traced for many of the lines present in their photographs, which do not appear in the Kensington photographs, and some of these may, therefore, be really due to iron, their absence from the Kensington photographs being due to insufficient exposure, or to the employment of different temperatures. The almost constant difference of 0·1 tenth-metre between the two sets of measures is a satisfactory indication of the accuracy of both.

4. The impurities which contribute the greater number of foreign lines to the spectrum of the electrolytic iron employed by the author are Ca and Mn, though there is decided evidence of the presence in minute quantities of various other elements.

This research on the arc spectrum of iron is made in connection with a wider investigation on the arc spectra of the other metallic elements, the results of which will be communicated to the Society in due course.

II. "Magnetic Observations in Senegambia." By T. E. Thorpe, F.R.S., and P. L. Gray, B.Sc., Assoc. R.C.S. Received October 31, 1893.

On the occasion of the recent Eclipse Expedition to Senegambia we took with us a set of magnetic instruments of the Kew pattern, with a view of making observations in a district for which the magnetic elements have not hitherto been determined. The instruments employed were magnetometer No. 61, by Elliott Brothers, dip circle No. 94, by Dover, and chronometer Dent 1932. They were part of the equipment made use of in connexion with the Magnetic Survey of the British Isles.

Observations were made at Fundium, Senegal, and at Bathurst, on the River Gambia.

The results are as follows:—

Fundium, Senegal, lat. 14° 7′·4 N., long. 16° 32′ W. (approx.).

The observations were made in the vicinity of the Eclipse Camp, and on a partially enclosed piece of ground between the Administrator's house and the River Salûm, about 80 yards from the shore. The temperature during the force observations was about 30° C.

Date.	Declination.		Horizontal force.		Dip.	
	L.M.T.	Obs. result.	L.M.T.	Obs. result.	L.M.T.	Obs. result.
1893.				c.g.s.		
April 4	9.1 A.M.	18° 45′ W.	5.13 P.M.	0·30400		
„ 5	8.31 „	18° 42′ „	9.26 A.M.	0·30434		
„ 14	8.39 „	18° 45′ „	8.53 „	0·30394		
„ 14	..	..	..	..	9.6 A.M.	Needle 1, 29° 9′·1
„ 14	..	..	..	..	9.28 „	„ 2, 29° 8′·2
Means ..	..	18° 44′ „	..	0·30409	..	29° 8′·7

Bathurst, River Gambia, lat. 13° 28′ N., long. 16° 37′ W.

The station was on a large piece of open ground and near the centre of McCarthy Square. All the observations taken were made on April 20, 1893.

Declination.... at 8.16 A.M. L.M.T. = 18° 50′ W.
Horizontal force at 8.44 „ = 0·30514 c.g.s.
Dip ..... at 8.17 „ = Needle 1, 28° 43′·4.
„ ..... at 9.14 „ = „ 2, 28° 42′·1.

III. "A certain Class of Generating Functions in the Theory of Numbers." By Major P. A. MacMahon, R.A., F.R.S. Received November 3, 1893.

(Abstract.)

The present investigation arose from my "Memoir on the Compositions of Numbers," recently read before the Royal Society and now in course of publication in the 'Philosophical Transactions.' The main theorem may be stated as follows :—

If $X_1, X_2, \ldots, X_n$ be linear functions of quantities $x_1, x_2, \ldots, x_n$ given by the matricular relation

$$(X_1, X_2, \ldots, X_n) = \begin{pmatrix} a_{11} & a_{12} & .. & a_{1n} \\ a_{n} & a_{22} & .. & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & n_3 & a_{nn} \end{pmatrix} (x_1, x_2, \ldots, x_n),$$

that portion of the algebraic fraction

$$\frac{1}{(1-s_1X_1)\,(1-s_2X_2)\,\ldots\,(1-s_nX_n)},$$