EXPERIMENTAL psychology is represented in *Mind* by an article on "Mediate Association," by Mr. W. G. Smith, the results of which do not appear to be very conclusive. In the *Psychological Review*, Prof. Ladd describes the results of experimental work on the "direct control of the retinal field." A class of sixteen students were asked to close the eyes, allow after-images to die away, and then to cause, by attentively willing, a cross, circle, or some other simple figure, to appear in the retinal field. In two cases, where the results were successful, a coloured figure was distinctly visualised, and when the eyes were opened after these voluntary crosses were obtained, and were immediately focussed on a sheet of white paper, a cross was found to appear on the paper in the complementary colour. It is clear that these experiments open up interesting psychological problems. Prof. Jastrow, in the same journal, describes experiments on Helen Kellar, a blind and deaf girl. The sensibility of her finger-tips and the palm of her hand were found to be decidedly more acute than in the average individual; her verbal memory is decidedly above the normal; and she shows that sensitiveness to vibration and jars which has frequently been noted in the deaf.

MR. THOMAS R. SIM, Curator of the Botanic Garden, King William's Town, South Africa, has done good service by collecting and systematically arranging the records of Kaffrarian plants, in a pamphlet recently published at Cape Town. As a botanical district, Kaffraria is described as an oblong tract of country two hundred miles long by about one hundred miles wide, bounded at one end by the Karoo, and at the other end by Natal. Mr. Sim finds that the flora includes 2449 species, of which 1690 are dicotyledons, 656 monocotyledons, and 103 vascular cryptogams. The richness in species is shown by a comparison with Great Britain—an area much greater than that of Kaffraria, but containing only about 1700 species. The opinion is expressed that were the Kaffrarian plants as well known as our own, they would number more than three thousand species. Though Mr. Sim's list is incomplete, it is an excellent groundwork upon which a detailed description of the flora of the district surveyed may be built.

FOR some years past Lieut.-General Pitt-Rivers has supplied the means for physical and mental recreation near his country seat at Rushmore. He has had the Larmer Grounds laid out as pleasure grounds, and opened them free to the public every day. In 1887 the number of persons who availed themselves of this privilege was 15,351, and last year the number was 24,143. To those interested in breeding and acclimatisation, some of the animals in the grounds at Rushmore will be found of interest. But the museum at Farnham, established and supported by General Pitt-Rivers, is most attractive to us. It consists of eight rooms and galleries devoted mainly to antiquities, and containing models of the excavations carried on by the generous donor in the neighbourhood. During last year, more than seven thousand persons visited the museum. Another building open is King John's House at Tollard Royal. This building contains a series of pictures illustrating the history of painting from the earliest times, commencing with Egyptian paintings of mummy heads of the twentieth and twenty-sixth dynasties, B.C. 1200–528. Descriptions of all these places are given in a short guide, recently received, together with illustrations of some of the most striking features.

STATISTICS relating to the distribution of rain over the British Isles have been collated by Mr. G. J. Symons, F.R.S., in "British Rainfall," for thirty-four consecutive years. The volume for 1893 resembles former issues so far as the tabular matter is concerned; but the great drought rendered the year an exceptional one in several respects. At twenty-five stations, only about an inch of rain fell from the end of February to the end of June, that is, during a period of four months. A curious point mentioned in connection with the discussion of this remarkably low rainfall is that among the stations recording droughts exceeding 120 days, two of the three which head the list were situated on promontories or projecting parts of the coast. These were Dungeness, with a period of 127 days, during which only 1·27 inches of rain were measured, and East Dean (near Beachy Head), where 1·18 inches fell in 126 days. Several remarkably heavy falls in short periods occurred during the year. At Preston, 1·25 inches is estimated to have fallen in five minutes on August 10; but this record is hardly trustworthy. A fall of 0·62 inch in five minutes was measured at Shirenewton Hall on June 14. This is at the rate of 7·44 inches per hour. An extraordinary fall of rain occurred at Eastbourne in July, and a waterspout (or cloud burst) caused great damage on the Cheviots in the same month. Various other remarkable falls of rain are recorded in the notes which the observers send to Mr. Symons with the results of their rain-gauge observations. A discussion of the relation of the total fall of rain in 1893 to the average shows that, taking the whole of the British Isles, the deficiency was 14 per cent.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus*) from India, presented by Mr. H. P. Nicholls; an Ocelot (*Felis pardalis*) from South America, presented by Miss Edith Zambra; two Ring Ouzels (*Turdus torquatus*) from Hungary, presented by Mr. John Young; a Herring Gull (*Larus argentatus*), British, presented by Mr. George Hayes; a Common Viper (*Vipera berus*) from Gloucestershire, presented by Mr. Barry Burge.

OUR ASTRONOMICAL COLUMN.

SOLAR ELECTRICAL ENERGY.—According to Dr. M. A. Veeder (*Proceedings* of the Rochester Academy of Sciences, vol. ii., July 1894), there is conclusive evidence that magnetic perturbations are not of thermo-electric origin, and are not connected with heat and light radiations. He holds, in short, that there is no correspondence whatever between the behaviour of magnetic storms and the manner in which thermal and luminous radiations are originated and propagated from the sun to the earth. His idea is that electrical disturbances upon the sun are transmitted to the earth not by radiation but by conduction through the impalpable dust and débris with which interplanetary space is filled. Such meteoritic particles are composed of good conducting material, and an examination of a large number of meteorites has shown Dr. Veeder that they all possess magnetic properties which might have been produced by long-continued induction. Therefore he thinks that the origin of magnetic storms is as follows:—"Particular portions of the sun's surface and cooler immediate surroundings are electrified by what has every mark of being volcanic action. The motion of rotation of the sun carrying forward these charged portions of its surface, develops currents dynamically which act inductively along lines of force wherever there is conducting material within their scope. There is no conveyance by radiation or in a manner similar to that in which heat and light are conveyed from the sun. The laws governing the process are entirely different from those of radiation, and have reference to the principles of conduction as they appear under the conditions existing in interplanetary space. It is a mode of solar action that is distinct, and that must be considered by itself."

TEMPEL'S PERIODIC COMET.—This comet, rediscovered by Mr. Finlay at the Cape, on May 8, is still visible, and promises to be within the grasp of moderately large instruments for some time. M. Schulhof points out in the *Astronomische Nachrichten* that it is desirable that the comet should be followed as long as possible. The object is becoming more favourably situated

for observation, and there will be very little diminution in its light during the next three or four months. Using recent observations of the position of the comet, M. Schulhof has computed a new orbit. The following positions are extracted from the ephemeris based upon the new elements :—

Ephemeris for Paris Midnight.

1894.	R.A. h. m. s.	Decl. ° ′ ″
Aug. 27 ...	3 53 39·6 ...	+3 32 39
29 ...	3 55 24·5 ...	3 24 13
31 ...	3 57 1·2 ...	3 15 16
Sept. 2 ...	3 58 29·6 ...	3 5 51
4 ...	3 59 49·6 ...	2 55 59
6 ...	4 1 1·1 ...	2 45 41
8 ...	4 2 3·9 ...	2 35 0
10 ...	4 2 58·1 ...	2 23 56
12 ...	4 3 43·3 ...	2 12 31

A NEW VARIABLE STAR.—The Rev. T. E. Espin informs us, through a Wolsingham Observatory *Circular*, that the star DM + 50°·2251, the position of which is R.A. 16h. 1·5m., Decl. + 50° 47′, is variable.

ON THE NEWTONIAN CONSTANT OF GRAVITATION.[1]

III.

FIG. 8 is a view of the apparatus with the optical compass in position, and with the microscopes focussed upon the wires. They are then ready to be withdrawn by the focussing slide, so as to transfer the distances directly to the small glass scale, as already described.

When this is completed the proper windows are put in position, the screen tubes, the octagon house, and the felt screens are all placed ready for operation 10, in which the deflections are measured, and the period with the balls is determined. As this is the operation in which variations of temperature produce so serious an effect, I prefer to leave everything undisturbed for three days, to quiet down. A few hours are quite useless for the purpose.

In operation 11 the period with the counter-weight in the place of the gold balls is measured; also the deflection, if any, due to the lid and lead balls upon the mirror alone. This is only 1/10 division, but its existence is certain. In the later operations the deflections, if any, due to the lid alone on the mirror alone, and to the lid alone on the mirror and gold balls, are separately determined. Neither of these can be detected. The actual elongation of the fibre may also be observed at this stage, but this is of interest only as bearing on the elastic properties of quartz fibres under longitudinal strain.

Before I come to the treatment of the observations, I should like to refer shortly to the kind of perfection of conditions which by the employment of every practicable refinement that I could devise, I have succeeded in obtaining. Taking experiment 8 as an example, favourable in that the conditions were good, *i.e.* I was not badly disturbed by trains, wind, or earth tremors, I give the worst and the best sets of four points of rest obtained from six elongations. They were :—

Worst set + position	Best set − position
24491	20795·4
24493	20795·7
24493·5	20795·5
24492	20795·5
(24491·7)[2]	
24492·4 mean.	20795·5 mean.

Taking all the mean points of rest, as determined above, in groups of three to eliminate slow shifting, if any, of the points of rest, the series of deflections were :—

3696·0
3696·3
3696·0
3696·8

Continued from p. 363.

[2] Disturbed by trains.

(Interval of one hour, in which oscillations of large amplitude were observed for period.)

(3697·7)
3696·0

Immediately after the oscillations of large amplitude, which in this case at the end were rather badly disturbed by trains or otherwise, a rather different deflection was observed, but not seriously different. As examination of the figures shows only one anomalous point of rest immediately after the large amplitude disturbance, I feel justified in rejecting the only discordant figure, and in taking the mean of the rest as the true deflection. The unit in this case is 1/10 division. It corresponds to an angular movement of 1/280000, *i.e.* about three-quarters of a second of arc. Now a calculation of the angular twist due to a rotation of the air based upon the period, the moment of inertia, and the logarithmic decrement, shows that if the air in the tube were made to whirl round at the rate of one turn in six weeks, so that the air would blow past the gold balls at the rate of

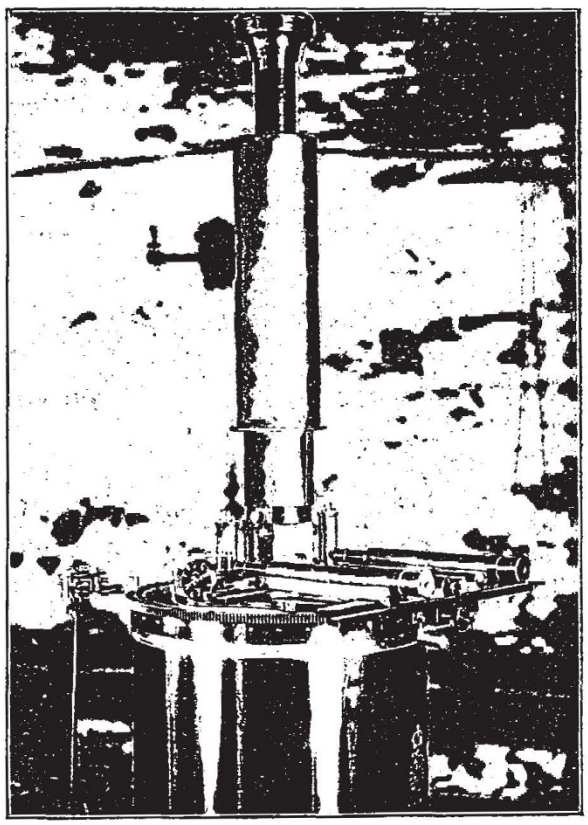

FIG. 8.

one inch in a fortnight, the deflection produced would be 1/10 division, an amount which is greater than the uncertainty of the deflection on this particular night. Again, an examination of the points of rest through the night in the positive and in the negative positions shows a very small steady creep, the same in each case. Creepage of this sort has been, I believe, mentioned as a defect of quartz fibres. When it gives trouble it is due to draughts, as already explained, or to imperfect attachment of the fibres.[1] In the present instance the creepage observed corresponds to a surface rate of movement on the fibre of a millionth of an inch a month.

An examination of the mobile system of the beam and suspended gold balls, of which I exhibit a greatly enlarged and working model, at once shows that all the parts are capable of independent movement to an apparently perplexing degree. This in the theory of the instrument I have

[1] See my paper on Attachment of Quartz Fibres," *Phil. Mag.*, May 1895.