garding induced magnetism) upon the suspended needle; then, as the line joining the centres of the two magnets is in every part of the observation approximately at right angles to the suspended needle, it follows from (1) that the attraction of the bar will be proportional to its magnetism. Hence in the north end downwards the equation of equilibrium will be

$$c(\mathrm{M}+\mathrm{Y}\mu)=\mathrm{X}\sin\phi,$$

and with the north end upwards

$$c(\mathrm{M}-\mathrm{Y}\mu)=\mathrm{X}\sin\phi'.$$

Hence

$$2c\mathrm{Y}\mu=\mathrm{X}(\sin\phi-\sin\phi'),$$

$$2c\mathrm{M}=\mathrm{X}(\sin\phi+\sin\phi').$$

Hence

$$\frac{\mathrm{Y}}{\mathrm{M}}\mu=\frac{\sin\phi-\sin\phi'}{\sin\phi+\sin\phi'}=\frac{\tan\frac{1}{2}(\phi-\phi')}{\tan\frac{1}{2}(\phi+\phi')};$$

and since $\mathrm{Y}=\mathrm{X}\tan i$,

$$\mu=\frac{\mathrm{M}}{\tan i\,\mathrm{X}}\frac{\tan\frac{1}{2}(\phi-\phi')}{\tan\frac{1}{2}(\phi+\phi')}=\frac{\sin u\tan\frac{1}{2}(\phi-\phi')}{2\tan i\tan\frac{1}{2}(\phi+\phi')}.$$

From the values of observations made at the Observatory with 66 magnets, all belonging to Classes A and B, we find—

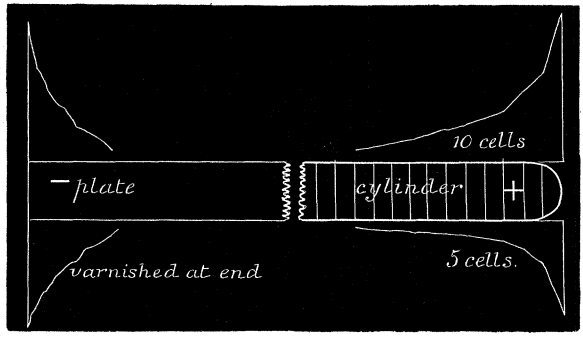
	Mean value.	Average difference from mean.	Maximum.	Minimum.
μ	0·000207	$\pm$0·000035	0·000420	0·000080

III. "Distribution of the Radicals of Electrolytes upon an Insulated Metallic Conductor." By Alfred Tribe, Lecturer on Chemistry in Dulwich College. Communicated by Dr. Gladstone, F.R.S. Received April 19, 1877.

Among other facts demonstrated in my communication to the Royal Society in January 1876 (Proc. Roy. Soc. vol. xxiv. p. 308), it was shown that a rigid conductor, when placed lengthwise between the electrodes in a fluid in the act of electrolysis, becomes, with sufficient battery-power, endowed with the power of doing chemical work similar in kind to the battery-electrodes themselves. This phenomenon, it was contended, was explicable on the view which regards an electrolyte as a dielectric, with the additional function of being capable of mutually exchanging its constituents in the act of depolarization—a conception which induced the quantitative experiments detailed below.

Distribution of the Positive Radical on the end of an insulated strip of metal facing the Positive Electrode.

For these experiments a 5-per-cent. solution of copper sulphate was employed, and a glass trough 30 centimetres long by 13 centimetres broad and 12 centimetres deep. In each experiment a strip of silver plate about the thickness of writing-paper was placed lengthwise midway between the electrodes, and allowed to remain immersed in the electrolyzing fluid for one hour, the battery-power being 5 cells of Grove. In experiments 1 and 1*a* the strips were similar, being 1 decimetre long



and 1 centimetre wide. In experiment 2 the strips were of the same width, but 4 millims. longer, 2 millims. at each end being covered with varnish, with the object of eliminating the action of the end surfaces. Successive lengths of 2 millims. exactly were cut off after the action, and the copper thereon was determined by the cyanide of potassium and ammonia method. One centimetre of the cyanide solution was equivalent to ·00309 gram of copper. The results were as under:—

Lengths of 2 millims. commencing at the end facing the + electrode.	Cubic centimetres of KCy used.		
	1.	1*a*.	2.
1.	7·2	7·3	5·4
2.	5·0	4·4	4·2
3.	4·0	3·6	3·6
4.	3·1	3·1	2·8
5.	2·9	2·4	2·4
6.	2·1	2·3	2·3
7.	1·9	1·8	1·4
8.	1·6	1·4	1·3
9.	1·1	1·2	1·0
10.	0·6	0·5	0·6
11.	trace.	0·0	0·0

It is apparent from the numbers that there is a considerable accumulation of the positive radical (and hence it may be concluded of negative electricity) at the extremity of the strip in proximity to the positive electrode, and that this gradually diminishes until, at a distance of 22 millims. from the end, it becomes too small for estimation. The relatively small number in the first line of experiment 2 shows the influence of the end surface.

The subjoined Table exhibits the results, showing the distribution upon a diamond-shaped strip (1 decimetre in its longer and 1 centimetre in its shorter diagonal) placed lengthwise under similar conditions:—

Lengths of 2 millims. counting from positive electrode.	Cubic centimetres of KCy used.	
	3.	3*a*.
1.	2·6	3·1
2.	2·0	1·7
3.	1·4	1·8
4.	1·6	1·7
5.	2·1	1·8
6.	1·9	2·1
7.	2·0	1·4
8.	1·7	1·6
9.	1·3	1·3
10.	1·0	1·2
11.	1·0	0·5
12.	0·4	0·0

It is worthy of notice that the positive radical is detectable at a somewhat greater distance from the point of the rhombus than from the end of the rectangular strips.

The area of the first 2 millims. of the rhombus equals 0·4 square millim. Calculating the copper on the first 2 millims. of the rectangular strip for an equal area, the accumulation on these areas is shown to be greater on the rhombus in the ratio of 20 to 1. This illustrates to a considerable extent the power of the more pointed conductor in storing up the radical.

Distribution of the Negative Radical on the end of the conductor facing the Negative Electrode.

For this a cylinder of pure copper, 1 decimetre long and 1 centimetre in diameter, was placed lengthwise in the trough containing a 5-per-cent. solution of copper sulphate, its position being similar to that of the silver strip in the previous experiments. The end of the cylinder, which was so placed as to be eaten away in the experiment, was made up of sections

of 3 millims. each screwed together. The first cylinder had six and the other two twelve divisions each. The amount of action was found by weighing the sections before and after subjecting the cylinder to the action of the electrolyzing fluid.

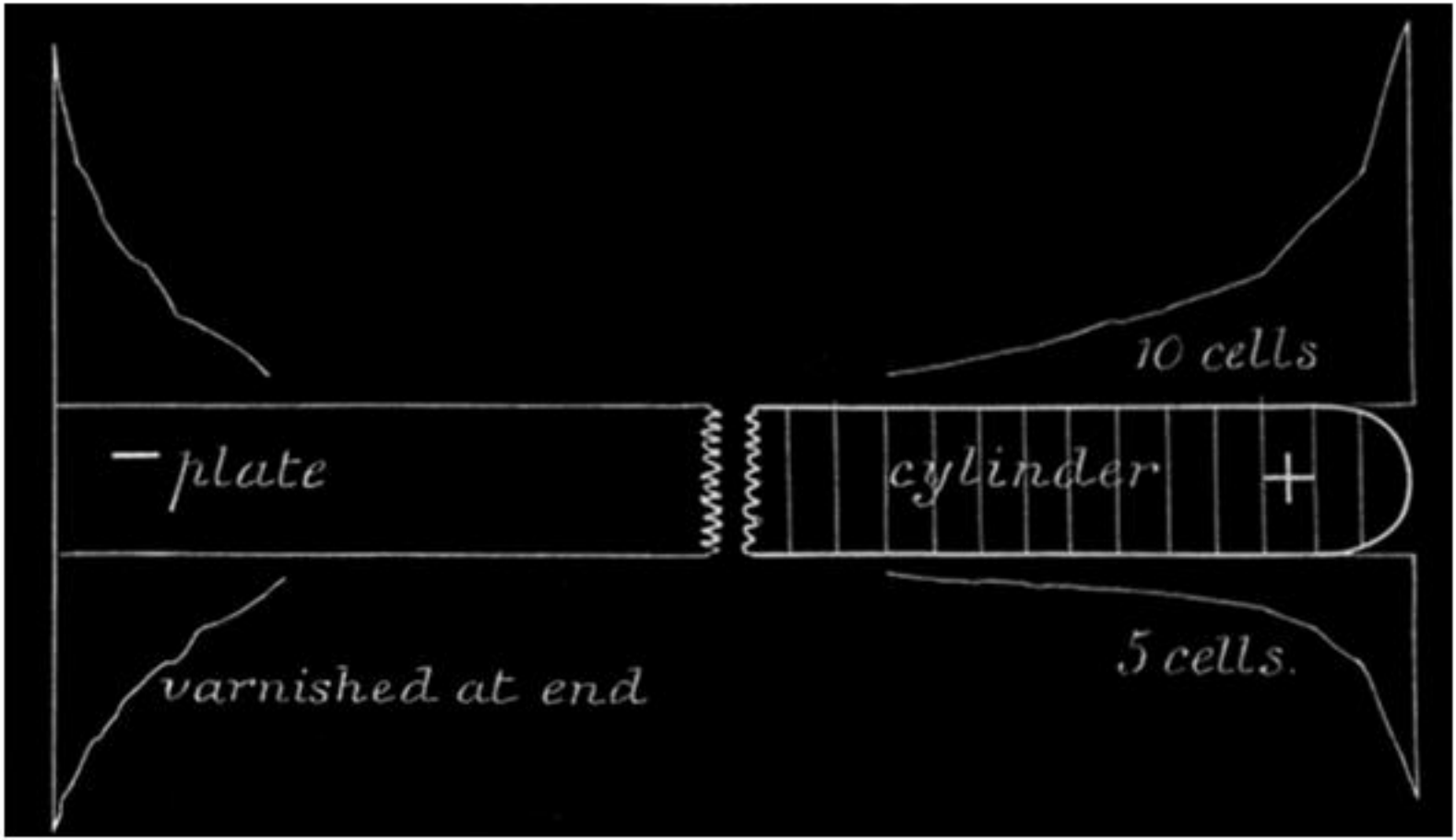
In experiment 4, three cells of Grove were used, the time being two hours; in experiment 5, five cells for one hour; and in 6, ten cells for one hour.

No. of section, counting from the end opposite the negative pole.	Weight in grams of copper dissolved.		
	4.	5.	6.
1.	·0923	·0936	·1590
2.	·0532	·0428	·0982
3.	·0368	·0325	·0745
4.	·0343	·0277	·0568
5.	·0285	·0226	·0507
6.	·0241	·0184	·0464
7.	.....	·0164	·0391
8.	.....	·0138	·0341
9.	.....	·0120	·0271
10.	.....	·0100	·0280
11.	.....	·0084	·0202
12.	.....	·0062	·0168

In experiment 4, signs of corrosion were noticeable to 48 millims. from the end of the cylinder, while the deposit of copper reached 46 millims. from the other end. In experiment 6, corrosion was noticeable also to 48 millims. from the one end, and deposition to 46 millims. from the other end. From this it would appear that the electro-negative radical spreads over a greater surface than does the positive radical, or that the neutral line is not in the middle of the cylinder, but somewhat removed towards the negative end, that is, where the deposition of the positive radical takes place. I hope to return to this.

The numbers in the columns 1, 1*a*, and 2 may be taken as showing approximately the distribution of the positive radical or negative electricity on the respective silver strips, and the numbers in 5 and 6 that of the negative radical or positive electricity on the copper cylinders, which facts, graphically represented, give figures as in the diagram.

The Society adjourned over Ascension Day, to Thursday, May 17.


10 cells
− plate
cylinder
+
varnished at end
5 cells.