place in nearly every case. Zweifel, he says, has proved by examination of cases that ventral hernia occurs only when primary union has not taken place.

As to the suture material, he is of the same opinion as is Dr. Marcy. He uses material which will be absorbed. In the skin, where the catgut will be too quickly absorbed, he uses silk. Kangaroo tendon and silk worm gut hold the fascia together. Silk is bad, and infection of the stitches may occur. It is an improvement to do subcutaneous suturing, and he knows many surgeons who do it in Germany. Another method is the use of Michel's clamps. They are short and are placed in the skin superficially, nicely coapting the edges of the wound. It is aseptic and nothing can be absorbed by the suture, and the scars are very small. Sutures must not be tied too fast or too tightly, and they must be placed at correct intervals; then complications will not appear.

DR. CHARLES STOLTZ, South Bend, Ind., thought that there is some value in closing the peritoneum by bringing the raw edges up, and not making an edge to edge suture. This prevents adhesion of viscera to the perineum. Another thing of value is overlapping or imbricating the aponeurosis or anterior sheath of the rectus. He has been doing this for several years in closing abdominal incisions, as is frequently done in the repair of hernia. The results have been very gratifying. Dr. Stoltz believes that the tier method should be practiced. Each structure should be carefully restored to its former position. Occasionally there are conditions that require a small temporary drain to prevent the accumulation of blood within the wound. Such a drain will prevent separation of tissues.

PROF. A. DÜHRSEN, Berlin, Germany, has used the method described by Dr. Marcy, but in the last month he has used another method. It consists in strapping the abdomen, not in the median line, but on one side. A long incision is made through the skin and fascia which covers the right rectus, and the inner part of the fascia is stripped from the muscle to the median line; then the muscle separated from the median line. The peritoneum is now opened on the side of the median line, and when closing the wound it is absolutely impossible to have a hernia. Of course, he said, if primary union does take place, then all the methods can not prevent hernia. Dr. Dührssen has also used the dry iodized catgut to great advantage. It is kept for eight days in iodine solution and then in dry sterile vessels.

DR. W. B. DORSETT, St. Louis, called attention to the mistakes some surgeons make in using animal sutures of large size. The larger the size the more probable is infection. This was demonstrated in two cases of fatal tetanus arising from large kangaroo tendon. He took some of this kangaroo tendon from his unused supply and injected mice, guinea-pigs, and rats with a maceration of it, and the great majority of the animals died of tetanus. As to the suppuration of wounds, he thinks it is caused by the too tightly tied sutures. There are many men who advance the through and through suture and they get as good results with it as others do with this method.

DR. H. O. MARCY, Boston, agreed with Dr. Dorsett that large sutures are not desirable. Surgeons should use the method that gives the best results, using it in the way they best can. There are certain principles which he thinks are important. This question of closing in layers and this method of inversion, overlapping and so on, have advantages in certain conditions; the simplest way is the eversion and union of the conjoined structures by means of the double sutures. He first taught that catgut was beyond question the best animal suture. Lister used it in ligating vessels, but after a time found that he was using infected material and wondered why. Long series of studies followed, and it was shown that catgut is inherently defective for sutures because of its construction, not unlike cutting a piece of finely woven silk diagonally and twisting it for use as a fishing-line. When wet, as it must be buried in the wet tissues, it becomes a thin, flat, elastic slippery band, not thicker than tissue paper. This has necessarily been the breeding-ground of millions of bacteria, and as a consequence, is difficult to sterilize. Carefully prepared tendons have never been thus damaged; the ultimate fibers are disposed in parallel instead of oblique directions. The cement substance is uninjured. They are in every way vastly superior to catgut when used for buried sutures. *

CASES OF MENINGITIS WITH ISOLATION OF DIPHTHERIA BACILLUS FROM CEREBRO- SPINAL FLUID.*

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Although the *Bacillus diphtheriae* has been found in the most diverse lesions, its presence in the central nervous system is almost unheard of. Thus far we have been able to find only one case in the literature, that of Wilson and Head, in which the organism was positively identified. The circumstances which led to the discovery of the organism in this case, however, as well as in the one about to be reported, would speak for greater frequency, though usually unrecognized.

Personal History.—W. M. C., colored, male, four and one-half months old, was admitted to the children's ward of Cook County Hospital, service of Dr. F. X. Walls, to whom we are indebted for permission to report the case. According to the mother's statement the child had been taken ill ten days before admission to the hospital with high fever, pain in the chest and a cough. Eight days later she noticed rigidity of the neck and bowing of the back. The child became highly excitable, but had no convulsions. This condition had presented for two days before admission to the hospital.

Physical Examination.—This revealed a well-nourished baby lying quietly with only an occasional moan as evidence of distress. The head was markedly retracted, the muscles of the neck were rigid, the back was bowed, and the thighs and legs were flexed. The remainder of the examination was negative.

Spinal Puncture.—A few hours after admission 45 c.c. turbid fluid flowing under high pressure was removed by spinal puncture. Cultures were made by allowing the fluid to flow, under aseptic precautions, directly into tubes of blood-agar, blood serum, bouillon and milk and incubating at 37 C. A sample of the spinal fluid was also centrifuged and the sediment examined microscopically for bacteria with negative results. The cellular elements consisted almost exclusively of small mononuclear lymphocytes.

After 24 hours' incubation the cultures yielded a growth of a bacillus resembling *Bacillus diphtheriae* to be described later. At the end of 48 hours another spinal puncture was performed with the same result as the first. At this time swab cultures from the nose and throat were taken, although at no time had there been evidences of inflammation, and plated in blood-agar. The organisms present were staphylococci, streptococci, pneumococci and a bacillus resembling the organism isolated from the spinal fluid.

Clinical Course.—The temperature throughout varied from 99 to 102.2 per rectum; pulse from 130 to 160, and respirations from 36 to 72, while several leucocyte determinations varied from 9,000 to 10,000. Physical findings remained the same. Four days after admission 6,000 units of diphtheria antitoxin were given, but the patient, already in an extremely critical condition, died 10 hours later. A few hours before death external strabismus of the right eye, accompanied by lateral nystagmus of both eyes, developed.

Postmortem Examination.—Postmortem was held 6 hours after death with the following anatomic diagnosis: General miliary tuberculosis; tuberculous bronchopneumonia; fibrinous pleuritis; tuberculous ulcerative enteritis; persistent thymus; tuberculous and exudative meningitis.

Cultures made postmortem from the heart's blood, spleen, peritoneal and pericardial fluids remained sterile; while those from the meningeal fluid and the exudate at the base of the

* From the Pathological Laboratory of Cook County Hospital.

* Read in the Section on Diseases of Children of the American Medical Association at the Fifty-seventh Annual Session, June, 1906.

right hemisphere again yielded the same organism isolated at the two previous spinal punctures.

BACTERIOLOGY OF THE CASE.

As has been already stated, the same organism was isolated from the spinal fluid at the two spinal punctures and again at the postmortem, as also from the throat, and a description of one will serve for all four strains.

Morphology.—The organism is a short bacillus measuring 2.5x0.5 microns. It stains readily by all anilin dyes, also retaining Gram's. Preparations from 48-hour cultures show a beaded appearance of the organisms when stained with Loeffler's methylene blue. There were also marked involution forms, such as club-shaped and dumb-bell-shaped organisms of variable size.

Culture Characteristics.—The organisms grow well on all the ordinary culture media, but best on blood serum, where at the end of 10 hours a creamy slightly elevated layer is formed. On blood-agar plates we find at the end of 24 hours pinhead colonies without hemolysis, though when glucose blood-agar was used often a zone of greenish tinge developed about the colonies.

Animal Experiments.—Guinea-pigs were inoculated subcutaneously with 1/20 of a 24-hour blood serum culture suspended in normal salt solution. The animals appeared sick at the end of 12 hours, with beginning evidence of local infiltration. Death occurred in from 48 to 56 hours. At autopsy there was found locally marked edema and bloody exudate into the subcutaneous tissues, extending some distance beyond the point of inoculation. The internal organs, as a rule, showed some pallor, while the adrenals were usually large and deep red in color. Cultures from the heart's blood and internal organs remained sterile, while the organism was always recovered in pure culture from the local process.

Unfortunately we were forced to discontinue the work for two months, and on resuming it the organisms had lost their virulence so that it was impossible to test the protective influence of diphtheria antitoxin.

To differentiate the bacillus isolated from the *B. xyrosis* and *B. pseudodiphtheriae*, the method of Knopf¹ was adopted. Serum sugar media were prepared with inulin, dextrose, saccharose and dextrin and inoculated with several strains of *B. diphtheriae* and also the bacillus C, described above, with the results as shown in the table.

FERMENTATION OF SERUM SUGAR MEDIA BY *B. DIPHThERIAE*.

Organism.	Serum Sugar Media.			
	Inu- lin.	Dextrose.	Sac- charose.	Dextrin.
P ₁	—	Fermented.	—	Fermented.
P ₂	—	Fermented.	—	Fermented.
R	—	Fermented.	—	Fermented.
Bacillus C isolated from case	—	Fermented.	—	Fermented.

We see from the table that Bacillus C corresponds in its ability to ferment sugar to the other known *B. diphtheriae*.

CONCLUSIONS.

Bacillus C isolated from the spinal fluid in the case of meningitis thus produces lesions in guinea-pigs typical for the *B. diphtheriae*. It agrees, moreover, with the same morphologically and culturally, as also in its ability to ferment certain sugars, and we are, therefore, justified in classing it with this group. The case just

reported also shows that these organisms occur more frequently in the central nervous system than suspected, and on careful search could undoubtedly be recovered in a large number of cases.

ETIOLOGY OF CEREBRAL PALSIES IN CHILDREN.*

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A number of classifications have been suggested for the cerebral palsies of children; some based on their pathology, others on the clinical manifestations and one on the time of their occurrence. The latter, suggested by Sachs, is very convenient. He divides them into antenatal, natal and postnatal cases.

It is not always easy to determine the etiology of cerebral palsies in individual cases. This is due chiefly to their coming late under observation or because the autopsy findings, obtained sometimes years after the onset of the disease, may not reveal the nature of the initial lesion and its cause. This applies more particularly to prenatal palsies and those occurring after birth.

The cerebral lesions having their origin *in utero* seem to depend partly on conditions affecting the mother and secondarily the fetus and partly on the development of the fetus. The brain of the fetus may suffer lack of or defective development as may other fetal organs. The pathologic change commonly found in prenatal cases is porencephalus, a localized brain atrophy, which is an end result of a primary vascular lesion, as embolism or thrombosis, which, in turn, has arisen from infections in the mother and fetus, as syphilis, etc. Injury to the abdomen of the pregnant woman has resulted in isolated instances in cerebral hemorrhage in the fetus and spastic contractures have been found at birth (Cotard, Gibbs).

Birth palsies are dependent on intracranial hemorrhage, the result either of trauma to the infant's head during precipitate labor, prolonged labor, forceps delivery or the result of prolonged asphyxia at birth. Occasionally a history of breech presentation is noted in a birth palsy. The hemorrhage is meningeal in location and arises from laceration of the pia vessels usually close to the longitudinal sinus, from which point it may spread and envelop a considerable part of one or both sides of the brain. While this is the invariable finding in recently posted cases, if they survive a number of years, as is common, secondary changes follow which may render the primary lesion unrecognizable and, instead, we may have a lobar sclerosis, etc. This applies, however, not only to natal cases, but to all spastic cerebral paralyses in children who survive the first insult, and it is this point which has caused so much discussion as to the etiology of postnatal cases. As the prognosis of those cases happening in childhood is usually favorable as to life, the autopsy findings of acute cases are correspondingly infrequent. There is little doubt of the prominence of the rôle of vascular lesions as a cause of many of these cases of hemiplegia, in fact a predominating factor in their production, as in early posted cases, hemorrhage, embolism and thrombosis are frequently found.

The paucity of pathologic information, however, has

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1. Jour. Med. Res., 1904, xii, pp. 475 to 479.