

*NATURAL PHILOSOPHY AND  
MOUNTAINEERING IN  
SCOTLAND, 1750-1850<sup>1</sup>*

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I must first define a little more closely the problem to which I have addressed myself in this paper. Many of the climbers of whom I intend to speak used methods or had objects in climbing which would have led to their immediate expulsion from the purist and specialist mountaineering clubs of the twentieth century; but nevertheless they were the pioneers who blazed the trails for their successors. Also with one or two exceptions I must leave the Lowlands out of account and concentrate on the Highlands. While I should not care to say that none of the Highland mountains had been climbed before the eighteenth century, no records of such ascents have survived. We do indeed hear of a mad laird in Glenlyon who is said to have climbed Stuich an Lochain and of a lovesick maiden, jilted by Mackintosh of Moy, who gave her name to one of the Cairngorm corries. From these instances we may perhaps conclude that our simple-minded forefathers regarded habitual wandering over the high hills as one of the clearest symptoms of a disordered mind.

Nevertheless the native Highlanders occasionally visited the high tops, especially in the course of a deer drive. Stevenson's line about the hunter home from the hill is historically accurate; but it seems improbable that the hunters would often reach the actual summits. If a mountain range formed the boundary between two clan territories there may have been something corresponding to the "riding of the marches". Sometimes too the most convenient route for traffic passed over or near a mountain top, as in the case of the Minnigaig crossing from Blair Atholl to Kingussie or some of the Mounth roads from Deeside to Angus, but for obvious reasons such routes avoided high exposed ground whenever possible. In war, too, small groups of Highlanders sometimes

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took to the mountain tops, as in Cameron of Lochiel's resistance to Cromwell's troops in the Protectorate period.

There may also have been a special reason for climbing certain mountains. Early nineteenth century tours from Glasgow to Inverary often state that at one time the Cobbler had been the highest point in the domains of Clan Campbell and that on succeeding to the leadership of the clan the new chief was required to climb Ben Artur and seat himself on the top-most crag. If he failed, the chieftainship passed to the next heir who had the courage and skill required for the climb. If this represents a genuine tradition and not a picturesque invention, we may perhaps regard the Celtic chiefs of Scotland as the original founders of a Scottish mountaineering club. There are similar stories about Norse kings.

I conclude therefore that down to the early eighteenth century the actual summits of the Highland mountains were almost as unknown to the Highlanders as they are in the main to their twentieth century descendants. Nor were they climbed by the few English and other foreign visitors who penetrated the Highlands and left accounts of their travels. Their attitude on the whole is that of E. Burt who wrote (Burt 1754:II,6, 10): "The summits of the highest mountains are mostly destitute of earth, and the huge naked rocks, being just above the heath, produce the disagreeable appearance of a scabbed head". He opined also that the Highland hills are "a dismal gloomy brown, drawing upon a dirty purple; and most of all disagreeable, when the heath is in bloom".

This attitude changed, however, in the course of the eighteenth century. At approximately the same time, four quite distinct categories of climbers began to resort to our Scottish hills.

1. A mixed category of persons who sought the tops in the course of their everyday duties e.g. deerstalkers, shepherds, guides, fencers or dykers, or else with a view to financial gain e.g. the land surveyors who spent long periods in making surveys of highland estates and the rather later early nineteenth century cartographers.

2. The second class of climber was the sportsman. Here the prototype was Colonel Thornton, a Yorkshire squire who had studied at Glasgow University, who kept a careful record of his activities which was published twenty-two years later in 1804.

3. The third type of climber was the mere tourist, who, often

unaccompanied by a guide, was beginning to climb the more accessible mountains in the second half of the eighteenth century. As yet these ascents were rare except in the case of Ben Nevis and Ben Lomond. The earliest English tourist who came to Scotland for the specific purpose of climbing our hills, was Thomas Wilkinson of Yanwath, an acquaintance of Wordsworth's. I must however add that Wilkinson's actual performance, like that of many of his successors, fell far short of his ambitions.

4. Finally, there was a fourth class of early climber consisting of men whose primary object in mountaineering was the pursuit of some scientific inquiry. As Sir Walter Scott's friend, John Stoddart, remarked: "Natural philosophers of late have not infrequently been travellers. They have displayed great talents and industry, they have accumulated much valuable matter, and their labour has richly deserved its reward; but high merit in this, as in all other lines, is rare . . ." (Stoddart 1801:I, ix).

It should perhaps be observed that my third and fourth categories are not entirely water-tight. While tourists climb inspired by a subjective desire to see out of the way places and perhaps to boast afterwards to less privileged mortals, the scientist is dominated by a determination to observe and record facts about the external universe. But motives are often mixed and it is sometimes difficult to say whether a particular climber on a particular climb was more scientist or tourist.

This sudden invasion of Highland hills by a horde of scientists was not of course a local phenomenon: it was part of a much larger and general movement. Whereas the medieval student had meditated in the seclusion of his study, on such problems as the exact number of angels who could dance on the point of a needle at any given moment of time, his seventeenth century successor was beginning to take an interest in laboratory work and indeed to realise that the whole external world could become his laboratory. As early as the sixteenth century we hear of a Zurich naturalist who resolved "to climb mountains for the delight of the mind and the proper exercise of the body" and made an early ascent of Pilatus (Styles 1951:276). G. W. Young argues that it was assumed mere adventure in mountaineering was unworthy of a grown man's interest unless undertaken for a serious scientific object: hence "the few adventurous Swiss who first explored their

own glaciers all bore the cloak of professional titles" (Young 1957:8-9). Thus the brothers De Luc in 1765 tried to climb the Buet near Geneva in order to observe variations in air-pressure and the boiling point of water at various heights. When the abbé Murith climbed the Velan in 1779 he carried the usual barometer and thermometer, although he did the climb chiefly because attracted by the mountain. It was Dr. Paccard who made the first ascent of Mount Blanc. When de Saussure, who had previously made unsuccessful attempts to reach the summit, followed in Paccard's footsteps next year (1787) he spent 4½ hours on the top and conducted numerous experiments. The instruments he carried to the top included a barometer, thermometer, hygrometer, electrometer and apparatus for determining heights by boiling water (Engel 1950:28-49).

Sir Joseph Banks climbed Hecla during his scientific expedition to Iceland (Cameron 1952:58). When serious climbing in the Pyrenees began in the French revolutionary period, the pioneer Raimond carried his instruments for observations with him. In England, however, in the seventeenth century, Thomas Johnson, who is reputed to have made the first ascent of Snowdon in 1639, was not a natural philosopher but a botanist, intent on compiling a complete illustrated description of all British plants. When he and his friends reached the summit of Snowdon "we sat down" he recorded "in the midst of the clouds, and first of all we arranged in order the plants we had, at our peril, collected among the rocks and precipices, and then we ate the food we had brought with us" (Raven 1947:289-290).

In Scotland the first physical experiment which necessitated hill-climbing seems to have been made by George Sinclair as early as 1670 (Sinclair 1683:207-9).

Upon Tuesday the 19 of July 1670 [he stated] the following experiment was made. In the middle marches between Scotland and England there is a long tract of hills . . . amongst the which the mountain Cheviot is famous beyond and conspicuous above all the rest for altitude . . . The North side of this mountain is pretty steep, yet easie to climb either with men or horse. The top is spacious, large and broad and all covered with a Flow-moss, which runs many miles South. When a man rides over it, it rises and falls. 'Tis easie to thrust a lance over the head in it . . . Upon the highest part of this Mountain was erected the Torricellian Experiment for weighing of the air, where we found the altitude of

the mercurial cylinder 27 inches and an half. The air was dry and clear and no wind. In our Valley-Countreys, near to the sea-coast in such weather we find the altitude 29 inches and an half. When this difference was found, care was taken to seal up closely with Bee-wax, mixed with turpentine, the orifice of the vessel that contained the stagnant mercury and through which the end of the pipe went down. This being done with as great exactness as could be, it was carried to the foot of the mountain in a frame of wood, made on purpose, and there opening the mouth of the vessel we found the mercury to rise an inch and a quarter higher than it was. The reason of this strange phenomenon must be this, namely a greater pressure of the air at the foot of the hill than upon the top, even as there is a greater pressure of water in a surface 40 fathom deep than in a surface 20 fathom deep. 'Tis not to be doubted but if the root of the mountain had been as low as the sea-coast or as the surface of Tweed at Kelso, the mercurial cylinder would have been higher . . . This experiment lets us see that the pressure of the air seems to be as the pressure of the water, namely the further down the greater and the further up the less and therefore as by coming up to the top of the water there is no more pressure, so by coming up to the top of the Air there is no more weight in it; which in effect says that the air hath a determinate height as the water hath. From this experiment we cannot learn the determinate height of the air, because the definite height of the Mountain is not known. I know there are some who think the air is indefinitely extended, as if forsooth the firmament of fixed stars were the limits of it, but I suppose it is hard to make it out.

So far as I know this experiment in physics was not followed up in Scotland for nearly a century; but from the 1760s scientific curiosity was the impulse which produced many of the earliest recorded ascents of our Highland hills. That there was great need of such first-hand enquiries by competent scientists is evident from the kind of information which was available about the Highlands in the seventeenth century. Much of this was collected by Walter Macfarlane and published by the Scottish History Society. These papers include, for example, an anonymous and undated description of Strathspey (Macfarlane 1908: 240-4): "Here is the famous hill called Kairne Gorum, which is four miles high. Here it is said, there are minerals; for gold hath been found here. This hill aboundeth with excellent crystall. Much deer and roe here." The author then refers to the red-handed spectre of Glenmore which "lately in '69" fought with three brothers in succession who all died.

Even taller stories circulated about the far north-west,

such as the constantly repeated yarn (Fraser 1699:230-2) about Meal-fuor-vouny, a mountain a mile high on Loch Ness-side and containing a loch near the top which was a mile deep. Fraser claimed also that in Glen Affric there was

a lake of fresh water, called Lochan Wyn or Green Lake, 18 foot in diameter, about a fathom deep. This lake is always covered with ice, summer and winter. The next mountain, north of that, is called Scùre-in-Lappich; on the top of it there is a vast heap of white stones like chrystal, each of them bigger than a man can heave. They will strike fire like flint and have the smell of seawrack . . . Upon this mountain is found also oister-shells in plenty, scallop and limpet-shells, yet 20 miles from any sea. Round about this hill grows the sea-pink, in Irish teartag: it has the taste and colour of that grows upon our sea banks.

When John Walker, Professor of Natural History at Edinburgh, was collecting material for his *Economical History of the Hebrides and Highlands of Scotland*, posthumously published in 1808, he could apparently find nothing better than Fraser's letter and copied it laboriously into his note-book (E.U.L. Dept. of MSS., Dc. 2.37).

The earliest scientists to penetrate this mysterious region were primarily interested in botany. Edward Lhwyd, former keeper of the Ashmolean Museum at Oxford, travelled in 1699 through Cantire, Argyll and Lorn and visited several islands. "In the Highlands" he recorded (Lhwyd 1713:97-101) "we found the people everywhere civil enough; and had doubtless sped better as to our enquiries had we had the language more perfect". While "going up one of the high hills of Mull we found *Rhodia Radix* [and other plants] and (which I had never seen grow spontaneously) *Alchemilla Alpina quinquefolia*".

In the 1760s Professor John Hope was offering prizes to his students at Edinburgh for the best collection of Scots vegetables and it was he who persuaded the Commissioners on the Forfeited Estates to finance a series of tours of Scotland by James Robertson (1767-71). Hope described Robertson as "one of the assistant gardeners [at the Edinburgh Physic Garden], a young man of promising genius (tho' then illiterate)". In exchange for a grant varying from £40 to £50 each year to cover his expenses, Robertson spent the summer months on tour, made the first recorded ascents of many well-known "Munroes" and brought back specimens for the College Museum (S.R.O. Forfeited Estates Papers). His MS.

*Journals*, which give no ground for his patron's charge of illiteracy, are partly missing but those for 1767 and 1771 (N.L.S. MSS. 2507-2508) show that he was interested in natural philosophy as well as natural history. For example, in 1771, on the advice of George Clerk Maxwell, Clerk to the Commissioners, he examined the heat of the different springs he met with in ascending mountains, "being of the opinion that the degree of cold would be found to increase in proportion to the height of the springs".

Hope's influence was, however, felt in another way. He himself accompanied Pennant and Lightfoot on Pennant's second tour of Scotland in 1772 and perhaps introduced Lightfoot to the Rev. John Stuart, whose father was the well-known minister of Killin and who had himself been one of Hope's students. By 1772 Stuart was familiar with the tops of many Highland hills and guided Lightfoot to some of these summits.

The botanists did not long have the hills to themselves. A party of astronomers chose the summit of Ben More (Perthshire) to observe in 1769 the transit of Venus (Robson 1814: letterpress relating to Plate No. 16). Other observations were made from Siberia to the Cape of Good Hope and from California to Tahiti but the results seem to have been disappointing.

This preliminary incursion was soon followed up. In 1772 the Rev. Nevil Maskelyne, the Astronomer-Royal, proposed to the Royal Society that they should try to measure by astronomical observations the attraction of some hills in this kingdom. When Maskelyne was being considered for appointment as Astronomer-Royal, the supporter of another candidate had asserted that Maskelyne's "moral character as a clergyman is infamous; his intrigues with the black women [on Barbadoes] were notorious to the whole island by his letters to them being publicly handed about", while his professional competence as an astronomer was also called in question (Jucker 1949:328). The Royal Society already possessed most of the instruments required and George III graciously allowed them to use for Maskelyne's project the residue of the funds he had contributed towards the cost of observing the transit of Venus. Therefore, in the summer of 1773, a certain Charles Mason was sent to make a preliminary inspection of suitable mountains. Schiehallion was found to be most convenient for the purpose. It was of sufficient height, tolerably detached from other hills, and considerably larger from east to west than from north to south. In 1774 Maskelyne spent four months on the mountain.

An observatory was constructed for him halfway up the south side of the hill, where the attraction of the mountain would be at its greatest, and then it was moved across the summit by twelve men, who took a week to the job, and re-erected halfway down the north face. The observatory consisted of a circular wall five feet in diameter with a conical roof for the quadrant, a square tent for the transit instrument and a bothy for the residence of the observer. There Maskelyne completed his observations while his assistants below with their theodolites were busy calculating the shape and dimensions of the hill with the aid of cairns specially erected on the summit ridge. During his residence on Schiehallion Maskelyne received numerous visits from the neighbouring gentry and also from university scholars interested in the experiment (Maskelyne 1775: 500-42).

The object of the exercise was clearly explained by Sir John Pringle, Bart., in his presidential address to the Royal Society on 30 November 1775. Pringle (1783:91-136) began by pointing out that the idea was to test the Newtonian theory in a way originally suggested by Newton himself. Bouger and Condamine in 1735 had already tried to do so on Mount Chimborazo in Peru, but "their observations not only varied from one another, but seemed to be little satisfactory to themselves".

The zenith distance of a star on the meridian being observed at two stations under the same meridian, one on the south side of a mountain, the other on the north; if the plumb line of the instrument be attracted by the mountain out of its vertical position, the star will appear too much to the north by the observation at the southern station, and too much to the south, by that at the northern station; and consequently the difference of the latitudes of the two stations will be found, by these observations, greater than it really is. And if the true difference of their latitudes be determined by measuring the distance between the 2 stations on the ground, the excess of the difference, found by the observations of the star, above that found by this measurement, must have been produced by the attraction of the mountain, and its half will be the effect of such attraction on the plumb-line at each observation, supposing the mountain attracts equally on both sides.

Maskelyne's calculations seemed to show that the mean density of the earth was about double that of the mountain. "All doubts about an universal attraction must at last be terminated, and every philosopher, in that respect, must now



become a *Newtonian*". Pringle concluded that "we have the pleasure to find the doctrine of *universal gravitation* so firmly established by this finishing step of analysis, that the most scrupulous now can no longer hesitate to embrace a principle, that gives life to Astronomy, by accounting for the various motions and appearances of the Hosts of Heaven".

Maskelyne's own conclusions (Maskelyne 1775: 500-42) were that (1) Schiehallion exerts a sensible attraction; (2) its density is about half the mean density of the earth; and (3) the density of the internal parts of the earth is much greater than near the surface. Unfortunately his measurements appear to have been vitiated by fundamental errors. Nevertheless his work was used by Charles Hutton in his celebrated calculations of the mean density of the earth (Hutton 1779:689-778), a problem which is still of interest to geologists.

Maskelyne had travelled to Scotland in the company of a fellow-member of the Royal Society, Colonel William Roy, a man of many parts who at this time was keenly interested in experiments to measure heights by the use of a barometer. The pioneers here were the Swiss brothers De Luc who had published tables based on their observations on the hills above the Lake of Geneva. The elder brother emigrated to England in 1773 and was appointed Reader to the Queen (Engel 1950:31). I do not know whether there was personal contact between De Luc and Roy, but when Roy visited Maskelyne in 1774 he climbed to the top of Schiehallion and took barometer readings on 11th and 12th July and calculated the height at 3,281 feet (O.S. actual 3,547). Subsequently Roy employed junior engineer officers and civilian volunteers to take similar observations from Faragon, Ben Lawers, Ben y Gloe and Ben More (Perthshire) as well as from several of the Pentland hills. Roy (1778:69-70, 127, 137) gave full details and made the suggestion that "reasonable accommodation" should be provided for an observer who should live a whole year on the top of Ben Nevis and make regular observations (Roy 1778: 118).

Later when the Rev. George Skene Keith opened up the Cairngorms his primary object was to calculate the heights of the various summits. He made Braeriach, Cairntoul and Ben Macdhui 4,280, 4,285 and 4,300 feet respectively and reckoned that Cairngorm did not exceed 4,050 feet. We cannot but be impressed by the accuracy of his results. It was these observations which first displaced Cairngorm from its age old pride

of place amongst the Cairngorm summits. Also Keith despatched his son to climb Ben Nevis and take observations there which convinced Keith that Ben Nevis was higher than any of the Cairngorms, although more than a generation was to pass before this was finally established (Keith 1811:641-53).

Roy, however, has other claims to our attention. As early as 1747 Watson and Roy with eighteen assistants had begun a general survey of Scotland, but the outbreak of the Seven Years War had prevented the completion of this task. Roy at the end of this war continued to press for its completion, but when the War of American Independence broke out it meant the end of his hopes for a proper survey of the whole of Britain (Macdonald 1917:202-5). Ultimately his work was taken up and carried to a successful completion by the Ordnance Survey.

In a foreword to the official *Account of the Observations and Calculations of the Principal Triangulation*, etc. published in 1858, the Superintendent expressed regret at the necessity of using hill stations to determine latitudes since these were necessarily inaccurate; but "the summits of mountains were necessarily selected for the communicating points in the triangulation". The *Account* is a severely practical compilation, though official reticence breaks down when we are told that "the ascent [of Ben Lomond] is by no means difficult and the prospect from it on a clear day is not only very extensive, but extremely beautiful and magnificent". Occasionally information was supplied as to the best route to the summit of the mountain. The observations were made by engineer officers who often spent long periods on the mountain tops. Thus one party remained on Ben Nevis, "the roughest and highest" mountain in Scotland, from 1st August to 14th November 1846 and another on Ben Macdhui from 6th June to 16th August 1847. From Ben Macdhui, Ben Nevis was observed 39 times, Scour na Lapich 35, Largo Law twice etc. (Ordnance Survey 1858:*passim*).

A much clearer picture of the life of an ordnance surveyor is offered by the quite unofficial *Memoir of the Life of Major General Colby* (Portlock 1869:*passim*). Colby spent much time from 1813 to 1822 on ordnance survey work in Scotland. Fortunately he was "in manners and habits . . . singularly simple and temperate, being as much at home and as satisfied on the mountain top with the most ordinary fare, as in comfortable winter-quarters with corresponding good cheer". He was interested in the use of instantaneous light signals for survey purposes and one of his assistants about the year 1816

“won a prize by throwing the sun’s rays from a concave mirror from, I think, the top of Slioch to the Clova hills in Kincardineshire, through some glen or other, thus enabling these spots to be fixed accurately for mapping” (Mackenzie 1952:142).

From a journal kept by one of his assistants, Major R. W. Dawson, in 1819, we get some idea of Colby’s methods. He joined Dawson at Huntly after

having travelled through from London on the mail coach, with a rest probably of only a single day at Edinburgh, the journey occupying at that time four or five days and nights. This was Captain Colby’s usual mode of travelling: neither rain nor snow nor any degree of severity in the weather would induce him to take an inside seat, or to tie a shawl round his throat; but muffled in a thick box coat, and with his servant Fraser, an old artilleryman at his side, he would pursue his journey for days and nights together, with but little refreshment and that of the plainest kind—commonly only meat and bread, with tea or a glass of beer (Portlock 1869:132).

Once established on their mountain top the observers could only take observations in certain circumstances, often after weeks of waiting. “It may be imagined” his biographer tells us, “how perplexing it is at such times to receive visitations from the gentry of the neighbourhood, which otherwise would be highly acceptable”. Colby, we are told, received visitors, even the humblest, with kindness as a rule, but “nothing appeared to annoy him more than the approach of visitors when we were really at work, and whatever might be their rank, he would then scarcely speak to them or show them even common attention” (Portlock 1869:137-8).

When not actually making observations, Colby used to set off with some of his men on what he called a “station-hunt” i.e. a pedestrian excursion to explore the country to erect objects on the tops of some of the principal mountains and select those which, from their position and circumstances, should be preferred for future encampments. Returning on 21 July 1819 from one of these station hunts in which he had walked 513 miles in 22 days Colby set out two days later with a fresh party of soldiers.

Captain Colby having, according to his usual practice, ascertained the general direction by means of a pocket compass and map, the whole party set off [from the top of Corryhabbie] as on a steeplechase, running down the mountainside at full speed, over Cromdale, a mountain about the same height as Corriehabbie, crossing several beautiful glens, wading the streams which flowed

through them, and regardless of all difficulties which were not actually insurmountable on foot.

In this manner 39 miles were covered in the first day and 40 in the second day. On the third day Creag Meaghaidh was apparently climbed and Colby remarked that "the view of the Alps, is in my opinion scarcely more imposing than this". On the fifth day they "bagged" Scour Ouran, above Loch Duich, but on the seventh the summit of the Coolin hills defeated them.

Not being provided [Dawson explains] with ladders or ropes the perpendicular rock at the summit effectually baffled our efforts for several hours to find a crevice by which to ascend it. We gained, however, a ridge which reaches out from the perpendicular cliff with a superb column at the extremity of it, and so narrow is this ridge that we were obliged to sit astride upon it, in which position little more than the strength of an infant was required to hurl a stone to the bottom of the corrie on the south side without impinging upon the face of the cliff, a depth of about 2000 feet. After admiring for a while the magnificence of the prospect and the dreary and all but chaotic scene around us, we returned to our inn, gratified above measure with what we had seen, though disconcerted with our professional failure.

Next day, however, Scour-na-Marich was successfully climbed and a large pile built upon it. Ascents of Slioch and other hills to the east of Loch Maree followed and the party returned to their base at Corryhabbie having walked 586 miles in 22 days, including Sundays and days on which they could not travel owing to bad weather (Portlock 1869:139-48). The party then did further work north of Inverness and held a farewell feast at which the chief dish was a plum-pudding nearly 100 lbs in weight. Colby and his chief assistants attended, but withdrew after partaking of the pudding and drinking "Success to the *Trig*" (Portlock 1869:153-4).

But the ordnance surveyors were far from being the only surveyors in the Highlands. The Commissioners on the Forfeited and Annexed Estates employed a whole army of them to make accurate surveys and many of these estate plans are preserved in the Scottish Record Office. Great noblemen followed this example, partly at least with the hope of being able to draw an increased revenue from their lands. Such estate plans were used by the early nineteenth century cartographers and covered many of the highest Highland hills. Other surveyors used their specialised knowledge and skill to

produce guides for tourists. Thus Charles Ross (Ross 1792:10) explained that "having made an actual survey of the county of Dumbarton and lake of Lochlomond, I am enabled to give a more minute account of the whole than those who have preceded me". Another surveyor, John Ainslie, produced *A Travelling Map of the Roads through Scotland* price 2/- with some assistance from the Commissioners. Another, James Stobie, published a map of Perthshire to show *inter alia* "hills and considerable rising grounds with the perpendicular heights of some of the most remarkable above the level of the sea", while Taylor and Skinner also applied for financial support in publishing their well-known road book, which they state had cost £1,433 sterling to produce (S.R.O. Forfeited Estates Papers).

From the point of view of hill climbing the most interesting surveyor was John Williams, who was a native of Wales and originally bred a miner. Subsequently he served as a soldier in the Dutch service before coming to Scotland as an adventurer at Leadhills (*circa* 1760). Soon he transferred his attention to coal at Carlops on the Newhall estate and elsewhere. His plan for "a coal progress" through Scotland (N.L.S. MS. 1810) attracted the attention of the earl of Buchan, who records that "as he seemed to me a worthy man and possessed of a great deal of practical knowledge in geology, though without much science, I invited him to reside with me some little time at Kirkhill and put such books into his hands as I thought might be useful to him". Buchan then found him employment in Sutherland at Brora and Dunrobin and subsequently as "overseer of the coal" at Gilmerton, near Edinburgh. He spent the summers of 1770-75 prospecting for mineral wealth on the forfeited estates, but the results were so disappointing that on 26 Feb. 1776 trials on all estates were abandoned by the Commissioners (S.R.O. Forfeited Estates Papers). Williams, however, had kept voluminous notes of his various surveys and later published them (Williams 1789). Shortly after the publication of this work he went to Italy to search for coal and copper mines and died soon after his arrival. Williams was perhaps the first man to call attention to the problems raised by vitrified forts and brochs (Williams 1777), though it cannot be said that he carried the enquiry very far, being content to associate these structures with Fingal and the Fingalians.

During the summers of 1770-75, when he was regularly employed by the Commissioners, he began by examining

“some of the high hills marching with Badenoch on the east side of” Corryarick (July 1770) and in September 1770 he hired special guides at 1/6 a day to show him the marches with Strathdearn (i.e. the upper reaches of the River Findhorn) and Badenoch. At the beginning of 1772 he was specifically instructed by the Commissioners “to examine the different sorts of stones particularly on the tops of high hills” and his climbs in 1772 include the second recorded ascent of Ben Wyvis and in 1774 the second recorded ascent of Ben Nevis. He had spent much of the summer of 1774 on Gulvin engaged on various surveys and trials but dashed down from the head of Locheil on 7 and 8 September 1774 “going to Fort William and going to the head of Benevus”. His expenses included “To a man going to the head of Binevus to assist in carrying meal and provisions 1/6” and “To a bottle rum, mutton, bread and cheese for Binevus 4/6” (S.R.O. Forfeited Estates Papers). “My mind” he later stated (Williams 1789:121) “was overwhelmed in amazement at the vastness and singularity of the prospect around me. When I turned my eyes westward, perhaps no man who has not been there in a clear day ever witnessed a prospect more full of real sublimity and grandeur, yet highly pleasing and agreeable”.

In the accounts of some early climbs there are references to the physical-physiological effects of altitude. William Burrell who made in 1758 the first recorded tourist ascent of Ben Lomond stated that when he got “within 100 yards of the top I had the misfortune to be seized with a dizziness” which prevented him from accompanying his friends to the actual summit. While Burrell was “creeping down on all fours” his heartless friends “feasted very heartily on the summit” (N.L.S. MS. 2911). And the Rev. James Bailey, Vicar of Otley in Yorkshire, who in 1787 made the first recorded tourist ascent of Ben Nevis, claimed that his party “had felt the usual sensations of a contraction of the chest and a difficulty of breathing on the summit of the mountain” which he attributed to a diminution of density in the atmosphere and also to “the rigid and increased frigidity on the summit” (N.L.S. Ms. 3295, fo. 281). He added that had they had the foresight to have provided themselves with a barometer and thermometer these might have been sources of additional amusement, so the symptoms were apparently not very serious. A trained scientist, Dr. Macknight, on the other hand reported that “so far as I could judge from my own sensations, the rarity of the air at

this altitude [the summit of Ben Nevis] had no perceptible influence on respiration" (Macknight 1811:336).

So far as I know the first record of the Brocken Spectre being seen in Scotland was when Sir Thomas Dick Lauder, Mr. Macpherson Grant, Junior, of Ballindalloch, and an unnamed man reached the summit of Ben Macdhui at 3 p.m. on 10 October 1830. The tops of Ben Macdhui, Cairntoul and Braeriach stood out clear above a level curtain of mist and when the party descended towards Loch "Etichan" they saw a bright rainbow accompanied by the Spectre (Macpherson-Grant 1830:165-6).

There is also an early record of an "electrical storm" at the top of Ben Nevis. The Rev. Dr. Macvicar of Moffat, Sir Walter Trevelyan and some friends were caught in a snow shower while a sort of hissing and crackling, such as proceeds from a strongly charged Leyden jar, was heard on all sides and continued for upwards of 1½ hours. The electrical discharge was noticed on an umbrella belonging to one of the party while Sir Walter's hair and beard stood stiff and erect on end. "The hissing noise indicated that the electric fluid was positive and was streaming from the mountain in pencil-jets characteristic of that state" (MacVicar 1825:312-16).

If it cannot be claimed that the study of natural philosophy was greatly advanced by the excursions to the hills of Scotland to which I have devoted this paper, I believe that I have said enough to prove that the natural philosophers took their fair share in exploring our Highland mountains and putting them on the tourist map.

#### NOTE

- <sup>1</sup> This paper was originally given as a lecture to the Physical Society of the University of Edinburgh. With the kind permission of the Editor I have thought it better to leave the text unaltered.

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