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THREE CASES OF TUBERCULOSIS OF THE KIDNEY.

BY

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The three cases which I wish to report are of particular interest both from a diagnostic and a pathological standpoint. In the first place, these cases show how chronic the disease may be, and to how few symptoms it may give rise. They also demonstrate how nature can at times limit the disease, and how it is that some intercurrent disease, such as a secondary infection, may be the only reason which leads the patient to consult a physician. It has been stated that symptoms referable to the bladder occur in all cases of tuberculosis of the kidney and actual lesions in advanced ones. In the cases here reported no lesions occurred, and in two of them not even symptoms of bladder disease could be discovered.

Indigo-carmin was used in all these cases as the functional test and proved of great value. It has the advantage over phloridzin that as soon as the blue appears the test is complete, whereas in the phloridzin test one has to collect five-minute specimens and then examine them for sugar. An additional advantage lies in this, that it does not involve the use of a catheter in the ureter, the presence of which may at times produce a reflex anuria, and thus give the impression of a functional inadequacy which may not actually exist. With indigo-carmin, the bladder need only be observed through the cystoscope. There is, therefore, no reflex action at work to disturb the reaction.

From a pathological standpoint the series is also of interest. To judge from the macroscopic appearance of the specimens, one would say that they were all undoubtedly tuberculous in origin. They all showed the gross evidences of caseation and infiltration of the surrounding tissues, the latter to such an extent as to simulate cartilage. Yet microscopic investigation demonstrated a decided difference between the first specimen and the other two. The first one showed the typical tuberculous lesions, namely, giant-cells, tubercles, and caseous material, while the others showed only a diffuse breaking down without any of the other signs of tuberculosis. The caseous-looking material proved to be only

a necrosis, and not a true caseation. Repeated examinations were made for tubercle bacilli, but none were found. In reference to this, mention may be made a case of miliary tuberculosis, showing the same microscopic appearances, that is, no true caseation, giant-cells, or tubercles, but numerous tubercle bacilli. This case was, however, a very acute and active condition, whereas the present ones were chronic and apparently self-limited affections. It was quite possible that the bacteria had succumbed and were disintegrated. The von Pirquet reaction was positive in both cases. Search was also made for other bacteria but without success.

Case I.—Miss M., aged 42, was admitted to the hospital, complaining of a pricking sensation in the left half of the abdomen. Her previous history was as follows: In 1907 she had an attack of grippe, accompanied by an occasional feeling of coldness in the left side of the abdomen. In February, 1909, she had another attack of grippe, which was accompanied by a pricking sensation in the left loin, and night-sweats. About the end of August, 1909, she noticed a lump in the left side of the abdomen. This was cold; slightly tender, and really caused her no discomfort. She had no urina; symptoms at any time.

During the past year she had lost 15 lbs.

The only important point in the family history was the fact that an aunt, on her mother's side, died of tuberculosis.

On examination, a mass was found in the left upper quadrant of the abdomen, which seemed to infiltrate the muscles of the loin. It was only slightly tender on palpation, and did not move with respiration.

The urine was normal except for an occasional blood-cell. A subcutaneous injection of tuberculin was administered which caused a rise of temperature to $99\frac{3}{4}$.

The leucocyte count was 10,000.

By the cystoscope, the only abnormality which was revealed in the bladder was that the left ureteral orifice was apparently absent, a few old submucous hæmorrhages being present in the place where the opening should have been.

Indigo-carmin was injected subcutaneously and appeared in eight minutes from the right ureteral opening, but was not seen at all, that is, at the end of half an hour, from the left one.

On October 19th she was operated on by Dr. Bell.

A loin incision was made and a couple of drams of pus were evacuated from the perinephric fat space. The muscles of the loin were infiltrated, making it very difficult to reach the kidney, and when it was reached, it was seen to be simply a capsule enveloping a caseous mass of apparently

structureless material. The pedicle was tied and the whole removed. The ureter could not be separated out.

The pathological examination showed that the kidney was simply a caseous mass, separated by fibrous tuberculae. The sections showed only fibrous tissue containing a few glomeruli in a fibrosed condition, and here and there a tubule. Typical caseation was seen, also giant-cells and tubercle bacilli.

Case II.—Mr. L., aged 24, came to the hospital complaining of pain in the right loin.

His history was as follows: About the middle of October, 1909, he awoke one morning with a feeling of pain in the right loin, which lasted only a couple of hours, and was not very severe. This occurred each morning, but at no time was it colicky in character. At this time he commenced to have slight frequency of micturition, mainly at night. Early in November, 1909, he noticed a swelling in the right loin, which was somewhat tender. He began to have night-sweats, but never had any chills. He never noticed any change in the urine. The only point in the personal history was the fact that he had had syphilis two years previously, diagnosed by a physician and well-treated.

Enquiry into his family history showed that he had one paternal uncle who died of consumption, and one sister who died of meningitis at the age of ten.

On examination, the right loin was found to be board-like, making it impossible to press between the ribs and the crest of the ilium. There was an indefinite mass in the right kidney region in front. In this situation there was no tenderness, but in the region of the 4th lumbar vertebra there was both tenderness and œdema.

The urine was normal.

The von Pirquet reaction was positive.

On cystoscopic examination the bladder was found to be normal, save for a slight congestion around the right ureteral orifice. Ureteral catheterization showed the left kidney to be secreting normal urine, whereas the right kidney was not secreting at all. Indigo-carmin was injected subcutaneously, and appeared on the left side in 13 minutes. It did not appear on the right side at all, that is, at the end of 25 minutes.

On December 9th, 1909, he was operated on by Dr. Bell.

A loin incision was made and the whole of the musculature on that side was found to be infiltrated and to cut like cartilage. In the region of the fatty capsule thick caseous pus was found. Only a small piece of kidney tissue was found, the remainder being destroyed. This was clamped and cut away, the clamps being left on 'as it was impossible to tie anything on account of the infiltration.

The pathological examination showed that there were present small portions of kidney tissue with some infiltrated muscle, and some caseous-looking material. The kidney showed nodules which were white in colour, and about the size of a split pea. On section these nodules were seen to contain a creamy-yellow material, which was firm enough in consistence to be scraped out. The sections showed a fibrous tissue stroma containing blood-vessels, around which were collections of lymphocytes. There were also seen some proliferative changes in the blood-vessels. There were no giant-cells nor definite tubercles seen, neither were there any areas of true caseation made out. In the sections of the kidney it was seen that the whole of its structure was distorted by an invasion of fibrous tissue. The glomeruli were surrounded by dense fibrous tissue, and the tubules, which were few in number, were shrunken and small. There was a diffuse infiltration by white cells of varying kinds, of which mononuclears predominated. Here and there the cell infiltration was darker, whilst in other places the admixture of varying types of cells gave rise to the appearance of granulation tissue. Some of these areas of loose tissue were delimited by fairly well defined fibrous bands. The vascular spaces were small but numerous. The larger vessels showed thickening of their walls. Plasma cells were seen throughout the tissue, and many fibroblasts were visible amongst them. The fibrous areas showed a strikingly diffuse permeation of the kidney relics by white fibrous tissue, and cell-aggregations were here scarce. Tubercle bacilli were not found.

It is clear that the evidence in this case, for or against tuberculosis, is conflicting. While it is almost out of the question to consider tuberculosis as a diagnosis when the typical systems of giant-cells are absent, or above all when no giant-cells occur, yet it is equally certain that cases have been described as tuberculous in which there was little more basis, microscopically, than in this case; and tuberculosis in the cow of the chronic type, affords exactly similar appearances to those here described. The only problem lies in the question of the possibility of this case being syphilitic in origin. In a syphilitic mass one would expect to see little more than occurs in this case; there would be the irregular cell-aggregations without any arrangement suggestive of a tubercle, and there might be no giant-cells. Plasma cells, occurring in large proportions, would also be a feature of a syphilitic lesion. On the other hand one would not expect to find such a diffuse change as occurs here, and one would expect to find a more localized gummatous mass with arrangement of cells at its edge. The present specimen shows numerous masses of granulation tissue with a very thin fibrous tissue

envelope. It is a question whether a diffuse chronic interstitial syphilitic nephritis, such as was present in this case, can occur as soon as two years after the primary lesion.

Case III.—Miss R., aged 28, came to the hospital complaining of pain in the right side of the abdomen, headache, general malaise, and fever. On November 14th she was seized with severe pain in the right side of the chest. This was accompanied by cough and some huskiness of the voice, also slight fever. In a few days her condition became much better, and she was able to do her work again. This pain was not accompanied by nausea or vomiting. On November 25th she was seized with severe pain in the right side of the abdomen just below the costal margin. Her temperature registered 101, and she felt chilly, but there was no nausea or vomiting. On admission, a mass was discovered in the right side of the abdomen, it was somewhat tender when pressure was exerted in the loin. She had no urinary symptoms at any time.

The only point in the family history of interest was the fact that her mother had lupus of the face.

The urine was normal.

The von Pirquet reaction was positive.

On cystoscopic examination the bladder was found to be normal, save for some congestion around the right ureteral orifice. The left orifice was normal.

The ureters were catheterized, and it was found that no urine was coming from the right kidney, whereas normal urine was coming from the left one. Indigo-carmin was injected, subcutaneously, and appeared in 9 minutes from the left ureteral orifice, but did not appear at the end of 45 minutes from the right one.

On December 15 the patient was operated on by Dr. Bell.

The usual loin incision was made and the kidney was found to be enlarged. At the lower pole a mass of inflammatory tissue was found infiltrating the muscles and the ureter. This mass was connected with the lower pole of the kidney. On cutting into it a thick caseous pus came away. The ureter was found to be completely occluded at this point, therefore, the kidney was removed. The perirenal fat, the sheath of the psoas, and the peritoneum were all infiltrated.

On macroscopic examination, the kidney showed, at the lower pole, a reddened and scarred area, corresponding to the infiltration in the tissue around.

On section, a mass $\frac{3}{4}$ of an inch in diameter was seen in the lower pole, corresponding to the reddened area on the surface, and containing a yellow, caseous material. Nowhere else in the kidney were similar nodules visible. The sections of the kidney mass showed that the kidney

structure was much altered. In parts the kidney was not recognized. The whole tissue was permeated by a fine network of connective tissue, with here and there islands of a more dense cellular infiltration. This infiltration consisted mainly of lymphocytes with newly developing connective tissue cells. The tubules had for the most part been destroyed and the glomeruli reduced. Several arteries with the intima much thickened were seen. No definite giant-cells were seen, and tubercle formation was wanting. Caseation was not present, but oedematous granulation tissue was seen in areas. This granulation tissue contained chiefly lymphocytes, but plasma cells were by no means inconspicuous, and a few eosinophyles were met with. The tissue in the immediate vicinity of the macroscopically caseous areas was found to consist of very dense but young fibrous tissue, which was everywhere diffusely infiltrated with round-cells of the usual chronic inflammatory type. Plasma cells were also met with. This fibrous portion was continuous with the dense fibrous tissue which occurred about the kidney. The central parts of the caseous-looking mass were hyaline, and the number of cells was decidedly small. New capillaries were numerous, not only in the vicinity of the caseous mass but in the granulation tissue abutting on the renal tissue. In the more healthy parts of the kidney the tubules were large, and showed some erosion and degeneration of the cells. True tubules were not present, and tubercle bacilli could not be found. Gram's method was also used, but no organisms could be found. In this case, again, the evidence for or against tuberculosis is conflicting, and we are again struck with the fact of giant-cell systems being wanting from a tissue which to all appearances is tuberculous and not syphilitic. The fact of the appearance of inflammatory cell-aggregations, like those of the preceding case, with the occurrence of fibrous tissue as a capsule around them, is very instructive, because here we have a case in which there is not the remotest suspicion of a syphilitic infection either recent or congenital, and yet the appearance of many parts of the tissue is almost identical with those of the preceding case. The only essential difference is that this third case presents much more fibrous tissue, and that the fibrous tissue is rather more localized in distribution. There seems no choice but to accept this case as a tuberculous one, so that the second one can be put into the same category in view of the difficulties of accepting it as syphilitic,—difficulties already sufficiently discussed.

It requires no specially detailed discussion to bring out the intricacies and peculiarities of these cases; and it is evident that they each present rather unusual features. In each case the diagnosis was difficult, and indeed in only the first case is there even now any certainty that the

lesions found were tuberculous in nature. The other two cases are very unusual in this respect, yet it would be difficult to believe that they were of any other origin, considering the clinical history, hard as it is to be dogmatic on those points.

In any case the macroscopic appearances of the specimens were sufficiently remarkable, and it came as a great surprise that more definite microscopic evidence of tuberculosis was not forthcoming.

In all these cases the value of indigo-carmin as a diagnostic agent was clearly shown. One does not need to enlarge on the value of the cystoscope or the ureteral catheter in all obscure abdominal conditions, especially those in the neighbourhood of the kidney, as so much has been written of late on that subject.

THE TREATMENT OF TABES DORSALIS.

BY

TOM A. WILLIAMS, M.B.C.M., Edin.

Were one to accept the dystrophic theory of the pathogenesis of tabes dorsalis, there could be little hope of effective treatment. The evidence against this view increases daily,* however; and the majority of us strongly believe that tabes is merely a consequence of syphilis of the spinal roots and their cranial homologues (Nageotte.) Against the view that it is a parasymphilitic or other dystrophy is: (1) the vastly greater degeneration of the root between radicular zone and spinal cord, as compared with the amount between intervertebral ganglion and radicular zone; (2) the meningitis always present, evidenced during life by lymphocytosis and post mortem by granulomata, or their cicatricial results, which a microscopic examination always reveals.

But the strongest argument in favour of the inflammatory theory is the demonstration of the active focus in the radicular zone, both of the anterior and posterior root, or in the presence of regenerated nerve fibres distal to this. Is it conceivable that regeneration can occur in a dystrophic disease?

Moreover, not only are sensory protoneurones implicated, in the syphilitic exudate, but also the sympathetic (Roux) and motor systems which pass through the spinal roots. Why, then, have so many neurologists disbelieved in the efficacy of antiluetic remedies against tabes?

In the first place, the iodides have been too much relied upon, on account of the notion that they are the remedies of choice against tertiary lesions, and hence are *a fortiori* against so late a result as tabes.

Int. Clin., Spring, 1910; Med. Record, 5 Feb., 1910.

* See author's articles in Amer. Jour. Med. Sci., Aug., 1908, Mar., 1910;

Recent work, especially in France, has shown syphilographers the subsidiary place of the iodides even in tertiary disease, and that mercury is the only truly specific remedy in every stage.

Why, then, has mercury failed to benefit countless tabetics? I believe on account of its administration by the mouth, by which means it is not possible, without disturbing assimilation, to saturate the system to the point where an adequate dose of mercury can reach a part of such comparatively low vascularity as the meningeal envelopes of the spinal roots. Besides, in many tabetics nutrition is poor; and this must be compensated to combat granulomatous disease, a result not conducted to by intense mercurialization. The inunction method is uncertain, inconvenient, and perhaps interferes with cutaneous elimination.

The method of choice in most cases seems to be intra-muscular injections. As I have most experience with the soluble salts, I adduce a few cases in which the pathogen of tabes is attacked in this way with enormous benefit to the patient.

Case I.—Man, aged 40, referred May, 1903, by Dr. Lewis L. Taylor, of Washington, for severe "nervous breakdown," following "indigestion" for five years.

Previous History.—Moderate smoker, and rarely took alcohol, had given up coffee. Eats well. Single from choice. No sexual excesses. Infected twenty years before. Since nine years, felt useless and depressed, almost wanted to die. Attacks of desperate desire to flee. Since two years, dyspnoëic and sinking feelings occurring suddenly without external cause, light feelings in the chest, thumpings in the heart. Nervous chills, with tremor, crying spells, voice tremulous and uncertain. For a year and a half, had given up his bank, and taken up out-of-doors soliciting; since when he had gained ten pounds.

Examination.—Foul breath, thickly furred tongue; circulation, respiration, urination, normal.

Nervous System.—Deep reflexes all exaggerated; the triceps, patellar, Achilles and deltoid were unequal on the two sides. The cutaneous reflexes were diminished, including the plantar. The pupils reacted normally.

Motility was deficient in the left forehead; trembling of left cheek and tongue and right fingers. Adduction of right thigh was imperfect. The left heel left the floor while he sat up from recumbency.

Sensibility unimpaired.

Psychic Functions.—Memory not impaired. Perception clear, calculation slow and imperfect. Not a tabetic; but in pretabetic stage of chronic meningeal irritation.

Treatment.—He was given a mercurial course during seven weeks, when he went to the mountains, with all the symptoms vastly improved and able to do office work without tire or irritability.

In October, a second course was given, and he could now stand the pain of mercurial cream injections once a week. He has since then remained well. I should add that a very careful regime and restriction of the proteids in the food were instituted.

Case II.—Man, age 54, seen with Drs. Prentiss and Main, of Washington, on account of a "neurasthenic state" since six months, which rest, change and a sea voyage had benefited only slightly and temporarily. His complaints were insomnia, irritability, and a state of suffering and incapacity. He has no children. Has been subject to hardly noticed depressions and exaltations every few years.

Examination.—In spite of the cold, an abundant sudorrhœa of both axillæ and the internal borders of the left arm, less abundant on the left leg.

Motility was strong. There was no tremor of tongue or face or eye, but the right platysma trembles, and there was a rhythmical tremor of the arm.

Sensibility.—A zone cirresponding to fifth lumbar and first sacral roots was insensible to vibrations.

Reflexes were uneven, that of the right knee being diminished, the abdomen almost absent, as was the right plantar. The pupils were irregular, and the light reflex was imperfectly maintained. The speech was slightly drawling, and a word or letter was occasionally stuttered over.

Psychic Examination.—Memory was slightly below normal. Calculation was slightly imperfect. During the first examination his insight seemed impaired, as he was quite indifferent. He declared that his lack of interest ensues upon peculiar abdominal feelings like the sensation after a debauch, followed by a sinking feeling and misery.

Treatment.—He was at once given mercurial injections, and a few days later the examination was continued and showed him to be incapable of detecting the glaring impossibilities depicted in some drawings I used for the purpose.

His steady improvement was interrupted only once by an error of diet. After five months of hard work on the farm, he began to feel nervous again, but another course of mercury arrested the symptoms. Six months later some unusually hard work caused another relapse, but I believe that a short rest will fully compensate this. (See International Clinics, 1909, for full report of first two cases.)

Case III.—It is one of a pretabetic invasion, characterized for four

years by paroxysmal twinges of darting and deep pain, chiefly in the lower limbs, also pin pricks in the scalp and intercostal pains with cold feelings in legs, and occasional hot flushes. Symptoms lasted for a few days every week or so. Attacks of burning at the neck of the bladder, with imperious desire to urinate, were particularly troublesome. The patient had consulted several English neurologists, who inclined to attribute his symptoms to fear, for they found no objective signs, although he had contracted syphilis nine years before. Diarrhoea and depression had prevented him taking mercury by the mouth. A four months course of inunction, when the pains began, five years after the chancre, had produced no improvement.*

Treatment directed to the bladder produced no improvement. Treatment by vaccines for two years was inefficacious.

I urged the patient, who was a medical man, to take a course of injections, and have the cerebro-spinal fluid examined. The lumbar puncture showed an apparently normal fluid, but produced severe vomiting and vertigo.

However, the patient injected a twelfth of a grain of perchloride of mercury every other day, and soon doubled the dose. In a few months the pains had practically disappeared, although he continued working hard, and he now has been free for six months, with only an occasional reminder. He writes: "It has made me a different man, and changed me from self-absorption into a normal being; not that I showed it outwardly I hope; but, perhaps, you cannot imagine, not having experienced it, the difference it makes to one's life having a constant shadow-like that unexpectedly removed."

A purin free diet, particularly at night, was recommended, and the very observant patient considers this almost as important as the injections. He found that late dinner was particularly apt to bring return of the pains.

In all cases it is of the greatest importance to prescribe regular physical exercise of a brisk kind, and periods of rest in the more aggravated cases. And regulation of the diet is of extreme importance. Twice, weekly, I prescribed a hot bath of about half an hour's duration, and do not permit it to be followed by the usual cold shower. I believe that in this way the kidney is preserved from the untoward effects of the mercury. Two months is, perhaps, long enough for an uninterrupted course of injection. If symptoms persist, then another course should commence after two weeks of recuperation from mercurialization.

* See also author. Treatment of Parasyphilis of Nervous System (Med Press and Circular, London, 1910.

I believe that the kind of treatment, thus broadly outlined, will enable us in the future to arrest or control the majority of cases of *tabes dorsalis*, more especially in the earlier stages, the diagnosis of which neurological technique makes possible. Even in later stages hope need not be given up, as some remarkable cases could attest did space permit. This is a great step in advance, and if the results of the new organic-arsenical (dioxydiamidoarsenobenzol preparation) recently discovered by Ehrlich are confirmed, we shall have still more rapid control over the pathogenesis of *tabes dorsalis*, a quondam despair of medicine.

TWO CASES OF SARCOMA OF THE CHOROID.

BY

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Pathological Report by Fred. T. Tooke, B.A., M.D., Montreal, Que.

The insidious nature of the onset of malignant processes which invade the human organism is a truism, the importance of which it is useless for me to emphasize. In a highly vascular organ as the eyes, choroidal sarcomata are by no means rare, and by means of the ophthalmoscope may frequently be observed or detected early in their formation. Many patients, either from ignorance or what cannot be termed anything else than stubbornness, delay to such an extent that the consultant is at a loss to differentiate the tumour from a number of complicating sequelæ, symptoms which completely mask the detection of the original intra-ocular neoplasm. I have recently seen two cases which largely bear out this assertion, one of which is of added interest due to a careful pathological examination.

Case I.—J. W., a male aged 50, was first seen by me in January, 1908. He stated that up to two weeks previous his eyes had been normal. Since that time, he noticed a mist before his sight, and when he closed his left eye, he saw only the upper half of objects. The eye was free from pain, and there was no external evidence of ocular disorder. The pupil of the right eye, the one complained of, was larger than that of the left, it reacted to light; the cornea, aqueous, and lens were clear. Vision was reduced 20/40, while the tension was + 2. Upon examining the patient with the ophthalmoscope, I found the upper half of the retina to be detached and floating in the vitreous. In six weeks time he again presented himself for examination, when I noted a complete separation of the retina with total loss of vision. The patient was then lost sight of for a period of six months, after which lapse of time he again came to me complaining of excruciating pain in the right eye,

which presented all the classical signs of an acute glaucoma. On account of the extreme pain, and as the eye was a sightless one, at the same time anticipating an intra-ocular neoplasm, I removed the eye. After removal, there was no evidence of extra-ocular extension, and when the globe was sectioned a dark coloured tumour of about the size of a small filbert was seen adherent to the choroid. Its position was upwards and to the temporal side, about 5 mm. from the optic disc.

The pathologist, to whom I sent the specimen, informed me that the tumour was a melano-sarcoma, but gave me no particulars in regard to its microscopic appearances. As the material had been misplaced or gone astray, he was unable to furnish me with further particulars, a fact which I regret, and one which associates an element of incompleteness to the report of this case. The patient was never seen by me after he left the hospital, and I only recently learned that he died one year following his operation from malignant disease of the liver, no doubt a metastasis of the original tumour.

Case II.—S. K., female, aged 81, consulted me for the first time in March, 1910, complaining of severe pain in the left eye. She stated that three years previous she noticed for a few minutes all objects appeared red. This was followed in a few hours by redness of the globe, swelling of the lids and pulsating pain in the eyeball. No treatment was adopted, and the pain and swelling subsided in three days. She then noticed that her vision was less than before this attack, but she was still able to use her eye for reading. The eye of the opposite side had been blind for several years as the result of an injury. During the following three years the patient experienced five or six attacks similar to the one I have just described, each lasting for about three days; but in the interval between the attacks the eye was absolutely free from pain. Vision, was, however, diminishing, and for the past twelve months she had been unable to read. On examining the eye for the first time, the lids were very edematous, with chemosis of the conjunctiva and injection of the cornea. The pupil was moderately contracted and fixed. The anterior chamber was rather deep, no view of the fundus could be obtained, due to a cataractous lens, light perception was absent, and tension was + 2. An enucleation was performed the following day, when no adhesions of the globe to the structures in or about the orbit could be determined. At the posterior pole of the eye the sclera was very thin, and a mass could be distinctly felt through it. On sectioning the globe the lens was seen to be opaque, and the retina was practically completely detached, being fixed only at the optic disc. Springing from the choroid, which was not detached, was a rather soft, pale

tumour; its base measured 9 mm. in diameter, and to it a globular head measuring 5 mm. was attached by a narrow neck or pedicle measuring 2 mm. in length. The wound healed readily without complications, and seven months following operation the patient reported herself in good health. The microscopic examination made by Dr. Fred. Tooke, Ophthalmic Pathologist to the Royal Victoria Hospital, Montreal, whom I wish to thank for the careful manner in which he has prepared the specimen, is appended.

“The specimen supplied is that of a globe which has been slightly macerated in the process of bisection, mostly manifested by a small oblique tear of the cornea. The contour of the eyeball has, however, been maintained, and, extrinsically, the globe shows no further pathological manifestation. The intraocular chambers are apparently void of anything suggesting pus or blood, the iris is in position, and no macroscopic indications of adhesions can be determined. Within the vitreous chamber the retina is seen detached from all points except at the papilla, and it is folded upon itself as a grey lustreless membrane. In the posterior half of the eye, beneath the retina, one sees a new growth, which lies obliquely, extending to within 2 mm. of the point where the retina is fixed to the globe from a point about midway in the circumference of the globe. This tumour is about the size and shape of a shelled almond, and is of a light gray colour, except posteriorly and to one side, where it is distinctly pink tinged. The tumour mass can scarcely be described as soft, nor, on the other hand, is it as firm as one expects to find in tumours of the sarcoma group. The specimen was fixed in formalin, hardened in progressive strengths of alcohol, and imbedded and cut in celloidin; the stains employed have been Hæmatoxylin and Eosin, and Van Gieson's stain.

“Microscopically one sees in the conjunctiva bulbi at its corneo-scleral attachment, a very moderate degree of infiltration of mononuclear leucocytes, the vessels are somewhat dilated, and the connective tissue cells swollen, presenting an œdematous appearance. An exfoliation of the superficial corneal epithelium is manifest; this has no doubt, been mechanical as the substantia propria of the cornea is clear throughout. Bowman's and Descemet's membranes have been unimpaired. One filtration angle is slightly distended, and the adjacent canal of Schlem shows evidence of slight infiltration along its course. The anterior chamber is clear with the exception of a few endothelial cells which occupy the filtration angle just referred to. Scarcely any evidence of an iritis is to be made out; all that one notes is a rather abundant supply of lymphocytes with a slight dissemination of the uveal pigment in the iris stroma. There are no blood cells in the anterior chamber, and nothing

suggestive of synechiæ can be determined; the lens is absent, doubtless having been dislocated when the globe was sectioned. The ciliary bodies show the same degree of slight infiltration as the iris, but absolutely no evidence of exudate can be made out extending from them into the vitreous cavity. The sclera is clear and unbroken throughout. The retina is completely detached along its whole length, and is folded upon itself a number of times, doubtless pushed out of position by the large neoplasm lying in front of it. The course and position of the retina is so distorted and irregular that its usual histological features are distinguished with difficulty. The membrane is at least atrophic in respect to the layers of rods and cones and of the ganglion cell layer, large vacuolated spaces suggestive of œdematous change occupying most of this area, other points showing a moderate degree of infiltration. The choroid follows the contour of the globe fairly closely although it is separated from it at a number of points. The choroidal pigment is generally disseminated throughout the stroma which is œdematous, the blood vessels are widely dilated, but for the most part are not occupied by blood corpuscles. The pigment cells underlying the membrane of Bruch are somewhat swollen, but "Drusen" or colloid bodies are absent. The arteries throughout the uveal track show but a moderate degree of thickening, while throughout its whole course there is practically no evidence of hæmorrhage between that membrane and the separated retina; certainly nothing of recent origin.

"The tumour mass proper springs from a small pedicle of the choroid, which is firmly attached to the sclera. This pedicle consists of a dense network of choroidal stroma in which is intermingled coarsely disintegrated pigment cells as well as a number of round cells which have deeply staining nuclei. A few spindle cells are also present, and a number of these, with some of the rounded variety, can be made out under high power in the innermost layers of the sclera adjoining the pedicle or base of the tumour. The precise characteristics of the sarcoma cells occupying the pedicle of the mass are difficult to define. On examining the tumour under high power, well within the vitreous cavity, its composition of round and spindle cells, closely massed together, can readily be determined; the former variety are much more numerous than the latter which are aggregated into little groups or clusters. The nuclei take the stain much more densely than those of other tissue cells throughout the section, while the cytoplasm is well stained with fuchsin. A number of large blood vessels are seen to be tremendously dilated with erythrocytes, and these at a number of points have broken down into the sarcomatous tissue. In this exudate of red blood corpuscles one

may detect an unusually large number of polymorphonuclear leucocytes, as well as several large and small mononuclears and a few eosinophiles. At one point in particular, where these lymphocytes are unusually abundant, not only within the exudate but also along the vessel walls, some evidence of early necrosis is apparent. Except at the point of origin of the tumour, where melanin is abundant, the tumour might almost be regarded as a leuco-sarcoma; however, under high power, fine pigment cells may be made out in a few places, which substantiate the diagnosis of melanotic sarcoma of the choroid."

SHOULD ECLAMPTIC MOTHERS NURSE THEIR NEWBORN

BY

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Within the last few years several pathetic cases have come under my notice, the sincere consideration of which has led me to endeavour to find a satisfactory answer to the title of this paper, Should eclamptic mothers nurse their newborn?

The question considered from the point of view of the interests of the child is a new one, one upon which nothing has been written, and upon which little if any discussion at all has taken place.

My cases are three in number, where healthy infants, or seemingly healthy infants, evinced no signs whatsoever of disease until the first copious nursing, when they suddenly died without apparent cause. These children died a death so similar in its antecedents that we are compelled to think that their exitus was from a common cause. They were well, even in vigorous health, until two hours after a copious nursing, and they were so insidiously and rapidly taken ill, that it was easy to see that there was no chance of recovery, even though seen in the early stage of the onset.

Let me describe the cases in full, and later consider some of the broader questions dealing with the effects of eclampsia upon both the mother and her offspring. I am writing of these cases, not in the spirit of the man, who feels that when he has completed his report, the last word will have been said upon so weighty a matter, but rather, in the spirit of the man, who seeks after knowledge, with an open mind, hoping that his lines may draw forth evidence from other sources either to corroborate or to refute his conclusions.

The first case was a near relative, a young woman of 35 years, mother

of three children, and a more healthy specimen of womanhood one seldom sees. She was delivered at full term of a strong, healthy infant, which cried lustily immediately after birth. According to the physician's statement, and this is fully corroborated by statements of near relatives, the patient had shown no signs of eclampsia either before or after delivery. The labour was easy and free from instrumentation. I happened to be on a visit to Ottawa at the time, and called to see her on the second day after delivery. She looked remarkably well, and seemed in the best of spirits except for a slight headache. The child was a strong, vigorous, well-nourished baby of eight and a half pounds. To my very great surprise, I was summoned to Ottawa on the following morning to find the mother in the coma of eclampsia. She had gone to sleep at 10 o'clock on the previous evening, and the nurse slept on a lounge in the same room. At seven o'clock the nurse was awakened by the bumping of the head of the bed against the wall. Her patient was in a convulsive seizure. Convulsion followed upon convulsion in rapidly decreasing intervals. I arrived in Ottawa on the noon train, to find the patient in a deep coma from which she died without rallying, except for a few moments when she made sign for writing material to let her husband know her wishes, which she could not speak. She gradually sank and died that night at eight o'clock from respiratory failure during a seizure.

The child had nursed for the last time at five o'clock that morning. During the night the breasts had filled up rapidly, and it was the first successful nursing that the child had had.

At 10 o'clock the nurse looked at the child to find it blue at the finger tips and nails, and cold about the ears and feet. Previous to this, owing to excitement over the mother's condition, the child had been overlooked. At noon, upon my arrival, the child was cold and cyanosed about the extremities, respirations were irregular and shallow. Somnolence was very pronounced, and seemed to amount almost to coma. The pulse was slow and full. The abdomen was slightly distended. There were slight muscular twitchings of the face and rigidity of the extremities. At 4 o'clock the abdomen became markedly distended and tense like a drum membrane. The cyanosis had spread to involve the cheeks and neck, the eyes were closed, and the lips a dark livid colour. Respirations were very slow and shallow, though very variable like a Cheyne-Stokes respiration. Careful examination, now and previously, did not help to clear up the diagnosis. The respirations grew more shallow and slower, and the cyanosis gradually spread and deepened; the abdomen became still more distended in spite of all measures

adopted. At 6 o'clock respirations gradually ceased and the cyanosis became intense; slight convulsive seizures had preceded the cessation of respiration. Upon my being summoned, I found the heart still vigorously beating, and by means of artificial respiration the cyanosis was gradually relieved, but respiration could not be established. After fully twenty minutes of artificial breathing the pulse could still be detected in the radials.

The second case is very similar in the main, though differing somewhat in several particulars.

Case II is that of a young woman of 28 years. She had had albuminuria and casts during the last month of pregnancy, and in the last week antepartum had suffered a very great deal from occipital headache and epigastric pain. Her labour was easy and not very long. The above symptoms continued for the first day after labour, and thirty-two hours after delivery she had her first convulsive seizure. Three convulsions followed in as many half hours, and then she slowly recovered. The child had been nursing previous to the seizures, and nursing was continued afterwards. It received no satisfaction at the breasts until the morning of the third day, when the child had a full nursing and it ceased to cry. Six hours later its hands and feet were cyanosed and cold, and its lips were blue. Respirations were shallow and slow. The child was somnolent, and there were muscular twitchings with occasional nystagmus. Careful examination failed to reveal anything in the several systems. The respirations grew shallower and slower until they finally ceased and the cyanosis grew progressively deeper. Distension was well-marked,—in fact, both cases were so similar in every respect that I was roused to find a common cause.

Case III is of more recent date. Mrs. S., a strong healthy woman in her third pregnancy, suffered from albuminuria during the last two months of her pregnant state. She was in the seventh month when I first saw her. My examination at that time revealed a markedly accentuated aortic second sound and a marked hydramnios. I at once suspected renal insufficiency, and upon analysis found four grammes of albumin to the litre. On a strictly milk diet she improved a great deal, both as to her hydramnios and as to her great discomfort when lying down, owing to dyspnoea. The albumin fell somewhat in amount, but the quantity of urine, though of low specific gravity, was always large. However, the improvement was only temporary, for soon the albumin rose from 3 grammes to 7.5, and later to 10 grammes.

Singularly enough, the symptoms apart from those caused by the hydramnios, were almost negligible. There was a very slight œdema

of the ankles and of the region of the hypogastrium as is so frequently found in hydramnios. She never had headache or vomiting.

Labour came on on December 26th, ten days before the calculated time. The membranes ruptured almost with the first pains, but the labour progressed rapidly and easily. During the second stage, the patient's eyelids twitched, the right side of the face had slight convulsive attacks, and twice, when the pains were on, the eyes turned to the left and became fixed, and respiration became somewhat jerky. However, though sailing close to the wind, she escaped without accident.

On the second day, the mother complained of loss of appetite and severe headache. The bowels had moved and moved freely, but the urine was still loaded with casts and albumin and bile, and there was œdema of the eyelids. There was slight jaundice. On the morning of the third day the patient seemed a great deal better, and as I entered the room she said that the baby had been ravenous previously, but that she had felt the milk pouring into her breasts during the night, and it had had a good nursing, but it would not nurse the second time, it seemed so drowsy. She asked me to have a look at it to see that it was all right. As I passed out of the room the nurse said, "I think the baby is sick." A glance was sufficient. The same clinical picture was before me; duskiness, cold extremities, blue nose, shallow, irregular respirations, and muscular rigidity from time to time in the lower extremities. A careful examination threw no light upon the diagnosis. At 6 o'clock that night I was told to come at once. The father met me in the hall and said that "it was all over with the baby." The child had been dead some minutes judging from what was told me. It had been laid out in a child's cot in the nursery and was covered with a white sheet. All this had been done deliberately after the supposed death. When I raised the sheet the face and neck were almost as black as ink, but the pulse was still readily palpable at the wrist. I am not prepared to say how much time had elapsed between the "death" of the child and my arrival, but I simply cite the facts and leave my readers to judge for themselves. I took the child to the grate fire and began artificial respiration, so that the cyanosis diminished rapidly. I continued the manœuvre for about 15 minutes and at that time, though the radial pulse was not palpable, the cardiac sounds were audible with the stethoscope. The respirations, could not be re-established, and death followed after one half hour's effort at resuscitation.

The albumin persisted for a long time in large quantities in the

mother's urine, and was not entirely absent until six months after delivery.

Such are the histories of my cases. The casual reading, not to say the careful study of them, will, I think, leave every thinking practitioner with the questions in his mind, Was there any connexion between the nursing and the incidence of the sudden change in the child's health? What was the nature of this illness? Is an eclamptic mother's milk toxic? If toxic, why to her own child, which was nourished from her own blood? Were these children healthy or only seemingly healthy before the onset of such startling symptoms? Are children, born of eclamptics, healthy children? Can mothers' milk secrete a condensed, or accumulative toxin more virulent than that which she has circulating in her blood? In a word, should eclamptic mothers nurse their newborn babies?

I have made a complete review of the literature in the hope of finding analagous cases, but as fruit of my labour, I found but one well authenticated case. But the search has been replete with interest, and has thrown a great deal of light upon these rather obscure questions.

Let me begin by answering the question, *Are children born of eclamptic mothers healthy at the time of their birth?* A great deal of literature upon the subject proves, conclusively, that they are far from being healthy. Von Winckel, in 1893, was the first to lay stress upon the necessity of performing autopsies upon children born of eclamptic mothers. Since then, many authors have given their attention to this side of eclampsia with the results that have been far reaching. Bar and Guyiesse found that in 17 children born of eclamptic mothers, in all cases there were signs of general intoxication, and in a large percentage the lesions were identical with those of eclamptic mothers, who had succumbed to the disease.

Schmorl autopsied six children born of eclamptic mothers, and in four cases found advanced degeneration of the kidneys and hæmorrhages in the liver in all six of them. Lubarsch examined five such children and found advanced renal and hepatic lesions in all of them. Prutz found in the kidneys of a child of an eclamptic, cellular degeneration of the renal tubules with cellular and hyaline casts in their lumen. Similar results are recorded by Chamberlent, Knapp, Dienst, and Williams.

Moreover, there are on record not a few cases where the infant, born of an eclamptic mother or of a mother, who presented all the signs of eclamptism, developed true eclamptic seizures within the

first three days after birth. Some of these succumbed, others survived. Schmid published one such case in which convulsions occurred shortly after birth. The autopsy showed all the organs to be affected similarly to those of eclamptic women. The kidneys were particularly affected, showing marked degeneration and associated with albuminuria and hæmaturia. Wilke wrote of a case in which typical eclamptic seizures came on after birth, and the autopsy revealed a toxic encephalitis. Similar cases have been described by Moraweck, Wendt, Woyer, Nicarelli, Pels-Leusden and Winkler. Knapp held an autopsy on mother and child and found the same pathological changes in both.

It is also interesting to note that Schmid found albuminuria in the case of a child, which died of eclampsia. This was corroborated by Eskelin, who found blood and casts and albumin five times in as many cases born of eclamptic mothers. Similar results have been described by Audebert and Arnozan.

Dienst's exhaustive monograph deals with seven cases of eclampsia or threatened eclampsia in the mother, and with either signs of advanced nephritis or with true eclamptic seizures in their offspring. His first case was 22 years of age. She had one eclamptic seizure immediately after delivery, and then made an uninterrupted recovery. The child had its first convulsion seven minutes after birth. Others succeeded rapidly, and it died of respiratory failure. The breathing grew slow, irregular and very shallow, and cyanosis was well-marked. Deep somnolence was a feature. The heart's action was still strong after the respiration had ceased, and artificial respiration was kept up for quite a while. Autopsy showed signs of acute nephritis, and the condition of the liver was typical of eclampsia, viz., focal necrosis, thrombosis, with congestion and hæmorrhages.

In the second case, mother and child succumbed after Cæsarean section. The child was living when operation was begun, but when removed was perfectly rigid in all its body and extremities. It evidently had died in a convulsive seizure in utero. The pathological findings were similar in both mother and child. The urine was drawn from the child's bladder by means of a soft catheter, immediately after it was delivered from the uterus, and it was found to be the urine of acute nephritis. It contained 10 grammes of albumin to the litre, numerous red blood cells, few leucocytes and casts of all kinds.

Case III.—Eclamptic mother died after Cæsarean section. Her child survived. The urine collected from the infant showed hæmaturia and albumin for three days. The albumin disappeared on the 5th day and the child gained slowly.

Case IV.—Eclamptic mother died, survived by her infant. The urine collected from the child showed a large amount of blood, albumin and leucocytes, hyaline and blood casts. The urine was free from albumin for the first time on the eighteenth day after birth.

Case V.—The mother died in eclamptic seizure. Her child had light convulsive seizures during the first five hours after delivery.

Case VI.—Eclamptic mother gave birth to twins. The mother had but one convulsion and recovered. The twins thrived, though both gave urine loaded with blood, albumin and casts.

Case VII was of less importance.

Wilke published a case, also, where the infant had its fourth convulsive seizure 12½ hours after delivery, and its mother her first eclamptic seizure 13 hours post partum. In Woyer's case, the mother had her first eclamptic seizure four hours ante-partum, and three more post partum. The child died after its fourth convulsion.

Similar cases are reported by Schmid, Moraweck, Gurick, Eskelin and Levinowitsch. In one of Gurick's cases the eclamptic convulsion did not appear in the child until 46 hours after birth.

I think that enough has been quoted to show that children born of eclamptic mothers are far from being healthy. In every one of them marked structural changes in the viscera, indicative of grave intoxication, were readily demonstrated. Practically all of them, both those which survived and those which died, in whom the urine was examined, there were all the signs of more or less renal injury. The milder cases showed only slight albuminuria and casts; the graver cases showed blood, albumin and casts in large quantities. Moreover, in one case the albuminuria persisted for 18 days after birth. In all the cases that succumbed, there were grave structural changes in the liver and other viscera. Fry has clearly pointed out that healthy children's urine, even the very first urine secreted immediately after birth, is free from albumin, casts and blood. Therefore, we may rightly look upon the presence of these ingredients in their urine as signifying the same disease as they would indicate in the adult. Hence, it may be affirmed with all certitude that the vast majority of children born of eclamptic mothers or of mothers threatened with eclampsia, are more or less profoundly and similarly affected. Inasmuch as two of my cases were eclamptic mothers, and the third had ten grammes of albumin to the litre, and had muscular twitchings during delivery, one is pretty safe in considering the children as being tainted with the same disease as the mother.

I think, therefore, the answers to the questions, Are children born of eclamptic mothers healthy? Were the children in my three cases

healthy or only seemingly healthy before the onset of such startling symptoms? can be considered as settled as can any question in the open subject of medicine.

Moreover, I consider eclampsia in the mother a fruitful source of the many chronic cases of nephritis in young children. How often nephritis occurs in children from three to six months of age is rather difficult to establish; but this I do know, that within the last four months my attention has been called to two such cases by practitioners who knew that I was interested in the subject. The frequency of nephritis is overlooked in a great many cases, owing to difficulty of getting specimens of urine. But Dr. F. M. Fry, who has made urinalyses in 100 cases of infants in the foundling hospitals, has devised an easy method of obtaining specimens. This consists in putting cold to the abdomen or buttocks. It seldom fails, and a specimen can be obtained at any time, provided two hours have elapsed since the last urination. He found nephritis, evidenced by casts, in 31 per cent., and evidenced by albumin and casts in 19 per cent. Yet it seems strange that in looking over standard works upon diseases of infants, not one author makes mention of eclampsia, which, to me, seems such a potent factor in the etiology of nephritis in children.

Since writing these foregoing lines, another case of death of a child with all the symptoms of nephritis, has come to my notice. It was in its fifth month, and was born of an eclamptic.

Is an eclamptic mother's milk toxic? It would be a very singular lack of co-incidence if a mother's blood could be saturated with the poisons of metabolism, to such a degree as to cause the grave cerebral disturbances culminating in eclamptic seizures, without the secretion of the breasts being at all tainted with the same metabolic products. It would be contrary to all the laws which govern secretions. Some of the toxins must pass over into the milk. As evidence of this, I have but to mention the startling symptoms in the infant, when small doses of drug are administered by mouth to the mother. In such cases the doses given have been infinitesimal, yet the poisonous action has been seen in the nursing infant. At least, we must assume that a certain quantity of the toxins are eliminated in the milk. So much the more must this be the case, for Massen has shown that the urine of eclamptic mothers is less toxic than is her blood. Owing to the failure of the diseased kidneys to eliminate the products of metabolism the poisons become stored up in the blood. Under such circumstances, can the reader adduce any one case where the loss of function in one eliminative organ has not been more or less compen-

sated for by other organs of elimination? And, as to the question of the secretion of toxins in the milk, can we doubt the fact when we know that even bacteria pass from the mother's blood stream into the breast secretion? I think it is thoroughly established at the present day. The whole clinical picture is one of metabolic arrangement whereby the organism becomes saturated with the products of an auto-intoxication. That poisons do pass over in the milk needs, I think, no further evidence of confirmation.

If a mother's milk is toxic why should it be to her infant, which has been nourished through her own blood? Can a mother's milk secrete a concentrated, an accumulative toxin more virulent than that which circulates in her system?

Let me begin by answering the second question first. We have no evidence which we can bring to bear upon this question; I mean purely experimental evidence. The clinical evidence is slight, but of great value. But by analogy we have the strongest proof that such can be and is the case, that the mother's milk can secrete a more concentrated toxin than that which circulates in her blood. For example, consider mercury. Its administration to a nursing mother has produced on more than one occasion, alarming symptoms of poisoning in her child. Again, let me but refer to an experience of my own, in which, owing to gall stone attacks, I had administered two $\frac{1}{4}$ grains of morphia within twenty minutes, yet the foetus in utero, so far as auscultation was concerned, showed no untoward effect, but the administration of a $\frac{1}{4}$ grain six days later, and $4\frac{1}{2}$ days after the delivery of the child, caused the most alarming symptoms in the nursing infant. In other words, it got a more concentrated or larger dose through the milk than through the mother's placental circulation. You will probably object that morphia is a respiratory depressant, and that the respiratory centre is inactive in utero. To this objection, let me state that the eclamptic toxin acts also as a strong respiratory depressant in the foetus, and its action is very similar to that of morphia, so the objection becomes, on the contrary, a very strengthening argument.

To further substantiate this point, I am indebted to my colleague, Dr. J. C. Meakins, for a most interesting case report. While working in the Rockefeller Institute, as clinical analyst, he had occasion to enquire into the cause of a persistent diarrhoea in a nursing child. He found that the mother had been taking five minims of Fowler's solution after meals. The diarrhoea in the infant had resisted all remedial measures. He found, upon examination of the mother's milk

and urine, that the same quantity of arsenic could be obtained from one part of the milk as from 10 parts of urine. In other words, the arsenic in the milk was ten times stronger than that in the urine. As soon as the arsenic treatment was stopped, the child grew better of its diarrhoea. The same argument holds for the toxine of eclamp-tics, for their urine is far less toxic than is their blood, and the breasts, having been free from function prior to delivery, would not be diseased to the same degree as the kidney, and nature would, in all likelihood, use them as a new avenue for elimination of toxic products.

Now, let us turn our attention to the first question. If a mother's milk is toxic, why should it be toxic to her infant which has been nourished through her own circulation? This is, probably, the most interesting point of this paper. It would seem very strange if a mother's milk is toxic, why so few infants are overcome. The reason for this seeming discrepancy is not far to find. It is known that in most cases of eclampsia, yes, in the vast majority of cases, the convulsive seizures come on prior to delivery, and that with the emptying of the uterus the patient's condition rapidly improves. So rapid is the improvement that the albumin, in a large percentage of cases, has completely disappeared by the third day. One has but to think of the tremendous diuresis which inaugurates the general improvement, to realize what an astounding amount of toxine must be eliminated in the first days post partum. Such is the course of the usual case; yet it is just during this period that the breasts are almost, if not wholly, inactive, and by the time that the breasts begin to secrete there is no longer any or but a comparatively low grade of toxæmia present in the mother. No, it is not in such cases that the milk becomes very toxic; it is just in those cases where the toxæmia of the mother remains, owing to failure of elimination, or worse still, when it reaches its height during full lactation. It will be in those cases in which some grave antecedent chronic renal affection prevents rapid elimination and favours a prolonged high index of maternal toxicity, or it will be in those cases where the seizures come on late post partum. It may be stated that the later post partum, and therefore the nearer to the period of full lactation, the graver will be the prognosis for the nursing child. Does this conform with my experience? It does exactly. Let me cite my cases:

Case I.—Seizures began on the morning of the third day. The baby had had its first copious nursing two hours before the onset of the convulsions.

Case II.—Eclampsia set in 32 hours post partum. The infant

received satisfaction at the breast for the first time a few hours previously.

Case III.—Muscular twitchings at labour, but no convulsions. Severe headache and loss of appetite on second day. The urine remained full of albumin, 7 grammes to the litre, and contained numerous casts. The child took sick on the morning of the third day after the mother had felt the milk pouring into the breasts through the previous night. The albumin did not disappear from the urine until six months post partum in this last case.

One well authenticated case in the literature is that of Kreutzman, Assistant Physician to the Chair of Obstetrics and Gynæcology at the University of Erlangen (Prof. Zweifel), from whose report I will quote freely, inasmuch as it bears out to a nicety my own previously formed conclusions:

“Patient was a perfectly healthy primipara, who showed signs of albuminuria at the sixth month of her pregnancy. During the last month the albumin was 6 grammes to the litre. The labour was easy, and the child vigorous. There were no eclamptic seizures in the mother’s case. The mother’s recovery was good, though the albumin persisted for a long time. The baby cried immediately and was perfectly normal. He weighed nearly eight pounds. He slept all day, and acted in every way as any other healthy baby would do; the mother wished to nurse the baby, so he was put to the breast; not getting anything there certainly but some colstrum; the nurse gave him a little boiled water to drink. On the second night, about 36 hours after birth, the baby was taken with convulsions, which came on without any warning; another attack was noticed next morning, and a third one at 8 a.m. Neither one of these I, myself, had the opportunity to see. At 11 a.m. there occurred another one, followed in half an hour by a fifth. This last one occurred while I was in the room. . . . He was kept perfectly quiet, not handled at all; bromide of potash was given. There occurred only one more short attack in the evening; from that time on the baby thrived on diluted cow’s milk, and later on a wet-nurse’s breast beautifully. From the time of the first convulsion he had not been put to the breasts. . . . The convulsions were described by the nurse as being identical with those I saw.”

After eliminating all possibility, he concludes that the cause must lie in the transmission of the toxins of the mother to her child in utero, and that this later caused the convulsions, or, “There is still another possibility of intoxication for our newborn; it had been put to the breast repeatedly, and certainly some colostrum was

“sucked and absorbed. This colostrum may have been the vehicle through which the toxic matter was carried into the newborn’s organism. Mentioning these possibilities, I am fully aware that I move on the unsafe ground of theoretical speculation. But the case remains decidedly interesting: the mother suffering from a severe nephritis of pregnancy, goes through parturition without eclampsia; the newborn, to all appearances normal and healthy, is taken with general convulsions resembling those of eclampsia parturientum.”

In the review of this article, for the *Centralblatt f. Gynäkologie*, the writer concludes his resumé in the following line: “Surely, this case is not without the greatest interest to the followers of the theory of the toxæmia of eclampsia.”

Kreutzmar, in reviewing the possibilities for such an eclamptic accident, states that it may be due to toxic influence during life in utero, or to the passage of toxins from mother to child, through the breasts. Why separate the two at all? It has been proven beyond the shadow of a doubt that children of eclamptics or nephritics, are children with a vitality below par. They come into the world diseased as to their several organs, and diseased especially as to their kidneys. That means, clinically, lowered power of assimilation, but it means more; it means diminished power of elimination through diseased kidneys. Hence, in the diseased state of foetal toxæmia, the poisons in the colostrum are but “the last straw.” Too many, as we have seen, this “last straw” was unnecessary, for the children passed into the eclamptic state before they nursed at all. And just as not all children have suffered equally before birth, so will they not all suffer alike from toxic nursing. The degree of disease in the newborn will be in direct proportion to the length of time to which it has been subjected to the poisons in utero. But it will depend also upon one other factor, viz, how long it will have been in utero after the mother’s true eclampsia has set in.

Too much stress cannot be laid upon these two last factors, yet of the two the second is the more important. Seldom it is that children of eclamptic mothers die in utero before the maternal eclamptic convulsions set in, but they usually succumb during or shortly after a seizure. The immediate cause for the onset of the convulsions in the mother is found in the uterine contraction, just as the cause of the death of the foetus may be traced to the same source.

When studying in the Obstetrical Schools, of Paris, I was taught—and I am a firm believer in the teaching—I was taught that eclamptic attacks seldom, if ever, come on in pregnant women without uterine contractions having set in. They find the immediate cause in

uterine contraction, inasmuch as this pumping action of the uterine muscles throws a large amount of toxins into the general systemic circulation. We have every reason to believe that the cause of eclampsia is the pregnancy, and the cause of pregnancy is the foetus with its appendages. Removal of these, or even death of these, generally brings about a cure. The toxine, therefore, is generally thought to be of foetal origin. Therefore, compression of the large uterine lymphatics and cavernous sinuses, as well as compression of the whole of the uterine contents, throws a larger amount of toxins into the systemic circulation than the maternal tissues are wont to receive in a given time. The result is a flooding of the maternal organism with the noxious products, and this finds its expression in an eclamptic convulsion.

Prior to the onset of the attack, the woman may not have been conscious of any uterine pain. This is not a strong argument against the presence of uterine action, for pains frequently go on for a long time without causing any marked impression upon the consciousness, and especially is this aided in the mental torpidity, more or less profound, which so frequently precedes an eclamptic attack. Moreover, how often is this the case that you are called to an eclamptic who has had one seizure; she is still conscious, has no knowledge of labour having set in; yet, when you examine, you are able to say that labour certainly has started. Dilatation is advanced sufficiently to let you know at once that labour is on. This is the rule and not the exception. On the other hand, the teaching in most of our schools is that the convulsion starts the labour.

What is the effect upon the foetus? Why may it remain in utero for weeks before the eclamptic seizures, and suffer pathological change in all its organs yet so seldom succumb? Whereas, with one eclamptic seizure it may die in utero, or if it does not die will suffer more and more with each maternal spasm. The causes of death are two in number. Most seem to die of asphyxia, due to the prolonged spasm of the maternal respiratory muscles, together with the prolonged uterine spasms. But not a few die before birth as a result of eclamptic seizures. As proof of this, three cases are on record (Dohrn, Dienst, Ebinger) in which during Cæsarean section perfectly rigid dead children were removed, whereas the offspring were living at the time of the beginning of the Cæsarean operation. These children passed at once, seemingly, from a state of eclamptic tonus into the rigidity of death.

In what do my three cases resemble that of Kreutzman and of others? In all of them the clinical picture was the same, except for

one fact, namely, that in my cases there was not a true eclamptic seizure in any of the children, but there were rigidity of the muscles and muscular twitchings. In other respects there was always the somnolent state, the cyanosis, the irregular—now slow, now rapid—shallow breathing, gradually growing slower, and finally ceasing; strong cardiac action long after cessation of breathing; prolongation of life for a considerable time by artificial respirations; absence of nausea and vomiting, or of signs of disease in any of the systems. The symptom complex of the disease set in in apparently healthy children without other cause than nursing. Such was exactly the cause, also, in Krentzman's report. Granted, then, that these three cases succumbed to, and Krentzman's case was seized with convulsions, from the milk of toxic mothers, can a means of preventing such untoward effects be suggested. A consideration of the foregoing cases allow of an easy solution.

1. In a mother profoundly toxæmic and jaundiced, I think it will be well to feed artificially for quite a few days, and have the breasts pumped dry once or twice after the maternal toxæmia has improved, and before the child is allowed to nurse.

2. If the maternal convulsions come on post partum (these are the most dangerous cases for the nursing infant), then allow the maternal elimination to go on until she is freed from the greater part of her toxæmia, and then empty the breasts before allowing the child to nurse.

3. Does the albuminuria persist after gestation, it will be well to feed artificially throughout.

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PECULIAR CASE OF STRANGULATED HERNIA.

BY

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On October 1st, Dr. A. N. Worthington referred to me a case for operation. The patient was a male infant, age 14 months, who had suffered from a left-sided inguinal hernia since birth. Strangulation had been present for 36 hours, and after an unsuccessful attempt to reduce it with the patient under chloroform, I decided to operate.

On opening up the inguinal canal and the sac, the contents were found to be cæcum and appendix, which latter measured 3 inches in length. After the removal of the appendix, and replacement of the intestine into the abdominal cavity, the cogenital sac was obliterated by a continuous catgut suture and an operation for radical cure was performed. The patient made an uneventful recovery, and did not seem to suffer any inconvenience from the operation at any time. During the last few years I have been very much impressed with the manner in which my little patients under 3 years of age, upon whom I have been called to do abdominal operations, have stood the operation and gone through a convalescence with very little inconvenience.

Although the hernia of the cæcum and appendix down the right inguinal canal is not unusual, this is the first case in which I have found these structures in a left-sided hernia.

FATIGUE: NORMAL AND ABNORMAL; ITS SIGNIFICANCE TO THE PHYSICIAN.

BY

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The title of this paper depends upon the fact that there is such a thing as normal fatigue, a fatigue strictly within natural physiological bounds.

"That tired feeling," to use a catch phrase held in much repute by the exploiters of patent panaceas, is by no means of necessity a pathologic indication.

Whilst we shall not deny the *possibility* of a perfectly normal man, who has had a peculiarly equable existence, requiring honestly to ask the question "What do you mean by fatigue? what is it to be tired? I do not know the feeling," we must take exception to his position, if he intends to imply that only he and such as he are to be regarded as perfectly normal.

On the contrary, this very absence of the sense of fatigue, in which perhaps he glories, may be and often is a proof of a diseased condition of body or mind.

It *may* be normal, but on the other hand, it may be closely akin to the condition of the maniac in whom acute mental disease has so dulled the sensorium that there is no feeling of physical fatigue, even after forced walking and other over-exertion, so that he is able to stamp and rave for days and even weeks without a pause; or, akin to the state of the general parietic who, too ill to feel ill, declares that he never was better in his life, when sinking into the grave from sheer exhaustion.

That the entire absence of the sense of fatigue at all times is usually regarded as pathologic, is evidenced by the fact that the alleged induction of such a state, through a railway accident, has been made the ground for an action at law.

Most healthy normal individuals have at some time of their lives exerted themselves to the point of fatigue, until, perhaps, they may have felt for the time being as if there was only one thing in the world worth doing, and that to throw themselves down and rest, and rest, to all eternity. And, truth to tell, the sturdy son of toil can scarce know a Paradise of greater bliss than is afforded him by the humble couch whereon he may rest his weary limbs.

Nature has so designed it that all necessary things should be pleasurable, but also that, ceasing to be necessary, they shall likewise cease to give pleasure. Hence, in due time, we find that that eternal repose for

which we longed was a mistake, for, the sense of fatigue passing off, our pleasure now depends, not upon rest, but upon renewed activity.

By this means the normal cycle of activity and rest alternating and in due relation to each other, and forming the physiological basis of, and key to health, is readily ensured.

(So, then, it would appear that the poor overworked charwoman, who defined Heaven as a place "where we shall sit and do nothing for ever and ever," whilst she might be excused somewhat on account of her tired body, was nevertheless quite heterodox, if not in her theology, certainly in her physiology.)

I regard Fatigue as a mild form of pain, whose seat (as can be shown by experiment) is chiefly in the nervous system, and to which Hilton's famous simile of "Monitor" is therefore doubly applicable.

And what a judicious, careful, provident Monitor is this! Mosso's classical ergographic experiments need but to be mentioned in order to recall the fact that although the voluntary excitation of a muscle is always more effective than any artificial stimulus (producing, as it does, contraction in a muscle quite fatigued by electrical stimulus) yet the central nervous system is the first to "give up"; for a muscle which is beyond voluntary contraction will readily respond to electrical stimulation of itself or of its nerve, *i.e.*, in laboratory language, the central nervous system is fatigued more readily than the nerve-endings in the muscle, still more readily than the muscle itself, and infinitely more readily than the nerve fibres, the possibility of fatiguing which is doubted. Or, as Waller has concisely stated it, "A centre is the less resistant and cannot normally exhaust its peripheral instruments."

What does this mean? Simply this; that Nature takes no chances; she makes sure of an abundant physiological margin; she believes in a bountiful reserve.

Hence, through the faithful Monitor, Fatigue (or, strictly speaking, the sense or feeling of fatigue), she calls a halt whilst she is still in possession of plentiful resources of strength, and capable of making quite a long forced march without any danger of exhaustion, *i.e.*, we feel tired before we really are tired.

Every student knows how, as the evening wears on, a feeling of drowsiness and tiredness comes over him. That is the monitor Fatigue—Nature's great protector against exhaustion, coaxing him to rest, and to make up the day's loss of strength. Let him resist that feeling for a while, and he is soon surprised to find how much more he can do, and that quite easily. But we can overdo this silencing of Nature's monitor, whose function it is to warn us of impending overstrain and approaching

exhaustion. Like conscience, it may be silenced, and that to the woe-ful grief of those who think to steal a march upon Nature.

Not a few of the world's most promising sons and daughters, geni-uses we called them, have filled premature graves from no other reason than this. Urged by ambition, or fired by success, they have refused to be restrained, and whilst their death was ascribed to this or that disease, the real fundamental cause was Nature's persistently unheaded call for rest—they were exhausted to death, the particular disease which attended the closing scene being regardable almost as incidental. They went down to premature graves largely because their intense interest in their pursuits had robbed them of the faculty of appreciating fatigue.

Therefore, whilst no fixed standard can possibly be set up as to the amount of work one may safely undertake, it behoves the family phy-sician to be on his guard when he learns concerning any of his clients that "they never seem to tire." There is this possibility, that they are possessed of a remarkable stock of energy, but there is the other, that it is the regulating apparatus that is out of gear.

But someone will say, "Is not fatigue merely the result of a using up of material necessary for activity, and of accumulation of waste products, a mechanical and automatic process largely?"

That something more than this must be reckoned with is evidenced by the fact that profound interest in one's work or play makes such a difference, warding off fatigue almost indefinitely, whereas detestation of a task, or expectation of fatigue increases or even produces the sense of fatigue.

The phenomenon of yawning, a sign of mental and physical weariness, is well known to be dependent largely on interest, and illustrates well the effect of mental attitude on fatigue. This indicates a value and a danger of psychotherapy:—a value, in its possible ability to remove a sense of fatigue which has no sensible cause assignable, and has no organic basis; and a danger, in that many a person has been made to believe (or has made himself believe) that he was all right, until he has dropped into his grave.

Having referred to the normal presence of a sense of fatigue, to a possible normal absence of the sense of fatigue, and to the abnormal sense of fatigue, there remains for our consideration the abnormal presence of the sense of fatigue, *i.e.*, a sense of fatigue not directly due to natural exertion on the part of the individual who feels it, but par-taking of the pathologic.

The well-known dictum concerning fame might be applied to fatigue, for true it is that: Some are born tired; some acquire tiredness, *i.e.*, as

the result of voluntary exertion; some have tiredness thrust upon them, i.e., as a result of disease.

It is with the first and third of these that we shall now concern ourselves.

Some are Born Tired.—This may be as a result in the parents of disease, of alcoholism, of over-work, or of over-ease.

With regard to this last, as it is a commonplace that those who rest overmuch are often the most tired, so it is a significant fact that children of people of ease, especially if there be an alcoholic taint present, are apt to belong to the "born tired" class. We have all met such. One case I particularly well remember. Poor Hiram Saunders! A family reversal necessitated his working for a living, a thing he seemed fitted enough for, as he had a splendid physique. But to work with anything like constancy he was unable. He would quit work at any time, his only reason being that he was tired, dead tired—not lazy—oh, no, just tired! "I can't help it," he would say, "I was born that way."

More numerous amongst the working classes are the "born tired" of overworked parents. Poor little mites, half-begotten children, born with a heritage of weakness! And yet, when one studies the conditions of life, in the largest cities, especially of the Old World, one wonders that there are not more such.

But Nature rarely sends a being into the world burdened with a handicap of weakness, if by any device it can at all be avoided. She usually refuses to allow that over-tiredness of the parent to perpetuate itself in the children, preferring rather to produce a dwarf, but that a lively one, than to produce a tired man.

The typical "Glasgow Keelie" is a good example. A mere pigmy compared with his not very distant but overworked ancestors, what he lacks in stature he undoubtedly more than makes up in activity.

I might mention as a possible matter of interest that the great Sir John Moore, of Peninsular fame, himself a Glasgow man, though not a "Keelie," was amongst the first to recognize the possibilities in this light type of man, and having organized them, made some of his most famous charges with companies of such light infantry, bidding them "Charge them doon the Gallogate boys."

These statements concerning Nature's processes are not mere airy fancies, but substantial facts which I have personally investigated, and can assuredly vouch for. Many a time have I been struck with the steady decrease in bodily frame and the corresponding increase in (or at least full maintenance of) bodily activity in each succeeding generation of city dwellers. Amongst the better classes there is naturally less

tendency to deteriorate, and as there is usually also a blending with fresh country blood, both standards (namely, of stature and activity) are better maintained. It is, therefore, amongst the poorer city classes (with whom the strong country folks would scorn to intermarry) that the phenomenon I have mentioned is best seen.

Of course, there comes a time when Nature can no longer strike a balance, and this fact corresponds with the axiom of sociology, that three or four generations of hard city life spell death, the energy of the race being completely exhausted.

Some have Tiredness Thurst upon Them.—Fatigue comes to them unsought, so to speak, not as the result of natural activity, but as a sign and symptom of disease. That fatigue is frequently not only a sign or symptom of disease, either at its onset or during its course, or both, but is also in some cases a not unimportant etiological factor in the same, is undeniable.

I need but to mention typhoid fever, to recall the insidious onset

Most of us are aware that a feeling of extreme languor, muscular fatigue. That fatigue is not only a predisposing cause in typhoid, but also a feature of its course, as of other fevers, goes without saying, death from sheer exhaustion sometimes occurring.

Most of us are aware that a feeling of extreme languor, muscular fatigue and asthenia, marks the onset of Addison's disease, and the marked weariness, fatigue and languor of diabetes, are also too well-known to require dwelling upon. And so on; the onset and course of pneumonia, nephritis, pulmonary tuberculosis, endometritis, and many other diseases, might be mentioned in this connexion.

Sometimes, the fatigue experienced in the course of a disease is more or less proportionate to the severity of the other symptoms, but most of us know from actual experience that this is not always so, for during an attack of influenza we have suffered a depression and debility markedly disproportionate to the other symptoms.

A simple eye-strain may cause a marked general fatigue, the patient feeling quite used up, in addition to having the local fatigue and a severe headache, etc. A correction of the error removes the lassitude in what seems to the patient a miraculous fashion. This fact is not without its significance to many an ardent but "tired out" student.

As we have said, fatigue may be also an etiological factor, as well as a symptom. Thus, *e.g.*, not only is it a very frequent symptom of multiple neuritis, but it is now acknowledged to be in many cases an important factor in causation.

Even the laity are well aware that fatigue, with its accompanying

lowered resistance, is a powerful predisposing cause in the production of disease, the infectious diseases being much more readily "caught," as they put it, when one is run down.

Having had occasion to visit a considerable number of country districts from time to time, I have come across in such districts a fair number of cases of pulmonary tuberculosis in young men. In most cases, one was somewhat at a loss to account for this yielding to the dread tubercle bacillus, the conditions of their life and the nature of their surroundings being markedly in favour of resistance.

In casting about for a possible predisposing cause, this element of fatigue has thrust itself upon me not once or twice.

It is notorious that many who generally take life more or less easily, at certain times, particularly harvest time, make excessive drains upon their strength, working vigorously from sunrise to sundown. Sometimes, especially if they expose themselves to an evening chill, an attack of fatigue fever results. (I refer to the non-specific fever—synochus simplex of Riverius, febris continua simplex of Licutand—described by Murchison as a "sporadic, non-contagious disease, arising from exposure to the sun, fatigue, surfeit, inebriety, etc.," in which the typical symptoms of the febrile state are present but no specific lesion is discoverable.)

If Nature's warning is heeded all may be well, but if the pernicious attempts at manual exertion are persisted in, the pathway to disease, often fatal, is laid.

Knott, of Dublin, has contended that death may result from this form of over-exertion fever without any specific infectious agents whatever. However that may be, I for one am convinced that it is the antecedent of many an obscure case of fatal pulmonary tuberculosis.

Cases have been reported (by Wood, of Melbourne, Poore, of London, and others) of direct poisoning by waste products after over-exertion, in which foul breath, convulsions, coma and other uræmic symptoms were marked.

Fatigue, then, may be an etiological factor in disease, from (as Walker assures us) a simple hyperhidrosis (sweaty feet, *e.g.*) to serious and almost certainly fatal maladies, or a symptom in disease, from a slight coryza (common "cold in the head") to very grave conditions indeed, both mental and physical.

Now, all this is surely more than a mere matter of passing interest, devoid of practical value. It ought to suggest, and does suggest, a very practical course to the practitioner, both as to prophylaxis and to treatment.

To take one example. It is now practically established that fatigue is a not unimportant accessory factor in the production of tabes dorsalis. At Mendel's Polyclinic (Berlin) statistics showed that the proportion of males, as compared with females affected, was as three is to one; this amongst the public patients who belong to a sorely overworked class, many toiling twelve to fourteen hours a day or more. In Mendel's private practice, not only was the *percentage* less amongst those liable, but the *proportion* was significantly changed, being as twenty-five is to one.

The reason for this, and the deduction therefrom, is obvious. Amongst the poor all must work, male and female alike, often the female as hard as the male, whereas amongst the better classes, as met in private practice, the women take life more easily. Quite a substantial support you will admit for Edinger's exhaustion theory.

Another authentic observation pointing to the fact that fatigue has to be reckoned with in the etiology of locomotor ataxia, is that there was a very marked increase in tabetic cases amongst the British soldiers during and following the exertions of the last Boer war. Now, this could not well be due to increased exposure to specific infection, even granting that there might have been such, for tabes almost invariably carries a considerable number of years. Therefore, the fatigue incurred during the campaign is the only plausible reason. This naturally suggests a point in the prophylaxis of tabes dorsalis—avoid fatigue.

Moreover, it suggests the necessity for care in treatment. Thus, when Frankel's excellent system is being employed for the re-education of the new neurones in the art of co-ordination, if we keep in mind that tabes is essentially an exhaustion disease, we shall be careful not to overdo our restraining, and so producing fatigue, induce more ataxia.

It is not always to be pooh-poohed and dismissed with a simple "take a rest";—albeit rest is the great restorer. It may indicate the onset of a grave disorder, and may, therefore, be of some diagnostic value. Occurring in the course of a disease, it may be indicative of its gravity or otherwise. It may indicate the temperament of the patient, a consideration in all rational treatment.

THE USES OF THE X-RAYS IN SURGERY.

BY

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The use of the X-rays in surgery has been well established for many years, their employment being part of the routine examination in suitable cases. Within recent years the great improvement in appar-

atus and in technique has enlarged considerably their field of usefulness. These improvements have resulted in great shortening of the time of exposure, better definition in the skiagram, and in opening up new fields of exploration. The limit of improvements has not yet been reached.

We are all familiar with the great aid which the X-rays have been in fractures, dislocations, diseases of bone, new growths, and in foreign bodies; information just as valuable can be obtained in examination of the skull, chest, and abdomen in conditions which previously were not thought to be accessible to the rays. There are several points to which I desire to draw attention; points which we must bear in mind when we seek the services of the X-rays.

First: Radiography is "shadowgraphy," and not photography. We do not get a photograph of an object, but a photograph of the shadow of that object.

Second: The density of the shadow will vary with the atomic weight of the object casting the shadow. Lead, mercury, bismuth, calcium, etc., with their high atomic weights, offer obstruction to the rays, casting dense shadows, whereas the various gases of low atomic weight readily permit their passage.

Third: The X-ray plate is a positive, and the print from it is a negative, the opposite to that which prevails in photography. The image is latent, and must be brought out by the action of a developer.

Fourth: It is necessary to know from what point we are viewing the skiagram; whether from before backwards, from behind forwards, or from which side. To deduce this, we must know the conditions under which the exposure was made, that is the relative positions of the tube, patient, and plate. The majority of operators work with the tube above the patient and the plate below, although with many the reverse holds. If the exposure has been made with the tube above and the plate below, and one holds the plate with the film side towards him, he is then standing in the place of the tube and looking at the patient from before backwards, the film side always being next the patient in making the exposure. If the plate is held with the glass side towards him, he is looking from behind forwards. Right and left of the patient are then easily established.

The final point to which I desire to draw attention is that in disease we do not get as clear a picture as in health, and often this haziness is an important point in diagnosis, rather than the mark of a poor skiagram.

In the ordinary skiagram we see the parts in one plane only. By the introduction of plastic radiography, obtained by the special arrange-

ment of two plates properly prepared, in which the tissues are shown up in relief, and by stereoscopic radiography, we are enabled to see the parts in all their dimensions. In the use of bismuth or of zirconium oxide, owing to the obstruction offered to the rays, we have valuable agents in demonstrating the course of sinuses, or in investigating conditions of the œsophagus, stomach, or intestines.

I will now proceed to consider the surgical uses of the X-rays in the various regions. In the examination of the skull, valuable information is afforded concerning the various sinuses; frontal, ethmoidal, sphenoidal, and mastoid; antrum of Highmore; dental affections; and in conditions affecting the bony envelope, such as exostoses, arrest of development, diseases of the bone, and occasionally in fractures of the vault. Under favourable conditions, it would be possible to infer a meningeal hæmorrhage, owing to the additional obstruction to the rays offered by the blood. Regarding conditions of the brain, such as tumour, very little should be expected, for in addition to the fact that there are two layers of bone to be penetrated, each of which casts a shadow, there is also the point that tumours of the brain are generally of the same consistence as the brain itself, and hence cast the same shadow. It may, therefore, be said, that the diagnosis of uncalcified brain tumours by means of X-rays is uncertain. On the other hand, tumours presenting calcareous changes may be made out, depending upon the amount of calcareous change present.

Regarding the spine, valuable information may be afforded by the rays, especially in the cervical and lumbar regions. In the dorsal region, the shadow cast by the sternum, heart and blood vessels may be sufficient to obscure the shadow of the vertebræ. Congenital anomalies, such as cervical rib, spina bifida, fractures and dislocations are generally a condition frequently mistaken for "sprained back." Osteo-arthritic conditions show up as a roughening of the free edges of bone, or fusing together of articular surfaces. Areas of either lessened or increased density are suggestive of tuberculosis, as is also a narrowing of the space between vertebræ from destruction of cartilage. Abscesses are frequently demonstrated and the course of sinuses may be readily mapped out with bismuth.

The chest is still largely within the province of the physician rather than the surgeon, and the X-rays are accordingly of greater service to the former than to the latter. In conditions of empyæma, abscess of the lung, and foreign body the use of the rays is of undoubted assistance to the surgeon.

The abdomen presents a large field for investigation. In a skiagram of the abdomen, the spine, iliac crests, and ileo-psosas muscles are appar-

ent. The liver and spleen cast shadows due to the quantity of blood which they contain. A bubble of gas, manifested by an area of increased radiability, may point to the region of the stomach, and there is generally a large collection of gas on the right side in the cæcum. Other portions of the bowel may show this too. The kidneys can sometimes be made out normally, although the shadow is more evident in disease, and especially when enveloped in a fatty capsule, fat obstructing the rays. The pancreas itself is not evident, but recently attempts have been made to obtain some information as to its size by mapping out the duodenum in bismuth. At times it is possible to detect a subphrenic abscess by noting the height of the diaphragm.

The use of bismuth has proved to be of the greatest value in investigating abdominal conditions. By its use, information may be obtained concerning conditions of the stomach and bowels, either by the aid of the fluorescent screen or with the plate. Here, it may be necessary to make a series of skiagrams in both the horizontal and vertical positions, and at stated intervals, with a view of obtaining the degree of motility of the contents. By the aid of bismuth, hour-glass stomach, gastropnoia, and post-operative effects, such as after gastro-enterostomy, are evident. Tumours of the bowel, because they are of the same consistence as the surrounding tissues, we are not able to demonstrate, but we have in the use of bismuth, either by the mouth or by rectal injection, a valuable aid in pointing to the site of the obstruction. The injection of the large bowel with air will often aid by increasing the contrast, and in mapping out the bowel. The use of the X-rays in diagnosing abdominal aneurism is of little service, for unlike the chest, there is not the contrast to be obtained between air and blood. Occasionally, a concretion in the appendix will cast a shadow, as will also concretions anywhere in the bowel, a point to be remembered in examining for urinary stone.

In diseases of the urinary tract, the X-rays are of greatest value in stone, and here there are several points which require mention. The shadow of a stone will depend upon its composition, other things being equal. The densest shadow is cast by an oxalate of lime calculus, with cystine stone next. The latter is rarely met with. Phosphate of lime comes next, whilst mixed phosphates are very difficult to detect, as the rays easily permeate them, and for the same reason, uric acid and the urates are seldom detected. A sharply defined dense shadow is either an oxalate or cystine stone. If composed mainly of phosphates, the shadow is densest where the stone is thickest, shading off at the edges. A phosphatic calculus is frequently branched.

In reference to position, the vast majority of shadows internal, to a

vertical line drawn from the most prominent point of the iliac crest to the last rib, are due to stone, whilst the majority of shadows external to this line, are due to foreign bodies in the bowel. Calcareous glands also cast shadows internal to this line, but these shadows are close to the spine, and frequently in chain form. Calculi in the upper ureter cast shadows on a line touching the tips of the transverse processes of the lumbar vertebræ. When the shadow falls directly over the transverse process, it may be so blended as to be entirely overlooked. If the rays are directed obliquely, this difficulty may be overcome. Shadows cast by calculi in the lower ureter, must be in the line of the ureter crossing the sacro-iliac articulation, then curving at first outwards, backwards and downwards, then forwards, upwards and inwards. Ureteral calculi are oval or more or less elongated in outline, with long axis towards the bladder. Although they may be found anywhere in the ureter, the three places where they are most frequently found are just below the commencement of the ureter, where the ureter crosses the bony pelvis, and at its termination.

Shadows cast by stone in the bladder are generally large, oval, and centrally placed, most frequently near the pubis. The insufflation of the bladder with sterilized air is often of service by increasing the contrast.

There are several objects which cast shadows not unlike ureteral calculi, namely, phleboliths, calcareous glands, patches of atheroma in the vessels, and intestinal concretions. Phleboliths cast shadows very similar to ureteral calculi, and are frequently found close to the course of the ureter. They are usually circular, with sharply defined margins, and if more than one is present, the direction of a line joining them is not the line of the ureter. A bougie in the ureter, or a stereoscopic radiogram will clear up any doubt. Calcareous glands are not common. They occur most frequently along the brim of the true pelvis, and along the transverse processes of the lumbar vertebræ. Atheromatous patches are rarer still, occurring in elderly subjects. They are generally multiple, irregular in outline, vary in density, and lie transverse to the line of the ureter.

The use of an ureteral bougie opaque to the rays is of the greatest value in mapping out the course of the ureter. If a stone is blocking the ureter, the arrest of the bougie at that point will be shown, although it is possible for the bougie to pass the stone, and for it to be arrested by conditions other than stone. The bougie is of great value in diverticulum of the ureter, curling up in the diverticulum. With the bougie in the ureter, shadows of doubtful origin, such as phleboliths, will be seen to be outside the ureter.

The introduction of non-irritating organic preparations of silver, such

as a weak solution of argyrol, has been found to be of service in enabling one to obtain an idea of the size of the renal pelvis, that is the existence or not of dilatation. The diagnosis of tuberculosis of the kidney does not rest on the X-ray examination. The skiagram shows merely the presence of pus in the kidney region, and the probable absence of stone. This, in conjunction with the clinical history and the cystoscopic examination, will usually enable one to make the diagnosis. In conditions of the urinary tract, it should be remembered, that here, as elsewhere, the X-ray is but one part of the examination. An opinion on the origin of a shadow should not be expressed without taking into consideration the clinical history and the report of the cystoscopic examination.

In the examination of the extremities, the X-rays find their most frequent use. It is often advisable to make skiagrams of corresponding parts, especially in disease, in order that the diseased part may be compared with its fellow. In studying the skiagram, there is a definite routine to be gone through. It should be studied as though a horizontal section had been made through the part. It is essential to know the appearance of the normal, and particular attention should be paid to the epiphyses.

First: The contour of the part should be studied for any change in shape. It should be noted whether it is regular or irregular; whether any bulging of the surface, as in abscess, tumour, foreign body, effusion, projection of fractured bones, etc.; depressed or broken from old cicatrices, sinuses, or wounds.

Second: The condition of the soft parts, subcutaneous tissue and muscle. Whether any increase or decrease; any change in density or shape. These should be noted and compared with corresponding parts if necessary. The distance between skin surface and bone should also be noted. This is increased in fat subjects, abscess, new growths, or effusion, as in simple sprain. It is decreased in thin individuals, diseases associated with atrophy, such as joint tuberculosis, where there is atrophy in the neighbourhood of affected joints; or atrophy when the limb has been immobilized for a length of time. Increase in density or haziness may be caused by fat, blood, pus, serum, etc. The subcutaneous space may be encroached upon by conditions arising from bone, as periostitis or growths.

Third: The bone. There are three parts to be noticed in the bone, periosteum, cortex, and medulla. Under normal conditions, the periosteum as a separate entity, is not visible. When it is detached, eroded or bulged out, as from effusion or new growth, it is plainly evident. The surface of the bone may be irregular and rough either from old or recent disease. In examining the cortex, we should note its density and

size as compared with the medulla. In certain conditions the medulla increases at the expense of the cortex, and in others, the cortex increases at the expense of the medulla. The thickness of the cortex varies normally with the different bones, and in different parts of the same bone. In disease it may be increased, diminished or destroyed. It is increased in chronic inflammatory conditions of the bone, and diminished in conditions associated with atrophy, such as joint tuberculosis, or from pressure, as in new growths. This is manifested by increased radiability or lessened obstruction to the passage of the rays. Regarding the medulla, the same points should be noted here: whether there is any decrease or increase in size or any irregularity of the lumen. The presence of cavities and of areas of increased density will be readily noted.

Fourth: The epiphyses. The epiphyseal line or zone of proliferation should be examined with great care, as old or recent changes due to disturbance of nutrition, infection or trauma may be evident. An examination of the epiphyses and centres of ossification will determine whether their size and appearance conform with the age of the individual.

Finally, the joint should be carefully studied. The presence of thickening of the capsule, as in early tuberculosis, is of great value. The width of the joint should be observed, the articulating surfaces being widely separated in effusion, and approximated in destruction of the articular cartilage. The surface of the bone should be inspected for any irregularities due to disease or fracture.

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A SYMPOSIUM UPON THE X-RAYS.

The third meeting of the Medico-Chirurgical Society for the year, held on Friday, November 4th, was devoted to a symposium upon the uses of the X-rays in medicine and surgery. The evening was a most instructive one. In the ante-room was erected a stand on which were demonstrated, in the illuminated box, a large number of plates of interesting diseased structures; in the meeting-room were erected five demonstration boxes, in which were displayed the plates shown by the speakers. The credit of the electrical arrangements is due to Dr. Walter Wilkins, of the General Hospital, and Mr. McNeill, of the Royal Victoria Hospital. Thanks to them, too, the exhibits were put on promptly and to excellent advantage. Dr. Girdwood opened the subject with a few remarks upon the recent advances made in apparatus and in the application of the rays. Among the notable features referred to, is the "cinematographic" recording of movements of organs, where, by a rapid substitution of plates, four pictures have been successively obtained of the heart during a beat, and thirteen consecutive plates in the twenty-two seconds during which a peristaltic movement of the stomach occurred. Following this paper was the exhibition of a number of plates upon the screen. Dr. Birkett showed a number of plates illustrating the accessory sinuses of the nose, and the mastoid in suppurative diseases. Dr. Walter Wilkins showed a large number of plates dealing with various diseased states, which were of much surgical and medical interest, after which Dr. R. P. Campbell dealt with the use of the rays in the detection of calculi. He also showed a plate demonstrating the

unique condition of a ureteral diverticulum. Dr. Hamilton showed an excellent series of plates taken in cases of pneumothorax, hydrothorax and abscess of the lung, laying stress in a few sentences upon the value of the fluoroscope as a confirmatory agent, to be used to supplement, not to replace, the ordinary modes of examination. Dr. Martin, the President, showed plates indicating the heart in cases of moderate and great enlargement, and the aorta in aneurysm. Dr. Elder spoke excellently upon the abuse of the X-rays. He laid stress upon the practice needed for the intelligent reading of a plate; pointed out that the X-ray plate in fractures or suspected fractures, is too much depended upon for the diagnosis, to the exclusion of the careful examination of the patient by the eye and the hands, and made protest against the introduction of the X-ray plate in court-cases where the layman is utterly unable to interpret what is shown him. Dr. von Eberts showed a series of plates of the stomach, where the organ is outlined in its different shapes and positions by the rays upon bismuth, which had been ingested with food, following this with a series showing the colon similarly rendered visible. The latter series enabled the observer to note the position of an enterocolostomy relative to the fistula which it was intended to relieve. Owing to the length of the programme, the papers to be given by Drs. Turner, Forbes and Scrimger, were held over until the next meeting. The papers, without exception, were short and to the point, and a large amount of instructive subject matter was given with considerable clearness and brevity.

PROFESSOR PENHALLOW.

It is our melancholy duty to record the death of Professor D. P. Penhallow, one of the oldest members of the medical faculty of McGill University.

About a year ago Professor Penhallow suffered a nervous breakdown and was released from his duties at the University in the hope that a year abroad would instill him with new life and vitality, and enable him to take up his work once more.

When he returned to Montreal, a couple of months ago, his medical advisers could not say that he was yet in a fit condition to resume work, as a consequence of which the faculty of McGill unwillingly but necessarily, because his state of health demanded it, granted him further leave of absence. He died on board the Lake Manitoba, on which he had sailed for Liverpool, Friday, October 14.

Professor David Penhallow, B.Sc., M.Sc., D.Sc., F.R.S.C., F.R.S.A., was fifty-six years of age, having been born at Kittery Point, Maine, in

1854 In 1876, three years after he had graduated from the Boston University, where he was educated, he received the appointment of professor of botany and chemistry at the Imperial College of Agriculture, Sappore, Japan, a position held by him until 1880.

Professor Penhallow, who was appointed to the chair of botany in McGill in 1883, was well-known as a writer on scientific subjects, his largest and most important work in this respect being his Manual of North American Gymnosperms.

He leaves a widow and one son. It is understood that the funeral took place at sea.

COLORATION OF URINE BY PHENOLPHTHALEIN.

The Editor MONTREAL MEDICAL JOURNAL.

DEAR SIR:—I notice in Dr. Cushing's most interesting report of a case of hæmatoporphyriduria the statement that phenolphthalein is not known to colour the urine. I have not seen a case of this kind reported, but I have had a patient whose urine turned pink after taking daily five grains of phenolphthalein.

The case was one which had been in the surgical wards of the Montreal General Hospital, being treated for cystitis following retention of urine.

The symptoms had left him for a few months, but had returned when I saw him. The urine contained no pus, but was very alkaline with an excess of phosphates. He was very constipated and was given five grains of phenolphthalein daily with good effect. In addition he had five grains of urotropin and boric acid, as well as a tonic for his general condition, as he was suffering from disseminated sclerosis.

Shortly after starting the phenolphthalein the urine turned pink. On adding acid the pink vanished, only to return with possibly greater intensity on adding Na OH.

The colour vanished on stopping the phenolphthalein.

One other case of pink urine I have had, where a child ate some biscuits covered with pink icing. Within a day the skin turned a dead pink, the faces were intensely red, and the urine was the colour of red ink.

Dr. Bruere kindly investigated the pigment and found it to be eosin. In order to clinch the diagnosis, I ate a small portion myself, and the urine was coloured pink within a few hours.

Yours truly,

MALCOLM MACKAY.

Sherbrooke, P.Q., October 5, 1910.

Reviews and Notices of Books.

HOOKWORM DISEASE: ETIOLOGY, PATHOLOGY, DIAGNOSIS, PROGNOSIS, PROPHYLAXIS AND TREATMENT. By GEORGE DOCK, A.M., M.D., Professor of the Theory and Practice of Medicine, Tulane University, New Orleans, and CHARLES C. BASS, M.D., Instructor of Clinical Microscopy and Clinical Medicine, Tulane University, New Orleans. Illustrated with forty-nine special engravings and coloured plate. St. Louis: C. V. Mosby Co., 1910.

One may find in very good form in this book the information he desires upon that ancient pest the hookworm. It is remarkable that for so long a time America failed to trouble herself about this parasite at all, and within the last few years newspaper exploitation made the public imagine that something actually new had transpired. Such was, indeed, the case, for although the disease and the parasite had been long known, a large amount of work was done before the zoological and geographical particulars of the malady in this country were understood. Prominent among workers on the subject are the authors of this work, and the book gains by being fresh from their laboratory. A short, interesting historical chapter is followed by the economics of the disease, its distribution and its importance, and this by the zoology of *Ankylostoma duodenale* and *Necator Americanus*. Their modes of infection are by the bowel and through the skin, some good experimental evidence being given of the latter. The pathology and symptomatology are, at the present, fairly familiar to readers; the latter is amplified with some good photographs of victims of the parasite. Under the heading Diagnosis, full laboratory directions, illustrated, are given. One of the most interesting chapters in the book is that upon prophylaxis, for here is indicated the great difficulty of proper assistance from the person most concerned—the generally ill-sufferers or only “carriers,” may cease to be centres of distribution of ova by means of the fæces. In the hookworm disease thymol takes the first place, but many vermifuges have been used with advantage, but it is noteworthy that the drug must be given after a careful preliminary treatment similar to that in use when employing other vermifuges; and the serious symptoms exhibited by badly-infected cases demand a suitable hygienic regime. We can heartily commend Drs. Dock and Bass’ book to everyone interested in the subject.

LIPPINCOTT'S NEW MEDICAL DICTIONARY. Edited by HENRY W. CATTELL, M.D. 1,108 pages. Philadelphia and London: J. B. Lippincott Company. Montreal: Charles Roberts.

There are many medical dictionaries competing for favour. The newest is that which is published by Messrs. Lippincott, and edited by Dr. Henry Cattell. Dr. Cattell is widely known in the profession as the editor of that excellent series "International Clinics." We have tested the dictionary carefully, and find it entirely adequate for the needs of the medical student, the practitioner, or laboratory worker for whom it is intended. We commend especially the adherence to established usage in spelling rather than a straining after new effects. Mechanically also the book is well done. The paper is durable though thin; the matter is clearly and conveniently displayed, and the binding is sound and flexible.

THE DISEASES OF THE NOSE, MOUTH, PHARYNX AND LARYNX. A Text-book for Students and Practitioners of Medicine. By DR. ALFRED BRUCK (Berlin). Edited and translated by F. W. FORBES ROSS, M.D., Edin., F.R.C.S. England, late Civil Surgeon His Britannic Majesty's Guards Hospital, London; Assistant North London Hospital for Consumption and Diseases of the Chest, etc., etc., assisted by FRIEDRICH GANS, M.D. Illustrated by 217 figures and diagrams in the text, many of which are in colours. New York: Rebman Company, 1910. Price \$5.00.

In addition to the anatomical trio, Nose, Throat, and Larynx, so often treated together in text-books, we are glad to find that the author takes up also the Mouth. Although the specialist's field is, as a rule, not wide enough to include this part adjoining the pharynx, the student and the "practitioner of medicine" cannot rationally divide them.

In this text-book of Dr. Bruck's there is more in the form than in the substance, which we find open for criticism. The translators say that they have endeavoured "to closely follow the German text"; they ought to endeavour to correct the English result. We cite for examples of strange English: "Training . . . only usually begins after the voice has developed," (p. 590); "eventual underlying disease," (p. 79); "eventual primary disease," (p. 37; "anæmized"; "the complications or not of other organs," (p. 155); and most remarkable of all "the fur coat of the tongue," (p. 179); and "the nose is the happy hunting-ground for operative busybodies," (p. 597).

The author's teaching in regard to individual pathological states differs here and there from that of many. Erysipelatous pharyngitis is a more recognizable entity in his book, and Thornwald's disease he

hardly admits to exist. He does not attach any definite value to the finding of the spirochæta pallida, saying that it is "not generally accepted as the *causa agens* of syphilis."

Examination of the accessory sinuses of the nose by Roentgen rays "is not often required, save for foreign bodies hidden in the nose or its accessory sinuses, or for a tumour." Such an estimate falls far short of the fact, since these rays can help to determine the presence of a sinus, its anatomical extent and the relative density of its contents.

In some of the minor surgical measures of the nose and pharynx, he is not modern. We do not expect to find Asch's operation given equal prominence with submucous resection; and in the directions for removal of hypertrophied or diseased tonsils, he has hardly kept abreast of the advances in the removal of tonsil and capsule.

It is a pleasure, however, to commend the author for the good features of his work.

At the beginning of each main section, he gives good and comprehensive summaries of the anatomical relationships and the physiology of the structures with drawings and diagrams.

The commoner diseases are described in *extenso*: the symptomatology is carefully worked up. Perhaps the best example of this is in the chapters on the diseases of the larynx and trachea; the author presents laryngeal paralysis in a readable form, and brings Semon's law out into special prominence. He discusses laryngeal arthritides in very logical terms, recognizing the difficulty in an accurate diagnosis between an arthritis and a peri-arthritis, but insisting on the recognition of pure joint diseases.

In regard to therapeutics, he is liberal in supplying a number of useful prescriptions (metric system.) He urges moderation in the use of applications to the different mucous membranes, especially the laryngeal membrane—advice which all will welcome.

He sets himself directly against intra-laryngeal treatment of malignant disease of whatever form, grudgingly except a clearly defined initial infiltration; "an intra-laryngeal operation is a great incitement for recurrence, . . . and is not seldom the reason for missing the psychical moment for performing a radical operation."

There are good chapters on the voice. The author gives sound advice against its over-use or straining, especially in the case of little children, compelled in the kindergarten to sing exercises, and of growing boys at the time of "breaking of the voice." He devotes one careful chapter to affections of the voice in singers and orators.

We would commend the book to careful consideration. Its faults,

as indicated above, are in general, of slight importance, and its excellences are pronounced.

H. S. M.

A TEXTBOOK OF PATHOLOGY. By JOSEPH MCFARLAND, M.D., Professor of Pathology and Bacteriology, Medico-Chirurgical College of Philadelphia. Second edition; octavo, 856 pages; 437 illustrations. Philadelphia and London: W. B. Saunders Company, 1910.

The second edition of McFarland's Pathology has been not only greatly enlarged, but shows marked evidence of careful revision on the part of its author. In the process of revision the book has been brought well abreast of the science as it stands to-day. The general and special pathology are well proportioned, and each subject carefully considered. The combination of two kinds of print has served a useful purpose in keeping the book small. The photographs and photomicrographs are good and comprehensive. As a textbook for students, the book is all that can be desired.

PHYSIOLOGICAL PRINCIPLES IN TREATMENT. By W. LANGDON BROWN, M.A., M.D. Cantab., F.R.C.P., Physician to the Metropolitan Hospital, Medical Registrar and Demonstrator of Physiology, St. Bartholomew's Hospital, &c. London: Baillière, Tindall and Cox.

This book, of about 400 pages, is written by one who during the past ten or twelve years has combined the role of a laboratory worker and teacher in physiology with that of physician to a London hospital. He endeavours here to set forth in order those facts and principles which, having assimilated as an experimental physiologist, he has found particular sources of strength as a practical physician.

Starting with a general consideration of internal secretions, he passes on to an excellent review of our knowledge of the functions, disorders and therapeutic applications of the thyroid glands, giving more or less support to their use in myxœdema, eclampsia, jaundice and certain skin diseases, and discouraging their use, and, in fact, any kind of organo-therapy in Grave's disease. He then proceeds to discuss the physiology of the supra-renals, and recommends adrenalin in the treatment of shock, hæmatemesis, and other forms of vomiting, but considers it contraindicated in cerebral and pulmonary hæmorrhage. His knowledge of its use in heart disease is very limited, and he does not mention its use in asthma, perhaps, because it is difficult to explain its action in this affection on physiological grounds. Most of the other internal secretions are discussed briefly but adequately.

In the next chapter, he considers gastric disorders in the light of

the recent work of the Russian school and other workers in this field. He is fully appreciative of Pawlow's work, but in some instances differs from his conclusions, as for example, with reference to the adaptation of the ferment contents of the digestive juices to the food. The physiology of the pancreas and its relation to diabetes is well treated, and certain other disorders of metabolism and intestinal intoxications are reviewed in turn.

Much of Mackenzie's work on the heart is presented briefly but clearly although some exception may be taken to the section on heart block which is somewhat confused on account of no proper distinction being made between the parietal and complete forms.

The concluding chapters deal respectively with the vaso-motor system, including blood pressure, cyanosis and calcium metabolism. In all of these chapters he makes some valuable suggestions. For example, after discussing the role of calcium in blood clotting, and the antagonism between calcium salts and citric acid, he suggests the possibility of explaining the frequency of thrombosis, after typhoid fever cases in the late Boer war, by the use of condensed milk in which the citrates are made insoluble, and the calcium salts are left free to act unchecked.

It would be too much to expect of the author to have personally tested the whole wide range of facts dealt with in this book, but a considerable number of the principles enunciated have been put into practice in his own hospital work, and many more have, to his knowledge, been tested by others. Where this is not the case, he usually makes it clear that his recommendations rest as yet on theory or animal experiment as the case may be.

In our opinion, the book is extremely valuable, and is exactly what many men are looking for.

W. S. M.

Messrs. Lea & Feibger announce for publication through their agents in Canada, Messrs. D. T. McAinsh & Company, 123 Bay Street, Toronto, a new work of which we transcribe the title:

MODERN TREATMENT; THE MANAGEMENT OF DISEASE WITH MEDICINAL AND NON-MEDICINAL REMEDIES. By Eminent American and English Authorities. Edited by HOBART AMORY HARE, M.D., Professor of Therapeutics and Materia Medica, Jefferson Medical College, Philadelphia; Physician to the Jefferson Medical College Hospital; Assisted by H. R. M. LANDIS, M.D., Medical Director of the Phipps Institute for Tuberculosis and Physician to the White Haven Sanatorium. In two very handsome octavo volumes, comprising 1,800 pages, with numerous engravings and full-page plates. Price per volume in cloth, \$6.00, net; half morocco, \$7.50, net. For sale by subscription only.

The following are the contents of Volume I:—Part I: General Considerations.—Modern Pharmacology and Its Bearing on Practical Therapeutics, by Horatio C. Wood, Jr., M.D., Associate Professor of Pharmacology in the University of Pennsylvania; The Combination of Drugs: Prescription Writing, by Ambrose Hunsberger, Ph.G., Lecturer on Commercial Pharmacy, Medico-Chirurgical College, Department of Pharmacy, Philadelphia; The Untoward Effects of Drugs, by Robert Dawson Rudolf, M.D. (Edin.), F.R.C.P. (Lond.), Professor of Therapeutics in the University of Toronto, Assistant Physician to the Toronto General Hospital and the Sick Children's Hospital.

Part II: The Treatment of Disease by Non-Medicinal Measures.—Climate, General Considerations, High Altitudes and Low Altitudes, by W. Jarvis Barlow, M.D., Professor of Clinical Medicine in the Los Angeles Department, College of Medicine, University of California, Member of the American Climatological Association; General Exercise, by Thomas A. Storey, M.D., Ph. D., Professor of Physical Instruction and Hygiene, and Director of that Department in the College of the City of New York; Mineral Springs, by Guy Hinsdale, M.D., Secretary of the American Climatological Association, Fellow of the Royal Society of Medicine of England and of the American Neurological Association; Hydrotherapy, by Simon Baruch, M.D., Professor of Hydrotherapy in Columbia University (College of Physicians and Surgeons), New York, and Arthur M. Shrady, M.D., Chief of Clinic; Electrotherapeutics, including High-Frequency Currents, by George E. Price, M.D., Assistant Professor of Nervous and Mental Diseases in the Jefferson Medical College, Assistant Neurologist to the Jefferson College Hospital, Philadelphia; X-Rays and Radio-Active Substances, by George E. Pfahler, and Director of the X-ray Laboratory of the Medico-Chirurgical Hospital, Philadelphia; The Rest Cure, by F. X. Dercum, M.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College of Philadelphia; Nutrition and Foods, by Julius Friedenwald, M.D., Professor of Diseases of the Stomach, College of Physicians and Surgeons, Baltimore, Visiting Gastro-enterologist to the Mercy Hospital, Bay View Hospital, St. Agnes Hospital, Union Protestant Infirmary, and the Church Home, Baltimore, and John Ruhrah, M.D., Professor of Diseases of Children and Therapeutics, College of Physicians and Surgeons, Visiting Physician to the Robert Garrett Hospital for Children, Nursery and Child's Hospital, Mercy Hospital, and Consulting Physician to the Church Home and Infirmary, Baltimore; Disinfection, Hygienic Measures, Personal, Communal, and National, including Control of Epidemics, by J. W. Kerr, M.D., Assistant Surgeon-General of the United States Public Health and Marine Hospital Service; Serum

Therapy and its Underlying Principles, by W. H. Park, M.D., Professor of Bacteriology and Hygiene in the University and Bellevue Hospital Medical College, Director of the Research Laboratory of the Department of Health of New York City; Vaccines and Opsonic Therapy, by Nathaniel Bowditch Potter, M.D., Visiting Physician to the New York City Hospital, to the French Hospital, and to the Hospital for Ruptured and Crippled, Associate in Clinical Medicine, Columbia University, New York, and Oswald T. Avery, M.D., Associate Director, Department of Bacteriology, Hoagland Laboratory, Brooklyn, N.Y.

Part III: The Treatment of Diseases of the Digestive System and Allied Organs.—Diseases of the Mouth and Salivary Glands, including Mumps, Diseases of the Stomach, Diseases of the Intestines, excluding Obstruction, but including those Diseases of the Rectum which can be Treated by Medicinal Measures, by Joseph Sailer, M.D., Professor of Clinical Medicine, University of Pennsylvania; Diseases of the Liver, Gall-Bladder, and Pancreas from the Medical Standpoint, by Herbert C. Moffitt, M.D., Professor of Medicine, University of California, San Francisco, Cal.

Part IV: The Treatment of Diseases of the Respiratory System.—Diseases of the Nasal Chambers, Pharynx and Larynx, Medical Treatment, by George Fetterolf, M.D., Laryngologist to the Henry Phipps Institute, the White Haven Sanatorium, and the Eastern Pennsylvania Institution for the Feeble-minded and Epileptic; Asthma, Acute and Chronic Bronchitis, Whooping-Cough, by Arthur Newlin, M.D., Pediatricist to the Howard Hospital, Physician to the Out-patient Department of the Pennsylvania Hospital, and of the Children's Hospital, Philadelphia.

Part V: The Treatment of Diseases of Nutrition and Diathetic Diseases.—Diabetes Mellitus, Obesity and Scorbutus, by Elliott J. Joslyn, M.D., Instructor in the Theory and Practice of Physic in Harvard Medical School, Second Assistant Visiting Physician to Boston City Hospital; Diseases of the Thyroid and Thymus Glands, by S. P. Beebe, Ph.D., M.D., Assistant Professor of Experimental Therapeutics, Cornell University Medical School, New York.

Part VI: The Treatment of Diseases of the Nervous System.—Diseases of the Brain, including Insanity, Apoplexy, Diseases of the Spinal Cord and Nerves, Meningitis and Cerebritis, and Disorders of Sleep, Headaches, Neurasthenia and Neuralgia, by D. J. McCarthy, M.D., Professor of Medical Jurisprudence in the Medical Department of the University of Pennsylvania, Neurologist to the Henry Phipps Institute, and to the Philadelphia and St. Agnes' Hospitals; Occupation Neuroses and

Poisonings in the Arts and by Foods, by James Hendrie Lloyd, M.D., Neurologist to the Philadelphia Hospital and to the Methodist Episcopal Hospital, Consulting Neurologist to the State Hospital for the Chronic Insane, Wernersville, Pa.; Epilepsy, Hystero-Epilepsy, Tetanus and Chorea, by William T. Shanahan, M.D., Medical Superintendent of the Craig Colony for Epileptics, Sonyea, N. Y.; Morbid Habits, by F. X. Dercum, M.D., Professor of Nervous and Mental Diseases in the Jefferson Medical College of Philadelphia.

Part VII: The Treatment of Diseases of the Genito-urinary Apparatus.—Nephritis, Phosphaturia, Chyluria, Albuminuria, Lithuria, Oxaluria, and Diabetes Insipidus, by James Tyson, M.D., Professor of the Theory and Practice of Medicine and Clinical Medicine in the Medical Department of the University of Pennsylvania; Diseases of the Uterus and Pelvic Organs (Non-surgical), including Diseases of Pregnancy and the Puerperal State, by Brooke M. Anspach, M.D., Associate in Gynecology, University of Pennsylvania, Gynecologist to the University, Philadelphia, and Stetson Hospitals.

Part VIII: The Treatment of Diseases of the Skin, by Howard Fox, M.D., New York, Member of the American Dermatological Association.

Part IX: Non-surgical Treatment of Diseases of the Eye.—Ocular Therapeutics, Normal and Abnormal Refraction, Presbyopia and Principles Involved in Fitting Glasses, by James Thorington, M.D., Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine (1906-1909), Member of the American Ophthalmological Society, Fellow of the College of Physicians of Philadelphia, etc.

Part X: The Treatment of Diseases of the Ear and Tympanic Membrane.—Acute and Chronic Disease of the Middle Ear, by S. MacCuen Smith, M.D., Professor of Diseases of the Ear in the Jefferson Medical College of Philadelphia, Otologist to the Germantown Hospital; Glandular Therapy, by S. P. Beebe, Ph.D., M.D., Assistant Professor of Experimental Therapeutics, Cornell University Medical School, New York; Tuberculin as a Therapeutic and Diagnostic Agent, by F. M. Pottenger, M.D., Medical Director of the Pottenger Sanatorium, Monrovia, Cal.

Part XI: The Treatment of the Infectious Diseases.—Typhoid Fever, by David Riesman, M.D., Professor of Clinical Medicine, Philadelphia Polyclinic, and Assistant Professor of Medicine in the University of Pennsylvania; Smallpox, Scarlet Fever, Measles, Rubeola, Rothelin, Chickenpox, by Dana Hubbard, M.D., Attending Physician, Department of Dermatology, Vanderbilt Clinic, Columbia University, N.Y., Attending Dermatologist New York City Children's Hospitals, Medical

Inspector, Department of Health, New York, formerly Diagnostician, Department of Health, New York, and Chief Medical Inspector, Borough of Brooklyn, Department of Health, New York; Cerebrospinal Meningitis, by Charles Hunter Dunn, M.D., Clinical Instructor in Pediatrics, Harvard Medical School, Assistant Physician at the Children's Hospital, Boston, Assistant Physician and Pathologist at the Infants' Hospital, Boston; Croupous and Catarrhal Pneumonia, including Pleurisy (Non-surgical), by Frank Sherman Meara, M.D., Professor of Therapeutics in Cornell University Medical School, New York; Tuberculosis, by H. R. M. Landis, M.D., Medical Director of the Phipps Institute for Tuberculosis, and Physician to the White Haven Sanatorium; Diphtheria, by B. F. Royer, M.D., First Associate Chief Medical Inspector in the Department of Health of Pennsylvania, formerly Chief Resident in the Municipal Hospital for Contagious Diseases of Philadelphia; Acute Articular Rheumatism, by Thomas A. Claytor, M.D., Clinical Professor of Medicine, George Washington University, Physician to the Garfield Memorial Hospital, and to the Tuberculosis Hospital, Washington, D.C.; Cholera and Cholera Morbus, by Leonard Rogers, M.D., F.R.C.P., Professor of Pathology and Physician-in-Charge of the Cholera Wards in the Medical College of Calcutta; Plague, by Thomas Wright Jackson, M.D., Medical Reserve Corps, U. S. Army, lately Captain and Assistant Surgeon, U. S. Volunteers, lately Lecturer on Tropical Medicine, Jefferson Medical College, Member of the Manila Medical Society, the Philippine Islands Medical Association, the American Society of Tropical Medicine, Author of a Text-book on Tropical Medicine; Influenza, by Oscar Wilson, M.D., Instructor in Clinical Medicine in the Jefferson Medical College of Philadelphia; Yellow Fever, by Aristides Agramonte, M. D., President of the Board of Infectious Diseases, and Member of the National Board of Health, Professor of Bacteriology and Experimental Pathology, National University, Havana; Pellagra, by H. F. Harris, M.D., Secretary and Director of the Laboratories, State Board of Health of Georgia, Atlanta, Ga.

Following are the contents of Volume II:—Part I: The Treatment of Diseases Due to Parasitic Infection.—Malarial Infection in all its Forms and Complications, Trypanosomiasis and Kala Azar, Uncinariasis and Helminthiasis, by Charles F. Craig, M.D., Captain, Medical Corps, United States Army, Assistant Curator, Army Medical Museum, Assistant Instructor in Clinical Microscopy and Bacteriology, Army Medical School, Washington, D.C.; Syphilis in all its Forms and Complications, by William S. Gottheil, M.D., Adjunct Professor of Dermatology in the New York Post-Graduate Medical School and Hospital, Attending Der-

matologist to City Hospital; and Lebanon Hospital, New York; Amœbic and other Dysenteries, by Thomas Leidy Rhoads, M.D., Major and Surgeon in the U. S. Army, Walter Reed General Hospital, Washington, D.C.

Part II: The Treatment of Diseases of the Circulatory System.—Acute and Chronic Diseases of the Heart, as well as Nervous Disorders and Functional Disturbances, and Diseases of the Bloodvessels, by James Mackenzie, M.D., M.R.C.P., London; Diseases of the Blood and Blood-Making Organs, by J. C. DaCosta, Jr., M.D., Associate in Clinical Medicine, Jefferson Medical College, Philadelphia, Pa.

A PRACTICAL STUDY OF MALARIA. By A. DEADERICK. W. B. Saunders Co., Philadelphia. Canadian Agents, The F. J. Hartz Company, Toronto, 1909.

There are now many works upon the market dealing with various aspects of malaria and malarial problem, and it might be held that this work fills no special need. On the other hand, it is thoroughly sound. It is written by one keenly interested both in the clinical and the biological aspects of the subject, and it gives the latest work upon the life history of the malarial parasites, so that as a good general review of the subject, written simply; but, at the same time, soundly, it is a useful work for the library of the physician who has to keep himself abreast with the times.

MANUAL OF OPERATIVE SURGERY. By JOHN FAIRBAIN BINNIE, A.M., C.M. (Aberdeen), Professor of Surgery, Kansas State University, Kansas City. Published by P. Blakiston's Son & Co., Philadelphia. In two volumes.

The appearance of the fourth edition, in two volumes, following so closely upon the third edition in one volume, carries with it its own recommendation. Dr. Binnie is a surgeon who happily combines the solid, careful, and thorough knowledge of anatomy and conservative surgery of the Scotch school, with the progressiveness, acuteness and broad-mindedness, in no small measure, due to his many years of residence in the land of his adoption.

While it is still claimed to be a pocket edition, it has almost outgrown that definition. One would not have wished it otherwise. The work should be of the greatest help to all interested in operative surgery, and particularly to the student and junior surgeon, as it fills a distinct gap between the small compact text books commonly used by students, and the expensive editions covering a full range of the subject.

One can find no criticism to its teachings, but in reviewing the

volumes, one is compelled to refer to the beautiful anatomical drawings and the concise phraseology used, making the descriptions easy to follow. It contains all of the operations in modern scientific surgery, with many original illustrations.

Dr. Binnie has been fortunate in having obtained the suggestions of a number of eminent surgeons of international reputation, among whom one might mention Drs. W. J. and C. H. Mayo, and Messrs. Robert Jones and Arbuthnot Lane. The publishers are to be congratulated on the beauty of the text and the reproductions of the illustrations.

A TEXT BOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY. By JOHN FLAISTER, M.D., D.P.H. (Camb.), F.R.S.E. E. T. S. Livingstone, Edinburgh.

The volume opens with a valuable chapter on legal criminal procedure in England, Ireland, and Scotland, followed by an excellent chapter on medical evidence, both of which are to be recommended as worthy of careful perusal, not only by students, but by the profession in general. The questions of personal identity and identity of the dead are fully treated. The other subjects usually found in works on medical jurisprudence are very complete and well illustrated by specific cases. The second section of the edition is devoted to toxicology, and gives a clear and concise description of the symptoms, treatment, dosage, and post-mortem appearances after the various forms of poison. The volume as a whole is an excellent one, and worthy of a place in a physician's or surgeon's library.

Society Proceedings.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

The second regular meeting of the Society was held Friday evening, October 21st, 1910, the President, Dr. C. F. Martin, in the Chair.

The address of the retiring President, Dr. W. Grant Stewart, was then read, and was discussed by Drs. Girdwood, Blackader and Gardner, who recalled many interesting reminiscences of the early history of the Society.

Dr. Stewart was accorded a hearty vote of thanks for his interesting address.

The resignation of Professor Wesley Mills was then brought up, and it was moved by Professor Gardner that his resignation be received and that he be made an Honorary Member of the Society. This was seconded by Dr. Girdwood and unanimously carried.

LIVING CASES.

1. GONORRHEAL ARTHRITIS OF THE HIP. 2. CHARCOT'S JOINT OF THE FOOT.

W. G. TURNER, M.D. This first case is of interest to the Society, after the discussion last meeting on chronic rheumatism. Seven years ago the patient began to complain of pain in the right hip. This gradually grew worse until the patient had to lay off from duty as a policeman for weeks at a time. He was on night duty, and usually after two or three hours walking would be obliged to give up. There was limitation of abduction and rotation, flexion and extension were normal. At first sight it appeared to me to be the general onset of osteo-arthritis, but after careful questioning we elicited the fact that there had been a Neisser infection, pretty severe, but from which the patient thought he had been completely cured. He was put at rest for two or three weeks, and on finding some threads in the urine we put him on vaccine, and started giving him 50 minims once a week. After the third injection the patient was very much improved, and since then until ten days ago he has been practically well. The injections were given once a week for over three months. The slight recurrence of pain was due to cessation of the vaccine, owing to his absence from town, and to the fact that he was exposed to rain during a long drive, and on getting out of the carriage gave a severe wrench to the hip. There is nothing in the hip to examine, the patient has returned to his duties, and shows no sign of the typical walk or the difficulty in rising from a chair, which four months ago was so marked. The X-ray picture shows a rather dense bony shadow which is really the thickening of the edge of the acetabulum.

The next case was referred to me by Dr. Russel from the neurological clinic, and is of great interest as showing a condition of the metatarsal joint as described by Charcot. The patient at the age of 20 contracted lues, and five or six years after began getting lightning pains in the right leg and also right knee. He had followed treatment very thoroughly in Paris, but the pain came on very severe, and this kept on until he came under the neurological clinic for treatment. Early this spring he noticed that his left foot was weak and stiff, and thinking that it probably was only stiff he jerked it rather violently, and he has had this disability ever since. It is a typical picture of a Charcot joint, which was probably aggravated by this last wrench. The X-ray shows very typically the Charcot joint on that side. This is a rather unusual site for this condition. The last one I saw was with Dr. Russel, and the patient was a bricklayer, and the exciting cause was the fact that he

carried a hod on his shoulder, and the condition was simply the result of added strain on one foot in walking up and down a ladder.

J. M. ELDER, M.D.—I would like to ask Dr. Turner if he attributed the improvement in the first case to the giving of the vaccine? On looking at the skiagram one sees definite bony tissue, as well as the inflammatory tissue. Does Dr. Turner think there may be absorption of the new bone thrown out as well as of the inflammatory tissue—absorption due to this vaccine treatment

W. G. TURNER, M.D. As to the absorption of the actual bone salts, I do not know. The X-ray picture was taken when he first came into the clinic, and at that time we were acting on the assumption that it was an osteo-arthritis. I have not had an X-ray taken since the treatment, it might be interesting though I doubt if any alteration in the picture could be expected. The change has been decidedly due to the infiltration of the cartilage, giving the typical picture of a gonorrhoeal joint; and the improvement is due to the fact that the adhesions have been pretty well absorbed.

PATHOLOGICAL SPECIMENS.

L. J. RHEA, M.D. 1. *Tuberculosis of the Intestines.*—Male, age 30 years. Autopsy Findings: Tuberculous cavities of the lungs: Generalized miliary tuberculosis: Tuberculosis of the intestines.

The specimen is intestine. On the mucous surface there are numerous discrete and confluent, ulcerated areas. They show great variation in size. As a rule they are ragged and their edges are undermined. The larger ones are seen to run in the direction of the circumference of the intestine. Small grayish tubercles are seen in the base of some of the ulcers.

2. *Pure Culture of the Bacillus of Tetanus.*—The patient from whom this culture was obtained fell 15 feet and inflicted a deep puncture wound in his axillary region. For two weeks he was well. Then convulsions appeared and his jaws became locked.

The culture was obtained from a small bit of foreign material found at the bottom of the puncture wound.

1.5 cm. below the surface of the medium there is a growth 3.5 cm. long composed of numerous radiating filaments.

3. *Retraction Diverticulum of the Œsophagus.*—Male 3 years old. Acutely ill five weeks. Temperature 100° 103°. There was rigidity of the neck and retraction of the head. Kernig's sign present.

Autopsy Findings: Generalized miliary tuberculosis: Tuberculous meningitis: Tuberculous lymph nodes: Tuberculosis of the myocardium and retraction diverticulum of the œsophagus.

Specimen consists of a portion of the trachea, œsophagus, lung and a group of adherent, partly calcified lymph nodes. Trachea and œsophagus have been opened. There is a small opening in the œsophagus which leads into a smooth walled, blind pouch, which is firmly attached to a group of adherent, lymph nodes. These nodes are surrounded by dense fibrous tissue and show calcified areas.

4. *Thrombosis of the Superior Mesenteric Vein with Infraction of the Intestines.*—Male about 55 years old. Admitted to hospital in semi-comatose condition. History indefinite. For a few days has had pain in abdomen. On examination there was tenderness in lower abdomen. No rigidity. Bowels moved freely. No vomiting.

Autopsy Findings: Thrombosis of superior mesenteric vein, with infarction of intestine. Broncho-pneumonia. Acute peritonitis (localized). Atrophic cirrhosis of the liver. Specimen consisted of a portion of the small intestine with adjacent mesentery and a small piece of the pancreas. Intestine and mesenteric veins opened. The intestine and adjacent mesentery show very dark coloured areas. The largest is seen as a triangular-shaped area with apex toward the root of the mesentery. Intestinal wall and mucous membrane very dark. Rugæ in this area thickened and prominent. On the visceral peritoneum there is an acute grayish exudate. Superior mesenteric vein shows a firmly adherent thrombus. In the distal portion of the lumen of the vessel the thrombus is grayish; nearer the intestine it is dark red.

J. M. ELDER, M.D.—With regard to the tetanus case, one has but to see these cases in the wards of a large hospital to recognize that this was a typical case. If there be no foreign body, but simply an infected wound, you do not, as a rule, get tetanus; but if a foreign body has been implanted in the wound, the patient may develop tetanus, and then in and about the foreign body you get the bacillus.

With regard to the pouch of the diverticulum of the œsophagus, I understand Dr. Rhea's explanation is that these glands became attached to the outside, and as they became calcified they pulled out and produced a pouch of the œsophagus. Might it not be that an abscess had evacuated itself into the œsophagus and left this cavity or pouch?

DEMONSTRATION OF HAMBURGER'S APPARATUS FOR ESTIMATING THE RESISTANCE OF THE RED CORPUSCLES AND ITS PRACTICAL APPLICATION TO CLINICAL MEDICINE.

O. C. GRUNER, M.D.—This apparatus is one designed by Hamburger to estimate the resistance of the red corpuscles. The term "resistance" may be interpreted in different ways, but the most satisfactory way, from the clinical point of view, is that it expresses the degree of resistance exercised by the corpuscles to certain salt solutions. The red cor-

puscle may be regarded as composed partly of stroma and partly of interglobular (cellular) fluid, and the resistance of the corpuscle as a rule is made up of the resistance of the stroma plus certain other factors. In calculating the resistance, the resistance of the total corpuscle is taken as a function of the resistance of the stroma, of the osmotic pressure of the intracellular fluid and of the percentage volume of that fluid. That brings the subject into a rather complicated form. The actual estimation is simple. The apparatus consists of a number of tubes which are of definite size and almost all of the same capacity; there is a straight piece made of thermometer tubing, and graduated very exactly into 100 parts, this swells out into a funnel-shaped dilatation at the top, which is capable of holding about 3 cc. of fluid, a little cap at the top serves to keep the fluid intact during manipulation. That upper chamber is filled with the fluid to be used for testing, and the lower chamber receives ultimately the deposit of red cells which is produced by centrifugalization. A certain quantity of blood, which is defibrinated and is also filtered, is put into each vessel. This is measured very accurately by means of a special pipette. Into each tube is put a certain strength of the solution, against which the resistance is to be calculated. The blood will not go into the small tube at once. It is mixed up in the dilatation and allowed to stand for one quarter of an hour. After that, the succession of tubes is put into a centrifuge capable of receiving 12 tubes. You then centrifuge for a given time and see whether there is any hæmolysis in the supernatant fluid, or ascertain when the volume of the deposit is exactly constant. The graduation on the wall enables you to read exactly the amount of deposit of the red cells. Observations are taken in half-hour, one-hour, and one-hour-and-a-half periods, and when you find that the volume remains unaltered, that will mean the conclusion of the experiment, and the reading is registered.

The simplest way to make an estimation is just to estimate the hæmolysis and you can easily see whether the supernating fluid is pink or not. You have to know, however, the strength of fluid which that number of red cells is able to stand without alteration of the volume (as compared with that of the tube containing normal saline or serum), and it is for that purpose that the series of tubes is needed.

The formula ultimately will run: that the resistance of the stroma of the red cell is proportional to that concentration of the fluid which allows the volume to remain constant. Another factor is the percentage volume of the fluid inside the red cell. This is neglected in ordinary estimations, because you are comparing blood of similar species of animals, since it may be assumed that that factor is the same in all

human red cells, but not in human as compared with animals'. That is the method which has been used for estimating the resistance of red cells in physiological work.

As a matter of fact this instrument is further valuable because it enables you to find out the exact variation of volume of red corpuscles before and after sudden procedures, such as the injection of toxine into animals. The volume may be taken before and after the experiment. It can be applied in any similar experiment with human beings, to find out the changes in the volume of red cells; *e.g.*, before and after ether anæsthesia.

Another use for the apparatus is the estimation of the osmotic pressure of the blood serum. That is done by taking a known quantity of blood and mixing it with a certain volume of normal saline and adding successively drops of water until you get a fluid, which, when mixed with the red cells, causes hæmolysis to occur. The concentration of the fluid is known before and after, so that all the data required for calculation are to hand.

A. D. BLACKADER, M.D.—I confess I would like to know under just what conditions we could make use of this test.

O. C. GRUNER, M.D.—The words "practical application" does not, in this case, refer to everyday clinical work, but to the use which can be made of it in studying red cells under different conditions. So far, it has simply been used in learning the changes in the blood of fevers and anæmias, and various general diseases. It has here brought out the result that resistance is diminished in fevers and anæmias, and led to the discovery of the relation of these changes to those in the actual chemical composition of the blood. In some diseases the difference in amount of carbon dioxide in the blood causes differences in the resistance. The application to *everyday* clinical work is not yet perfected, but it is useful for special work in connexion with blood examinations.

WM. GARDNER, M.D.—Dr. Gruner spoke of a difference or reaction in blood corpuscles from the human and from animals; I would like to know if this difference is marked.

O. C. GRUNER, M.D.—The difference between the resistance of human red cells and that of animals is not so characteristic as to be of use for medico-legal purposes, for instance.

BLOOD PRESSURE: Demonstration of various forms of apparatus.

JOHN McCRAE, M.D.—Significance in clinical medicine.

E. W. ARCHIBALD, M.D.—Significance in clinical surgery.

W. S. MORROW, M.D.—Remarks.