scopic sections, and teasing and dissection of the brain. The true striate ganglion is mapped off from the olfactory area and deep medulla by the peculiar formation which I have termed from its configuration the olfactory lyre. In front of the thalamus opticus the coronal connexions betwixt the striate ganglion, capsule, and cerebral cortex arise, *par excellence*, from that marginal aspect of the hemisphere at the vertex, which has been stated to be characterised by an extremely rich ganglionic formation—a region entering largely into the composition of Ferrier's motor realm. As the motor ganglia, however, retire outwards before the intervening thalami, their coronal connexions arise chiefly from the upper and outer aspect of the hemisphere, and still further back from the occipital cortex at their own level. Lastly, the median cortex of the upper limbic arc has throughout its course no connexion whatever with the striate ganglion or internal capsule.

VII. "On the Production of Transient Electric Currents in Iron and Steel Conductors by Twisting them when Magnetised or by Magnetising them when Twisted." By J. A. EWING, B.Sc., F.R.S.E., Professor of Mechanical Engineering in the University of Tokio, Japan. Communicated by Professor H. C. FLEEMING JENKIN, F.R.S., Professor of Civil Engineering in the University of Edinburgh. Received September 7, 1881.

(Abstract.)

An iron or steel wire subjected to longitudinal magnetisation by a surrounding solenoid gave when twisted a current along itself, which was observed by means of a ballistic mirror galvanometer in circuit with the wire. When the twist was that of a common screw the transient current flowed along the wire from the nominal N. to the nominal S. end. An opposite twist gave an oppositely directed current.

Reversal of the longitudinal magnetisation of the wire, when it was held twisted, gave a strong transient current, but mere interruption or reapplication of the magnetising current gave effects so relatively feeble as not to admit of measurement by the same appliances. When there was no torsion on the wire, reversal of the magnetising force gave no current. The first application of the magnetising force after the wire was twisted gave a current.

A permanently magnetised wire gave when twisted a transient current of the same sign as that described above (from N. to S. if the twist was that of a common screw).

The transient currents produced by twisting a magnetised wire had been noticed by Matteucci as early as 1858 (Wiedemann's "Galvanismus," ii, § 484), but the signs of the effects as observed by him were opposite to those observed by the author, and he did not observe any current when a twisted wire was magnetised. These discrepancies, as well as the evident connexion between the effects under consideration and the remarkable experiments recently described by Professor Hughes ("Proc. Roy. Soc.," vol. 31, p. 525), led the author to examine the subject at length. The results are described fully in the paper.

The statement of the numerical effects, which are at first sight very involved, is much facilitated by the conception that the combined effect of torsion and longitudinal magnetisation is to produce a state, provisionally called "polarisation," in the wire, which persists almost unchanged when the magnetising force is removed. This polarisation is measured by the transient currents which accompany its production. The normal polarisation for a given angle of twist and a given magnetising force is measured by half the ballistic deflection due to the transient current which appeared in the wire when the magnetising force was reversed at that angle of twist. In this way, curves connecting normal polarisation with angle of twist (within the elastic limit) are given for iron and steel. When the wire, after being normally polarised at $+\theta^\circ$, is twisted over to $-\theta^\circ$, the polarisation does not change to the full normal value for $-\theta^\circ$, but to something less, and this difference becomes still more apparent after several twistings from one side to the other. By dividing the full twist across into several steps, cyclical curves have been obtained, showing the relation of polarisation to torsion when the same magnetising force is kept up without interruption or reversal. These curves exhibit, in a striking manner, a persistence of previous state, such as might be caused by molecular friction. The curves for the back and forth twists are irreversible, and include a wide area between them. The change of polarisation lags behind the change of torsion. To this action, which is like that formerly described by the author as a characteristic of the curves connecting thermoelectric quality with longitudinal pull, in a paper on the "Effects of Stress on the Thermoelectric Quality of Metals," Part I, the author now gives the name *Hysterēsis* (ὑστέρησις, from ὑστερέω, to be behind). The modifying influence of "hysteresis" in the whole action is minutely described, and it is shown that the effects of hysteresis may be wiped out by subjecting the wire to mechanical vibration, and still more effectually by changing its magnetisation, which may be done either by breaking and re-making the magnetising current in the solenoid, or by reversing it.

A curve is given showing the relative effects of different values of the magnetising force up to 24 c.g.s. units, from which it appears that a maximum transient current is produced by reversal of the magnetising force when that force is about 15 c.g.s. units. It is probable that by increasing the magnetising force sufficiently the signs of the effects would be reversed.

When torsion is carried beyond the elastic limit the effects become somewhat diminished, and when a permanent twist has been given, and the wire allowed to come back to its new zero of stress, reversals of the magnetising force then give feeble transient currents whose signs are opposite to those of the currents given when the wire is still under torsion.

In steel the general effect is less than in iron, but steel exhibits hysteresis more strongly. With copper, silver, brass, german-silver, and platinum, no effects whatever could be observed. In all probability the effects are peculiar to the strongly magnetic metals.

Having described the experimental results, the author proceeds to point out their relation to the discoveries of Thomson, Villari, Wiedemann, and Hughes, and attempts to explain the production of transient currents by the setting up of a state of circular magnetisation in the wire. Sir W. Thomson's discovery that aelotropic stress developes an aelotropic difference of magnetic susceptibility in iron may be used to account for circular magnetisation by the combined effects of longitudinal magnetisation and torsion. In order that the effects should have the signs which they actually had, this explanation would require that the magnetising force must have been, in all cases, below the Villari critical value at which the effects of push and pull on magnetisation are reversed. It is shown that this may possibly have been the case, and that the same assumption would explain away some of the contradictions between the author's results and the earlier ones of Matteucci.

The paper concludes with some general considerations regarding the phenomenon to which the name "hysteresis" has been applied.

VIII. "The Prehensores of Male Butterflies of the Genera *Ornithoptera* and *Papilio*." By PHILIP HENRY GOSSE, F.R.S.

Received October 12, 1881.

(Abstract.)

Anatomists have long ago recognised, in insects, the existence of certain organs, intimately connected with the function of generation, yet perfectly distinct from the organs which perform the proper generative act. They are found only in the male sex; and are considered to have, as their sole use, the office of seizing and holding the female, during the act of coition.

In the detailed examination and comparison of these auxiliary