The microscopical anatomy of the brain and spinal cord, in a case of imbecility, associated with Duchenne's paralysis / by W.B. Kesteven.

THE MICROSCOPICAL ANATOMY

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BRAIN AND SPINAL CORD,

In a Case of Imbecility, associated with Duchenne's Paralysis.

BY

W. B. KESTEVEN, F.R.C.S.

Lewes:
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1870.

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John Marshall Esq
with Kind Regards

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The minute pathological anatomy of the brain being at present but little advanced, the following contribution is offered towards its elucidation in mental disease.

The April number of this Journal contains a paper that was read at a quarterly meeting of the Medico-Psychological Association, and in which are related the histories of two cases of mental imbecility, associated with "Duchenne's," or the pseudo-hypertrophic muscular paralysis. In June last, one of the patients therein mentioned, the elder boy, died of pleuro-pneumonia. Permission was given by the father to examine the body and to remove any organs that might be required for scientific examination.

Autopsy 18 *hours after death.*—The body and limbs were emaciated; the lower extremities were rigidly flexed, the knee-joints requiring the division of the hamstring tendons, in order to the extension of the limbs. The bones of the skull were unusually thin; the membranes of the brain in a state of venous congestion, attributable to the mode of death. There was no excess of serum in the cavities. The brain weighed fifty-five and a-half ounces, and presented nothing remarkable in its outward aspect. Comparing it with the drawings given by Mr. John Marshall in his elaborate paper "On the Brain of a Bushwoman and on the Brains of Two Idiots of European Descent" ("Philosophical Transactions," 1864), I could perceive no departure from the normal number and character of the cerebral convolutions.

The brain and entire spinal cord were removed. Portions

of the muscles of the calf and of the left ventricle of the heart were also taken for microscopic examination. Of the characters of the muscular structure, I have only to observe that my notes simply repeat the results of M. Duchenne's and Lockhart Clarke's observations. When cut into, the muscular substance is found pale, almost white, and very greasy. The superabundance of fat is evident to the unaided eye. When examined by the microscope the great quantity of adipose tissue is the most striking appearance—the muscular fibres present their ordinary striation, but less distinctly than usual. The ultimate fibres are pale, and separated by a large increase of areolar and fibrous tissues; so that although the mass of muscle seems considerable, there is relatively a want of muscle. For the delineation of the microscopical appearances in the muscular tissue, I must refer to Dr. Duchenne's essay.*

Having preserved the brain in strong alcohol for three months, I further hardened small portions of it by placing them for a few days in a solution of chromic acid. Thin sections thereof were treated with glycerine and carmine; some with glycerine alone, while others were rendered transparent by turpentine. The spinal cord having been placed in a solution of chromic acid for three months was examined throughout its length both in opaque and in transparent sections.

In the paper referred to, I stated that hitherto "Pathological anatomy had as yet had opportunity to take cognizance only of the condition of the muscles," in this form of paralysis; I am now, however, able to go a step further, and to show the diseased structure of the brain, with which it is connected. So far as I am aware, the following description of the morbid appearances found in the brain and spinal cord is the first that has been placed on record.

The morbid conditions and change of structure are, in the first place, dilatation of the peri-vascular canals, consequent upon long standing congestion; and, in the next place, numerous circumscribed spots of granular degeneration of the nerve substance. The dilatation of the peri-vascular canals is observable throughout the brain and spinal cord. It is so marked in many parts, that the vessels seem to lie in a tunnel cut out of the surrounding tissues. (See plate.) The vessels themselves are enlarged and consequently, being more

* De la Paralysie Musculaire Pseudo-hypertrophique, ou Paralysie Myo-Sclero-isque, par le Dr. Duchenne (de Boulogne). Paris, 1868.

readily seen, appear to be more numerous than usual. It would seem that from repeated distension of the vessels occurring throughout long periods, the brain structure has lost its elasticity, and has yielded to the distending force; or, possibly atrophy of the brain structure has caused it to shrink from the peri-vascular canals. This lesion of the circulation, originating in a morbid condition of the vaso-motor nerves, may have been the starting point of subsequent structural changes.

The spots of granular degeneration vary in size and in number in different parts. They are irregularly scattered in the white substance adjoining the grey matter of the convolutions, very few are noticeable in the grey matter. In the corpus striatum and thalamus opticus they are very sparse, and in the medulla oblongata and spinal cord they are also few and far between. The form of these spots is generally circular, some few are lobulated. They are evidently spaces caused by loss of cerebral tissue replaced by the morbid matter. Examined by a half-inch or quarter-inch object glass this matter is seen to be amorphous, colourless, and semi-opaque ; it resists the carmine dye, so that it is readily distinguished from the surrounding structure. In transparent and coloured sections the borders of the apertures are for the most part defined, their edges being formed by minute vessels and nerve tubules which become tinged by carmine. The borders, however, are frequently much less distinctly defined, the brain substance insensibly gliding into the granular matter. These spots of degeneration vary in size; the larger having a diameter of from $\frac{1}{50}$ to $\frac{1}{200}$ inch, while the smaller transparent spots range from $\frac{1}{250}$ to $\frac{1}{1500}$ inch in diameter. Throughout the brain and cord the cells of the grey matter retained their normal characters. The history of the case would show that the brain had attained its normal growth up to the date of the first deviation from health.

A morbid condition of the medulla oblongata, closely resembling the above, was described by myself in the "British and Foreign Medical Chirurgical Review," April, 1869. I may add that Dr. Batty Tuke regards the above described appearance as constituting an example of the first and second stages of a definite lesion of the brain, which has been described by himself and Dr. Rutherford, in the "Edinburgh Medical Journal," September, 1868, and October, 1869.

EXPLANATION OF LITHOGRAPH ILLUSTRATIONS OF MR. KESTEVEN'S PAPER.

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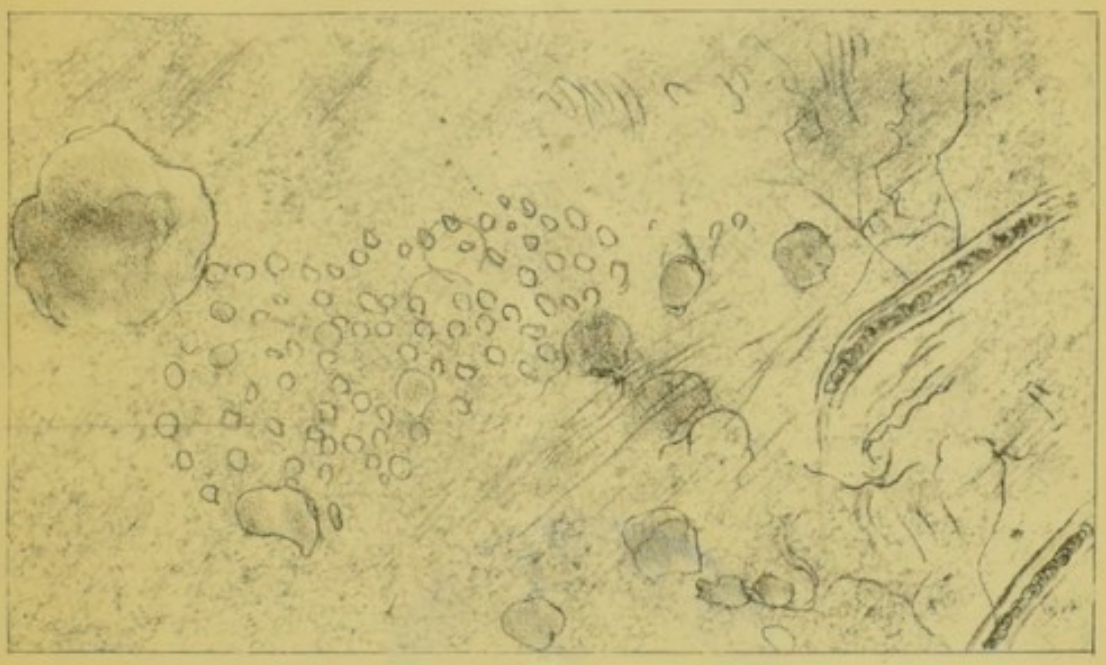
a. Smallest miliary spots of degeneration, averaging from $\frac{1}{1500}$ to $\frac{1}{250}$ths of in. in diameter.

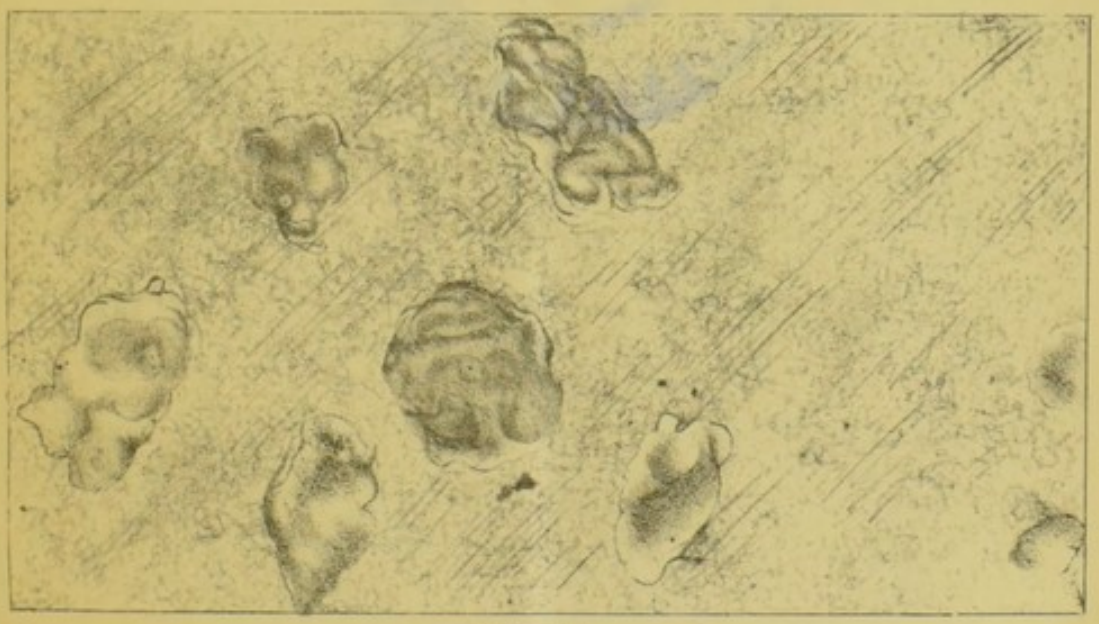
b. Small spots of degeneration, resembling amyloid bodies, averaging $\frac{1}{400}$th in.

c. Large spots of degeneration, many of which have a lobulated aspect, as if the result of the union of several smaller spots, averaging $\frac{1}{50}$th in. diameter.

d. Blood vessels, showing their relation to the dilated perivascular canals.

These forms of the disease, constitute what Dr. Batty Tuke has described as the first *(a* and *b)* and *(c)* the second stages of sclerosis, or gray degeneration.





W. West. lith.