A CONTRIBUTION
TO THE
PATHOLOGY OF THE CRURA CEREBRI.

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AFFECTIONS of the crura cerebri are on the whole of rare occurrence, and especially those which are uncomplicated with other affections of the brain and medulla oblongata, and which thus throw light on the functions and pathology of this portion of the brain. I, therefore, venture to communicate to the Society the following case of hæmorrhage into the left crus cerebri, and will afterwards compare the symptoms with those observed in similar cases, and with the results of vivisections.

Summary.—C. L—, a man, æt. 52, affected with disease of the aortic valves, and rigidity of the arteries, had headache and disturbed sleep during the last years of life; was about two months before death, suddenly seized with paralysis of the right side of the body, and of the muscles supplied by the third nerve of the left side; died of broncho-pneumonia, especially of the right side, after slight but perceptible improvement in the phenomena of paralysis.

Post-mortem examination.—Hæmorrhage into the internal

and inferior portion of the left crus cerebri, with partial degeneration of the third left nerve.

C. L—, æt. 52, a temperate man, of sedentary habits, had in his fortieth year severe rheumatic fever, since which time he frequently felt shortness of breath, and palpitation of the heart. During the last two or three years of his life he suffered occasionally, for days, from headache, and often had tinnitus aurium; but not to such a degree as to render him anxious. The sleep, too, which formerly had been sound, was of late often disturbed by anxious dreams.

On May 8th, 1862, soon after a moderate dinner, and immediately after having returned from a short walk, and having sat down on a chair, he felt suddenly giddy and faint; he said this in a rather indistinct voice to his wife, who “saw him get up from the chair with a pale and ghastly appearance, and in the same moment fall down on his right side.” The wife at once endeavoured to raise him, but he again would have fallen, if she had not supported him “For a few minutes he seemed unconscious, and unable to speak in an intelligible manner, but he soon recognised those around him, and spoke distinctly, although his voice was rather thick. The face looked strange, the mouth was all on the left, and the eyes turned in different directions.”¹

After a few hours the patient was seen by Mr. Stuckey, of Wellclose Square, who found him perfectly conscious, and noticed a complete paralysis of the right side from the face to the toes, ptosis of the left upper eyelid, and squinting; the pulse weak and irregular. Mr. Stuckey ordered the patient to be kept perfectly quiet, and gave him draughts of citrate of ammonia. On May 9th, the bowels being costive, he gave, in addition, six grains of Pilul. Coloc. comp., with four of Pil. Hydrargyri.

On May 10th, I saw the patient in consultation with Mr. Stuckey, and took the following notes.

¹ The words between the inverted commas are, as nearly as possible, those of the wife, an intelligent woman, when she related to me the occurrence in the presence of Mr. Stuckey.

Patient is of middle stature, good muscular development, of rather dark complexion, and pale. Posture on back. Face considerably drawn to the left, the right side hanging and almost motionless. Drooping of the left upper eyelid, and distinct squinting. A more accurate examination of the eyes shows that the right obeys the will, while the left is entirely motionless except in two directions, viz., in the horizontal direction from inwards outwards (the movement being very limited, as the cornea even in the state of rest is turned outwards), and round its own axis, in such a manner as to move the white from the outer corner upwards, from above inwards, from the inner corner downwards, and from below outwards, but not in the opposite way, or in other words, from outwards upwards, but not downwards. The cornea of this eye (the left) is always turned perceptibly towards the external corner, and can by no force of the will be turned either to the centre, or upwards, or downwards. There exists, therefore, on the left side paralysis of the third nerve, with immunity of the fourth and sixth nerves.

Both pupils are rather wide; the left is however much wider than the right; both contract imperfectly under the influence of light, the left much more so than the right.

The vision with both eyes combined is not always correct. He relates himself that, since the seizure, most objects of moderate size have a kind of shadow at their left side; that small objects appear sometimes double, the image to the left being, however, much dimmer than the other; and that, when he looks more attentively at the object, the shadow or the second image disappears. Some experiments made by Mr. Stuckey and myself proved this description to be correct, and showed in addition that the error in vision occurred only in looking at objects in a certain distance, while the same objects when moved farther away, or nearer to the eyes, were seen correctly. Thus, a large pin hung up in the distance of about a foot from the middle line, was repeatedly seen double, with the dimmer object to the left, but when held up in a greater distance, or nearer to the

eyes, it was always seen as only one object, and even in the distance of a foot it was seen single, as soon as the patient concentrated his attention on it.

Vision with the right eye alone is perfect; with the left eye alone it is less good; but yet print in moderately large characters is easily read when held at a certain distance. The range of distinct vision is much smaller for the left eye than for the right. Before the seizure both eyes had been, according to the patient's assurance, equally good.

The tongue, when protruded, points to the right side; the right half is furred, the left almost clean. The uvula is drawn to the left; the right half of the soft palate is pendulous.

The senses of smell, taste, and hearing are unaffected.

The sensibility of the right half of the face is much less acute than that of the left.

The right arm and leg are perfectly motionless, and their sensibility is very dull. The patient feels the paralysed limbs warmer, but to the hand no difference between the right and the left side is perceptible.

The muscles of the right side of the thorax, although not paralysed, act less vigorously under the influence of the will, than those of the left. Thus the left side measures from the middle of the sternum across the nipple to the spine after expiration $44\frac{1}{2}$ centimeters (about $17\frac{5}{16}$ inches), and expands during deep inspiration to $47\frac{1}{2}$ centimeters ($18\frac{7}{16}$ inches); the right side, measured in the same manner, yields after expiration 45 centimeters (about $17\frac{7}{16}$ inches), and expands during a deep inspiration to scarcely $47\frac{1}{2}$ centimeters (not quite $18\frac{7}{16}$ inches).¹

The mental conditions are otherwise normal, but the sleep is much disturbed by anxious dreams. A dream

¹ The measurement was taken five times, and the expansion by a deep inspiration was always greater on the left side; the average difference was rather more than $\frac{1}{2}$ centimeter (rather more than $\frac{1}{16}$ ths of an inch), the minimum being $\frac{1}{4}$ th, the maximum rather more than $\frac{3}{4}$ ths centimeter. During calm (involuntary) respiration no difference was perceived in the expansion of the two sides during inspiration, $1\frac{1}{2}$ centimeters (about $\frac{1}{16}$ ths of an inch) being the average expansion of either side.

which almost regularly recurs is that of falling from a great height.

Deglutition normal ; the action of the intestines is very sluggish ; the bowels, which formerly had been regular, have not been moved since the day before the seizure, in spite of strong aperient medicines administered during the last two days.

The phenomena of respiration are normal in both lungs.

The examination of the præcordial regions manifests the signs of old disease of the aortic valves with hypertrophy of the left ventricle ; the arteries are rather rigid ; the pulse is 62 to 65 per minute, rather irregular, and has the jerking character peculiar to insufficiency of the aortic valves (regurgitation).

Micturition is unaffected. The urine is passed in moderate quantity, is acid, of high specific gravity (1030), deposits lithates, and contains neither albumen nor sugar.

Treatment.—Rest of mind and body. Head in raised position. Moderate amount of easily digestible food.

Pilul. Colocynth. comp. gr. x, ad gr. xv nocte, si opus sit.

On May 13th, I saw the patient again, and found the general health, the action of the heart, the lungs, the kidneys, and the skin, as on the 10th ; the obstinate constipation continued up to this morning, when the bowels were moved for the first time, and only once, after fifteen grains of Pilul. Colocynth. comp. administered last night, and three ounces of Infus. Sennæ comp., with a drachm of sulphate of magnesia given early this morning. The tongue when protruded pointed still to the right, and the fur was limited to the right half. The muscles of the right side of the face were rather less relaxed than on the 10th ; the action of the muscles of the left eye unchanged ; that of the right arm and leg scarcely improved, the expansion of the right side of the chest, too, manifested still the same defect. The patient complained of spasm in the right leg, and especially in the great toe ; all the toes were in a state of extension, but the great toe was most drawn back, and it required some

force to bend them ; there was, on the whole, some degree of rigidity in all the muscles of the right arm and leg which, however, became only perceptible when we tried to bend and extend them.

With regard to sensibility, the difference between the two sides, measured by Sieveking's aesthesiometer, was as follows. The distance of the two points necessary to cause distinct perception was,

	On the left side.	On the right side.
Chin	$\frac{3}{10}$ in. (7·6 mm.)	$\frac{6}{10}$ in. (15·2 mm.)
Middle of the cheek.....	$\frac{5}{10}$ in. (12·7 mm.)	$\frac{9}{10}$ in. (22·8 mm.)
Point of the index finger (palmar surface).....	$\frac{1}{10}$ in. (2·54 mm.)	$\frac{4}{10}$ in. (10·1 mm.)
Middle of the back of the hand, longitudinal diameter	$1\frac{8}{10}$ in. (33·0 mm.)	4 in. (101·6 mm.)
Middle of the back of the hand, transverse diameter.....	$\frac{6}{10}$ in. (15·2 mm.)	$1\frac{3}{10}$ in. (33·0 mm.)
Middle of the back of the foot, longitudinal diameter	$1\frac{6}{10}$ in. (40·24 mm.)	Over 4 in.
Middle of the back of the foot, transverse diameter	$1\frac{1}{10}$ in. (27·9 mm.)	(over 101·6 mm.) $3\frac{3}{10}$ in. (91·6 mm.)

The sensibility was tested on several other points of the limbs, and was everywhere found at least three times less acute on the right side than on the left. There was also a marked difference between the two halves of the trunk, but less great than between the limbs. If this examination had been made on the first day after the seizure, the difference between the two sides would probably have been much greater, as it appeared, not only to Mr. Stuckey and myself, but also to the patient, that some improvement had taken place in this respect during the last days.

Again the patient mentioned that he felt the right arm and leg warmer than the left ; and although there was scarcely any difference perceptible to the hand, yet, by means of a finely divided thermometer (of Geissler in Berlin) the temperature in the right axilla, and in the bend of the elbow, was found 0·5° Centigrade (0·9° Fahr.) higher than in the same places of the left side, both arms having been covered in the same manner before the examination. In the right axilla the temperature was 37·0° Centigrade (98·6° Fahr.), in the left 36·5° Centigrade (97·7° Fahr.); in the bend of the elbow the figures were slightly lower.

The left pupil is about three times as wide as the right, the diameter of the latter appearing now quite normal, or even slightly narrower than usual ; the contraction of the left pupil is less perfect than that of the right.

The vision, with both eyes combined, is less disturbed than it had been at first ; there is now no double vision at all, and only rarely a shadow, although the axes of both eyes still diverge almost as much, if not quite as much as on the 10th. The vision with the left eye alone is still rather "hazy" and inaccurate, except for large objects and for certain distances ; the accommodation with the right eye appears much more rapid and perfect than with the left.

Treatment—as before, substituting only *Pilul. cambogiæ comp.*, for *Pilul. Colocynth. comp.*

On May 25th the face, with the exception of the eyes, is almost symmetrical when at rest, but when animated, as in conversation, the right side moves less than the left ; the tongue is protruded almost in the middle line, pointing only slightly to the right ; the fur on it is much more equally distributed ; both sides of the soft palate are almost equal. The muscles of the left eye supplied by the third nerve are but slightly more active than they were on the 10th ; the squinting is still quite distinct, although rather less so than before.

Has had repeatedly, during the last eight or ten days, a dull but not violent pain in the left temple and forehead ; is now free from it.

The paralysis of the limbs as to motion is just perceptibly diminished, the patient being able to move the fingers and toes slightly ; there is still some rigidity in the muscles of the right side ; the muscular irritability, tested by electricity, seems rather greater in the paralysed than in the sound limbs, but the difference, if any, is scarcely perceptible.

The sensibility in the paralysed side is decidedly improved. The distance of the points necessary to cause distinct perception, is—

	On the left side.	On the right side.
Chin	$\frac{3}{10}$ in. (7·6 mm.)	$\frac{5}{10}$ in. (12·7 mm.), had been $\frac{6}{10}$ in. on May 13th.
Middle of cheek	$\frac{7}{10}$ in. (12·7 mm.)	$\frac{7}{10}$ in., or rather more (18 mm.), had been $\frac{8}{10}$ in. on May 13th.
Point of index finger, palmar surface	$\frac{1}{10}$ in. (2·54 mm.)	$\frac{3}{10}$ in., or rather less (about 7 mm.), had been $\frac{1}{10}$ in. on May 13th.

No difference is perceptible, by the thermometer, in the temperature of both sides. The bowels are still very costive.

The patient continued, according to Mr. Stuckey's report, to improve steadily, though slowly, in every respect, until about five weeks after the last report, when he was suddenly seized with rigors, followed by the symptoms of pleuro-pneumonia of the right side, and died eight days later before I had seen him again. The phenomena of the paralysis had not been perceptibly affected by the last illness.¹

Post-mortem examination.—Thirty-four hours after death. Cadaveric rigidity on both sides slight. The muscles of the limbs of the right side thinner than those of the left; no marked difference between both sides of the trunk.

The abdominal organs offer nothing abnormal.

The right lung is adherent by fresh layers of lymph, and there is about half a pint of sero-purulent effusion in the right pleural cavity; the greater portion of the same lung exhibits the phenomena of recent broncho-pneumonia. The upper lobe of the left lung is normal, the lower lobe is congested, and a small portion of it shows likewise traces of broncho-pneumonia. The left ventricle of the heart is much hypertrophied; the aortic valves are considerably thickened and rigid (stenosis and insufficient closure); the lining membrane of the aorta contains many atheromatous spots; the anonymous trunk, carotid, subclavia, and aorta descendens are felt on several spots thickened and rigid.

The cranium, dura mater, and arachnoid membrane

¹ It ought to be mentioned, that the patient had been in the habit of riding in an open carriage during the last eight or ten days before the appearance of the inflammatory chest symptoms, and that the latter first manifested themselves three days after a long drive, when the patient had felt chilly.

are normal. The subarachnoid serosity is slightly increased in quantity, it occupies the intergyral spaces, and scarcely raises the arachnoid from the surface of the convolution; it is almost equally distributed over the convex surface of the hemispheres and over the base, and is quite transparent. The pia mater contains a moderate quantity of the just described fluid in its meshes, and is everywhere easily separable from the brain without any loss of substance. The sinuses of the dura mater contain a moderate amount of slightly coagulated blood.

In examining the base of the brain, the basilar artery is found to be rather rigid, and to contain several atheromatous spots; and a similar condition is met with in the cerebral portions of the internal carotid, and also in the middle and posterior cerebral arteries of the left side. The substance of the hemispheres, and of their ganglia and commissures, the ventricles, and their contents, offer nothing abnormal.

The left crus cerebri looks very slightly fuller than the right, the colour being, however, scarcely different in both; the third nerve of the left side is just perceptibly pushed towards the right. In making a horizontal section through the centre of the lower part of the crus, an oblong clot of blood is discovered in its internal half, which clot is about 0·6 inch (15·0 mm.) long, about 0·25 inch (6·3 mm.) broad, and almost as deep; it is situated very close to the internal and inferior surface, being separated from it by only a thin layer of nerve-substance; its commencement is immediately in front of the pons. (The accompanying sketch shows the situation and outlines of the clot.) The blood is of dark colour and rather dry, *i. e.*, less fluid and soft than a newly formed clot. The surrounding tissue is tinged yellow to the depth of about $\frac{1}{15}$ inch (1·8 mm.), and more tense than the remainder of the substance of the crus. No membrane can be recognised round the clot. To the naked eye there is no difference in the appearance of the third nerves of the two sides. Both optic nerves look quite natural.

The microscopic examination of the clot manifests many shrivelled blood-globules, besides many apparently unaltered

ones. The surrounding yellowish and tense tissue contains scarcely any nerve-fibres, but much connective tissue. In the left third nerve many oil-globules, and granules of various size, and also small granular corpuscles, are found, which are absent in the right nerve; the nerve-fibres in the left nerve are scanty and broken down. No difference is found in the microscopic appearance of the optic nerves of both sides.

The cerebellum, the corpora quadrigemina, the pons and medulla oblongata, offer nothing abnormal.

With regard to the Diagnosis, this case belongs to the rarer class of cerebral affections, in which an almost accurate diagnosis is comparatively easy. Sudden paralysis of the right side of the body, with immunity of the mental faculties and special senses, and paralysis of the third nerve of the left side, were the prominent facts, pointing unmistakably to an affection near the base of the left hemisphere and near the origin of the third nerve. The fact that none of the other cerebral nerves of the same side was affected, demonstrated that the morbid condition was confined to a small spot. I thought at first of an aneurism close to the inner side of the left crus, but the circumstance that the paralysis of the right side was so complete, soon rendered it more probable that some hæmorrhage or other morbid process had taken place within the substance of the crus cerebri; and the bursting of a blood-vessel externally to the crus appeared still more unlikely by the consideration that it would most likely have caused a more extended injury to the nerves situated at the base of the brain. The existence, however, of the aortic disease, and of the rigidity of other arteries, recognised during life, rendered the disease of the cerebral arteries, and therefore that of hæmorrhage, more likely than that of other cerebral affections.

Such accuracy of diagnosis in cerebral diseases is, however, unfortunately but seldom obtainable, and almost only in morbid conditions situated near the base of the brain, where they interfere not only with the conducting or transmitting function of the large tracts of nerve-fibres contained

within the medulla oblongata and its cerebral expansion, but also with that of the cranial nerves issuing from the base of the brain, and thus cause what the French call, I believe, "*paralysie alterne*," i.e., paralysis of one side of the body (side opposite to the lesion), and of one or several cranial nerves on the other side (side of the lesion). Griesinger's remarks on the diagnosis of cerebral diseases contain much valuable information on this point.¹

With regard to the pathology of the crura cerebri the case before us is especially valuable, because the alteration is of limited circumference, and is uncomplicated with any other morbid condition of the brain. In considering the principal symptoms we must bear in mind that the clot occupied a great portion of the internal and inferior part of the left crus, and thus paralysed its function, while the external and upper part appeared unaltered. The symptoms in question were: Total immunity of the intellectual faculties, with the exception of the first moments after the seizure, when the transitory loss of consciousness was, no doubt, due to the general shock, and not to the local affection; almost total paralysis of the limbs of the opposite side as to motion, and considerable impairment as to sensation; imperfect, and less persistent paralysis of the muscles of the trunk and of the fifth, of the pars dura of the seventh, and of the ninth cerebral nerves of the same side; the affection of the pneumogastric nerve manifested itself in the more than usually slow and irregular action of the heart during the first days after the seizure; to the impaired action of the same nerve, combined with that of the sympathetic, I am inclined to ascribe also the production of, or at all events the disposition to the broncho-pneumonia, and pleuritis appearing two months after the hæmorrhage, the more so, as the right side was the one principally attacked; the participation of the sympathetic nerve was further manifested by the increased temperature of the paralysed side. On the side of the lesion we have the paralysis of the third nerve, causing, in

¹ "Diagnostische Bemerkungen über Hirnkrankheiten," in 'Archiv für Heilkunde,' vol. i, 1860, p. 51.

addition to the strabismus, some interesting phenomena of vision which I shall not endeavour to analyse at present; there was, besides, an occasional pain in the temple, but this was but moderate, and appeared only after the first week.

In searching for instances of disease of the crura cerebri published by others, I have met only with few uncomplicated cases, although I will by no means assert by this that our literature does not contain others besides.¹

A very important case is furnished by Andral in his 'Clinique Médicale' (Third edition, vol. v, p. 339, 1834).

"A woman, about 60 years of age, came into the 'Hôpital de la Pitié' in March, 1831, with symptoms of chronic peritonitis. She had, besides, hemiplegia of the right side, of four years' standing; the voluntary movement of that side being entirely destroyed, and the sensibility very obtuse. She said that one morning in waking, she found herself thus paralysed, after having been quite well on the previous evening. The face had been unsymmetrical in the beginning. She had no head symptoms either before or after the attack; voice, intelligence, and special senses were normal. Death occurred from peritonitis. The post-mortem examination exhibited a cavity of the size of a cherry, rather oval, filled with a greenish serous fluid, in the middle portion of the left crus cerebri; the cavity was lined with a tense membrane, and surrounded by hard tissue some lines in thickness. The rest of the brain was normal." There were also evidences of chronic peritonitis, and there was sero-purulent effusion in the right pleural cavity. Andral remarks upon the rare occurrence of such lesions, and the fact that symptoms were restricted to paralysis of motion and sensation in the limbs of the opposite side.

¹ In the excellent dissertation of Werner Nasse, "*De singularum cerebri partium functionibus ex morborum perscrutatione indagatis*" (Bonnæ, MDCCCXLV), I find, in addition to Andral's and Green's cases, two others mentioned; one by Mohr (Casper's *Wochenschrift*, 1840), the other by Duplay (*Archives gén. de Méd.*, Nov., 1834); but in both cases the lesions were extensive and complicated, and the symptoms not well defined.

The great similarity between Andral's case and the one just related to the Society is self-evident. The absence of the paralysis of the third nerve on the side of the lesion is very natural, as the lesion existed in the centre of the crus, and not near the origin of the third nerve.

In a paper on 'Tubercles of the Brain in Children,' by Dr. P. Hennis Green, published in vol. xxv of the 'Medico-Chirurgical Transactions,' I find the following notes at page 195, under No. 7:

"Le Platu, girl, æt. 3½. Symptoms of two months' duration; headache; stupidity; paralysis of left side; strabismus; constipation; somnolence; lesions; tubercle in the right crus cerebri, with green detritus around; tubercles in chest and abdomen."

The shortness of these notes prevents us from interpreting with certainty the phenomena related in them, but it appears probable that "the paralysis of the opposite side, the strabismus, the constipation, and perhaps the headache," were due to the affection of the crus cerebri, while the "stupidity and the somnolence" may have depended on complications which are so frequent in tubercular affections of children; as, for instance, tubercular meningitis.

Very different from the symptoms observed in these cases of disease in man, are those described as the results of experiments on animals (cats, rabbits, and dogs). Magendie, Lafargue, Longet, Schiff, and others have all found that section of either of the crura cerebri causes the animals to perform circus movements ("mouvements circulaires ou de manège"), although the different observers do not quite agree with regard to the direction of these movements, and the interpretation of the phenomenon. Schiff, who is one of the latest authors on the subject, states that, if the section of the crus cerebri is complete, the circuit is narrow, and the circus movement is persistent, *i. e.*, it can still be witnessed in the second week after the operation, while, if the section is only partial, the circuit performed by the animal is larger, and the animal after a short time again becomes enabled to walk in a straight line ('Lehrbuch der Physio-

logie des Menschen,' von J. F. Schiff, vol. i, p. 343, 1859). The same observer asserts that the section of the crus does not cause any hemiplegia whatever, but that the head and neck turn towards the side opposite to the lesion, as soon as the animal endeavours to move; while when at rest, the head is kept in the middle line, and both forelegs are directed towards the side of the section if the animal attempts to stand on them or to move. To this peculiar direction of the neck and forelegs, Schiff ascribes the occurrence of the circus movements in animals; and if this explanation be correct, the absence of real circus movements in man would be explained by it, as we do not use our arms for walking.

Longet and Lafargue likewise assume that the circus movement takes place in the direction opposite to the lesion, but they explain it by assuming imperfect paralysis of the limbs of the opposite side as the cause of it. (*Traité de Physiologie*, par F. A. Longet, seconde édition, vol. ii, p. 409, 1860.)

With regard to sensibility, Schiff remarks that, in rabbits and cats after the section of the crus cerebri, the head and the extremities of the side of the lesion are much more sensitive than the same parts on the opposite half of the body, and that this greater sensibility does not depend on anæsthesia of the latter, but on hyperæsthesia of the former.

How can we explain, we naturally ask, these differences between the pathological phenomena in man, and the experimental phenomena in animals? It would lead too far to discuss here this often discussed subject. We may say that the pathological lesions in man, and the experimental lesions in animals, are not quite the same; and further that the anatomical and functional relations of the different parts of the brain in man, and in the animals experimented upon, are likewise different; but we certainly ought not to throw away the results of vivisections, when they do not agree with our pathological observations; we ought, on the contrary, to be prevented by them from making premature inferences, and to

be led to further and more careful observations. If this remark is correct with regard to other portions of the brain, it is also most certainly so with regard to the crura cerebri, concerning which our pathological experience is so limited.

It would, however, if we might judge from the cases described, seem probable, but not certain, that any considerable lesion of the centre, the internal and lower portions of the crus cerebri in man (the only parts which were diseased in the three cases mentioned), causes :

1. Almost perfect paralysis of the limbs of the opposite side as to motion, and great impairment as to sensation ;
2. Less complete, and only transitory paralysis of the opposite side of the face, leaving, however, the muscles of the eye intact ;
3. A similar, but perhaps more permanent impairment of the pneumogastric and sympathetic nerves of the opposite side ;
4. A great retardation in the functions of the intestinal canal.
5. The intellectual faculties, and the spinal nerves seem to be altogether independent of the crura cerebri.
6. The third nerve on the side of the lesion (not on the opposite side) seems to become paralysed only in those morbid conditions of the crus which affect the most internal and inferior layers of nerve-substance, close to the place of issue of the said nerve.

With regard to diagnosis, paralysis of the limbs and body of one side, with paralysis of the third nerve of the opposite side, and with immunity of the other cranial nerves of the latter side, and of the intellectual faculties, and spinal senses, may be regarded, with a considerable degree of probability, as pointing to an affection of the inferior and internal part of the crus cerebri, close to the pons, situated on the side of the paralysed third nerve.

Respecting the prognosis, Andral's case, and the one related by myself, show that hæmorrhage into the crus cerebri is not necessarily fatal ; but both cases demonstrate also the applicability of the old axiom, that organs entirely or only partially deprived of their normal nervous influence, are more liable to inflammation, and they teach us also that through this liability new dangers in distant organs arise in

cerebral affections, and in diseases of the nervous centres in general. I can scarcely resist finding an intimate connection between the hæmorrhage into the left crus cerebri, and the right-sided broncho-pneumonia and pleuritis, which killed our patient two months after the occurrence of the hæmorrhage, when he was already on the road to convalescence. As to Andral's case, it may perhaps appear rather farfetched if I connect the hæmorrhage into the left crus, and the sero-purulent effusion into the right pleural cavity, and the chronic peritonitis with sero-purulent effusion,¹ met with four years after the hæmorrhage; but the facts that the pleuritic effusion occupied the right side, and the consideration that idiopathic peritonitis is on the whole of rare occurrence, strengthen the opinion that the old cerebral lesion exercised some influence in the origin of these morbid conditions.

This liability to diseases of remote organs ought also to be taken into consideration in the treatment of such cases, by showing us the necessity of avoiding all agencies likely to cause congestion or inflammation of any part of the body. The cerebral affection itself is not amenable to our treatment, which must regard the general health, and the concomitant circumstances of the patient, and will in most cases mainly consist in proper nursing as to rest and diet.

I was on the point of sending my paper to the Society, when I received, through the kindness of the author, the inaugural dissertation of Dr. F. J. Stiebel, of Frankfort, describing a remarkable case of disease of the crus cerebri.²

¹ Andral's own words concerning the post-mortem examination of the thorax and abdomen are:

"*Thorax*.—Poumons sains. Epanchement séro-purulent dans la plèvre droite. Cœur normal.

"*Abdomen*.—Liquide séro-purulent dans la cavité péritonéale. Adhérences des anses intestinales par des brides celluleuses encore molles. Pâleur de la surface interne du tube digestif (loc. cit., p. 340)."

² Paralyseos hæmorrhagicæ nervi oculomotorii in infante observatus casus rarissimus, Dissert. inaug. medica, quam in Universitate Ruperto-Carolina submittit, F. J. Stiebel, M.D., Francofurti ad Moenam, MDCCCXLVII.

As this dissertation is very little known, I do not hesitate in annexing a description of the case in question.

A girl, æt. 11, habitually subject to attacks of bronchial catarrh, dyspnœa and disturbance of circulation, had suffered in March, 1847, from periodic earache ("otalgia periodica"), but had been cured of it by quinine, and had been comparatively well, when, a few days after exposure to great heat in the sun, she was suddenly, on June 21st, attacked with headache, which disappeared on the following day, leaving her "pale and weak on her legs;" on June 23rd, headache, nausea, slight swelling of the face, pulse 140, very weak, consciousness unaffected; on 24th only moderate headache; on 25th, in addition to violent pain in the left part of the forehead, ptosis of the left upper eyelid, hanging of the left angle of the mouth, dilated left pupil, and photophobia, with undisturbed vision, weak and frequent pulse, nocturnal delirium, absence of paralysis in the extremities; on 26th, headache diminished; ptosis and dilatation of the pupil continue, but angle of mouth not any longer hanging; head always turned to the right; on the 28th, increased headache; towards evening rigors; on 29th, some degree of anæsthesia in the left side of the face, with continued headache, principally in the left supra-orbital region; weakness and frequency of pulse, and costiveness as before; the left upper eyelid is constantly rubbed with the back of the left hand; on June 30th, trismus, and tetanic convulsions of the limbs; death two hours after the accession of these symptoms.

Post-mortem examination.—Brain rather large; on its base, in front of the left side of the anterior margin of the pons, the colour is changed on a small spot from which pus oozes out. The removal of the pia mater, which is otherwise healthy, shows the left crus cerebri just in front of the pons much enlarged and softened; the diameter of the right crus being six, that of the left thirteen lines. The posterior part of the left optic nerve slightly softened and enlarged. In the left crus cerebri is seen an oblong aperture of an abscess or ulcer ("ulcus") which contains good-

looking pus, mixed with grayish-white fibres of softened brain-substance. In its posterior part, near the pons, the ulcer is perfectly circumscribed, while in front it enters a little into the substance of the crus. The third nerve issues about a line distant from the interior margin of the "ulcer," and about five lines more in front than the right third nerve, the structure of the nerve itself being unchanged. The dilatation of the aperture of the "ulcus" shows that its length from the pons anteriorly is nineteen lines, and its greatest breadth fourteen lines. In that part of the "ulcus" which is nearest to the pons, a "focus hæmorrhagicus" is found, about nine lines great ("magnitudine novem linearum"), well circumscribed, grumous, and enclosing a drop of pus. The substance forming the ground floor of this focus is red, and covered with a few red granulations.

The rest of the brain with its ventricles is normal. The organs of the chest and abdomen contain nothing abnormal, with the exception of the heart, which is in the state of concentric hypertrophy.

It is to be regretted that in the description of this most interesting case neither the depth of the "ulcus" or abscess is mentioned, nor the general and microscopic appearance of the remaining substance of the crus. The circumstance, however, that the diameter of the diseased crus was more than twice as large as that of the other side, renders it probable that its structure had been altered, at least for the time, in a great part. This case would, therefore, teach us that a rather considerable portion of the lower part of the crus cerebri may be altered in substance without causing hemiplegia of the opposite side; a fact for which we had been scarcely prepared after having met only with the three cases described in the former part of this paper. The lesion in Stiebel's case does not, it is true, occupy quite the same spot as in the other cases, and the destruction of tissue may have been rather superficial, but the alteration of tissue at the time of death must have been, to judge from the swelling of the crus, much more extensive.

I will not attempt farther to analyse the case, as I have

occupied the time of the Society too long already; I may, however, draw attention to the symptom mentioned in Stiebel's case, that the head was always turned to the right, *i. e.*, the side opposite to the lesion—a fact which coincides with the results of vivisections, and which had not been remarked in any of the other cases. I further cannot help pointing out how Dr. Stiebel's case demonstrates the necessity of our guarding ourselves against hasty inferences from a few pathological observations, especially in cerebral affections. Our duty in such cases is carefully to note the symptoms manifested during life, accurately to describe the anatomical lesions found after death, and to compare our pathological experience with the teachings of anatomy and physiology of man and animals. In this manner we may hope to obtain, sooner or later, some insight into the functions of the different parts of the brain, and to learn at the same time to distinguish the real from the apparent symptoms of their lesions.

DESCRIPTION OF PLATE VI.

The crura cerebri and pons varolii, showing the seat of the hæmorrhage in the left crus, in Dr. Hermann Weber's case.

- a.* Left crus cerebri.
 - a'.* Right crus cerebri.
 - b.* The dark spot showing the outline of the hæmorrhage.
 - b'.* The margin surrounding the dark spot indicating the indurated tissue round the blood clot.
 - c.* The pituitary gland.
 - d.* The corpora albicantia.
 - e.* The pons.
 - f.* The cerebellum.
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- i.* The commissure of the optic nerves.
- iii.* The third nerve.
- v.* The fifth nerve.
- vi.* The sixth nerve.
- vii.* The *pars dura* and *pars mollis* of the seventh nerve.