

*On Some of the Newer Aspects of the Pathology of Insanity :
A Demonstration, with Specimens prepared by W. LLOYD
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(Abstract.)

After noting the importance not merely of the study of the origin, evolution, and structure of the central nervous system, but the importance of the attempt to correlate these with the actual life-activities of the organism in both health and disease, Dr. Andriezen showed how the neglect of alienists to follow and work up these investigations entailed their falling back and separation from the advancing army of neurological workers. He hoped that, with the awakening of the spirit of inquiry and scientific research in our asylums, that reproach might be wiped away, and that an attempt would be made to study and localize the lesions in the insanities, making use of all the methods available—neurological, psychological, pathological, sociological, and experimental.

Dr. Andriezen referred at some length to the labours of Hughlings Jackson, Fritsch and Hitzig, and Griesinger, and the more recent histological work of Golgi and Cajal. He then dwelt upon the doctrine of the "neuron" as the basis of nerve-function, and the inter-relations of the neurons within the central nervous system, giving illustrations from spinal cord and cerebrum. Referring especially to the cortex, he observed that, when the conditions described for the cortical type of nerve-mechanism are realized, the foundations are laid for possibilities in nerve-activity which may grow into the most elaborate forms of movement and conduct. For the whole complex of cortical neurons is so disposed that they may deal with the nerve-currents of the various specific incoming sensory excitations, weaving and elaborating out of these higher and more complex sensations, which we designate psychical states—mental acts of cognition and recognition, comparison, discrimination, judgment—ultimately issuing in the reactions of conduct. The cortical areas are themselves complex structures (layers of cortical cells, groupings and cell-clusters, complexes of associated unilateral and bilateral clusters), yet in each of these the individual neuron preserves not only its integrity as distinct from other neurons, but also its three-fold character as a nutritive and dynamical doubly-connected apparatus;

and we have here the elaboration of energy carried highest in the whole organic world. The cortex is not to be looked upon merely as only the meeting place, so-to-speak, of the various sensations which fall upon the organism from the external world. For the organism itself reacts to these, and these reactions—their quality, extent, variety, etc.—themselves excite sensory fibres which, passing from the various reacting tissues of the body (*e.g.*, kinæsthetic impressions), also reach the cerebral cortex. The cerebrum, as a whole, is thus a double representative organ, in which both the environment and the body of the organism are represented, the two sides of which organ can not actually or speculatively be separated. Thus the importance of a correct appreciation of the cortical type of nerve-mechanism cannot be over-estimated; here is the anatomico-physiological basis for every form and quality of sensorial, psycho-motor, and psychical life.

In the human brain, he said, his investigations were made with Golgi's method in the first place, and with a variety of others which would be duly cited as occasions arose. In this department Dr. Andriezen observed that he was at present able to quote no observations except his own, for nearly all workers (Golgi, Cajal, Retzius, etc.) had mainly restricted themselves to the brains of young and new-born animals. Indeed, Golgi's method and its modifications were mainly worked out on those lines; his own results, therefore, stand isolated in so far as they lack at present either co-workers or confirmation. The classification of brain structures which he proposes, and it seems to be a natural one, is into three groups of elements—(1) the neurons, (2) nutritive elements (lymphatic, vascular, secretory, etc.), (3) protective elements, and perhaps, (4) the ground substance.

Passing to the consideration of the neurons (nervous elements), Dr. Andriezen referred to the classification adopted by Meynert and Obersteiner. He himself proposed to classify these elements of the cortex into four layers, the second of which is different from and not co-extensive with that of these authors, *viz.*: First, molecular layer; second, ambiguous layer; third, "long pyramidal" layer; fourth, mixed pyramidal or polymorphic layer (including Meynert's granule *plus* spindle layers). But this classification is not based upon the external shape of the cell-body; it has a widely different significance, which was not seen or appreciated by Meynert, and which only the Golgi method of investigation, coupled with the comparative study of the

cortex in vertebrates *below* mammals, could adequately enable us to realize. (See Figs. 1 to 4.)

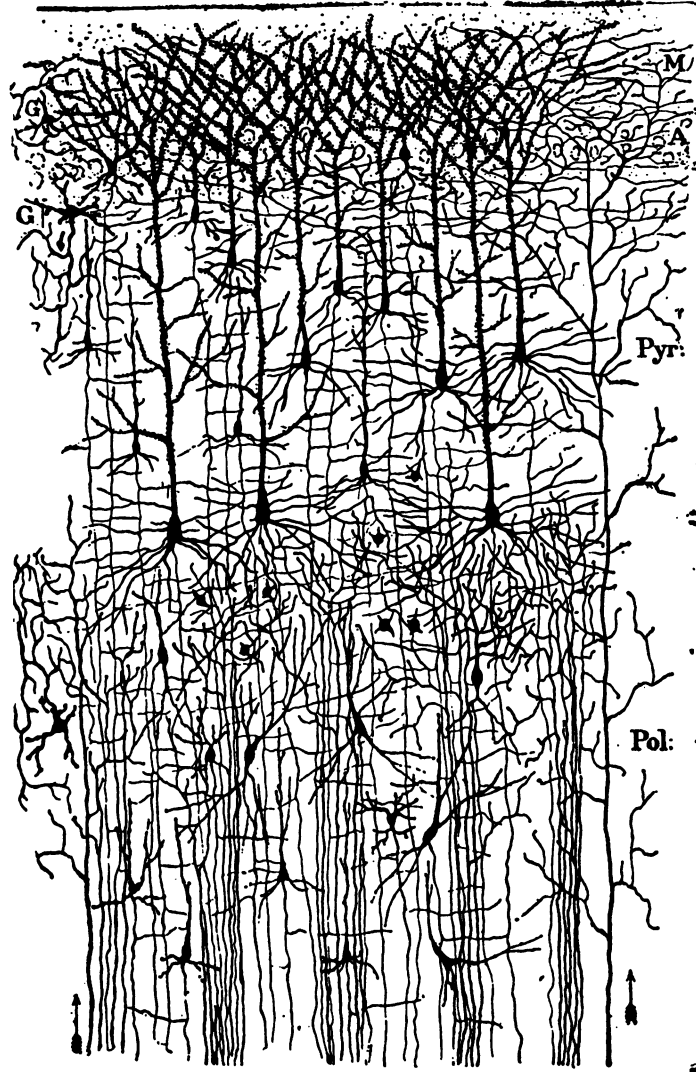


FIG. 1.
Structure of cerebral cortex in man (semi-diagrammatic) showing the nervous elements only.
M. Molecular layer. A. Ambiguous layer.
Pyr. Pyramidal layer (long pyramidal cells). Pol. Polymorphic layer.

These layers were described in detail, and especial attention drawn to the fact that, with the newer methods of investigation, ten or more different structures can be recognized in the "molecular layer," which in Meynert's time was thought to be composed chiefly of basis-substance and connective-tissue elements.

Dr. Andriezen then proceeded to give a detailed account of his work, illustrated by the specimens he had prepared. He then passed on to the consideration of the psychical accompaniments of nervous activity. The nervous excitation arriving at the cortex *via* the olfactory, optic, fillet, or other upward projection system, spreads out in the

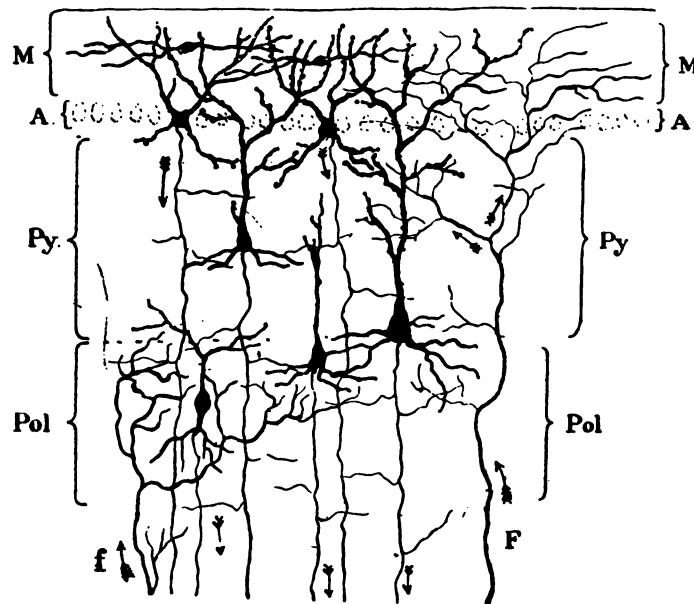


FIG. 2.

Diagram to illustrate the neuro-protoplasmic connections in the cerebral cortex.

M. Molecular layer or field of association between the subjacent ambiguous long pyramidal cells on the one hand, and the distribution of incoming nerve-fibres (projection, etc.) on the other. One such nerve-fibre (*F*) is a projection fibre, another (*f*) an association fibre.

A. Ambiguous layer.

Py. Pyramidal layer. This figure shows two "long pyramidal cells," and their apical distributions in the molecular layer.

Pol. Polymorphic layer. Two cells (a short pyramidal and a fusiform cell) are shown.

The arrows indicate the directions of the nerve currents.

molecular and sub-molecular layers of the primary cortical area which it enters, where these fibres terminate. Here it affects two intrinsic sets of cortical elements, the ambiguous and the long pyramidal. These cortical elements are thereby roused to activity, and discharge in their turn. The *excitation, rise of tension, and discharge* of the conjoint ambiguous-pyramidal elements thus affected is the "nervous process," the psychological counterpart or accompaniment of which is a sensation aroused in the mind. Such a sensation may be *faint or vivid* in intensity, according to the intensity of the cortical reaction in the primary cortical centre. Similarly, according to the locality and peripheral connections of the centre, the sensation may be *visual, tactile, gustatory, olfactory, kinæsthetic, etc.* That such an excitation of a primary sensory area of the cortex will be accompanied by its appropriate psychological sensation is now a well-established neurological fact. It is now thirty years since Hughlings Jackson taught that certain forms of epilepsy with local motor disturbances were almost uniformly due to organic disease of some kind, situated in the Rolandic region of the brain—a view comparatively neglected then, but which the revelations of the experimental school of workers (Fritsch and Hitzig in 1870, Ferrier, Munk, etc., 1872, *et seq.*) have accentuated. And following these a brilliant school of clinico-pathological investigators, such as Charcot (Charcot et Pitres, *Localizations Cerebrales*, "Revue de Medicine," 1879-83), Nothnagel ("Topische Diagnostik der Gehirn-Krankheiten," 1879), Wernicke ("Gehirn-Krankheiten," 1881), Ferrier ("Localization of Brain Disease," 1878), Allen Starr (*Cortical Lesions of the Brain*, "American Journal of Mental Science," 1884), and others have by their researches confirmed the truth of the Jacksonian doctrine, while contributing important additional details. By such work not only have the various centres, which incite to muscular movements (kinæsthetic centres) of the organism, been localized in the brain cortex, but also other important centres, which have to do with the perception of gustatory, olfactory, visual, and auditory excitations, have each and all of them been similarly localized. Thus the cortical field for the Jacksonian epilepsies has been considerably extended, and now includes all the areas just mentioned. So it happens that, just as when a kinæsthetic centre is aroused the psychological counter-process that is evoked is a sensation (cutaneous sensation) referred to this or that peri-

peral movement which is in relation to the said centre, so, if the focal discharge be stronger, it issues downwards *viá* the pyramidal cells to the bulbo-spinal motor centres, producing thereby movements of the face, tongue, hand, or foot, according to the site and locality of the cortical epileptogenous focus. And similarly with a focal discharge occurring in this or that special-sense area, we have aroused its psychical accompaniment, viz., a hallucination of this or that special-sense; gustatory, visual, olfactory, auditory, etc. We have thus kinæsthetic epilepsies, we have also special-sense epilepsies, and—to complete the picture—we may add that we have psychical epilepsies. Not that the other epilepsies are non-psychical, for each and every one of them has its own psychical counterpart, viz., a *feeling* of cutaneous excitation, or of a peripheral movement, or the excitation of one or other *special sense*. But in the psychical epilepsies in the stricter sense of the word there is a disturbance of a more distinctively psychical nature, consisting of a moderate mental disturbance (bewilderment, sudden loss of memory, stupidity and a dreamy state, or a reminiscence of certain ideas), or of a more serious violent and maniacal excitement, an intense furor in which the patient may do the wildest and most terrible deed, murder or even suicide, as the result of the intense cerebral (psychical) discharge affecting the higher regions of the brain. We cannot exclude this form, viz., psychical epilepsy, from the category of the other epilepsies; our aim and object should rather be, in following the light we now have, to work out its localization in the brain, to ascertain what area or what set of cortical elements is the seat of such epileptic discharge.

The comparative evolution of the cortex in higher vertebrates was next discussed; and especially the growth in the complexity of structure in the amphibian, reptile, and mammal. It was shown that *pari passu* with the growth and perfection of movement, there is a parallel growth of protoplasmic processes and collaterals of the nerve-cells in the Rolandic cortex; the same applied to the special sense areas, and full details with specimens were adduced to show that the qualitative elaboration of structure was the organic basis for the facts of psycho-genesis. Quality (*i.e.*, extent and complexity) of cerebral organization was the real basis of intellectual capacity, and thus a brain small in size (like that of Gambetta) may from its high intrinsic elaboration be able to subserve more varied, extensive, and

multiform activities in life and thought than others of greater size but grosser organization can.

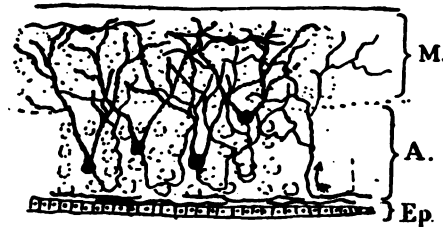


FIG. 3.

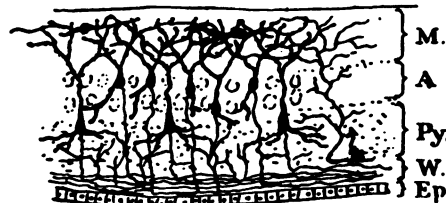


FIG. 4.

FIG. 3.—Cortex of Frog's Brain (semi-diagrammatic).

FIG. 4.—Cortex of Lizard's Brain (semi-diagrammatic).

M. Molecular layer.

A. Ambiguous layer.

Py. Pyramidal cell-layer (only in Lizard's Brain).

W. White matter.

Ep. Epithelial layer (ependyma).

(The arrow in both figures denotes a nerve-fibre coming to the cortex from elsewhere, and being distributed chiefly to the molecular layer.)

The author next proceeded to illustrate the law of pathogenesis, selecting for this purpose the insanities of chronic alcoholism, and dealing especially with the clinical and psychological phenomena of *amnesia*, incapacity for *attention*, easily induced *fatigue*, *insomnia*, and muscular *weakness and tremor*, which patients exhibit in various grades. He showed the results of his pathological investigations, carried out by Golgi's methods. Special stress was laid on the alteration and destruction of the fine naked collaterals and nerve-terminals, shown by the author's specimens to exist in the molecular layer, and also the swelling and softening of the very minute protoplasmic granules attached to the special processes in the superficial quarter of the cortex. These changes the author would class chiefly as dynamical, because they affected the nervo-protoplasmic plexuses only, in the

first place—such nervo-protoplasmic plexuses being the “field of association” between cortical neuron and cortical neuron, or between cortical neuron and the nerve-fibres (sensory pathways) arriving in the cortex from the outside. Co-extensive with those dynamical changes, there were other changes within the cell-body and nucleus of the cortical cells which could be with justice spoken of as nutritive changes, changes which hitherto had been shown to exist in other cells (muscular, glandular, etc.), but which a sort of pseudo-sanctity, which had hitherto hedged in the nerve-cell, had hindered us from sufficiently recognizing, or when recognized, had deterred us from attempting to correlate with clinico-psychological manifestations. He was glad to believe that the present and younger generation of workers felt that that was a state of things which was passing away. A detailed account, with Golgi and other specimens showing the changes in the polymorphic elements, was here given, both dynamical and nutritive changes being correlated with the clinical symptoms. After further dealing with the structure of the non-nervous elements which also entered into the composition of the brain, viz., (a) the *nutritive mechanisms* (vascular and lymphatic structures), and (b) the *protective mechanisms* (the perivascular and the superficial condensation systems of neuroglia-fibres, the ependyma formations, and the diffuse neuroglia fibre-system), the author stated that these are also involved in the alcoholic insanities; and that the earliest to suffer are generally the intrinsic cortical nerve-elements. He stated that the earliest dynamical changes in the nervo-protoplasmic plexuses which he had described, and which were generalized and extensive over various cortical areas, were to be correlated with the *diminished sensitiveness and alertness of the alcoholic to incoming sensory impressions*, and similarly a diminution of *spread of the excitation from one area to associated areas*. He would partly correlate this, plus the early intuitive changes described below, with the *amnesia*, and the *slowness of reaction time* of the alcoholic. He held that the early nutritive changes in the cell-body and nucleus, e.g., swelling and indistinct staining of the intra-cellular chromatin rods (as shown by Nissl’s methylene blue method, or by staining in toluidine after fixation and hardening in sublimate and alcohol), and the intra-nuclear *coarseness and increased intensity* of staining (as also shown by the second of these methods), coupled with the recent experimental observations on fatigue in nerve-cells (a subject he would not enter

further into, as Dr. Batty Tuke would deal with it very fully in his demonstration), indicate that the cell-protoplasm and nuclei in alcoholism are the seat of a distinct series of nutritive changes. He thought that the earliest change he had as yet recognized approximated to what Dr. Batty Tuke designated the fourth stage of nutritive impairment in his *Morison Lectures* ("On the Insanity of Over-Exertion of the Brain," 1894, Ch. II.), viz., that obtained experimentally after about eighteen hours' continuous stimulation of the nerve-cell. At this stage the cell-protoplasm is so much damaged that its capacities for repair (rebuilding, anabolism) are greatly diminished. He would correlate this with the *chronic insomnia* of early alcoholic insanity. A more *rapid* derangement of nutrition in the nerve-cells would underlie the more acute early manifestations, viz., sleeplessness combined with mild delirium. For there are two things in the nutritive sphere to consider, viz., (a) the intra-cellular (stored) nutritive material, built up during sleep, and available during waking activities; and (b) the lymphatic food-material circulating in the lymph which bathes the nerve-cell, but which the cell can *assimilate only at a certain slow rate*. The undue stimulation of the nerve-cell by excess of any sort (over-exertion, alcoholic excess, sexual excess, etc.), gradually exhausts it of the intra-cellular (stored) nutritive material. Beyond a certain stage, therefore (optimum stage), there is a gradual decline of the average nerve-tension within the cell. The decline of such "nerve-tension" (using the valuable phrase of Mercier) is the *nervous condition of which the feeling of fatigue is the psychical accompaniment*. In health, therefore, the individual now sleeps, and the nerve-substance is rebuilt and tension restored. In the alcoholic subject, however, the fatigued nerve-cell is the subject of stimulation by the alcohol still circulating in the blood till sufficiently eliminated by the kidneys, etc. The nerve-cell is thus stimulated beyond its average limits, and at a greater pace than in health. The result is a quickness, rapidity, and overflow of ideas and action at first, and then a rapid development of fatigue and drowsiness, *i.e.*, exhaustion of the nerve-cell. But when the poisoning is greater in degree, the fatigued nerve-cell is further damaged. It is fatigued to such an extent that the individual falls down helpless and drowsy. But it is not recuperating, rebuilding its intra-cellular nutritive store. The alcoholic poison is still circulating in the system in sufficient amount to excite the fatigued nerve-cell; the

drowsy down-struck patient is in a state of mild delirium; subconscious, but with a continuous and distressing whirl and turmoil of nerve-current throughout the whole brain.

Such a mild delirium lasting for a few hours produces marked brain exhaustion; a repetition of such attacks of insomnia, with mild delirium, after a time damages the nerve-cell to such an extent that its nutrition is *permanently* altered. Co-extensive with such feeble nutritive power are the dynamical changes in the nervo-protoplasmic apparatus we have before mentioned. The preponderance of this or that set of changes in this or that cortical region determines the local manifestations of chronic alcoholism. He had elsewhere ("Brain," 1894) correlated these more fully with clinical and psychological manifestations; there it need only be stated, in conclusion, that the whole series of early changes, viz., *insomnia, with mild delirium, amnesia, incapacity for attention and mental exertion, easily induced fatigue, and the muscular weakness and tremor* have a demonstrable pathological basis in which nutritive and dynamical changes are progressive; further, that the repeated insomnias with more or less frequent attacks of delirium or depression with confusion of ideas which mark the onset of so many of the other insanities (non-alcoholic), all combine to show us that these also pass through prodromal stages comparable to those of chronic alcoholism. He ventured to think that the progress of psychiatric medicine would not be served by calling the insanities "functional" diseases; it turned our eyes away from the morbid nutritive and structural changes underlying a great many of them, and which with more fortunate methods of investigation at home and abroad we are now more and more able to recognize where our predecessors failed. There can be no doubt that neurological science, especially within the decades following 1870, has been steadily narrowing the area of our ignorance concerning the whole host of diseases of the brain and nervous system, and he felt sure that year by year we would be able to base the symptoms, the prognosis, and the treatment of the insanities more firmly on the only foundations on which they can be based, viz., a more definite and extended knowledge of the anatomy, the physiology, and the pathology of the brain and nervous system.*

* For further account of Dr. Andriezen's researches, illustrated by drawings and photographs, see "Brain" (winter, 1894).

A Demonstration of the Abnormalities of the Brains of two Microcephalic Idiots. By D. J. CUNNINGHAM, M.D., D.C.L., Professor of Anatomy in the University of Dublin, and TELFORD SMITH, M.D., Royal Albert Asylum.

This demonstration was given in Professor Cunningham's class-room, and a full description of the clinical and pathological aspects of the cases will be given in due course.

A Demonstration Illustrating the Development of the Cerebral Sulci in the Human Brain. By D. J. CUNNINGHAM, M.D., D.C.L., Professor of Anatomy in the University of Dublin.

Professor Cunningham showed with the lantern, photographs of a series of beautiful preparations of foetal brains, pointing out the order and relations of the appearance and disappearance of the transitory sulci, and of the appearance and development of certain of the more important permanent sulci. The work shown was a continuation of Dr. Cunningham's well-known researches in cortical topography and development, and will no doubt soon be published in monograph form. The demonstration was most lucid, and Dr. Cunningham received the thanks of the members for this interesting exhibition of the work he is doing in this department.

In this and the other lantern demonstrations given at the School of Physic, Professor Cunningham's assistant, Dr. Dixon, was so kind as to attend to the management of the apparatus, and contributed very materially to the success of the exhibitions by the skill with which he conducted his share of the work. The kindness and helpfulness of everyone connected with the School must be gratefully acknowledged. The Association was received though the Session was still going on, and though the medical degree examinations were in full swing, so that the inconvenience occasioned to the professors and demonstrators must have been considerable, but the strangers were certainly not made conscious of it.

REST AND EXERCISE IN THE TREATMENT OF ACUTE INSANITY.

Dr. CLOUSTON read a paper on rest and exercise in the treatment of acute insanity.

Dr. BATTY TUKE—I think this question so important that it cannot be discussed in a few minutes. It opens up such a wide field that I think that the best course would be to move an adjournment of the debate, so that it may be more fully dealt with.

The PRESIDENT—I am, of course, in the hands of the Association with regard to the question of adjournment which has been suggested by Dr. Batty Tuke. But I beg to say that we have on the programme for to-morrow a discussion of the very first importance, and we have four papers, excluding that of Dr. Elkins, who has asked me to allow him to withdraw. Therefore, I can hardly see my way to hold out a hope of allowing the present discussion to be deferred, unless there is a very strong wish expressed to that effect by the Association.

Dr. BATTY TUKE—The discussion opens up the whole question of anatomy and physiology. In the course of a series of lectures recently delivered in Edinburgh, I devoted my attention entirely to one class, namely, the class of incipient insanity due to over-exertion. I went as far as my light, into the pathology and physiology of the condition. I hold that when the brain is in a diseased condition you must apply to it the same means of treatment which we apply to any other organ of the body. And the treatment which I find most efficient is perfect rest. I wish it were the practice of our specialty, as it is the practice of other specialties, to publish long series of cases. I wish it were possible,

because, if it were, I think that I could produce a series of well authenticated cases in support of my contention.

Dr. MERCIER—An arrangement has been made to adjourn this meeting to Bristol, when it will be resumed in July, and the matter might be re-opened then.

The PRESIDENT—A more important subject in practical therapeutics has not come before the meeting, and I think that the suggestion of Dr. Mercier is a very important one.

Dr. LAWLESS—It would be hard on some who might not find it convenient to attend at Bristol to adjourn the matter to that meeting, and I suggest that we should adjourn the debate to some other period of this meeting.

Dr. NICOLSON—It is unfortunate that time does not permit a full discussion of the views which have been promulgated, but if the matter is allowed to stand over until next year, Dr. Batty Tuke will raise the question by reading a paper himself, so that we may be in a position to go into it much more fully. I beg to move that the matter be adjourned until the next Annual Meeting.

Dr. URQUHART, in seconding the motion, said that they would all agree that such a discussion would prove of practical importance, and that they would await the results of Dr. Batty Tuke's experience with deep interest.

The PRESIDENT—I don't see that I could accept this motion proposed by the President-elect and seconded by the Secretary for Scotland, because I think that if one member—especially a member of the distinction of Dr. Clouston—brings forward a subject, it is not treating him with proper courtesy to defer the whole matter for a year, and then ask another member to bring up the subject and treat it as he thinks fit, and treat it probably on different lines from those on which it was originally introduced by the first member.

Dr. CLOUSTON—As regards myself I in no way feel that it is a discourteous precedent to adjourn the matter. I should have been glad to have gone on with it, but if circumstances are against us, and it can be put off till next year, I have no objection. My object, and my only object, was to bring this matter, in a scientific manner, before a practical Association.

The PRESIDENT—I have no hesitation in deferring the matter after hearing these remarks from Dr. Clouston. It is, therefore, deferred until next year, to be reintroduced by Dr. Batty Tuke. The members are to understand that the postponement and rearrangement are due to the courtesy of Dr. Clouston.

INSANITY AND RACE DECAY.

Dr. ANDRIEZEN read a paper upon insanity and race decay, which is to be published in the "British Medical Journal."

The PRESIDENT—Had time permitted I should have liked to have spoken on many of the interesting points which Dr. Andriezen has raised, and I know that the members generally were anxious to express their opinions on these subjects. I very much regret that, owing to lack of time, we cannot do so at present. But I feel that I am justified in offering Dr. Andriezen the special thanks of the Association for the work which he has done for this meeting. I refer not merely to this paper, but to his magnificent laboratory work which we had the pleasure of seeing yesterday afternoon. Personally I feel towards him that esteem which one feels for a man who has satisfied one's ambition. It was my ambition that at our meeting this year some of our younger members should make their mark; and I can confidently say that Dr. Andriezen has done so.

OTHER PAPERS.

In addition to the foregoing papers and discussions Dr. OSWALD had prepared a report on "Multiple Neuritis, with Mind Involvement," which will be published in the "Glasgow Medical Journal;" and Dr. ELKINS "On Twenty-eight Cases of General Paralysis occurring in Women," which has been published in the "Lancet."