PRELIMINARY NOTE ON CERTAIN MORBID PRODUCTS FOUND IN THE BRAINS OF PATIENTS DYING AFTER SEVERE HEAD INJURIES.¹

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WHILE engaged recently in investigating the microscopic appearances in a number of brains of patients who had died at varying periods, after receiving severe head injuries, I found in several cases large numbers of peculiar bodies, which appear to me to bear some relation to the so-called Colloid bodies described by various writers.

These bodies were found in the brain of a youth who died fourteen hours after sustaining severe injuries to his head by falling off the Forth Bridge; but as they were more characteristic in the case of a mason who survived his accident for two-hundred and fifty-six hours (256), I shall describe them from sections of his brain.

The bodies referred to vary in size from 7ω to 50ω ; the average being about 18ω . In shape they are more or less rounded or ovoid; are homogeneous, with no evidence of a nucleus, or other cellular contents, and except when very deeply stained are perfectly translucent. In some cases they exhibit a regular outline, the periphery being somewhat more deeply stained than the rest of the cell, while in others the margin is sinuous giving it the appearance of having shrivelled up slightly.

They take up the hæmatoxylin stain very readily, and stain black with osmic acid, but are unaffected by aniline-blue-black, and picro-carmin. The smaller examples stain faintly and uniformly, while the larger ones vary considerably in the degree to which they react to the dye. It would appear

¹ From investigations conducted in the Research Laboratory of the Royal College of Physicians, Edinburgh.

that these latter are formed by the coalescence of several of the former, as is shewn by their irregular outline at first, and later by their tense rounded appearance.

They are not confined to any one region of the brain, but are found in greater or less numbers alike in the cortex, basal ganglia, pons, medulla, and cord. To describe them as they occur in the cerebral hemisphere

They are distributed :—

- (1) All through the white matter.
- (2) In the most superficial area of the grey matter.
- (3) In the "lymphatic system" of the brain.

(1) *In the white matter* they are exceedingly abundant, being thickly studded all through the section. Here they are fairly uniform in size and take up the stain well. They are largest, however, and most numerous in the immediate vicinity of punctiform hæmorrhages into the brain substance, where they not only invade the torn strands of nerve fibres, but also pass among the extravasated blood corpuscles.

(2) *In the grey matter* they are only to be detected in the most superficial layer, but there they are very plentiful. While they are less darkly stained and smaller than their fellows in the white matter, they shew a greater tendency to coalesce with one another, especially on the free surface of the brain, the largest being found in the epicerebral space.

(3) *In the "Lymphatic system" of the brain* they are chiefly found in one of two places, viz. :—

(a) In the meshes of the pia mater—the subarachnoid space.

(b) Along the course of the larger intra-cerebral blood vessels.

(a) It may be of importance from the point of view of their origin to observe that when these bodies are found in the *sub-arachnoid space* it is always in close proximity to a laceration of the brain substance, which makes it probable that they are then derived from the superficial layer of the grey matter. It is in this situation that they attain their greatest size, possibly because they have more room to expand here than elsewhere, or it may be that they swell up by imbibition of cerebro-spinal fluid.

(b) When in relation to *intra-cortical blood vessels* these bodies are found in the perivascular lymph space of His, between the hyaline membrane, or adventitia, and the brain tissue. They also are present for a short distance into the brain substance, and sometimes find their way into the space of Robin, between the tunica adventitia and the tunica muscularis, whether by natural or artificial openings is difficult to determine. The vessels round which they are seen are most evident in the superficial layers of grey matter, next in the region where the grey and white matters join—a very vascular area—and to a less degree as we pass deeper. In all respects they resemble those described in the sub-arachnoid space, save that they are somewhat smaller and more compressed laterally.

Of the exact significance of these bodies I am not at present prepared to speak definitely, but their general appearance, distribution, and reaction to staining agents, seem to point to their being in some way related to the myeline of the nerve fibres. Probably the main importance of the observation lies in the demonstration that these bodies may be produced very rapidly.