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AN

ESSAY

ON THE

GANGLIONARY SYSTEM OF NERVES

IN THE

CAVITY OF THE CRANIUM,

AND ITS USE.

BY WILLIAM INGALLS, M. D.

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To the Reader.

It will be perceived by the Anatomist, the subject of the following Essay is very far from being exhausted ; and there still remains an ample field for anatomical research.

AN ESSAY

ON THE

GANGLIONARY SYSTEM OF NERVES, &c.

§ I. The energy of the brain, and the due performance of its functions, as it has been supposed, do not depend on its volume, the size of its convolutions, nor the temperaments.

§ II. As in other viscera, the perfect organism of the brain, is undoubtedly a condition essential to the performance of its functions with exactitude and energy; for, a malconformation, or some defect in its minute structure, not cognizable by the senses, may render this viscus unsusceptible of impressions, necessary to its vigorous and healthy action. But, a complex organ, deprived of the stimulus of nervous influence, however perfect its structure, becomes torpid, and its function destroyed.

§ III. From the following post mortem examinations it may be inferred, the size of the brain, the number, depth and thickness of the convolutions, are merely conditions, but, perhaps, necessary conditions in the production of thought, and the propensities to which man is subject.

Case 1.—In this case, the person was subject to frequent and great mental excitations. The brain was of extraordinary dimensions, and all its parts were uncommonly developed : the convolutions were large, distinct, and numerous ; the ganglia were readily distinguished and displayed ; the medullary cords easily traced ; and the pineal gland was of the pine apple form, and so large as to attract particular attention.

The remarkable development of the brain, and the dissection taking place a few hours after death, in a subject that had died suddenly from suffocation, and the whole organ being moist with serosity, enabled me to demonstrate the minute parts with comparative ease ; and led me to believe, the pineal gland and other similar bodies, the use of which have not been explained, were destined to perform an important part in the functions of the brain.

Case 2,—Was the dissection of the brain of a person, who sustained the reputation of possessing fine intellectual powers, and who had practised law with reputation and success. The brain was small, the convolutions were diminutive, comparatively indistinct, and apparently more numerous than usual.

Case 3,—Was the dissection of the brain of an idiot, of very diminutive stature. In this subject, the capacity of the cranium in proportion to the size of the body was exceedingly small; the cerebrine convolutions were *few* in number, but very large and uncommonly distinct. This idiot was wholly destitute of understanding, and devoid of every propensity, good or bad. The pineal gland was converted into a substance resembling a small melanose petecchia.

By the way, it may not be improper to remark, there was found in the digestive canal, a number of lumbrici of extraordinary size; several had penetrated by the pori biliarii into the substance of the liver; and three were closely impacted into the common biliary duct, by which it was greatly enlarged, both in diameter and length.

Case 4,—Was the brain of a man possessing a

degree of intelligence, but was so much of an idiot, he was incapable of providing for his physical wants; and, on this account, he was placed under the superintendence of a brother. The brain was large, and all its parts fully developed. The pineal gland was of the pine apple form, cartilaginous, and larger than usual.

In this individual, the intellect remained unimpaired, till he arrived at the age of nine years; when, after a severe fever, ensued the mental imbecility, which continued through life. Several analogous cases occurred in the same family.

§ IV. In this place, it was my intention to give the anatomy of the brain; but, as hitherto, the relative importance and use of parts, beside those that are now under consideration, have not been satisfactorily demonstrated, this subject will be postponed, to be resumed at some future period.

From the remarkable appearance of the pineal gland, in Cases 1, 2 and 4, Section III., I was induced to examine the parts connected with this organ; and the result of my investigation will be found in the following paragraphs.

§ V. It is not pretended, however, because the

organization of the pineal gland was in a morbid condition, it was the sole cause of idiocy in cases 3 and 4, Section III.; yet it is not unreasonable to suppose, the diseased state of this organ, may have had an influence in diminishing the activity of the brain.

§ VI. It is thought by many to be capable of demonstration, the diseased state of the ganglia of the trisplanchnic nerve, may have an important agency in impairing, disturbing, and even destroying the functions of viscera essential to life.

§ VII. Hence, if it be established, the glands and other bodies contained in the cavity of the cranium are found to discharge the office of ganglia, the brain will undoubtedly be liable to suffer from the disordered affections of these parts.

§ VIII. *GLANDULA PINEALIS* is for the most part of a conical form, and is situated on the back part of the posterior commissure. Its base is attached by a short slender neck to a short transverse medullary cord, which, at each of its extremities, divides into two pedunculi, the anterior and posterior. The former passes over the thalamus nervi optici near its internal margin, and finally terminates in the emi-

mentia mammillaris. In its passage, it sends a few filaments to the optic couch, and one to the anterior crus of the fornix, just before it arrives at its ultimate destination. The latter, which is much shorter than the former, takes a direction backward, and is united with the quadrigeminal bodies.

§ IX. The *EMINENTIE MAMILLARES* are two small hemispherical bodies, situated at the base of the brain, anterior to the cribriform plate, and posterior to the junction of the optic nerves. From each of these bodies proceed three nerves, or medullary cords, an anterior, middle and posterior.

§ X. The *FIRST, OR ANTERIOR CORD*, penetrates the anterior lobes of the brain, and may be traced to a considerable distance into its substance.

§ XI. The *SECOND, OR MIDDLE CORD*, under the several appellations of anterior and posterior crura of the fornix and corpus fimbriatum, extends from the eminentia mammillaris to the bulb of the pes hippocampi major. This cord, having, like the nerves belonging to the ganglionic system, connexion with small masses of gray substance, furnishing various organs with nervous filaments, and anastomosing with other cords, is justly entitled to the rank of a *NERVE*.

§ XII. The ANTERIOR CRURA of the fornix go upward and backward, gradually approximating each other, till they come in contact in the anterior part of the lateral ventricles; soon after their junction, they begin to diverge, and continue to diverge, assuming in their course the name of posterior crura, until they reach the pedes hippocampi majores; when, under the name of corpora fimbriata, they follow the course of these bodies, to which they adhere, almost to their termination. These cords or nerves send off fibrillæ, which, in some subjects, from their peculiar distribution on the inferior face of the fornix, have been considered not inaptly to bear a strong resemblance to the strings of a lyre. These fibrillæ supply with nervous influence the part of the corpus callosum, where this and the fornix coalesce.

§ XIII. The THIRD, OR POSTERIOR CORD, penetrates the body of the optic couch, and ascending, till it arrive nearly to the semicircularis geminum, it soon separates into a number of filaments, which run backward parallel to the above mentioned cord, and, finally, emerging from the optic couch, unite with the filaments of the semicircularis to form a plexus.

§ XIV. The *TENIA SEMICIRCULARIS GEMINUM* originates from the tuber cinereum, and anastomoses with the anterior crus of the fornix; and, receiving a branch from the anterior peduncle of the pineal gland, takes a direction backward, coursing between the thalamus nervi optici and corpus striatum, till it meet the branches of the posterior cord of the eminentiamammillaris, when, dividing into filaments, it unites with those of the former body to form a plexus.

§ XV. The result of the union of these two nerves, Section XIII. and XIV., if it be allowed to call them so, is the formation of a plexus, from which filaments are distributed to the optic couch, and the flooring of the inferior horn of the lateral ventricles; some also are continued to the extremity of this sinus, and anastomose with the posterior filaments of the anterior commissure, before they disappear.

§ XVI. The *COMMISSURA ANTERIOR* is a round medullary cord, which traverses the middle lobes of the cerebral hemispheres, and terminates in a radiating lash of filaments; some extending forward as far as the fissure of sylvius, others backward to the descending horn of the lateral ventricles; the for-

mer anastomosing with the root or origin of the olfactory nerve, the latter with the filaments proceeding from the plexus formed by the branches of the semicircularis, and the posterior cord of the eminentia mammillaris, (and the corpus fimbriatum. —*Meckel.*)

It is slightly curvilinear with its convex part forward: a small portion of it may be seen in the third ventricle, just before the anterior crura of the fornix.

§ XVII. If we take a survey of the wide range which the cords or nerves, above described, perform, the mind must be convinced of the similarity existing between these and the nerves of the ganglionic system in the other cavities. In tracing the cords from ganglion to ganglion, commencing with the pineal gland, we find that the posterior peduncle is connected with the tubercula quadrigemina, and the anterior with the eminentia mammillaris; that from the eminentia mammillaris depart three medullary cords, an anterior, middle and posterior; the two latter travel backwards, the middle terminating in the corpus fimbriatum, and the posterior anastomosing with the semicircularis to form a plexus; that the branches of the anterior

commissure are united with those of the above plexus and the corpus fimbriatum posteriorly, and anteriorly with the external root or origin of the olfactory nerve; and that this nerve is connected by its internal root or origin either immediately or through the medium of the tuber cinereum with the optic nerve. To this it may be added, the anterior commissure is connected with the tuber cinereum. Hence by the agency of the above mentioned cords and their appendages, the ganglia, a stimulus necessary to its functions is not only supplied to the brain, but a mutual relation is preserved between the peripheral and the central parts of this viscus, and the optic nerve.

§ XVIII. The GLANDULA PITUITARIA is an isolated mass of gray substance, lodged in the sella turcica, and furnished with a neck or twig; which by Meckel is thought to be attached to the anterior commissure. In these respects, as well as in its diseases, it has a striking analogy to the pineal gland.

§ XIX. The TUBER CINEREUM, viewed from the base of the brain, is of a triangular form, and situated between the junction of the optic nerves, and the mammillary eminences. It is attached by its

apex, to the decussating portion of the former; but its base lies towards the latter. This mass has all the properties of a ganglion. Its thickness is very considerable, and embraces the greater part of the anterior pillars of the fornix, and the parts of the nerves that anastomose with them; namely, the anterior pedunculi of the pineal gland, and the tænia semicircularis geminum; and also a portion of the anterior ^{cord} ~~part~~ of the eminentiæ mamillares. The infundibulum enters the inferior face of this body near its centre.

From a review of the structure, arrangement, and distribution of the various organs, above described; and their being particularly adapted to accomplish the purpose for which they were evidently designed, the mind is irresistibly impelled to the conclusion, the ENERGY and ACTIVITY of the BRAIN, like the liver, heart and other viscera in the abdominal and thoracic cavities, must depend on a GANGLIONARY SYSTEM of NERVES. Should this position be eventually established, it would afford a foundation for the attainment of a clearer and more precise knowledge of the physiology of the brain.

SUPPLEMENT.

My opportunities for dissection being very precarious, it is impossible for me to pursue the study of the anatomy of the brain with the regularity and constancy, which so complex an organ demands. This may serve as an apology for the additional description of the infundibulum and its connexions.

Since the manuscript was placed in the hands of the publishers, an opportunity of dissecting the brain, and of obtaining a more precise knowledge of the relative situation of the infundibulum, the tuber cinereum and the anterior commissure, has presented itself.

The brain was placed on its vertical surface, and the optic nerves were cautiously detached from its connexions from before backward, till the membrane, which closes the anterior extremity of the iter ad infundibulum, came into view. The removal of this membrane opened a free communication between the third ventricle and the surface of the brain; and, through the aperture made by the removal of the membrane, the orifice of the infundibulum was conspicuous. On folding back with precaution the optic nerves, and introducing the point of the blow-pipe into the orifice of the infundibulum, its canal was inflated through its whole extent.

The border of the aperture, which was circular, and which had been closed by the above mentioned membrane, consisted of gray substance, one portion of which was attached to the commissure above, and another was blended with the tuber cinereum below; so that the tuber and the gray substance that surrounds the aperture may be regarded as a continuous mass. In this subject, the infundibulum was not adherent to the anterior commissure, but to the tuber cinereum: hence the pituitary gland could exert no influence over this medullary cord, except through the agency of the tuber cinereum; to which body I consider the pituitary gland to be an auxiliary appendage.