Abstracts.

Neurology.

NEURO-ANATOMY AND NEUROPHYSIOLOGY.


In the rabbit there is a fixed and definite anatomical projection of the dorsal nucleus of the corpus geniculatum externum on the cortex, and lesions of the striate cortex only a few millimetres in diameter cause circumscribed and sharply localised areas of atrophy in the external geniculate. Contiguous lesions of the cortex produce contiguous lesions in the corpus geniculatum, and the size of the one is proportional to the size of the other, in the areas devoted to monocular vision. On the other hand, lesions of the striate cortex in the adult rabbit cause no demonstrable lesions of the ventral nucleus, the anterior colliculus or the optic tract. When the results of these experiments are combined with the already known projection of the retina on the corpus geniculatum, the nasal quadrants are found to be projected on the postero-inferior portion of the striate cortex, and the temporal quadrants on the antero-superior portion. The field for binocular vision has a relatively large representation anterior to that of the temporal quadrants. The superior retinal quadrants are represented superiorly in the cortex, the inferior quadrants inferiorly; so that a second rotation of the field must take place in the geniculocortical neurone.

R. M. S.


The primitive mammalian type of corpus geniculatum externum, with a dorsal and ventral nucleus, without lamination, lying vertically on the surface of the brainstem, is seen in marsupials and lower mammals. Only the dorsal nucleus has a projection on the cortex and an indication of this is seen in the brain of the didelph. Of the animals studied, the cetacea, carnivora and primates showed a variation from the primitive mammalian type of corpus geniculatum. This consists of the almost complete disappearance of the ventral nucleus: the appearance of one or two rows of large cells along the periphery of the persisting dorsal nucleus: certain deformations of the primitive
form, perhaps resulting from an increase in the size of the area of representation of binocular and macular vision: and a rotation lateralward, so that the original external surface lies ventrally. In all the animals studied, the fasciculus longitudinalis inferior appeared to be the only system connecting the external geniculate body with the cortex, and in some animals (*phoca, phocæna*) the entire fasciculus can be unmistakably traced to it.

With the other reasons for believing that the inferior longitudinal fasciculus is the geniculostriate radiation should be considered the fact that its fibres resemble those of the optic tract, and also other important radiations. Such coarse fibres are not seen in association systems. In the ape, fibres are given off only from the superior and inferior edges of the longitudinal fasciculus and simultaneously to the lateral and mesial cortex. This speaks in favour of the "vertical division" of the optic radiation. The existence of callosal fibres uniting the corpus geniculatum with the opposite cortex has been postulated on hypothetical grounds, but the author could find no evidence of decussating cortical fibres in the present study.

R. M. S.

[137] The radix spinalis trigemini and the principle of usurpation.—WALTER FREEMAN. Arch. of Neurol. and Psychiat., 1926, xv, 607.

One of the interesting features of the trigeminal nerve is its long caudal extension in the radix spinalis. The axons of the cells in the gasserian ganglion enter the pons and divide, one branch going to the main sensory nucleus, the other turning caudad and extending even as far as the first or second cervical segment of the spinal cord. The behaviour of these fibres is different from that of the homologous fibres in Lissauer's tract in the spinal cord. In the spinal cord these fibres run for a distance of one or at most two segments before entering the gray matter of the posterior horn, whereas in the case of the spinal trigeminal tract they run for a much greater distance before terminating in the substantia gelatinosa of the bulb. The explanation for this is to be sought in the phylogenetic development of the trigeminal nerve.

The fifth nerve is not the only one which contributes fibres to the radix spinalis trigemini. The seventh, ninth, and tenth cranial nerves also contribute to this root in the lower fishes, so that the similarity of the root to Lissauer’s tract is quite marked. During the development of the head these lower branchial nerves have gradually lost their cutaneous fibres, and the trigeminal nerve has increased in importance until it has covered all of the face and a large part of the head. Why there has been this progressive concentration of function in a single nerve is difficult to explain, except that concentration and centralisation seem to be in keeping with the economy of the organism. Clinical investigation has also shown that the substantia gelatinosa of the brainstem is segmented in a primitive fashion, focusing on the mouth, just as the lower sacral segments of the cord focus about the anus. With
these two facts in mind, (1) that the trigeminal nerve has usurped the fields formerly supplied by several other nerves, and (2) that there is definite segmental representation in the spinal root of this nerve, we may arrive at an explanation of the long caudal projection of the afferent fibres. Pain, pressure, heat and cold are primitive types of sensibility accompanied by a high degree of feeling-tone. They might be called palæo-aesthetic sensibility. The receiving centres for these sensations are arranged in primitive fashion, segmentally, in the substantia gelatinosa rolandi in the medulla oblongata just as in the spinal cord. These centres, laid down early in the course of phylogenesis, do not change their position. Therefore, when a single nerve usurps the function of several other nerves, the fibres supplying the invaded area must travel a greater distance within the nervous axis in order to reach the cells of origin of the secondary pathway. In the case of the trigeminal nerve this probably explains the long caudal projection of the axons of cells in the gasserian ganglion.

R. M. S.


Summarising the results of their researches, the authors conclude as follows:

1. The occurrence of the Argyll Robertson pupil depends on a break in the reflex arc in that part consisting of the intercalated colliculonuclear neurone and the nucleus of origin of the efferent irido-constrictor fibres.

2. The origin and path of the colliculo-nuclear neurone concerned have not yet been defined, but hypothetically it has its cell in the fifth stratum of the colliculus, and its tract either in the inner layer of the arcuate fibres or in the fibrae radiales.

3. The fibrae radiales give the most direct connexion with the Edinger-Westphal nucleus.

4. Evidence (developmental) is adduced to show the relationship of the Edinger-Westphal nucleus with the rest of the third nucleus, and to show that its differentiation from the third nucleus synchronizes with the development and functioning of the sphincter pupillæ musculature, both phylogenetically and ontogenetically.

S. A. K. W.


According to Sherrington, reflex tonus is reflex posture, "a reflex which differs from the reflexes more commonly studied mainly in this, that the latter execute movements while this maintains posture." Thus viewed, tonus is that state
of constant muscular tension which underlies and makes possible all orderly motion.

1. The question of sympathetic innervation. Though the subject is far from settled, the author states we are justified in concluding, in the words of Langley, that "there is a balance of histological evidence that sympathetic nerve-fibres form hypolemmal endings on some striated muscle fibres."

2. Innervation of red and white muscle fibres. It appears that in mammals red and white muscles differ somewhat both in anatomy and physiology, but the distribution is variable and white fibres may perhaps turn red. The type of innervation gives no clear and consistent anatomical basis for distinguishing between red and white fibres. There appears to be, however, a clearer distinction in reptiles.

3. Contractility of sarcoplasm. The author cannot find that there has ever been any proof that the sarcoplasm in a muscle fibre is in fact contractile. It is purely a hypothesis.

4. Sympathetic influence on muscle tone. After a long examination of the data advanced by Hunter, Langelaan, and many more, the author summarizes as follows: "until it can be proved (a) that mammalian muscle contains two distinct forms of fibre, the slender and the coarse, each with a special innervation, and until (b) there is satisfactory proof of the existence of two kinds of muscle tone, plastic and contractile—the theory of Hunter cannot be accepted. Additional evidence is also desirable to explain the 'interval' after operation. Nor will the evidence ever be satisfactory until some positive proof is obtained through stimulation experiments."

5. Creatin metabolism. No satisfactory evidence has been produced that creatin metabolism is in any special way associated with tonic muscular contraction.

6. The tonus of skeletal muscle as a proprioceptive reflex. Static and kinetic movements can be explained on the basis of one neuromuscular mechanism. 'Tonic' and 'phasic' reflexes, though unlike, are separated by no fundamental difference in physiological mechanism. Tonus is a graded series of proprioceptive reflexes, continuously and unconsciously playing its part in every motor act. By its remarkable specificity it moulds individual muscles; by its universality it controls postures.

S. A. K. W.

NEUROPATHOLOGY.


This paper is devoted to a study of the muscular tissue and its proprioceptive system of nerve terminals in paralysis agitans, and is well illustrated by numerous drawings and microphotographs, some of which are in colour. Byrnes considers that there is much in the clinical course of paralysis agitans
Neurology: NEURO-ANATOMY AND NEUROPHYSIOLOGY.

J Neurol Psychiatr 1927 s1-7: 243-246
doi: 10.1136/jnnp.s1-7.27.243

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