

*On the Normal Constituents of a Convolution, and the Effects of Stimulation and Fatigue on Nerve Cells: A Demonstration.*  
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It is not suggested that the specimens to be shown on the screen afford anything like an exhaustive demonstration of the constituents of a convolution. They are mainly intended to show the extreme value of Golgi's method for elucidating the important anatomical connections between cell and cell, and between area with area. Dr. Clouston must be congratulated on being able to submit such an admirable series of slides illustrative of the microscopic morbid anatomy of the brain. One experiences a feeling of envy of the rising generation at being able to start so far along the road. When I some thirty years ago began such investigations I could not make a section—only two men in Great Britain knew how to do so. I had to commence at zero; and I shall never forget the feeling of satisfaction when for the first time I was able to demonstrate a nerve-cell by my own unaided efforts. But methods of imbedding, cutting, and staining were soon discovered, and those of us who were working at the subject were, within a few years, able to demonstrate, describe, and figure a large proportion of the morbid changes which have been so brilliantly exhibited to-day. With such a demonstration the first volume of the pathological anatomy of the insane brain may be considered to be closed; it may have to be re-opened from time to time for marginal notes, but for all practical purposes of the post-mortem theatre we know roughly the general characters of the changes in the membranes, vessels, cells, and glia, so far as they can be made out by the Bevan Lewis and other methods. The second volume must deal with interruption of connections due to changes in the cells. This will be a long and difficult task; but if, as we have seen to-day, so much has been overcome within the last thirty years, we may fairly anticipate that the next generation of workers will accomplish very much more. The great value of Golgi's method and its modifications is that the various processes of the cells can be traced for long distances, and the characters of their insulating material can be demonstrated. When I place before you the best demonstration of a nerve-cell that can be obtained by aniline staining and another prepared by Golgi's process, you will at once see the immense advance that has been made. In this section of a great pyramid the character of the axis cylinder process at the base is seen to differ from the "splendid tufts" (as

Ramon y Cajal calls them) in which the apical protoplasmic process ends; the basal axis cylinder is shown to bifurcate and to throw off numerous collaterals; and the lateral protoplasmic processes can be traced for long distances. The apical processes and the "splendid tufts" present a mossy appearance, differing in this respect from the apical poles of cells of other zones, and from the basal axis cylinder process of the pyramids. It can be determined that these processes are never anatomically connected; therefore, that the impulses they convey must be transmitted by contact only. When discussing lately with Prof. Cuninghame the probable function of this mossiness I suggested it must be for the purpose of presenting a more extensive area of contact, and this view is supported by the interesting statement made by Dr. Andriezen that he has found in chronic dements that the mossiness has been lost or much diminished. Ramon y Cajal has, by his modification of Golgi's process, demonstrated the important fact that the poles of the external or molecular layer, of the pyramidal zone, and of the internal or polymorphous layer differ in their distribution, those of the outer zone being directed horizontally, and for the most part antero-posteriorly, and never descending; that the axis-cylinder process of the pyramid is in direct communication with the projection fibre, and probably with the commissural fibre; that its apical process runs up to the surface of the brain; and that the poles of the great cells of the polymorphous layer never extend beyond the pyramidal zone. This, along with the demonstration of the large cells (Cajalsche Zellen) of the molecular layer strongly suggest that each zone exercises special functions. It is impossible on the present occasion to go into further particulars. I must apologise for the roughness of the demonstration. I thought it might interest some members to be able to see what important results may be looked for from the use of Golgi's and Ramon y Cajal's methods. If we hold that mental action is a function of connection it is of extreme value to have at our command a method of investigation by which may be shown that the cell-processes suffer a Wallerian degeneration as a consequence of the implication of cell integrity.

[Dr. Tuke also demonstrated the effects of stimulation and fatigue in ganglionic and cerebral cells as shown by Hodge, of the Clark University, Mass. He referred the members to the description he had given of the results of these experiments in a series of lectures lately published in the "Edinburgh Medical Journal."]