presence of complete anæsthesia in the latter, and is important from the point of view of prognosis and treatment. In the first group recovery is possible, and the author thinks that trephining of the spinal column with the removal of the tissues compressing the cord would be here particularly advantageous. He draws the following conclusions :—

(1.) Compression of the cord can, without giving rise to appreciable organic lesion, cause very severe and even complete paraplegia of several months duration.

(2.) When, in flaccid paraplegia which has lasted some weeks and is consecutive to compression of the cord, the flaccidity cannot be attributed to a lesion in any part of the reflex arc of the tendon reflexes, and is, moreover, not due to the destruction of a portion of the cord throughout its entire thickness, we may conclude that the cord is not altered or only very slightly damaged.

(3.) In this variety of paraplegia, other things being equal, the prognosis is relatively favourable.

(4.) Surgical interference is especially indicated if the general condition of the patient does not contra-indicate it.

J. MICHELL CLARKE.

Kurella on Asymmetry of the Skull in Torticollis.
Centralbl. f. Nervenheilk u. Psych. August, 1891.

The mechanical factors which condition the external conformation of the skull are but imperfectly known. In considering the causation of deformities of the head, the attention has been chiefly directed to those circumstances affecting the degree of cranial resistance to the expansive pressure of the skull contents, and a whole series of cranial malformations has been explained by variations in the time at which ossification of sutures has occurred in symmetrically placed regions.

The influence of the traction force exercised by the deep muscles uniting the spinal column to the occiput, in cases of scoliosis, has been treated in an able work on the "Scoliotic Cranium," by L. Meyer, but the nearly allied deformities of the skull in torticollis have not previously been specially described.

To render this gap in literature less complete, Dr. Kurella relates the case of a village cobbler, aged forty-six, who came under observation owing to his criminal propensities. The patient was brutal, intemperate and somewhat imbecile; he exhibited a slight degree of *caput obstipum* with very considerable asymmetry of the skull. Patient attributed his torticollis to a fall against the

edge of a table during his first year. For nine years after the accident he carried his head obliquely backwards and to the left, with his chin turned to the right. About his tenth year this condition began to lessen. From his thirtieth year only the slight deviation, noted above, remained, and there was no impediment to the normal voluntary movements of the head. Dr. Kurella found the portion of the right trapezius arising from the occipital bone greatly atrophied; no marked difference between the right splenius capitis and the left was evident; the right sterno-mastoid, particularly its sternal portion, was much thinner than the left. Forehead, very receding; presented a deep groove above the enormously developed superciliary ridges; left half of forehead small and less vaulted than the right; left frontal eminence scarcely discernible; right, strongly developed. Subnasal portion of face prognathous. Left side of hard palate much the wider and less arched. Left parietal eminence more prominent, and situated more posteriorly, than its fellow. Left mastoid process very strongly developed, while the right was barely perceptible. The left external meatus situated nearly two cm. lower than the right. Left occipital region considerably the wider and more projecting.

Cranioscopically the skull appeared as though compressive force had acted on the left side anteriorly and the right side posteriorly, the left half being at the same time drawn downwards in the petrous and mastoid regions, and bulged downwards and outwards in the occipital region.

The length of skull was 180 mm., breadth 158, the skull accordingly was brachycephalic, with an index of 87.7. The smallest width of forehead equalled 100 mm. The frontal index was strikingly great—surpassing that described by Corre (viz., 0.71) as considerable for a murderer's skull. The distance from the occipital protuberance to the left frontal eminence equalled 180; to the right, 183 mm. Horizontal circumference 545 mm., of which the left half barely took 270, a difference which could not be considered to rest exclusively upon errors of measurement. An accurate estimate of asymmetry by linear and arc measurements during life, however, is scarcely possible, or at best the craniometric procedure gives questionable lustres.

A contour delineation of the normal vertical gave a figure very similar to that of the skull designated scoliotic by Meyer.

Dr. Kurella indicates how the cranial deformity resulted from the prolonged tonic spasm of the left sterno-mastoid, trapezius,

and splenius capitis, the most prominent evidence of the abnormal muscular action being the lowered position of the external meatus and the marked downward bulging of the occipital bone. The palatal and maxillary deformities must also be considered in relation with the permanent (during nine years) unequal pressure on the condyles from the traction on the basis cranii.

The left half of the skull proved, on the whole, to be less developed than the right, hence arises the question whether the constant pressure on the vessels, particularly the carotids, of the side affected with spasm may not be educed in explanation of that inhibited general growth, as Bardeleben has done for the scoliotic skull? In this case of Kurella's that assumption seems to gain in probability from the fact that considerable asymmetry of the larynx co-existed; the left half of the thyroid cartilage stood almost in the middle of the neck, on a lower plane than the right, and formed with the latter an angle nearly approaching 90°.

Dr. Kurella does not enter into the connection between the mental anomalies and the cranial deformity further than to remark upon the frequent occurrence of malformation in the occipital bone in habitual criminals.

Schütz on the Nerve Fibres of the Central Cavity—Grey Matter and Their Degeneration in General Paralysis of the Insane. *Arch. f. Psych. u. Nervenkr.* Bd. xxii. H. 3.

WITH the aim of throwing some light upon the pathologico-anatomical basis of reflex pupillary inaction in general paralysis—a symptom which occurs in about 50 per cent. of cases, and may be considered to be one of the early indications of this disease—Dr. Schütz examined first the peripheral portions of the reflex arc. The results were negative; in 20 cases of general paralysis with reflex pupil immobility, the retina, papilla, optic nerve, chiasma, third nerve, and ciliary ganglion exhibited no pathological change. These cases, during life, had presented normal ophthalmoscopic appearances.

Elaborate researches into the normal histology of the central grey substance in the adult, infantile, and foetal brain, were then necessitated by the facts that, although the cellular elements of the nerve nuclei have been studied and described by many investigators, comparatively little has been written upon the fibres of the central grey, and not until Pal's method of staining came into use has it been possible to trace, or even see, many of the delicate medullated fibres which form part of its extremely complex structure.

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These researches showed that from the tuber cinereum to the pyramidal decussation three fairly defined formations can be distinguished in the central grey matter of adults, viz., (1) the nuclear grey, (2) the retiform grey, and (3) the system of longitudinal fibres (dorsal longitudinal bundle).

In the first the author includes Stilling's nuclei, the nucleus funiculi teretis, Westphal's trochlear nucleus, and those groups of ganglion cells in the central grey which are not regarded as centres of origin for root-fibres of cranial nerves.

The retiform grey is most abundant in the region of the aqueduct of Sylvius. Near the aqueduct it receives fibres which radiate from the quadrigeminal bodies and probably are connected with the oculomotor nucleus, also a bundle of fibres, apparently proceeding from the red nucleus, whose further course could not be traced.

Many of the fibres running in the central grey matter arise from the thalamus. Two tracts emerge from this body; one from the chief nucleus and ganglion habenulæ, the other from the antero-ventral portion of the thalamus. They enter the central grey somewhat in front of the middle commissure and course towards the mouth of the aqueduct; here they meet a fasciculus from the tuber cinereum which derives its fibres partly from the network of the latter and partly from the nucleus of Luys and the ansa peduncularis. After passing the mouth of the iter the fibres of the three bundles radiate in various directions; some, probably coming from the chief nucleus, enter the posterior commissure and mingle with its fibres; another portion traverses the roof of the aqueduct to end in the corpora quadrigemina and reticular grey substance. Apparently, other fibres, best seen in sagittal sections, run immediately beneath the ganglion of the posterior corpus quadrigeminum through the anterior medullary velum into the cerebellum. But the chief mass of fibres in the central grey, directed caudalwards from the third ventricle, constitutes the dorsal longitudinal bundle. This lies along the floor of the aqueduct, between the lining and the oculomotor nucleus, spreads into a thin layer immediately beneath the ependyma of the fourth ventricle, as far as the vagus nucleus, then is collected into a club-shaped mass in the region of the hypoglossal nucleus, and continues downwards to the central canal.

The dorsal longitudinal bundle gives fibres to all the cranial nerves, to the previously mentioned cell groups—*e.g.*, Westphal's trochlearis nucleus and the superior central nucleus, to the retiform grey, and to the formatio reticularis grisea, as well as to parts external to the central grey.

The fibre-network of the several nuclei varies much in closeness; the hypoglossal nucleus has the richest plexus of fibres; next come the oculomotor, facial and remaining motor nerve nuclei. As in the cord, the network of the sensory nuclei is much less close than that of the motor.

The fibres of the central grey matter have no medullary sheath until after myelination of most of the other fibre systems. In children, newly-born or a few weeks old, the dorsal longitudinal bundle, and the reticulum of delicate fibres in the nuclei of nearly all the cranial nerves are not visible; the root fibres alone are medullated: the radial fibres entering the *formatio reticularis grisea* and those from the *ansa peduncularis* and nucleus of Luys also are non-apparent. The oculomotor and trochlearis nuclei develop their network about the seventh month of foetal life.

Dr. Schütz acknowledges that his researches, the description and results of which are very fully communicated in his paper, leave many voids—"The chaotic intricacy of the fibres in various regions of the central grey often makes all attempts to recognize any definite arrangement of them completely illusory."

The clinical and pathological conditions found in twelve cases of general paralysis are detailed. For the purpose of this abstract we give an epitome of Case II., selected at random:—

A female general paralytic with paresis of right elevator of eyelid and internal rectus. Pupils of medium size, right pupil larger than its fellow, both inactive to light, tongue tremulous, articulation impaired, knees' jerk absent. Later there were right facial paresis, Romberg's symptom, and marked ataxy.

Post mortem:—Posterior spinal sclerosis in upper part of cord; nuclei of posterior columns shew well-preserved fibre-net-work.

The dorsal longitudinal bundle greatly atrophied from the decussation of pyramids to the oculomotor nucleus; thence the degeneration gradually diminishes, but is still evident at the level of the posterior commissure. Over the hypoglossal nucleus the fibres of the dorsal longitudinal bundle shew numerous varicosities. From the auditory nucleus to the locus *cæruleus* there are many small blood vessels, with thickened walls, amongst the fibres of this tract.

Few fibres of the retiform grey in the neighbourhood of the aqueduct remain.

In the hypoglossal nucleus the root-fibres appear sharply defined amidst the mere vestige of the fibre-network. The facial and vagus nuclei, the nucleus *funiculi teretis*, and the superior central nucleus exhibit a somewhat minor degree of this atrophy. The reticulum in the nuclei of the other cranial nerves is not affected.

In the vicinity of the locus cæruleus and the descending root of trigeminus, the fibres passing into the formatio reticularis from the central grey, are greatly reduced in number. The radial fibres from the deep medullary layer of the anterior quadrigeminal body to the central grey are remarkably few, especially the lateral group, as compared with the normal condition.

In all the cases there was more or less pronounced atrophy of fibres in the dorsal longitudinal bundle. In some cases this atrophy extended from the upper limit of the pyramidal crossing to the third ventricle; in other cases it ceased at the proximal end of the aqueduct. With one exception, all the cases shewed a decrease of fibres in the ventricle from the region of the locus cæruleus to that of the oculomotor nucleus, the diminution being most marked in this latter area.

Concurrently with the degeneration of the dorsal longitudinal bundle, there was decrease of the fibres radiating into the formatio reticularis from the central grey, and the retiform grey was affected in equal degree.

The nuclear grey, in all but one case, displayed marked atrophy of its fibre-network.

Of the cranial nerve nuclei only the motor were involved. The hypoglossal nucleus was most degenerated in nine of the cases; in some of these the atrophy of the plexus had proceeded so far that only the root fibres remained. The fibre-network of the facial nucleus was greatly diminished in eight cases. The nuclei of the other cranial nerves were mostly unimplicated in the fibre degeneration.

The nucleus funiculi teretis in two cases was almost free from fibres. Usually the superior central nucleus shewed atrophy of its retiform structure.

In most of the cases there was no trace of inflammatory process in the central grey substance. About half of the cases shewed, in places, a considerable number of newly-formed vessels with thick walls, but without proliferation of nuclei around.

Several considerations lead Dr. Schütz to think that the fibre degeneration in the central grey is a primary systemic affection, in its restriction analogous to systemic lesions in the cord. He maintains that the fibres of the central grey matter constitute a distinct system, a fact which he considers is proved by developmental circumstances—the late myelination and small calibre of the fibres, and their apparent absence until some weeks after birth at term. The fibre-atrophy is confined to those fibres whose developmental history is specifically distinct from other fibre systems. A section from the brain-stem, or medulla oblongata of

a general paralytic, with extensive fibre-atrophy in the central grey, presents a similar appearance, in this respect, to a section from the same part of a newly-born child; in both the dorsal longitudinal bundle, the network in the motor nerve nuclei (excepting the oculomotor), and the fibres streaming into the formatio reticularis are absent.

Dr. Schütz does not assume to have established that the degenerative condition described by him is a lesion peculiar to general paralysis, or that it occurs in all cases of that disease. In senile dementia, chronic alcoholism, and paranoia he has found no such condition.

Which of the symptoms of general paralysis are to be assigned to the degeneration of fibres in the central grey? Dr. Schütz admits that the present state of our knowledge is inadequate to solution of the question. In general paralysis nearly all parts, peripheral or central, of the nervous system have been found diseased. Most recently the researches on degeneration of fibres in the cerebellar cortex, and those of Lissauer on disease of the thalamus in general paralysis have rendered the attempt to discover the relationship between the semeiology and pathology yet more difficult. Further, the physiology of the central grey matter is almost unknown. Dr. Schütz thinks that the network of the nerve nuclei represents a system of association fibres between the individual cells of the nuclei, by which is conditioned a regulated synergy of the ganglion cells. In like manner the dorsal longitudinal bundle would have a similar function for groups of ganglion cells. The fibres of the central grey matter accordingly serve functions which do not come into existence until some time after birth, and which are expressed by co-ordinated action of groups of muscles in complicated fine movements, such as articulation. It is precisely these fine movements which are the first to become impaired in general paralysis.

The infrequency of sensory disturbances and derangement of the external eye-muscles in general paralysis corresponds to the results found by Dr. Schütz, viz., absence of evident change in the oculomotor and sensory nuclei of the caudex. He concludes that disease of the cerebral cortex can no longer be regarded as the most essential cause of the motor derangements in general paralysis. In his cases, with one exception, the severity of the motor symptoms coincided with the intensity of the fibre-degeneration in the central grey.

He confesses that he has failed in the primary object of his research.

ERNEST BIRT.