Short Notes and Clinical Cases

'CROWDING' OF INHIBITION AND OF EXCITATION

BY

MAX LEVIN, HARRISBURG, PENNSYLVANIA

IN a former paper⁴ on the pathogenesis of narcolepsy I alluded, on p. 9, to five cases, reported by Kinnier Wilson,⁸ Cave¹ and Rosenthal,⁷ in which the patient had made the observation that attempting to fight off a sleep attack sometimes gave rise to an attack of powerlessness. For this phenomenon I proposed an explanation. Sleep, as we know from the work of Pavlov, arises through the irradiation and coalescence of many scattered inhibitory processes. When a person fights sleep off, a multitude of excitatory processes come into play, opposing the irradiation of the inhibitory processes. The latter, when not entirely checked, continue to irradiate where they are least opposed. They may invade the motor areas, if these areas are (as in narcolepsy they presumably are) unduly 'inhabitable.' When this happens, the patient will find that in attempting to prevent sleep he has caused an attack of powerlessness to supervene. I suggested that this phenomenon may be likened to what happens in a game of American football, when the player carrying the ball is 'crowded' by his opponents, so that he runs in the direction in which he sees the least opposition. Thus we may say that in the five cases mentioned above the warding off of an impending sleep attack caused the inhibition then gathering in the substrate of consciousness to be diverted or crowded into the motility substrate.

A cognate phenomenon occurred in a case reported by Cohen,² which I cited on the same page. In this case the patient gave the following account of one of her cataplectic attacks: 'I think I could have stopped it in the first stages, but unfortunately I was stupid enough to concentrate not on sitting still, but on trying not to spill the coffee from the cup I was holding, with the result that I kept the coffee cup quite safe, but slipped to the floor beside it.' This is a particularly clear illustration of the crowding of inhibition from one part of the brain to another—in this instance from the central mechanism of the upper limb to those of the trunk and the lower limbs.

In the present paper I shall consider the question: Are there cases in which one may assume that there has been crowding of excitation? I believe that this question may be answered affirmatively. The clearest

instances are those in which a person voluntarily suppresses an impulse to some movement. I shall cite several instances under three headings.

1. *Instances in which there is Suppression of a Primitive Motor Response.*— I refer to a significant observation made by MacCurdy⁶ in regard to the reactions of soldiers to their first bombardment. The reader should consult the paragraph beginning at the foot of p. 16 of MacCurdy's article (this paragraph is cited in full on p. 125 of my more recent paper⁵). After remarking that the commonest response is fear, MacCurdy said: 'A less common reaction is that of excitement, accompanied even with a kind of spurious elation. The man has a tendency to make facetious remarks about the shells, to laugh at feeble witticisms, and very often feels under considerable *motor tension, there being a pressing desire to do something, to do it immediately and do it hard*' (italics mine). I suggest that the motor tension observed by MacCurdy may be regarded as a manifestation of crowding of excitation. The 'most basic' wish of the front-line soldier is to run away to a spot where there are no shells.* To say that the impulse to run away is suppressed is to say that excitation is crowded away from the nervous arrangements utilized in running. This excitation cannot vanish into nothingness, and its persisting in the motility substrate may be inferred from the fact that the soldier is aware of motor tension and of 'a pressing desire to do something, to do it immediately and do it hard.'

It may be presumed that MacCurdy's soldiers experienced tension in the muscles of the lower limbs as well as in the other muscles of the body. Therefore, we may not conclude simply that excitation was crowded from lower limb areas to areas in which the lower limbs are least represented. The crowding must have occurred not in the middle, but in the highest motor centres. In the highest centres there is a multitude of 'nervous arrangements' in which the lower limbs are prominently represented. It therefore seems possible, in the highest centres, for excitation to be crowded in such a way that the lower limbs are tense, though the impulse to run away has been suppressed.

There is possibly a second reason for the tension experienced by the soldiers. Man's natural way of fighting calls into play the large muscles. To be moved into a front-line trench must therefore 'awaken' powerful motor impulses. But modern warfare is anomalous in the fact that the front-line soldier, instead of fighting, as nature intended, with his large muscles, spends most of his time in a trench not really fighting at all or, at most, fighting with his index finger. It is possible that, when the soldier is required to discard primitive in favour of more 'refined' methods of fighting, excitation,

* I say the 'most basic' rather than the 'strongest' wish. In most soldiers the wish to appear brave is stronger than the wish to run away. But the wish to run away is ontogenetically the older of the two. The soldier who actually runs away is acting more automatically than he who suppresses the impulse.

crowded away from the nervous arrangements utilized in hand-to-hand fighting, is diverted into other parts of the motility substrate, a subjective feeling of tension being one of the consequences.

2. *Instances in which there is Suppression of Speech.*—Speech being a special form of movement, the instances I am about to give are identical in principle with those given under the previous heading. Every observant person knows that many people, when telling a lie, betray themselves by making accessory movements, e.g., wiggling a foot.* These accessory movements frequently help one to determine whether one is listening to the truth. Furthermore, there are instances in which, without telling a lie, one must suppress something one wants to say. For example, a debater, hearing his opponent's argument, immediately thinks of the answer he wants to make, but, of course, must remain silent until his turn comes to speak; he may react by restlessly drumming with his fingers.

3. *Instances in which there is Suppression of both Speech and More Primitive Movements.*—The best example here is that of the angry man who would like to assail his opponent both physically and verbally. The suppression of these movements may mean the crowding of excitation into nervous arrangements representing other movements; the frustrated man may slam the door or, at his first opportunity, kick the cat.

It should be emphasized that crowding of excitation does not account for *all* the phenomena that occur in consequence of the suppression of strong impulses. When one attempts to suppress an impulse, there is, in the centre in question, a sort of tug of war between excitatory and inhibitory processes. The resulting phenomena must therefore be carefully separated into two groups: (a) those arising from the crowding of excitation into *some* neighbouring centres, as discussed in this paper, and (b) those arising from an overflow of inhibition into *other* neighbouring centres. The latter group of phenomena were discussed on p. 11 of my earlier paper,⁴ with particular reference to several cases in which sleep and other manifestations of inhibition occurred in consequence of the suppression of the defence reflex to pain and of sexual reflexes. In these instances one sees the manifestations of an excess of inhibition. In the paragraph beginning on p. 16 of MacCurdy's article, to which I have already alluded, the existence of these two groups is easily seen. MacCurdy found that some soldiers, at their first bombardment, reacted with motor tension, and with a 'pressing desire to do something, to do it immediately and do it hard'; here is crowding of excitation. Other soldiers, in the same situation, reacted with pathological sleep; here is overflow of inhibition.

It is possible that in some cases one may see, at one and the same time, manifestations resulting from crowding of excitation and those resulting from overflow of inhibition. I once studied a bright thirteen-year-old boy,

* Holman³ called particular attention to this phenomenon.

referred for disobedience and other 'behaviour problems.' His mother, an intelligent person, said that whenever he did something wrong his reaction to his attempt to keep it secret was to become very talkative. We deal here with a boy who wished to tell his mother certain things and at the same time wished not to tell her. In other words, the nervous arrangements for uttering certain propositions formed the scene of a tug of war between excitation and inhibition. Since the boy refrained from talking about his escapade, but jabbered away about other matters, we may infer that excitation was crowded from the nervous arrangements representing one set of propositions to those representing other sets. At the same time, it is possible that in addition to this crowding of excitation there was also some overflow of inhibition throughout the highest layers of the highest centres, resulting in loss of control over lower layers which then became overactive, overtalkativeness being the consequence. If this be true, his overtalkativeness was the result of two factors which reinforced each other, in very much the same way as contraction of the biceps and relaxation of the triceps reinforce each other in producing flexion at the elbow.

SUMMARY

When by voluntary effort one succeeds in preventing inhibition from supervening in a given area of the brain, this inhibition may be 'crowded' into a nearby area. For example, several narcoleptics have reported that when they fight off an impending sleep attack, an attack of powerlessness sometimes supervenes. Corresponding to this crowding of inhibition, there occur, in other cases, phenomena attributable to crowding of excitation. For example, MacCurdy observed that during bombardment some soldiers experienced great motor tension. Since in front-line soldiers the impulse to run away has been suppressed, it seems reasonable to suppose that the motor tension observed in many of them occurs as the result of the crowding of excitation from one part of the motility substrate into some of its remaining parts. Other examples are given.

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