however, so extremely rare that a distinct case of glanders recovers that we may practically accept it as an incurable disease. There are well established cases in which years after distinct signs of glanders have been noticed and a cure been made, a *post-mortem* examination has been carefully conducted. All that has then been revealed has been two or three isolated calcareous tubercles. I believe a similar thing has been found in tuberculosis of man, and there is no reason to doubt that if spontaneous recovery is possible in one disease or one animal it may also obtain in the other. The form of glanderous disease known as farcy undoubtedly does show some cases of recovery. Distinct attacks of farcy have recovered and worked for years in apparent health, whilst a *post-mortem* examination has revealed no lung lesions whatever. Now that no distinction is made by our sanitary laws between glanders and farcy it is necessary to impress the fact that some cases do recover. It is true that they are few—very few—but if they exist at all, and it is impossible to say of each case whether it may or may not recover, there can be no argument for compelling a man to slaughter his horse at his own cost. If the argument for slaughter be based upon the notion that every infected animal is incurable and therefore its destruction is no injury to the owner, it is false. If the argument for slaughter be based upon the fact that every diseased horse is a source of danger to others than the owner, it is a sound argument, but then it is only fair that others should share the cost.

PARTURIENT ECLAMPSIA IN COWS.

By JAMES CLARK, F.R.C.V.S., Coupar-Angus.

IN the following article I propose to give an account of personal experiences regarding a most interesting disease in cattle practice, which does not appear to have gained as much attention in this country as the subject deserves. So far as I know, the only work really treating of this disease is the *Veterinary Obstetrics* by Dr George Fleming, and even that work distinctly shows that we are largely indebted to our continental neighbours for a record of cases. It is true two cases have been recorded in this country, viz.: by Mr Rolls (*Veterinary Journal*, vol. ii., page 17), and Mr Storrar of Chester (same journal, vol. iv., page 53). Rolls ascribes the attack in both instances to the fact of the animal having been deprived of its calf. This I think must have been a coincidence, as I have never found it to be an exciting cause. I have noticed records of curious cases in cows, which to my mind clearly pointed to eclampsia. It thus appears quite evident from the scarcity of cases reported, that it does not occur often in the experience of veterinary surgeons. In medical practice considerable attention has been given to the disease, and it is calculated that one case of eclampsia occurs in every 350 cases of labour. It is held in great dread, especially the ante-partum form, looked on as a very grave complication of the pregnant state, and is attended by serious consequences, as may be seen by statistics on the subject. Fortunately, owing to better knowledge of the etiology and pathology of the disease, the death-rate has been considerably reduced. From

personal experience I am glad to state that the death rate in cattle practice is not of such a formidable character. To the best of my recollection I have only had two deaths in nearly 25 years' practice, and in both cases I was called in at a very advanced stage of the attack,—thus having no opportunity for treatment. It is astonishing how time and experience reduces the alarm of such attacks. I can well remember being in 1876 brought face to face with a very serious and apparently dangerous series of cases of this disease, occurring in one byre, and which was largely the means of turning my attention to the nature of the disease. I think I cannot do better than select a number of typical cases, which will serve more fully my purpose, and more clearly illustrate the character of the disease as it occurs in practice.

CASE I.—This case, or rather series of cases, is unique from the fact that 3 cows became affected within a week in one byre, the history being as follows. In February 1876 my client bought 4 cows in Ayrshire, and trucked them here in an open cattle truck. Three of the 4 cows had recently calved, all within a few days of each other. The weather was cold and stormy, and owing to a recent attack of pleuro-pneumonia contagiosa the cows on arrival were placed in a temporary wooden shed in rather an exposed situation.

The 3 cows showed characteristic symptoms of eclampsia from the 10th to 12th day from the date of each calving. The first showed symptoms on 26th February, and the last on 5th March 1876. One of the cows was 9 years old, and two were six years old. All recovered, were kept for several years, had calves, and showed no recurrent attacks. In each case the symptoms were of the most urgent character. The attacks were ushered in by considerable excitement, staring eyes, champing of the jaws, profuse frothing at the mouth, occasional bellowing, and during the intensity of attack leaning for support on the stall. Each case did well under belladonna, to which I shall refer under the head of treatment.

CASE II.—An Ayrshire cow (primipara). Attack came on about the 9th day after calving; was seen unwell for a few days, but no special attention was paid to her. She, however, began to show more urgent symptoms—great restlessness, staring eyes, frothing at the mouth, etc. On my arrival the animal was in a most excited state; when the box door was opened she at once forced her way out, ran for a short distance on the roadway, and fell down dead.

CASE III.—A cross white cow (primipara). Attack ushered in about 10th day after calving; the usual characteristic symptoms; treated with belladonna and made an excellent recovery.

CASE IV.—A fine short-horn cow, 7 years old (multipara); first showed symptoms of illness (eclampsia) 10th day after calving. The symptoms were not urgent, and it was thought unnecessary to call me. A dose of medicine was given and the attack disappeared. About a week afterwards the same symptoms were observed but much more urgent. I was then called, and on examination found brain symptoms extremely urgent, staring of the eyes, frothing at the mouth, temperature 105°. I tried belladonna, chloral, and potass. bromide, with cold water to the head, but without effect, as she died on the second day after I saw her. I now regret that I did not bleed her.

CASE V.—This is certainly one of the most interesting cases that have occurred in my practice.

It is the first and only case in my experience in which eclampsia has occurred twice in the same animal. This cow had a post-partum attack on 21st November 1889, which occurred eight days after calving. She afterwards had an ante-partum attack, on 1st February 1892.

The cow in question at her first attack was 7 years old, of polled Angus breed.

On examination I found champing of the jaws, and staring of the eyes; treated with belladonna; required only one dose, and in a short time the symptoms abated, the animal making a rapid and satisfactory recovery. The next attack occurred, as stated, on the 1st February 1892, the cow being then at the middle period of pregnancy or towards the end of the fifth month. The attacks continued daily for twenty-five days, and generally from 3 P.M. till 8 p.m. She was treated with belladonna, chloral, potass. bromide, and salines. It was noticed that belladonna gave the best results in bringing the convulsion to a termination. She made a good recovery, and showed no recurrent symptoms at date of calving. Labour took place naturally. The cow is again in calf (March 1893), and I shall watch her with interest.

CASE VI.—This cow was also the property of Mr Scott, the owner of Case V. The cow was a cross between Ayrshire cow and black polled Angus bull, 9 years old (multipara). Her attack was ante-partum, and occurred towards the end of the fifth month. She showed all the urgent symptoms of eclampsia, so much so that she became paralysed, and lay for a fortnight. She was treated in the same way as the previous case. She has been pregnant on two occasions since, and not shown signs of disease.

I have neglected to mention that at date of parturition after the attack of eclampsia labour took place without any untoward symptom.

CASE VII.—An Ayrshire cow 6 or 7 years old, in rather thin condition, an exceptionally heavy milker. I was called on 30th June 1891. The cow had been out of sorts for two days—got a dose of medicine, which brought her apparently right; I was again called late on the evening of 3rd July. She had been taken out during the day, which was cold and stormy, with an east wind. About 8 P.M. she was observed to show unusual symptoms. On arrival at midnight I found she was suffering from an acute attack of eclampsia, wild expression, staring eyes, head turned, licking the post to which she was fastened, frothing at the mouth, etc. This attack took place about the 26th day after calving; administered belladonna, which did not require to be repeated; attack passed off in two or three hours, and she made a good recovery.

CASE VIII.—A small Ayrshire cow, 5 years old, in poor condition. She showed most urgent symptoms of eclampsia.

The history of this case is as follows:—She had been seen out of sorts for a week, but not in any way urgent. I was called on 22nd June 1891, and, as stated, found the symptoms very alarming. I gave the usual treatment of belladonna, which relieved the convulsions, but she went down soon after her attack, and was unable to rise for

about a month. She was most carefully nursed, the box was thoroughly bedded, and sacks of straw placed about her. She was regularly turned over to prevent sores, and was treated after the attack abated with potass. bromide and mild saline laxatives. This attack deprived her of sight, which she never regained. She calved again last year (1892) without showing signs of another attack.

It is unnecessary that I should quote further cases, as the preceding are sufficiently typical of the disease.

Symptoms.—These are markedly characteristic in this disease, as may be noted from the cases already quoted, and can hardly be mistaken for those of any other disease, although that appears to have been done by Franck, who is said to have carefully studied parturient apoplexy or collapse. It therefore appears all the more incomprehensible that he should have confounded parturient apoplexy with eclampsia. There cannot be a doubt that it is an essential error, as I will try and show further on by comparison of symptoms of both diseases. Dr George Fleming in his excellent work on *Veterinary Obstetrics* appears doubtful as to the identity of eclampsia in cows with the same disease in woman. Dr Fleming says, "In the first place the eclampsia of woman is essentially epileptic and convulsive—the convulsions being of a tonic and clonic nature, and *though in the disease of the cow convulsions are sometimes present yet they are far from being a constant symptom.*"

I can from experience give the most positive assurance that the symptoms and *convulsions*, are *constantly present* and identical in the cow with those of woman, with one exception, viz.—œdema of the face and extremities, which I have never been able to observe in the cow. I am free to admit that in cows the symptoms as a rule are not so extremely urgent; this may be accounted for by the higher organisation and nervous temperament of woman, mode of life, and other causes, which to some extent must tend to modify both the percentage of animals affected, and the intensity of the attack. In the foregoing cases, and in the majority of attacks which have come under my care, the cows had been out of sorts for a day or two, sometimes a week before the invasion of urgent symptoms of eclampsia took place. This period I believe to be analogous to the period in woman when headache, derangement of vision, etc., are found.

The attack is usually sudden, and without warning, as follows:—Foaming at the mouth, champing of the jaws, prominent staring eyes, excited expression, head very often turned to the side; sometimes licking at the fore leg, stall, or some imaginary object. Some cows I have heard bellow, others don't do so; twitching of the body and limbs (clonic spasm), difficulty in respiration according to intensity of attack; the convulsions generally last two or three hours, and in the majority of cases do not reach the stage of coma, although I have had cases which have done so. The following may be taken as a summary of my observations regarding the occurrence of the disease.

(1.) The attacks occur during the pregnant state and also after labour, as in human practice.

(2.) In ante-partum cases the attacks appear about middle term, but this requires confirmation by further cases.

(3.) In ante-partum attacks convalescence and recovery may take

place without labour, and cows which are affected in the pregnant state may not show recurrent attacks at the period of labour, as appears to be constantly the case in woman.

(4.) Post-partum attacks are much more common in cows than the ante-partum form, the reverse being the case in woman.

(5.) The attack in post-partum cases usually occurs from the 8th to the 12th day after calving.

(6.) The disease occurs in cows of all ages, from primiparæ upwards.

(7.) The condition does not appear to materially influence an attack, urgent cases occurring in cows both in high and in poor condition, but certainly in greater proportion in the latter.

I have already pointed out that the symptoms are pronounced, and cannot well be mistaken for any other disease, and before closing this part of the paper I may summarise the differences between parturient apoplexy or collapse and eclampsia, which Franck has so strangely mixed up.

Parturient Collapse.

1st. Mostly occurs in cows at third calving and after that period (very rarely if ever in primiparæ).

2nd. Very rarely occurs before calving, and generally within 48 hours after parturition.

3rd. One attack predisposes to another at a subsequent labour.

4th. Most common in cows of fat condition.

5th. In every case the patient fails to keep the standing position.

6th. Rapidly followed by coma.

7th. Earliest period of recovery 18 hours, and generally delayed for 2 or 3 days.

8th. Prognosis generally unfavourable, and treatment cannot be relied on.

Parturient Eclampsia.

1st. Occurs in cows of all ages, very frequently in primiparæ.

2nd. Occasionally occurs in cows before calving; if after calving, the attack is delayed until the 8th up to the 12th day, and it may occur as late as the 26th day after calving.

3rd. One attack is not necessarily followed by another at next calving, but may be so in isolated cases.

4th. Most common in cows of lean condition.

5th. In a great proportion of cases the patient is able to retain the standing posture.

6th. Only occasionally becomes comatose.

7th. Recovery generally takes place in a few hours, except in ante-partum cases, which may be delayed for several weeks, or until labour is completed.

8th. Prognosis generally favourable, and treatment usually successful.

Etiology and Pathology.—Opinions on this head are of the most conflicting character. Playfair, in his *Science of Midwifery*, says

"the etiology is very doubtful," and quotes Lever, Braun, Frerichs, and many others who have found frequent association of eclampsia with albuminuria. This has been supposed to clear up to a great extent the etiology of the disease, and *to prove its dependence on the retention of urinary elements in the blood*. More recent observations have tended to throw doubt on its essential dependence on such a condition, and to show that albuminuria is not always a potent factor in eclampsia. Imbert Goubeyre found that out of 164 cases in which there was marked albuminuria before or during conception, 95 had no eclampsia, and Blot found in 41 cases that 34 were delivered without untoward symptoms. Again, it has been pointed out that albuminuria followed the convulsion, and in these it was evident that the retention of urinary elements could not have been the cause of the attack, and it is consequently highly probable that the albuminuria was produced by the same cause which induced the convulsion. It may be taken, therefore, as proved that albuminuria is by no means necessarily accompanied by eclampsia. Braxton Hicks in the *Obstetrical Transactions*, vol. viii., says "the nearly simultaneous appearance of albuminuria and convulsion, the two being almost invariably combined, must then be explained in one of three ways :—

" 1st, The convulsions are the cause of nephritis.

" 2nd, The convulsions and the nephritis are produced by the same cause, *e.g.*, some detrimental ingredient circulating in the blood irritating the cerebro-spinal system, and other organs at the same time.

" 3rd, That the highly congested state of the venous system induced by spasm of the glottis in eclampsia is able to produce the kidney complication."

In the theory propounded by Traube and Rosenstein the occurrence of eclampsia is ascribed to acute cerebral anæmia resulting from changes in the blood incidental to pregnancy :

1st. The primary factor is the hydræmic condition of the blood, which is an ordinary concomitant of the pregnant state, and of course when there is also albuminuria the watery condition of the blood is greatly intensified—hence the frequent association of the two states.

2nd. Accompanying this condition of the blood there is increased tension of the arterial system, and that is favoured by the hypertrophy of the heart, which is known to be a normal occurrence in pregnancy.

3rd. The result of these combined states is a temporary hyperæmia of the brain, which is rapidly succeeded by serous effusion into the cerebral tissues.

M'Donald in his volume on heart disease during pregnancy, describes two very careful *post-mortems* in which he found the following conditions.

1st. Extreme anæmia of the cerebro-spinal centres.

2nd. Congestion of the meninges.

3rd. No evidence of oedema.

He inclines to the belief that eclampsia is caused by irritation of the vaso-motor centre in consequence of anæmic condition of the blood, produced by the retention of excrementitious matters which the kidneys ought to have removed—this over stimulation resulting in anæmia of the deeper seated nerve centres and consequent convulsion.

Dr Haultain, in an excellent article on the treatment of eclampsia during pregnancy, published in the *Edinburgh Medical Journal*, considers the disease due primarily to renal insufficiency, which secondarily gives rise to fits from a consequent poisoned state of the blood, causing general and extreme arterial tension from contraction of the peripheral arterioles.

Finally, Scanzoni, Dubois and others hold the theory that eclampsia is a neurosis due to reflex irritation of the spinal system. This is more in accordance with my views. We have very frequently epileptic fits in dogs caused by reflex irritation from teething or the presence of worms in the intestinal canal, and the same condition in pigs arises from irritation of the bowels through indigestible food. I therefore strongly believe that the primary cause, particularly in post-partum cases, is reflex irritation of nerve centres of the uterus. I have already pointed out that attacks most frequently occur in cows from the 8th to 12th day after calving, and this is well known to be the period at which the second cleansing makes its appearance. It is consequently not unreasonable to suppose that the nerve centres of the uterus are more susceptible to diseased conditions at this particular period, owing to the activity and hyper-sensitive condition of the uterus.

I have observed as a leading feature in all my cases, that the weather has been unfavourable, cold and stormy, with winds from east and north-east, and I have long looked upon this as a potent factor, causing chill, and acting directly on the nerve centres of the uterus, with consequent reflex irritation of the spinal system, this also inducing albuminuria as an accompaniment.

Treatment.—I am glad to be able to state that treatment can be carried out with every prospect of success. It is essential in the first instance to place the patient in comfortable quarters, as it is necessary to keep the animal warm and away from cold draughts. In the series of three cases which I record under Case I., believing the attacks were primarily due to morbid or disturbed condition of the nervous system brought about by exposure to cold and chill, I prescribed extract of belladonna, and with the most marked benefit. I have also tried morphia and chloral hydrate, but cannot speak with the same degree of confidence regarding them, and have consequently to fall back on belladonna, which was always entirely satisfactory.

Dr Haultain in his treatment of this disease remarks that “chloral to relieve arterial tension, and pilocarpine as a sudorific, with ol. crotonis as a rapid purgative to remove poisonous ingredients from the blood, gives the best results.” This is a point on which I have often reflected, as I find that *belladonna alone* gives highly satisfactory results in cows, and that if the attack is so relieved they rarely return, in post-partum cases especially; this leads me to strongly suspect that eclampsia is, as I have previously stated, a neurosis due primarily to reflex irritation of the spinal system, which brings about renal insufficiency and the albuminuria so frequently found accompanying convulsions. If the attack were primarily due to a blood poison, I do not think belladonna alone would be sufficient to arrest attacks, considering its action as a powerful narcotic, possessing diaphoretic and diuretic properties, and its effect in the treatment of disease having its seat in the nervous system (Squire). This leads me to suppose that if irritation or morbid condition of the nervous system is removed,

the other accompanying symptoms cease to exist for want of an exciting cause.

The dose usually prescribed by me, in ordinary sized cows, such as Ayrshires, is $\bar{5}ij$, and this may be increased with advantage in cross cows and shorthorns to $\bar{5}ijj$, to be repeated in two or three hours if necessary. I have little faith in so-called specifics in the treatment of disease, but can with confidence assert that belladonna in the treatment of eclampsia most deservedly warrants the name of specific, the action in nearly every case being rapid, certain, and satisfactory. I can strongly recommend to my professional friends the preparation called glycerol of belladonna (equal parts of glycerine and belladonna); this I find a most handy preparation, easily dispensed, being semi-fluid and quickly miscible with water.

Bleeding, I believe, may be of great service in the more urgent cases, and it may be carried out in the event of belladonna failing to arrest the attack; but it must be kept in mind that although bleeding is a powerful means in arresting violent attacks, by relieving the vascular system of arterial tension and pressure, it is well known that the quantity of blood soon becomes the same, through the serum taken from all the tissues, while the quality is much deteriorated, and there is consequent danger from further attacks, in which case the patient is in greater danger than before. It is now an ascertained fact in midwifery practice that the death-rate has been greatly lessened owing to the care and discrimination exercised in venesection. I feel certain that only in very few cases will it be necessary to resort to bleeding in cows; but in the event of an urgent and aggravated case refusing to yield to medicinal treatment I certainly would run the risk of bleeding.

AN ABNORMAL LUMBAR VERTEBRA.

By A. E. METTAM, M.R.C.V.S., F.Z.S., Royal Veterinary College, Edinburgh.

ABNORMALITIES of bones, more especially in their naked eye anatomy, rather than in any departure from their normal histology, are interesting in that they frequently throw light upon embryological questions that are more or less debatable. We must not, however, believe that all monsters can be explained either from an embryological or palæontological point of view, nor can we be certain that the so-called "atavistic peculiarities of polydactylism" point to the origin of the horse from eocene ancestors; and although, from geological evidence, we believe the ancestor of the horse to have had five digits, yet we hesitate to say that he was also double-headed because occasionally we see a foetus in this condition.

The vertebra I am about to describe has a well marked rib-like transverse process growing from the centro-pedicle junction. It was brought to me by one of my students, Mr W. S. Worthington, and was the anterior member of the lumbar region of the vertebral column of a horse obtained for study. Examination showed that it was from a young animal, the epiphyses being not entirely anchylosed to the