

chemical action at one pair of plates cannot pass by another pair except an equal chemical action take place there; and as the chemical and electrical action are always equivalent, the equal chemical action at the second pair will do no more than suffice to transfer forwards the forces disturbed at the first pair, and can add nothing to their quantity: but they can add to their *intensity*, and in fact the recurrence of a second chemical action at the second pair of plates has exactly the same effect as would be produced by a more intense chemical action at the first pair. In this way it is that numbers of plates give energy to the voltaic pile, and enable its power to penetrate electrolytic bodies and permeate bad conductors in a manner which could not be done by the electricity of a few pairs of plates only.

The *fourth* part of the paper relates to the resistance opposed to the electric current at the place of decomposition, and refers this at once to the resistance of the chemical affinity which has to be overcome. This of course varies with the number of places where decomposition is effected, the strength of the affinity of the elements of the decomposing body for each other, and the nature of the substance against which the decomposition is effected, and by which it may very frequently be assisted. All these are taken into account, their general, and occasionally particular, results shown, and their perfect harmony with the principles previously advanced pointed out.

In the last part of the paper some general remarks on the active voltaic battery are made, in which the influence of several distinct causes in producing a rapid change and deterioration of action is pointed out. Each of these causes is considered separately, and the effects they produce are shown to be necessary consequences of the principles already laid down as those of the voltaic battery.

The following Papers were then read:

1. "Observations on the *Teredo navalis* and *Limnoria terebrans*, as at present existing in certain localities of the British Islands." By William Thompson, Esq., Vice-President of the Natural History Society of Belfast. Communicated by J. G. Children, Esq. Sec. R.S.

The opinion which has been advanced, that the *Teredo navalis* is no longer to be found on the British coast, is shown by the author to be erroneous; for numerous specimens of that destructive animal, collected from the piles used in the formation of the pier at Portpatrick in Ayrshire, were furnished to him by Captain Frayer, R.N. (of His Majesty's Steam-packet Spitfire). Some of these specimens had attained the length of nearly two feet and a half, a magnitude at least equal to, if not exceeding, the largest brought from the Indian seas. After giving a description of the animal, the author enters into an inquiry into the agency it employs to perforate the timber which it consumes as food, and in which it establishes its habitation. He ascribes to the action of a solvent, applied by the proboscis, the smooth and rounded termination of its cell, which is afterwards enlarged by the mechanical action of the primary valves.

The author then gives an account of the natural history and opera-

tions of another animal, the *Limnoria terebrans*, of Leach, belonging to the class of Crustacea, whose depredations on timber are no less extensive and formidable than the *Teredo*. At Portpatrick it appears that both these animals have combined their forces in the work of destruction, the *Teredo* consuming the interior, and the *Limnoria* the superficial parts of the wood; the latter continuing its labours until it comes in contact with the shells of the former, so that the whole mass is speedily deprived of cohesion. It is stated, on the authorities of Mr. Hyndman and Mr. Stephen, that the *Limnoria* is already committing great ravages in the timber at Donaghadee.

2. "On the Nervous System of the *Sphinx ligustri* (Linn.) during the latter Stages of its Pupa and its Imago States; and on the Means by which its Development is effected." By George Newport, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

In a paper formerly read to the Royal Society, and printed in the Philosophical Transactions, the author has given a description of the anatomy of the nervous system of the *Sphinx ligustri* in its larva, and the earlier periods of its pupa, state; and he has since prosecuted the inquiry then commenced, following the changes of structure through the remaining stages, until the insect has arrived at its full development. He enters into minute details of all these changes, which vary considerably in the rapidity with which they take place at different periods, according as the vital powers are called into action by external circumstances, or become exhausted by their efforts at effecting the growth or modifying the form of different parts. Thus the ganglia and nervous cords undergo great changes both in their form and situation, and also in their number, during the passage of the insect from the larva to the pupa state; and after these changes have been carried to a certain extent, they are suspended for several weeks, during which the insect remains in a state of hybernation; but at the expiration of this period the changes again proceed, and are continued uninterruptedly, till the insect attains its ultimate or perfect stage of development. The *Sphinx ligustri* remains in the pupa state during at least forty-two or forty-three weeks; thus affording ample opportunities of examining the whole progress of the changes which take place in the structure of different parts. The concentration of the nervous system, which was commenced in the larva, proceeds to a much greater extent while the insect is inclosed in the pupa, and is continued for a short time after it has assumed the imago state. The double origin and connexions of the nerves distributed to the wings are described, and a conjecture offered as to the object of this arrangement, which appears designed to establish a harmony of action between the wings, in those insects, especially, which are remarkable for velocity and power of flight; a different disposition being adopted in those which fly with less regularity or speed. The nerves of the organs of sense, as the antennæ, eyes, proboscis, and apparatus for manducation, are traced and minutely described, and a comparison instituted between them and the nerves which have similar offices in vertebrated animals. The author traces the origin and course of the