

at a telephone in the head office of a large establishment. Messages are reaching him at frequent intervals from various parts of the house, asking what shall be done under various circumstances, and to each of these he sends separately the appropriate answer directing the procedure to be adopted—to each call its own answer. That is what happens in the nervous system. Messages are constantly reaching the brain along the sensory nerves from all parts of the body, and to each message its proper reply is sent along the motor nerve going to the particular muscle. Imagine now, instead of our cool and collected managing director, an irascible, peppery man, who is in a constant state of weak minded irritation. What he will very probably do when he gets a message that annoys him is to send directions to many sorts of different departments telling numerous people who really have no connection whatever with the original message to do all sorts of things at once: the establishment will thus be thrown into temporary disorder, and will be afflicted with violent purposeless movements.

That is just what happens in a fit. Instead of one message only going down one motor nerve, the brain sends all sorts of indiscriminate directions to many different muscles without very much regard to the nature or place of the original stimulus. It does so because it is weak and irritable, so in order to explain the cause for any given fit we have to find out why the brain is temporarily weakened, so that it cannot make proper use of its sensory impulses.

Coming back to our analogy, we know that a man may be unable to direct his business either because he is unfit himself (it may be because he is ill, or has not been sleeping or eating properly) and is thus incapable of attending to any messages, or, on the other hand, he may be fairly well himself but may have been subjected to a constant stream of annoying messages from one particular source. In the latter case he can attend to all other work fairly well, but is apt to fail when the importunate client repeatedly rings him up.

So it is with the brain. Convulsions may occur either because the central nerve cells are not receiving proper nourishment, and so cannot adequately attend to any business, or because there is one particular source of irritation which is so overwhelming as to throw the brain into a state of irritable weakness. In the latter case, however, there is almost always some general weakness as well, just as a perfectly healthy director would not let himself be annoyed by any particular client however persistent he might be.

But there is yet another cause for convulsions. Suppose that in the business house messages were sent to a particular department, and that a fire had suddenly broken out there, so that all the staff in a particular room were suffocated, and could not attend to their work of direction. We can then imagine that the office boys and junior clerks might feel the absence of control, and run hither and thither, so that that part of the business would be disorganised, while the other quarters of the house where no fire was would be undisturbed. Sometimes this happens in the brain. A blood vessel may burst in one small particular place, or the patient may fall violently on his head, and a portion of broken skull bone may penetrate the brain. In both these cases one portion only of the brain would be affected, and there might be convulsions of the muscles which that portion normally controlled.

Coming now to details, we have to see what are the causes of general weakness of the brain cells, and then how some stimuli are so strong as to throw the brain off its balance; and lastly, what sort of occurrences destroy parts of the brain altogether.

The commonest cause of general weakness of the nerve cells is the presence in the circulating blood of some poisonous substance. For instance, we have seen in a previous paper that general convulsions may occur in uræmia from disease of the kidneys, when urea and its allies are retained in the blood, and we get a similar condition in asphyxia when for any reason the blood is not receiving its proper supply of air, so that the nerve cells are being fed with venous instead of arterial blood. Examples of this are met with in the convulsions which occur in children suffering from pneumonia or whooping cough. Or the poison may be a drug like strychnine, or the products of some micro-organism such as may be present in the infectious fevers, or hydrophobia or tetanus.

But we cannot always explain an unnatural irritability of the nerve cells in this way, and in two diseases at all events we cannot get any further than the knowledge that they are very unstable. The complaint known as epilepsy is an example of this. Here the patient has repeated attacks of violent convulsions, which can seldom be traced to any definite cause, and the pathology of which is at present quite unknown. The convulsions that occur in some infants (apart from those due to a definite irritant) are similarly wrapt in obscurity as to their origin.

Sometimes, however, convulsions, both in children and adults, are due to an irritant.

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