealing rather to well-established facts in adjacent countries than attempting to discuss the minutiæ of sections often of a temporary nature and by no means well-exposed, which were familiar to many of his British readers. It is not to be supposed, however, that he had changed his ground; to the last he maintained the validity of the British evidence for interglacial periods, [Pg 177] though in some parts of it modifications of his original statements might have become necessary. In the nature of things the evidence collected from so small an area as Scotland was sure to be incomplete, and to treat Great Britain as a region apart was more likely to lead to error than to correct results.

Another subject which he handled more fully than in *The Great Ice Age* was the antiquity of the human relics of palæolithic type which had been found in caves and river gravels. Many British geologists of the highest reputation held that these were of post-glacial date, but Prof. Geikie had always contended strongly that some at least of the deposits containing the implements of early man were interglacial or preglacial. Time has justified his sagacity, and it is now fairly widely recognised that these relics date back in some cases to periods anterior at any rate to the last glaciation of Northern Europe. The old controversy regarding changes of climate in Pleistocene time reappears in this volume, and the author stoutly maintains the position he had taken up in *The Great Ice Age*, that the association of the remains of mammals of southern and northern types in gravel deposits can be explained only on the hypothesis that periods of genial alternated with periods of arctic climate.

But perhaps the main purpose of this book, as seems to be indicated by the title selected for it, was to discuss the changes that had taken place in Europe since the melting of the ice of the last stage of the glacial period. The phenomena of the raised beaches that encircle our Scottish [Pg 178] coasts, with the alluvial or "carse" clays of the river valleys intimately associated with the beach deposits, and the peat and buried forests of our moorlands and coasts, had fascinated Prof. Geikie since the beginning of his glacial investigations, and he felt that for their proper discussion more scope was required than was afforded by such a book as *The Great Ice Age*. These problems were full of difficulties and the evidence appeared often contradictory or misleading, but he managed to piece it together and to arrive at a consistent and clearly reasoned interpretation. The raised beaches indicate, of course, changes of the level of sea and land; but these were far more considerable than the beaches alone would indicate, as the submerged forests that in many places are intercalated with the beach and carse deposits show that at certain stages the land area had been far more extensive than at present. This was confirmed by many facts regarding the present distribution of animals and plants in the British Isles which could not otherwise be logically explained; and in this field of investigation he gratefully acknowledges the assistance furnished by his old friend Dr Buchanan White, with whom he was in close contact since he was then living in Perth. The raised beaches also were associated with the closing phases of glaciation in Britain, since both the 100-foot and the 50-foot beaches in the north of Scotland showed effects of contemporaneous glacial action, and the older marine shell beds contained shells now living only in Arctic seas. The interpretation of the [Pg 179] evidence to be obtained from the study of peat-bogs and buried forests was by no means so clear, but indubitably pointed towards the recurrence of damp cold epochs suitable for the rapid growth of peat, separated by epochs of a different character during which the country was overspread by a dense growth of forest. These hypotheses had long occupied the author's mind, and he had pondered deeply over the evidence in support of them. Fuller investigation in future years was destined to bring out many striking confirmations of his opinions. It may be said that so far as his interpretation of the post-glacial history of Scotland is concerned, the most authoritative opinion of Scottish geologists at the present time is in accordance with the conclusions which he had arrived at. This alone makes the book still worth careful study by those who would appreciate the changes our islands have undergone in the most recent stages of their geological history, and though notable additions have been made to the store of accumulated observations, they readily find a place in the scheme which he has outlined.

CHAPTER XII

[Pg 180]

Educational and Administrative Work

With his appointment in 1882 to the Murchison Chair of Geology and Mineralogy in Edinburgh University to succeed his brother Sir Archibald Geikie, a new epoch began in James Geikie's career. For some years he had been District Surveyor on the Scottish Survey, a post of considerable responsibility, and requiring the exercise of tact and firmness, but one which presented most valuable opportunities to a keen geologist. The Scottish Survey at that time had an exceptionally strong personnel, and in pure field geology was setting a standard of excellence which has rarely been surpassed. Several of his colleagues came to be recognised in the course of a few years as scientific men of the highest distinction, and among them there was a spirit of camaraderie and of friendly emulation in research which made their daily tasks a constant source of novelty and of unflagging interest. To many of his colleagues, such as Peach, Horne, Jack, Croll, Skae, and Irvine, James Geikie had been indebted for important information and for the most searching criticism, combined with unselfish appreciation of the value of his work. The [Pg 181] ground surveyed had most of it been previously examined only in a quite unexhaustive way, and had consequently the attraction of novelty; it was also of very varied structure, and, more important from his point of view, it was rich in evidence of glacial action. No better training ground for a field-geologist who intended to devote himself to the study of glaciation could well be imagined.

Among the Scottish geological staff James Geikie's position as a field-geologist and as a glacialist was fully recognised, and he had the unquestioning support of his colleagues. His life was full of variety and interest. No doubt, like other men, he had made mistakes and had been severely handled by some of his critics. Some of his early work on the Silurian volcanic rocks of Ayrshire, for example, had suffered greatly from his insufficient knowledge of the chemical and mineralogical foundations on which geology rests.

Probably this criticism taught him to be more careful in speculation and more critical in accepting evidence. But his field work, as a whole, was of the highest standard. His field maps of Carboniferous and Devonian ground proved to be exceptionally thorough and accurate. In these early years, of course, it was not intended to execute a survey on a very minute scale. The large area upon which each surveyor was expected to report each year prevented him from spending more than a limited time on a small district. Moreover, the literature of the geology of Scotland [Pg 182] was as yet by no means large. Many of the more specialised branches of geology, such as petrology, were as yet in a very rudimentary state. Perhaps on that account the field-geologist was expected to be more of an all-round geologist, and to rely less on the guidance of specialists than his successors at the present time.

The opportunities presented to him he had made use of to the fullest. He was a born observer. The retentiveness of his memory for localities and for geological details was extraordinary; but that he did not trust to it exclusively his well-filled note-books bear witness. What distinguished him specially, however, was his power of maintaining his interest in the abstract questions of geology and the indomitable perseverance and industry with which he pursued his researches in spite of the distractions of field work. Not many geologists after an arduous day in the open air could sit down, as was his habit, and spend many hours in literary work, or in the task of mastering the papers, in many foreign languages, in which the progress of glacial geology was recorded. Even admitting that he was a ready writer, we must acknowledge that his power of work at this time was enormous, and we cannot wonder that at times he felt on the verge of a breakdown.

The testimonials which he had printed when making application for the Professorship of Geology in Edinburgh show how thoroughly his reputation as a scientist was established in Europe and America. His book on *The Great Ice Age* receives high praise from Norwegian, [Pg 183] Swedish, Swiss, German, Italian, and American geologists, and among his British supporters he could number Darwin, Evans, and Hooker.

It was not, as already seen, without reluctance that James Geikie decided to leave the Geological Survey. The earnest scientific spirit in which its work was conducted, the intimate fellowship with scientific men of kindred spirit, and the free open-air life had great attractions for him. The academic life was new to him, and must have seemed at first a cabined and cribbed existence compared with that of a field-geologist. Yet there is no doubt the choice was a wise one. In the higher departments of Survey work his duties would have been mostly of an administrative nature, and much of his time would have been taken up by routine business, very largely of a non-geological character, which would certainly have proved uncongenial. His opportunities of visiting the field would also have been much curtailed. Residing in Edinburgh, he could keep in intimate touch with his former colleagues of the Survey, and glean the most valuable results of their work when they returned to the office each year. They were now beginning the survey of the North and West Highlands, and were to undertake investigations of a kind with which he was quite unacquainted. A good deal of new information on glacial geology was being collected by them year by year, and of course communicated to him regularly. But the main work in hand was the unravelling of the intricate history of the Highlands and the palæontology and petrology of [Pg 184] the older rocks of Scotland. This was destined to yield most brilliant results, and the Scottish Survey was to become more famous even than it had been in the days of Sir Andrew Ramsay; but these fields of investigation were not those which he had chosen for his own especial study, and there can be no doubt that as a university professor, with ample time for research in any branch of his subject which appealed to him, he was able to follow out his own line of work far more

untrammelled than he would have been as an officer of the Geological Survey.

To the execution of the duties of his Chair he devoted himself with characteristic thoroughness and energy. His brother had combined the office of Director of the Geological Survey of Scotland with the Murchison Professorship, but James Geikie was free to give his whole time to university work. At first, at any rate, he had little spare time on his hands. Well versed in Scottish geology and in the physical and structural divisions of the science, he had also a wide knowledge of stratigraphical geology and of the geological structure of Europe and North America. He worked hard to increase his knowledge of mineralogy, petrology, and palæontology, even setting up a laboratory to carry out mineral assays. Ever a skilful draughtsman, he prepared with his own hand many drawings of landscapes, geological sections, and the microscopic structure of rocks. He was always rather averse to the use of the lantern to illustrate his lectures, and preferred large wall diagrams, many of which had cost great pains to make. From every available source he [Pg 185] collected specimens of rocks, minerals, and fossils. He was unsparing in his efforts to make his subject as interesting to his students as possible, and to relieve them of the tedious work of taking voluminous manuscript notes. For this purpose he prepared long series of memoranda, and had copies of them struck off by a primitive duplicating apparatus.

As a lecturer he had rather an easy-going, colloquial style, which undoubtedly had the merit of catching and holding the attention of even the least intellectual of his audience. He spoke fast, and covered a very large part of his subject in the course of the one hundred lectures which constituted the work of the winter class, but by the help of the memoranda above mentioned his students had little difficulty in keeping abreast of his progress. Brimful of humour and of fun, he was not above making an occasional joke to his audience; but this aspect of his character was far more in evidence on his Saturday excursions. However long the walk and however unpropitious the weather, there was always a circle of admiring students around him, intent on catching every detail of the amusing stories, reminiscences, and snatches of old ballads or songs, of which he had an unfailing supply. From the first he proved a very successful professor. His course was at that time optional, in the sense that candidates for the recognised degrees of the University did not require to take it. Only students desirous of studying geology for its own sake were to be [Pg 186] found on the benches of his class-room. He had always also a fair number of men who were not regular students but engaged in professional work, who desired to widen the range of their intellectual vision, and took an occasional class at the University. Many of these were teachers occupied all day in the schools of the city; and to meet the needs of such men he fixed his hour for lecturing at four o’clock in the afternoon, so as to give them a chance of attending after their day’s work. Many of these students afterwards became his attached personal friends, and in this group were included missionaries home on leave, army men, journalists, doctors taking postgraduate courses at the University, and planters and mining engineers enjoying a long holiday at home after years spent in foreign countries.

At first he conducted all the classes himself, but after a time the University granted him an assistant, and he started a regular practical or laboratory course. His relations with his assistants were of the most sympathetic character. Always ready to take more than his fair share of the drudgery of elementary teaching, he showed the most kindly interest in the progress of his assistants, and encouraged them to carry out original research on their own account. His fine library and wide knowledge of the literature of geology were always at their service, and as the University in those days was by no means liberally endowed with funds for the purchase of scientific apparatus, he often provided at his own expense the instruments necessary for special researches. The rooms assigned to the geological department were miserably inadequate—dark, [Pg 187] half-furnished attics, draughty, cold, and uncomfortable—but much good work was done there.

James Geikie lived to see the conditions of university teaching in Edinburgh greatly altered for the better. The courses qualifying for degrees were made much less restricted, and geology became a subject in the curriculum for the Arts as well as the Science degree. The number of students increased, and the status of the Chair was improved. Better-paid assistants were provided, increased grants for the purchase of apparatus, and a higher stipend for the professor. A very important addition to the department was the provision of a library of geological books, the gift of Sir Archibald Geikie and James Geikie in the first place, subsequently taken over and maintained by the University Library authorities. The prestige of geology in the University and the condition of the department in 1914 when he resigned were incomparably superior to those which existed in 1882 when he was appointed to the Chair.

In 1894 he became Dean of the Faculty of Science in the University, and continued to hold this responsible appointment till a year before his retiral. Although he did not by any means suffer fools gladly, he had much sympathy with students and with his colleagues, the professors, lecturers, and assistants, in the difficulties which they encountered in their work, and he had good business faculties, being careful, prompt, and industrious. The great esteem in which he [Pg 188] was held by all who came in contact with him was clearly proved by his long tenure of this exacting post, and his success in smoothing the difficulties inevitable in university life where so many interests have to be considered. The time required for this work he gave ungrudgingly; but as he was at the same time Honorary Editor of the Royal Scottish Geographical Society’s *Magazine*, and eventually President of that Society, and served on the Council of the Royal Society of Edinburgh for many years, he felt that his time for research and literary work was very seriously curtailed.

If we consult the list of Prof. Geikie’s contributions to scientific literature which appears as an appendix to this volume, it becomes evident that with his appointment to the Edinburgh professorship he began to write on several topics which previously had not specially engaged his

attention. The voluminous notes from which his lectures were delivered were abridged, rearranged, and ultimately published as his *Outlines of Geology*. This work was expressly meant for the use of his own students, and served to relieve them of a large part of the tedious note-taking which was in those days a heavy burden on members of the University classes. It found acceptance, however, in a wider circle, and in time three large editions of the book were sold. Its most distinctive feature is the ample space devoted to physical geology, especially the processes at work to-day which throw light on the structures and origin of rocks. The more technical portions of the subject, such as petrology and palæontology, he considers in much less detail. In [Pg 189] fact, the book is quite as suitable for the general reader as for the university student. This book appeared in 1888, and seventeen years later his second and most successful text-book was published, the *Structural and Field Geology for Students*. His natural abilities as an observer, and his thorough training as a field-geologist, made him especially competent to handle this subject effectively, and he made judicious use of photographs taken by the Geological Survey to illustrate the volume. The success of the book was also in large measure due to his long experience as a teacher and his clear and easy style; in fact, the foundations of the text-book were laid in the courses of lectures on structural geology which he used to deliver in the summer sessions. Something also, no doubt, was due to there being no really good work on this subject for English and American students. He was much gratified by its success, for he felt that he had done something to stimulate accurate field surveying by students of geology, and field work he always considered the most educative part of geological training.

Here we may mention also his contributions to *Chambers's Encyclopædia*, for which he wrote many of the geological articles. In 1875 he had prepared a small Elementary Manual for the well-known Edinburgh firm of publishers, and as successive editions of the *Encyclopædia* were printed he continued to revise his geological articles, so that he had a continuous connection with [Pg 190] Messrs Chambers lasting over forty years.

His work as a geographer next claims our attention. The fields of geological research which he especially cultivated have a very close connection with geographical science. In the Scottish Geographical Society, as already stated, he took a deep interest from the start. For many years his face was a familiar one on the platform at the lectures delivered by eminent geographers and distinguished travellers in Edinburgh, and as these lectures are always very well attended, probably his connection with the Society made him better known to the general public than any other of his numerous activities. These functions also brought him into contact with many explorers and scientists who came to Edinburgh to lecture, and were the source of many friendships which he valued highly. During the latter years of his life the Geographical Society claimed almost as much of his attention as his academic duties, and as he was fortunately assisted by very competent lecturers in the University, he could spare the time required to fulfil both functions.

His studies in geography were always in those fields which form the border-land between geology and geography. The history of the development of scenery and of earth-forms in general, and the relation between geological structure and geographical configuration, were favourite subjects for his pen. In this he was a true follower of Playfair. He delighted also to prepare short [Pg 191] notices for the Society's magazine, describing the results of recent work on prehistoric man, on changes of climate in recent geological periods, and the action of ice in the production of surface features. The magazine proved a useful vehicle for conveying to the public the results of his wide reading on topics such as these. Many of the articles which first appeared in its pages were subsequently issued in book form, or were used in the preparation of the third edition of *The Great Ice Age*, and the other scientific treatises which he produced.

In 1893 he collected the most important and interesting of his scientific lectures and addresses into a volume to which he gave the title *Fragments of Earth Lore*. The book was published by his friend Dr Bartholomew of the Edinburgh Geographical Institute, and served to introduce the results of some of his researches to a wider circle of readers than they would otherwise have reached, as they had originally appeared in publications as widely different in purpose as *Good Words* and the *Transactions of the Geological Society of Edinburgh*. Most of the papers, as was to be expected, treat of the progress of glacial geology, and one of these is of special importance. It is entitled "The Glacial Succession in Europe," and was reprinted from the *Transactions of the Royal Society of Edinburgh*. It shows considerable progress along the lines which his work on glacial and interglacial periods had previously followed, and was the precursor of the third edition of *The Great Ice Age*, in which the new developments of this branch of science were to be [Pg 192] more fully expounded. Among the other papers are several which are excellent popular scientific articles, such as the sketch of the "Geology of the Cheviot Hills," originally issued in *Good Words* in 1876. These essays show him at his best as an exponent of the simpler and more attractive themes of geological literature. He had an easy, fluent style, and had he chosen to do so, might have attained great popularity as an exponent of science for the million. The fine illustrations of this book deserve special mention, especially the maps, which owe much to the skill and artistic taste of Dr Bartholomew, who in this matter had the cordial support and co-operation of Prof. Geikie. Ever since his days on the Geological Survey he had set a very high standard in the preparation of maps, and paid the greatest attention to their artistic qualities as well as to their excellence as scientific documents.

His book on *Earth Sculpture* followed in 1898, and in this particular field soon came to be

recognised as a standard work. It was published as one of a series, and the limitations of space probably did not allow very complete discussion of so large a subject: in fact, it is only a sketch of the relations between geology and surface features; but the subject was one for which he had a great liking, and he dwelt on it lovingly in the lectures which he delivered each winter to the University students. In this, of course, he followed the Scottish tradition, which since the days of Hutton and Playfair had assigned to this branch of geology a special importance. The writing of this little book accordingly was a real pleasure to him, and he drew nearly all the illustrations for [Pg 193] it with his own hand, feeling that the only difficulty was to keep himself within the limits which necessity imposed. His immense knowledge of geographical literature supplied him with abundant material to illustrate the operation of natural agents in giving rise to modifications of topographical form, and the change of subject-matter from the always more or less controversial questions of the glacial history of the northern hemisphere afforded stimulus to his pen.

CHAPTER XIII

[Pg 194]

Interglacial Controversies

The second edition of *The Great Ice Age* was sold out about the year 1892, and the author set himself to the task of preparing a third edition, incorporating all the most recent investigations. The task was necessarily a very severe one, as an enormous increase had taken place in the number of workers in this field, and the evidence had accumulated at a very rapid rate. Prof. Geikie always regarded this work as his principal contribution to geological literature, an opinion which most of his critics seem to have shared; and certainly the labour he spent on the third edition of his *magnum opus* was sufficient to entitle it to a high place in the history of glacial investigation. With indomitable perseverance he undertook the work of mastering the literature, and the number of papers he read may be inferred from the fact that his collection of pleistocene and glacial pamphlets, which now form a part of the noble library of the University of Edinburgh, numbered over one hundred and sixty volumes. He aimed at making the book not only a compendium of information on the subject of which it treated, but also a critical review of the [Pg 195] conclusions which might fairly be drawn from the evidence to hand; and in this he not unfrequently differed from the authors of the papers he cited, a proceeding which was likely to awaken feelings the reverse of grateful.

The subject-matter was now, of course, so vastly enlarged that only the more important contributions could be adequately noticed, and much interesting detail had to be passed over or handled only in the briefest way. Many of the old controversies which had bulked largely in the first and second editions of the book had been decided, or had been so fully discussed that there was no pressing need to devote much space to them; but the subject as a whole was not less involved in uncertainty and debate, for new topics of discussion had arisen, hardly less keenly disputed than the old ones. In the main lines of his argument Prof. Geikie still followed the teaching of Ramsay and Croll and the geologists of the old Scottish school, and though, for example, no longer inculcating the necessity of a great glacial subsidence, he maintained most of the positions he had taken up in his early days. In one respect, however, the work marked a great advance, for he now believed it possible to subdivide the history of *The Great Ice Age* into a succession of glacial and interglacial periods with far more minute detail than he had hitherto attempted. In this he showed a boldness which some critics might call rash, but which has been in very large measure justified by the results of subsequent research. He came to be recognised as pre-eminently the defender of interglacial periods; and to this aspect of the book far more [Pg 196] attention has been directed than to any other. James Geikie, in fact, was soon considered an ultra-interglacialist, if we may coin a ponderous but perhaps expressive term. The technical details of the evidence cannot be discussed in this place; it will be sufficient to say that he believed there was good evidence in Scotland and in Europe generally for the former existence of no less than six glacial periods separated by intervals of milder climate which were truly interglacial.

At the time the book was published it is no exaggeration to say that he was alone in holding these views. Glacial investigation had made considerable progress in Scotland since 1877, when the second edition of his book was issued; but most Scottish geologists, though in agreement with Prof. Geikie on many points, would hardly have followed him in the extreme position which he took up. That interglacial periods had existed they generally admitted, but the searching criticism to which the evidence in favour of them had been subjected had revealed that much of it was of an indecisive character, if not actually untrustworthy; and no British geologists of that time had Prof. Geikie's wide knowledge of the glacial literature of other countries. They were consequently often unable to appreciate how far the continental evidence filled up the gaps which were painfully evident in the record of British glacial history. In certain circles, in England especially, the evidence for interglacial periods was regarded with sceptical distrust, if not completely [Pg 197] disbelieved; but on Clement Reid, his former colleague on the Survey, and one of the most skilled and critical glacialists then living, it had produced a different impression. He saw clearly the necessity for admitting the existence of at least one interglacial period; but between his position and that of James Geikie, who believed in five interglacial periods, a great gulf intervened. Perfectly aware of his apparent isolation, and supremely confident in the accuracy of his results, James Geikie pressed strongly on his readers the necessity of appreciating more fully the significance of the facts, and in consequence his book became very obviously an argument in

favour of Pleistocene and Recent oscillations of climate rather than a critical and impartial review of the evidence available. In every case he went as far in support of his conclusions as the facts in his opinion could be interpreted to lead; and the treatment of British glacial questions showed undoubtedly a stubborn courage and a determination to make the best of his case, which only his confidence in the general sufficiency of the evidence for the whole of Europe could be held to justify.

In foreign countries generally he found more support, though everywhere, it may be admitted, his views must have been regarded as extreme. In Germany glacial investigation was still in a comparatively backward state, but in Penck, Brückner, and Partsch (names subsequently to figure most prominently in the story of the advance of this department of science) he found disciples and supporters of the highest value. The investigations of these geologists had led them [Pg 198] independently to the belief in the repeated glaciation of the Alps and the mountains of Central and Eastern Europe. Their chief results were still to appear, but enough was known of their conclusions to define their attitude. In Norway and Sweden, though many notable investigations into glacial geology had been made, no general consensus of opinion had been reached as to the stages into which the glacial history of that country must be subdivided, and Prof. Geikie still found his old friend Axel Blytt the nearest in agreement with his views among the Scandinavian geologists. In France the existence of interglacial periods had warm defenders and keen opponents; but attention was being directed more particularly to the successive phases of palæolithic culture, in the study of which French geologists and anthropologists have always been in the forefront. But in America a school of geologists had arisen in which Prof. James Geikie had found not only warm personal friends but also powerful supporters in his theoretical views, and a most notable contribution to the third edition of *The Great Ice Age* are the chapters by Prof. Chamberlin (*cf.* Part I., p. 120), in which the glacial history of North America is reviewed. The literature of the glacial geology of that continent has now swelled to enormous dimensions, and to describe the phenomena in a critical and discriminative manner was beyond the powers of anyone who had not devoted many years to a personal examination of the evidence; but in Prof. [Pg 199] Chamberlin an exponent was secured who was not only in very substantial agreement with Prof. Geikie in his conclusions, but was also exceptionally familiar with the facts.

The general reception of Prof. Geikie's book was deferential if not enthusiastic. The masterly handling of the subject was freely admitted, and the thorough and scholarly manner in which the sources of information had been searched; but no symptoms appeared to indicate the existence of a school of advanced interglacialists, in Britain at any rate, prepared to accept and defend the author's theoretical views. In fact, for a time it almost seemed as if the belief in the reality of interglacial periods, or at least in their importance, was less prevalent than it had been fifteen years before. A very large body of geologists declined to regard the evidence on which Prof. Geikie and his supporters relied as having real value or significance. There were still a few supporters of the theory of the marine origin of boulder-clay, and even some who were prepared to advocate the agency of floods and debacles as the prime factors in the formation of boulder-clay; and their views for some years were prominent in the discussion of the origin of glacial deposits. The majority of experienced geologists certainly did not accept these explanations; but they were equally unwilling to concede that the Ice Age could be subdivided into six glacial epochs, alternating with warmer climates in which Northern Europe and America had been [Pg 200] occupied by a fauna and flora of temperate facies.

Prof. Geikie lived to see very considerable changes in the opinion of geologists on these matters. As time went on much new evidence accumulated to prove that great fluctuations of climate had marked the recent stages of the earth's history. From many sides facts were reported which tended to support his theories. Gradually it came to be recognised that the ice margin must have withdrawn at times for considerable distances, leaving bare wide tracts of country which became populated by animals and plants. Still, however, it was contended that these were mere episodes of no great account, temporary retreats and advances of the ice-sheets, unworthy to be designated glacial and interglacial periods. But the increase of knowledge renders this position less and less tenable as years go by, and it may fairly be claimed that before Prof. Geikie's death, in most countries of Europe and North America the existence of several interglacial periods was freely conceded by a majority of those who were competent to express an opinion on the subject.

The important new evidence brought to light was not wholly the result of geological investigation, though much of it was strictly of the kind to which Prof. Geikie had appealed. Most striking perhaps were the descriptions of the glacial phenomena of the Alpine valleys which Profs. Penck and Brückner published in a famous volume in 1909. This work was most [Pg 201] appropriately dedicated by the authors to Prof. James Geikie. It is probably the most notable contribution to the literature of glacial geology in the last twenty years, and although it has not escaped criticism, it has produced in the minds of impartial readers a firm conviction of the occurrence of glacial and interglacial periods so far as that part of Europe is concerned. Prof. Geikie was familiar with some of the evidence from the Alpine chain when he was writing the third edition of *The Great Ice Age*; some of the facts had led geologists to postulate the existence of interglacial periods as long ago as the middle of last century; but he watched with great pleasure the gradual accumulation of observations added to previous knowledge by Penck and Brückner, and for many years he maintained an active correspondence with these investigators. In America, also, the opinion was gradually gaining strength that the Ice Age was marked by several prolonged intervals of warmer conditions; and in France, Germany, and Scandinavia many geologists were added to the ranks of those who maintained the importance of interglacial periods.

Hardly less convincing than the results of Penck and Brückner's investigations into the repeated glaciation of the Alps were the advances which have been made by the study of palæolithic deposits, especially in France, Belgium, and Germany, during the last twenty years. In popular interest this chapter of geological history necessarily surpasses all others, and the study of the deposits of the caverns and river valleys which contain the rude stone weapons of [Pg 202] early man and the remains of the wild animals which he hunted has never lacked enthusiastic investigators. In particular, the geologists and anthropologists of France have distinguished themselves by their patience and success in this department; and the palæolithic history of Europe is now far more fully known than it was in 1895. These investigations have shown not only that man inhabited Northern Europe before the cold conditions of the glacial period had passed away, as Prof. Geikie had stoutly maintained from an early period in his career, but also that cold epochs had alternated repeatedly with warmer epochs. Differences of opinion, of course, there are, as is inevitable in subjects which at the present time have been so incompletely examined. Penck and Geikie, for example, would place the epoch of weapons of Acheulian type in the second interglacial warm period, while Boule and Schmidt would relegate it to the third; but the significant fact remains that there is a general agreement that since man inhabited Northern Europe he has seen repeated epochs of genial climate alternating with periods of severe cold.

Prof. Geikie was always deeply interested in this work, and followed the course of investigation with the closest attention. Unfortunately Scotland possesses no deposits containing palæolithic weapons; and circumstances precluded him from taking part in the field studies except during brief holiday visits to the Continent; but he diligently read the literature, as may be seen in his [Pg 203] course of Munro lectures in Edinburgh University in 1913, subsequently published in book form as *The Antiquity of Man in Europe*. In reading this book, it is pleasant to find how little change he had been obliged to make in the conclusions he had arrived at twenty years before, and how fully his sagacious interpretation of the evidence then available had stood the test of time. One can notice in his preface a serene conviction that his work had been justified by the results.

"The research of the past twenty years has certainly cleared up much that was doubtful and obscure, and brought to light many interesting details which enable us to form a more adequate conception of the early history of our race than was previously possible. These later investigations, however, have not in any respect shaken the general conclusions arrived at twenty years ago but, on the contrary, have served only to strengthen and confirm them."

Gradually also the difficult task of correlating the interglacial deposits of Britain, Switzerland, and France was being mastered, and even the interglacial periods of North America were being relegated with more or less confidence to their proper places with reference to the European sequence, so that in this, his last book, he was able to announce that solid progress had been made along the lines of advance which he had sketched, and his laborious investigations had produced valuable results.

Prof. Geikie had always considered that much valuable knowledge of the climatic changes which Scotland had undergone since the melting of the great ice-sheet would be obtained from a [Pg 204] minute examination of the peat-bogs which cover large expanses both of the hills and of the plains of his native country. His own botanical training was insufficient to enable him to attack such a problem with success, but for many years he closely studied the geology of the peat-bogs, and never failed to impress on his students that a rich harvest of scientific information might be reaped by any investigator who took this difficult task in hand. Fortunately he lived to see a very careful examination of the flora of the Scottish peat-bogs by Prof. Lewis published in four parts in *The Transactions of the Royal Society of Edinburgh*. Prof. Lewis was evidently much indebted to Prof. Geikie and to Dr Horne for suggestions and assistance in the geological part of his work; but the evidence, which is very carefully and fully stated in his papers, is sufficient to carry conviction on several important points. He shows that many of the peat mosses began their growth under arctic conditions when glaciers must have existed in many of the more elevated districts of Britain. Thereafter changes of climate supervened, and were accompanied by changes in the flora, of which the remains are now preserved in successive layers of peat. Speaking generally, we may say that the lowest arctic plant bed is followed by a lower forest bed, usually rich in birch (and sometimes hazel and alder), which is overlain by a second arctic bed, followed in turn by a second or upper forest bed containing mostly roots and stools of pine. Above these [Pg 205] lies the modern peat. Prof. Lewis concluded as the result of his researches that while it is difficult to reconcile the several stages in the peat with the theory of a single glaciation, the whole of the peat beds agree very closely with the scheme of classification proposed by Prof. Geikie (in the third edition of *The Great Ice Age* published thirteen years before). These results were none the less gratifying because they had been in some measure foreseen; and if we admit, as some maintain, that the final test of scientific hypothesis is the power to foresee the outcome of future researches, we must agree that Prof. Geikie had good reason to feel that his speculations on late-glacial changes in climate in Britain had not been mistaken.

When in course of time the third edition of *The Great Ice Age* was sold out, he considered very carefully whether he should undertake a revision of the book, bringing it up to date by incorporation of the most recent additions to our knowledge of the glacial period. Advancing years made him to some extent reluctant to undertake so formidable a task, and he felt also that in his interpretation of the chief events of this chapter of geological history he had no radical alterations to make. This, as we have already said, is sufficiently clear from his attitude in his Munro lectures. Moreover, the whole subject was highly controversial, and he greatly disliked fighting the old battles over again. At one time he was seriously thinking of writing a short work outlining the most important recent advances in glacial geology, but the intention was never [Pg 206]

carried into effect.

Problems of tectonics and of the relations between geological structure and the surface configuration of the earth at the present time always possessed a strong fascination for him, and in his college lectures were favourite topics for discussion. Belonging to both geology and geography, these were subjects in which all his powers found congenial exercise. The *Scottish Geographical Magazine* contains many papers from his pen dealing with physical geology, and the last of these which he wrote was on "The Deeps of the Pacific Ocean and their Origin." In this paper he advocated a new interpretation of these great submarine depressions, and as his views were not in accordance with those of Prof. Suess of Vienna, as expounded in his great work *The Face of the Earth*, this paper was the occasion of a long and friendly correspondence with the eminent Austrian geologist (an Englishman by birth). Prof. Geikie had always been a great admirer of Suess and a close student of his writings, and both were attracted by the same kind of problems. In 1911 Prof. Geikie had written a paper on the "Architecture and Origin of the Alps" which appeared in the *Scottish Geographical Magazine*, and ten years previously more than one paper on the origin and structure of mountains had been contributed by him to various journals. He now determined to use the materials he had collected for the preparation of a book which was ultimately issued under the title *Mountains: their Origin, Growth, and Decay*. As usual he did not [Pg 207] despise the non-scientific reader, but made his exposition of the subject so simple and clear that all could apprehend his meaning. A vast amount of important work had been done on the geological structure of the Alps during the previous ten years, and in addition to reading the literature carefully, Prof. Geikie visited Switzerland to make himself familiar with the scenes he described, and to enable him to form an opinion on the theories advanced, based on personal examination of some of the best sections. At the same time he utilised the results of the work of his old colleagues of the Scottish Survey on the North-west Highlands, where they had gleaned new data of the highest value, and the book was illustrated with many beautiful photographs of Scottish and Alpine mountains. Throughout the book the influence of Prof. Suess is often noticeable. The compilation of this book was a thoroughly congenial task to Prof. Geikie. He was content for a time to let glacial controversies rest, and to concentrate his attention on problems of geographical evolution.

In bringing to a close this short review of Prof. Geikie's scientific work, we may be permitted to point out what seems to be the main characteristics of his investigation and teaching. Had he been questioned himself on this point, there can be no doubt he would have given his University courses of instruction a high place in his services to science. He never allowed himself to regard it as routine work, to be hurried through without enthusiasm. He gave his best to his students, [Pg 208] and constantly improved his lectures, excursions, and practical classes, so as to make them as modern and as complete as circumstances would allow. Hampered by very inadequate accommodation and equipment, he gave freely of his time and money to compensate for these disadvantages. The ordinary student he strove to interest and to instruct, and as year by year his classes increased, he had good evidence to convince him that both his subject and his method of expounding it were receiving their full share of attention among the students of the University. But he had a keen eye for merit, and young men who evinced a desire to pursue the path of original research were quickly recognised and encouraged in every way to follow the right lines. Thus, although geology was for a long time a very small class, it produced almost every year one or more men who subsequently made a name for themselves in science. All over the world, and especially in the British colonies, there are many well-known geologists who can trace the impetus which decided their careers to the lectures delivered by the genial professor in the dingy old Edinburgh class-room at the top of those interminable stairs.

As a geologist he had limitations which he clearly recognised. Palæontology, petrology, and mineralogy he had a sound working knowledge of, but he never professed to know them thoroughly, and much of the teaching of these subjects he left to specially trained assistants. Had he been better equipped in these respects, he might have avoided some of the pitfalls into which [Pg 209] he stumbled at times. But in physical and structural geology he took a very high place among living scientists. The thorough training and natural aptitude for structural and field geology made him a very shrewd judge of controversial questions in tectonics, and laid a secure foundation for his researches in geographical evolution and the origin of the earth's surface features. As a geographer, interested especially in the larger problems of geographical configuration, he earned a world-wide reputation. His special field of work, however, was the history of the glacial period in all its aspects, and as time went on he came to be recognised as the most thorough-going advocate of repeated glacial and interglacial epochs. The positions he took up at a very early stage in his scientific career he maintained with little modification till its close, and in spite of indifference and in the face of severe criticism he saw his theories more and more completely established year by year. The subject is one of the most controversial in geological science at the present day. Very eminent authorities may be found who deny the validity of nearly every one of Prof. Geikie's conclusions about interglacial epochs, but there is a large and increasing body of supporters of his views, though even now the extreme position he took up in subdividing the Ice Age into six glacial periods cannot be said to be generally accepted. But if we compare the text-books of the present day with those published twenty years ago, we can realise how great an [Pg 210] advance has been made in the direction in which he led; and there can be no doubt that in the long-run his consistency, courage, and sagacity will receive full recognition.

The old Scottish school of geology which had numbered so many famous men among its members found in James Geikie one of its most distinguished representatives. In science, as in all things, he was pre-eminently a Scotsman. Ramsay and Croll, two of the most philosophic geologists of their time, were the men to whom he owed the inspiration which originally directed

him, and he was a true disciple of Playfair, whose memory he reverenced. In all his writings he places in the foreground the observations which he and his fellow-workers in Scotland had made in the field, and the inferences drawn from them; and it was in no small measure to James Geikie that the high position which the work of Scottish geologists holds in the estimation of scientific men is to be ascribed.

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Transcriber's Note

In the "List of Publications" missing quotation marks have been added, but other inconsistent punctuation has not been changed.

In the index the spelling of Moncrieffe (from Moncrieff) and Skjervö (from Skerjvö) have been changed to match the spelling in the main text.

On page 123 the signature copied as "Dr Hav. Pfeifer" appears to be that of the glacialist Dr Franz Xaver Pfeifer. The signature also appears in this form in *The Journal of Geology*.

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