perature coefficients are much smaller in each case. With the exception of carbonate of soda and chrome alum, all the other hydrated salts have a coefficient of expansion not differing greatly from that of ice at low temperatures. Generally, the densities of the compressed blocks of different bodies agreed well with the results of other observers, but my potash alum had only a density of 1·614, whereas Playfair and Joule give 1·731. It will be noted that iodoform is a highly expansive body like iodine, and that oxalate of methyl has nearly as great a coefficient as paraffin, which is one of the most expansive solids. The correcting factor was used for paraffin, naphthalin, chloral hydrate, iodoform, and sodium. All weights are in grammes.

It will be possible by cooling the moulds with liquid air during the process of hydraulic compression, to produce cylindrical blocks of solid bodies of lower melting-points than any given in this investigation, such as alcohol, ether, nitrous oxide, ammonia, chlorine, &c., and to ascertain their coefficients of expansion in the solid state between the individual melting-points and the boiling-point of liquid air.

This method, which works well with liquid oxygen or air, fails when applied to liquid hydrogen, as the density of the liquid is too small (apart from other difficulties) to give accurate values of the weights of fluid displaced. For temperatures about 20° absolute, recourse must be had to measurements of the coefficient of linear expansion, and such observations could only be applied with ease to metallic bodies and alloys.

"Report of Absolute Magnetic Observations at the Valencia Observatory (Cahirciveen, co. Kerry), 1899, 1900, and 1901." By J. E. Cullum. Communicated by The Earl of Rosse, F.R.S. Received April 12,—Read April 24, 1901.

As far back as 1887 the late Professor FitzGerald, of Trinity College, Dublin, expressed a desire for a series of magnetic observations to be made in Ireland, when the writer offered to undertake the work if he was provided with instruments, and obtained the consent of the Meteorological Council. This was done, and an old pattern unifilar by Jones, with a dip circle by Barrow, being loaned by Trinity College, experimental observations were commenced in a wooden hut erected in the Observatory grounds in Valencia Island, with funds supplied by the Royal Irish Academy. The result of the first few years of this series was published in the 'Proceedings of the Royal Irish Academy,' and the observations were continued until the end of 1896. The observatory was removed in 1892 to Cahirciveen, about 4 miles eastward.

Seeing that no use was being made of these observations, and Trinity College requiring their instruments, Professor FitzGerald came to the conclusion to terminate the work, and the observations accordingly ceased. Soon after enquiries were made for them, and very strong expression of their value given, with a desire for their continuance. Acting on such weighty opinion, he determined to put the observations on a business and permanent basis by obtaining a set of modern instruments, and a fund to endow the work. Enough was collected in Ireland to ensure the observer a small annual honorarium.

With a new set of instruments, examined at Kew Observatory, the present series of observations was commenced in January, 1899, in the original wooden observing house erected in the field north of the Observatory, 90 yards from that building. A railway runs east and west about 50 yards north of the hut, and five light trains pass each way daily, but these do not appear to materially affect the magnets whilst observing. The observing house being copper-fastened, with no iron down-pipe, this is the only magnetic interference likely to affect the results.

In determining the position of the hut, consideration was given to obtaining a satisfactory fixed mark, visible from the observing pillar, and the down-pipe of a school house about 1 mile north of the Observatory was decided upon, as being the property of the Board of Works and likely to be permanent. Not having the means of obtaining sufficiently accurate time for a sun's transit, the orientation of this mark was determined by taking three series of observations of equal altitudes of the sun by means of a transit theodolite lent by Kew Observatory for the purpose; the mean of these was taken, and the value 19° 46′ 0″ W. used in the reduction of the declination observations.

The observatory is situated on an arm of Valencia Harbour, co. Kerry, lat. 51° 56′ N., long. 10° 15′ W., and is consequently about the most western part of the United Kingdom.

The unifilar is by Dover, No. 139, and, as before stated, was verified at Kew Observatory, where the constants of the magnet were also determined, and tables of corrections supplied in the usual manner.

The dip circle is also by Dover, No. 118; it was also examined and passed at Kew.

For the convenience of observing, the two middle days of each month have been adhered to throughout; the declination being observed about 10 A.M. Greenwich (local time 41 mins. later), the actual mean time for the three years being 10.9 A.M.

The mean time of the inclination observations is for the morning 11.45 A.M., and for the afternoon 1.25 P.M., these being made on succeeding days with two needles, which give unusually consistent results, the mean of each of the three years showing an excess in No. 1

of only 0′·2. The meridian of the circle is determined in January of each year, the value so obtained being used throughout the current year.

The intensity observations are made in the usual manner of vibrations and deflections, the same magnet being used as in the declination observations. Two observations are made on the same day, one before noon (11 A.M.), and the other afternoon (3 P.M.), so that the mean time of the two observations used in calculating the forces is 1 P.M., which very nearly agrees with the mean time for the inclination, with which they are combined in the formulæ (V.F. = H.F. × tan inclin.) and (T.F. = H.F. × sec. inclin.). The strength of the magnet considerably diminished during the first year, which may be attributed to its want of age; the magnetic moment (m) falling in 1899 from 770 to 728 units; in 1900 to 714; and in 1901 to 700, a decrease which will probably become less each year. The value of P (distribution of magnetism) in the reductions is calculated for the yearly series, in 1899 being 8·2; 1900, 7·0; and in 1901, 7·5.

Below are given monthly values of each element for the three years.

Year.	Month.	Declination.	Inclination.	Intensity.	Vertical F.	Total F.
		° ′	° ′			
1899	Jan....	21 39·1	68 34·9	0·17739	0·45220	0·48548
	Feb....	40·8	35·3	·17715	·45176	·48525
	March .	33·8	34·2	·17734	·45392	·48538
	April ..	32·3	34·9	·17741	·45227	·48571
	May ...	35·6	35·2	·17732	·45216	·48568
	June...	33·5	32·0	·17741	·45115	·48479
	July...	34·6	33·5	·17742	·45175	·48534
	Aug. ..	31·7	31·5	·17737	·45086	·48450
	Sept. ..	37·2	31·8	·17736	·45095	·48459
	Oct....	32·8	32·1	·17736	·45107	·48469
	Nov. ..	33·7	30·4	·17747	·45068	·48436
	Dec....	35·4	29·7	·17768	·45095	·48469
	Means .	21 35·0	68 33·0	0·17739	0·45164	0·48504

Year.	Month.	Declination.	Inclination.	Intensity.	Vertical F.	Total F.
1900	Jan....	21° 34′·8	68° 30′·9	0·17738	0·45028	0·48435
	Feb....	29·7	31·1	·17758	·45119	·48489
	March .	29·1	32·1	·17744	·45122	·48486
	April ..	25·9	30·3	·17754	·45071	·48444
	May...	30·0	30·6	·17765	·45138	·48509
	June ..	29·7	28·7	·17751	·45025	·48397
	July...	29·8	30·5	·17763	·45133	·48503
	Aug. ..	31·4	27·4	·17776	·45011	·48397
	Sept. ..	30·1	29·3	·17781	·45101	·48480
	Oct....	29·0	27·8	·17770	·45035	·48414
	Nov. ..	29·6	27·9	·17782	·45065	·48446
	Dec....	31·3	28·5	·17796	·45139	·48521
	Means .	21 30·0	68 29·6	0·17765	0·45082	0·48460

Year.	Month.	Declination.	Inclination.	Intensity.	Vertical F.	Total F.
1901	Jan....	21° 29′·0	68° 27′·5	0·17792	0·45070	0·48456
	Feb....	30·2	27·7	·17792	·45079	·48463
	March .	25·9	27·7	·17790	·45074	·48459
	April ..	26·8	27·7	·17783	·45056	·48438
	May...	26·5	26·9	·17804	·45079	·48469
	June...	26·6	27·2	·17797	·45072	·48460
	July...	26·4	25·3	·17803	·45014	·48407
	Aug. ..	28·7	25·4	·17803	·45018	·48411
	Sept. ..	29·4	24·3	·17799	·44967	·48362
	Oct....	28·1	26·5	·17811	·45084	·48474
	Nov. ..	27·3	25·1	·17812	·45030	·48424
	Dec....	27·4	24·1	·17827	·45030	·48431
	Means..	21 27·7	68 26·3	0·17801	0·45048	0·48438

For the purpose of comparison, the published values of Kew and Falmouth are also given :—

Kew.

Year.	Month.	Declination.	Inclination.	Intensity.	Vertical F.	Total F.
1899		16° 57′·1	67° 14′·7	0·18393	0·43852	—
1900		16 52·7	67 11·8	·18428	·43831	—

Falmouth.

1899		18 32·7	66 48·7	0·18663	0·43569	—
1900		18 29·1	66 45·2	·18689	·43507	—