

by auscultation and percussion, enabling us to recognize more fully and accurately the degree, position and relation of areas diseased. In our case there were no spots of isolated foci over the lungs, no haziness indicating tuberculous infiltration, no decided shadows of consolidation and no circumscribed spots of bright reflex, surrounded by dark rings, which would point to cavities, but there was darkness on the left at the lower portion of the lungs, indicating pleuritic thickenings. Numerous microscopic examinations of the sputum showed no "bacilli tuberculosi," but micrococci gonorrhæe or gonococci (Neisser) in great numbers.

Various theories are offered to explain this condition in secondary pleuritis and its relation to gonorrheal infection, but none of them have yet proved satisfactory. In some cases there seems to be no doubt that the gonococci are carried through the blood and lymphatics to the pleura, finding there, as in this case, a *locus resistantie minoris*, for although these micro-organisms have not been discovered in the blood, they have been found in the sputum, and their identity has been fairly well established, as in our case, through their behavior with stains, and through culture experiments on human blood serum, where they gave semblance of a growth, the temperature being between 33 and 37 degrees C. In three days we had a very thin, almost invisible, moist yellowish growth, seeming to be composed of little drops. Under low power, characteristic small processes shooting out from the smooth border were seen. Transferred to fresh media they gave same results.²

The patient, being a traveler, was confined to bed immediately, the epididymitis treated with elevation of scrotum and application of evaporating lotions. When acute inflammatory symptoms subsided, the testicle was strapped and patient finally allowed to go to California for substantial rest. All other symptoms of pleurisy under treatment were much better, patient improving. The pleuritic process terminated in eight weeks, patient being convalescent from that disease. Râles were still present, but were higher pitched, and percussion note was far from satisfactory. I would not have been surprised at some other complication, but then another curious feature manifested itself; the discharge from the meatus of the penis returned and continued for several weeks—or at least it was so reported to me—showing that gonorrhea in our case was not only a chronic, specific and infectious disease, with local manifestations, but with a marked systemic reaction.

Hyde, speaking of such cases, says that they seem to be essentially pyemic, and to be due to infection with pus coccus, which gains admittance to the circulation through the urethral or other epithelium that has been damaged or destroyed by the gonococci. Anders, describing the etiology of endocarditis, states: "Acute endocarditis may be of gonorrheal origin. In the inflammatory products of this condition, Hering found the gonococci, as has also Councilman, in the heart muscles. As the result of invasion of the blood by the gonococci, suppurative arthritis may also be occasioned, and now the clinical picture is that of general septicopyemia. I observed one case in which pleurisy was associated, and among the numerous widespread complications, iritis deserves special mention."

Dr. Aug. Fisher, Chicago, refers in *Ces. Lekarske Listy*, 1898, to a similar "Case of Secondary Pleuritis as a Result of Chronic Gonorrhea."

A man, aged 26, single, machinist, vigorous, family history good, had gonorrhea four years ago; was never sick before. In March he gave all the characteristic symptoms of pleurisy. Two weeks later aspiration was made, with no result. He had occasionally slight discharge from the meatus, as finally admitted, but these stopped during the present disease, which in the third week was marked by increased cough, followed by copious purulent expectoration. Microscopic examination of the sputum revealed a large number of gonococci (Neisser), but no bacilli tuberculosi. In October, when the symptoms of pleurisy subsided, and the patient was feeling well, the discharge from the meatus showed itself again, and the case was referred to a specialist.

I have to say again that my interest in our case arose altogether independently of any intention to investigate the etiology of secondary pleurisy, as

regards gonococcus. It was only by accident during the study of the X-ray diagnosis in the diseases of the lungs, that I was led to consider the possibility of a relation of an irritant called "gonococcus"—what is in the name?—or an irritant called "bacillus tuberculosi;" both are and remain to be irritants if finding a soil in the lungs. This subject presented itself to me, as it seems to have presented itself to the minds of others. From the beginning it seemed evident that in investigating this question one was bound to follow the rules usually followed in bacteriologic investigations, but the end, from a pathologic standpoint, remains the same, just as well as the problem, how and through what channels the gonococci went up to the pleura and, irritating the same, caused hyperemia, exudation and then resolution. Malsbury makes a good point in this direction, saying: "The organisms, unless arrested, are prone to multiply, to spread into new territory and transmit their toxic products to the general circulation."³ If we had had in our case bacilli tuberculosi, the mode of infection could be explained through the respiratory organs, etc., but with gonococci we seem to be at sea.

In reporting the case, I fully realize that one or two cases are very little to build on, but it shows that nature sometimes adapts itself to newly arising circumstances, even at the expense of science, bringing our terms "inflammation" and "infection" very close together.

THE FUNCTION OF BRÜCKE'S MUSCLE.

BY DR. V. FUKALA, WIEN.

Translated by J. W. SHERER, M.D., Kansas City, Mo., from Arch. f. Augenheilk., Bd. xxxvi, p. 65.

In 1864 Brücke published his views in regard to what he calls the "ciliary muscle." As is well known, this muscle consists of two parts, one circular, and one longitudinal. The circular portion escaped his observation, but he correctly apprehended the longitudinal part, and to it his name has been applied. Brücke first demonstrated that the ciliary muscle was unstriated. It had hitherto been designated the "ligamentum scleroticum," "plexus ciliaris," or "ganglion ciliare," according to the different views of its structure. Brücke failed to correctly understand the function of the longitudinal muscle, and this error, to a degree, still prevails. In his "Anatomic Description of the Human Eyeball" he states: "the muscle discovered by me extends from the corneo-scleral junction to the roots of the ciliary process." Unfortunately he did not follow the muscle farther into the choroid, and consequently there escaped him the important fact that it extends nearly to the posterior ocular pole. Brücke's conception that the muscle had the function of drawing the choroid anteriorly is erroneous. He expressed himself regarding this as follows: "This muscle draws the choroid tightly to the retina and vitreous, and reduces the closed space formed by the cornea, choroid and itself. At the same time it draws forward the zonula Zinnii, which is united with the ciliary processes, reducing the tension between the lens and ciliary processes. Whether this causes a forward movement of the lens can not be stated, since we do not know how far such movement would be permitted by the aqueous." Brücke appeared inclined to bring the action of his muscle in

² Tontou: Der gonococcus und seine Beziehungen zu gonorrhoeischen Processen. Berliner klin. Woch., No. 21, 1894. Venereal Diseases: Prof. Dr. Franz Mrazek.

³ Gonorrhea in Male; Journal Am. Med. Assn., July 16, 1898.

consonance with Keppler's views of accommodation in stating that its contraction and relaxation moved the lens forward and backward. He suggested the name "tensor choroideæ."

Further study by Müller (1857) and Schultze (1867) perfectly elucidated the anatomy of the muscle. We now know that the muscle consists of two parts, an anterior, circular part called "Müller's muscle" and a posterior, longitudinal part called "Brücke's muscle." It is beautifully described and illustrated in Graefe-Saemisch's *Handbuch*, i, 1874, p. 170. Although the anatomy was so thoroughly worked up, ophthalmologists were still in doubt as to the function. There was not the slightest doubt that the anterior part performed the labor of accommodation. The function of the posterior part has remained unanswered to date. Brücke's views have been given. Cramer, Helmholtz and most other scientists who thoroughly understood accommodation considered that Brücke's muscle assisted accommodation by drawing the choroid forward and relaxing Zinn's zonula. It is so given in the works of most authors, and at first glance is a very enticing theory, but on closer scrutiny serious objections to it appear, particularly if thought is taken of the condition of the two parts of the muscle in the different states of refraction, as first indicated by Iwanoff.

Let us first look closely at the anatomy of the normal muscle. The longitudinal portion extends from the corneo-scleral junction almost to the posterior pole in unstriated bundles which anastomose by lateral processes, the mere presence of which argues against the simple function of drawing the choroid anteriorly. Only in the anterior 2.5 mm. of their course do these fibers not anastomose.

Moreover, Schultze discovered fibers running transversely to the longitudinal ones, and anastomosing with them by numerous star-like branches (Jeropheeff). All researches duly considered, we arrive at the conclusion that Brücke's muscle constitutes a dense meshwork spread over the entire choroid and vitreous, forming what Iwanoff called "Schultze's net." As to the function of this net, I would compare it with the network around a balloon. In both the net prevents overdistension and bursting. *Brücke's muscle supports the globe in every direction, and more especially in the antero posterior diameter.* The six extrinsic ocular muscles, particularly the obliqui, exert a strong pressure to increase the length of the bulb. This would gradually develop myopia.

I believe that the gradual expansion of buphthalmos depends on an alteration in Brücke's muscle. The contraction of the muscular network *restrains expansion in all directions, and strongly resists increase in length of the eyeball.* Otherwise the normal eye would become myopic, and the myopic eye grow worse. *Brücke's muscle is the direct antagonist of the extrinsic muscles and may be called the "contractor bulbi."*

Let us see how my views agree with Iwanoff's findings. *In the norm Müller's and Brücke's parts of the ciliary are equally developed.* If considerable demand is made upon accommodation, a corresponding demand upon Brücke's muscle is necessary, in order to prevent distension and elongation of the eyeball and the development of myopia. *In hypermetropia Iwanoff found Müller's part hypertrophied and Brücke's part atrophied.* This indicates that accommodation is vigorously exercised in the hypermetropic eye, and

that Brücke's part lies in disuse, since elongation of the ball would not be inimical but would approach emmetropia. *In myopia the condition of the muscle was found reversed. Brücke's part was hypertrophied, Müller's atrophied.* This is most naturally explained by the fact that the myopic eye needs accommodate little, but must guard against elongation and increased myopia. Iwanoff (v. Graefe's *Arch. f. Ophth.*, xv, 3) has expressed his astonishment over this remarkable condition of the two parts of the ciliary muscle. He accepted Donder's theory of accommodation, and thought the whole muscle should *hypertrophy* in *hypermetropia* and *atrophy* in *myopia*.

My view of the function of the ciliary muscle explains this condition in a simple and natural way. However, it combats the opinion of those ophthalmologists who contend that Brücke's muscle assists accommodation. Iwanoff first recognized the fallacy of this theory. "The theory of accommodation which we at present accept (*gegenwärtig geltenden*) is in nowise confirmed, etc." (v. Graefe's *Arch.*, xv, 3, p. 289). If it were accepted, we should be unable to explain why the longitudinal fibers are atrophied in hypermetropia—a condition in which an inordinate demand is made upon the accommodation at all times. On the contrary, if it were correct, we could foretell the hypertrophy of these fibers. How otherwise are we to explain hypertrophy of Brücke's muscle in high myopia, in direct ratio with the degree of error present? The highly myopic eye needs no accommodation on account of the great approximation of its far point. This circumstance speaks with the convincing logic of physiologic fact for my theory, in opposition to those who take the view that Brücke's muscle participates in accommodation.

No argument can be made in favor of Henke's theory of negative accommodation, which states that the retina is drawn nearer to the lens by the action of Brücke's muscle. Iwanoff, who was at first inclined to accept this statement, later admitted its absurdity and pointed to the fact that myopes practically never have clear distant vision without the aid of concave glasses. The posterior pole is the only place where the choroid is not covered by the meshwork. Here the sclera is dependent on its own elasticity unsupported. Consequently, just here the ocular tunics most frequently give way to the pressure exerted by the extrinsic muscles; here is a favorite site of staphyloma, and here occur the posterior pathologic processes of high myopia.

From the foregoing it is evident that the efforts of many French and German surgeons who, about 1842, tried to cure myopia by resecting the ocular muscles was not entirely unfounded, although they appear preposterous enough.

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SOCIETY PROCEEDINGS.

Chicago Medical Society.

Clinical Meeting held Jan. 11, 1899.

Dr. ARTHUR D. BEVAN, president of the Society, occupied the chair.

Drs. A. E. HALSTEAD and MAXIMILIAN HERZOG reported

A CASE OF LYMPHANGIOMA CYSTICUM.

The parents of Maud Taylor, a child aged 22 months, consulted Dr. Halstead in August, 1898, concerning a growth that had developed in the left side of her neck. Shortly after her birth they had noticed a tumor, about the size of an English