Correction to Prof. Cayley's "Eighth Memoir on Quantics." Phil. Trans. Vol. 157 (1867). Received June 26, 1875.

The Table for L, M, L′, M′, p. 544, should stand:—

$72L=$		$72L'=$	$24M'=$
⋮		A^3I+1	$I-1$
⋮		$ABI+3$	
A^2B^2C-81		$CI-15$	

and substituting these values we find for 36a, 36b, &c. the values given p. 554; where in the expression of 36a, the term A^2B^2C-126 should have been distinguished by an asterisk, to show that there was an alteration in the coefficient, -126, instead of -36 as given p. 544.

June 17, 1875.

JOSEPH DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

Prof. John Casey, Dr. August Dupré, and Dr. James Hector (who was elected in 1866) were admitted into the Society.

The following Papers were read:—

I. "On a new Form of Dynamo-Magneto-Electric Machine." By S. C. Tisley. Communicated by W. Spottiswoode, M.A., Treas. R.S. Received June 17, 1875.

In the first machines constructed by Siemens and Wheatstone in 1867 (see Royal Society's Transactions) the power of augmenting the magnetism by successive currents, developed from the original residual magnetism contained in the iron, was fully demonstrated, and it was shown that the power of the machine could thereby be developed to a great extent; but the only means for obtaining external work was by the insertion in the circuit of a magnet or coil so that the secondary discharge could be utilized. Sir Charles Wheatstone also showed that a great part of the current could be shunted through a platinum wire, care being taken that the resistance of the platinum wire was sufficient to compel a large part of the current to pass round the electromagnet.

In the same year the writer designed a machine which was made by Mr. Ladd, and described by him in a paper read before this Society (see Transactions), the principle of which was that two separate armatures

being introduced, one was employed for magnetizing the machine, the other being used for external work. This machine gave a good electric light &c., and was shown in the Exhibition of Paris, 1867, when a silver medal was awarded for it.

To simplify this machine, the author of this paper afterwards placed the two armatures in the same groove between the poles of the electromagnet, bolting the two together at right angles to each other, so that they came under the influence of the magnetism alternately; by this method one pair of bearings was sufficient instead of two, and the machine altogether was much simplified.

The machine now about to be described is a still further modification, in which the greatest amount of simplicity and effective power are combined.

The apparatus consists essentially of an electromagnet with shoes, forming a groove in which a Siemens's armature is made to revolve: this is much the same as the original machines made by Siemens and Wheatstone; but the difference occurs in the break or commutator; here there are two springs or rubbers employed in taking the current off from the commutator. The commutator consists of three rings: one of these rings is complete for three quarters of the circle, the other quarter being cut away; another ring is cut away three quarters, leaving the one quarter; and in between these two rings is a third ring, insulated and connected with the insulated end of the wire wound round the armature; on this centre ring are projecting pieces, one a quarter of a circle and the other three quarters, so arranged as to complete the two outer circles. The rubber spring which comes into contact with the quarter of the middle circle is connected with the electromagnet of the machine, and the armature is so arranged that at the time of contact the best magnetizing current is developed. The other spring rubber is in connexion with the wire on the armature during the other three quarters of its revolution; and this is connected with any external piece of apparatus required to be worked.

By this arrangement, the alternate currents being utilized, they are all in the same direction; and by the length of contact the whole of the current is obtained in the best condition for heating wires, decomposing water, giving an electric light, and other usual experiments.

At present a model machine has been constructed on this principle, the armature of which measures 5 inches long by 2 inches diameter, on which is wound about 50 feet of cotton-covered copper wire, no. 16, B. W. G. The magnet has about 300 feet of covered copper wire, no. 14, B. W. G.: the whole instrument, without the driving-gear, weighs 26 lbs.; with this apparatus 8 inches of platinum wire, ·005, can be made red-hot, water is rapidly decomposed, &c.

The armature is constructed specially to prevent the accumulation of heat to which every class of dynamo-magneto-electric machine is liable. It is

made in two halves, a groove of a zigzag form being cast in each half, so that when the two are screwed together a continuous channel is maintained through the bearings for a current of cold water to pass during the whole time the machine is at work.

The advantages suggested by these arrangements are their extreme simplicity, the few number of parts, only one armature and one wire being used.

This principle of the alternate current being utilized is also applicable to machines constructed on the multiple armature principle; and the economy thereby resulting would prove of great advantage, as the power of the machine could be varied by throwing into the electromagnets either every other current, or every fourth, sixth, or eighth current, according to the strength required in the machine, the whole of the other currents being utilized for electric light or otherwise.

II. "Note on the Anatomy of the Umbilical Cord." By Lawson Tait, F.R.C.S. Communicated by W. S. Savory, F.R.S. Received April 28, 1875.

(Abstract.)

I. Its external form and method of growth.
II. Its covering.
III. Its substance.
IV. Its vessels.
V. Its relations to the fœtus and placenta.
VI. Its nutrition.

I. The spiral form of the cord has received many explanations; but hitherto none has seemed satisfactory, nor sufficient to explain all the facts. The cause of the spiral form has generally been regarded as existing in the arteries; but experiment shows that the vein is the chief factor.

The considerations drawn from the comparative and teratological anatomy of the cord point to the conclusion that its twist must depend upon some mechanism at the fœtal insertion.

Such mechanism is found in a peculiar camb-like growth of the dermal ring of the umbilicus, and in an arrangement of capillaries upon which the nutrition of the cord depends, that nutrition being supplied over the venous surface of the cord in about the proportion of three to two on the arterial surface. This unequal nutrition would seem necessarily to result in a spiral.

II. When the surface of the cord is treated with litmus or hæmatoxylin, the epithelial covering is found to consist of a single layer of irregularly polygonal cells, regularly nucleated. The fibrillar matrix on which they lie is evidently only a slightly condensed arrangement of the canalicular tissue. Silver-staining shows that these cells have a peculiar irregularity in size and arrangement.