

condition that certainly would aid in elimination, and also that the convulsion is so likely to be followed by an increase in the urinary secretion. Moreover, the cells are exhausted by their discharge, and require time for recuperation before another fit can occur. For these two reasons, then, the patient is not constantly convulsed.

I regret that I cannot as yet substantiate my opinion with any direct proof, but trust that the results of some experiments about to be undertaken will go towards showing that my statements are at least well grounded. Meanwhile there are certain points connected with convulsive disorders which we may advisedly consider.

Convulsions, no matter what muscles implicated, are due to abnormal functioning of cells in some part of the central nervous system. The location of the discharging cells determines the character of the seizure. The lower the situation of the discharging cells, the simpler and less general are the fits, while, *vice versa*, the higher their situation, the more complicated and more comprehensive are the convulsions. From a simple involuntary and incoordinated action of the muscles of a limited portion of the body, when the discharge originates in a "lowest level," we rise through a series of fits which grow more and more general and severe, and are attended by more and more complex involvement of the various parts of the muscular system, until we reach those fits known as "epileptic," which are believed to originate in the "highest level" of the encephalon, which are attended with more or less profound unconsciousness, and which, when frequently repeated, tend in *ultimato* to mental degeneration.

Our knowledge enables us to classify convulsions into those which *are* and those which *are not* due to some evident irritant. The fits following trauma of the brain, those associated

with tumor, abscess or other condition in which structure is disturbed (as in apoplexy, meningitis, general paralysis of the insane, etc.), class under those due to evident irritant. The so-called idiopathic epileptic fits, major and minor, the convulsions of hysteria, etc., might be placed in the list of those in which there is no evident irritant. And in some conditions which have long been regarded as due to the retention of effete matters in the system—as in what has been called uraemia, as well as in the early stages of many acute disorders regarded by modern pathologists as toxic (bacterial), we find convulsion to be a frequent and prominent symptom. It is true that these convulsions differ materially from one another in their appearances, but the differences are really minor, and depend upon the situation of the cells in which the discharge of nervous energy originates. And I think it is reasonable to suppose that in every case the cells are excited into discharging—or at least made extraordinarily unstable—on account of irritation, whether that irritation be evident as a tumor or gross lesion of some kind, or whether it be the more subtle but equally capable effect of some retained poisonous secretion.

It is unquestioned that the convulsions of asphyxia are due to the retention in the blood of  $\text{CO}_2$ —which acts as an irritant to the cerebral cells. We cannot, it is true, trace so apparent a poison as  $\text{CO}_2$  in all cases of convulsion, yet it is not beyond possibility that our rapidly perfecting knowledge of physiologic and pathologic chemistry may soon permit the demonstration of a substance or substances, existent within the body under certain circumstances, and to which may be attributed the causation of convulsive seizures.—Anaemia is a condition which is becoming more and more regarded as the result of defective elimination. The examination of the blood of many of our