faeces leaked out, but the stitches were left in for three weeks and the parts cleansed by daily irrigation. Five weeks later she passed a voluntary stool, in the sitting posture, and daily afterwards, when the leakage became obviously less in three more days. After six weeks she sat up daily, the morphine was much reduced, unknown to her, and less than a week later she volunteered to go without it, and it was then abruptly discontinued. A week later (March 13th) she went home, took her nurse with her, and final healing occurred by the end of that month. Gradual improvement took place, resumption of ordinary diet, carriage exercise, and open-air life in house or garden.

Some violent attacks of abdominal distension and constipation occurred, through reckless feeding; but were corrected by enforced fasting and rest in bed. It had to be impressed upon her that owing to the attachment and probable stricture or other deformity of the bowel, she would have to practise great frugality to avoid imminent danger.

By August, 1908, she was perfectly well, and at Christmas she went from home on a visit of several weeks, being in full health and vigour, with firm scars at all the sites of operation; and no impulse in the groins or any trace of hernia, but still a closed vagina.

BIBLIOGRAPHY.

BRITISH MEDICAL JOURNAL, February 27th, 1909. Professor D. J. Cranwell, of Buenos Aires. Macready, *Treatise on Ruptures*, 1893, pp. 162-4. Cruveilhier, *Anatomie Pathologique (folio) Lévasson*, 37, Pl. 6 (showing a similar ulcer, but in a left femoral hernia.)

CAESAREAN SECTION WITH UNUSUAL INDICATIONS.

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ORDINARILY a Caesarean section is looked forward to as one of the possibilities of a particular case, and preparations for it are made in due course, but in the case which I am to narrate, until I was actually in immediate presence of the need, I had no thought that delivery in this form might be called for. As there were none of the classical indications and the ordinary conditions of election for its performance were all violated, the notes of the case may have interest for members of the profession not in special practice.

Mrs. M., aged 46, was seen by me on September 20th, 1908, with a view to her prospective confinement. She had had four previous pregnancies, the last three ending at term with rather large children ranging up to 9 lb. weight, and each requiring delivery by forceps. The last confinement was ten years ago. Her last period was in the end of March and she had quickened in mid-August. During this pregnancy she had felt unusual fatigue, and on examination she showed great abdominal distension. There was evident hydramnios and the uterus was almost as large as a uterus at term. The fetal length, however, corresponded to the assigned date of menstruation. Arrangements were therefore made for a confinement early in January. The patient's comfort was added to by a special bandage, but she had from this time mostly to keep her bed.

The nurse engaged for January got tired of waiting and took another case, and a second prepared for February had also to go, and it was not till I had decided on puncturing the membranes that the labour came on spontaneously. I had seen her frequently but never found any sign of engagement of the presenting head.

On February 19th, almost eleven months after the last menstruation, I was called at midday, and found that she had been in labour since the morning. The os was fully dilated, but the head not engaged. I ruptured the membranes to relieve the hydramnios, and then recognized that the fetus was an anencephal, and of large size. As this condition put delivery by forceps practically out of the question, I gave the patient chloroform and brought down the left foot, only to find that the breech would not enter the pelvis. I then brought down the other foot, and found that no amount of suprapubic pressure and traction on the legs which I could exert would bring the pelvis into the brim. At this deadlock, embryotomy was the next consideration, but it was evident that with legs corresponding to the size of the feet we saw protruding from the vulva it would be so difficult to reach the child's pelvis above the brim that with the subsequent necessary crushing of the shoulder girdle and skull base, embryotomy was to be a perilous process for the mother. I therefore asked and received the husband's consent for Caesarean section, and went to the telephone in search of an assistant and some catch forceps. I was fortunate in finding Mr. Price, who said he would bring both instruments and dressings. Pending his arrival at 5 p.m. I prepared the abdomen and kept the patient under light anaesthesia.

The operation, made with a vertical incision, presented no unusual feature except that the extraction of the child which I had so forcibly tried to bring through the pelvis was more than ordinarily difficult. After the child was extracted, the uterus was extruded, the placenta extracted, and the uterus sutured with catgut. The abdominal wound was sutured with silkworm gut, and dressed with sterile gauze.

Mr. Price and I were able to leave at 6 p.m., and the 60 c.cm. (2 oz.) of chloroform with which I started the afternoon were not exhausted. The puerperium was as smooth as after an ordinary confinement. There was no sickness. The temperature never rose over 99° F., and the wound healed normally. The patient was out of bed on the fourteenth day, and on the twenty-ninth day was able to go down town to see a play in which her children were engaged.

The child breathed for a few minutes. It measured 21½ in. to the skin border over the eyes, and 6 in. round the calf. It weighed 10 lb. The mother is a small woman but well developed, and has little if any pelvic contraction.

While I have no doubt as to the rightness of the management in this case, my expectation of performing Caesarean section in a practically normal pelvis is not high. The difficulties encountered seem to me such as are more likely to occur in general practice than in hospital.

TETANUS OCCURRING AFTER SURGICAL OPERATIONS:

IS THE INFECTION INTRODUCED BY CATGUT LIGATURES?

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On September 30th, 1907, I operated upon an elderly lady, and removed a large number of gall stones from the gall bladder and cystic duct. After the operation the patient made most satisfactory progress in every way until October 6th, when some rigidity of the muscles of the neck appeared, followed rapidly by trismus and other well-marked symptoms of tetanus, from which disease the patient died within forty-eight hours of its onset.

I had heard of tetanus following upon surgical operations before this calamity overtook my patient, and I at once suspected that the bacilli of tetanus had been introduced in the catgut ligatures used at the operation, because in all the cases of which I had heard the same suspicion had been cast. Catgut was the material which I had used for ligatures and for deep sutures; the only other material which I had employed being silkworm gut for sewing up the wound in the skin. All the catgut in my possession was examined for me bacteriologically, and the report states that "the experiments made with this material to detect the presence of *Bacillus tetani* have proved absolutely negative. The catgut is absolutely sterile."

After receiving that report I was entirely baffled in the attempt to find a source from which the infection could have arisen, and I am still in the dark.

In January, 1909, I operated upon a middle-aged man for strangulation of the omentum in the sac of a right inguinal hernia. I used catgut for ligaturing the neck of the sac, for the blood vessels and for the deep sutures, and silkworm gut for suturing the skin. The patient did well and left the infirmary, with the wound healed, in fourteen days. A week later he was admitted with tetanus, from which he died two days later.

I have spoken to many surgeons upon the subject, and they all believe firmly that the infection is conveyed by catgut ligatures—not one of those with whom I have been in communication appears to have a doubt about it. One surgeon, who had two cases within eight weeks of each other, wrote as follows:

I had catgut and the pedicle from the fatal case examined both here and in London, with no particular result. No organisms were found in the catgut, and the cultures from the pedicle, though "resembling" tetanus bacilli, were negative in experiments upon animals. I am not sanguine of any more definite result being obtained, except in cases where tetanus bacilli are proved to exist in the catgut. I am morally certain that in my cases the catgut was responsible.

That accurately sums up the belief of those whose opinions I have obtained. It may be that such a belief is correct; indeed, in view of the fact that catgut was used in all the cases of which I have any knowledge, it would appear undeniable, and yet it must be confessed that no positive evidence has been adduced which entitles us to condemn catgut.

I have collected notes of 21 cases in which tetanus has followed a surgical operation; 20 of the cases have occurred during the past three and a half years and 1 occurred as long ago as 1884:

Of the 21 operations—

- 4 were for ovarian cysts
- 4 were for removal of the uterus
- 4 were for radical cure of hernia
- 3 were for gall stones
- 1 was for acute pancreatitis
- 1 was for acute appendicitis
- 1 was for ventral fixation of the uterus
- 1 was for carcinoma of the rectum
- 1 was for varicocele
- 1 was for scirrhus of the breast

18 of the patients died.

In all the cases catgut was used for ligatures. In 14 of the cases the catgut was submitted to bacteriological examination with a view to the detection of the *Bacillus tetani*. In 4 a bacillus "resembling" the tetanus bacillus was cultivated from the catgut, but no animal has been infected with tetanus by means of the cultures in those cases in which the experiment was tried. In 1 case the catgut was found to be sterile, but cultures of a bacillus were obtained from the pedicle of an ovarian cyst, for which the patient had been operated upon, and which was removed after death, but it was not found possible to cause tetanus in animals by inoculation with the cultures.

Thus it appears that in spite of careful search there is no positive evidence of the existence of tetanus bacilli in the catgut.

Before going further into these cases, I would like to refer to the late Professor D. J. Hamilton's paper on the Alimentary Canal as a Source of Contagion. In it he dealt with a group of diseases, prevalent among sheep, of a nature closely resembling tetanus. The object of the paper was to call attention to the "relationship existing between these diseases of the sheep and many obscure diseases of man," and to the fact that these diseases of the sheep are caused by specific bacilli, whose habitat is the lumen of the intestine, but which, at certain periods of the year, pass through the wall of the bowel and are found in the peritoneal liquid but in no other part of the body. The result of their activity is the liberation of toxins which, when absorbed, produce in the sheep symptoms of a tetanic nature. The disease called "louping-ill" or "trembling" was used by Hamilton as the type of the group.

The points in that paper which have chief bearing upon the subject of post-operative tetanus are:

1. The similarity of these diseases in the sheep to tetanus.
2. The mode of entry of the bacilli.
3. The seasonal prevalence.
4. The geographical distribution.

1. The similarity of louping-ill and tetanus is most striking. The likeness is not only seen in the characters of the bacillus which produces the disease but also in the symptoms.

Of the bacillus Hamilton says "it is a large, coarse-looking rod, sometimes elongating into a thread, or, it may be, a chain of rods. Its dimensions, like all the members of the group, vary considerably. The ends are rounded, and it is possessed of feeble motility. It has a considerable tendency to spore; the spore is located at its centre or at one end, and occasionally, especially after incubation in its native liquid, it assumes a drumstick configuration, indistinguishable from that of the *Bacillus tetani*."

Of the symptoms he says: "There are cases which assume quite a tetanic character. In these the muscles are in a state of rigid spasm, while, it is said, although I have never seen an instance of this in the natural disease, the muscles of mastication are in a like rigid condition, and, in most respects, the phenomena resemble those of idiopathic tetanus." "Certain instances of louping-ill have quite a tetanic character, and apparently tetanus itself can be aroused in the sheep by injecting subcutaneously the bacteriolized organism of the disease."

2. The Mode of Entry of the Bacilli.—"On examining the carcass in this disease one of the most notable features is the absence of lesion which might serve to localize the peccant agent in any particular organ." "The abdominal cavity, as a rule, contains an excess of serous liquid, but this is not always the case." Sometimes the liquid is thick, muddy-looking, and, it may be, tinged with blood, while at other times it is quite clear and limpid, or, at the most, a delicate coagulum separates from it. "In no case have I seen peritonitis or pleurisy accompany the disease, and hence the conclusion seems inevitable that the organism which causes it is not possessed of inflammatory tendencies. A few punctiform haemorrhages may be met with along the course of the intestine, but with this exception all the viscera may seem to be quite healthy. Nor have I seen any

evidence of meningitis or other disease of the central nervous system. The microscopic examination of the natural liquids or of the organs of the body proves equally disappointing. Thus the blood is free from any micro-organism which can be detected microscopically, and when cultivated aerobically or anaerobically remains equally barren. The cerebro-spinal liquid and nerve centres are devoid of any parasite which might be taxed with a causal relationship to the disease." "On microscopic examination of the turbid peritoneal liquid it was found to be teeming with a large, coarse-looking rod organism having a great tendency to spore, while in the case of that which was clear and limpid not a bacillus was to be detected. On incubating the clear peritoneal liquid, however, in sealed tubes, I found invariably that in the space of twenty-four hours it became turbid. On examination of the liquid microscopically it was now found to be swarming with the same large sporing rod present in the liquid which was turbid."

"Not only in the case of louping-ill but in that of all the other members of the group the intestine seems to be the portal through which the organism gains entrance, and the fact that the peritoneal cavity contains it more than any other cavity or any organ in the body is thus readily enough explained."

3. Seasonal Prevalence.—"One remarkable feature of these diseases is that they occur periodically—that is to say, at stated times of the year. Certain of them, such as braxy, prevail in the autumn and winter months, while others, and more particularly louping-ill, are diseases of the spring, the period from the middle of April to the middle of June. All of them tend to vanish during the summer. They show themselves almost to a day, each in its season, and vanish quite as regularly and mysteriously."

4. Geographical Distribution.—"They prevail only in certain districts, and mainly along the West Coast and southern counties of Scotland and the northern counties of England, while the East Coast of the whole of Great Britain may be said to be almost exempt from their ravages. Draw a straight line from the North of Scotland down to the South of England, and you practically separate the infected districts from the non-infected." "The valley of the North Tyne is one of the most severely smitten areas."

With regard to tetanus itself, Professor Hamilton says:

"In the case of tetanus, the symptoms are induced by the absorption of a toxin secreted by the tetanus bacillus. The organism exerts its evil influences only when introduced into a wound; when administered by the mouth it is apparently harmless. So universally is the organism distributed in Nature, that we must be constantly swallowing it, and yet no ill-effects follow."

"There is a variety of tetanus which is known as 'idiopathic,' mainly because we know nothing of its pathology, and in which there is an absence of any wound of the surface, or other apparent point of entrance. It has always been assumed that the organism inducing this idiopathic variety is the same as that occurring in the traumatic form. In view, however, of the disease, 'louping-ill' of the sheep, being so closely allied with tetanus, both with regard to the organism producing it and in the character of the symptoms occasionally evoked, I would be inclined to pause before admitting the truth of this allegation. May it not be a disease caused by an organism of the same class as that producing louping-ill, but intestinal in its habitat, as are the organisms instrumental in producing all the members of this class of diseases of the sheep? and may it not happen that it is a common inhabitant of the intestine, but that only in certain susceptible individuals gets over the channel of the bowel into the blood, becomes bacteriolized, and so allows the toxins bound up in its protoplasm to escape, these again acting on the nerve cells with which they have a combining affinity?"

"Tetanus of the newborn is also a form of the disease of whose pathology we have no conception, and I would go so far as to suggest that it may be the result of the action of such an intestinal anaërope to which the infant has not as yet become immunized."

When one recalls the fact that all the catgut which is used by surgeons is obtained from the intestine of the sheep, the bearing of Professor Hamilton's paper upon the subject of post-operative tetanus becomes apparent.

The questions arise:

1. Is it true tetanus, or some other member of the group of diseases so common amongst sheep, by which patients are apt to be attacked after undergoing surgical operations?

Answer may be sought in an investigation of the symptoms of those who have suffered, and in an examination of the bacilli from those cases in which cultures of material from the patient have proved the presence of drumstick organisms.

As to the Symptoms.

We surgeons who attended any of these 21 cases had no doubt in our minds that the patients suffered from true tetanus, but whilst accepting these diagnoses, we must bear in mind the fact pointed out by Professor Hamilton that the symptoms of all the group of diseases of which louping-ill is the type, are hardly to be distinguished from tetanus.

In the case of idiopathic tetanus, he makes the definite suggestion that it may not be true tetanus, but a disease caused by an organism of the same class as that which produces louping-ill.

As to the Bacilli.

The catgut used at the operations in 14 of the cases was examined bacteriologically, and bacilli were found in the cultures in four instances. Bacilli were found in the cultures from the ovarian pedicle in another case.

In one case the report from the bacteriologist was as follows: "From the cultures of this sample of catgut we have isolated a large anaërobic bacillus, of which some of the individuals show large terminal spores, giving to the rods the drumstick appearance characteristic of the *Bacillus tetani*. It will not be possible to find proof of the specific nature of this bacillus without animal inoculation." "Note.—We were not authorized to have an animal experiment made, so there was no further investigation."

In 2 cases the reports are to the effect that "a bacillus 'allied to' the tetanus bacillus was found, but that experiments upon animals were negative."

In another case I have only the statement that tetanus bacilli were found in the catgut, which was "shop-prepared."

In another case no organisms were found in the catgut, but "the cultures from the ovarian pedicle, though 'resembling' tetanus bacilli, were negative in experiments upon animals."

The only answer, therefore, which can be given to the question whether or not it was true tetanus from which these patients suffered, is, first, that the symptoms were characteristic of a group of diseases closely allied to tetanus; and, secondly, that in the catgut used at four of the operations and in the pedicle from another case, a bacillus was found resembling in appearance the tetanus bacillus but similar to the bacilli of a group of diseases allied to tetanus, and that proof of its being the tetanus bacillus failed in experiments upon animals.

2. Is the Infection Conveyed by the Catgut?

The fact that catgut was used in every one of these cases is the most striking as well as the only apparent common feature. It tempts one to blame catgut offhand, but careful inquiry suggests some doubt.

At the outset we are met with a difficulty. If we blame catgut as the vehicle by which the disease is introduced, we assume that the tetanus bacilli are wrapped up amongst the strands of the ligature, in which they probably existed at the time of the manufacture of the catgut, and that they are liberated during the process of its absorption. Now catgut is made from the intestine of the sheep, which "is not an animal liable to tetanus as we ordinarily understand the disease." Therefore it would appear more probable that there should exist in the catgut the bacilli of one of the other members of the tetanic group of diseases, which are known to infect the intestine of the sheep, rather than the bacilli of true tetanus.

I have made inquiry of most of the business firms who supply catgut to the large hospitals in England, Scotland, and Ireland, and, with one exception, they tell me that the raw catgut is procured from Germany. If it is the vehicle of infection, tetanus should occasionally follow surgical operations in all parts of the United Kingdom, because catgut is used very largely by surgeons all over Great Britain. In most of the great hospitals, both in London and the Provinces, and in many private practices it is almost the only material which is used for ligatures, and yet the occurrence of post-operative tetanus appears to be unknown in the South of England and in the Eastern Counties.

Of the 21 cases—

- 11 occurred in Northumberland
- 6 occurred in Ireland
- 2 occurred in Scotland
- 1 occurred in South Shields
- 1 occurred in Manchester

That is to say, they were found in the same geographical area as that in which the tetanic group of diseases in the sheep is prevalent.

Professor Hamilton's observation about the geographical distribution of "louping-ill" applies exactly to the distribution of these cases of post-operative tetanus. It is

impossible to believe that German catgut, if infected with bacilli, will produce a disease when used in the North of England, in Scotland or in Ireland, and yet be innocuous when used in the South of England or in the Eastern Counties.

In view, therefore, of the common source from which catgut is obtained, its general and widespread employment, and the irregular geographical distribution of these cases of post-operative tetanus, it does not appear probable that catgut is the carrier of the bacilli which produce the disease. Enough has been stated to show that there is a legitimate doubt, first, as to whether the disease which we have been calling post-operative tetanus is really tetanus, and secondly, as to whether the disease, whatever it may be proved to be, is conveyed by the catgut.

On the supposition that it is not tetanus but some other member of the group of diseases so prevalent amongst sheep, it is interesting to see how far the facts of these 21 cases agree with the essential points laid down by Hamilton as characteristic of those diseases.

We have seen that the symptoms are of the same tetanic character and that the bacilli are indistinguishable; also that the geographical distribution is identical. There remain the seasonal prevalence and the mode of entry of the bacilli.

With regard to seasonal prevalence, of the 21 cases

3 occurred in January	3 occurred in July
1 " February	2 " August
1 " March	3 " September
2 " April	1 " October
2 " May	2 " November
1 " June	None " December

The Mode of Entry of the Bacilli.

When considering this point a feature of the cases presents itself which is almost as striking as is the fact that catgut was used in all—namely, that of the 21 cases, 19 followed operations in which the peritoneal cavity was opened. It cannot surely be a coincidence that over 90 per cent. of the operations involved the peritoneum. At the Royal Victoria Infirmary in the year 1907, as nearly as I can estimate, 4,377 operations were performed which required the making of an incision and the use of ligatures. Of these, 1,472 involved opening of the peritoneal cavity, and 2,905 were upon other parts of the body. That is to say, there were twice as many operations upon other parts as there were within the peritoneum. This may be taken as an average proportion of peritoneal to non-peritoneal operations. If, then, catgut were the guilty agent of infection one would expect to find that a majority of the cases of post-operative tetanus occurred after these other operations rather than after those upon the peritoneum, especially when one remembers the large amount of catgut which is left in the wound of such an operation as that for the removal of enlarged glands from the neck as compared with the small amount used in the radical cure of an inguinal hernia, or in an operation for the removal of an ovarian cyst. It would not be surprising to find that any of the bacilli of the spore-bearing nature referred to, so common amongst sheep, are frequent inhabitants of the human intestine, nor to find that the patient is himself the host of the bacilli at the time of the operation, because the gathering ground of the drinking water used in the districts from which these 21 cases have been collected is largely covered by sheep farms. This is especially true of Northumberland, in which county the majority of cases have occurred, and in which "louping-ill" is prevalent. Such an explanation would appear to hold good for sporadic cases, such as my own, which occur without any ascertainable cause, and in which the catgut is proved to be sterile.

It is possible that the catgut may have become infected with bacilli after its importation into the counties in which post-operative tetanus has occurred, but this would apply also to any other material, such as silk or linen thread, used in the same district. I do not know of any case having occurred in which any other kind of ligature than catgut has been used. Too much stress must not, however, be laid upon that observation, because it may be due to the fact that catgut is used almost universally in Northumberland to the exclusion of silk and other ligature materials.

Between some of the cases there appears to be a direct connexion.

In one house 2 cases occurred in the course of eight weeks.

In another house 4 cases occurred as follows: One in October, one in June, one in July, one in August. In that house the water supply from a new cistern was suspected, and an anaërobic bacillus was developed from the water; since attention to that no further case has occurred. Although a careful investigation was made, no bacilli were found in the catgut used at any of the four operations. They were all abdominal operations.

In the Royal Victoria Infirmary five abdominal sections were performed by the same surgeon in the course of one morning. The third operation was for gall stones, and the fourth for appendicitis. Both of these patients developed tetanus, and the gall-stone patient died. None of the other 3 cases developed symptoms, although catgut from the same store was used in all the cases.

I have ventured to publish this list of cases, large as it is when viewed as a series of surgical calamities, but small when used for the purpose of generalization, and to make the foregoing remarks, in the hope that others who can throw light upon the subject may be induced to do so.

It is a matter of the most serious nature. Not only is it horrifying to think that a patient should suffer from a deadly disease after a simple operation, such as the radical cure of an inguinal hernia, but it is a matter of the utmost importance that we who used catgut should know whether we will be justified in reverting to its use. It will be a great misfortune if catgut should be proved to be the agent, because it is without any doubt the ideal ligature and suture, having advantages over all other materials. If it is the guilty agent, it would appear as if its use must be discarded altogether, because, judging by the variety and thoroughness of the means which were employed in the sterilization of the catgut in many of these cases, it seems to be impossible to destroy the spores without at the same time ruining the ligature.

The methods were various, and I am unable to give the exact process followed in each case, but in my own cases it was as follows: Raw catgut was wound upon small glass reels and placed in ether for twenty-four hours. From this the spools were transferred to fresh ether for another period of twelve hours. They were then placed in a 1 in 1,000 solution of binoide of mercury in methylated spirit for twenty-four hours, being then transferred to a fresh similar solution, in which they were kept for several days before being used. I had the catgut thus prepared bacteriologically examined on several occasions, and it was always found to be sterile.

In several of the other cases the catgut was prepared by boiling in absolute alcohol at 212° F. for one hour after it had gradually been raised to boiling point.

SUMMARY.

From the foregoing observations I have drawn no conclusion, as they do not appear to justify it, my object in writing this paper being to elicit from others information which may lead to a definite solution; but I would like to give a short summary of the facts and to offer a suggestion.

Hamilton pointed out that there is a group of diseases amongst sheep the symptoms of which are closely allied to tetanus and the bacilli of which cannot be distinguished from those of tetanus.

In these diseases the bacilli are normal inhabitants of the sheep's intestine, but at certain periods of the year they pass from the lumen of the bowel into the blood, where they become bacteriolized, and the liberated toxins give rise to the symptoms of the various diseases.

During these seasons the bacilli are found in the peritoneal cavity and in no other part of the body.

These diseases are endemic in certain parts of the British Isles.

The 21 cases of post-operative tetanus have occurred only in those districts in which the tetanic group of sheep diseases is endemic.

More than 90 per cent. of the cases of post-operative tetanus followed operations in which the peritoneal cavity had been opened.

Bacilli resembling tetanus bacilli have been found in the

remnant of catgut used for ligatures in 4 cases and in the ovarian pedicle in 1 case, but confirmation of the suspicion that those bacilli were tetanus bacilli has not been forthcoming.

The catgut used at these operations was obtained from the same source as that which is used in the South of England and the Eastern Counties.

I would suggest:

1. That the disease which we call post-operative tetanus is not tetanus at all, but one of the sheep diseases.

2. That it is not introduced by the catgut.

3. That the patient is, at the time of the operation, the host of the bacillus.

4. That we must look upon these cases of post-operative tetanus as cases of idiopathic tetanus, accepting Hamilton's suggestion that idiopathic tetanus is not true tetanus as we ordinarily understand the disease. By that I do not assume that these patients would have developed tetanus had no operation been performed. I would rather account for the sequence of events by supposing that the disturbance aroused by the opening of the peritoneum at the operation was of such a nature as to favour the activity of bacilli which, possibly, would have remained dormant, had no operation been performed.

That the mere opening of the abdomen can affect the interaction of a patient and bacilli already present in the peritoneum is frequently demonstrated in cases of tuberculous peritonitis, when a small incision, without any other interference, is followed by immediate improvement of the local condition and ultimate complete recovery.

It may be suggested that the ligatures are infected at or before the time of the operation—that is to say, that post-operative tetanus is the consequence of faulty surgical technique. During the past five years some 350 patients have had loose cartilages removed from the knee-joint, at the Royal Victoria Infirmary, without mishap. This, I believe, is a sure test of the efficiency of any surgical method, and would point to the sterility of the catgut, unless we are to believe that all other germs than tetanus bacilli may be destroyed and yet the latter may remain unaffected.

From such facts and observations as I have brought forward, it will be seen that many questions arise which I am quite unable to answer. As I have said before, this paper is written with the sole object of gathering information. Twenty-one cases are far too small a number to warrant the drawing of any conclusion. For instance, I have failed to find any cases of post-operative tetanus in the South of England, in spite of some diligence, and I have laid some stress on the identical geographical distribution of these cases and the group of sheep diseases, but it may well be that there have been many such cases in the southern counties. If that be so, my argument fails.

In view of the almost universal use of catgut, it appears to me to be a duty to publish my cases, and I hope that others who have had the misfortune to encounter similar experience may be induced to do the same. The problem as to whether the disease is really tetanus is interesting, and suggests many collateral inquiries. That, however, is not a subject with which I am able to deal, it being a matter for bacteriologists. The central point is to find out whether the infection, whatever it may be, is conveyed by the catgut, and I am not without hope that catgut may be acquitted.

FRACTURE OF THE THIGH IN THE NEWBORN.

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CONSIDERABLE interest has lately been aroused in regard to the treatment of fracture of the femur in the newly-born child. Various means are suggested for treating this difficult fracture, but, with the exception of Credé's original method, they are all based on the supposition that both extension and traction are necessary.

Credé recommended binding the limb in a flexed position to the abdomen. Unfortunately, this does not invariably give the best result, and an unsatisfactory union is a difficult thing to rectify. The unsatisfactory cases possibly result from the restlessness of the child, and a heaving abdomen which is sometimes distended