observations can be carried; while a rapid barometric rise, and an influx of moist air also, are frequently coincident. The misapprehension obviously arose from the general acceptance of the theory that the lower pressure of the Southern Hemisphere, as compared with the Northern, is due to the larger relative area of ocean in the former, But that the presence of aqueous vapour is not the only, or even the chief source of deficient pressure, can be proved beyond dispute. Comparison of barometric readings after the subtraction of the vapour tension will show this plainly. A very cogent illustration, however, is afforded by the tables already quoted, which show the pressure to be 29·932 at Hokitika, and only 29·871 at Christchurch, or ·061 in favor of the West Coast, notwithstanding that the latter has a mean humidity of ·86, as compared with ·77 at Christchurch, which, moreover, is to leeward of Hokitika as regards the prevailing wind. Hence the atmospheric pressure seems actually to diminish instead of increasing as the air loses its moisture. The truth appears to be that the atmosphere is subject to disturbances more or less analogous to those of the ocean—waves, currents, eddies, and even tides, produced by causes and governed by laws as yet only imperfectly understood, but wholly irrespective of excess or deficiency of aqueous vapour, whose presence or absence probably is oftener the effect than the cause.

17. There are many other climatological characteristics of New Zealand related directly or indirectly to the subject of Dr. Newman's able essay, and I purpose treating of them on a future occasion. In the present paper I have simply endeavoured to prove—and I trust I have succeeded in the attempt—that whether Dr. Newman's speculations as to the probable degeneration of the English race in New Zealand be well founded or not—for the sake of our adopted country we must hope the latter—at any rate deficient atmospheric pressure does not enter as a factor into the problem.

ART. XVIII.—*On the Longitude of Wellington Observatory.*

By VEN. ARCHDEACON STOCK, B.A.

[*Read before the Wellington Philosophical Society, December 9th, 1876.*]

A BRIEF account of the establishment of a longitude for the Wellington Observatory will be found, it is hoped, interesting for the present meeting of the Society, and as a record for future reference.

Some twenty-five years ago, H.M. ships "*Pandora*" and "*Acheron*" came to Australia for the express purpose, amongst other duties, of fixing the longitudes of different points in New Zealand, both ships being well provided with chronometers of the best construction.

The point of departure in Sydney harbour was Fort Macquarrie, which was assumed to be in longitude 151 14′ 00″ E. Pipitea Point, in Wellington Harbour, was placed in longitude 174° 47′ 53″ E., difference being 23° 33′ 53″, or 1h. 34m. 15·533s.

It has been since ascertained that there was error in this assumed longitude for Fort Macquarrie, and that Fort Macquarrie is 2·63 seconds E. of Sydney Observatory.*

The longitude of Sydney Observatory was taken as 10h. 04m. 53·9s. E. Wellington Observatory is 3300·2 feet W., by measurement from Pipitea Point, or 2·88 seconds.

These data thus gave result :—

		H.	M.	SEC.
Sydney Observatory		10	04	53·9
Fort Macquarie	+			2·63
		10	04	56·53
Difference	+	1	34	15·533
		11	39	12·063
Pipitea Point from Observatory	−			2.88
		11	39	09·183

This longitude is at present used at the Observatory. True time is there gained and corrected for this constant error 9m. 09·183s., so that the clock which drops the time ball shows always the same time as a clock stationed at 11h. 30m. 00s. E. There is this manifest advantage in this plan : a shipmaster has only to note the difference of his chronometer from 12h. 30m., when the Wellington ball drops, to gain a Greenwich date ; and so, observing from time to time, to gain the rate of his chronometer.†

In the early part of this year a communication was received from Dr. Russell, Astronomer Royal at Sydney, proposing to interchange signals between Sydney and Wellington. At an arranged time, at the ending of each fifteen seconds in five minutes, a key was pressed down, thus giving twenty signals ; and, after an arranged interval, twenty similar signals were received from Sydney.

Dr. Russell gives this as the result :—

	H.	M.	SEC.
From Wellington to Sydney	1	34	15·35
From Sydney to Wellington	1	34	16·6398
With mean	1	34	15·9949

I have no hesitation in saying that the signals from Wellington to Sydney are of more value than those from Sydney to Wellington, and that

* Capt. Nares, "Trans. N.Z. Inst.," Vol. VII., p. 504.

† Hector, "Trans. N.Z., Inst.," Vol. I., p. 48." *n.e.* p.

the former value is more likely to be true than the latter, for these reasons: I sent the signals from Wellington, and the evidence of all in the Observatory was that the key was pressed down synchronously with the fifteenth-second beats of the clock. The signals from Sydney were received by an assistant, whose cry at the movement of the flash, as the Sydney key was pressed down, was compared by me with the clock beats. Thus the second process passed through two observers. It is also vastly more difficult to receive than to send. It may be certainly presumed also that the Sydney observers were more practised in the work than those at Wellington, to whom the work was new. But the difference thus gained thoroughly establishes that obtained by the chronometers of the "*Acheron*" and "*Pandora*."

* Fort Macquarrie — Pipitea Point *

1h. 34m. 15·533s.

* Sydney Observatory, 2·63 E. of Fort M. — Wellington Observatory, 2·88 W. of P. Pt. *

1h. 34m. 15·9949s.

The difference between the two values is only half a second; and if, as I think should be done, that value be allowed for superiority of the signals from Wellington to Sydney to those of the reverse way the two values will be nearly identical.

The value now given for the longitude of Sydney Observatory is 10h. 04m. 47·32s. This new value would give for that of Wellington Observatory 11h. 39m. 02·6s.

The value of Sydney Observatory, however, as gained from the Observatory of Melbourne is 10h. 04m. 50·61. This value gives for Wellington Observatory 11h. 39m. 05·893s.*

Major Palmer's value, gained by comparison of time difference between Wellington and Burnham (Burnham longitude being fixed after several months' observation), is 11h. 39m. 4·81s.†

These longitudes are therefore:—

	H.	M.	S.	
1.—	11	39	09·18	Wellington from Sydney, with old value of Sydney Observatory.
2.—	11	39	05·893	Wellington from Sydney and Melbourne Observatories.
3.—	11	39	04·81	Wellington from Burnham.
4.—	11	39	02·6	Wellington from Sydney, new value.

Confessedly no problem is more difficult than that of obtaining an absolute longitude by observation. Even with the instruments at the Royal

* Hector, "Trans. N.Z. Inst.," Vol. VII., p. 504.

† New Zealand Gazette, 30th March, 1876.

Observatories of Sydney and Melbourne there is a known error of 3·27 seconds between the two observatories. While then it would seem that the longitude for Wellington Observatory is in error, it would be better perhaps to adhere to the value now used, which only differs from the mean of the above values by 4·746 seconds—a difference too slight to be a cause of any danger to vessels arriving from long sea voyages, while for coastal navigation it is obviously desirable to maintain a local time in accordance with the longitude on the charts.

Art. XIX.—*Notes on some Ancient Aboriginal Câches near Wanganui.*

By H. C. Field.

[*Read before Wellington Philosophical Society, 9th December, 1876.*]

I have compiled the following notes on an examination of some ancient aboriginal *câches* near Wanganui, not only because I believe they may be of interest to the Wellington Philosophical Society, but because I think it well that the result of any such investigation should be placed on record for the guidance of other explorers, and to facilitate the comparison of similar observations in different localities.

The coast between the mouths of the Wanganui and Kai Iwi rivers is formed throughout the greater part of its length of cliffs from 120 feet to 150 feet high, against the base of which the sea beats for so great a portion of every tide that it is only for an hour or two at dead low water that any one can pass below them. This of course necessitated the opening of tracks parallel with the coast line, and at some little distance from it, and such tracks have evidently been used from a very early period. The ground on the top of the cliffs is covered with sand dunes, extending to an average distance of a quarter of a mile inland. These dunes are, however, for the most part disposed in high ridges, extending diagonally inland at an angle of from 30° to 40° from the coast line. The cliffs are of the marine tertiary formation, and wear away very rapidly (at an average rate—so far as I can judge by nearly 26 years knowledge of them—of about six feet per annum), and the sand dunes are continually creeping inland, and covering soil previously occupied by vegetation, fern, flax, toi-toi, and grass. The actual ridges of sand often extend for a distance of half a mile, or more, inland; but between them the vegetation, on the other hand, often extends to within one or two hundred yards of the actual cliff. It is noticeable that as the sand covers up the vegetation, it seems actually to desiccate and destroy not only it, but also the soil on which it grows, so that when any surface afterwards becomes exposed by the sand being blown from off it, on the