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A DETERMINATION OF THE HEIGHT OF BARN
BLUFF.

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In a paper read before the Society in 1912 on the Height of Ben Lomond, the claims of Barn Bluff to be higher than its neighbour, Cradle Mountain, were referred to, and in a sketch map of the latter district made by Franz Malcher in 1914 the height of Barn Bluff is placed as between 5,135 feet and 5,200 feet.

At Christmas, 1915, a party, consisting of Professor Flynn, Dr. W. N. Benson, L. Rodway, C.M.G., Dr. Rodway, E. Maxwell, A. V. Giblin, A. Garnett, and the writers, spent several days in the vicinity of Cradle Mountain, and whilst Professor Flynn and Messrs. W. N. Benson, L. Rodway, and Dr. Rodway each spent their time in examining the biological, geological, and botanical features of the district, the writers decided to attempt to settle the disputed point as to the height of Barn Bluff.

The majority of the party left Hobart by the morning train, and were met at Sheffield and driven that night to Wilmot.

Next day this party were driven through the V.D.L. Company's Middlesex block to Pencil Pine Creek, a distance of about 24 miles, where they were met by Mr. G. Weindorfer, who had made all arrangements for their stay. After partaking of lunch, the party walked to Mr. Weindorfer's accommodation house, prettily-situated in a forest of pencil pines at the commencement of Cradle Valley, a distance of about four miles from Pencil Pine Creek.

The next day an excursion was made to the top of Cradle Mountain, the trigonometrical station on which is

stated in the official maps of Tasmania to have a height of 5,069 feet. This station was inside a wooden stockade, now much decayed, approximately four feet in height, and as the trigonometrical pole had fallen a new pine pole 5 feet 9 inches in height, with a white flag attached, was erected on the approximate site of the station. From there a ridge was observed running to Barn Bluff. About midway between the two mountains it widened out to such an extent as to give an appearance of being a suitable base to measure the difference in height of the two. The remainder of the party then made their appearance at the accommodation house, having motored to within six miles of Cradle Valley.

The following day we visited the ridge mentioned above, but found it to be rather too narrow to give an accurate result, so determined to make a base along the ridge, and then to triangulate to another point across a small gully, which would give the required base. We, therefore, went back to the accommodation house, and next day returned and made a camp in a sheltered spot approximately half-way between the two mounts.

We first laid out a base $X Y$ on the ridge, and measured it by a steel tape four chains in length, and found to be 26.089 chains, 26.091 chains, and 26.078 chains respectively. The correctness of the last measurement was doubted, owing to the high wind prevailing when the measurement was being taken. As, however, only a difference in height was being ascertained, an error in the length of the base would have made a much smaller error in the height, the length of the base was adopted as 1.722 feet. A point Z was then fixed so that the base $X Z$ would be a suitable one to determine the distance between the mountains, and next a flag was erected on the summit of Barn Bluff. We then returned to point Z , and Mr. Hutchison measured the horizontal and vertical angles to the points X and Y and to "C" (Flag on Cradle Mountain) and "B" (Flag on Barn Bluff). Owing to the flag on Cradle Mountain having wrapped round the pole, the point where the pole appeared above the stockade was the point there measured, and on Barn Bluff the ground line was found the best to adopt.

He then took observations of the sun to determine the bearing of Barn Bluff from Cradle Mountain. A good site for taking observations could not be obtained, as the ground was wet and spongy, and covered with vegetable growth, but every precaution was adopted to make the stand of the theodolite as firm as possible so as to minimise any shifting of the instrument. Observations, however,

for this reason were more liable to inaccuracy at this point than at either X or Y.

On the following day Mr. Hutchison took the necessary angles from the points X and Y, and also observations of several other points, including Mount Pelion, lying approximately 9 miles to the S.S.E.

The instrument used was a 5-inch Troughton and Simms' transit theodolite, reading on each circle by two verniers to 20".

Tests as to the accuracy of the measurements are obtainable by taking the three measured angles of the triangle X Y Z, the sum of which was $180^{\circ} 0' 29''$, and also by calculating the distance between the two points B and Z from the data obtained from the two triangles B X Z and B Y Z. This was 7,271.96 feet and 7,271.60 feet respectively; and similarly the distance C Z from the two triangles C Z X and C Z Y was, respectively, 9,147.61 feet and 9,145.64 feet.

The angles obtained at each setting are given below, and an abstract given of the calculations, from which it will be seen that the height of Barn Bluff was determined in three ways from the points X, Y, and Z, the results being based upon a height of 5,069 feet for Cradle Mountain.

Height of Barn Bluff.

Observation.	Calculated Height.
From X	5,114.86
From Y	5,114.34
From Z	5,114.43

The results justify the adoption of 5,114 feet as the height of Barn Bluff.

The observations of Mount Pelion are interesting, but, unfortunately, not conclusive owing, first, to the smallness of the base X Y, compared with the distance from P (Mount Pelion); and, secondly, to the smallness of the angle X Y P. However, it seems certain that this mountain is over 5,000 feet in height, and probably in the neighbourhood of Barn Bluff and Cradle Mountain, but it does not appear likely that it will prove to eclipse Legge Tor on Ben Lomond.

The latitude of Cradle Mountain is given on the official maps as $41^{\circ} 43'$. $41^{\circ} 44' 20''$ was, therefore, adopted as the approximate latitude of Z, and from the observations taken there of the sun, the bearing of the point B on Barn Bluff from C on Cradle Mountain was South $28^{\circ} 12' 17''$ Wes'. The distance between the two points was also found from the above observations to be 3 miles 7 chains 51 links.

ABSTRACT OF OBSERVATIONS.

- C a spot within the stockade at the trigonometrical station on Cradle Mountain.
 A pole with a flag on it was erected on the spot and observations taken to the point on it appearing above the stockade approximately 4 feet above the solid rock.
- B a spot on Barn Bluff towards the South-West end selected as the highest point. A pole with a flag on it was also erected here, and all observations were taken to the ground line of the pole.
- X and Y the tops of flags at the ends of a base measured on the ridge connecting Barn Bluff and Cradle Mountain.
- Z the top of a flag to form a base from X and Y by triangulation for obtaining positions of C and B.

Length of base X Y reduced to the horizontal 26.089 chains, 26.091 chains, 26.078 chains. Length adopted 1,722 feet.

HORIZONTAL ANGLES OBSERVED.

Each entry in the columns Face Right and Face Left is the mean of the vernier readings at one setting.

To	Face Right.	Face Left.	Mean.	Calculated horizontal distance feet.
From 1·2 feet above Z (top of flag), 27/12/15.				
	° ' "	° ' "	° ' "	
C	179 59 50	180 1 20	180 0 35	9,147·61
Y	223 33 30	223 34 20	223 33 55	3,887·45
X	249 8 50	249 10 0	249 9 25	3,123·55
B	348 30 5	348 30 40	348 30 22	7,271·78
Sun 1st	213 30 40			
Sun 2nd		213 37 10		
From 1·4 feet above Y (top of flag), 28/12/15.				
C	359 59 40	359 58 10	359 58 55	6,872·04
Z	246 28 50	246 28 40	246 28 45	3,887·45
B	209 58 25	209 57 40	209 58 2	10,018·40
X	194 54 0	194 54 10	194 54 5	1,722·
From 1·4 feet above X (top of flag). (Two separate sets of observations taken.)				
Y	359 59 20	360 0 30	359 59 55	
	69 58 50	69 59 20	69 59 5	1,722·
C	348 2 35	348 3 0	348 2 47	
	58 2 20	58 3 20	58 2 50	8,551·31
Z	257 9 20	257 10 5	257 9 42	
	327 8 30	327 8 50	327 8 40	3,123·55
B	198 9 10	198 9 30	198 9 20	
	268 8 25	268 8 55	268 8 40	8,354·73

VERTICAL ANGLES.

Each entry in the columns Face Right and Face Left is the mean of the vernier readings at one setting.

To	Face Right.	Face Left.	Mean.	Correction.	Corrected Angle.
From 1.2 feet above Z (top of flag).					
	° ' "	° ' "	° ' "	"	° ' "
C	8 23 50	8 21 30	8 22 40	+ 39	8 23 19
Y	3 51 30	3 49 0	3 50 15	$16\frac{1}{2}$	3 50 $31\frac{1}{2}$
X	4 24 10	4 21 50	4 23 0	$13\frac{1}{2}$	4 23 $13\frac{1}{2}$
B	10 50 40	10 47 15	10 48 57	31	10 49 28
From .4 feet above Y (top of flag).					
C	8 56 10	8 58 40	8 57 25	+ $29\frac{1}{2}$	8 57 $54\frac{1}{2}$
Z	-3 53 35	-3 51 50	-3 52 $42\frac{1}{2}$	$16\frac{1}{2}$	-3 52 26
B	6 22 55	6 24 50	6 23 52	13	6 24 35
X	-0 45 0	-0 42 40	-0 43 50	7	-0 43 43
From 1.4 feet above X (top of flag).					
Y	0 36 30	0 40 20	0 38 25		
	0 40 10	0 38 40	0 39 25	+ 7	0 39 2
C	7 18 40	7 22 40	7 20 40		
	7 21 30	7 20 0	7 20 45	36	7 21 19
Z	-4 28 10	-4 25 30	-4 26 50		
	-4 25 10	-4 27 5	-4 26 $7\frac{1}{2}$	$13\frac{1}{2}$	-4 26 16
B	7 47 20	7 49 15	7 48 18		
	7 48 50	7 46 20	7 47 35	35	7 48 31

Sun observations from Z on 27th December, 1915.

Sun in upper left-hand quadrant touching cross wires in telescope Azimuth Face Right $213^{\circ} 30' 40''$. Elevation, $9^{\circ} 57' 50''$. Time about 6hr. 50m. (Zone time).

Sun in lower right-hand quadrant touching cross wires in telescope Azimuth Face Left $213^{\circ} 37' 10''$. Elevation, $8^{\circ} 44' 40''$. Time about 6hr. 54m. (Zone time).