

brain, since a definite period is required for the arrangement of the nerve centres under control; and secondly, physiological impressions on the brain may be of different classes or kind as produced by various modes of sensory stimulation from without. It will suffice for our present purpose to speak of four classes of such impressions.

1. *Impressions of sight* are formed when an object is seen; light passes from the object to the eye, stimulating the retina, from which nerve currents then pass to the brain and control its nerve centres. The thing shown is seen if the child's eyes are turned towards it and an impression on the brain is produced through sight.

2. *Impressions by hearing* are produced by nerve currents from the apparatus of the internal ear when the sound vibrations of air have acted on the tympanum. This is something like the action that occurs in a telephone, where the vibrations produced by the speaker's voice start an electrical current which is conveyed to a distance.

3. *Impressions from muscular action (muscular sense).*—When a muscle contracts and produces a movement a stimulus passes upwards from the nerves of the muscle to the brain and this produces an impression which may be felt. Thus, movements produced in training the child through the senses result in some control over the nerve centres in two ways: (a) partly by stimulation through sight, as the child sees the teacher's movements, which sends a nerve current from the brain to the muscles; and (b) partly by muscular sense, an afferent stimulus passing from the muscle to the brain. The child is said to feel the movement. Exercises with the hands and fingers may be trained by sight in imitation of the teacher, while the muscular sense also produces results in the brain. When you control the eye movements the muscles which move the eyeballs act through muscular sense on the brain.<sup>2</sup>

4. *Impressions caused by muscular tension* produce an appreciation of weights as held in the hand. The weight held in the hand makes a strain upon the muscles; the feeling of this strain is transmitted to the brain and the weight is perceived.

In education it is important that the pupil should learn to distinguish between the size and the weight of an object and he must be taught to compare size with size and weight with weight when describing two objects, such as coins. Weights are compared by feeling muscular tension and the size of objects by muscular sense. For this reason the two senses should be exercised separately.

It is desirable in early training to produce one kind of impression only at a time and to implant it accurately and distinctly. One of the principal reasons for this is the fact that in subsequent use of the impressions for mental operations we need to establish associations between those of the same kind. The pupil must be taught weights, sizes, colours, and sounds. When teaching the use of money let the pupil see the coin, then feel its size as it lies on the table or in his hand with the fingers closed over it so that the weight is not felt; later let him feel the weight only. Subsequently he may be taught to compare coins as to colour, size, and weight and understand that the value of silver is proportional to its weight.

Another way of training the brain and directing its action without the use of words is by exercising the faculty of imitation. If the teacher holds out one hand the child will usually do the same, and when one finger is bent the pupil makes a similar movement. In this method of training the sight of the teacher's hand controls the child and the same nerve centres are brought into action in him as are employed in the teacher's brain. Useful control over the brain may thus be gained before there is much teaching by the use of words; exactness of movement is cultivated both in the time and degree of action as regulated by the teacher's intelligence; modes of brain activity may thus be established of great use in later instruction. The child who has learned to imitate his teacher's movements will learn to write on the blackboard by following the action of her hand as he sees this more easily than a copy. When the numerals have been learned their meaning and employment may be taught by movements of the eyes and hands, in which case the significance of numbers, size, and proportion is felt.

I must now pass on to speak more definitely of "culture of the mental faculty." Impressions made on the brain as planned by the teacher for future use must be associated for intellectual purposes. Comparison may be practised early.

Impressions of similar sensory origin more readily adhere to one another in the brain than those of different classes. The similarity in their mode of production by sight, hearing, muscular sense, &c., and their consequent similarity in constitution cause them to be easily associated when rendered reactive under the guidance of the teacher. Nerve pathways are more easily established among like sensory impressions than among those unlike in kind. In an act of comparison we need the coactivity of two or more impressions of the same kind; a mental act of comparison is appreciation of the similarity of characters and their proportions. If the pupil has received stage by stage the early elementary training already described his brain will by this means have been prepared for mental work and he will more readily and accurately appreciate instruction such as the relative weight of coins and their value, also the significance of addition, subtraction, multiplication, and proportion.

We may now review some characters of brain development that were described in speaking of the earliest display of mental faculty and consider how they bear upon the teaching of children at school age. In the early stage of mental potentiality a sensory stimulus produces only a momentary stopping of movement; a little later in development this "still period" is followed by a new act; during the pause the brain centres are arranged by the sensory stimulus for the action which results. At more advanced stages some period of time is still occupied by a mental act. In teaching, a question should be followed by a pause on your part while the necessary arrangements are occurring in the child's brain corresponding to an act of thinking—i.e., it is useless to expect a correct answer without allowing sufficient time.

The educative effect of exercises in imitation of the teacher's planned movements has been spoken of; this and other ways of controlling the motor coördination of the brain centres are the principal means that experience has led me to adopt in directing the training of backward and feeble-brained children in whom mental faculty has to be implanted stage by stage as planned for future employment. As the growth and development of the child produce a healthy spontaneity of the nerve centres, his brain becomes capable of further organisation by impressions produced through the senses.

Much might be said as to the processes of growth and the hygienic conditions necessary to their physiological development. It has been my purpose to show something of the way in which brain training may be planned to produce impressions of different kinds and to coördinate the physiological nervous action for the culture of mental ability. Spontaneity of brain action is the foundation upon which success in educational efforts depends and this must be trained through the senses. At the same time impressions of various kinds must be produced in the child and their interaction should be controlled, stage by stage, as the means of educating mental faculty leading up to the formation of intellectual and moral character.

Kensington, W.

## TWO UNUSUAL OCCURRENCES IN TYPHOID FEVER: ACUTE ENCEPHALITIS AND PERFORATION OF THE SIGMOID FLEXURE.

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THE following brief records of two unusual conditions occurring in typhoid fever will be of interest to practitioners.

CASE 1. *Typhoid fever; diphtheria; cerebral softening (acute encephalitis); death on the fourteenth day of the disease; post-mortem infection by bacillus aerogenes capsulatus.*—A man, aged 22 years, was admitted to Dr. Martin's service on the sixth day of the disease. The nervous system was normal. A blood count gave the following result: red cells, 4,210,000 per cubic millimetre; leucocytes, 6900 per cubic millimetre. On the seventh day he developed sore throat, a culture giving a growth of the bacillus diphtheriæ. The patient was isolated and

<sup>2</sup> See The Study of Children, Chapters vii. and xi. (Macmillan).

was given 2000 units of antidiabetic serum. The leucocytes numbered 7000 per cubic millimetre. On the eighth day he was drowsy with quiet delirium; rose spots were present. On the ninth day he was irrational. On the eleventh day the throat was clear of the bacillus diphtheriae (by culture). On the thirteenth day blood culture gave a pure growth of the bacillus typhi abdominalis. The pulse was dicrotic; the spleen was palpable. The patient was semi-comatose but replied if questioned. There were much involuntary twitching of the face, especially of the lower jaw, slight twitching of the hands, and difficulty in swallowing and in protruding the tongue. On the thirteenth day the Widal reaction was present. The leucocytes numbered 6600 per cubic millimetre. On the fourteenth day he was semi-comatose and delirious. He had occasional tremor of the hands. The leucocytes numbered 9000 per cubic millimetre. Chill was noted at 10 P.M. Death occurred at midnight. The temperature varied from 100° to 104° F. The treatment consisted of baths and cold sponging.

*Necropsy.*—This was performed 13 hours after death and at this time the body was bloated beyond recognition by the effects of the bacillus aerogenes capsulatus which crowded all the tissues. Almost the entirety of the left temporo-sphenoidal lobe was occupied by a soft, dark red mass of softening, very definitely marked off from the surrounding tissue. Microscopical examination of the meninges over the temporo-sphenoidal lobe showed intense small-celled infiltration (localised meningitis) and all the cut vessels were thrombosed. The perivascular areas showed even greater inflammatory infiltration than elsewhere. Sections through the brain tissue itself showed much blood, no evidences of nuclei of the original tissue, and a general necrosis with hæmorrhage into its site. There were gaps in the tissue (caused by the gases formed by the bacillus aerogenes), some of the large ones being macroscopic in size. It was thought that the softening was due to embolus (followed by thrombosis) or to thrombosis, though examination of the vessels concerned gave no indication in one direction or the other. The other findings at the necropsy showed the usual lesions of typhoid fever. The ulcers were confined to the last eight feet of the ileum and were very numerous in the last three feet. All the organs showed gas bubbles. No trace of the diphtheria infection was found either by the eye or by the cultures from the fauces.

*CASE 2. Typhoid fever; perforation of the sigmoid flexure on the twenty-eighth day; operation; death on the twenty-ninth day.*—This case was from the hospital service of Dr. W. F. Hamilton and the operation was performed by Dr. A. E. Garrow, to both of whom I am indebted for permission to publish it. The patient, a man, aged 23 years, was admitted on the eighth day of the disease. The Widal reaction was positive on the ninth day. The patient was treated by baths. On the eleventh day he had abdominal pain and distension which recurred at intervals. The course was satisfactory and uneventful and on the twenty-sixth day the temperature touched the normal line. On the twenty-eighth day the abdominal pain recurred and again disappeared. On the twenty-ninth day he complained of severe pain in the lower abdomen. There were tenderness and slight distension of the whole abdomen but no rigidity. An hour later he complained of very severe pain, had rigidity and tenderness of the whole abdomen, and the diagnosis of perforation was made. Operation was performed as soon as possible. At the operation greenish-grey fluid with lymph flakes filled the abdomen and there were no adhesions. The large intestine was distended; a small perforation was found in the sigmoid flexure which was repaired. The patient died a few hours later.

*Necropsy.*—This showed acute general peritonitis, smears from the peritoneum exhibiting streptococci. Cultures gave streptococci and bacillus coli after 24 hours' growth. Typhoidal ulceration began in the ileum, five feet above the ileo-cæcal valve, and the last 18 inches showed many ulcers. The cæcum, ascending colon, and first few inches of the transverse colon contained over 100 ulcers. In the descending colon were four ulcers and perforation had occurred at the beginning of the sigmoid flexure 13 inches above the anus. The sigmoid flexure contained six ulcers, one of which had been reinforced by sutures. The rectum contained one ulcer.

It may be pointed out that at the operation in Case 2 there was a half turn of the sigmoid flexure upon itself, which turn may have helped to increase the distension of this part of the bowel, for the ulcers in the lower parts of

the colon were not generally so deep as those in the transverse colon, which seemed from their appearance to be the oldest and the most severe.

Montreal.

## Clinical Notes:

### MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

#### A CASE OF APPARENT RECOVERY FROM PRESUMABLY MALIGNANT DISEASE OF THE MOUTH.

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I DESIRE to record, for what it is worth, the following very remarkable case.

The patient, who was a man, aged 53 years, consulted me on Nov. 8th, 1904, for what I diagnosed as cancer of the tongue. Till his present illness he had been a healthy man, had never had any venereal disease, is married, and his wife has had no miscarriages or still-births. One sister is said to have died from cancer and another is reported to be suffering from cancer of the breast. About six months before I saw him he began to complain of "sore-throat" on the left side which he attributed to a sharp edge of a tooth which hurt the side of his tongue. This grew worse and he began to have pain which ran up into his ear. Later still there was difficulty in opening the mouth. Just before he came to see me he had a hæmorrhage from the tongue (about a pint), followed next day by a smaller one. There had never been any discharge of pus. He said that he had lost a stone in weight. I found him unable to open his mouth more widely than just sufficient to admit my finger or to protrude his tongue except just beyond the teeth. There was a deep ragged ulcer on the left side of the tongue opposite the last molar teeth, with raised hard edges, very tender, bleeding on examination, and surrounded with much induration, which spread to the gum and anterior pillar of the fauces. He had severe pain, which sometimes amounted to agony at night, radiating to the ear. I could feel no enlarged glands in the neck. I told him that he had cancer and advised him to consult a surgeon at once. He saw four surgeons, all men well qualified to judge of such a case from extensive experience in consulting work. All four diagnosed cancer. Immediate and extensive operation was recommended. He refused this and proceeded to treat himself at home as follows. He took a handful of violet leaves and put them in a basin, pouring over them a pint of boiling water and leaving them to soak for 24 hours. At the end of that time he poured off the liquid and divided it into two equal parts. One part he drank in the next 24 hours and the other part he used for making hot fomentations which he applied continuously outside the neck on the left side for two hours every night. Sometimes he used the leaves themselves as poultices outside the neck. Sometimes he kept the fomentations on all night. He began this treatment on Nov. 10th and was so much better by Jan. 23rd, 1905, that his employers sent him to me to show himself. The change was extraordinary. He looked well. His weight had gone up from 10 stones 3 pounds (on Nov. 8th) to 12 stones 7 pounds. The pain was trifling; he could open his mouth freely and protrude his tongue almost naturally. The ulcer was much reduced in size, its hardness was less, the surrounding induration was greatly reduced, and it was no longer tender or inclined to bleed. On Feb. 20th I saw him again. He had continued the violet treatment just the same since Jan. 23rd. There was almost no pain and except a hard scar very little remained of the deep ragged indurated ulcer of last November.

The violets were sometimes wild, sometimes garden-grown. He thought the latter better because they "tasted stronger." Except the violet treatment absolutely no other remedy had been used, locally or internally. The ragged teeth have not been removed. I believe the man to be absolutely honest. He has nothing to gain by deceiving me and appears only anxious that others should profit by what he considers has cured himself.

I think it will be admitted that I am justified in reporting this case. It proves nothing certainly, because the