

ON THE MAGNETIC VARIATION OF HOBART.

BY HIS EXCELLENCY SIR J. H. LEFROY, K.C.M.G., C.B., F.R.S.

Read 12th Sept., 1881.

It is, I believe, about 18 years since there has been determination of the magnetic variation here, at all events published. It may have been, and very probably was, observed by the American Transit of Venus Expedition in 1874; but, if so, it does not appear to have been published. The most recent authentic observation I can find is that of Dr. Geo. Neumeyer in April, 1863, as included in his "Results of the Magnetic Survey of the Colony of Victoria."* He made it 10deg. 25·15min. E.

Dr. Neumeyer's station appears to have been in the field to the south of the approach to Government House. He describes the spot as 9·4 chains, or 206yds., south of the former Observatory, and S. 4deg. 27·76min. E. of it.

Captain J. H. Kay, R.N., the former director of the Observatory, made it 9deg. 57·2min. E., reduced to mean scale reading, for the mean epoch January 1, 1843, and inferred the annual rate of increase to be 1·46min., at which rate it should have been 10deg. 26·8min. E. in April, 1863, and 10deg. 52·7min. E. in January last.

I make it a considerably less quantity, and the inference is that it has passed its maximum amount, and is now somewhat rapidly decreasing. The annual rate of change from 1843 to 1863 was, in fact, rather more rapid than Captain Kay supposed, being 1·9min.

My observations have been made with a 4in. prismatic compass, the property of Kew Observatory. The limb is divided to degrees on silver. It has one directing magnet, and is a good instrument of the kind, although inferior to the declinometers now carried by scientific travellers. Moreover, I have laboured under the disadvantage of not knowing my time with absolute accuracy. I have been in the habit of setting my watch, a good lever one with compensation balance, by Mr. Abbott's regulator, which is kept to time I am told by transits, and I do not think it has in these observations been many seconds from the truth. I hope, therefore, that while individual results differ more than I could wish, the mean of the whole may be relied upon.

The following are my results:—They were observed on the site of the Observatory of 1840-1848, which appears to have been judiciously selected as free from local effects. The sand-

* Mannheim. J. Schneider, 1869. 4to.

stone here crops out, forming an island surrounded by basalt, which, however, does not approach within 100yds., and is then of moderate thickness.

OBSERVATIONS OF MAGNETIC VARIATION AT THE HOBARTON OBSERVATORY OF 1841-8, EACH THE MEAN OF 5 SIGHTS.

1851.	Time.			Variations E.			Diff. from mean.	
		No.	Hour.	Obsv'd.	Corrd.	Corrd.	E.	W.
				° /	' /	° /		
			h. m.	° /	' /	° /		
Jan. 10..	P.M.	I.	6 4	8 25·3	- 1·9	8 23·4	—	25·9
"	"	II.	6 9	8 21·8	- 1·9	8 19·9	—	29·9
"	"	III.	6 15	8 35·2	- 1·9	8 34·3	—	15·0
"	"	IV.	6 20	8 54·0	- 1·3	8 52·2	2·9	—
"	"	V.	6 25	8 52·0	- 1·8	8 50·2	0·9	—
March 22	A.M.	I.	8 36	8 49·3	+ 3·5	8 52·8	3·5	—
"	"	II.	8 33	8 56·4	+ 3·5	8 59·9	10·6	—
April 4*	A.M.	I.	8 50	9 31·0	+ 2·7	9 36·7	47·4	—
April 16*	P.M.	I.	3 3	8 46·8	- 4·1	8 42·7	—	6·6
April 18*	A.M.	I.	8 36	8 59·0	+ 2·5	9 1·5	12·2	—
Sept. 9..	P.M.	I.	4 39	8 42·6	- 2·8	8 39·8	—	9·5
Sept. 10*	A.M.	I.	8 8	8 35·6	+ 2·3	8 38·9	—	10·4
"	"	II.	8 17	8 59·6	+ 2·6	9 2·2	12·9	—
"	"	III.	8 32	8 54·5	+ 2·8	8 57·3	8·0	—
						8 49·3		

* These were observed by Mr. G. A. Lefroy.

I think there must have been an error in the time on the 4th April, and it was not observed on quite the same spot as the rest, but I do not feel at liberty to omit the observation. The rest are very fairly accordant. As we know the diurnal movement here, I have applied the proper correction. The mean of the whole is 8deg. 49·3min. east.

Being desirous of ascertaining whether any local influence could be supposed to cause the variation at the Observatory to be less than it should be, I repeated the observations at Lady Franklin's Museum, and at, or near, the Cascades Brewery.* These two stations were selected as likely to show the influence of the massive basaltic formation capping Mount Wellington, if it is capable of exerting any at two miles distant. The bold cliffs called the Organ Pipes bear about W. 60deg. S. from the Museum, and W. 15deg. S. from the Brewery. These stations are about two miles apart, with hills between them. Mean of two sets on the 22nd January at the Museum, 8deg. 59min. S.E.; mean of four sets on the 28th January at the Brewery, 8deg. 35·0min. E. We have here concurrent evidence that the variation is considerably less than it must have been in 1863. To which I might add an observation at Port Arthur, taken on the 27th January, but, as it was a hurried one, I will only say that it also points to a decrease.†

* In the field beyond, near the gate.

† The result was 10deg. 43·9min.

On comparing Dr. Neumeyer's chart for the epoch 1858-1864 with the revised curves of equal magnetic variation issued by the Admiralty about a year ago, we find strong evidence to the same effect. The Admiralty curves are a generalisation from a vast body of observations collected at the Hydrographer's Office, and may possibly not include any recent observations in Tasmania. Indeed, I have reason to know that they do not. Dr. Neumeyer's Hobarton curve of 10deg. 25min. E. for 1863, falls between the curves of 9deg. and 10deg. E. on this map, which is dated 1880, somewhere near 9deg. 45min. I have inserted these lines in a map which is on the table. We may gather from the whole evidence that the line of no variation, which cuts West Australia, is now moving eastward. Twenty years ago it was moving westward. I am indebted to Mr. Calder for an extremely curious extract from Tasman's journal, which proves that, in his time, it was far to the westward again. That great navigator notes, in December, 1642, "*when you come from west, and find the N.W. variation suddenly decrease, you may then look out for the land. Near the coast here the needle points due north.*"

That is to say, the line of no variation which at present cuts the parallel of 42deg. S., in 130deg. E., or thereabouts, was in 1642 very near the West Coast of Tasmania, and, therefore, fully 14deg. more easterly than it is now. The variation of the needle is a matter of greater practical consequence here than is generally supposed. The district surveyors throughout the colony, I am told, make use of compass bearings only—all grants of land are laid out by them; all boundaries defined by them. Now, if I am thus informed correctly, any gentleman who may have had given to him in 1863 a line due N. as his boundary, if he ran it again by compass to-morrow, would find himself at the end of one mile, 50 yards off the line.

This consideration will show plainly that the compass ought never to be trusted for such purposes. There are many other considerations which point to the necessity of putting the surveys of this colony upon a different basis. I alluded to this pointedly in my address to you in April last. I will only now express my full concurrence with the weighty opinion expressed, I observe, by our colleague and Vice-President, Mr. Stephens, in a correspondence just laid before Parliament,* that, "if it be long delayed inextricable confusion will be the probable, if not certain, result."

Postscript.—In the discussion which ensued upon this paper, one of the Fellows present remarked that the variation is still increasing at Melbourne, and I thought it due to the Royal

* Sessional paper, No. 101, New Map of Tasmania.

Society to withhold the paper from publication until I could ascertain if such is the fact. I have pleasure in annexing an extract from a letter since received from Professor Ellery, dated September 19, which is conclusive to the contrary:—

“ You will find your magnetical results nearly correct. The magnetic declination has been decreasing since 1865, roughly at the rate of 2min. per annum. In 1866 the declination was 8deg. 40min. E.; now it is 8deg. 6min. (Signed) ROBT. J. ELLERY.”

As the variation at Melbourne was 8deg. 42min. in 1860, and 8deg. 40min. in 1866, we may take it as 8deg. 41min. in 1863, or 1deg. 44min. *less* than the variation at Hobart at that date. If my mean result is correct, the difference now is only 43min. It is, therefore, to be wished that the observations be repeated with a better instrument.

REMARKS ON THE SCAMANDER GOLDFIELD.

BY S. H. WINTLE, F.L.S.

[*Read 10th Oct., 1881.*]

The Scamander Goldfield, which was discovered about two years ago, is distant from George's Bay between 15 miles and 16 miles in a westerly direction. The country between the Bay on the N.E. and the Scamander River, where it is crossed by the bridge track to the Black Boy, consists of coarse porphyritic granite for the most part, and comprises the George's Bay tin-mining district in the County of Cornwall. A well-defined boundary, separating the granite from the older palæozoic formations, is formed, for a distance of some miles, by the Scamander River. Indeed, so well defined is the line of demarcation that at the north-eastern confines of the Goldfield the granite occupies the fording* place on one side without any sedimentary rock being visible *in situ*, while on the opposite side of the river, a distance of not more than 20 yards, no granite whatever is seen, it being completely covered up by palæozoic sedimentary rock, consisting of hard, cherty, altered sandstone, which in places assumes a slightly gneissose character. This, in turn, in the higher ground, gives place to very laminated, fissile clay schists or slate, so highly inclined as to be almost vertical. The Goldfield is situated at the head of Scamander River, in a valley bounded on three sides by very steep, lofty hills of slate, having a mean angle of about 40deg. As far as is known at the present time, the auriferous area is limited in

* See sketch plan.