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“A view of the Grampians”

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## ***A view of the Grampians observed in 1818 and published in 1820***

***David L Walker***<sup>1</sup>

In the course of the initial triangulation of Scotland, Captain Thomas Colby (who was usually in a hurry) unusually allowed Mr James Gardner at Ben Cleugh to record a panorama of the Grampian mountains. Back in London, Gardner had his work engraved and published as an aquatint six feet wide, from which the following extracts (comprising about twelve percent of the panorama) have been photographed. Handsome in itself, it demonstrates the versatility of James Gardner, and his key to the panorama shows the heights of a dozen Scottish mountains, and provides one of the few progress reports between 1811 and 1856 on the development of the initial triangulation of Scotland.<sup>2</sup>

As their first observations of Ben Nevis were achieved from Ben Cleugh<sup>3</sup>, Colby may have been more tolerant than usual, or he may have expected Gardner's panorama to prove useful later. It extends over 85 degrees from about west to about north and, subject only to vertical exaggeration, compares well with the computer assisted panorama calculated from OS data by Jonathan de Ferranti<sup>4</sup> – and it shades the background mountains particularly effectively beyond the foreground hills. James Gardner had been appointed to the Survey by William Mudge on the advice of John Rennie, the eminent consulting engineer, on a salary of £100 a year.<sup>5</sup> As James Gardner does not appear in the will<sup>6</sup> of William Gardner, head draftsman at the Tower until he died in 1800, they presumably were not related.

Apart from the East Sussex Record Office, the 1820 edition of Havell's engraving apparently survives only in the British Museum collection, although in 1875 it was lithographed and mounted on linen (with the key) by James Knipe.<sup>7</sup> It was also copied in John Thomson's Atlas of Scotland published in 1832.<sup>8</sup> But this version shades the hills less effectively than Havell's original, and does not include Gardner's key.

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<sup>1</sup> The author is a retired civil engineer, who once was captivated by the panorama of the Grampians visible from Ben Lomond, and also frustrated by thick mist at the summits of The Cobbler and Ben Nevis.

<sup>2</sup> David L Walker, 'The initial triangulation of Scotland', *Sheetlines* 98, 5-15 (2013) provides the background.

<sup>3</sup> Colby with Gardner had been unable to observe Ben Nevis from Glashmeal in June 1818: Capt A R Clarke, *Account of the observations and calculations of the principal triangulation etc*, London 1858, 114.

<sup>4</sup> [www.viewfinderpanoramas.org](http://www.viewfinderpanoramas.org) - panoramas, Ben Cleuch (North) - based on OS digital elevation data.

<sup>5</sup> 17th Report of Commissioners of Military Enquiry, Parliamentary Papers 1812 (5) IV, 168-169.

<sup>6</sup> Will of William Gardner, of the Ordnance Office Drawing Room Chief Draftsman of Tower of London, Middlesex, The National Archives, 3 April 1800, PROB 11/1340/41.

<sup>7</sup> This edition is in the map catalogues of the British Library and the National Library of Scotland.

<sup>8</sup> John Thomson's Atlas of Scotland, 1832, National Library of Scotland, map images at [maps.nls.uk](http://maps.nls.uk), ix.



*From the Summit of Bein Lomond the German and Atlantic Oceans are both visible , also the Cities of Edinburgh and Glasgow, the former at a distance of  $58\frac{2}{5}$  Miles. The greatest diameter of the visible horizon is  $152\frac{1}{2}$  Miles, Knock Layd near Ballycastle in Ireland being S.W.  $95\frac{1}{4}$  Miles, and Carn Gowar in Athol N.E.  $57\frac{1}{4}$  Miles; from Benmore in Mull to Sayrs Law in Lammermuir (another diameter) the distance is E.S.E.  $136\frac{2}{3}$  Miles, and from Buianoch in Lochaber to Cairnsmuir near Carsphairn, the diameter is in a Southerly direction  $119\frac{1}{8}$  Miles, so that the circumference of the visible Horizon cannot be computed at less than 450 English Miles.*

*above and opposite:*

*Extracts from A view of the Grampian Mountains from the Summit of Benclach the highest of the Ochil Hills, delineated and published by J Gardner, employed on the Trigonometrical Survey, January 1<sup>st</sup> 1820; engraved by Daniel Havell 16 Howard St, Strand, London; from ref GIL/4/8/236/1/237 by kind permission of East Sussex Record Office.*



*Ben Nevis is the Highest Mountain in Scotland,  
its distance from Benclach is 63½ Miles.*



Thomson's version of Gardner's panorama is accompanied by a 'Comparative View' of Scottish peaks that shows heights different from Gardner's. These are included in the tabular analysis below, which appears to confirm that the heights on Gardner's panorama were calculated trigonometrically from observations made in 1818 (and perhaps in 1816). Mudge and Colby in 1811<sup>9</sup> had published heights of hills and mountains observed until then, together with an account of the allowances made for refraction, as well as the curvature of the earth. Significantly, the percentage errors in those heights for Criffel, Wisp Hill, Dunrich and Sayrs Law in the south of Scotland were very similar to (and in the same directions as) the errors shown below for 1820.

Gardner's mountain heights are very interesting in showing that accurate triangles extending as far as Ben Lawers and Ben Nevis must have been calculated in 1818-19 (although these stations were not occupied until many years later). But who made these calculations?

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<sup>9</sup> William Mudge and Thomas Colby, *An account of the trigonometrical survey carried on by order of the Master-General of his Majesty's ordnance, in the years 1800-1809*, London, 1811.



*Heights in feet of Scottish mountains named in Gardner's panorama*

<i>Name in 1820</i>	<i>Name today</i>	<i>Ht. 1820</i>	<i>Ht. today</i>	<i>1820 error</i>	<i>Roy 1777</i>	<i>Wilson 1807</i>	<i>Thomson 1832</i>
Bein Lomond		3,191	3,195	-0.14%		3,240	3,270
The Cobbler	Ben Arthur	2,863	2,890	-0.95%			
Bein Eim	Beinn Ime	3,301	3,317	-0.48%			
Bein Ledi		2,863	2,884	-0.72%		3,009	3,010
Bein Lui		3,651	3,707	-1.52%			
Stobinnain	Stob Binnein	3,794	3,822	-0.74%			
Bein Mor		3,818	3,852	-0.87%	3,844	3,870	3,900
Steuchnachrone	Stuc a Chroin	3,171	3,199	-0.87%			
Bein Vorlich		3,207	3,232	-0.76%			
Bein Feskinich	Beinn Heasgarnich	3,482	3,537	-1.55%			
Bein Nevis		4,358	4,406	-1.09%		4,380	4,340
Meal Girdy	Meall Ghaordaidh	3,364	3,409	-1.31%			
Bein Lawers		3,944	3,983	-0.98%	3,978	4,015	4,010
Beinachony	Ben Chonzie	3,028	3,054	-0.87%			
Schiehallion		3,513	3,553	-1.13%	3,573	3,587	2,880

Thomas Colby was not known for making such calculations himself. James Gardner had made the observations from Wisp Hill and Sayrs Law in 1809 (and many other stations in subsequent years), and would have been ready to learn how to calculate mountain heights. Simon Woolcot, who had supported Mudge's work on refraction, had been active in calculating triangles and heights until his death on 19 April 1819.<sup>10</sup> So presumably Woolcot had either calculated, or had provided the advice that enabled Gardner to calculate, the heights shown on the key to the 1820 panorama.

Estimates of the heights of mountains in the eighteenth century (and the early nineteenth century) had mostly depended upon barometric observations, as described by William Roy in 1777.<sup>11</sup> His results (adjusted to allow for the heights of his base stations but not the tidal datum) appear brilliantly close to present day figures. But it still has to be established how Joseph Wilson<sup>12</sup> arrived at the figures he published in 1807, and where John Thomson's artist Mr Mackenzie found those published in 1832.<sup>13</sup> Against the background that it still had to be accepted that the height of Ben Lawers was less than 4000 feet, and, at least in Aberdeenshire, Ben Macdhui was still thought to be higher than Ben Nevis,<sup>14</sup> it would be interesting to know more about the estimation of the heights of Scottish mountains before the completion of the principal triangulation of Scotland.

**Correction.** *Sheetlines* 99, 17, footnote 49. Airy to Biot, 12 Feb 1850. Amend RGO 6/362, Cambridge University Library Archives to RGO 6/372, Cambridge University Library Manuscripts.

<sup>10</sup> Sir Charles Close, *The Early Years of the Ordnance Survey*, 1926: republished with an introduction by JB Harley, Newton Abbot: David & Charles, 1969, 49-52.

<sup>11</sup> William Roy, 'Experiments and Observations made in Britain in order to obtain a rule for measuring heights with the barometer', *Phil. Trans. R. Soc. Lond.* 1777, vol 67, 653-787.

<sup>12</sup> Joseph Wilson, *History of Mountains, Geographical and Mineralogical, accompanied by a Picturesque View of the Principal Mountains of the World by Robert Andrew Riddell*, London, 1807.

<sup>13</sup> *A comparative view of the heights of the principal mountains of Scotland*, John Thomson's Atlas of Scotland, 1832, National Library of Scotland, map images at [maps.nls.uk](http://maps.nls.uk), ix.

<sup>14</sup> Aberdeen Journal, 19 September 1832.