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Summer No 1894

7.

PERIPHERAL NEURITIS IN EXOPHTHALMIC GOITRE.

BY ARTHUR MAUDE.

IN the paper I read at the opening meeting of the London Medical Society in October, I endeavoured to produce evidence, purely clinical, that peripheral neuritis was a common epiphenomenon in exophthalmic goitre. In the discussion which followed, the only notice which was taken of what was at any rate a novel point, was a direct statement from a well-known neurologist that he did not see any reason for supposing that neuritis was ever present. May I, therefore, ask to submit my views to a more highly trained audience of neurologists in these pages?

I was at the time quite unaware of Professor Greenfield's late researches in the microscopical anatomy of exophthalmic goitre;¹ and it is premature to criticise them in detail, as they are still incomplete. I pointed out, however, that no examinations, after modern methods, have yet been made of the peripheral nerve trunks; and I still look to such examination to show changes comparable to the so-called multiple neuritis produced by various toxic agents.

The symptoms I ground my supposition on are:—

(1) The frequent occurrence of "cramp." Dr. Hector Mackenzie,² who first drew attention to it, found it present to some degree in thirteen out of fifteen instances, a proportion I can verify from my own experience. These painful contractions often assume the form of veritable "tetany," both of hands and feet. It is needless, since the publication

¹"Bradshaw Lecture," 1893.

²*Lancet*, September 13, 1890.

of Ross and Bury's work,¹ to insist that muscular spasm of this form is due to peripheral irritation. As to the nature of this irritation two views present themselves.

(a) Tetany commonly follows removal of the thyroid, and often the injection of mucin into the circulation of animals (cats: Wagner and Hammerschlag).

It is possible, then, that cramps are in these cases the result of late, excessive disturbance of the thyroid, by which some poison, perhaps mucin, remains in excess in the circulation. The cases in which I have found cramp and tetany present have not all presented large goitres. But this proves nothing, for great functional disturbance may exist without great external increase of the thyroid.

(b) Tetany is frequently associated with disturbances of the alimentary canal, from the formation of a direct toxin, which may be separated from the digestive fluids. Precisely similar disturbances of alimentation are prevalent in Graves' disease. In the few cases in which I have been able to follow out this point, cramps were always associated with gastro-intestinal troubles.

(2) Ordinary sensibility is nearly always increased: "Hyperæsthesia is as universal in the sensory as tremor in the motor nervous mechanism" (Grainger Stewart²).

(3) Symmetrical paresis of the legs is the rule. It rarely amounts to complete paraplegia, and is never associated with rectal or cystic paralysis.

(4) The patellar reflexes are nearly always lessened or entirely abolished (Marie): this is my own experience also. On the other hand, Grainger Stewart states that the myotatic irritability varies much, that "the knee-jerks may be sometimes increased, and ankle clonus even be present, more especially in the cases manifesting a high degree of nervous excitability, but on the other hand, the knee-jerk may be entirely absent."

(5) I find varying degrees of numbness, tingling and pains in the peripheral nerves of the legs, a common cause of complaint.

¹ "Peripheral Neuritis," Ross and Bury, p. 398, 1893.

² *Edinburgh Hospital Reports.*

(6) I would suggest that those forms of localised œdema evidently of neuropathic origin, so frequent in Graves' disease,¹ are, in fact, manifestations of peripheral neuritis; comparable as they are to the conditions described by Dr. Bristowe² as hysterical neuritis, in which œdema was occasionally a prominent feature. The comparison is also striking between these localised œdemas and those also seen in beri-beri, which is clearly a "peripheral neuritis."

We have here, I think, all the clinical attributes of peripheral neuritis in an early stage, but in that stage it seems to stop. I have seen no cases, in record or in my own practice, which point to advanced neuritis. And as this arrest is also a feature of the neuritis of diabetes, I have examined all my cases carefully for glycosuria, with negative results. On the other hand, so many of these patients present gastro-intestinal disturbances that it is possible that the irritating poison may be of alimentary origin; while it may be some substance formed in the thyroid, or which should have been eliminated there.

Dr. Judson Bury informs me (August 29, 1893) that he remembers one case in which in addition to the ordinary tumour there was the most marked fibrillation of the interosseous muscles of the hand. This he adduces, quite correctly, as evidence of peripheral neuritis. He kindly adds: "I quite agree with you as to the probable association of peripheral neuritis and Graves' disease."

The point is, perhaps, worth following out by neurologists, both at the bedside and by microscopical examination."

¹ Maude, *Practitioner*, December, 1891.

² *British Medical Journal*, 1892, ii., p. 1098.

A CLASSIFICATION OF REFLEX ACTIONS.

BY D. FRASER HARRIS, B.SC. (LOND.), M.B., C.M. (GLASGOW).

THE accompanying classification is an attempt to exhibit in one view a scheme of the various groups of the reflex actions of the animal body arranged in ascending degrees of psychological complexity (*vide* column B.)

Both physiological and pathological reflexes are noted, though it was possible to quote only one or two examples of each subgroup out of a very large number.

The scheme aims at providing a more extensive and at the same time more definite terminology than is at present in use, whereby it would be possible to refer, with considerable precision, any given reflex to its appropriate genus or species.

The classification is more an indication of the lines on which such could be carried out than any final or rigid presentation of the question. It has however, I think, a certain naturalness and symmetry in its construction.

A terminology that simultaneously recognises the psychological and physiological aspects of the same action has its advantages.

We might include under "excito-motor," all those obviously simple or "low" reflexes which (*a*) do not require consciousness even for their existence; (*b*) do not affect it (*i.e.*, the majority of them are outside its "pale"); and (*c*) are not able to be voluntarily controlled (or "inhibited").

They are, for the most part, the actions, movements and processes of "vegetative" or "organic" life.

If, however, such a reflex affect consciousness, or be in any measure, voluntarily controlled, then it rises *psychologically* into a higher category, while its physiological nature has undergone no change.

Thus euperistalsis, conforming to *a*, *b* and *c*, is merely excito-motor; but when consciousness becomes affected as

in dysperistalsis (colic), it is an algio-motor reflex—psychically higher. Again the unconscious micturition in a sleeping child is excito-muscular, whereas healthy adult micturition is sensori-muscular, consciousness being affected, and the reflex (within limits) being capable of voluntary control—physiologically they are quite similar so far as the mechanism of the act is concerned. Intermediate in psychical value between mere stimulations and the sensori-motor group are the algio-motor reflexes, for which consciousness at least of pain is a *sine quâ non*.

Under group 3, the sensori-motor, are included all those reflexes whose afferent currents have originated in a true *sense-organ*, there having existed a perception (to be strictly accurate) between the reception of the afferent current and the emission of the efferent. Now this, like most *natural* groups, has no rigid confines, for, in the first place, if the sensation be painful, the pain may be *the* predominating mental state, and the subsequent reflex be an algio-motor; while, on the higher side, it merges into group 4 or 5, both emotions and ideas being pre-eminently stirred up by sensations *presented* (*re-presented* sensations being “ideas” themselves).

But when an emotion (however produced) is the *characteristic* of the mental state *causally* preceding a reflex, that reflex is emotio-motor, the emotion being *the* intermediary between the afferent and the efferent currents. Almost no state is purely perceptive, emotional or ideational, yet it may be one of these *characteristically*, and *as such* gives rise to *its* reflex.

The ideo-motor group includes all reflexes which are not the result of either perception or emotion; in some sense “residual phenomena” among reflexes.

The “ideas” may, of course, be perceptions or emotions represented.

It would be under the heading “ideo-muscular” that one would classify “volitions” if disposed to do so—a proceeding very acceptable to certain advanced psychological physiologists. And yet, to call all voluntary acts reflex, seems to lose sight of certain most radical distinctions be-

tween sets of actions, most notably between a reflex act (as we all understand it), and what one might call the corresponding voluntary *imitation* of it, *e.g.*, winking from a strong light is a sensori-muscular reflex; winking *voluntarily* is *psychologically* a process of a totally different kind.

The notion of a "reflex," as a thing done in "spite of a person," vanishes. Again, laughing "in spite of yourself," is an emotio-muscular reflex (afferent currents being from ear or eye or both), whereas voluntary laughing, *i.e.*, imitation of laughing, is, on the face of it, a very different act. Of course, many reflexes can be controlled by the will, but to identify an action which is habitually uncontrolled by the will with one which must be both originated and controlled by the will seems confusing.

The will naturally suggests "reflex inhibition." This is largely, but by no means entirely, voluntary.

I suggest that a reflex action (as ordinarily understood) be designated + (positive), and that when "inhibited" or prevented from taking place (either by the restraining influence of a higher centre upon the special "reflex" centre in question, or by the advent of an impulse to the lower centre which prevents that discharge) it be called a negative (—) reflex. Under this last category might be included reflex inhibitions of acts other than reflex themselves.

Thus the will notoriously both inhibits reflexes (as in the postponement of adult defæcation) and reflexly inhibits; but a powerful "idea" can as efficiently reflexly inhibit, as when a sudden thought renders a person speechless for the time being (*negative* ideo-muscular reflex).

It is almost superfluous to add that an emotion can inhibit reflex action, as when "fear" causes dry mouth (*negative* emotio-glandular reflex), or when "joy" produces syncope (in this case a term is already in use—cardio-inhibitory reflex).

Lastly, pain can reflexly inhibit, as in syncope from "shock" from operation (negative algio-muscular reflex on cardiac muscle).

As to "vaso-motor" reflexes, if there be but *one* centre "vaso-motor," whose function it is to maintain general

vascular tonus, then active (arterial) hyperæmia, due to inhibition of the centre, would be a negative excito-vascular reflex ("vaso-inhibitory" of authors), while pallor would be the positive excito-vascular reflex ("vaso-constrictor"). If there be *two* centres, one for vaso-constriction, Vc., and one for vaso-dilatation, Vd., then, *e.g.*, blushing from present emotion would be either: A + emotio-vascular reflex through Vd., or A — emotio-vascular reflex through Vc.; and similarly, emotional blanching would be either: A + emotio-vascular reflex through Vc., or A — emotio-vascular reflex through Vd.

A word as to psychico-metabolic reflexes. Of course, all vital action is "metabolic," but one can distinguish a kind of reflex concerned, not with definite glands or vessels, but having its manifestations through a wide spatial distribution.

We may, as before, have metabolism stimulated or depressed, and thus a + psychico-metabolic reflex might be more shortly named psychico-anabolic, while a — psychico-metabolic reflex would be a psychico-katabolic reflex.

Thus, the hair turning white through emotion would be a negative emotio-metabolic reflex.

The emotional state has acted "*reflexly*" on centres trophic to the nerves influencing the formation of pigment over a considerable area of skin.

It would be under the category "*ideo-metabolic*" that we would place those well-authenticated cases of hallucinations causing or curing disease. Thus there is much mystery and romance dispelled when instead of "miraculous cure by faith-healing" we write "positive ideo-metabolic (systemic) reflex!" Of course, metabolic reflexes might exist in other systems than the dermal.

A final word on reflexes. It will be very evident that "expression of the emotions" is largely reflex, while any imitation of an emotion—simulation of a particular expression—is a different thing psychologically; it is voluntary to begin with. Moreover, expression of many emotions is eminently under control: self-command does not so much consist in not experiencing certain emotions, as in being habitually able to "inhibit" or control their manifestations.

A CLASSIFICATION OF REFLEX ACTIONS ON A PSYCHICO-PHYSIOLOGICAL BASIS.

EXAMPLES.

D

C

B

A

1. <i>Excito-motor</i> .	Excito-muscular	Of Involuntary muscle.	{	Euperistalsis. Micturition in sleeping child. Early non-voluntary stages of Parturition. Defecation and micturition in "spinal disease" and in coma. Iris reflex in partial narcosis. Hiccough. Ejaculatio seminis during sleep. Later stages of deglutition.	Movements of
	Of Voluntary muscle.	Spasm in children during sleep from any irritation, <i>e.g.</i> , worms. unconsconscious adjustment in sleep.		Movements of	
	Excito-glandular.	Outpouring of gastric and intestinal juices in digestion. glands in pregnancy.	"Sympathetic" preparation of the mammary		
	Excito-vascular.	Pathological blushing ("flushings") from indigestion. Erectio penis (in sleep). Probably certain tropho-neuroses, such as erythema, eczema, herpes, scleroderma, urticaria, "glossy skin."	Erectio penis (in sleep).		
2. <i>Algio-motor</i> .	Excito-metabolic	(Dermal). Pigmentation of areola in pregnancy.	Chloasma in disease.		
	Algio-muscular.	Of <i>Involuntary</i> muscle: Dysperistalsis (colic). Vomiting from "renal colic," &c. ("shock") under operation without chloroform. Of <i>Voluntary</i> muscle: Spasm=writhing from pain.	Inhibition of heart		
	" glandular.	Perspiration due to pain. Lachrymation from painful foreign body.	Spasm=writhing from pain.		
3. <i>Sensori-motor</i> .	" vascular.	Blushing or pallor from agony.			
	" metabolic.				
	Sensori-muscular	Of Involuntary muscle.	{	Contraction of iris in strong light. Accommodation. Action of tensor choroideæ in positive	Non-voluntary
	Of Voluntary muscle.	Contraction of uterus when child is "put to the breast." elements of adult, conscious micturition and defecation. Coughing, sneezing.		Winking from foreign body. Laughter and spasm from tickling. Spasm from draught of cold air in hydrophobia.	Spasm from
Sensori-glandular.	Lachrymation in strong light. Salivation on eating sour or acid materials, or at sight of food.	Deep inspiration from cold affusion.			
" vascular.	Pallor in cold bath. Glow of skin in hot bath. Catarrh of mucous membranes (<i>e.g.</i> , nasal) from draught of air, &c.; probably with contemporaneous "low nerve tone."	Rise of blood-pressure whilst hearing music.			
" metabolic	(dermal). Freckles. "Bronzing" of skin in hot climates.				

4. *Emotio-motor.*

Emotio-muscular.	<p>Hyper-peristalsis with diarrhoea from various emotions, <i>e.g.</i>, fear. Progress of "labour" (dilatation of "os") inhibited by stranger coming in, or induced by fright.</p> <p>Cardio-inhibition ("syncope") from many emotions—"Heart standing still." Rate of heart beat accelerated by emotion. Micturition through emotion.</p> <p>Child jumping for joy, stamping feet from vexation, slamming door from rage. Assault and murder from violent emotion.</p> <p>Emotional alteration of the respiratory rhythm, <i>e.g.</i>, sighing.</p>
Emotio-glandular.	<p>Activity of certain glands, <i>e.g.</i>, stink-glands of "skunk" through fear. Weeping from emotion or inability to do so.</p> <p>Inhibition of salivation from fear. "Cold sweat" of fear, and perspiration from other emotions.</p> <p>Lactation ("draught of milk") induced through joy. Eupepsia due to happy "frame of mind."</p>
Emotio-vascular.	<p>Blushing from shame, modesty, rage, &c. Pallor from rage, fear, "nervousness," &c.</p>
Emotio-metabolic (dermal).	<p>Hair turning grey from emotion.</p>

5. *Ideo-motor.*

Ideo-muscular.	<p>Vomiting from <i>recollection</i> of disgusting sight or taste, or from vivid gustatory hallucination.</p> <p>Influence of hallucinations, &c., in the insane on the muscular tonus of viscera, <i>e.g.</i>, constipation of certain lunatics.</p> <p>Spasm of muscles of deglutition in hydrophobia at the <i>idea</i> of "water."</p> <p>Actions and co-ordinated movements in somnambulism, and the majority of such in the hypnotic trance.</p> <p>Laughing at a recollection.</p> <p>"Reflex speech" of certain lunatics.</p> <p>Certain so-called "secondarily automatic" actions, such as standing, sitting, walking, playing on piano (when completely familiar with it).</p>
Ideo-glandular.	<p>Weeping at a recollection. Action of hallucinations (in the insane) on secretions.</p> <p>Salivation at thought of food.</p>
Ideo-vascular.	<p>Blushing or blanching at a recollection.</p>
Ideo-metabolic.	<p>Nails ceasing to grow in mania (dermal). Action of the mind over nourishment of tissue. Mentally-induced or cured diseases (as alleged).</p> <p>Psychically-produced tropho-neuroses.</p>

CASE OF TUMOUR OF PONS AND LEFT CRUS CEREBRI.

BY SEYMOUR J. SHARKEY, M.D., F.R.C.P.

W. B., aged 43, sailor, was admitted into St. Thomas's Hospital under my care on January 22, 1892, and died on the 25th of the following May.

His family history presented no features of importance. He had had malarial fever eight years previously, but had never had syphilis. Three years ago he fell from a height of twenty-eight feet, landing on his feet and fracturing his leg near the ankle, but not injuring his head in any way.

Three months and a half ago when in the Gulf of Mexico he began to perspire so freely that it became a subject of general remark. He got rather stupid, and used to knock against objects on turning to his right. Soon after he became deaf in the right ear, and suffered from numbness all down the right half of his body, the face and head being the last parts affected.

On admission he was found to have right hemianopsia, deafness in the right ear, and paralysis of the superior rectus in each eye, and the right pupil was larger than the left. Both pupils reacted to light and accommodation, but sluggishly. There was no optic neuritis.

The right ear was completely deaf, bone as well as air conduction being abolished.

There was not only numbness over the whole right side of the body, but tactile sensation was also diminished. Sense of temperature was likewise altered, and the only difference he noticed between hot and cold things applied to the right side, was that the former gave rise to a pricking sensation. Muscular sense was normal, and there was no loss of power, except perhaps in right hand. Taste and smell were not materially altered. Superficial and deep reflexes presented no marked changes. Memory said by patient to be defective, but it was not very obviously so. Speech was rather thick, and there was a

tendency to stammering. Gait was somewhat peculiar, the right foot being raised higher than the left, and the heel striking the ground first. But this might have resulted from a partial ankylosis of ankle joint due to the old injury.

No inco-ordination or giddiness.

Profuse perspiration present, but no *visceral* disease detected.

During the first few days in hospital he suffered sometimes from bad headache, sometimes became strange in manner, and usually kept his left eye nearly closed, and the latter peculiarity remained unaltered till he died. He was, however, generally pleasant, and humorous, and much inclined to talk, but his memory got worse and some aphasia supervened.

On February 1, he had forgotten the name of his last ship and captain, though he said he knew them quite well, but could not say them. When shown a candlestick and quill-pen, he was unable to name them, though he named a button correctly. When asked whether the candlestick was a watering can he became very angry, and said the question was childish and ridiculous.

On February 12 Mr. Lawford saw him and said he could read with each eye, and with one as well as the other. He could understand what he read and could write. Loss of power in both superior recti and in inferior oblique of right eye.

On February 15 Mr. Nettleship examined him and noted that there was no movement of the eyes upward beyond the horizontal, and that downward movements were also defective, more in right than in left eye. Concomitant lateral movements full, but convergence very defective, and more so in right than in left eye. Irregular nystagmus in lateral and in upward movements. Right pupil larger than left. State of accommodation doubtful. No ptosis; but left palpebral fissure always narrower than right. As to diplopia, patient appeared to say nothing about it, and he could not with any certainty be got to see double, at any rate not in such a manner as would agree with paresis of right internal rectus.

R. reads 6J. at 14"

c. + 3D.=1J. at 9"

L. reads 14J. at 14"

c. + 4D.=1J. at 9"

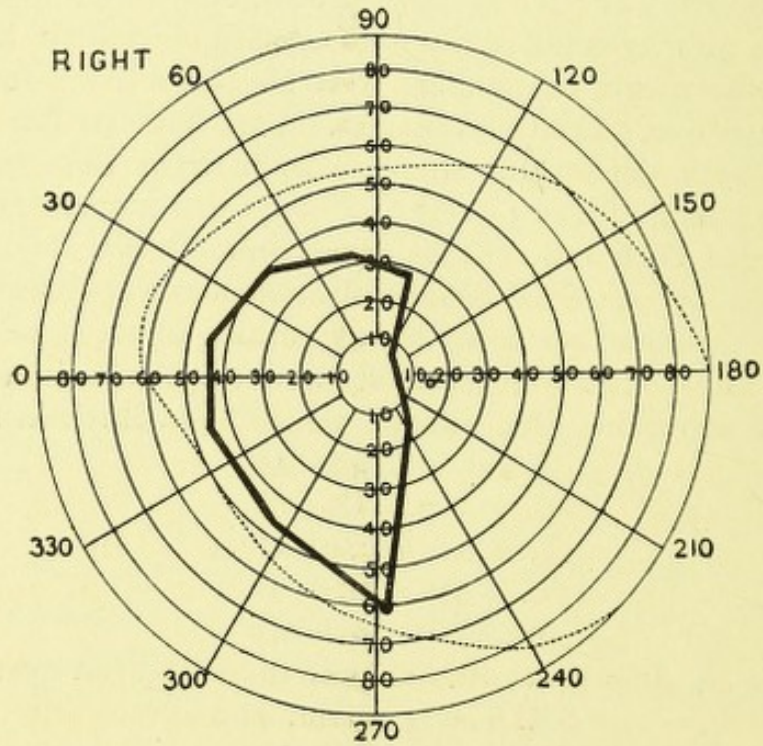
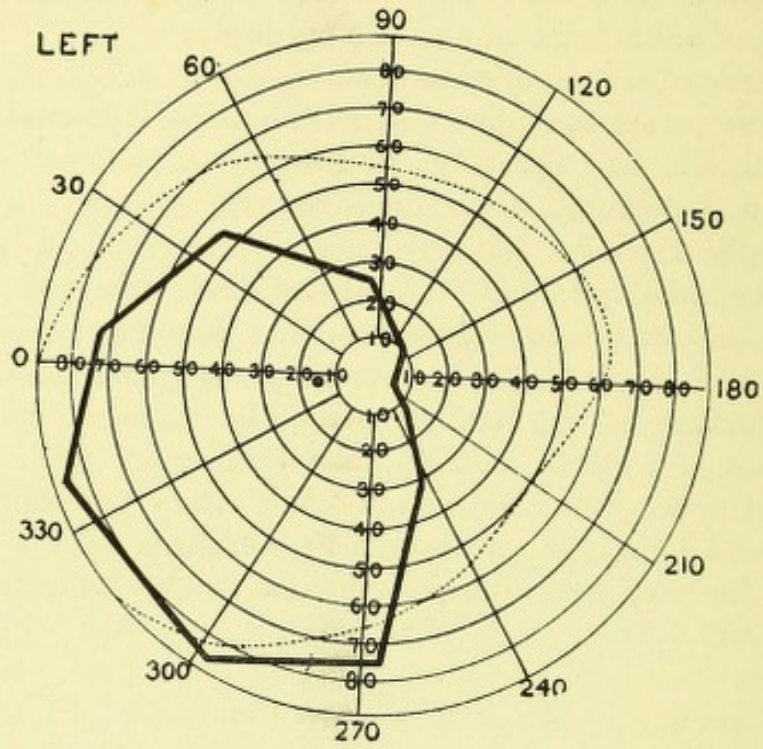
Together=6J. at 14"

c. + 3D.=1J. at 9", but prefers to shut left eye.

R. V.= $\frac{6}{12}$: Hm. 1D.

L. V.= $\frac{6}{18}$: No Hm.

Not tried with cylinders.



Fundi normal.

Loss of memory and mental power well marked. When told to sit on his locker he could not be got to understand what was wanted; nor could he say anything he wished to say. There was no muscular paralysis, but very evident anæsthesia, as he could not feel a pin stuck into his right arm. Always yawning.

On February 27 I made the following note:—

“There is distinct loss of power in the right side of face in lower part, the left side being drawn up on laughing, the right not. Tongue protruded straight. Movements of eyes good laterally, much limited in upward direction, (?) somewhat in downward direction too. Both hands grasp poorly, right less strongly than left. Legs fairly strong, but still probably not normally so; right not quite as good as left. Knee-jerks good; no clonus. Intellect very dull at times; cannot remember the names of blotting paper, pen, &c., and speech is hesitating and stuttering. So forgetful of words is he that he cannot carry on a conversation. No fits. Discs normal.”

March 5.—Mental condition varies a good deal, being much better on some days than on others. Yesterday he was found sitting up in bed eating a crust of bread which he said was a pine, which he was enjoying very much; all the time he was holding his left hand below it to prevent the juice from falling on the bed-clothes.

He was getting very drowsy. He could not now touch his nose with his eyes closed, or make his index fingers meet in the middle line, nor could he imitate movements made with his legs, though he was sometimes able after much thought to say which of his legs was uppermost.

On *March 10* I made the following note:—

“Patient cannot read printed or written characters; he can make out a word or two here and there, but little more than that, and he appears to lack entirely the power of attention necessary for continued attempts. He cannot write. He very rarely names ordinary objects aright, and he does not seem to think it extraordinary if asked whether a book is an orange, apple, &c. Still he occasionally says a few sentences correctly. He is very good-humoured. Optic discs a little hazy, and streaked on internal border; (?) optic neuritis.”

March 15.—Optic neuritis evident in both eyes. Attempt to take the field of vision had to be abandoned as he could not be got to understand what was wanted. His mental powers varied very markedly from day to day. For instance, on *March 18* he named

a bunch of keys, a watch, a knife and a pen, and said he knew other things, but that his head was "mixed." On the 21st, he could not even remember his own name. At other times, *e.g.*, March 31, he called things by wrong names; a hair brush an egg brush, a comb an egg brush, blotting paper a cork.

April 7.—Patient could not now feed himself; urine passed unconsciously sometimes; great drowsiness. Right side evidently weaker than left; clonus sometimes obtained in right foot.

April 28.—In much the same condition, at times making intelligent answers, at others unable to understand what is said to him and giving irrelevant replies; sometimes unable to pronounce words properly.

May 19.—Mentally much the same, but physically very weak; unable to sit up for any length of time.

May 24.—Very drowsy; by 5 p.m. comatose with stertorous breathing, and temperature 103.4° , pulse 132. He recovered a little and the temperature fell, but soon rose again, reaching before death 106.2° , the pulse 200, and deep coma supervening.

Autopsy.—The brain was the only organ found diseased, and after a rough examination it was put aside to harden in alcohol. On looking at the hemispheres it was seen that the left was larger than the right, but the convolutions, nerves, and vessels on both sides were normal. Where the crura cerebri emerged from the pons on the under surface of the organ the left crus was seen to be much larger than the right, measuring $1\frac{1}{2}$ inch across, while the right only measured $\frac{3}{4}$ inch. The left optic tract was much flattened as it ran over the left crus cerebri.

On dividing the corpus callosum and separating the hemispheres the left crus was again seen to be very large. The corpora quadrigemina and the roof of the aqueduct of Sylvius were unrecognisable, their place being occupied by a new growth, irregular on the surface and continuous with the left crus cerebri. The whole space between the anterior and upper border of the cerebellum and the third ventricle was filled up by the tumour. The superior crura of the cerebellum could, however, be seen emerging from the tumour apparently healthy, and entering the cerebellum. The floor of the fourth ventricle viewed from above appeared to be normal. After the brain had been hardened in alcohol, sections were made.

Section 1 passed through the pons varolii vertically just beyond its junction with the medulla oblongata. The right half of the pons appeared to be healthy, but the fourth ventricle was pushed far to the right by the tumour which grew from the left half of the roof of the aqueduct of Sylvius, but the roof itself and the superior cerebellar peduncle seemed thin and healthy, as did also the greater part of the left half of the pons. The root of the tumour seemed, however, to invade the floor of the fourth ventricle.

Section 2 made vertically, $\frac{1}{8}$ inch posterior to the emergence of the crura cerebri from the pons showed the aqueduct of Sylvius pushed far to the right, the tumour involving the roof of the aqueduct and left half of pons above the locus niger (fig. 1).

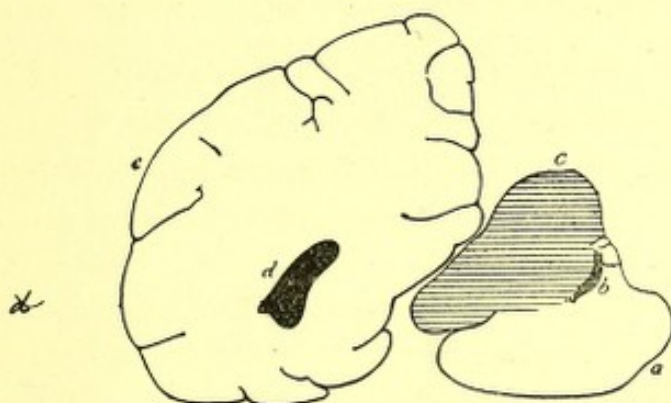


FIG. 1 (Section 2).

a. Pons varolii. b. Aqueduct of Sylvius. c. Shaded tumour.
d. Lateral ventricle. e. Left hemisphere.

Section 3, made vertically through the crura cerebri about $\frac{1}{4}$ inch beyond their point of divergence, showed the right crus healthy, and the upper or dorsal part of the left entirely occupied by the tumour. The latter had obliterated the posterior part of the internal capsule, the optic thalamus, and part of the extraventricular nucleus of the corpus striatum. The hippocampal convolution was intact (fig. 2).

Section 4 just in front of corpora mammillaria. The optic thalamus, tail of caudate nucleus, and internal capsule appeared intact, the tumour appearing only in a small area

of the section and involving part of the extraventricular nucleus.

Section 5 through head of caudate nucleus just behind the anterior extremity of the third ventricle. It showed the internal capsule healthy, and slight involvement of the outer and lower part of the extraventricular nucleus.

Section 6 vertically through Broca's convolution showed nothing abnormal.

The following *résumé* of the order of appearance of the symptoms helps one to realise how easy it was to come to a conclusion as to the exact position of the tumour.

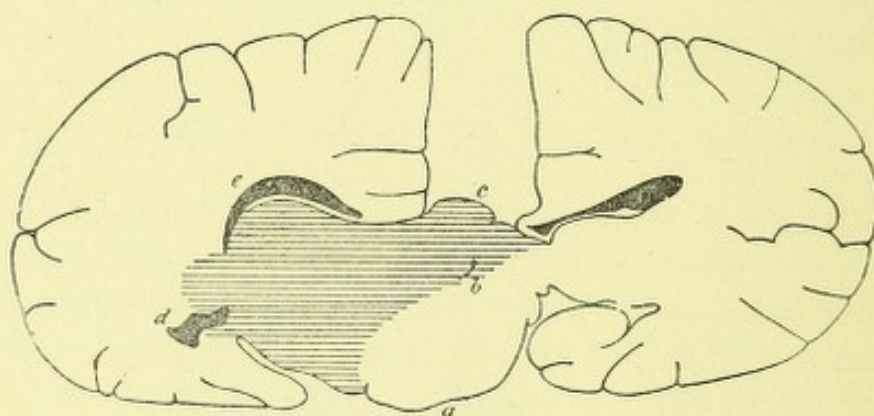


FIG. 2 (Section 3).

a. Pons varolii. b. Aqueduct of Sylvius. c. Shaded tumour.
d. Lateral ventricle. e. Left hemisphere.

Three and a half months before admission:—Profuse perspiration; paralysis of superior recti of eyes (it is probable that this existed early, though only proved to exist on admission into hospital. It is not a paralysis likely to arrest the attention, and no remark was made by the patient with reference to it); hemianopia; deafness; numbness in right side.

On admission, January 22, 1892, he was found in addition to be suffering from alteration of sense of touch; alteration of sense of temperature (but no alteration of taste or smell); thickness of speech; difference in size of pupils; headache; failure of memory.

February 1.—There were found mental weakness ; aphasia ; utter loss of memory for words ; drowsiness.

February 27.—Right facial paresis.

March 5.—Loss of taste (probably) ; loss of muscular sense.

March 10.—Alexia ; agraphia ; optic neuritis.

April 7.—Partial right hemiplegia.

May 19.—Great physical weakness.

May 24.—Coma ; hyperpyrexia ; death.

The paralysis of the superior recti of both sides, together with hemianopia, deafness and numbness on right side could scarcely be explained except by disease of the floor of the aqueduct of Sylvius gradually invading the left crus cerebri and internal capsule. The successive changes in the patient's condition indicated greater and greater involvement of the nerves of sense, special as well as general, and subsequently disorganisation of the more distant motor tract. It was not until late, when the tumour had reached considerable dimensions, that optic neuritis supervened.

The profuse perspiration which marked the onset of the disease, and then disappeared, is very interesting with reference to the question of the existence of sweat centres.

Another very remarkable point is the gradual abolition of mental power and of those functions which are the special attributes of the left cerebral hemisphere, owing to the cutting off of its sensory connection with the exterior, and that notwithstanding the integrity of the hemisphere itself, and that of the corpus callosum which should put it into free communication with the right hemisphere. The mental defects were very marked three months even before his death.

