For descriptive purposes we might say that she suffered from "psychosis with gross brain lesion," or, in Meyerian terms, that an oligergastic individual had become dysergastic. The Adlerians would have something to say about a "will to power"; the Freudians could scarcely fail to be lured by the obvious narcissism and mother-identification; while the sleep pattern would doubtless be seized upon by others as a survival of archaic hibernation. If she escaped from the clutches of the "septic focus" school with her carious teeth still in her head she would be fortunate; but, notwithstanding the retention of these deadly poison producers, her lymphocyte count returned to normal in due course. Her stature and her sugar reactions would no doubt have proved of absorbing interest to the endocrinologists; in fact, almost any school of psychiatric theory would welcome her case as a convincing demonstration of the validity of its teachings.

In the sense that there is truth in each of these theories we believe that they are all right—it depends entirely upon the aspect of the individual which one is considering. But the task of the clinical psychiatrist is to understand how the patient got into the condition in which she is seen; only then is he in a position to determine what factors are capable of modification, so that the "working agreement" between the patient and the cultural environment is once again operative.

There is no need for ingenious theory; a simple chronological record of her life, together with a conception of levels of function and of integration, of the adaptative function of the nervous system, and of the final common path, appears to us to be sufficient.

Despite her gross organic handicaps she reached a stabilized condition in the convalescent villa of a mental hospital, remaining there of her own volition, doing useful work, happy and contented, enjoying parole beyond the grounds, and going to entertainments. She found, in fact, a new milieu with which her damaged adaptative mechanism could reach a working agreement, and which, we believe, she would never have reached if she had not been forced by gross temporary organic disablement to retreat from an endeavour quite beyond her natural capabilities. Who knows but that she too might have developed a paranoid schizophrenic state had she been stricken with peripheral neuritis instead of encephalitis lethargica.

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FRACTURE-DISLOCATION OF THE CERVICAL SPINE AND ITS OPEN REDUCTION

BY

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Recent circumstances have prompted me to publish the following case, which, though belated, has this advantage, that time has justified what was thought to be a dangerous experiment.

Brief Synopsis of Case

A man aged 21 sustained a crush-fracture dislocation of the cervical spine, causing root pressure and gross deformity of the neck. He was invalided from the Army. One year later an attempt at reduction by traction was made, and failed. After careful study on the cadaver the dislocation was almost completely reduced by exposure of the front of the spine and direct leverage of the dislocated vertebra combined by traction. For fourteen years he has followed the occupation of a van driver and salesman.

Clinical History

A private in the R.A.M.C., on May 8th, 1915, at Steenwoode, was marching at the rear of a column when he was run into by a car, which forced him into a sitting position. He was taken to hospital with loss of power in the arms, inability to move the neck, and a severe scalp wound. The scalp wound was treated at the hospital, but little attention was given to the neck, which he was told was sprained. On evacuation to a general hospital in England his neck was x-rayed, and it was then found he had a partial dislocation of the fifth cervical vertebra forwards. He was later discharged with full pension.

Towards the end of 1915 he was seen at the 1st Northern General Hospital for pension board. His condition was pitiable. He had pain in the neck, shoulders, and arms. His head was bent forward, so that his chin was almost on his chest and he had to support his chin with his

hands, and had considerable difficulty in sitting or lying. He was ready to consider any form of treatment which might give him some relief, and was admitted under me at the 1st Northern General Hospital in April, 1916. It was proposed to attempt reduction by traction, and if this failed, as seemed likely after one year, an open operation was to be done. A poroplastic bed was made for the upper half of his back and head.

Operative Treatment

The first operation was performed on May 27th, 1916, under general anaesthesia. A sandbag was placed behind the shoulders and lower part of the neck, and with the head hanging over the end of the table strong traction was made on the head, with such manipulation as was considered advisable. It seemed doubtful if any improvement had been made in the position, although on x-ray examination the deformity seemed somewhat diminished. A trial exposure of the front of the fifth and sixth cervical vertebrae was made on the cadaver, and it was found that good access could be obtained to the fracture site and that direct leverage could be carried out.

A second operation was performed on June 10th, 1916. An incision was made from the angle of the jaw to the sterno-clavicular joint. The sterno-mastoid was retracted outwards and the carotid sheath and pharynx displaced mesially. The forward dislocation of the fifth cervical was readily recognized. The anterior common ligament was incised and the end of a flat metal bar, about one and quarter inches broad, inserted between the bodies of the fifth and sixth cervical. Direct leverage, combined with traction and manipulation, appeared to restore the vertebrae to a normal relationship.

The patient was immobilized for some six weeks in his poroplastic mould, and later allowed up with a cervical support. A further x-ray showed an almost complete reduction. He was before various medical boards, and was given a final award of 50 per cent. disability in 1922. He had previously started as a tobacconist, but his business failed.

About this time, as he was much improved, he started training for a van driver and salesman. Before this a medical examination was necessary, and he was at first

failed because of defective eyesight. Correction by glasses remedied this defect, and on being asked what was the matter with his neck he told the examining doctor that it was a "bit stiff." No detailed examination was made, and he was passed for training. This was completed, and for the last fourteen years he has carried out his work as a van salesman, starting and driving his van and loading and delivering packages himself.

Present Condition

He is now about to give up his present work on account of heart disease, which has incapacitated him on several previous occasions. He has a slight ache in the neck, worse after a heavy day's work. His arms and shoulders are strong (previous to the operation he could hardly push open a door). While sitting no abnormality of the neck is seen, but on being stripped the head is seen to be held slightly forwards, there is a slight kyphosis of the lower cervical region, and slight lateral deviation to the right. Flexion, extension, and rotation of the head are normal, while movements of the lower cervical spine are limited, and there is some thickening over the back of the spine in this region. He has an enlarged and grossly irregular heart.

Remarks

The change from his original condition is striking. Then he had considerable pain, stiffness of the neck, was unable to support his head alone, and able to walk only by supporting it with a hand on the chin and another on the occiput. He has been relieved of most of the pain and deformity, and has done full manual work for fourteen years; he is married and has a family, and but for heart disease would continue as a vanman. It is nearly twenty years since I have seen him, until he reported, at my request, in July, 1936.

Any success must be largely due to my friends, then Captain F. G. Armstrong, who was responsible for the anaesthetics, and Major H. Muir Evans, who assisted me.

ANATOMY OF PERIPHERAL SENSATION*

BY

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The punctate theory built up by v. Frey has not been seriously challenged; it is that the four elementary cutaneous sensations are distributed over the skin as a mosaic of points, each point being allocated to one of these sensations. It is a part of the punctate theory that there shall be specific receptors for heat and cold, irrespective of whether the temperature is close to that of the body surface or far removed from it.

Head divided the cutaneous temperature sense into an epicritic moiety near to the temperature level of the surface of the body and a protopathic (dyscritic) moiety further removed from it. This seems a difficulty, for we would then need receptors for cold, cool, warm, and hot. This is not impossible, though it is difficult to imagine why there should be separate receptors for heat and cold, since these differ physically only in molecular velocity. Some present-day histologists maintain that all neurofibrillae pass at the periphery into a neuroprotoplasmic continuum. Others emphasize that nerve endings are so various and transitional forms so common that form and position have no particular significance. Thus in their view nerve endings are to be regarded merely as devices for securing increased surface. All the real differences between naked and encapsuled endings disappear if these pass into protoplasmic continuity with one another or with the protoplasm of adjacent cells.

* Paper read in the Section of Anatomy at the Annual Meeting of the British Medical Association, Oxford, 1936.

The ideas of Head, even though they conflict with the punctate theory in some degree, are of the greatest importance, for he first enunciated in clear fashion the theory of the dual composition of the nervous system. The evidence upon which Head based this theory was derived mainly from the experiment of dividing one of his own nerves. Though this experiment has been repeated several times, no one has come to the same conclusions as Head. The basis thus rendered unreliable, the whole edifice has been regarded as insecure. The best evidence for Head's dualistic theory, found elsewhere in comparative neurology, has been assembled by Sir John Parsons. For instance, the double conducting systems of the spinal cord for contact, pain, and temperature on the one hand, and the localization of touch, awareness of position, and discrimination of points on the other—a double conducting system whose pattern can be traced in all vertebrates—is convincing evidence that can be obtained from comparative anatomy.

Electrical Investigation

The analysis of peripheral nerves has proceeded apace recently by means of electrophysiology. Anatomical analyses make it quite clear that nerves in passing from the cord to the dermis preserve their morphological characters. It might well be supposed that the diameter of a nerve would depend on the distance it has travelled, upon the number of collaterals given off, and upon whether the nerve itself was an original fibre or a collateral. At all levels, then, the nerve fasciculi contain both thick and thin fibres. If the frequencies of nerves arranged in 2- μ groups are plotted, a curve with two well-separated summits is obtained.

Adrian, from his investigations on the change of potential, rate of adaptation, velocity of conduction, and other features, divides nerves into two groups, while Gasser and others make three or more groups. There is general agreement that the finer fibres which conduct slowly and adapt slowly bear the pain sensation. The difficulty lies in the fact that such fibres cover morphologically those from less than 2 μ up to those of 5 μ or more in diameter, and in rates of conduction from 0.5 metre to 30 metres a second; the pain sensation group includes also exclusive pain fibres, as well as some which bear first the sense of contact and then pain. Thus there are difficulties in suggesting that these two main subdivisions can be fitted to Head's series of protopathic and epicritic nerves.

Histological Investigation

We have made use of large flat spreads of human skin stained while still living with methylene-blue. This has the advantage that a nerve fibre can be traced for long distances and all its subdivisions and endings can be inspected. This method dispels the idea of intermediate and transitional endings. It can be asserted that one nerve fibre bears only one kind of nerve ending, and that these are as uniform and as like each other as the flowers on the same stalk. As many as thirty-seven similar endings have been counted on the collaterals of one nerve fibre. There may have been more.

We are thus reduced to really a small number of endings. It is in the deeper, complex, highly organized, and encapsuled endings that the greatest seeming diversity occurs in different parts of the body, and it is to these that so many names have been applied until one has exclaimed, "So many observers, so many endings!" We would agree that the general observation of large areas of skin and the making of maps of all nerves and nerve endings that can be found therein reduces the anatomical complexity to limits which promise success to the task of associating these endings with the elementary cutaneous sensations.