On these principles, the author thinks it will readily appear why the various attempts hitherto made to divert the motion of the shingles to a distance from the general line of the shore, both at Dover and at Folkstone, have invariably failed; and he recommends, for the prevention of the evil of accumulation, the adoption of a more general system of management along the coast, in preference to the resorting to particular devices adapted exclusively to each particular case.

The reading of a paper, entitled, "On some Elementary Laws of Electricity." By W. Snow Harris, Esq., F.R.S.—was commenced.

April 17, 1834.

FRANCIS BAILY, Esq., Vice-President, in the Chair.

The reading of Mr. Harris's paper was resumed in continuation.

April 24, 1834.

DAVIES GILBERT, Esq., D.C.L., Vice-President, in the Chair.

The reading of Mr. Harris's paper was concluded.

For the purpose of determining several questions relative to the forces exerted by bodies in different states of electricity, the author contrived an electroscope of peculiar construction, and also an electrometer, both of which he minutely describes; and in order to obtain a unit of measure, in estimating the quantity of electrical accumulation, instead of transmitting the electricity evolved by the machine immediately from its conductor to the battery to be charged, he interposes between them a coated jar, furnished with a discharging electrometer, so that the quantity of charges that have passed through it may be estimated by the number of explosions occurring in the process of accumulation. By increasing or diminishing the distance between the discharging balls, the value of the unit may at pleasure be rendered great or small.

A series of experiments is described, showing that when a given quantity of electricity is divided among any number of perfectly similar conductors, the attractive force, as measured by the electrometer, is inversely as the square of that number; and if different quantities of electricity be communicated to the same conductor, their attractive forces are directly as the squares of those quantities.

The author observes that the electrical force exerted by one body on another is always diminished by the vicinity of a neutral body; an effect which is analogous to the operation of screens in diminishing the force of a revolving magnet on metallic disks, as noticed by him in a former paper, published in the Philosophical Transactions. It appears, thus, that there is, in all these cases, a portion of electricity, which is masked, and not appreciable by the electrometer.

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