THE GULSTONIAN LECTURES ON EPILEPSY.

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LECTURE II.*

I HAVE placed together, in the next group, the bilateral sensations in the limbs and certain general sensations which seem to the patient to be universal. Of the attacks beginning simultaneously in the limbs of both sides, the commencement was in the arms in 11 cases. In 4, it was by a sensation only—numbness, tingling, or pain; in 7, by twitching or cramp, with or without tingling. In most cases, the commencement was in the hands as a whole, as might be anticipated from the wide distribution of the discharge. In 12 cases, the attacks commenced simultaneously in both legs. In half of these, the aura began in the feet, as a tingling, trembling, or creeping sensation. Two of the cases of this group were distinctly due to chronic alcoholism. Auræ referred to the trunk, and not distinctly visceral, are very rare; and the sensation is almost exclusively felt in the back—pain, or a sense of trembling in the spine. The frequency with which there are hystero-epileptic convulsions in these cases differs very strikingly according to the seat of the aura. All the cases with a spinal aura were epileptic, and so were almost all those in which the attacks began in both arms, only 1 of 14 having been hystero-epileptic. But of 11 cases in which the aura was referred to the feet, in only 4 could I be certain that the attacks were epileptic; in 3, they were certainly hystero-epileptic, and in 4, their exact character was doubtful.

The other auræ, grouped together as general—tremor, startings, jerks, malaise, faintness—were described in 51 cases—one-tenth of the whole. General tremor or shivering, present in 13 cases, was associated in 3 with pain in the head. General starts or jerks, the aura in 10 cases were never associated with pain in the head. In several of the cases, the fits occurred during sleep; the patient was awakened by the starts or jerks, and then passed into the fit. General sensations were described as preceding the attacks in 15 cases; a feeling of general illness or malaise, of general powerlessness, of general heat (in 3 cases), of general cold (in 1 case). A sense of faintness, which the patient could not localise, was the aura in 13 cases, and was associated with sweating in 1 case and with giddiness in 3. Almost all the cases commencing with tremor or starting were purely epileptic; whereas among those which commenced by faintness, one-third, and of those commencing by other general sensations, one-half, were hystero-epileptic.

The next group of auræ are those which I have associated as referable to the region of the pneumogastric nerve, including the respiratory part of the spinal accessory. It is not suggested that they have any special relation to this nerve as such. Some of them begin or pass beyond it, but the pneumogastric is the nerve to the organs in which visceral auræ are most frequent, and the majority of these auræ are confined to its functions. These warnings were described in 106 cases.

The commonest form is the so-called "epigastric aura", a sensation referred to the pit of the stomach, present in one-half (51 cases). In a third of these, it was actual pain; in half, it was a vague, indescribable sensation; in the remainder, it was described as a feeling of "burning", of "coldness", of "trembling", of "something there", or of "winding up". In most cases, it was referred to the epigastric region generally; in a few, it was a little to the left; in none to the right. In 2, it commenced lower in the abdomen; in several, it was referred to both the epigastrium and the lower part of the sternum. Whenever the sensation was actual pain, it remained at the epigastrium until consciousness was lost. In many of the cases in which the sensation was vague, it was described as "rising up through the chest" to the throat or head. The passage to the head was usually followed by immediate loss of consciousness; that to the throat by a sensation of choking. The latter reminds us of the well known sensation in hysteria, and in many cases of genuine epilepsy the sensation appears to be exactly the same as the globus hystericus. Not only so, but I have seen a case of tumour of the pons in which the epileptiform convulsions commenced with the same sensation, described as a "ball rising up from the stomach to the throat, and stopping the breath".

* Concluded from page 395 of last number.

In 18 cases in which there was no sensation at the epigastrium, the warning was the choking feeling only. In 2 of these, there was also coughing. In 7 cases, the attacks commenced by some other sensation in the throat. One patient would suddenly exclaim that her throat was sore, grasp it with her hands, and fall in the fit. In 6 cases, there was a sensation of dyspnoea or suffocation, referred to the chest and not to the throat. In 5 cases, there was some other sensation in the chest, vague in 2, "burning" in 3.

These auræ felt in or ascending to the chest and throat, appear to be the expression of a disturbance in the sensori-motor processes connected with the respiratory function of the pneumogastric. I need hardly remind you that spasmodic actions form part of the normal action of the respiratory centre as they do of no other, and must be reproduced in higher and associated centres. The epigastric pain which remains limited to the epigastrium appears to be related exclusively to the gastric division of the vagus. Accordingly we find that in 14 cases there was described, as part of the aura, another sensation referable to the same function—nausea, evidently such after most careful questioning, and accompanied in several cases by actual retching. In 1 case, sudden, intense hunger was described. Other symptoms, often associated with gastric disturbance, accompanied the pneumogastric aura in some cases, as pain in the head and giddiness, the latter especially when there was actual nausea.

Another organ within the innervation of the vagus is the heart, and cardiac sensations constituted the aura in 16 cases, pain in 2, a vague sensation in 3, and palpitation in 11. Hystero-epileptic attacks occurred in a larger proportion of the cases in this than in any other group—one-fourth. They constituted one-fifth of those with an epigastric aura, or with chest dyspnoea, one-half of those with a throat aura, and one-third of those with a cardiac aura.

The next group comprehends the cases, 90 in number, in which the attacks commenced with a sensation of giddiness, vague or definitely vertiginous, or with the fact of rotation. As a rule, when a sensation merely, the direction could not be ascertained; but of 5 cases, the sensation was of turning to the right in 2, and to the left in 3. Of 15 cases with actual rotation, the movement was to the right in 5, and to the left in 10. In nearly all, the convulsion was bilateral. In bilateral fits, the discharge is never quite equal on the two sides, as proved by the common deviation of the head, and the rotation and vertigo seem to be the expression of this inequality. Almost all the cases were epileptic, one-sixth only being hystero-epileptic. In most, consciousness was very easily lost.

Sensations referred to the head preceded the fits in 50 cases. In 21, the sensation was actual pain, mostly general or undefined; in a few, frontal; in very few, vertical or unilateral. It was rarely associated with any other aura. In 29 cases, the sensation was other than pain, usually vague; in a few, definite—described as "blood rushing to the head", "coldness", "burning", or a dim sense of heaviness or pressure. In some cases, it was associated with distinct vertigo, and in others, the cephalic sensation itself was closely allied to vertigo. In one patient, for instance, the sensation was always described as "two circles within the head moving rapidly in opposite directions, and seeming to get alternately nearer and farther off", until consciousness was lost. In one or two cases, a cephalic sensation was associated with an auditory aura, in none with a visual sensation. In one-fourth of the cases with this aura, the convulsions were the hystero-epileptic, and the proportion was nearly the same whether it was a mere sensation or actual pain. Sudden somnolence preceded the fit in five cases, all purely epileptic. Sudden inability to speak constituted the warning in 9 cases, of which 2 were hystero-epileptic.

The aura was psychical in 25 cases, an emotion in 10, an idea in 15. The emotional aura in all took the form of fear—vague alarm or intense terror. Associations with other auræ were rare, the only combinations being with a sensation in the legs, and with pain or other feelings in the head. In no case was it combined with an epigastric sensation. In every case the fits were purely epileptic, although in some they were slight. This is remarkable, since, as we shall see, manifestations of terror are common in hystero-epileptic attacks. The occurrence of this aura bore no relation to fright as a cause of the attacks. Its comparative rarity may excite surprise. No case was reckoned in which the sensation was not mentioned spontaneously by the patient. In most, perhaps in all, cases with a deliberate onset, a natural feeling of alarm is produced by the warning, and if the patient be asked if he have a feeling of fear, he always replies in the affirmative, but this can evidently not be reckoned as a true emotional aura. Of the 15 cases in which the attacks were preceded by a mental state, in 12 they were purely epileptic, in 3, hystero-epileptic symptoms occurred. In most cases, no other description of the aura could be given than that "an idea seems to come into the mind". In one case, that just mentioned

as commencing by a sensation in the great toe, followed by a desire to micturate and a feeling of turning over and over, this was succeeded by the idea of being in heaven, seeing persons, and hearing a question asked. The subsequent fit was certainly epileptic. Several patients described a feeling analogous to that which Dr. Hughlings Jackson has designated "voluminous", apparently similar to that said to be experienced during the act of drowning, a sudden recollection of many past events. Another occasional aura was a sense of strangeness; familiar objects suddenly seemed unfamiliar, and then the attack came on. In one case, whatever was taking place before the patient would suddenly seem to be wrong—i.e., morally wrong—and then he lost consciousness.

The last group of auræ are those referred to the special senses and their organs, which were present in 119 cases. Two-thirds of these (84) were referred to the organ or sense of sight, one-fifth (26) were auditory, 9 olfactory or nasal, and 1 gustatory.

Sensations of smell preceded the fit in 7 cases, all purely epileptic. In most cases, the sensation was of an unpleasant smell. One patient described it as a smell like matter; another, such as is caused by burning dead bodies; another, as like rotten eggs; another compared it to Tonquin beans. The only associations noted were with a visual aura (2 cases) and with a feeling of suffocation (2 cases). A true gustatory aura is among the rarest forms of warning, and was met with in only 1 case. It was described as a taste between sour and bitter, and was referred to the back of the tongue.

The warnings referred to the organs of vision may be divided into five classes; a sensation in the eyeball itself; diplopia; an apparent increase or diminution in the size of objects; loss of sight; distinct visual sensations. A sensation in the eyeball was present in 7 cases, 5 purely epileptic. The eye to which it was referred was in 1 case on the same side as the first motor symptom of the fit; in 1, on the opposite side. It is probable that the centre for common sensation in the eyeball is connected with that for vision. This is suggested by the phenomena of photophobia due to the fifth nerve. In one patient, fits commencing with a pain in the eye were followed by red vision; and in a case of cerebral tumour, presently to be mentioned, a visual sensation and pain in one eye were associated as the aura of the fits. Double vision preceded the attacks in 5 cases. Two were cases of hystero-epilepsy, and the diplopia may have been due to the convergent strabismus common in hysteroid states. In 2 of the cases, however, the attacks were epileptic. In 1, the diplopia was associated with aching in one eye and an apparent magnification of objects. The apparent increase or diminution in the size of objects is a rare and curious aura. It is apparently connected with increase or diminution in the sensitiveness of the visual centre, which produces the same effect on the consciousness as the stimulation of a larger or smaller area of the retina by a larger or smaller image. Loss of sight preceded loss of consciousness in 26 cases—18 purely epileptic, 4 co-ordinated. It was commonly complete and simultaneous in the two eyes. In 1 case, it was said that the sight of the right eye went before the left, followed by rotation of the head to the left. The loss was preceded by a visual sensation in 2 cases, by an auditory sensation in 1, and in 1 case loss of hearing followed the loss of sight. The only frequent associations were with vertigo in 4 cases, and with rotation of the head in 2.

The aura was a distinct visual sensation in no fewer than 46 cases (35 epileptic, 3 with hystero-epileptic symptoms, 8 doubtful). The sensation in 9 cases was that of light, not colour—sparks, a ball of light, a flash, or a glare. In 17, colours were seen; and 15 patients were able to give some account of the colours. In 7, only one colour was seen, and this was always either red or blue—the former described five times, the latter twice. No other colour was ever seen alone. Combinations described were—red and blue twice; red, blue, and purple, once; red, blue, and green, once; red and green once; blue, green, and yellow, twice; red, blue, and yellow, once. Thus not only were red and blue the only colours seen alone, but they were both present in half the cases in which other colours were seen, and in no case were both absent. Taking the cases together, the order of frequency of the several colours is—red (eleven times), blue (eight times), green (three times), yellow (three times), and purple (once). It is evident that this order does not correspond to the physical relations of colour, as shown, for instance, by their grouping in the spectrum; nor does it correspond in any way to the areas of retinal perception. Red, seen most frequently, has one of the smallest retinal fields; but green, seen much less frequently, has a still smaller field; while the field for yellow, seen as rarely as green, is one of the largest, and is nearly the same as the field for blue, which is one of the colours mentioned most frequently. But the order does correspond, not exactly, but in a very suggestive manner, to the degree of visibility of colours. Cohn (BRIT. MED. JOUR., Oct. 4th, 1879) found that the order in which spots of colour, one millimètre in diameter, can be seen in direct sunlight at different

distances is—beginning with that which can be recognised at the greatest distance—red, next blue and green (equal), next yellow, and last violet. This is evidently not far from the order of development in epilepsy.

In 14 cases, the aura was a highly specialised visual sensation, a visual idea. In 2 cases, this succeeded a simple visual sensation. One patient, in attacks of *petit mal*, first saw a number of red and white dazzling stars, and then an old woman and other objects which she could not remember. This is, of course, rather an attack than an aura. But another patient first saw always bright lights—red, green, yellow; and then, the lights continuing, she saw a girl, and tried to get to her to ask what the lights meant, and then fell in the fit. In the first of these cases, the less specialised preceded the more specialised sensation: a sequence to which Dr. Jackson has drawn attention, as suggesting that the more special sensation is the result of the loss of control from the discharge causing the less special sensation. But in the second the more and the less specialised sensations occurred together; and, in other cases, an equally special sensation, a visual idea, constituted the sole warning of the fit, and must be ascribed to the discharge itself. Two patients had visions of an old woman, and in 3 ugly faces were seen, and in 2 "various people"; in 1, "animals". Two patients described an aura consisting of visions of objects and places familiar long ago: a visual sensation analogous to the psychical aura I have mentioned. In one patient, the fits were preceded by a vision of "beautiful places, large rooms", etc.

Associations of the visual aura are comparatively rare. In 3 cases the conjoined aura was in the limbs, and, as already mentioned, in all these the aura in the limb commenced by a sensation. One of these was the case in which a flash was seen as soon as a pain, which commenced in the arm, reached the middle of the thigh. When the visual sensation was unilateral, the side in several was the same as that on which the limbs were involved. Thus, in 1 case, some fits commenced with the appearance of a blue star before the left eye, which grew larger and larger until consciousness was lost, and other fits began in the left arm, and others in the left leg. In another patient, a bright light referred to the right eye was associated with loss of speech. In these cases the sensation may have been rather referable to one side of both fields of vision than to one eye. Epigastric sensations were associated in 3 cases, and in 3 an auditory sensation. The sensations in one patient were very complex and numerous, and, as I shall have to refer to it again, it may be well to relate the case in some detail. The patient was an intelligent man, twenty-six years of age, and all his attacks began in the same manner. First there was a sensation in the left hypochondriac region "like pain with a cramp"; then, this sensation continuing, a kind of lump seemed to pass up the left side of the chest, with a "thump, thump", and when it reached the upper part of the chest it became a "knocking", which was heard as well as felt. The sensation rose up to the left ear, and then was like the "hissing of a railway engine", and this seemed to "work over his head". Then he suddenly and invariably saw before him an old woman in a brown-stuff dress, who offered him something which had the smell of Tonquin beans. The old woman then disappeared, and two great lights came before him—round lights, side by side, which got nearer and nearer with a jerking motion. When the lights appeared the hissing noise ceased, and he felt a choking sensation in the throat, and lost consciousness in the fit, which, from the description, was undoubtedly epileptic. He had also attacks of *petit mal*, which consisted of a vision of a dull red ball to the right in the lower part of the field. Thus here we have first a pneumogastric (visceral) sensation, which becomes intermittent and sound-like as it ascends towards the ear, until it is finally an intermittent hissing, perhaps the least specialised of all the auditory sensations. This is accompanied by a visual sensation of very high specialisation—a visual idea associated with an olfactory sensation. This gives place to a much less specialised sensation—the two lights, and, as the visual centre becomes invaded by this discharge, that in the auditory centre ceases. Finally, the aura terminates with the completion of the pneumogastric sensation—a sense of choking. I shall have to refer to this case again in my next lecture, and will now merely point out that the more specialised visual sensation preceded the less special, and therefore cannot have been due to "loss of control" by preceding discharge; it was evidently due to the discharge itself. The phenomenon of two lights before the eyes is one of great rarity among the auræ of epilepsy. Lastly, the association of intermission of the sound with a jerking movement of the lights is worth remark. The only necropsy which I believe has been published of a case in which the visual warning existed is one which I recorded about a year ago. The fits were preceded by a flash of light or pain in the eye, and micropsy, and were due to a tumour in the occipital lobe, which had extended forwards as far as the visual centre in the angular convolution.

To pass to other forms of auditory warnings, noted in 26 cases. In 6 there was an auditory loss, a sudden sense of stillness analogous to the sudden loss of sight already mentioned. In 1 case, the two were associated; for a moment all was silent, then all was dark, then consciousness was lost. In a case in which the sensation began in the tongue and passed to the arm and leg, sight was lost after the arm was involved, and hearing after the sensation was felt in the leg. In 1 case some attacks were preceded by an auditory sensation, "singing in the ears"; others by an auditory loss. Auditory sensations preceded the fits in 21 cases. In 4 it was a sensation of an explosion or crash; in other cases the sensations described were "the sound of a drum" (twice), a "whiz" (twice), a "hissing" (twice), a "ringing" (twice), a "rustling" a "rushing sound", and a "sound of thunder". All these may be regarded as the lowest forms of auditory sensation. In 3 cases the sensation was more special—an auditory idea. One patient always heard the words "c-o-n with a con" repeated several times, and then came the fit. In 2 cases music was heard. The most frequent associations of the auditory aura were with a visual aura (in 7 cases), and an olfactory aura (in 2 cases). In two cases it was associated with a sensation beginning in the left hand, and other combinations noted were with auræ beginning in both legs, in both arms, with vertigo, an epigastric sensation, and nausea. In the 3 latter, we may trace the normal association of the auditory centre. In several cases in which a visual and auditory aura were combined, the two corresponded in character—*i. e.*, in their degree of specialisation. For instance, one patient described a red light and a rushing sensation like water. The patient who heard the words "c-o-n with a con" saw a girl standing by her who was saying them, and a patient who saw "beautiful places, large rooms, etc.", heard at the same time "beautiful music". The association of the visual and auditory warnings is well explained by the contiguity of their centres as determined by Ferrier. The angular gyrus, in which is the visual centre, is continuous with the superior temporo-sphenoidal convolution, in which is the auditory centre. I am aware of no published *post mortem* examination of a case in which an auditory aura preceded the fits; but in a case of cerebral tumour of Dr. Hughlings Jackson's (which I had the opportunity of watching with him for some years, and which he kindly permits me to mention), a sound of bells ringing, referred to the left ear, preceded left-sided fits in an early period of the disease. After death, we found a tumour outside the opposite optic thalamus. It was extensive, but had evidently commenced between the thalamus and the upper temporo-sphenoidal convolution.

Dr. Hughlings Jackson has suggested that the senses are not equally represented on the two sides of the brain, and that the more special the sense the more unequal is its bilateral representation, the more does it preponderate on the right side. The facts of this series of cases give only a partial support to this view. We have seen that attacks commencing by a sensation in the arm began twice as frequently in the left arm as in the right. Nevertheless, all the cases commencing by a sensation in the tongue were right-sided. In none of the cases with an olfactory aura was there any indication of the side which led in the fit. In most of the cases with an auditory aura, the sensation was referred to both ears. In 6 cases, however, it was referred to one ear, twice to the right (left side of the brain), and four times to the left (right side of brain). But in 10 cases in which visual sensations commenced the fit, in which there were indications of the leading side, there was no difference between the two; in 5, the fits began on the right, and in 5 on the left side; and we must regard the visual as perhaps the most special of all the senses. Among the other symptoms of the attacks of epilepsy in this series of cases, time permits me to mention only one or two points. The first of these is that pallor of face, although frequent in the early stage of epileptic fits, is also entirely absent in a considerable number of cases. I have watched many attacks, both slight and severe, in which there has been absolutely no change in the appearance of the face until cyanosis came on from interference with respiration.

A typical fit consists of first tonic and then clonic spasm. It has been customary to separate the periods marked by these two forms of spasm, and assign them to different causes. But close observation will show that there is no abrupt transition from one to the other. The clonic spasm is developed by interruptions in the tonic spasm, and these interruptions may be detected by the hand before they are visible to the eye. The clonic spasm is, indeed, only a condition of tetanus in the physiological sense of the word. Slight intermissions probably exist, but are too frequent to be recognised. As they become less frequent, they increase in degree, until they become complete. The muscular contractions are thus separated; as the fit ceases, they do not become slighter, but less frequent, and the last jerk is often as intense as any which preceded it. In partial epileptiform seizures, the spasm is usually clonic throughout; and I have seen, in rare instances, tolerably severe attacks in which all the spasm was clonic. The significance of

these facts will be considered in the next lecture. There is one class of epileptic attacks in which there is only tonic spasm—general rigidity. They constitute, however, a special group, and are on the side of epilepsy towards hystero-epilepsy.

In the spasm of an epileptic fit, flexion predominates slightly over extension, and more in the distal than in the proximal parts of limbs, at least in the arms. The hands are said to be usually tightly clenched. Sometimes this is the case; but a much more common position is with the wrist strongly flexed, and the fingers in the interosseal position, that is, with the metacarpo-phalangeal joints flexed and the others extended, the thumb being within the fingers, and all close together. It is an exaggeration of the posture seen in tetany.

The cases which present co-ordinated spasm as part of the attack, and which may be somewhat loosely grouped together under the name of hystero-epilepsy, are of much interest on account of their practical importance, and on account of the attention which has lately been directed to them. These forms of attack present many variations, and, as seen in this country, differ somewhat in their character from that which they present abroad. Attacks of these forms have long been described as hysterical. But their severity, their epileptoid aspect, have led to their being designated by such terms as hystero-epilepsy, hysterical epilepsy, and Dr. W. Roberts has lately proposed to call them hysteroid. They have unquestionably close relations with epilepsy. They own for the most part the same causes, near and remote; are, as we shall see, pathologically connected with epilepsy; and, as stated in the first lecture, many of them have almost certainly been included in all published statistics of epilepsy. They have also relations with insanity as well as with hysteria in its simpler forms.

The cases which have come under my notice may be grouped into four classes. The first and most frequent is that which resembles the most closely the description of hysteria major given by Charcot. A patient suddenly falls, apparently unconscious, and, sometimes after a brief period of tonic rigidity, sometimes instantly, presents more or less violent co-ordinated movements, extreme opisthotonos, wild movements of the limbs, which are sometimes jerked quickly, regularly or irregularly, more often thrown about. Often the opisthotonos alternates with simple tonic spasm, in which the arms are stretched out at right angles to the trunk, in the attitude designated by Charcot "crucifement". The eyes converge strongly, or are rolled up, or directed to one side or the other. They never diverge. Often the paroxysms of violent movement alternate with manifestations of the most intense terror. The eyes are fixed on some imaginary object, as with a look of horror the patient half rises or tries to shrink away. In a moment, convulsive movements of frenzied intensity succeed. The head is dashed about with such violence as often to inflict serious bruises, and the back is arched with such rapidity and force as almost to make the patient bound off the bed; the attempts to restrain the movements increase their violence. The more restraint used the more is needed, and these are the attacks in which the friends of a patient sometimes tell us that "six persons have to sit on him to keep him down". The violent paroxysms often alternate with periods of tranquillity, in which, however, peculiarities in tone and aspect tell those accustomed to these attacks that the fit is not yet over, and presently a fresh paroxysm of terror or furor comes on, and, if not cut short by treatment, the condition may go on for hours. The end is unusually sudden, often with a deep sigh. These attacks vary infinitely in severity and character. When slight, they resemble, and are indeed identical with, the attacks properly called hysterical. When severe, they resemble epileptic mania rather than hysteria, and might indeed be called attacks of compressed mania. In slighter paroxysms, the patients may talk wildly. One patient always counted backwards with extreme rapidity. In some cases, especially in children, the patients scream loudly throughout; these are the "screaming fits" of which the friends speak. In severe seizures, a curious condition is often observed, which may be called therio-mimicry. The noises and actions of animals are strangely imitated. The patient mews like a cat, or, much more frequently, barks like a dog. This is evidently in part mimetic, although some patients who present the symptom are, in the intervals between the attacks, as far as possible removed from any absurdity. But it seems to be, in part also, the manifestation of some strange animal instinct which we possess in a latent or modified condition, like our canine teeth. A frequent characteristic is the tendency to bite, which may exist apart from any other imitation of animals. It renders the task of attending to these patients in the attacks not wholly devoid of danger. Not only do they bite, but they do so in a curiously animal manner. I have seen a lad of sixteen take the corner of his pillow between his teeth, and shake it exactly as a cat does a mouse, or as the lion shook Livingstone. We are reminded by the barking and biting of some of the symptoms of hydrophobia; and one effect of the poison of rabies in man appears to be to develop a condition identical with hystero-epilepsy, and the con-

vulsions of hydrophobia are always more or less co-ordinate in character. Such symptoms as I have described may probably succeed a true epileptic fit. They may also succeed attacks of *petit mal*. But the co-ordinated convulsion may also, as I have seen, commence in the first moment of the attack. The tonic rigidity, which often initiates these seizures, is different from the condition in a true epileptic fit, although apparently nearly the same as that which Charcot has described as the epileptic stage of these fits.

In women suffering from these attacks, I have occasionally found ovarian tenderness, and by ovarian pressure I have often made the patients feel ill, and caused choking sensations in the throat, but I have never succeeded in producing an attack. Nor, of many gentlemen who have practised ovarian compression at the Salpêtrière, and tried it on the hystero-epileptics at Queen Square, has anyone, as far as I am aware, been more successful. Now and then, I have arrested a fit by ovarian compression, but the arrest has appeared to be due merely to the pain caused, and not to any special influence; and, in such cases, the attacks could be cut short much more readily by faradisation of the skin. In one of the most severe cases of hystero-epilepsy which I have seen, Dr. Wilson of Surbiton found that at first ovarian compression had no effect; after many repetitions, in different attacks, it did arrest them, but even then less readily than compression at the epigastric region. Another point of difference from the disease as it occurs abroad is that, in the natives of this country, it is never, so far as I have seen, accompanied by any erotic manifestations. Such attacks occur in girls of any age over seven, in women under forty, in boys not at all rarely, and occasionally in adult men. Some of the severest attacks which I have seen have been in men between twenty and thirty-five. They frequently come on during sleep.

In the co-ordinated attacks just described, opisthotonos is frequent. A second variety presents, as its predominant characteristic, spasms of the opposite variety, emprostotonos. The trunk is flexed, so that the head and thighs are in contact. This form occurs chiefly in boys, and is usually very uniform in its occurrence, all the attacks being similar. One patient, a woman, whose attacks came on in the night, always woke up from sleep with a sensation of this spasm, although there was in reality merely general tonic rigidity. A third variety presents co-ordinated spasm in the legs of regular rhythm. During the attack, the legs are alternately drawn up and pushed down, the patient being commonly on her back. If on the floor, she may be gradually propelled, head foremost, from one side of the room to the other. Several cases which I have seen have presented singular uniformity in the character of the spasm. All were females. Identical convulsive movements in the legs have been observed in hydrophobia. A fourth variety of attack is characterised by extreme difficulty of breathing, not the rapid breathing sometimes observed in hysterical patients, but intense respiratory spasm. They are the "choking fits" of adults. It is no doubt an extreme degree of the disturbance, which in slighter measure causes the globus hystericus. Since this variety is rare, I may describe briefly an example of it. The patient was a quiet well-conducted girl. She was unconscious of any warning, but an observer could note a slightly frightened expression and restless movement of the eyes just before an attack; then she would suddenly fall, and instantly begin labouring for breath. If placed on a chair, she could sit up, but the agony of dyspnoea was extreme. Her head was thrown back, her mouth half open, her arms held out before her with fingers separated; the muscles of inspiration were thrown into violent action, and a choking noise in the throat accompanied each laboured breath. From time to time, there was an ineffectual attempt to swallow, and she would strike the upper part of the chest with violence, as if trying to shake something down. Her face became rapidly flushed, then dusky, and the dyspnoea increased, until she seemed on the point of suffocation. By closing the mouth and nose, and so producing actual apnoea, the spasm could generally be stopped, but her aspect was wild, and she spoke strangely, and in a few minutes passed into another similar paroxysm. Even if placed under the influence of chloroform, the dyspnoea returned as the effect of the anæsthetic passed away, and, if not stopped by means to be described in the next lecture, such attacks would go on for hours. It is instructive to compare the features of such an attack with the other well-known forms of respiratory spasm—the globus hystericus, the epigastric-throat aura of epilepsy, the paroxysms of laryngismus stridulus, and the respiratory spasm, which constitutes so prominent a feature in the symptoms of hydrophobia. The relation which attacks of the co-ordinated class bear to epilepsy and to hysteria is a subject on which various opinions may be and are held, and to which I hope to refer briefly in the next lecture, in considering the pathology of these diseases.

DR. MATHEW JOSEPH KEHOE has been elected Surgeon to St. Vincent's Hospital, Dublin, in the place of the late Mr. O'Leary, M.P.

THE CROONIAN LECTURES ON SOME POINTS IN THE PATHOLOGY AND TREATMENT OF TYPHOID FEVER.

Delivered before the Royal College of Physicians of London.

By WILLIAM CAYLEY, M.D., F.R.C.P.,

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LECTURE I.*

ADMITTING, then, that in all probability typhoid fever never arises *de novo* from decomposing sewage, and that, whenever it spreads from the sick to the healthy, it is by a process of indirect infection, it still remains to be considered whether this is the only way in which the disease may originate or become disseminated. To this question, I think we are compelled to give a negative answer. Several outbreaks have now been recorded which have been ascribed to eating diseased meat. And although in some of these considerable doubt has been expressed as to the real nature of the disease, in others I think the evidence is quite decisive.

The first of these outbreaks on record is the well-known one which occurred at Andelfingen, in the canton of Zürich, in 1839. On July 10th of this year, the Local Choral Society held a festival meeting, after which, 513 persons of all ages sat down to a cold collation, consisting chiefly of veal and ham. It was noticed at the time that neither the veal nor the ham was perfectly good. Some portions of the former had a greenish colour and a disagreeable smell; the ham, also, is said not to have tasted well. But most of the guests observed nothing amiss, and ate heartily. Of the 513 persons who partook of this collation, 421 were subsequently attacked by an acute febrile disease, which was regarded at the time as typhoid. Thirty-four inhabitants of Andelfingen were also attacked who had taken no part in the choral festival, but all of whom, it was ascertained, had been supplied by the same butcher who had furnished the veal and ham for the festival. The day after the festival, there was a wedding in the neighbourhood of Andelfingen, at which fifteen persons were present, only one of whom had attended the choral meeting. The meat—veal and beef—for the wedding breakfast was supplied by the same butcher. Of these fifteen persons, eleven were attacked. The period of incubation of this epidemic was very variable. A few were seized with nausea and vomiting on their way home, but this was ascribed to their having drunk too much wine. Out of 230 cases in which the incubation period was ascertained, 43 were taken ill during the first five days, 123 during the second five days, 48 during the third five days, and 16 during the fourth five days, 6 being attacked on the nineteenth day. The symptoms were those of severe gastrointestinal irritation, with high fever, delirium, stupor, congestion of the lungs, and great prostration. No rose rash was observed, but in some cases there were petechiæ. The duration of the milder cases was about eight days; of the severer ones, three to four weeks. Convalescence was slow, and often the hair fell out. The mortality was slight; and, on *post mortem* examination, in some cases there were infiltration and ulceration in the lower part of the ileum, with enlargement of the spleen; in others, these changes were not observed. There can be no doubt as to the meat having been the cause of the epidemic, as only those persons who had partaken of it were attacked, while a very large number of persons from all parts of the canton were present as singers or spectators who did not share in the collation, and they all escaped. But great doubts have been expressed as to whether it was really typhoid fever, or a form of poisoning resembling sausage-poisoning.

In 1845, a similar epidemic occurred at Thalweil, though on a much smaller scale. The particulars of this I have failed to obtain, as the journals containing it are out of print. But eight out of ten persons were attacked with what was believed to be typhoid fever after eating bad veal.

A third epidemic due to the same cause, and which was undoubtedly typhoid fever, occurred at Kloten, a place about seven miles north of Zürich, in 1878. On Ascension Day, June 30th, a festival was held of the united choral societies of the district, together with choirs from Zürich and Winterthur. The festival collation was furnished by the landlord of one of the inns, who himself was attacked by the epidemic. The food supplied consisted of ragout of veal, roast veal, and veal-sausages. The meat, which came from various sources, was hung up in the meat-room of the inn, and, the day before the festival, was partly

* Concluded from page 393 of last number.