

southern race of savages have it all their own way to the extent that they do? Here, no doubt, our Government has been greatly at fault, for after all, humble local museums, *parvis componere magna*, are little British Museums, and there is no help provided by the government for any physical, or chemical, or astronomical students in the British Museum. But though our government is behind the age in London, the South Kensington authorities are alive to the weak point in the armour, as regards the provinces, and if a local society will only establish a Science Class, travelling collections of the most important modern scientific instruments are to be had for the asking; and we may hope that ere long there may be a model museum at South Kensington, doing for physical science what is done for it in Paris by the magnificent *Conservatoire des Arts et M^{ét}iers*, a museum in which the applications of Science, and the implements for the teaching of Science hold the first place.

FARADAY ON SCIENTIFIC LECTURING

AT a time when the lecture season is commencing, we believe we shall be doing good service by placing before those of our readers who are not already acquainted with them in Dr. Bence Jones' "Life of Faraday," the opinions of that great man on many points connected with lectures on Science.

They were written to a friend when Faraday was but 21 years of age, but we believe he would have changed little though he might have added much if he had revised them in his later years. He commences by explaining that:—

"The subject upon which I shall dwell more particularly at present has been in my head for some considerable time, and it now bursts forth in all its confusion. The opportunities that I have latterly had of attending and obtaining instructions from various lecturers in their performance of the duty attached to that office, has enabled me to observe the various habits, peculiarities, excellencies, and defects of each of them as they were evident to me during the delivery. I did not wholly let this part of the things occur to escape my notice, but when I found myself pleased, endeavoured to ascertain the particular circumstance that had affected me; also, whilst attending Mr. Brand and Mr. Powell in their lectures, I observed how the audience were affected, and by what their pleasure and their censure were drawn forth.

"On going to a lecture I generally get there before it begins; indeed, I consider it as an impropriety of no small magnitude to disturb the attention of an audience by entering amongst them in the midst of a lecture, and, indeed, bordering on an insult to the lecturer. By arriving there before the commencement, I have avoided this error, and have had time to observe the lecture-room."

He dwells on the form of the lecture-room, and then indicates how important a matter ventilation is.

"There is another circumstance to be considered with respect to a lecture-room of as much importance almost as light itself, and that is ventilation. How often have I felt oppression in the highest degree when surrounded by a number of other persons, and confined in one portion of air! How have I wished the lecture finished, the lights extinguished, and myself away merely to obtain a fresh supply of that element! The want of it caused the want of attention, of pleasure, and even of comfort, and not to be regained without its previous admission. Attention to this is more particularly necessary in a lecture-room intended for night delivery, as the lights burning

add considerably to the oppression produced on the body."

He then goes on:—

"Having thus thrown off, in a cursory manner, such thoughts as spontaneously entered my mind on this part of the subject, it appears proper next to consider the subject fit for the purposes of a lecture. Science is undeniably the most eminent in its fitness for this purpose. There is no part of it that may not be treated of, illustrated, and explained with profit and pleasure to the hearers in this manner. The facility, too, with which it allows of manual and experimental illustration, places it foremost in this class of subjects. After it come (as I conceive) arts and manufactures, the polite arts, belles lettres, and a list which may be extended until it includes almost every thought and idea in the mind of man, politics excepted. I was going to add religion to the exception, but remembered that it is explained and laid forth in the most popular and eminent manner in this way. The fitness of subjects, however, is connected in an inseparable manner with the kind of audience that is to be present, since excellent lectures in themselves would appear absurd if delivered before an audience that did not understand them. Anatomy would not do for the generality of audiences at the R. I. (Royal Institution), neither would metaphysics engage the attention of a company of schoolboys. Let the subject fit the audience, or otherwise success may be despaired of."

Now for the lecturer:—

"A lecturer may consider his audience as being polite or vulgar (terms I wish you to understand according to Shuffleton's new dictionary), learned or unlearned (with respect to the subject), listeners or gazers. Polite company expect to be entertained not only by the subject of the lecture, but by the manner of the lecturer; they look for respect, for language consonant to their dignity, and ideas on a level with their own. The vulgar—that is to say in general, those who will take the trouble of thinking, and the bees of business—wish for something that they can comprehend. This may be deep and elaborate for the learned, but for those who are as yet tyros and unacquainted with the subject must be simple and plain. Lastly, listeners expect reason and sense, whilst gazers only require a succession of words.

"These considerations should all of them engage the attention of the lecturer whilst preparing for his occupation, each particular having an influence on his arrangements proportionate to the nature of the company he expects. He should consider them connectedly, so as to keep engaged completely during the whole of the lecture the attention of his audience.

"I need not point out to the active mind of my friend the astonishing disproportion, or rather difference, in the perceptive powers of the eye and the ear, and the facility and clearness with which the first of these organs conveys ideas to the mind—ideas which, being thus gained, are held far more retentively and firmly in the memory than when introduced by the ear. 'Tis true the ear here labours under a disadvantage, which is that the lecturer may not always be qualified to state a fact with the utmost precision and clearness that language allows him and that the ear cannot understand, and thus the complete action of the organ, or rather of its assigned portion of the sensorium, is not called forth; but this evidently points out to us the necessity of aiding it by using the eye also as a medium for the attainment of knowledge, and strikingly shows the necessity of apparatus.

"Apparatus, therefore, is an essential part of every lecture in which it can be introduced; but to apparatus should be added, at every convenient opportunity, illustrations that may not perhaps deserve the name of apparatus and of experiments, and yet may be introduced with considerable force and effect in proper places. Diagrams, and tables too, are necessary, or at least add in an

eminent degree to the illustration and perfection of a lecture. When an experimental lecture is to be delivered, and apparatus is to be exhibited, some kind of order should be observed in the arrangement of them on the lecture table. Every particular part illustrative of the lecture should be in view, no one thing should hide another from the audience, nor should anything stand in the way of or obstruct the lecturer. They should be so placed, too, as to produce a kind of uniformity in appearance. No one part should appear naked and another crowded, unless some particular reason exists and makes it necessary to be so. At the same time, the whole should be so arranged as to keep one operation from interfering with another. If the lecture-table appears crowded, if the lecturer (hid by his apparatus) is invisible, if things appear crooked, or aside, or unequal, or if some are out of sight, and this without any particular reason, the lecturer is considered (and with reason too) as an awkward contriver and a bungler.

"The most prominent requisite to a lecturer, though perhaps not really the most important, is a good delivery; for though to all true philosophers science and nature will have charms innumerable in every dress, yet I am sorry to say that the generality of mankind cannot accompany us one short hour unless the path is strewn with flowers. In order, therefore, to gain the attention of an audience (and what can be more disagreeable to a lecturer than the want of it?), it is necessary to pay some attention to the manner of expression. The utterance should not be rapid and hurried, and consequently unintelligible, but slow and deliberate, conveying ideas with ease from the lecturer, and infusing them with clearness and readiness into the minds of the audience. A lecturer should endeavour by all means to obtain a facility of utterance, and the power of clothing his thoughts and ideas in language smooth and harmonious, and at the same time simple and easy. His periods should be round, not too long or unequal; they should be complete and expressive, conveying clearly the whole of the ideas intended to be conveyed. If they are long, or obscure, or incomplete, they give rise to a degree of labour in the minds of the hearers which quickly causes lassitude, indifference, and even disgust.

"With respect to the action of the lecturer, it is requisite that he should have some, though it does not here bear the importance that it does in other branches of oratory; for though I know of no species of delivery (divinity excepted) that requires less motion, yet I would by no means have a lecturer glued to the table or screwed on the floor. He must by all means appear as a body distinct and separate from the things around him, and must have some motion apart from that which they possess.

"A lecturer should appear easy and collected, undaunted and unconcerned, his thoughts about him, and his mind clear and free for the contemplation and description of his subject. His action should not be hasty and violent, but slow, easy, and natural, consisting principally in changes of the posture of the body, in order to avoid the air of stiffness or sameness that would otherwise be unavoidable. *His whole behaviour should evince respect for his audience, and he should in no case forget that he is in their presence.* No accident that does not interfere with their convenience should disturb his serenity, or cause variation in his behaviour; he should never, if possible, turn his back on them, but should give them full reason to believe that all his powers have been exerted for their pleasure and instruction.

"Some lecturers choose to express their thoughts extemporaneously immediately as they occur to the mind, whilst others previously arrange them, and draw them forth on paper. Those who are of the first description are certainly more unengaged, and more at liberty to attend to other points of delivery than their pages; but as

every person on whom the duty falls is not equally competent for the prompt clothing and utterance of his matter, it becomes necessary that the second method should be resorted to. This mode, too, has its advantages, inasmuch as more time is allowed for the arrangement of the subject, and more attention can be paid to the neatness of expression.

"But although I allow a lecturer to write out his matter, I do not approve of his reading it; at least, not as he would a quotation or extract. He should deliver it in a ready and free manner, referring to his book merely as he would to copious notes, and not confining his tongue to the exact path there delineated, but digress as circumstances may demand or localities allow.

"A lecturer should exert his utmost effort to gain completely the mind and attention of his audience, and irresistibly to make them join in his ideas to the end of the subject. He should endeavour to raise their interest at the commencement of the lecture, and by a series of imperceptible gradations, unnoted by the company, keep it alive as long as the subject demands it. No breaks or digressions foreign to the purpose should have a place in the circumstances of the evening; no opportunity should be allowed to the audience in which their minds could wander from the subject, or return to inattention and carelessness. A flame should be lighted at the commencement, and kept alive with unremitting splendour to the end. For this reason I very much disapprove of breaks in a lecture, and where they can by any means be avoided, they should on no account find place. If it is unavoidably necessary, to complete the arrangement of some experiment, or for other reasons, leave some experiments in a state of progression, or state some peculiar circumstance, to employ as much as possible the minds of the audience during the unoccupied space—but, if possible, avoid it.

"Digressions and wanderings produce more or less the bad effects of a complete break or delay in a lecture, and should therefore never be allowed except in very peculiar circumstances; they take the audience from the main subject, and you then have the labour of bringing them back again (if possible).

"For the same reason (namely that the audience should not grow tired), I disapprove of long lectures; one hour is long enough for anyone, nor should they be allowed to exceed that time.

"A lecturer falls deeply beneath the dignity of his character when he descends so low as to *angle for claps*, and *asks for commendation*. Yet have I seen a lecturer even at this point. I have heard him causelessly condemn his own powers. I have heard him dwell for a length of time on the extreme care and niceness that the experiment he will make requires. I have heard him hope for indulgence when no indulgence was wanted, and I have even heard him declare that the experiment now made cannot fail from its beauty, its correctness, and its application, to gain the approbation of all. Yet surely such an error in the character of a lecturer cannot require pointing out, even to those who resort to it; its impropriety must be evident, and I should perhaps have done well to pass it.

"Before, however, I quite leave this part of my subject, I would wish to notice a point in some manner connected with it. In lectures, and more particularly experimental ones, it will at times happen that accidents or other incommencing circumstances take place. On these occasions an apology is sometimes necessary but not always. I would wish apologies to be made as seldom as possible, and generally, only when the inconvenience extends to the company. I have several times seen the attention of by far the greater part of the audience called to an error by the apology that followed it.

"An experimental lecturer should attend very carefully to the choice he may make of experiments for the illus-

tration of his subject. They should be important, as they respect the science they are applied to, yet clear, and such as may easily and generally be understood. They should rather approach to simplicity, and explain the established principles of the subject, than be elaborate and apply to minute phenomena only. I speak here (be it understood) of those lectures which are delivered before a mixed audience, and the nature of which will not admit of their being applied to the explanation of any but the principal parts of a science. If to a particular audience you dwell on a particular subject, still adhere to the same principle, though perhaps not exactly to the same rule. Let your experiments apply to the subject you elucidate, do not introduce those which are not to the point.

"Though this last part of my letter may appear superfluous, seeing that the principle is so evident to every capacity, yet I assure you, dear A., I have seen it broken through in the most violent manner—a mere alehouse trick has more than once been introduced in a lecture, delivered not far from Pall Mall, as an elucidation of the laws of motion.

"Neither should too much stress be laid upon what I would call small experiments, or rather illustrations. It pleases me well to observe a neat idea enter the head of a lecturer, the which he will immediately and aptly illustrate or explain by a few motions of his hand—a card, a lamp, a glass of water, or any other thing that may be by him; but when he calls your attention in a particular way to a decisive experiment that has entered his mind, clear and important in its application to the subject, and then lets fall a card, I turn with disgust from the lecturer and his experiments. 'Tis well, too, when the lecturer has the ready wit and the presence of mind to turn any casual circumstance to an illustration of his subject. Any particular circumstance that has become table-talk for the town, any local advantages or disadvantages, any trivial circumstance that may arise in company, give great force to illustrations aptly drawn from them, and please the audience highly, as they conceive they perfectly understand them.

"Apt experiments (to which I have before referred) ought to be explained by satisfactory theory, or otherwise we merely patch an old coat with new cloth, and the whole (hole) becomes worse. If a satisfactory theory can be given, it ought to be given. If we doubt a received opinion, let us not leave the doubt unnoticed, and affirm our own ideas, but state it clearly, and lay down also our objections. If the scientific world is divided in opinion, state both sides of the question, and let each one judge for himself, by noticing the most striking and forcible circumstances on each side. Then, and then only, shall we do justice to the subject, please the audience, and satisfy our honour, the honour of a philosopher."

We trust that during the ensuing session, these opinions of Faraday may be in the minds of every lecturer on Science.

ECKER'S "CONVOLUTIONS OF THE BRAIN"

On the Convolution of the Human Brain. By Dr. Alexander Ecker, Professor of Anatomy and Comparative Anatomy in the University of Freiburg, Baden. Translated, by permission of the author, by John C. Galton, M.A., Oxon., M.R.C.S., F.L.S., &c., &c. Translator of Prof. Roser's "Manual of Surgical Anatomy," &c. (London: Smith, Elder, & Co., 1873.)

OF late years the topographical anatomy of the surface of the brain has deservedly attracted considerable attention; and the recent able investigations of Huxley,

Jackson and Ferrier have shown the importance, in fact the absolute necessity of a correct and generally recognised description and enumeration of the cerebral convolutions. Mr. Galton therefore deserves the thanks of all interested in the subject, for having introduced to us in English dress this valuable monograph by Prof. Ecker of Freiburg.

There are two methods by which the complex human brain may be analysed and reduced to its simpler elements, two paths that lead to the same goal; the one is by a careful examination and comparison of the brains of the lower animals, and especially of apes, which latter in their higher groups present a "sketch map" as it were, which is filled in and completed in man only. This has been carried out with great success by Gratiolet primarily, and in England it has been followed amongst others by Huxley, Marshall, Flower and Rolleston. The other method is by tracing the development of the fetal brain, and observing which fissures, and therefore which convolutions, are the first to make their appearance, and so are of primary importance, and how these subsequently undergo farther evolution and complication. Tiedemann and Reichert have hitherto been our authorities on this point, and it is by this method chiefly that Prof. Ecker arrives at his conclusions.

In this country the admirable little treatise of Prof. Turner has been welcomed and the classification therein adopted is now generally accepted, and taught in several of our anatomical schools. Prof. Ecker in the main follows Prof. Turner, although the nomenclature, of course, is that of the German school, and so differs occasionally from ours, which follows rather Gratiolet and the French school. The synonyms are, however, in all cases faithfully given.

The author insists upon the essential difference between the Sylvian fissure and the other sulci, these being mere indentations of the cortex, whilst that is formed by the folding of the temporo-sphenoidal lobe on the fore part of the brain during its development. The anterior or ascending branch of this fissure is here correctly described as being short and arrested by the hinder end of the lower frontal convolution, whilst that described as such by Prof. Turner is a distinct sulcus (præcentral) terminating close behind the ascending ramus. The gyrus connecting the inferior and ascending frontal (anterior central) convolutions is always present, although it is not always superficial, being occasionally concealed by the over-lapping of those convolutions. Instead of the orbital lobule usually described on the under surface of the frontal lobe, the three frontal convolutions are traced round the apex to the orbital surface. The narrow ridge internal to the olfactory sulcus (gyrus rectus) is regarded as the continuation of the first, the gyrus between that and the orbital sulcus as the second, and outside the last as the third. We should rather consider all internal to the orbital sulcus as first frontal, which is grooved by a special olfactory sulcus, and the second as ending posteriorly between the anterior branches of the tri-radiate orbital sulcus. The marginal convolution is regarded as simply the inner surface of the superior frontal.

In the parietal lobe the supra-marginal and angular convolutions are amongst the most difficult in the brain to indicate and circumscribe. Prof. Ecker describes the