3. Destruction of the angular gyrus (*pli courbe*) causes blindness of the opposite eye, the other senses and voluntary motion remaining unaffected. This blindness is only of temporary duration, provided the angular gyrus of the other hemisphere remains intact. When both are destroyed, the loss of visual perception is total and permanent.

4. The effects of electrical stimulation, and the results of destruction of the superior temporo-sphenoidal convolutions, indicate that they are the centres of the sense of hearing. (The action is crossed.)

5. Destruction of the hippocampus major and hippocampal convolution abolishes the sense of touch on the opposite side of the body.

6. The sense of smell (for each nostril) has its centre in the subiculum cornu ammonis, or tip of the uncinate convolution on the same side.

7. The sense of taste is localized in a region in close proximity to the centre of smell, and is abolished by destructive lesion of the lower part of the temporo-sphenoidal lobe. (The action is crossed.)

8. Destruction of the optic thalamus causes complete anæsthesia of the opposite side of the body.

9. Ablation of the occipital lobes produces no effect on the special senses or on the powers of voluntary motion, but is followed by a state of depression and refusal of food, not to be accounted for by mere constitutional disturbance consequent on the operation. The function of these lobes is regarded as still obscure, but considered to be in some measure related to the systemic sensations. Their destruction does not abolish the sexual appetite.

10. After removal both of the frontal and occipital lobes, an animal still retains its faculties of special sense and the powers of voluntary motion.

The Society then adjourned over the Whitsuntide Recess, to Thursday, May 27th.

May 27, 1875.

JOSEPH DALTON HOOKER, C.B., President, in the Chair.

The Presents received were laid on the table, and thanks ordered for them.

Mr. I. Lowthian Bell and the Right Hon. Sir James Colvile were admitted into the Society.

The following Papers were read :—

I. "On the Liquation of Alloys of Silver and Copper." In a Letter addressed to the Secretaries of the Royal Society, by Col. J. T. SMITH, Madras Engineers, F.R.S. Received April 2, 1875.

It has occurred to me that it might be useful, as a guide to future inquiries, if I were to communicate, in reference to Mr. Roberts's paper "On the Liquation, Fusibility, and Density of certain Alloys of Silver and Copper," the results of some experiments made by me many years ago, the conclusion to which I was led being that the separation of the constituent parts of an alloy containing $91\frac{2}{3}$ per cent. of silver was not so much due to the rapidity or slowness with which the heat of the fluid metal was abstracted, as to the inequality affecting its removal from the different parts of the melted mass in the act of consolidation. Thus, if a crucible full of the melted alloy were lifted out of the furnace and placed on the floor to cool, the surface of the melted metal within it being well covered with a thick layer of hot ashes, the lower parts of the mass, after it had become solid, would be found to contain less silver in proportion than the upper surface.

If, on the other hand, the crucible were left to cool while imbedded in the furnace, the upper surface only being exposed to the air, except a thin layer to protect it from oxidation, then the lower parts would, after solidification, be found finer than the upper surface.

The variations here referred to are not considerable; but they sometimes become of practical importance, especially in those cases wherein, as the practice of the Indian Mints used to be, the value of a large mass of coins is calculated by the assay of samples cut from a representative bar, formed by melting together a number of the pieces selected from the mass.

Under certain conditions, different parts of a bar of 50 or 60 lbs. weight, cast horizontally, though composed of metal which, previous to being poured from the crucible, was perfectly homogeneous, might be found to vary as much as $1\frac{1}{2}$ or even 2 per cent. A much smaller difference than this might be the cause of considerable loss or gain in the valuation of a large invoice.

This peculiar action in the cooling of melted silver alloy first attracted notice by observation of the fact that coinage-ingots, which were about 15 inches high, $2\frac{1}{2}$ inches broad, and $\frac{5}{8}$ inch thick, cast in vertical iron moulds, were *uniformly* finer at their upper surface and coarser at their sides and bottom, especially at the corners.

It was at first thought possible that this might be due to the combustion of the oil employed to lubricate the moulds causing a sensible refinement of the metal, as the flames were frequently tinged by copper; but the same increased fineness of the tops of the ingots was found to exist when they had been poured into new iron moulds which had never

been lubricated, and also when burnt clay-moulds were used—the only case in which the phenomenon did not occur being when clay-moulds heated to redness were used, and the melted metal, instead of being poured in at the top, was caused to rise from the bottom upwards.

It was also found that, by using artificial means to cool the ingots from their upper surface only, the usual refinement was prevented, and the metal might be caused to become as inferior in quality at the top as, in the ordinary course, it would have been at the bottom.

In short, after many experiments, it was satisfactorily established that, whatever form the metal might take, the act of cooling caused a partial separation of the copper towards the surfaces from which the heat was abstracted, those parts of a bar or ingot being the finest which congealed the last.

The experiments here referred to were part of a series constituting a minute analysis of all the ordinary processes of a mint, with the view of discovering the unavoidable causes of the loss of precious metal, if any, and measuring their amount. In the course of the series more than 3700 assays were made of standard silver under various conditions; and the result was a demonstration of the fact that, with the exception of the very inconsiderable proportion left in the sweepings, which might be reduced, in silver coinage, to less than the twenty thousandth part, no loss whatever ought to occur; and hence that, if the quantity left in the "sweep" be ascertained and allowed for, every particle of silver intrusted to the Mint might be accounted for. This was actually done in 1854–55 by a coinage of more than 24 tons of silver into 3,458,000 pieces, when every ounce was reproduced, even taking into account the "turn of the scale" in assays given in favour of the purchaser.

But this close agreement between the receipts and deliveries of a mint requires not only an exact valuation of the bullion delivered to it, but also an equally exact valuation of the coins produced by it; and a somewhat curious result followed, as a corollary to the phenomenon above described—namely, that as the ingots showed a uniform difference in their various parts, so the laminated straps, formed by reducing the same ingots to one twelfth of their original thickness, show similar varieties, and the coins cut from the straps also.

A minute examination of all the various parts of laminated straps proved that there must be, in all cases, a difference, and in some cases an important one, in the fineness of the several parts of every coin, depending upon the position it occupied in the laminated strap from which it was cut. On a careful examination of the latter there was found to be, as in the ingots, a *systematic* variation between the finenesses of the parts rolled out from the top and bottom, and also between the sides and centre. In like manner, as the centre of an ingot is finer than the sides, so the central line of the strap formed from it is finer than the edges, and this to a degree frequently exceeding the allowed "remedy"

of 1 dwt. in the pound, or the $\frac{1}{220}$ part; and as the coins were cut in a double row down each strap, from top to bottom, it followed that every coin at one end of a transverse diameter touched the edge of the strap, or the coarser metal, and at the other end of the same diameter touched the interior or finer metal.

Thus the different parts of coins composed of standard silver vary essentially in fineness at different points of their circumference. If we were to call those parts of the coins north and south which, before they were cut, lay in the direction of the length of the strap, and those at right angles thereto east and west, it would give a correct idea of this peculiarity to say that there is no essential difference between the north and south sides of the piece, but a considerable one between the east and west, frequently amounting to $\frac{3}{4}$ dwt. in the lb., and in coins cut from certain portions of each strap to more than 1 dwt., or $\frac{1}{220}$, sometimes even to 2 dwts. From this circumstance it is evident that assays taken in the manner formerly used for the pyx examination of coins in some of the Indian Mints, by flattening one edge of a coin and cutting off a part of it for trial, may often lead to its unjust condemnation; and when the whole work of a mint of many thousands of pounds value is liable to rejection in consequence of an unfavourable report upon individual coins, which more than once occurred in Madras, it is obvious that a more correct method of ascertaining the average fineness of the whole outturn is very desirable.

For this purpose it was suggested that the samples for assay should be taken from the centre of each coin, or by a ring representing the whole circumference. But the true average fineness of the whole of a large silver coinage is much more easily and better arrived at by taking out a large number of the coins indiscriminately, and having melted them together into a perfectly uniform and homogeneous compound, proceed according to the following method, which was latterly adopted in India.

While the representative coins are undergoing fusion, a portion is taken out in its fluid homogeneous condition and granulated by pouring into cold water. A number of the granules are then selected for assay, and after being carefully dried and weighed, are wholly (that is, each granule in its integral state) dissolved in acid. The silver contained in them is afterwards separated as a chloride, and estimated in the usual way, the fineness of the mass being calculated by a comparison of the weight of pure silver thus ascertained with the original weight of the granules.

When carefully prepared, as above described, there is a near agreement in the finenesses of the single granules, which rarely differ from the mean fineness of the metal so much as two thousandths when individually assayed, more than half of them being found within one thousandth, and the average of a number consequently very close to the truth.