but the stage of excitement, which in adult cats passed gradually off in a few hours, was followed by a condition marked by a want of coordination of muscular movements, and presenting the most grotesque resemblance to certain stages of alcoholic intoxication. This stage was followed in turn by sleepiness and stupor, in which the kitten was left at night; in the morning it was found dead.

Two observations have shown that these salts paralyze (in dogs and cats) the inhibitory fibres of the pneumogastric; they also seem to lower the internal tension, but want of material has prevented me from ascertaining how this is brought about.

On *rabbits* neither salt, even in doses of a decigramme, seems to have any effect, except perhaps a slight excitement. There is no dilatation of the pupils, no flow of saliva, and, if one observation can be trusted, no paralysis of the inhibitory fibres of the pneumogastric.

No marked difference was observable between the two salts, except that the morphia-salts seemed rather more potent than the corresponding codeia bodies.

The salts of deoxycodeia and deoxymorphia given by mouth or by subcutaneous injection in doses of a decigramme, produced in adult cats, almost immediately after exhibition, a series of convulsions much more epileptic in character than tetanic. In one case there was a distinct rotatory movement.

In a few minutes these convulsions passed away, leaving the animal exhausted and frightened. Then followed a stage of excitement with dilated pupils and flow of saliva, very similar to the effects of the tetracodeia and tetramorphia salts, but less marked.

Doses of half a decigramme given to adult cats produced the stage of excitement only, without the convulsions.

In no case, with any specimen of product, has vomiting been witnessed; like the tetracodeia and tetramorphia products, the deoxycodeia and deoxymorphia salts appear to paralyze the inhibitory fibres of the pneumogastric. Trials with rabbits gave only negative results.

No marked differences could be observed between the hydrochlorates and hydrobromates of deoxycodeia or deoxymorphia.

VI. "On the Measurement of the Chemical Intensity of Total Daylight made at Catania during the Total Eclipse of Dec. 22, 1870." By Henry E. Roscoe, F.R.S., and T. E. Thorpe, F.R.S.E.

Received June 15, 1871.

(Abstract.)

The following communication contains the results of a series of measurements of photochemical action made at Catania in Sicily, on Dec. 22nd, 1870, during the total solar eclipse of that date, with the primary object of determining experimentally the relation existing between this action

and the changes of area in the exposed portion of the sun's disk. The attempt to establish this relation has already been made by one of us from the results of observations carried out by Captain John Herschel, R.E., F.R.S., at Jamkandi, in India, during the total eclipse of Aug. 18, 1868. Unfortunately the state of the weather at Jamkandi at the time of the eclipse was very unfavourable, and the results were therefore not of so definite a character as could be desired, and it appeared important to verify them by further observation. The method of measurement adopted is that described by one of us in the Bakerian Lecture for 1865; the observations were made in the Garden of the Benedictine Monastery of San Nicola, at Catania, the position of which, according to the determination of Mr. Schott of the United States' Coast Survey, is lat. 37° 30′ 12″ N., long. 1^h 0′ 18″ E. In order to obtain data for determining the variation in chemical intensity caused by the alteration in the sun's altitude during the eclipse, observations were made on the three previous days, during which the sky was perfectly cloudless.

In the following Table the observations taken at about the same hours are grouped together:—

TABLE I.

Mean Altitude.	No. of Observations.	Chemical Intensity.		
		Diffused.	Direct.	Total.
° ′ ″ 1 30 28	1	0·009	0·000	0·009
9 28 10	7	0·044	0·008	0·052
13 9 57	7	0·050	0·014	0·064
19 57 49	12	0·072	0·028	0·100
24 46 12	7	0·095	0·049	0·144
28 24 10	14	0·108	0·047	0·155

The above numbers confirm the conclusion formerly arrived at, viz. that the relation between total chemical intensity and sun's altitude is represented by a straight line, or by the equation

$$CI_a = CI_0 + \text{const.} \times a,$$

where CI_a signifies the chemical intensity at any altitude a in circular measure, CI_0 the chemical intensity at 0°, and const. a a number derived from the observations.

The observations on the day of the eclipse (the 22nd) were commenced about nine o'clock A.M., and up to the time of first contact were made regularly at intervals of about an hour. The sky up to this point was cloudless, and the measurements almost absolutely coincided with the mean numbers of the preceding day's observations. As the eclipse progressed, and the temperature of the air fell, clouds were rapidly formed,

and from 1^h 40′ up to the time of totality it was impossible to make any observations, as the sun was never unclouded for more than a few seconds at a time. As the illuminated portion of the solar disk gradually increased after totality, the clouds rapidly disappeared, the amount falling from 9 (overcast =10) to 3 in about fifteen minutes. The observations were then regularly continued to within a few minutes of last contact.

Although the disk and by far the largest portion of the heavens were completely obscured by clouds during totality, rendering any determination of the photochemical action perfectly valueless for our special object, it was yet thought worth while to attempt to estimate the chemical intensity of the feebly diffused light at this time, which certainly is capable of producing photographic action.

Immediately after the supposed commencement of totality the slit was opened, and the sensitive paper exposed for ninety-five seconds. Not the slightest action, however, could be detected on the paper, and we therefore believe that we are correct in estimating the intensity of the chemically active light present at certainly not more than 0·003 of the unit which we adopt, and probably much less.

The Table containing the experimental numbers and the graphic representation of them are given in the memoir. By a graphical method the relative areas of the sun uneclipsed at the times of observation were obtained; and these are seen in column 3 of Table II., the area of the unobscured sun being taken as unity.

Column 2 gives the results of the photochemical observations made during the eclipse obtained from the graphical mean, and corrected for variation in the sun's altitude, the total chemical action immediately before first contact being taken as unity. Column 1 gives the apparent solar times of observation.

TABLE II.

1.	2.	3.
h ′		
12 44	0·915	0·961
12 54	0·876	0·880
1 16	0·686	0·637
1 24	0·555	0·534
2 2	0·000	0·000
2 9	0·165	0·127
2 25	0·307	0·338
2 34	0·464	0·498
2 44	0·601	0·602
2 54	0·725	0·736
3 4	0·876	0·861

From these observations we conclude *that the diminution in the total chemical intensity of the sun's light during an eclipse is directly proportional to the magnitude of the obscuration.*

The question of the variation of (1) the direct and (2) the diffused radiation is next discussed. On comparing the curve representing the chemical intensity of diffused light with the curve of solar obscuration, it is found that the rate of diminution in chemical action exerted by the diffused light is up to a certain point greater than corresponds to the portion of eclipsed sun, whilst from this point up to totality the rate of diminution becomes less than corresponds to the progress of the eclipse. The same rapid diminution in the chemical action of the diffused daylight during the early periods of the eclipse was also observed at Jamkandi; it is doubtless due to the dark body of the moon cutting off the light from the brightly illuminated portion of sky lying round the solar disk.

The results of the observations at Catania are then compared with those made at Moita, near Lisbon, and communicated to the Society in 1870. This comparison shows a striking coincidence between the two sets of observations. In each case it is seen that the relation between solar altitude and total chemical intensity is represented by a straight line, although the Catania observations slightly exceed, by a constant difference, those made at Moita in conformity with the slight difference in latitude, and with the fact that the former determinations were made at a greater elevation above the sea-level.

The Catania observations further confirm the fact which we formerly announced, that for altitudes below 50° the amount of chemical action effected in the plane of the horizon by diffused daylight is greater than that exerted by direct radiation, and also that at altitudes below 10° direct sunlight is almost completely robbed of its chemically active rays.

VII. "On the Calculation of Euler's Constant." By J. W. L. Glaisher, B.A., F.R.A.S. Communicated by James Glaisher, F.R.S. Received June 6, 1871.

The main object of the present communication is to correct some inaccuracies both of reasoning and calculation contained in two papers by Mr. Shanks, viz. "On the Extension of the Value of the Base of Napier's Logarithms; of the Napierian Logarithms of 2, 3, 5, and 10; and of the Modulus of Briggs on the common System of Logarithms; all to 205 places of Decimals," in the Proc. Roy. Soc. vol. vi. p. 397; and "On the Calculation of the Numerical Value of Euler's Constant," in the Proc. Roy. Soc. vol. xv. p. 429 (1867).

For the calculation of the constant Mr. Shanks has used (as, indeed, has every calculator who has computed the value of the constant during the present century) the semiconvergent series

$$\gamma = 1 + \frac{1}{2} + \frac{1}{3} \dots + \frac{1}{x} - \log x - \frac{1}{2x} + \frac{B_1}{2x^2} - \frac{B_2}{4x^4} + \frac{B_3}{6x^6} - \dots, \qquad \text{(i)}$$

γ being the constant, and B_1, B_2, B_3 . . . Bernoulli's numbers.