XIII. "Researches into the nature of the Involuntary Muscular Fibre." By GEORGE VINER ELLIS, Esq., Professor of Anatomy in University College, London. Communicated by Dr. SHARPEY, Sec. R.S. Received June 11, 1856.

(Abstract.)

Having been unable to confirm the statements of Professor Kölliker respecting the cell-structure of the involuntary muscular fibre, the author was induced to undertake a series of researches into the nature of that tissue, by which he has been led to entertain views as to its structure in vertebrate animals, but more especially in man, which are at variance with those now generally received. The present communication contains the results of these inquiries, which tend to show that the voluntary and involuntary muscles resemble each other very closely in the arrangement and constitution of their fibres.

After adverting to the present state of opinion on the subject, the author gives an account of his own observations, and treats successively of the interweaving of the fibres, their size, form, and ultimate structure; their mode of attachment at their extremities, their length, and the corpuscles connected with them. He devotes a section also to the question of the periodic formation and destruction of muscular fibres in the uterus, in its different conditions; and while he is led by his own investigations to recognize an enlargement in size of the individual fibres of that organ during pregnancy, followed by subsequent diminution, he is unable to confirm the doctrine of new formation. Moreover, he finds that during pregnancy a considerable amount of granular matter, with round or oval granular-cells, is deposited among the fibres. He adduces reasons for believing that this substance cannot be regarded as a blastema, nor its imbedded cells as formative cells, for the production of new fibres; and he is disposed to ascribe the enlargement of the uterus in pregnancy principally to the enlargement of the muscular fibres, and the addition of this new deposit.

The following is a summary of the conclusions which the author has arrived at on the main subject of his inquiry :—

In both kinds of muscles, voluntary and involuntary, there is an interweaving of the fibres with the formation of meshes.

The fibres in both kinds are long, slender, rounded cords of uniform width, except at the ends, where they are fixed by tendinous tissue; and in both, the size of the fibres in the same bundle varies greatly.

In neither voluntary nor involuntary muscle is the fibre of the nature of a cell, but in both is composed of minute threads or fibrils. Its surface-appearance in both kinds of muscle allows of the supposition that in both it is constructed in a similar way, namely, of small particles or "sarcous elements," and that a difference in the arrangement of these elements gives a *dotted* appearance to the involuntary and a *transverse striation* to the voluntary fibres.

The length of the fibres varies in both cases with the organ or part examined, and the connexion with tendon always takes place after the same manner, whether the fibre is dotted or striated.

On the addition of acetic acid, fusiform or rod-shaped corpuscles make their appearance in all muscular tissue; these bodies, which appear to belong to the sheath of the fibre, approach nearest in their characters to the corpuscles belonging to the yellow or elastic fibres which pervade various other tissues; and, from the apparent identity in nature of these corpuscles in the different textures in which they are found, and especially in voluntary as compared with involuntary muscle, it is scarcely conceivable that in the latter case exclusively they should be the nuclei of oblong cells constituting the proper muscular tissue.

The paper concludes with a statement of the mode of procedure which the author has found most suitable for examining the tissue which forms the subject of his inquiry.