these unstable cortical motor centres, Metchnikoff's hypothesis was assumed and the cause of the symptom-complex sought in the large intestine.

Urinalysis revealed the presence of the sulpho-conjugate ethers in disproportionate amount. The conjugate, or ethereal, sulphates eliminated by the urine, being the accepted index of the intensity of the putrefactive process, it is apropos to review their origin and significance. The sulphuric acid in the urine is derived from albuminous material—both native and ingested proteid. While the greater portion of the sulphuric acid in the urine is found in the form of mineral sulphates, about one-tenth of the total amount is in combination with aromatic substances belonging to the oxy-group (salts of phenol, indoxyl and skatoxyl). Indoxyl and skatoxyl are derived from indol and skatol, which, together with phenol, are formed during the process of intestinal putrefaction, their amount increasing and decreasing with the degree of putrefaction, and hence are a direct index of its intensity. The total amount of sulphates excreted in twenty-four hours in the urine of a normal individual varies between 2 and 3 grammes, the ratio of the mineral sulphates to the conjugate or ethereal sulphates (salts of phenol, indoxyl, skatoxyl) being as 10 of the former to 1 of the latter.

Treatment.—Urinalysis having revealed the presence of abnormal quantities of indoxyl and its congeners, thus establishing the diagnosis of proteid putrefaction with its consequent toxemia as the cause of the convulsions, the treatment further confirmed the diagnosis.

As a preliminary measure, proteids were excluded from the diet, and a combination of the phenolsulphonate of zinc with cascara sagrada given at four-hour intervals for five days. The convulsions, which numbered forty on the day treatment was begun, had now diminished to twelve per day. On the morning of the sixth day, one-half ounce of magnesium sulphate in hot water was administered, followed by the same dose at noon; on retiring, the patient was given 5 grains of thymol in a small piece of bread, followed the next morning by another half-ounce of magnesium sulphate. During this time, and until the bowels were completely evacuated (a period of 36 hours), all food and drink, except teaspoonful doses of water, were interdicted. When the bowels had been completely emptied of the thymol, the patient was allowed his usual diet, with meats, however, restricted to a minimum. He was at once started on a bi-daily dose of lacto-bacilline (a suspension of lactic-acid bacilli in pure culture), and urged to drink freely of buttermilk.

The convulsions rapidly diminished in number, and in five days from the administration of thymol (ten days from the beginning of treatment), had entirely disappeared, nor has there been a single instance of recurrence in the succeeding seven months.

SUMMARY.

The salient features of this instructive case are worthy of enumeration.

1. The great number (50) of the convulsions per diem; their mild character; their brief individual duration (1 to 2 minutes); their occurrence for 3 consecutive years.
2. The preservation of unusually sound mental and physical health.
3. The rapidity and completeness of the cure, following thorough sterilization of the intestinal tract.
4. The preservation of the sterility thus obtained by acclimatization of the lactic-acid bacillus.
5. Confirmation of Metchnikoff's contention that the large intestine, by reason of putrefactive processes occurring there, is the chief portal of entry to the system of profoundly toxic substances.

This remarkable case is of value not alone for its illuminating clinical features, but as a commentary on the diagnostic deficiencies unfortunately all too common in the work-a-day world of medicine.

If Osler's sound advice, "When in doubt, examine the rectum," were more often applied to our therapy, to the end that many obscure symptom-complexes be presumed to originate in the intestine and treated upon this assumption, we might be less frequently guilty of such gross and oft-repeated error as illustrated by the past experiences of this child.

TWO UNUSUAL TRAUMATIC CASES.

REMOVAL OF BULLET FROM ATLAS; AND PUNCTURE OF THE RECTUM BY THE AXLE OF A BABY CARRIAGE.

By FRANK H. LAHEY, M.D., BOSTON.

THE two following cases are, I believe, sufficiently unusual and interesting to warrant their publication.

CASE 1. A boy of eight, while sleeping, was shot by a demented parent, the bullet entering the left side of the upper jaw just above the left second incisor. It penetrated the hard palate at about its junction with the soft palate and entered the posterior pharyngeal wall, embedding itself somewhere in the neck behind this point.

The wound in the lip was cleaned up as well as possible at a nearby hospital, and the next day a stereoscopic x-ray was made Dr. Ariel George and the boy transferred to the Deaconess Hospital.

The x-rays, Figs. 1 and 2, showed the bullet lying just inside the posterior arch of the atlas on the left side, and just behind the groove for the vertebral artery.

An immediate operation was not undertaken on account of the amount of slough in the mouth, from the wound in the palate, and because there were no symptoms relative to the bullet itself.

FIG. 1.

FIG. 2.

At the end of three days, when much of the slough had separated, the child was etherized in the face-downward position, and a curved incision, extending from just below the external occipital protuberance nearly to the mastoid, was made. This incision was deepened through the neck muscles, in a way similar to the suboccipital decompression ap-

proach, until the posterior arch of the atlas was reached. The incision was then carried through the left lateral occipito-atlantal ligament until a small blackened area of tissue was found surrounding the bullet, which lay, as shown by the x-ray, inside the posterior arch of the atlas on the left side and just behind the groove for the vertebral artery. Until a good grasp had been obtained on the bullet with toothed clamps, its withdrawal was a little difficult on account of its being wedged beneath the arch and because of a few sharp projections on the bullet made by its journey through bone. A rubber dam drain was laid into the wound leading from the situation of the bullet to the lower angle. The muscles were sutured with chronic catgut and the skin with silk-worm gut. Recovery from the operation was uneventful, the temperature reaching normal in a few days. There was a slight discharge of sero-purulent material from the wound for a few days after withdrawal of the wick, which was done on the fourth day. The child was kept flat on his back and not allowed to move his head for two weeks. He was discharged from the hospital on the twentieth day. The wound was solidly healed, but there was considerable stiffness of the neck, particularly for backward movements of the head and rotation from left to right.

The child was seen again twenty-seven days after leaving the hospital, and was able to move his head much more freely, but still had some limitation of motion in the directions spoken of above.

The child was seen a few days before publication of this article and now has every motion in his neck.

This case is interesting when one considers that a bullet entering the bony canal of the cord in front between the base of the skull and the atlas, was extracted from this canal in the rear, yet no injury to the cord was apparent.

CASE 2. A boy eleven years of age was seen during the course of my service at the Haymarket Square Relief Station, with the following story: The boy states that he was playing with part of an old baby carriage, consisting of an axle with one wheel attached; states that he had been rolling the wheel along with the other end of the axle grasped in his hand and that after doing this for some time became tired and decided to sit down, using the wheel as a seat, and the axle as an upright. He accordingly inserted the end of the axle, not occupied by the single wheel, into the ground and seated himself on the seat made by the upturned wheel on the opposite end of the axle. On sitting down he felt something suddenly enter his anus and rectum, suffered a sharp pain in the abdomen, and fell to the ground, thereby extracting the axle, which had pushed its way through the hub of the wheel and accurately entered the boy's anus, with no external wound to indicate its entrance, excepting a slight laceration of the mucous membrane over the external sphincter.

On examination there was found a well-developed and nourished boy, nauseated, pale, sweating, and in some shock. Pulse, 108. Respirations, 20, and shallow. Other than this his general physical examination was negative except for some tenderness on deep pressure between his umbilicus and pubes.

Rectal examination showed a slight abrasion of

the mucous membrane over the external sphincter and a laceration of the rectum, three-fourths of an inch long, two inches above the internal sphincter, on the anterior wall.

Operation was advised and accepted by the child's parents.

Operation at the Haymarket Square Relief Station. Ether.

A median incision three and one-half inches long was made between the umbilicus and pubes, the peritoneum opened, and the abdominal contents examined. Free faeces were found in the pelvis, emerging from a perforation of the rectum on the anterior wall, just at the point of reflexion of the bladder peritoneum onto the rectum. Several abrasions were found on the small intestine and an abrasion of the parietal peritoneum over the sacro-iliac joint. The wound in the rectum was sutured with Pagenstecher and a cigarette drain carried down to it, the abdominal wound being closed in layers. On account of the wound in the rectum being extra-peritoneal, and to guard against an extra-peritoneal accumulation, a second cigarette wick was carried up from below, through the ischio-rectal space beside the rectum, to the repaired hole.

The recovery was uneventful except for a slightly fecal discharge for a few days after the withdrawal of the abdominal drain. Twenty-one days after the operation the child left the hospital with his wounds completely healed.

There is no comment to be made on this case, its chief interest being the unusual form of the accident.

A CASE OF ROTARY DISLOCATION OF THE ATLAS.*

BY JOHN J. MORTON, JR., M.D.,

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A REVIEW of the literature covering various forms of dislocation of the atlas reveals that the condition is by no means a rare one. There are on record at least 14 uncomplicated cases of the rotary type and many others associated with fracture either of the odontoid process or arches of the atlas. E. M. Corner¹ published his excellent article, "Rotary Dislocation of the Atlas" in the *Annals of Surgery* for 1907. He reviewed the nineteen known cases, both complicated and otherwise, and gave a comprehensive treatise on the anatomy, etiology, diagnosis and treatment of the condition. A second important contribution was made by Mixter and Osgood² in 1910. Their paper, "Traumatic Lesions of the Atlas and Axis," consisted in a report of seven cases, five of which were rotary in nature. In his monograph in 1910, Wittkop³ treated the dislocations of the atlas, and devoted a section to rotation luxations. He considered four cases of the latter form. Beside the main articles, single cases have been added by Taylor,⁴ Brooks,⁵ Christovitch,⁶ Kocher,⁷ Eisendrath,⁸

Pilcher,⁹ and Kienboch.¹⁰ Several of these, however, must be regarded as a combination of forward and rotary dislocations.

The following case, a rotary dislocation of the atlas, is reported because of two unusual factors,—aphonia, and the presence of an accessory cervical vertebra.

On May 26, 1914, J. O., a boy of 12, was admitted to the Peter Bent Brigham Hospital, complaining of pain in the back and inability to raise the head from a bowed position on the left shoulder. Three days previously he was wrestling with a much larger boy and was twisted violently towards the right while his head was caught rigidly between his opponent's legs. Immediately following this, the head was bent to the left shoulder, and could not be brought back to the midline. He complained of severe cervical pains which prevented him from sleeping during the next two nights. Directly after his injury the boy could not speak aloud. He had considerable difficulty in swallowing, and took nothing but liquids in the way of nourishment.

On examination he was apparently suffering much pain, responding only feebly in a scarcely audible whisper to questions asked him. His head was twisted far to the left, bowed down with the left cheek resting on the shoulder and practically fixed in this position. He held his left hand against his forehead constantly as a support and cried out with pain if it was removed (Cf. Fig. 1). Passive motion of the head caused extreme pain. The spines of the axis, seventh cervical and first thoracic vertebrae were prominently felt and there was a depression just below the occiput. The transverse processes of the atlas could not be palpated in the normal position on either side. The mouth could not be opened sufficiently to permit an examination through the pharynx. An irregularity in the heart action was noted, there being an extra beat at about every fifth systole. There were no cardiac murmurs. The reflexes were all active with a quick response, and much exaggerated on both sides. Ankle clonus and plantar stimulation gave suggestive reactions although not typical for an upper segment lesion. There was no disturbance in sensation and no difference in the power of the muscle groups of the extremities.

The x-ray exposure from a lateral position revealed a "displacement between the atlas and axis with no evidence of fracture of the odontoid but suspicion of the anterior arch of the atlas." The plate also showed the presence of eight cervical vertebrae (Cf. Fig. 2). It was impossible to obtain a good antero-posterior view on account of the difficulty in opening the mouth.

On May 29, under deep anesthesia, an attempt was made at reduction of the deformity. Examination at this time revealed a prominence on the right side of the pharynx on a level with the soft palate. This lump was considered to be the transverse process of the atlas. No similar projection was palpable on the left side of the throat. When full relaxation was obtained the head was extended on the body and gently rotated toward the right. At the same time an assistant pressed upon the above noted prominence, which, however, did not completely disappear on restoring the head to its normal position. The head came to the midline easily without a catch or click of any kind. A crinolin bandage passed around the head, neck and chest was used to maintain the presumed reduction.

* From the Surgical Clinic of the Peter Bent Brigham Hospital.