

The author proposes to distinguish the terms *tension* and *intensity*, as applied to electricity; expressing by the first, the actual elastic force of a given quantity, accumulated in a given space; and by the second, the action of that part which is in a state of freedom, and which is indicated by its effects on the electrometer.

Experiments are next related, which were made for the purpose of showing the incorrectness of the explanation of the above fact proposed by Mr. Singer, namely, that it depends on the electrical action of the atmosphere. In the transmission of electricity between conductors placed at a distance, the quantity required to produce a discharge is directly as the distance; and conversely, the distance is directly as the quantity. This distance will, therefore, be a measure of the tension; whereas the attractive force, as indicated by the electrometer, is a measure of intensity only. Another conclusion deduced from this train of reasoning is, that the resistance of the atmosphere to the passage of electricity is not really greater through any one discharging distance than through another, and is in no case greater than the existing atmospheric pressure; and it was found by direct experiment, that the distance through which a given accumulation of electricity could be discharged, is inversely as the density of the interposed air. When this air preserved its density unaltered, the elevation of its temperature produced no difference in its power of controlling the escape of electricity; hence it is concluded that heated air is no otherwise a conductor of electricity, than in as much as it has thereby become rarefied; but heat applied to solid conductors was found to diminish their conducting powers.

The electrical capacities of conducting bodies of different shapes was the subject of inquiry. In plates having the form of parallelograms, the relative capacities, when the areas are constant, are inversely as the sum of the length and breadth; and when this latter sum is constant, the capacity is inversely as the area. The capacity of a plane circle differs but little from that of a square having the same area; nor does it make any difference if the plates be turned into cylinders, or prisms with any number of sides; and the capacity of a sphere or cylinder is the same as that of a plane equal to it in superficial extent.

The author proceeds to investigate some laws relating to the action of electricity, when resulting from induction; and particularly that of the relation between electrical attraction and distance; adducing experiments in confirmation of the former being in the inverse duplicate ratio of the latter. The attraction actually exhibited between two equal spheres, he considers as composed of a system of parallel forces, operating in right lines between the homologous points of the opposed hemisphere. The author concludes by various observations on the transmission of electricity to bodies in vacuo, from which he infers the fallacy of all explanations of the phenomena of electrical repulsion, founded on the supposed action of the atmosphere.

The reading of a paper, entitled, "On the Generation of the Marsupial Animals; with a Description of the impregnated Uterus of the

Kangaroo." By Richard Owen, Esq., Member and Assistant Conservator of the Museum of the Royal College of Surgeons, London. Communicated by Sir Anthony Carlisle, F.R.S.—was commenced.

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BENJAMIN COLLINS BRODIE, Esq., Vice-President, in the Chair.

Mr. Owen's paper was resumed, and concluded.

The author gives a history of the opinions which have been advanced relative to the generative organs and functions of the *Marsupialia*, an extensive order of quadrupeds, including animals nourished by every variety of food, and exercising very different powers of progression, yet exhibiting a remarkable uniformity in their mode of reproduction. In all the genera included in this family, the uterus is double; in most of them the vagina is also double; and there is always a single cloacal outlet for the excrementitious substances, and the products of generation. There is a corresponding uniformity in the male organs, which are bifurcated at the extremity, and have a double groove for the transmission of the semen; and the male has not only marsupial bones, similar to those of the female, but also a muscle, similar to that which surrounds and compresses the mammary gland in the female, winding round these bones like pulleys, and acting as cremasters for the retraction and compression of the testes.

A minute description is then given of the results of the dissection of the impregnated uterus of a kangaroo, which was obtained by Mr. George Bennett, during a short residence in New South Wales, and which, together with the impregnated uteri of the *Ornithorhynchus* and other valuable specimens, were sent to the Museum of the Royal College of Surgeons. The membrane corresponding to the chorion, or external envelope of the fœtus, was found not to have a vascular structure, and not to adhere in any part to the surface of the uterus; neither was there any appearance of a placental or of a villous structure. It adhered internally to a vascular membrane, into which the umbilical stem of the fœtus suddenly expanded, and which terminated in a well-defined ridge, formed by the trunk of a terminal blood-vessel. The three omphalo-mesenteric, or vitelline vessels, were traced, from the umbilical cord into the abdomen, where they terminated in the usual manner; namely, the veins in the vena portæ, and the artery in the aorta. Hence it was apparent that the membrane on which they ramified, corresponded to the vascular layer of the germinal membrane, which, in oviparous animals, spreads over the yolk, or to the umbilical vessel of the embryos of ordinary mammalia. The ventricles of the heart were completely joined together, and bore the same proportions to each other as in the adult; a perfection of structure which is not observed in the embryos of ordinary mammalia at a corresponding period of development. The lungs were equal in size to the heart, and were of a spongy texture, and full of red blood; their precocious development, compared with that of the abdominal or di-

gestive organs, being evidently a provision for their early or premature exercise.

From the close resemblance in the structures of the ovary and Fallopian tubes of the kangaroo with those of ordinary mammalia, and from the circumstance of the young being nourished, after birth, by a secretion from mammary glands, the author concludes that the ovulum in the former animal quits the ovisac in a condition corresponding to that in the latter class, and increases in a similar manner as it descends to the uterus. But as there is no formation of a placenta, it remains to be determined how the aeration of the foetal blood is effected: this, however, probably takes place through the chorion, although this membrane is not vascular, to an extent sufficient for the purposes of the vital functions of a foetus so imperfect, and whose uterine existence is of such short duration, as they are in this animal. Reasons are given, which render it probable that in the Marsupiaata an allantois and umbilical arteries are developed at a later period of gestation, corresponding in this respect to the foetal condition of the Batrachian reptiles, and corroborating the views entertained by the author, that the former family are essentially ovo-viviparous.

The author next proceeds to investigate the structure and condition of the mammary foetus in the Marsupiaata, or that stage of its existence when it is retained in the marsupial pouch, and derives its sustenance from the imbibition of milk from the mammary glands. He relates the observations which he has lately made on the foetus of a kangaroo in the Menagerie of the Zoological Society. He ascertained that the period of uterine gestation in the animal is thirty-nine days, and examined the foetus a few hours after it had fixed itself to the nipple in the abdominal pouch, and when it was not much above an inch in length, and resembled an earth-worm, both in the colour and the semi-transparency of its integument. Four days afterwards, he detached it from the nipple, and observed that although it moved its limbs freely, it was unable to regain its former situation. The parent endeavoured to replace it by introducing its head into the pouch, which it held open with its fore paws; but these efforts were ineffectual, and the next day the foetus had disappeared, having, probably, been destroyed by the mother.

The last section of the paper is occupied by an inquiry into the structure and analogies of the female generative organs of the Marsupiaata. These are traced throughout the successive orders of mammalia, to their connexions with various tribes of birds and reptiles, and is concluded by a disquisition on the final purposes of marsupial generation, and its relations to the other modes by which the continuance of the race is accomplished, in the more elevated orders of animals, and which appear to have reference to the greater expansion and perfection of the brain, and the greater development of the intellectual faculties.

A paper was then read, entitled, "On a new Law of Combustion."
By Charles J. B. Williams, M.D. Communicated by W. G. Maton, M.D., F.R.S.