

is also no less important, on the other hand, to complete, in the latter, the method hitherto applied solely to the periodic inequalities. Hitherto those terms in the disturbing function which give rise to the secular inequalities, have been detached, and the stability of the system has been inferred by means of the integration of certain equations, which are linear when the higher powers of the eccentricities are neglected; and from considerations founded on the variation of the elliptic constants. But the author thinks that the stability of the system may be inferred also from the expressions which result at once from the direct integration of the differential equations. The theory, he states, may be extended, without any analytical difficulty, to any power of the disturbing force, or of the eccentricities, admitting the convergence of the series; nor does it seem to be limited by the circumstance of the planet's moving in the same direction.

A Paper was also read, entitled, "On the Nervous System of the *Sphinx Ligustri* (Linn.), and on the Changes which it undergoes during a part of the Metamorphoses of the Insect," by George Newport, Esq. Communicated by Peter Mark Roget, M.D. Sec. R.S.

The author gives a minute anatomical description, accompanied by drawings, of the development and arrangement of the nerves of the *Sphinx Ligustri*, and the successive changes they undergo during the last stage of the larva, and the earlier stages of the pupa state. As this insect, in passing from its larva to its perfect state, remains for several months in a torpid condition, it affords a better opportunity of minutely following these changes, and of ascertaining in what manner they are effected, than most other insects; and the great comparative size of this species renders the investigation still more easy.

While in its larva state, this insect frequently changes its skin: it enlarges rapidly in size after each operation, and the nervous system undergoes a corresponding development. The author minutely describes the longitudinal series of ganglia, which extend the whole length of the animal. He remarks that the eleventh or terminal ganglion is distinctly bilobate, a form which, as suggested to him by Dr. Grant, is probably acquired by the consolidation of two ganglia which had been separate at an earlier period of development. A detailed account is then given of the nerves proceeding from these several ganglia.

During the change from the state of larva to that of the perfect insect, the number of the ganglia is found to diminish in consequence of the approximation and conjunction of adjacent ganglia; and the nervous cords which connect them are generally much shortened. A nerve is described which, from the mode of its distribution to the stomach, intestinal canal, and dorsal vessel, presents a remarkable analogy to the *par vagum*, or pneumogastric nerve of vertebrated animals; so that the author considers it probable that its functions are somewhat similar to this nerve; as has, indeed, been already conjectured by Straus-Dürckheim. Another division of nerves exist, which, from the principal branches derived from each abdominal plexus being always distributed among the tracheæ, near the spiracles, are perhaps analogous to the sympathetic system of nerves of the higher classes of animals.

When on the point of becoming a pupa, the nervous lobes above the œsophagus are found to be considerably enlarged, and to have assumed more of the appearance of a cerebral mass; while, at the same time, the nervous cords descending from them are shortened and thickened. The ganglia are brought nearer together, and their intervening cords lie between them in an irregular manner, the ganglia themselves being retained in their proper places in the segments by the nerves running transversely from them. The nerves of the antennæ are enlarged, and the optic nerves are become much thicker and shorter than before. There is a remarkable enlargement of the thoracic nerves, particularly of those sent to the wings; and those belonging to the posterior pair of legs are curiously convoluted within the thorax, preparatory to their being uncoiled at the instant of the change being made to the pupa state.

These changes are followed minutely through several stages of development. The author expects to be able to lay before the Society, in a subsequent paper, the results of his investigation of the remaining stages, and to offer some observations upon the manner in which these changes are effected.

The Society then adjourned over Whitsun Week to the 21st of June.

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June 21, 1832.

HIS ROYAL HIGHNESS THE DUKE OF SUSSEX, K.G.  
President, in the Chair.

Papers were read, bearing the following titles:

1. "An Account of the magnetical Experiments made on the Western Coast of Africa in 1830 and 1831," by Commander Edward Belcher of H.M.S. *Etna*. Communicated by the Rev. George Fisher, M.A. F.R.S., through Captain Beaufort, R.N. F.R.S.

The object of the inquiry specified in this paper, and of which the results are given in a tabular form, was to determine the relative horizontal intensities of terrestrial magnetism on the different parts of the coast of Africa which the author has been lately employed in surveying. The experiments were made with four needles constructed by Dollond on the model of those of Professor Hansteen; and the permanence of their magnetism during the voyage was verified by a comparison of trials made in England before and since the voyage. Errors arising from local causes of irregularity were guarded against by varying the places of observation at each station, and taking mean results.

2. "On the Use of a substance called the *False Tongue* in Foals," by Professor Sewell, of the Royal Veterinary College. Communicated by Sir Charles Bell, F.R.S.

The substance called the *false tongue*, which is thrown out from the mouth of the foal, either at the period of birth, or shortly before it, and to which various whimsical uses and virtues have been assigned, is conceived by the author to be requisite in this animal for the action of sucking, in consequence of its not respiring through