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PAPERS AND COMMUNICATIONS.

The Vitality of the Spermatozoon and the Liberated Ovum in Domestic Animals, with special reference to the relation of the time of Copulation during Oestrus to Conception.

By Prof. JOHN QUINLAN, F.R.C.V.S., Dr. Med.Vet., Onderstepoort.

The observations recorded in this short paper are an attempt to summarise our present knowledge of the vitality of the reproductive cells in the domestic animals. The necessity for intimate knowledge of the vitality of the ovum after its liberation from the ovary and of the duration of the vitality of the spermatozoa in the female genital tract is obvious, if the highest percentage fertility is to be obtained by using male animals under controlled service methods.

The time has passed when sires of proved value may be allowed to copulate with females under veld conditions without restraint. It is now well known that frequent copulation causes a decrease in the numbers of spermatozoa present in the ejaculated semen and also reduces their vitality [Lewis (1911)]. With ordinary precautions in stud or herd management, however, this reduction is not accompanied by reduced fertility,—that is when the number of females mated with a sire does not exceed reasonable limits. These limits have been determined by practical observations on all species of domestic animals. It must be pointed out, however, that the effect of frequent service is a matter of individuality in males. Constitution, temperament, condition, and environment play a large part in the effects of too frequent service or, let us say, over-taxation. The number and vitality of the reproductive cells of one individual may be reduced as much after five or six services as they would be in another after four times that strain.

It becomes apparent that, if the greatest possible use is to be made of a sire, his services must be controlled. If mating be allowed at the correct time during the oestrous period, having in mind the time of ovulation, the fertilisable vitality of the extruded ovum, and the time which it takes the highly vital spermatozoa to reach the site of fertilisation, namely the Fallopian tubes, one service should be sufficient to bring about conception in normal animals.

A thorough knowledge of the physiology of the genitalia in general, and the reproductive cells in particular has within recent years assumed enormous economic importance. Modern tendencies towards high speed have also entered the sphere of animal husbandry. When milk- and beef-production are forced beyond nature's intended limits a protective phenomenon automatically comes into play. A disturbance of the complex interrelationship of the ductless glands

produces a temporary inability to conceive until the strain produced by artificial environment has been overcome. This type of temporary infertility may be produced in two ways: Firstly, through the influence of the hypophysis, which is now definitely proved to be a factor controlling ovarian rhythm. Secondly, through the influence of the ovary itself. Even though the ovarian cycle appear to be normal, or at least very little changed, conception fails to follow copulation, either as a result of the extruded ovum being of low fertilisable vitality, or of a temporary unsuitability of the tubal and uterine secretions to nourish the impregnated female germ cell pending the development of the foetal and maternal placentae.

Since the physiologist and the gynaecologist were not prepared to allow nature the victory, scientific researches became necessary and were commenced about the beginning of the present century. While definite progress in this direction has been made, much still remains to be elucidated before our breeding problems are entirely solved.

Since highly bred stallions with proved ability to produce high-class race-horses are difficult to obtain, and further since their service fee is seldom less than 100 to 500 guineas, it is not unnatural that experimental researches were begun on equines. Towards the beginning of the present century Lewis (1911) began investigations into the possibilities of artificial insemination in the breeding of animals. He studied the vitality of the sperm cell under varying experimental conditions, as well as under normal conditions.

In artificial insemination, the handling of the semen by means of instruments, involving exposure of the germ cells to an artificial environment, has led to a careful study of the vitality of spermatozoa under a great variety of conditions.

In this paper it is not intended to discuss the behaviour of the reproductive cells *in vitro*. Our observations will be entirely confined to its behaviour *in vivo*. It is intended to discuss the domestic animals only, and reference is made to the small laboratory animals only where the subject matter is particularly relevant to them.

In adopting the controlled service method of mating, it is necessary to know the period of time for which the spermatozoa in the female genitalia are capable of fertilising the ovum. It is also desirable to be acquainted with conditions tending to prolong or shorten their vitality. It is equally important to know the length of time during which the liberated ovum is capable of fertilisation.

It is now generally known that the ovum is not, as a rule, liberated in the early stages of oestrus, but rather towards the termination of that period, and it appears evident, in view of recent experiments, that breeding will be followed by better results if copulation be allowed towards the middle of heat than at an earlier period.

It is now accepted that the ovum is capable of fertilisation for only a few hours after its liberation from the Graafian follicle [Knaus (1931), Pincus (1930), Marshall and Hammond (1926), and Lewis (1911)]. Pincus (1930) has shown that the ovum of the rabbit is fertilisably viable only for 2 to 4 hours after liberation. In this species it must be pointed out that coitus is necessary for ovulation, which occurs 10 hours after mating, so that very accurate observations are possible.

It is asserted by certain workers that the male reproductive cells are capable of living in the female reproductive tract of the domestic animals for days or weeks. Recent observations have proved this to be incorrect. It appears that the life of spermatozoa *in vivo* is as short as *in vitro*. It is sufficient to state that copulation outside the heat period is rarely followed by conception, although Lewis (1911) has been successful in breeding two sows one day after oestrus had disappeared. Quinlan, Maré, and Roux (1931) have had a few successful results in mating sheep shortly after the disappearance of oestrus.

It is now generally accepted that the life of spermatozoa in the female genitalia does not extend beyond 48 hours: Anderson (1922), Lewis (1911), Walton (1930), Hammond (1930), Quinlan, Maré, and Roux (1931), Knaus (1931), Wester (1921).

It is evident that the physiological secretions of the genitalia have a definite influence on the vitality of the sperms deposited in the vagina during copulation [Kugota (1929)]. Quinlan, Maré, and Roux (1931) have been able to confirm, in the case of the sheep, the detrimental influence of the vaginal secretions, which has already been established for the mare, cow, and goat by other workers—Wester (1921), Renckert (1913), Hutschenruyter (1915). Spermatozoa begin to lose their power of motility after a sojourn of a few hours in the genital tract of the female. Soon after, a spermalytic process comes into operation so that within a few hours dead spermatozoa can no longer be found. When motile power is lost the sperm cells begin almost immediately to show morphological changes.

Recent observations made by Quinlan, Maré, and Roux (1931) in the case of sheep have shown that the spermatozoa live longer in the cervix than in the other divisions of the female genitalia. There appears to be no doubt that the cervix acts for spermatozoa as a reservoir from which they appear to be liberated continuously in small numbers pending the arrival of an available ovum. This is supported by the anatomical structure of the cervix and the fact that the male sperm cell survives much longer in the cervix than in the uterus and the Fallopian tubes.

It is now intended to give a summary of our present knowledge of the vitality of the sperm cell and the egg cell *in vivo* after liberation from the gonads in which they have developed. While it is impossible in a short paper such as this to discuss all the relevant literature, some of the most important workers and most of the more recent papers will be mentioned. In discussing each species of animal the duration of the ovarian cycle, the duration of oestrus, and the relative time of ovulation will be cited. The relevancy of such knowledge to the subject under discussion is easily recognised, since in any species successful mating by the controlled service method depends largely on the application of the physiological factors which these studies have elucidated.

Knaus (1931) has recently made some interesting observations on the vitality of the human sperm cell in the female genital tract. Having in mind the close similarity between the reproductive physiology of man and that of the domestic animals, a summary of these observations will not be out of place here.

Human Species.

In women the intermenstrual period varies from 26 to 30 days. From clinical examination of women, and the fact that many women suffer pain and inconvenience in the region of the ovary at a definite period each month, Knaus (1931) believes that ovulation takes place at about the 12th or 14th day from the commencement of menstruation.

He has observed, in women with an average intermenstrual period of 28 days, that conception is possible only between the 10th and the 17th day from the first day of the menstrual period. This time is from the 9th to the 14th day following the appearance of menstruation, when the intermenstrual period averages 26 days, and from the 14th to the 18th day when the intermenstrual period is 30 days.

It is therefore apparent that the life of the sperm cell in the human uterus is limited to days. If accurate experimentation were possible, its vitality would probably be proved not to exceed that which has been observed in the domestic animals.

Porcine Species.

In the pig the ovarian cycle is repeated throughout the year, and its duration varies from 18 to 23 days. McKenzie (1926) states that it may vary from 18 to 25 days, oestrus lasting from one to three days. Struve (1911) has observed the period to be 18 to 22 days in length and oestrus to last two to four days.

Lewis (1911) has shown that the vitality of sperms in the genitalia of the sow varies considerably in different individuals. Only in three cases could live sperms be found at a time longer than 20 hours

after breeding. In two cases live cells were found 40 hours after copulation, and in one case after a lapse of 22½ hours. In 80 per cent of nineteen sows killed for observation the sperm cells were found dead where a period of 16 hours or more had elapsed between copulation and slaughter.

Lewis (1911) has shown that ovulation in this species does not occur during the early hours of the oestrous period. He states that it is safe to assume that in the great majority of cases the follicles do not rupture before the thirteenth hour of oestrus and mentions cases where the follicles were still intact after lapses of 45 hours and 70 hours.

Evidently, therefore, for successful mating in pigs, with the controlled service method, copulation should be allowed not earlier than the 18th hour of oestrus.

According to Struve (1911) oestrus occurs 4 to 9 days following parturition.

Ovine Species.

In Merino sheep in South Africa the ovarian cycle occurs throughout the year at intervals of 16 to 18 days. The average duration of oestrus is about 40 hours, varying from 24 hours to 96 hours. Ovulation occurs about the 36th to 40th hour of the oestrous period [Quinlan and Maré (1931).]

Quinlan, Maré, and Roux (1931) have shown that the vitality of the spermatozoa in the genitalia of the ewe varies considerably in individuals, but living sperms have been seen in the cervix and uterus as late as 48 hours following copulation. Such long vitality would, however, appear to be exceptional. Spermatozoa die rapidly in the vagina. In the body and horns of the uterus and in the Fallopian tubes a large percentage are motionless after 18 hours. On microscopic examination, it is difficult to find living sperms in the female tract, with the exception of the cervix, after a lapse of 30 hours; but that some are undoubtedly present and are capable of fertilising an available ovum after this period has been shown by the fact that 20 sheep served at the commencement of oestrus showed 75 per cent fertility. More successful results are obtained if copulation is allowed between the ninth and twenty-fourth hour after the commencement of oestrus. This indicates that the sperms are losing their fertilising ability after a stay of 30 hours in the female genitalia.

By mating sheep at intervals of 3 hours from the commencement of oestrus, information has been obtained on the duration of physiological vitality of the extruded ovum. Copulation following the 30th hour should provide active spermatozoa during the next 18 to 20 hours. Since it has been shown by Quinlan, Maré, and Roux (1931)

that sperms may be found in the tubes as early as six hours after mating, if the ovum still retains its vitality for a long period matings following the 30th hour of oestrus should be followed by conception. It has been observed, however, that there is a sharp decrease in the percentage fertility in matings following the 30th hour of oestrus. Matings between the 33rd to the 42nd hour show as little as 50 per cent. fertility. It has been shown that this is due, not to the lack of fertilising power of the sperm cell, which is capable of impregnating after a stay of 30 hours in the female genitalia, but to the rapid degeneration of the extruded ovum, which in at least 50 per cent of cases is not capable of being fertilised 6 to 12 hours after follicular rupture: that is assuming that ovulation takes place in all cases about the 36th to the 40th hour of oestrus.

EQUINE SPECIES.

The ovarian cycle in the mare is seasonal and covers a period of 28 to 30 days. Oestrus lasts 4 to 9 days and ovulation occurs, as a rule, during the last 3 days of the oestrous period.

Anderson (1922) has shown that the vitality of the sperm cell of the stallion, under laboratory conditions, is about six hours. The vitality is longer at low temperatures than at those approaching body heat. These observations have recently been confirmed by Walton (1930) and Hammond (1930) in the case of rabbit spermatozoa.

Anderson correlated the earlier death at higher temperatures with the more rapid growth of the bacteria; but, according to more recent workers, the higher temperature alone is a sufficient cause. Hutschenruyter (1915) showed that sperms in the vagina of the mare became motionless within 5 to 6 hours.

Anderson's observations on the vitality of equine sperm cells *in vivo* are very limited. In one case no living sperms were found after a lapse of 16 hours. In a second case vitality had ceased 5 hours after copulation, but he remarks that in this case the mare had a somewhat inflamed and congested uterus. In another case living and active sperms were present 7¼ hours after mating.

The recent work of Hammond (still in progress) shows that copulation towards the time of ovulation increases fertility in the mare. Mares served towards the end of heat showed a higher percentage fertility than those served during the few days following its onset. Hammond interprets this as evidence of the limited life of the spermatozoon in the female tract.

As a rule, it is therefore desirable to mate mares not earlier than the 5th to the 6th day of the oestrous period.

BOVINE SPECIES.

In the cow the ovarian cycle is continuous and covers a period of 19 to 22 days. Oestrus lasts 18 to 24 hours and ovulation occurs late during the oestrous period.

Renkert (1913) has indicated that the life of the sperm in the genitalia of the cow is of short duration; after a stay of 5 to 6 hours in the vagina sperms were no longer motile. Wester (1921) corroborated these observations, and while he has seen living sperm cells in the uterus and Fallopian tubes of the cow 40 hours after copulation, he believes this to be the limit of their vitality.

Since the oestrous period in the bovine species is short, extending only to 24 hours as a maximum in normal animals, the short survival of the sperm in the genital tract is less important in fertilisation than in species having a longer oestrous period and later ovulation. However, even in the cow it is better to allow copulation not earlier than the 9th to the 12th hour of oestrus if highest percentage of fertility is to be obtained from controlled service.

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The Veterinarian and the Law.—II.

By C. P. BRESLER, M.A., LL.B., Pretoria.

COURSE OF A CRIMINAL CASE.

The procedure and the evidence relating to criminal cases in the Union are governed by Act 31 of 1917 which consolidated and amended the laws in force in the several provinces and by Act 32 of 1917 which consolidated and amended the law relating to Magistrates' Courts. The criminal law itself is a composite and complex structure consisting of the Roman Dutch system which has been tremendously influenced by the English system, and of the enactments of legislative bodies.

JURISDICTION OF THE SEVERAL COURTS OF THE UNION.

The Appellate Division has jurisdiction in Appeal from any Superior Court of the Union, that is over the several provincial and local divisions, the special Criminal Courts and the Natal Native High Court. In case the Minister of Justice wishes to reconcile conflicting decisions of Superior Courts he can obtain the ruling of the Appellate Division for future guidance. The Provincial Divisions have original jurisdiction in respect of all crimes committed in their respective provinces except where by statute exclusive jurisdiction is given to another Court. The same applies to Local Divisions save that as a rule they have concurrent jurisdiction with the respective Provincial Divisions. Special Criminal Courts are established by the Governor-General at the request of an Attorney-General (probably now of the Minister of Justice) to try cases arising out of treason, sedition, public violence, riotous gatherings, dealing in precious metals and the supply of liquor. The Natal Native High Court has jurisdiction to try without a jury all crimes committed by natives excepting those relating to insolvency, Municipal Corporations, townships, villages, immigration settlements, customs, excise, railways and so forth. The general principle regarding venue or the place where a crime is to be tried is that an offence must be tried before the Court having jurisdiction in the area where it was committed. The local limits of the jurisdiction of a Magistrate's Court are specially provided for by Act 32 of 1917. This Act also gives a Magistrate's Court jurisdiction over all offences, excluding treason, murder and rape. The Magistrate is also confined by the Act within strict limits as to punishment. The Courts of Special Justices of the Peace, Native Commissioners and Native Chiefs are of minor importance.

The prosecution of an accused person may be conducted either at the instance of a public or a private prosecutor. The right of private prosecution where the State has declined to proceed is vested *inter alia* in anyone who can show a substantive interest in the trial, or a

husband in respect of an offence against his wife, a legal guardian in respect of a ward.

Once it has been decided to proceed with a charge against a person, his presence at Court can be secured either by way of warning, summons or arrest. If he is not in the Union the aid of the State in which he is must be invoked for the surrender, usually known as the extradition of the offender. The circumstances and conditions under which extradition will operate are contained in statutes of the Imperial Parliament and in treaties with foreign countries. Once the presence of the accused has been obtained his case may be disposed of by way of summary trial in the inferior Court having jurisdiction, after such bail and postponements as may be necessary or just have been granted. If the offence is one of magnitude the Public Prosecutor may institute a preparatory examination.

The Magistrate may serve subpoenas and examine all such persons as are likely to give material information in respect of the offence which is the subject of the preparatory examination. Any witness so served who refuses to attend, answer questions put to him, or produce anything required of him for production without offering any just excuse, may by warrant be committed to gaol by the Magistrate. If at any stage of the proceedings, it appears that the matter is proper for the cognisance of an inferior Court, the preparatory examination shall be converted into a summary trial, or vice versa.

After the examination of the witnesses in support of the charge in the presence of the accused, the accused may then voluntarily make a statement, and/or call and examine witnesses in his defence, and may himself give evidence on oath. When the preparatory examination has been concluded the Prosecutor shall submit to the Attorney General particulars of any alleged previous convictions of the accused. Whenever there appears to the Magistrate sufficient reason for putting on trial any accused person, he shall grant a warrant to commit accused to a gaol, there to be detained till brought to trial. If, however, the accused pleads guilty to an offence within the jurisdiction of the Magistrate's Court, and does not wish the witnesses recalled, he will be committed merely for sentence and not for trial in the Supreme Court. The Magistrate shall as soon as possible after the conclusion of the preparatory examination transmit a copy of the record thereof to the Attorney General for his consideration. After considering which the Attorney General may:—

(a) Decline to prosecute and cause the Magistrate to liberate accused.

(b) Indict accused for trial.

(c) Indict accused for trial even where he has been discharged by the Magistrate.

(d) Remit the case for trial in the Magistrate's Court.

(e) Direct the Magistrate to reopen the preparatory examination for additional evidence.

Where the Attorney General has decided to prosecute, the person committed for trial of sentence shall be brought to trial at the first Session of the Supreme Court held after the date of commitment.

Every person committed for trial or sentence in respect of any offence except treason or murder is entitled to be admitted to bail as soon as the warrant of commitment is made out. When the offence is rape the bail is in the discretion of the Magistrate as is that of a woman on a charge of infanticide; the amount of bail also being discretionary.

In any Criminal case before a Superior Court the trial of the accused is normally before a Judge and Jury of nine men, of whom not less than seven shall determine the verdict. Trial may be without a Jury if this is desired by the accused.

Every criminal trial shall take place in open Court in the presence of the accused and the evidence of the witnesses adduced viva voce. At the trial before any evidence is given the Prosecutor usually outlines his case, then examines the witnesses and puts in such documentary evidence as is admissible, using against the accused any statements made by him at the preparatory examination. If the accused is not discharged at the end of the Crown Case, the accused or his legal representative proceeds on lines similar to the above. After the Prosecutor and legal representative of the accused have addressed the Jury (or the Court) the Judge sums up, and the verdict of the Jury is taken or the Court delivers judgment.

Course of a Civil Case in the Supreme Court.

The ordinary manner of procedure to compel the appearance of any person to answer a demand or matter of complaint is by means of **Summons** addressed to the Sheriff or his deputy. A copy of this Summons shall be served either by delivery personally to the Defendant or at his place of abode or residence, at least seven days before the day appointed for his appearance.

Where any Corporation, Church, Society or Syndicate is Defendant in an action, service may be effected by delivering a copy of the summons to the Chairman or Secretary of the Council controlling such body. It is the duty of such Sheriff or his deputy to explain the contents of such summons to the person served. The Sheriff shall, before the return day, file with the Registrar such summons endorsed by him as to its service, etc. Where service on a defendant is by Edictal Citation, application shall be made to the Court for directions as to service.

The party on whom summons has been served, shall, either personally or by attorney, **enter appearance** within the time allowed before the summons. Alternatively, confess the claim or demand in writing, which is to be filed with the Registrar. In the latter case the matter is simply set down for judgment in accordance with such confession. If appearance is not entered within the time fixed by the summons, Defendant shall be barred of his right to appear.

Where a claim is for a debt or a liquidated amount only, a Plaintiff shall file a **declaration** with the Registrar, and if the Defendant has entered appearance, a copy of the declaration shall be served on the attorney of the Defendant (or the Defendant personally where he has personally entered appearance). The declaration shall state:—

(I) Name and description of Plaintiff, and the right in which he sues.

(II) Name of Defendant, and right in which he is sued.

(III) Nature, extent and grounds of the action.

(IV) Such conclusions as the Plaintiff shall by law be entitled to deduce.

Where there are several distinct claims, they shall be stated separately and distinctly.

Where the Defendant has appeared, he shall except, answer, plead, or make claim in reconvention, which shall be filed with the Registrar, and a copy of the same served on the attorney of the plaintiff within 14 days of the service of declaration. Where this is not done, and after demand by Plaintiff, the Defendant shall be barred. The Defendant in his plea shall either admit or deny, or confess and avoid all the material facts alleged, and state all the material facts on which he relies, each allegation being specifically dealt with.

After service of the Defendant's plea, the Plaintiff shall reply thereto in a **replication** filed with the Registrar, and have a copy of same served on attorney of Defendant within 8 days, whereafter he shall be barred.

Issue may be joined in the replication, but if it contains new allegations, then the Defendant may make rejoinder, followed by Plaintiff's rejoinder in reconvention.

All pleadings must be signed by an Advocate and Attorney on the roll (except the summons). At any stage before that a Judge in Chambers may allow pleadings to be amended.

Pleadings are considered closed:—

(1) If one of the parties is barred from answering, etc.

(2) If either party has joined issue without adding further pleadings.

A written agreement by both attorneys, that the pleadings be considered closed.

After the pleadings are closed, the Plaintiff may forthwith set down the case for trial, giving notice in writing to the Registrar 4 days before the appointed day. If this is not done in 6 weeks, the Defendant may have action set down. Notice shall be given to the opposite party 8 days previous to trial.

At the trial, one Counsel shall briefly state the facts which plaintiff intends to prove and then proceed to the proof thereof. When the evidence of both sides is closed, Counsel for Plaintiff shall observe on whole case generally, and then Counsel for Defendant, unless burden of proof lies on Defendant when order is reversed.

Production and Disclosure of Documents.

It shall be lawful for a Judge in Chambers at any time during the course of an action to order the production by any party thereto under oath of such documents in his possession relating to any matter in question in such action. Either party may apply to a Judge in Chambers for an order directing the other party to make discovery under oath of the documents relating to any matters in question in the action. This is made after the pleadings are closed. Any such documents disclosed must be produced for inspection by the opposite party where request in writing is made.

Witnesses.

Either party desiring the attendance of any person to give evidence at the trial, may of right take out subpoenas from the office of the Registrar for that purpose. If a person is so summoned a reasonable time before trial, and reasonable expenses having been tendered, and having no excuse, on default will be liable for contempt of Court. If the witness has in his possession any deed or instrument which either party is desirous of using in evidence, he shall be expressly summoned to produce the same.

At any trial the witnesses shall be examined viva voce and in open Court, but the Court may order that a particular fact be proved on affidavit, except where the opposite party bona fide desires to cross-examine the witness.

Where convenient and necessary for purposes of justice, the Court may order a witness to be examined by interrogatories or before a Commissioner of the Court, which deposition to be filed and used in evidence.

Expert Witnesses.

The opinions of skilled witnesses are admissible whenever the subject is one upon which competence to form an opinion can only be required by a course of special study or experience (Phipson 323).

Such evidence will be rejected when the subject is one upo. the Judge or Jury is capable of forming an opinion. *(Ramac. . Ryan 9 Bing 333).*

In addition to the scientific evidence adduced by the parties, the Court for its own guidance and information may (except in Criminal proceedings by the Crown) order independent **inquiries** and reports to be made or experiments to be tried in or out of Court *(Marconi v. British Co., Times Dec. 15, 1910)* by experts of its own selection, and may act on such reports (Judicature Act 1925 Ss. 86, 89).

Competency. The competency of the expert is a preliminary question for the judge.

Credit. The fact that an expert was not in a fit state of mind or health to form a proper opinion, or is interested or corrupt, or has expressed a different opinion at other times, must be elicited in cross-examination, or if denied, independently proved *(Alcock v. Royal Exchange Assur. 13 Q.B. 292).*

Value of Expert Evidence. The testimony of experts is usually considered to be of slight value, since they are proverbially biassed in favour of the side which calls them, and overready to regard facts as confirmation of pre-conceived theories *(Re Dyce Sombre 1 Mac. & G. 116 per Lord Cottenham) .Tracy Peerage.* 10 C.e.F. 191 per Lord Campbell.

Where the jury accepts the untested opinion of experts in preference to direct testimony as to facts, a new trial has been granted *(Poynton v. P. 37 1 L.T.R. 54).*

Subjects of Expert Testimony. Science, art, technical terms, etc. The opinions of medical men, etc., are admissible upon subjects in their own province, e.g. causes of disease or death, the consequence of wounds, the conditions of gestation, etc. *(Gardner Peerage Le March R. 169).*

Technical Terms may always be explained by experts *(Re Cliff (1897) 2 Ch. 229)*, unless they are equally intelligible to ordinary readers.

Scope. An expert may give his opinion upon **facts** which are either admitted or proved by himself, or other witnesses in his hearing at the trial, or are matters of common knowledge, as well as upon hypothesis based thereon.

Reference to Text Books. An expert may refer to books to refresh his memory, or to correct or confirm his opinion *(Collier vs. Simpson 5 G. and P. 73).*

Examination of Witnesses.

ıter a witness has by oath, affirmation, or admonition been .ced in a position to give evidence, he is examined by the party who has called him—which examination is known as Examination-in-Chief. All questions which are relevant and admissible are allowed, except that questions may not be put in a leading form—that is, anticipating the answer desired. This does not apply in introductory or undisputed matters, or where permission has been granted to treat a witness as hostile. (*Stein v. R. 1908 J.S. 819*).

The party calling a witness cannot bring general evidence to discredit him, but he may call other evidence to show that his statement in this respect was wrong (*R. v. Finn 1918 E.D.L. 2*).

Examination-in-Chief is followed by Cross-Examination of the witness by the person against whom he gives evidence, or his legal representative. The object of this is, by means of the opposite party's own witnesses, to weaken or destroy the case which that party seeks to establish, or to prove that of the cross-examining party. The omission to cross-examine a witness on a fact, will sometimes lead to the inference being drawn that his story is accepted as truthful and accurate.

The only restriction on the matter and form of questions in cross-examination is that they are relevant to the issue, and not seeking privileged information. Leading questions may be put, and need not be confined to matters which have been testified to in examination-in-chief, and they are relevant if they tend to show the witness unworthy of evidence. When a witness has been subjected to cross-examination, the party who called him is entitled to re-examine him with a view to re-establishing his credit where it may have been damaged, or of explaining any points raised in cross-examination. The re-examination is subject to the same restrictions as to leading questions as the examination-in-chief, and in addition must be confined to the points which were raised in the course of, or to matters which arise out of the cross-examination.

Where questions are put to witnesses for purposes of shaking their credibility, in the course of cross-examination, it must be noted that no witness is bound to answer any question which might expose him to penalty, forfeiture, or to a criminal charge, or to degrade his character (301, 31/1917). The Court should warn a witness that he need not answer when it sees that the effect of a question is to incriminate a witness (*R. v. Ramakok 1919 T.P.D. 305*).

Fees of Witnesses. (S. 255, Act 31/1917.)

Payment of witnesses, whether for the Prosecution or Defence, takes place upon the order of the Court or Magistrate before which the witness appeared. Defence witnesses are only paid if they come

within the circumstances prescribed by the Regulations. Tariffs are based on the circumstances of life of the witness, distance travelled, etc. For instance, the fee payable to expert witnesses in Criminal or Civil cases in the Union is £1 1s. per diem provided he is resident over five miles from the place at which he has to attend. Also railway warrants will be issued which entitle witnesses to their return tickets.

JL. S. AFR. VET. MED. ASS.
III (1) 1932.

The Genus *Agriostomum* with a description of *A. cursoni* n. sp.

By H. O. MÖNNIG, B.A., Dr.Phil., B.V.Sc., Onderstepoort.

The genus *Agriostomum* was created by Railliet (1902) for a worm which he described as *A. vryburgi*, collected by A. Vryburg, from a Zebu *(Bibos indicus)* at Deli, Sumatra. Subsequently the worm was again described and figured by Railliet and Henry (1913) from the original material, by Lane (1923) from specimens collected at Darjeeling from *Bos indicus*, by Smit and Notosoediro (1923) from specimens which they collected from an ox in Java, and by Ware (1925) from specimens taken by him from a calf *(Bos indicus)* in South India, with which he also compared Lane's material.

The type species for a long time remained the only known species of the genus, until le Roux (1929) described *A. gorgonis* from the blue wildebeest (*Gorgon taurinus*) and Mönnig (1929) described *A. equidentatum* from the springbuck *(Antidorcas marsupialis)* both collected in South Africa. In this paper another South African species, *A. cursoni* from the sassaby *(Damaliscus lunatus)*, is added.

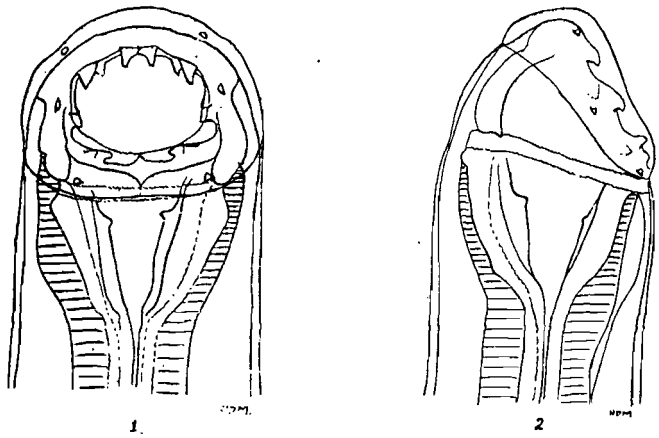

Fig. 1. *Agriostomum cursoni* n. sp. head, dorsal view.
Fig. 2. *Agriostomum cursoni* n. sp. head, lateral view.

Agriostomum cursoni N. SP.

The description is based on three males and two females collected from a sassaby at the Kudumane River, in the northern part of Bechuanaland, by Dr. H. H. Curson of this Institute. I have much pleasure in dedicating this species to the collector.

The worm is rather like *A. gorgonis*, but differs in a few important points. The appearance of the buccal capsule, the oesophageal funnel, and the teeth can be seen from Figs. 1 and 2. The mouth

collar is well developed and the six head papillae are distinctly visible. The ventral pair of teeth are close together and, as in *A. gorgonis* and *A. equidentatum*, the subdorsal, lateral, and subventral teeth are double. In this species the inner tooth of each pair is smaller than the outer, but not so much smaller as is the case in *A. gorgonis*. The oesophageal funnel has on the inside two subventral longitudinal thickenings of its wall, each bearing a fairly strong lancet, while the dorsal gutter also bears a small tooth-like process (Fig. 2) which is, however, not as prominent as the same structure in *A. equidentatum*.

In this respect the description of *A. gorgonis* requires amplification. The original material of le Roux had not been very well cleaned before fixation, and the internal structures in the oesophageal funnel were thus not distinctly visible. The writer later obtained very satisfactory material of what is undoubtely *A. gorgonis* from the type host, and in these specimens it can be clearly seen that there are subventral lancets and a lancet-like process on the dorsal gutter as described above in the case of *A. cursoni*.

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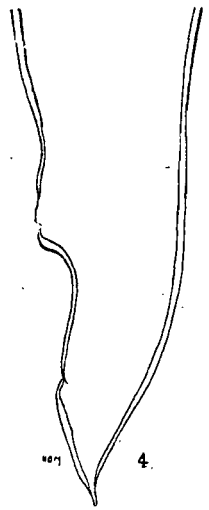

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Fig 3. *Agriostomum cursoni* n sp. Male bursa.
Fig. 4. *Agriostomum cursoni* n. sp. Female, hind end.

The portion of the oesophagus behind the funnel is club-shaped and is 0.88-0.91 mm. long in the males and 1.08-1.1 mm. in the females. The cervical papillae are small, 0.88 mm. from the anterior end. The excretory pore and the nerve ring are respectively 0.71-0.77 mm. and 0.65 mm. from the anterior end in the males and 0.77-0.89 mm. and 0.77 mm. in the females. There is no sign of a cervical groove as in the type species.

The **males** are 12.5-13.8 mm. long and 0.46 mm. thick. The buccal capsule and oesophageal funnel together are 0.37 mm. deep.

The bursa (Fig. 3) has well-developed lateral and dorsal lobes and the rays present no special features, being very similar to those of the other species of this genus. Prebursal papillae are present. There are two equal, alate spicules, 1.1-1.28 mm. long, the alae ending abruptly as in the other species. A gubernaculum is absent and there is a telamon as described for *A. equidentatum* and *A. gorgonis*. A similar structure appears to be present also in *A. vryburgi* and has been incompletely illustrated by previous authors.

The two **females** are respectively 14.5 mm. and 17 mm. long by 0.53 mm. thick. The buccal capsule and oesophageal funnel are together 0.42 mm. deep. The tail is short and acute as in the other species, measuring 0.26-0.27 mm. in length. The vulva is prominent an situated 0.6-0.66 mm. from the hind end of the body. The vagina is fairly short, one ovejector runs straight forward while the other is directed backward but immediately bends also forward. The eggs measure 0.071-0.075 x 0.045-0.049 mm. and are segmenting.

HOST: *Damaliscus lunatus.*
LOCATION: Small intestine.
LOCALITY: Northern Bechuanaland.

Type specimens in Onderstepoort Helminthological Collection No. 2341.

While it will be seen that this species is very close to *A. gorgonis*, the following differences seem to warrant the creation of a new species. The difference in size of the internal and external teeth is not so large as in *A. gorgonis*. The worms are distinctly larger than the biggest specimens of *A. gorgonis* in a fair amount of material from three different hosts. The spicules measure 1.1-1.28 mm. in length while those of *A. gorgonis* are 0.95-1.06 mm. long. (Le Roux (1929) gives the length as 1-1.2 mm. for the latter species; the present writer measured the spicules of all the type males and a number of others and obtained the measurements given above).

A. vryburgi.

Through the kindness of Dr. H. J. Smit of Buitenzorg, the writer obtained a male and a female of *A. vryburgi* which, as stated above, had been taken from a Javanese ox. This material was studied in order to determine whether in this species also the teeth are not paired as in the other three species and to settle a few other points in its morphology.

The mouth opening is fringed with a number of delicate, somewhat pointed, membranous structures resembling, as Lane describes, "a primitive, or degenerate corona radiata." The border of the mouth capsule bears two ventral and, on either side, a subventral, a lateral, and a subdorsal tooth. The subdorsal was not originally described by

Lane, but was later seen by Ware and also by Lane in the same material, as stated by the former. Without the knowledge accrueing from a study of the three subsequently discovered species, one would not notice any more teeth, but on a close search it is quite evident that *A. vryburgi* also has double teeth. This was quite clearly seen in the case at least of the subventral and the lateral teeth, while no definite internal teeth could be found in the case of the subdorsal ones. These internal teeth are very small and are, in fact, nothing more than small tubercles of chitin next to the bases of the external teeth (Figs. 5 and 6).

Further it was found that *A. vryburgi* has, like the other species, a small median dorsal plate projecting forward between the subdorsal

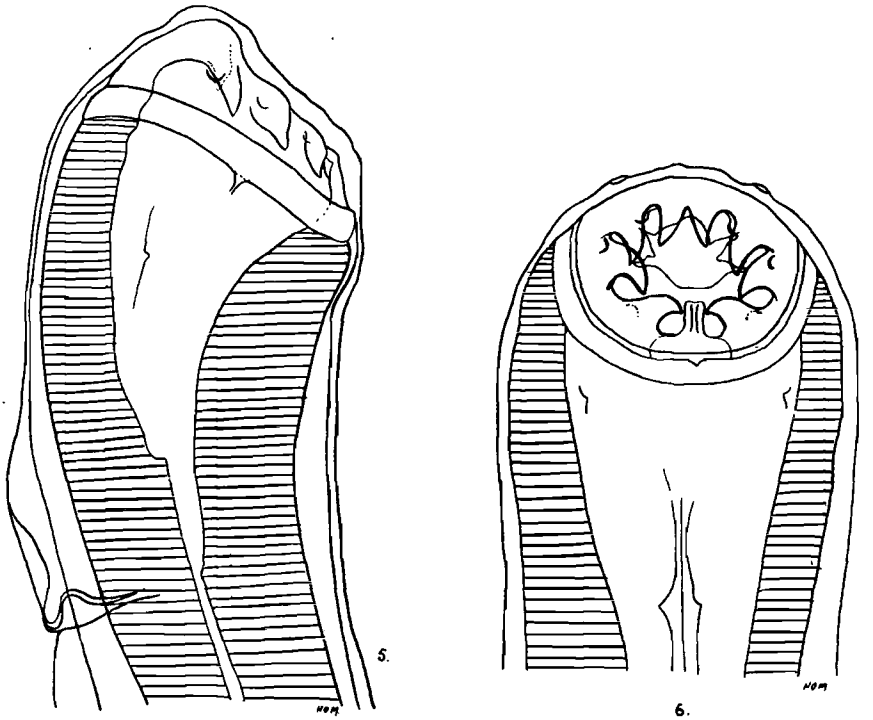

Fig. 5. *Agriostomum vryburgi* head, lateral view.
Fig. 6. *Agriostomum vryburgi* head, dorsal view.

teeth. This plate has two parallel grooves, which may give it the appearance of having "a bifid free extremity" as stated by Ware.

The oesophageal funnel bears a pair of very minute subventral lancets while, at its posterior end, the cuticle also forms two subventral projections which may act as lancets (Fig. 5). On the posterior border of the broad band which separates the buccal capsule from the oesophageal funnel, there are laterally a pair of highly refractive spots, which may be the openings of the ventral oesophageal glands.

Such structures are also present in the other species. The dorsal gutter is not conspicuous and bears no lancet.

As has been described by all previous writers on this subject, *A. vryburgi* has a distinct ventral cephalic groove. For this reason Railliet and Lane have considered the parasite to be allied to the *Oesophagostominae*. Although the other three species have no sign of a cephalic groove, they resemble *A. vryburgi* so closely in other particulars that there can be no doubt of their belonging together in the same genus.

The location of the *Agriostomum* species in their hosts seems to be of some interest. *A. vryburgi* is stated to have been found in the duodenum, by Railliet and Henry (1913) and in the same organ by Smit and Notosoediro (1923), while the other authors record either "gut" or "intestine." *A. equidentatum* was recorded as having been taken from the small intestine of the springbuck, but the writer has since had two opportunities of collecting this parasite personally from the same host and has in both cases found the worms firmly attached to the mucous membrane of the *ansa spiralis* of the colon, while the small intestine contained none. *A. gorgonis* is stated by le Roux to have been taken from the ileum of its host, and this is also recorded in the notes of Mr. Bedford, the collector. It is not clear in which part of the intestines was found the material of *A. gorgonis* which was subsequently obtained by the writer. In the case of *A. cursoni*, there seems to be no doubt that the worms were taken from the small intestine.

The generic diagnosis of *Agriostomum* can now be given as follows: *Ancylostominae:* anterior extremity bent dorsally; buccal capsule shallow, oesophageal funnel very large; oral margin surrounded by four pairs of teeth which are usually double except the ventral pair; the oesophageal funnel contains two subventral lancets and usually a tooth-like projection from the dorsal gutter. A ventral cervical groove may be present. Male: ventral rays close together and parallel, antero-lateral short and separated from the other laterals, externo-dorsal arises from the dorsal trunk, dorsal bifurcates twice; spicules equal; gubernaculum absent but a well developed telamon is present. Female: vulva near anus, amphidelph. Parasites of ruminants.

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A Policy Regarding Native Animal Husbandry.

By J. QUINLAN, J. H. R. BISSCHOP, and H. H. CURSON,
Onderstepoort.

INTRODUCTION.

The lack of research into types of South African cattle other than the Afrikander is little less than a reproach to us by whom the slogan "South Africa first" is constantly repeated. Although we may realise, to consider the analogy of the flora around us, that many of the plants at present existing have successfully overcome the vicissitudes associated with climatic, physiographic, edaphic, and biotic factors, it is apparent that we have yet to learn to appreciate the significance for animal husbandry of our native stock which, since their introduction centuries ago, have already passed through trials yet to be overcome by stock of European origin.

At present there is for some considerable reason a strong prejudice against native cattle, but it is forgotten that imported cattle in this country do not retain the European standard of excellency unless special care is bestowed on them. How then can the native beast, left to its own resources and with no policy in selection, be expected to maintain itself?

It is somewhat a reflection on those entrusted with the development of animal husbandry from colonial days (1) until the present time that, apart from Mr. R. Thornton (Director of Native Agriculture, Department of Native Affairs), who has at Ngoma in Zululand a herd of white Nyonihipumuli cattle, no one has taken the trouble to establish herds of cattle of the various types. In Tanganyika, McCall (2) has done this with success; and in India, as a result of judicious selection of the Sahiwal cattle at Ferozepore Farm, "to-day the average yearly milk yield of that herd approximates to 9,000 lb. or more per cow." (1st Qtrly. Bull., Imp. Bur. Animal Genetics, p. 5, 1929).

The authors consider it profitable briefly to discuss the advantages, not only academic, but also economic, likely to accrue from the application of a similar policy in this country and a definite scheme to this end has been outlined.

ADVANTAGES.

(1) At present nothing definite is known regarding our native cattle. Types have actually disappeared within recent years with no

(1) After the Boer War, the Repatriation Department allowed Mr. A. C. MacDonald of the Department of Agriculture, Transvaal, to select 50 head of Afrikanders as a nucleus for further improvement. The result of this experiment is not known. (*Tvl. Agr. Jl.* III. 2).

(2) McCALL, F. J. (1928). *Ann. Rpt. for* 1926 *Dept. of Vet. Sc. Tanganyika Territory.* Published by Crown Agents of the Colonies, London.

description or even skeletal material being available. Thanks to Nobbs (3) the cattle of Southern Rhodesia have been described, but unfortunately photographs of the various types were not included in his paper. Further, it is scarcely possible intelligently to carry out grading experiments (using European bulls) unless something be known of the foundation stock on the female side (usually loosely described as "native stock"). The native cattle differ among themselves as do European cattle, and it is as unsatisfactory to compare progeny of a certain bull from e.g. a Makalanga cow with that from a Bechuana cow, as to compare the offspring of a thoroughbred sire from pony and hackney dams.

(2) When certain types have been recognised, it will be apparent that each possesses advantages in a particular environment over European breeds. Such advantages include (a) anatomical factors, e.g. suitable conformation, especially of the masticatory apparatus, and (b) physiological, e.g. ease in locomotion, natural resistance to disease, tolerance of sun and heat, etc. Obviously, by selection, the various points enumerated are capable of improvement.

(3) In succeeding generations considerations such as milk yield, fat percentage, beef production, and transport service might be developed in proportion to the amount spent on food.

While the late maturity characteristic of native stock is a serious handicap, it is contended that this could be rectified by selection in breeding and attention to feeding. By supplementary feeding, especially of phosphates, du Toit and Bisschop (4) have shown that earlier maturity may be realised.

(4) Finally, a study of native cattle would provide information not only on the changes (principally degenerative), that are taking place to-day, but also on the ancestry of South African cattle. For example, McCall (5) suggests that the Ankole of East Africa and the Afrikander are descended from a common type. Knowledge of such facts would popularise the use of South African native cattle, favouring the establishment of an export trade with countries whose climate resembles that of the sub-continent. At present only the Afrikander has received any attention, but the Bechuana, given the same care, may prove a far better beast.

POLICY.

It is proposed that a herd, consisting of two bulls and ten first calf cows, be established in each of the areas of the Union where

(3) NOBBS, E. A. (1927). The Native Cattle of Southern Rhodesia, *S. Afr. Jl. Sc.* XXIV. pp. 328-342.

(4) DU TOIT, P. J. and BISSCHOP, J. H. R. (1929). The Breeding of Cattle on Phosphorus Deficient Veld. 15th Rpt. D.V.S. p. 1160. Graph 4.

(5) McCALL, F. J. (1928). *Loc. cit.* p. 62.

native cattle exist, e.g. Zululand, Northern Transvaal, and Southern Bechuanaland (and elsewhere if considered advisable). If the matter were explained to the South Rhodesian and Bechuanaland Protectorate Governments, it is felt that they would co-operate. It should be realised that the problems of animal husbandry by which we are faced are common to all the countries of the sub-continent.

Although from the point of view of standardisation and study generally it would be preferable if the cattle were kept in their own areas, supervision under such circumstances might prove difficult. A possible alternative would be to run the several herds on a central farm, preferably in the middleveld, where one officer would be responsible.

CONCLUSION.

A plea is advanced for the study of the native cattle of Southern Africa, some of the advantages being enumerated. Since there is no policy (apart from an effort being made by the Department of Native Affairs), a scheme, namely selection from among the best of certain types, is put forward. Details as to standard can be dealt with later. Never have conditions for such an investigation been so favourable as at the present time when cattle are cheap and the natives anxious to dispose of them on account of the recent drought.

Native Sheep and Goats.

Addendum by J. G. BEKKER, Onderstepoort.

At the request of one of the above authors (H. H. C.), I am adding a few remarks in connexion with the necessity for a thorough study of our indigenous sheep and goats.

The development and evolution of the various breeds of domesticated animals kept by natives in Africa has been allowed to progress naturally without any effective interference by skilled breeders, with the result that those animals best suited to their surroundings have survived and those not so well suited have been crowded out. It has been remarked by competent authorities that from the point of view of types of sheep, Africa possesses unique material for further examination and study. We are the trustees of this material, and it is our duty of instigate research and to apply to the native stock around us the methods of animal improvement so successfully employed in the development of the various European breeds of livestock.

The Blackhead Persian is assuming an important rôle in sheep farming in the Union. This breed, indigenous to Africa and a native of Somaliland, has, from the point of view of production, improved considerably since its introduction into South Africa, because the European farmers are equipped with a better understanding of the principles of animal husbandry.

It is singular that none of the so-called "kaffir" breeds of sheep and goats has received our serious attention. These breeds may possibly possess valuable latent characteristics, which by better management and breeding, could be utilised with advantage in our pastoral industries. These types afford suitable basic material for crossing with other breeds and so improving the productivity of the offspring. Attention should be focussed on such factors as milk qualities, mutton properties, wool and fur characteristics, and suitability of skins for the glove trade.

Apart from economic considerations, interesting and, no doubt, ultimately useful information will be accumulated also by making comparative anatomical and physiological studies. It is commonly held that indigenous sheep and goats are exceedingly resistant to our peculiar communicable diseases. Whether this is definitely so and whether it is natural immunity or acquired resistance is not clear. From a genetic point of view we know practically nothing about the behaviour of possible factors involved in natural resistance to disease. Material in our immediate vicinity is available for such studies. Are we making the best use of it?

JL. S. AFR. VET. MED. ASSN.
III (1) 1932.

Foot and Mouth Disease in Southern Rhodesia.

By Dr. P. J. DU TOIT, Director of Veterinary Services and Animal Husbandry, Union of South Africa.

At the request of the Hon. R. A. Fletcher, Minister of Agriculture for Southern Rhodesia and with the consent of our Minister, General J. Kemp, Dr. du Toit proceeded to Rhodesia on the 30th September, 1931, to study the position regarding the outbreak of Foot and Mouth disease in that Colony and presented this report to the Southern Rhodesian Government.

The detailed description of the trip as contained in Section I, and of the position of the disease in the various places visited, Section II, is omitted by reason of lack of space and because the information is sufficiently recapitulated in subsequent sections.—(Ed.)

I. ITINERARY.

II. THE POSITION AS I SAW IT.

III. REVIEW OF THE POSITION.

Looking at the map of Southern Rhodesia, we see a large block of infected country in the southern and central districts (Gwanda, Chibi, Belingwe, Victoria, Selukwe, and Chilimanzi). More isolated outbreaks have occurred in the Charter District (around Enkeldoorn), the Salisbury and Mazoe Districts, the Gwelo District, and the Bubi, Insiza, and Umzingwane Districts.

Looking at these isolated outbreaks first of all, we see that the infection has completely disappeared in the areas around Enkeldoorn and Gwelo; that the few fresh infections in the Salisbury District apear to be well under control; and that in the districts surrounding Bulawayo the position is also stated to be well in hand. All freshly infected areas are surrounded by cordons.

In the large infected block we have seen that no spread of the disease has taken place in an easterly direction for some considerable time. There appears to be good reason to hope that the existing cordons will prevent such a spread.

Since the original outbreak, there has been a tendency for the disease to spread slowly in a westerly direction in this block. Fairly large areas have recently become infected in the Selukwe District (Tokwe Ranch and adjacent farms), the Belingwe District (a large section of the Belingwe Reserve and the Wedza Block), and the Gwanda District (the area west of the Umzingwane River).

A determined effort is now being made by the Authorities to prevent a further spread of the disease westward. A cordon has been drawn from the north-western corner of the Chilimanzi Reserve (where it meets the cordon on the northern boundary of this Reserve referred to previously), along the Nuesi River, then north and west of the

Tokwe Ranch, and all along the infected area in the Lundi Reserve, enclosing the infected portion of de Beers Block; it then runs in a general southerly direction through the western portion of the Belingwe Reserve (which is not at present infected) and to the west of the Wedza Block (Section VII and IX of Liebig's Ranch) and the adjoining recently infected farms (Tygerberg, etc.) until it strikes the old Pioneer Road, which it follows until it reaches the infected area on the Umzingwane River; this entire area is enclosed by the cordon, which meets the Rhodesian-Bechuanaland border at the Bakali Block on the Shashi River north-west of Fort Tuli.

IV. Notable Features of the Outbreak.

1. The low rate of mortality amongst infected cattle was an important feature of the disease in Rhodesia from the start. It is doubtful whether any adult cattle died as a direct result of the disease. Amongst new-born calves there was certainly a fairly high mortality (perhaps 40—50%) when the disease first broke out on the Nuanetsi and Liebig Ranches, but since then the mortality in small calves seems to have decreased. The reports about mortality in pure-bred animals also seem to have been exaggerated. On Liebig's Ranch the mortality amongst pure-bred Sussex calves was less than 10%, amongst Aberdeen Angus and Afrikander calves it was very much less still. No adult pure-bred animals were lost on this Ranch.

2. The low degree of infectivity to which reference has already been made, stands perhaps in direct relation to the low mortality. Examples have already been quoted of animals coming in close proximity to infected animals and yet not contracting the disease. Many cases have been observed in Rhodesia where infected animals passed through clean areas without leaving the infection behind them.

3. Probably as a consequence of the low infectivity the disease seems to have infected game on rare occasions. Mention has been made of the infected kudu. Specimens of infected feet of bush-pig were also seen. Cases were further reported of infection in other animals including horses and fowls, but no authentic proof for these statements was forthcoming. In many other instances game which were shot in infected areas were found to be entirely free from Foot and Mouth disease.

4. These facts again explain the apparently unimportant rôle played by game in the spread of the disease. The history of the infection on the Central Estates illustrates the point. Here large numbers of game moved from the infected paddocks to the clean paddocks without carrying the infection. The same must have happened on innumerable occasions in the other infected areas. It should further be pointed out that, had it not been for this comparative freedom of game from disease, the Union of South Africa could scarcely have escaped infec-

tion, seeing that game are constantly moving backwards and forwards across the Limpopo River.

5. In practically all cases where the history of the outbreak on a farm was known, it was found that infection was due to direct movement of cattle. In many cases direct contact was responsible for the infection, in other cases infected animals rested on a farm and the local animals apparently picked up the infection on the camping ground.

6. There are only a very few outbreaks in Rhodesia which cannot be accounted for in the way mentioned in the preceding paragraph. Reference was made above to the outbreak on the farm Crowborough, west of Salisbury, which, in my opinion, was probably due to natives carrying the infection from the Salisbury Commonage. A more baffling outbreak was that on the Lochard Block which occurred at least 60 miles from the nearest infection. The origin of this outbreak has not yet been traced.

7. This brings me to the interesting question regarding the source of the original outbreak in Southern Rhodesia. In spite of exhaustive enquiries, nothing definite can be said about it. At this stage it is only possible to speculate, and many possibilities suggest themselves. To me it still seems most likely that the infection was brought overland from East Africa (where the disease exists enzootically) perhaps by means of a motor car. It seems quite feasible that a motor party might have brought the virus from East Africa either in the form of infected meat, or infected hides or hoofs of game, or, more likely still, in the dried state attached to hay or straw. The party may have stopped at various towns along the road from the north and may have camped at the crossing of the Nuanetsi River, where the virus, attached to the straw which had been used as packing material, was left lying about and was responsible for the infection of the first animals at this spot.

It is, of course, to be regretted that the source of the original outbreak cannot be traced. Had we known how the infection was brought into Rhodesia, we should be in a better position to prevent a recurrence of the event. In the absence of this knowledge, we do not know how to guard against the introduction of a similar infection in the future; and it should be remembered that, should the disease be introduced again at any time in the future, it may break out, not in Rhodesia, but in the Union of South Africa.

V. Measures Adopted by the Authorities in Rhodesia.

The history of the spread of the Foot and Mouth disease in Rhodesia reads like a chapter of accidents. Had the disease been diagnosed a fortnight earlier on the Nuanetsi Ranch, it would probably never had spread beyond the boundaries of the Nuanetsi and Liebig

Ranches. Again, if the diagnosis had been made a few days earlier, the spread from Victoria to Enkeldoorn and Gwelo could have been avoided. And in the case of the Lochard outbreak, the receipt of the report a few hours earlier could have prevented the outbreak and spread of the disease in the Salisbury and Mazoe districts.

These facts are recalled here to emphasise the point that, before any steps whatever could be taken by the Rhodesian authorities, the disease was already present in a wide area (Nuanetsi, Victoria, Gwelo, Enkeldoorn). At that time it seemed almost impossible to prevent the disease from spreading right through the country in a short time. Active measures seemed hopeless, except in so far as the movement of cattle was concerned.

1. The restriction of the movement of cattle has been one of the chief weapons in fighting the disease in Rhodesia. The successful restriction of the disease to the originally infected areas proved the efficacy of this measure. A slow spread of the disease by immediate contact certainly took place, but no big jumps were recorded for several months.

It is impossible to generalise on a subject such as this, and I realise only too well the necessity for examining each case on its merits. Nevertheless, I am of opinion that the movement of cattle in the neighbourhood of infected areas might possibly have been restricted still further right from the start. A general standstill order would perhaps have been impracticable, but a state of affairs as near as possible to this would, in my opinion, have saved many areas which became infected in the course of the last six monhs.

I have gained the impression that very strict vigilance on the movement of cattle is now being observed by the veterinary authorities, and I strongly endorse the necessity for such vigilance. This point will be referred to again.

2. The second important measure which is now being adopted is the guarding of infected areas by means of cordons. The existing cordons have been referred to above. From the information at my disposal it would seem that since the institution of this measure the disease has in no case broken through a cordon. This would seem to make the outlook for the future much more hopeful than it appeared to be some time ago. The placing of the cordons under Police supervision as has now been done will, in my opinion, increase rather than decrease their efficiency.

3. Various other measures have been applied in local areas as circumstances necessitated.

The shooting of game was prohibited in an area 25 miles north of our border (Proclamation No. 13 of 1931). In spite of what has

been said above on the low infectivity of the disease for game, I still consider this measure to be very important, and I hope that Proclamation No. 40 of 1931 which appeared in the Southern Rhodesia Government Gazette on the 25th September, 1931, is not intended to cancel this order.

The removal of cattle from certain areas to prevent the spread of the disease was carried out with success in various instances. This measure has been particularly valuable in protecting the borders of neighbouring territories.

The herding of native cattle has been enforced in some cases. I regard this as a very valuable measure and, if necessary, further legal powers should be obtained to make it compulsory wherever it is considered essential.

Restrictions on the transport of certain products such as meat, milk, etc., are also of importance in the prevention of the spread of infection.

4. In this connection a measure should be mentioned which is not intended to stop or prevent infection, but rather to spread it and so get it over quickly. I refer to the deliberate exposure and infection of animals. One difficulty in connection with the disease has been, in many instances, the slow spread of the infection. This was undesirable in such cases where the animals were bound to become infected sooner or later, for instance in Native Reserves. The spead of infection in these cases was further retarded by the precautionary measures taken by the veterinary authorities when the disease first broke out, namely, the cessation of dipping in the infected districts. In order to assist in the rapid spread of the infection in such cases, the Authorities have now arranged to have all the native cattle brought together at the dipping tanks at regular intervals (e.g. weekly) so as to bring infected and non-infected animals in close contact with each other. The method has been very successful in many instances.

Brief reference should also be made here to the artificial infection of animals. In many instances it would have been of great help to the Authorities if all animals exposed to the disease could have become infected at the same time. Experiments were conducted by Mr. Bevan at his laboratory in Salisbury, and he experienced considerable difficulty in transmitting the infection to cattle. However, Mr. Bevan has now succeeded in finding a satisfactory method, and it is expected that this method will be of material assistance.

5. Reference should also be made to certain measures which were not adopted by the Rhodesian authorities. I think in the first place of the slaughter of animals. Had the original outbreak occurred on a fenced farm with a comparatively small cattle population, I dare

say the authorities would immediately have slaughtered the infected and contact animals, and the disease might have been wiped out in this way. But with the actual course of events in Rhodesia this measure was entirely out of the question. It would have been, not only financially, but also physically impossible to shoot all the animals on the Nuanetsi and Liebig Ranches.

However, this measure should not be entirely dismissed from our minds. It is quite possible that the disease may disappear from the whole of Rhodesia and linger on in one or two isolated spots, or break out in a distant and dangerous area; and it is then that it might be more profitable to destroy the infected animals than to continue the other protective measures for a long period.

VI. RECOMMENDATIONS.

In the previous section the measures adopted by the Rhodesian Authorities have been discussed. It has also been shown that these measures have been responsible for a considerable improvement of the position regarding the disease in Rhodesia during the last two months. If this improved position continues it would seem unnecessary for me to make further recommendations. Nevertheless, I should like to emphasise certain points in connection with the measures already in force, and incate my views in regard to others.

1. I have tried to sketch, in Section II of this report, the general distribution of the disease in Rhodesia. It was shown that there was a large block of infected country in the southern and central districts, and that more isolated outbreaks had occurred:

(a) around Enkeldoorn,

(b) around Gwelo,

(c) in the Salisbury and Mazoe districts,

(d) in the Bubi, Insiza, and Umzingwane districts.

Outbreaks (a) and (b) have cleared up. My recommendation is that a determined effort be made to eradicate the disease from (c) and (d) as soon as possible. When this task is accomplished, all available forces can be concentrated on the large infected block and the prospects of a final eradication of the disease will be much brighter.

The methods to be employed for the achievement of this object must be decided on by the local veterinary authorities. Rigid quarantine of cattle in and around the infected areas; a strong cordon around the areas; frequent inspections of suspected farms, etc., are amongst the most important measures to be enforced.

2. As soon as these "outposts" of the disease have been disposed of, all efforts can be directed against the central infected area. Here again the first aim should be to "clean up" the spreading "tentacles"

of the infection and thus reduce the infected area. One such "tentacle" is at Felixburg, where quite recently a further farm (Beema) became infected.

It has been stated that the spread of the disease from this central area eastward has apparently been checked. On the south it is hoped that the Union of South Africa will continue to be successful in preventing a further spread. The greatest danger lies on the west and here the defending forces will probably have to be strengthened.

3. If we take for granted that all the present centres of infection in Rhodesia are known, and that the object from now on will be to confine the disease to these centres until it dies out naturally, then reliance must be placed chiefly on the cordons which guard these areas.

Obviously the strength of the cordons is limited by financial considerations. But in view of the present comparatively favourable situation, it would be wise to be relatively liberal with expenditure on this service and so curtail the duration of the campaign. I would urge that the strength of the cordons be increased up to the point at which the local veterinary officers regard the position as sufficiently safe. Probably the supervising staff would also have to be increased temporarily.

4. The work of the cordons can be effective only if there is complete control over the cattle both inside and immediately outside the infected areas. On most of the fenced European-owned farms the position is probably quite satisfactory. But this, according to my information, is not the case in the Native Reserves. Straying of cattle is not uncommon, and apparently there is no legal barrier against the movement of cattle from one end of a Reserve to another.

This position, in my mind, is unsatisfactory and should be remedied. It should be possible for the veterinary authorities to define areas (for instance "dipping tank areas") inside a Reserve, out of which cattle may not be moved without a permit. Suitable penalties should be prescribed for the contravention of such an order.

It should also be possible to enforce legally the herding and kraaling of cattle; also the watering of animals at certain times and places.

I further regard it as essential that the Minister should have power to order the destruction of cattle which have strayed or been moved from an infected into a clean area. The straying of some native cattle recently from the Gwanda Reserve to the infected area on the Dendeli River, and their subsequent removal by the owner back towards the Gwanda Reserve, illustrates forcibly the necessity for such a procedure as is contemplated here.

5. In order to safeguard the rest of the country and to prevent the spread of the disease over wide areas (as happened for instance in

the movement of cattle from Lochard to Salisbury) I regard it as essential that great care be exercised in granting permits for the movement of cattle. Every application for a permit should be looked upon as a reminder of the danger which such a movement might entail. However safe the circumstances may appear to be, every case should be regarded with suspicion and should receive very careful consideration and minute scrutiny.

If the movement of cattle over a long distance is considered to be essential and safe, a period of quarantine should still be insisted on. Generally speaking, such movement should only be allowed if the cattle are intended for immediate slaughter. In no circumstances should such cattle be allowed to go on a sale.

These precautions should be observed right through the country, even in districts which are regarded as clean. Here inspection of all cattle should be carried out as frequently and as thoroughly as possible.

The use of transport oxen should be restricted as much as possible. Inside the infected areas there can be no serious objection against the use of oxen, but in clean areas and especially in the neighbourhood of infected areas the greatest possible care should be exercised.

6. It is not intended to add here a series of recommendations which might be excellent in themselves, but could not be carried out on account of the cost. Recommendations such as (a) an increase in professional and other staff, (b) erection of fences round infected areas, (c) slaughter of cattle in such areas, and (d) evacuation of zones of country around the infection could all be supported with very good arguments, but would not be of any material use to the Rhodesian authorities, because they would entail expenditure which could not be faced at present.

I limit my recommendations, therefore, to those enumerated above, and would summarise them as follows:—

(i) Tackle the disease centripetally, i.e. first stamp out the infection in the outlying districts, then close in the cordon round the central infected block and confine the disease to this area till it dies out naturally.

(ii) Strengthen the cordons as much as possible.

(iii) Keep strict control over the movements of cattle in and around the infected areas.

(iv) If necessary, obtain further legal powers to enforce the restrictions.

(v) Exercise the greatest care in the issuing of permits for the movement of cattle, also in the supposedly clean districts.

(vi) Have a regular inspection of cattle in the "clean" districts.

(vii) Restrict the use of transport oxen to a minimum.

VII. What are the Prospects for the Future?

In August 1931, when Foot and Mouth disease appeared at Lochard, not far from Bulawayo, and was carried from there to Salisbury and Mazoe, it almost seemed as if the disease had got out of hand completely and was going to spread over the whole of Southern Rhodesia. Fortunately subsequent events have proved that this fear was unfounded. The authorities have gradually tightened their grip on the disease and my impression is that they now have the position in hand. If this impression is correct, and if no unforeseen accidents happen, it seems reasonable to expect that the disease will have "died out" in Rhodesia in less than twelve months from now.

The question immediately arises, what will be the position both in Southern Rhodesia and in regard to the neighbouring territories when active infection is no longer present? Will it be safe to remove all restrictions in Rhodesia immediately and are the neighbouring States likely to do the same? An answer to this question cannot be given here, but a few remarks bearing on the question will not be out of place.

Firstly, it should be borne in mind that even though fresh infection may not be known to exist, there may still be actively infected, mild, undetected cases which could cause a fresh and perhaps widespread outbreak if the restrictions were removed too soon.

Extreme caution is, therefore, indicated. It would be far better to enforce the restrictions unnecessarily for a few months than to raise them one week too early.

Secondly, the question of carriers of infection has to be considered. Up till quite recently it seemed rather doubtful whether true "carriers" of Foot and Mouth disease existed. The occurrences which suggested such carriers could also be explained in other ways. But now it has been proved conclusively by Waldmann and his co-workers in Germany that some animals may excrete the virus in their urine up to 8 months after recovery. This important discovery has a very direct bearing on the position in Rhodesia. In the first place, it implies that recovered animals may be a source of danger should they mix with susceptible animals. This means that it would be unwise completely to remove all restrictions from areas where the disease has apparently disappeared. My recommendation is that for a period of nine months after the disappearance of the disease from an area such area be kept under quarantine and that movement of cattle into and out of the area be allowed only under permit. There need be no objection against cattle being sent to the abattoirs for immediate

slaughter, but as far as possible cattle from such an area should not be allowed to mix with cattle which have not had the disease.

The second implication is that the neighbouring territories will probably be loath to receive cattle from previously infected areas for a period of at least nine months after the disappearance of the disease from the whole country. Again, in my opinion, there need be no objection against animals intended for immediate slaughter.

From the above remarks it would seem that, even if we take a fairly optimistic view of the position, there will be no appreciable outlet for Rhodesian cattle for another year or two. In that case the problem of overstocking may become serious. Some ranches and farms may be able to carry the extra number of cattle, but others (including probably many native Reserves) cannot do so, and the question arises whether it would not be a wise policy in these cases to induce the owners not to breed from their cows this coming season.

VIII. What Safeguards can be Adopted for the Future.

It has been pointed out above that the source of the original outbreak of Foot and Mouth disease on the Nuanetsi River is still obscure. We are, therefore, faced with the position that at any time in the future the disease may again be introduced in the same way. Can nothing be done to guard against this danger?

Before attempting to answer this question a few aspects of the general problem may be stressed.

In the first place it should be borne in mind that the danger is one common to the whole of Southern Africa. For about 40 years Africa south of Tanganyika Territory had been free from Foot and Mouth disease. Then without any warning the infection was brought into this clean area and was dropped in the heart of the cattle country in Southern Rhodesia. If ever the disease should be brought in again in the same way it might break out in Northern Rhodesia or in Natal or in the Transvaal.

The moral appears to me to be that these neighbouring States in the South should get much closer together in their combined fight against the dangers which threaten them from the tropical countries in the north. The days are definitely over when each political State could, in matters of this nature, regard itself as an independent unit. Modern progress, especially the rapid modes of transport, have wiped out boundaries and brought countries much closer together. Nairobi is to-day closer to Pretoria than, say, Mossel Bay was a few years ago. In Europe a complete change has already come about during the last few years. Representatives from practically every country now meet regularly two or three times a year at the International Veterinary Office in Paris to discuss matters of mutual interest. It behoves

us in South Africa to organise in a similar manner. Only if we do this can we hope to be able to cope effectively with a big problem such as the one now under discussion.

There is also a financial side to this problem. When a disease like Foot and Mouth disease breaks out in a sparsely populated country like Rhodesia, the difficulties are no smaller and the financial burden no lighter than if it broke out in a thickly populated and far wealthier country such as England or France. Yet the small country is expected to fight the disease as effectively as the large State. Rhodesia may succeed, but another country may not be able to shoulder the burden, and then the disease must inevitably invade the neighbouring territories. To me it seems a much wiser policy to regard such an outbreak as a common concern and to expect all the territories which are involved to take part in the fight against the disease.

To return now to the question asked above, I submit that the answer should be in the affirmative. We can do something to prevent the introduction of the disease in the future provided we organise properly. With a proper organisation and with an efficient intelligence service it ought to be a comparatively easy matter to devise measures which would minimise the danger of introducing infection. But instead of each country in the south sitting at home and watching the border, the attack should be carried as far as possible into the "enemy" country, in other words, as near as possible to the centres of enzootic infection in the north.

IX. Concluding Remarks.

I may sum up my general impressions of the situation in Rhodesia as follows:—

The position regarding Foot and Mouth disease has definitely improved during the last few months. This improvement is due to the very active measures now being taken by the veterinary authorities in Southern Rhodesia. The measures could perhaps be tightened up in some respects as indicated in this report. The prospect of getting rid of the disease entirely, say within 12 months, is fairly good at present. Strict control will be necessary for a period of at least nine months after the apparent disappearance of the disease. Steps should be taken to guard against another introduction of the disease into Southern Africa in the future; such steps are more likely to be effective if they are taken conjointly by all the States in Southern Africa. In conclusion I wish to extend my hearty thanks to all those who assisted me during my stay in Rhodesia. In the first place my sincere thanks and appreciation are due to the Prime Minister, Mr. H. U. Moffatt, and the Minister of Agriculture, Mr. R. A. Fletcher, for the invitation which they extended to me to visit their country, and for the opportunity which they thus afforded me of seeing the conditions

in regard to Foot and Mouth disease for myself. This experience has been of great value to me personally and to the Department which I represent. My fervent hope is that my visit may be of some small assistance to the Government of Southern Rhodesia in the heroic fight they are conducting against this dread disease.

I wish further to thank very sincerely the many Government officials who placed their time and knowledge at my disposal. Mr. Sinclair, the Chief Veterinary Officer, made great personal sacrifices in order to accompany me throughout my tour. Without his wholehearted assistance and that of his staff, my visit would have been futile.

I am also very grateful to Mr. Bagshawe, the Secretary for Agriculture, and the members of his staff for their valuable assistance and the many stimulating discussions we had.

Finally, I wish to thank all those whose hospitality I enjoyed during my visit. The Prime Minister and other Members of the Cabinet, Government Officials and private citizens all gave me tangible proof of the proverbial Rhodesian hospitality.

These many tokens of goodwill and friendliness made my stay a very enjoyable one indeed. My final wish is that the spirit which prompted this invitation may lead to closer co-operation between the Government Departments of our respective States in all matters which affect the welfare of the whole of Southern Africa.

The following announcement, appended to a list of instructions to veterinary advisory officers, is quoted from The Veterinary Record* as being an ideal which Government Veterinarians in this country also would do well to bear in mind: "The N.V.M.A. have received a covering letter from the Minister of Agriculture in which it is stated that it is being made clear to the veterinary adviser that in all his dealings he must be guided by the fact that he is a member of the profession and that his conduct must be ruled by the etiquette of that profession."

* Vet. Rec. XI. 43, p. 1077. Oct. 1931.

CLINICAL AND GENERAL NOTES.

Coccidiosis of Sheep in Natal.

By A. S. CANHAM, F.R.C.V.S., Pietermaritzburg.

This short note records the occurrence of ovine Coccidiosis in Natal. Reports were received from the Mooi River district of a fairly

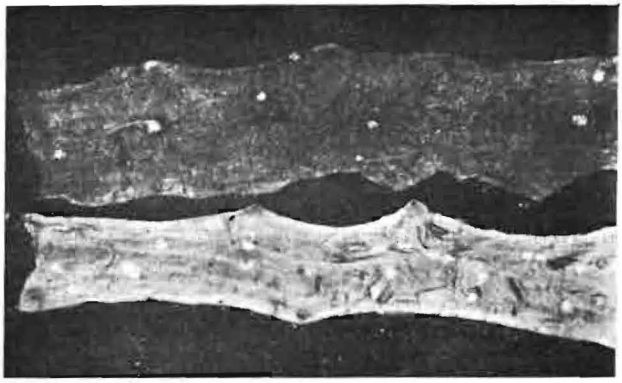

Fig 7. Lesions of coccidiosis (whitish areas) on the intestinal mucosa of a sheep.

heavy mortality among sheep from a disease, the chief symptom of which was a severe diarrhoea accompanied by loss of condition. It

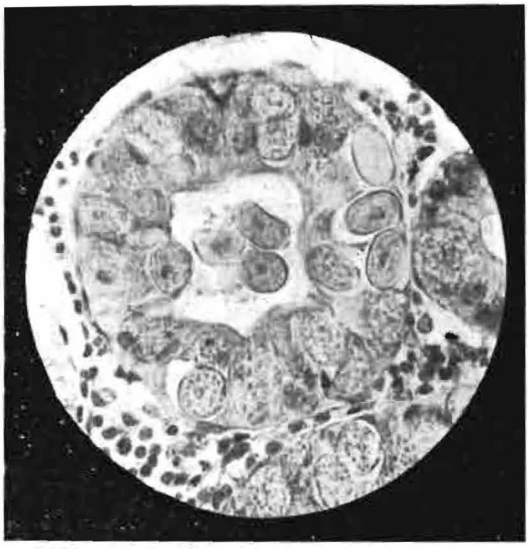

Fig. 8 Various stages of coccidia in glandular epithelium of intestine.

was stated that losses were heaviest amongst sheep six to twelve months of age.

Two such sheep sent to the Allerton Laboratory were both in very poor condition. The faeces were normal in appearance, being fairly dry and formed. Examination of a faecal emulsion by the direct method having disclosed the presence of a few coccidia, samples were centrifuged whereupon coccidia in large numbers and also nematode ova were seen. Daily examination of the faeces of the second sheep

Fig. 9. Large variety sporoblastic stage.

(the first was slaughtered) showed that the numbers of coccidia gradually decreased until they could be found only after a careful search. After a few more days coccidia increased in number coincidently with

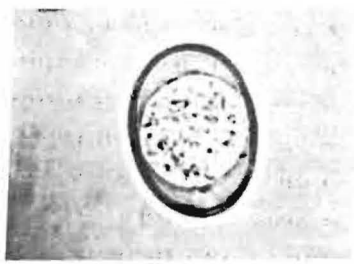

Fig. 10. Small variety of oocyst note envelopes.

a tendency to diarrhoea. It appears that mature oöcysts are excreted intermittently.

Post mortem examination showed a heavy infestation of *Haemonchus contortus* and *Trichostrongylus extenuatus*. Dotted through the length of the small intestines, and prominent on holding the opened gut against the light, were numbers of whitish foci, 1-2 mm. in diameter (See Figure 7), raised above the mucosa, and having denticulated edges and a central pin-point greyish spot. On squeezing or scraping them a small amount of whitish material was obtained in which coccidia in varying stages of development were evident on misroscopic examination.

The oöcysts varied considerably in size and shape and could be divided into three forms, viz. large oval, small oval, and circular. A large number were measured with the following results:

Variety	Average size	Maximum size	Minimum size
Large oval	26.2 x 21.1 μ	30.8 x 23.8	22.4 x 16.8
Small oval	19.09 x 16.1 μ	25.2 x 18.2	16.8 x 14
Circular	14.6 x 13.3 μ	16.8 x 15.4	12.6 x 11.2

The large oval forms were scarce. In both oval forms one end was broader than the other, and a distinct operculum was often visible at the sharper end. In others, however, one end was flattened and a micropyle was distinctly visible.

We were able by the usual methods to cultivate oöcysts up to the sporoblastic stage.

In scrapings from the intestine and in sections made of the intestine most stages could be seen. It appears that the lesions must have been of some standing, since in sections the forms most commonly seen were the macrogametocytes. The species was identified as *E. faurei*.

My thanks are due to Mr. Hill for the excellent photographs.

Further Notes on Pisgoed in Hamels.

By F. J. DUNNING, F.R.C.V.S., Stellenbosch.

In a further attempt to produce clinical cases of the disease "Pisgoed," two hamels were fed a total weight of 68 lb. of *Euphorbium genistoides* (i.e. roughly 34 lb. each) over a period of eighteen days. In order to compel ingestion of the suspected plant all other food was withheld, but the supply of drinking water was unrestricted. The sheep were confined in a small pen in a shed with a cement floor. Their health remained unaffected apart from loss of condition ascribed to the inadequate diet. No attempt was made to collect urine (which appeared reduced in quantity) for chemical analysis or quantitative measurement.

Since the plant is found on the veld in very limited quantity, the

daily consumption during the experiment was far in excess of what would be taken voluntarily under natural conditions. It can, therefore, only be concluded that *Euphorbium genistoides* is **not** the direct cause of urethral stone or gravel in hamels, known locally by the term "Pisgoed." In support of this statement it is noteworthy that the plant does not appear to contain any substance causing irritation in the urinary organs, or stangury, or a deposit of sabulous matter in the prepuce.

It is suggested that the cause of the disease must be looked for in the character of the feed. The dry state of the herbage during the summer months in the winter rainfall area is probably of significance. On the farms where the disease occurs sheep are probably kept on bush feeding only, no succulent food being available. Under such conditions it may be expected that the urine will be highly concentrated, and passed in small quantities only, probably at infrequent intervals. This would favour fermentation with deposition of solids.

The factors mentioned by McGarrison (1931) in dealing with the causation of stone in both man and cattle in India, viz. avitaminosis and calcium phosphate imbalance, should be borne in mind in attempting to elucidate the aetiology of "Pisgoed."

Such conditions in South Africa might well be due to continuous feeding on bushes of a non-succulent character. Some farmers have observed that calves castrated young are later in life more subject to the disease. An old-time custom was to postpone the operation until three years of age, a practice which would allow full development of the penis with a wider urethra. One farmer claims to have seen what he called "pisgoed" in hogs fed liberally on mangels. Presumably in this case the strangury was due to urethral calculi.

During an examination of theories regarding the disease it was noticed that not only *E. genistoides* but also other latex producing plants such as *Asclepias crispa* are blamed by farmers, and also that the white substance said to occlude the urethra and called "pisgoed" is generally believed to be the coagulated latex from such plants. I suspect that these plants have been blamed merely because of an erroneous conception regarding the fate of the latex and its excretion from the system.

I have not had an opportunity of conducting a necropsy on an affected animal, nor have I been able to procure for chemical analysis a specimen of the material said to cause the obstruction. The pathology of the condition can be surmised only from descriptions offered by farmers. Possibly calculi could be found also in the kidneys, bladder, and even in the sabulous accumulations in the prepuce.

Law states that renal calculi in cattle are associated with dry feeding and are common in animals on magnesium limestone soils. No

information is available regarding the character of the soils in the areas where "Pisgoed" occurs.

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Artificial Fattening of Meat.

By A. D. THOMAS, D.V.Sc., Onderstepoort.

A process which should be of considerable and general interest has recently been perfected in France with a view to improving the qualities of table meat. It is a well recognised fact that the tenderness and tastiness of meat depend to a large extent on the distribution between the muscular fibres of natural fat deposits. The principle underlying the new process is both simple and effective. Briefly it consists of the introduction of fat via the arterial system, in such a way that it becomes distributed evenly throughout the muscular mass supplied by the artery.

The idea of utilising the blood vessels as channels for the distribution of fluids is not a new one. In the case of preserving fluids, it has, of course, been made use of from time immemorial for the purpose of embalming. It was also advocated in the 19th century for the rapid pickling of meats with brine (Morgan 1855 and Milne-Edwards 1870).

More recently a similar idea has reappeared as the fundamental principle underlying the patented "Pitchford Process."

The application of the method to the introduction of fatty substances as well as various suitable seasoning ingredients is, however, both novel and interesting. The process has been perfected by a French veterinarian, Dr. Gauducheau, who has successfully demonstrated its practicability. The fact that meats so treated have received nothing but praise from highly placed French officials, who have had the opportunity of tasting them, speaks volumes for the possibilities of the proposition. That the practice did not develop sooner is probably due to the fact that success can only be ensured when the methods used are based on a scientific knowledge of anatomy, physio-

logy, and chemistry, coupled with strict hygienic facilities such as can only obtain in a modern and well equipped abattoir.

This in short explains why a practice which at first sight might rightly be considered as falling in the province of the butcher becomes indeed yet another useful phase of the multiple activities of the veterinarian.

THE PROCESS.

In ordinary culinary technique, of course, the fat and gravy with condiments bathe the joint on the outside and the latter have to penetrate inward as best as possible.

In venison and very dry, lean meats, the practice of "larding," i.e. introduction of strips of bacon into the meat, is often resorted to in order to achieve the same object. In other words, improving the fat distribution enhances the taste and tenderness of such meat.

In the new process liquefied fat or oils, together with suitable seasoning, are injected via the arterial system into the whole carcass, or portions of it such as a leg, a kidney, etc. The distribution by this method is even, immediate, and perfect. The meat will take up as much as 5% of its own weight of the injected fats.

Apart from the more obvious advantages of fattening and seasoning, the process, by the addition of suitable ingredients, constitutes a method whereby certain natural, but often unpleasant tastes or smells inherent in the flesh of some animals (e.g. mutton, goat, rabbit) or organs (e.g. kidney) may be totally or partially masked.

The composition of the injected fluid, for which the term "intra-sauce" has been proposed by the originator, varies widely according to individual taste and the different joints to be treated. Aromatic principles such as those of onion and garlic, which are fat soluble, are incorporated in oil by maceration and torification, peanut oil being generally used. Other condiments such as pepper, mint, thyme, truffles, etc., are added in the form of alcoholic extracts. The blending of the ingredients is naturally a matter of considerable experience.

One example only need be given to illustrate the type of recipe used.

For mutton:

Oil of garlic	10
Oil of onion	50
Salt Water 23%	30
Extract of estragon	10

An injection such as the above is said to transform an ordinary leg of mutton into an excellent joint somewhat resembling, but surpassing, venison in taste.

With practice and good equipment the actual injection takes very little time, and when properly carried out there can be no disadvantages to this process. Objections have, however, been raised against it principally on the ground that it opens up, to the unscrupulous, possibilities for fraudulent practices, e.g. dissimulation of decomposition changes in meats.

There need be no fears in this respect for the following reasons:

1. In order to be effective the treatment of carcasses has to be carried out in the freshly killed state, before division into quarters, etc. It would not be easy to inject a decomposing carcass or joint.

2. The substances used would in any case be ineffective in masking anything but very slight odours or tastes.

3. The ingredients used are wholesome articles of food or condiments and adequate legislation already exists to protect the consumer against the use of any unauthorised preservative, etc.

4. Meat treated in this way would, by reason of its special taste and higher value, naturally be marked and offered for sale as such, in order to command the higher price commensurate with the extra expense of preparation.

While the practice has undoubted limitations, especially in a country where meat of indifferent quality is consumed as a matter of course, we feel sure that its application in catering for the more appreciative class of consumer is only a matter of time.

The Toxicity of "Maranc."

By D. G. STEYN, B.Sc., Dr. Med. Vet., Onderstepoort.

A portion of a "Maranc" ("Maranca" or "Maracca"—*Cucumis* sp.) was received at Onderstepoort from Dr. Phillips, Principal Botanist of the Division of Plant Industry, with the remark that it had caused symptoms of poisoning in human beings. The family concerned were in the habit of buying "marancas" on the Johannesburg market. This vegetable is very generally consumed and so far as is known no previous case of poisoning has been observed. The "maranc," which was not quite mature, appeared quite normal and fresh, but its bitter taste aroused suspicion.

Unfortunately only a portion of the suspected "maranc" was obtainable, with the result that a few preliminary experiments only could be conducted. Some of the seeds were retained, but it is not expected that they will germinate.

Three rabbits were drenched with 90, 35, and 6 gm. respectively of the comparatively fresh "maranc." In each case restlessness and

dyspnoea were observed in less than an hour after dosage (in the first case within 10 minutes. Death followed with symptoms of asphyxia, which were accompanied by paralysis in the case of the first animal. The heart continued to beat for about one minute after cessation of respiration.

Autopsies revealed general cyanosis, the heart in diastole, congestion of the gastric mucosa, and in two cases pulmonary hyperaemia.

It is evident that this "marane" contained a most virulent poison, which chiefly affects the respiration and the gastric mucosa. Death was due to respiratory failure. Through lack of material no further investigations into the nature of the toxin could be conducted, and it could not be ascertained whether the "marane" in itself contained the poison or whether the latter had been maliciously added.

This notes illustrates the danger of paying no heed to unusual tastes observed in any foods used for human consumption.

A Note on the Occurrence of *Globidium gilruthi* in Natal.

By A. S. CANHAM, F.R.C.V.S.

This is to record the finding of this parasite in a sheep in Natal. While carrying out a post mortem examination of a sheep that was the subject of Coccidiosis it was noticed that on the mucous membrane of the abomasum small prominences were present. These were

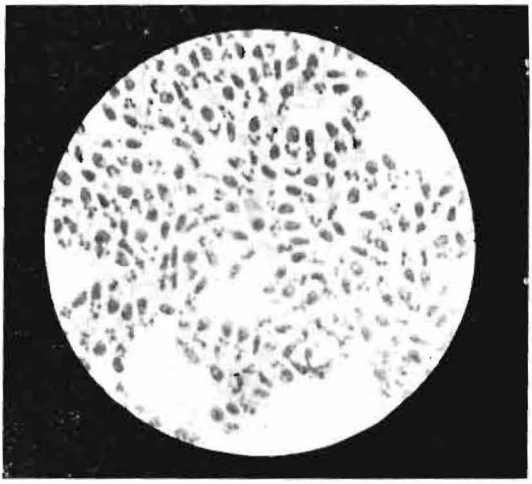

Fig. 11. Spores of *Globidium gilruthi*.

not any bigger than the head of a pin and could only be seen after a careful examination. On cutting lightly into several of these small prominences we obtained a greenish or yellowish semi-liquid material.

In those from which we obtained the greenish material were what appeared under the microscope to be masses of Coccidia merozoites. These were lying either singly or in clumps surrounding what we took to be a residual body. These organisms were about 10 μ long, cigar-shaped and possessed an oval nucleus and above it a mass of granules. Both ends were tapered, but the extremity that did not contain the granules was the more pointed of the two. These spores stained well with Giemsa. Dr. du Toit very kindly identified them for me.

Unexpected Advantage of Sudan III for Routine Staining.

By CECIL JACKSON, B.Sc., B.V.Sc., Onderstepoort.

Specimens of organs sent to the Pathological Section at Onderstepoort for histo-pathological diagnosis are submitted by the assistants to three staining methods unless the instructions are varied. These stains are Haemalum-eosin, van Gieson, and Sudan III. As often as not, Giemsa staining is also requisitioned (e.g. in any case where it is desirable to attempt the demonstration and identification of vegetable or animal parasites in the tissues, or where cytological observations are essential to the diagnosis).

However, the omission of the Sudan III staining is frequently permitted in the case of organs in which the presence of "pathological" fat is unlikely. Thus fat-staining, always employed in the case of organs such as liver, kidney, and myocardium, is often omitted for lung, intestine, etc.

A section of lung, submitted together with other organs of a bovine whose death was suspected to have been due to arsenical poisoning following dipping, and which happened to have been stained with Sudan III, presented a striking appearance on microscopic examination, due to the circumstances that the alveolar lumina were loaded with fat globules. A diagnosis was made of asphyxia following aspiration of some or other oleaginous material (doubtless Ol. lini, used therapeutically). The point could of course easily have been missed in a section stained for example with Haemalum-eosin. Needless to say, this diagnosis caused the owner to abandon his intention of instituting legal proceedings for damages.

It is not the intention of this note to point the moral of dangers attendant on the omission of particular stains. But it was gratifying that by a lucky chance the appropriate staining had in fact been carried out. Still more fortunate was the fact that a specimen of the lung was submitted at all. The case thus serves to emphasize the soundness of the advice usually given in the past from this Division, viz. "When in doubt, send liver, kidney, and lung."

It appears probable that the value of a fat stain in cases suggestive of aspiration asphyxia is insufficiently appreciated. In this connexion it is well to bear in mind that among the many drenches poured by laymen into the lungs as an efficacious method of administering a speedy coup-de-grâce to their ailing animals, vegetable oils are among those most commonly used.

ABSTRACTS.

Enzootic Hepatitis or Rift Valley Fever. An undescribed Virus Disease of Sheep, Cattle and Man in East Africa. R. Daubney and J. Hudson *J. Path. and Bact. 34,* 545-579,, 1931. Abstracted in the Veterinary Bulletin, Vol. 1, No. 4, 1931.

This article contains a description of a very interesting disease which occurs in the Rift Valley region of Kenya. The occurrence of the disease was associated with a change in the lambing season. October and November are the usual months for lambing, but owing to climatic conditions the season on one farm in 1930 had to be changed to July and August. Previously the farm was not noted for the frequency of sheep diseases, but that particular season the mortality in lambs three to seven days old was very high. Prior to the lambing season there had been numerous abortions with a high death rate in the ewes concerned. Upwards of 1,200 ewes and 3,500 lambs were lost. The survivors were removed to higher land and mortality ceased. In some left on the farm mortality continued until December.

Post mortem examination at first indicated that the disease in the lambs and ewes was different, but the difference was later found to be due to the rate at which the disease took its course. In lambs there was extensive focal necrosis in the liver, the foci showing a tendency to coalesce.

In ewes the liver showed a mottled appearance, due to pinhead, reddish brown spots. The spleen, heart and kidneys showed petechial or more extensive haemorrhages. A varying degree of hyperaemia was noticed in the intestines and the contents were sometimes tarry. Decomposition set in rapidly.

The virus causing the disease can be kept in citrate at room temperature for a week, and at 5°C. for many weeks. It is present in the blood and organs and will pass Chamberlain filters up to Grade II.

Sheep, goats and cattle can be infected. The goats and cattle recovered. The horse and pig gave negative results. During the investigation, four Europeans and a number of natives developed a dengue-like disease which ran its course in about 4 days. All the evidence is in favour of transmission by a mosquito and *Taeniorhyncus brevipalpis* is suspected.—E.M.R.

BOOK REVIEWS.

A book which attempts the ambitious task of covering the whole field of diseases (medical, surgical, and infectious) of dogs, cats, and rabbits should prove of interest to practitioners. Professor Brumley's Diseases of the Small Domestic Animals (1) is concisely written and

sound in its subject matter, although it makes an unfortunate first impression owing to a poverty of style and grammar.

We feel bound, however, to draw attention to certain inaccuracies occurring in the text. It was with surprise that we learnt of the transmission of canine piroplasmosis by fleas and that the disease responds only to symptomatic treatment. Again, in the section on intestinal heliminthiasis no mention is made of the value of carbon tetra-chloride in Dochmiasis or of chenopodium in Ascaridiasis.

Authors setting themselves the difficult task of meeting the need of the busy practitioners for books of this kind deserve commendation. A little more care in writing and revision might well have made this publication an admirable short textbook of medicine.

NEWSLETTER SERVICE TO GOVERNMENT VETERINARIANS.

No. 15.—Common Salt Poisoning.

Specimens of salt and salt licks are continually being received at Onderstepoort from stock-owners with the remark that the salt has caused losses among their sheep. Biological and chemical tests proved these specimens to be free from any extraneous poison. Invariably it was found that the losses had occurred among animals which had had no access to salt licks for long periods. When such salt-starved animals are allowed access to salt licks, it will be noticed that many of them partake of the lick very greedily. Under these circumstances it actually happens that some animals ingest toxic and lethal doses of salt.

Symptoms.—The severity of the symptoms depends on the amount of salt taken. If highly lethal doses have been ingested, animals will within a very short time show extreme thirst, depression, excitement, abdominal pain, and die in a state of collapse. In these peracute cases the post mortem will in most cases be completely negative, whereas in some cases hyperaemia of the gastro-intestinal tract will be present. In addition to the above symptoms, a profuse watery diarrhoea, which in the course of time may become slightly haemorrhagic, sets in when less toxic amounts of salt are taken in. Pregnant animals may abort.

On post mortem an inflammation of the gastric and intestinal mucosa and injection of the cerebral membranes are generally found.

Toxic Doses.—Cattle: 1½ to 5 lb.; Sheep: 4 to 8 oz.

Prevention.—Salt poisoning, as it occurs among stock under the abovementioned conditions, can be most effectively prevented by allowing the animals free access to salt licks.

(1) Diseases of the Small Domestic Animals, by O. V. Brumley, V.S., 2nd Ed. pp. XXI+611. London: Baillière, Tindall & Cox, 1931; 25/-.

Treatment.—In peracute cases treatment will be of no avail, as death occurs suddenly. No specific antidote is known and symptomatic treatment will have to be applied. Lime-water, either alone or mixed with an equal part of raw linseed oil, can be given to allay intestinal irritation. In general weakness or collapse stimulants, such as ether, coffee, and camphor oil, could be given.

Sweating Sickness.

Occurrence.

The disease has been reported from the Bush Veld area extending from Bechuanaland, through the middle and northern Transvaal and Rhodesia, into Swaziland and Zululand. In parts of the latter it has been particularly bad. Only calves seem to become affected; the most susceptible age being from 2 weeks to 9 months. The disease may appear in December, but is most prevalent in January and February.

Symptoms.

Calves usually get sick suddenly. They are first noticed dull and listless with a harsh, staring coat. There is dribbling at the mouth and a high temperature, which is as a rule soon accompanied by profuse sweating, hence the name of the disease. At first the skin is clammy or wet along the neck, behind the shoulders, and between the legs. Sweating is not always perceptible, but in severe cases the whole body is wet and perspiration may actually drip off. This symptom is more pronounced in the early mornings. The skin is very warm and moist and the hair comes off easily with handling. The whole body may shake or tremble with ague. Ulcers are frequently present in the mouth, and the eyes may run more or less profusely. In the course of a few days the hair tends to become sticky and fall out in patches, the skin becomes drier, hard, and scabby, and may crack extensively. The calf shows great tenderness of the skin and a certain stiffness of movement due to pain in bending any joint or attempting to suck. Looseness of the bowels is usually present.

Cause.

The cause of the disease is still unknown in spite of active research in the past three or four seasons. The disease is not tranmisible from one animal to another in any of the ordinary ways, e.g. by inoculation or by contact, nor has it been possible to incriminate any particular parasite.

Mortality.

Losses from this condition can be fairly heavy where the calves are left to themselves as under ranching conditions. In many instances a single calf or only a few calves catch the disease in a herd, while the rest show no signs of it.

TREATMENT.

There is no specific remedy against this disease, neither can any preventive measure be advocated until the cause is known. In the meantime, however, it is desired to point out that losses from this cause can be reduced to a minimum, provided a little trouble is taken with the sick calves. Experience has shown that the majority of calves affected may be saved by the timely application of simple measures such as described below:—

(1) As soon as the disease is recognised the calf should be kept in a clean, shady place, e.g. in a shed, with plenty of bedding and protected from draughts or, better still, covered with a sacking blanket to keep it warm.

(2) It is important to attend to the feeding regularly and thoroughly. Where calves are used to being hand-fed, this presents no difficulty and the calf will usually take its three feeds of milk or more daily quite readily. Where the calf ordinarily runs with its mother it becomes necessary to teach it to feed out of the bucket for the following reasons: All movements, such as lifting of the head to suck, running after the cow, holding the teat in the mouth, etc., are painful on account of ulcers in the mouth and gums and the state of the skin, and as a result the calf does not get sufficient nourishment and rapidly succumbs.

(3) It is unnecessary to give any medicine internally.

(4) The skin may be washed occasionally with a very weak solution of disinfectant such as Jeyes Fluid, and it should then be rubbed over gently with Carron oil, sweet oil, or even with fat if nothing better is available.

In two to three weeks such calves will usually recover entirely and new hair will grow on the bare patches.

NOTES AND NEWS.

The Secretary R.C.V.S. has for disposal a number of copies of the reports of the Xth and XIth International Veterinary Congress held in London in 1914 and 1930. The reports in each case consist of three volumes and the price has been fixed at 20/- and 40/- respectively for the two series. In view of the forthcoming Congress in America in 1934, South African colleagues who desire to procure these reports should communicate direct with the Secretary R.C.V.S., 10 Red Lion Square, London W.C.1.

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Dr. John Legg, who has recently been appointed to the Veterinary Research Laboratory in Queensland, has been on a visit from Aus-

tralia to the Onderstepoort Laboratory where he has been studying the various phases of veterinary research being carried on there. He will study the methods of veterinary administration under field conditions in the Union before returning home in April.

* * * * *

Dr. K. Schulz, a former student at Onderstepoort, who recently returned to South Africa from Germany where he took his doctorate in veterinary medicine at the University of Leipzig, has been appointed Government Veterinary Officer at Kimberley. Dr. Schulz was a government veterinary officer under the South West African Administration for three years before going to Europe.

* * * * *

Mr. R. A. Alexander who was awarded one of the Empire Marketing Board Fellowships at Onderstepoort, returned in January from a year's study in various European centres.

* * * * *

GEORGE CHARLES WEBSTER, born at Gourock, Scotland, 15/5/85, qualified at the Royal (Dick) Veterinary College, Edinburgh, in 1908, and entered the Union C.V.D. 13/10/10. During the Great War he served with the S.A.V.C. in German East Africa. During part of the time he was seconded to the Rinderpest Commission (1916-1919) under Mr. C. E. Gray, P.V.O. Union, who had been despatched north to take charge of operations. During recent years he had been in charge of meat export, Durban. He resigned from the C.V.D. on 11/4/31, and we are pleased to hear he has settled down at Lancaster and is doing well.

* * * * *

Three students passed the final B.V.Sc. examination of Pretoria University in November, 1931. All three, Messrs. C. C. Wessels, N. T. van der Linde, and M. H. V. Brown, received appointments in the government service. Messrs. Wessels and v.d. Linde are stationed at Alberton Laboratory and Mr. Brown at Onderstepoort.

OBITUARY.

David Stranaghan.

Qualifying at the Royal (Dick) Veterinary College on 29th May, 1890, the late Mr. Stranaghan did not come to South Africa until shortly after the Anglo-Boer War (1899-1902). He practised privately for a short time at Potchefstroom and then settled down in Johannesburg. Although a member S.A.V.M.A. he was of a retiring disposition and his death on 22/12/31 was quite unexpected.

JL. S. AFR. VET. MED. ASSN.
III (2) 1932.

PAPERS AND COMMUNICATIONS.

The Bovine Tuberculosis Problem in South Africa.

By Dr. GILLES DE KOCK, Deputy Director of Veterinary Services, Onderstepoort.

INTRODUCTION.

This is an endeavour to place before veterinarians in the Union a general review of the tuberculosis problem as it occurs in recent literature, and particularly in its relation to South African conditions. At the same time an attempt will be made to explain why it has become necessary for the Department of Agriculture to restrict the tuberculin test to very definite conditions. From a perusal of these notes it will become clear to every practitioner that the tuberculin test as such plays only a minor part in any eradication scheme. Far more important in order to bring about complete eradication are the essential conditions under which the test itself should be carried out.

From the meagre statistics derived from a number of tuberculin tests and abattoir data it would appear that the tuberculosis problem, especially amongst dairy cattle in the urban areas of the Union, has become as involved as in the older countries, especially in view of the high percentage of infection. In view of this an eradication scheme was launched at the end of October 1930 in a prescribed area at Durban, after careful consideration by the Department of Agriculture, the Borough of Durban, and the Dairymen's Association of Durban. A brief survey of this campaign will illustrate the number of difficulties encountered under South African conditions, in spite of the fact that the scheme was based on the knowledge gained (mainly abroad) after exhaustive study of the causes of the disease, its mode of development, its channels of dissemination, its economic importance, etc.

When the tuberculin testing of cattle in the United States under the co-operative tuberculin eradication plan was launched as far back as 1917, it was maintained that the campaign had been undertaken prematurely without basic knowledge. To American Veterinarians, therefore, is due all the credit of launching their formidable policy without which the knowledge that is rapidly accumulating today and the researches that are in progress would probably never have materialised.

The policy in America is that no change should be made in the present efficacious methods, such as tuberculin testing and pasteurisation, until something infinitely better is at hand to replace them. Since 1922 a co-ordinated campaign of study in which the U.S. Public

Health Service, the Bureau of Animal Industry, and the National Tuberculosis Association are co-operating has been organised to gain the knowledge needed for the solution of this problem.

Tuberculosis in cattle is a twofold problem, viz:

I. Its relation to public health;

II. Its economic importance to animal industry.

The former is mainly associated with the provision of a *safe milk supply* for human consumption, whereas the latter demands the eradication of tuberculosis in bovines to ensure healthy herds giving the maximum milk and meat supplies. Measures for dealing with these two problems should be discussed by the Ministries of Health and Agriculture and they should jointly agree on a plan which would embrace the two problems and lead to the maximum administrative efficiency.

I. Bovine Tuberculosis in its Relation to Public Health

Authorities in England are satisfied from the evidence that milk as at present produced and distributed in England and Wales is one of the agencies through which tuberculosis is communicated to human beings.

The annual death rate, however, from tuberculosis, both pulmonary and non-pulmonary, has considerably diminished during the past eighty years. To this diminution the following factors are said to have contributed:

(a) *Improvement in the general hygienic production of milk.* Judging by the proportion of samples infected now and twenty years ago, however, there is little evidence of improvement. According to recent statistics recorded by the Ministry of Health, the presence of tubercle bacilli in milk samples taken under the provisions of the Milk and Dairies Act was as follows:

Of 69,901 samples, 4,690 contained tubercle bacilli, i.e. 6.7%. It may well be that even though the proportion of infected samples still remains high the actual numbers of tubercle bacilli in market milk have fallen.

(b) *Increased practising of pasteurisation and sterilisation of milk.* The extent to which pasteurisation has been responsible for the fall of tuberculosis of bovine origin in England and Wales is described as doubtful.

(c) *Improvement in child welfare.* At many centres care is taken to provide milk derived from safe herds or treated in such a way as to ensure the probable destruction of any tubercle bacilli present.

Mortality and morbidity from this disease are, however, still matters of grave concern when it is remembered than 1000 children under 15 years die annually in England and Wales from tuberculous infection of bovine origin.

It is stated that in America the human death rate from tuberculosis in 1900 was 188.6 per 100,000 and in 1924 83.5 per 100,000. Furthermore, the fall in death rate from non-pulmonary tuberculosis (i.e. probably of bovine origin) in New York is even more significant, viz. 29 per 100,000 in 1921 and 12 per 100,000 in 1925. This marked reduction is believed to be the result of pasteurisation.

Although pasteurisation decreases the incidence of the disease in human beings, it does not solve the problem in so far as bovines are concerned. Furthermore, we are without precise knowledge as to whether the changes brought about by pasteurisation have a material or a negligible effect on the nutritional value of milk to the human consumer. Is pasteurisation as commercially carried out effective in destroying tubercle bacilli in milk? In spite of the good results attributed to pasteurisation, America still persists, for both public health and economic reasons, in its eradication policy of bovine tuberculosis.

An attempt was made to ascertain the incidence of human tuberculosis of bovine origin in South Africa. The only information available was the following, European deaths from tuberculosis 1921-1930, given in the Report on the Vital Statistics of the Union of South Africa:

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930
Pulmonary (without Miners' Phthisis)	732	555	557	627	629	599	603	622	564	614
Pulmonary (with Miners' Phthisis)..	66	101	79	122	134	191	164	161	142	123
Non-pulmonary	89	87	98	82	100	106	96	103	96	104
Total	887	743	734	831	863	896	863	886	802	841
% Non-pulmonary	10.03	11.71	13.55	9.86	11.58	11.60	11.12	11.62	11.96	12.36
Death rate per 100,000	52.26	57.74	46.46	51.59	52.70	53.41	50.50	50.95	45.37	46.78

An estimate of the proportion of cases due to infection of bovine origin is not given.

The bacteriological work necessary for the determination of the type of bacillus is considerable, and although many workers abroad have undertaken this task, yet it cannot be stated with accuracy what proportion of deaths is due to the bovine bacillus. According to the most extensive work in this direction carried out by Dr. A. S. Griffith in Great Britain, (the figures refer to the incidence of bovine infection as determined from pus of cervical glands, from the cerebro-spinal

fluid in cases of meningitis, etc., and not to the mortality from this cause) it would appear that a large proportion—in some varieties as much as half—of the tuberculosis in children under 15 years, is caused by the bovine type. On the other hand, there is little or no evidence of bovine infection producing pulmonary tuberculosis in children.

In South Africa 46 of the 96 deaths from non-pulmonary tuberculosis in 1929 were in children under 15 years of age. If to this is added the number of cases in which lesions have healed out, and the number of cases where deaths have been due to other causes, it will be realised that bovine tuberculosis through milk consumption plays perhaps a bigger part than has been anticipated.

II. Tuberculosis in its Relation to Animal Industry.

In view of the varied incidence of the disease in the different countries of the world, various schemes have been evolved to bring about the diminution or eradication of tuberculosis of bovines. The incidence of bovine tuberculosis in Great Britain, as estimated from the results of the tuberculin tests, is about 40%, which is regarded as a conservative estimate of the amount of tuberculosis in dairy cattle. Of the cows inspected in England and Wales 0.13% yield evidence of mammary infection with tubercle bacilli detectable by clinical examination supplemented by bacteriological methods. Abattoir statistics in London, Edinburgh, and Newcastle-on-Tyne revealed 39.5% gross macroscopic lesions in 55,318 cows slaughtered. An attempt will be made to indicate the incidence of bovine tuberculosis in a few South African dairies and herds as revealed by

(a) *the tuberculin test* :—

1. Government Institutions.

Herd	Date tested	No. of cattle tested.	Negative.	Doubtful.	Positive.
Cedara	April 1930	158	157		1
	9/2/32	238	238		
Glen	28/9/31	39	39		
Potchefstroom	21/9/31	333	323	7	3
	12/10/31	87	87		
	18/1/32	400	400		
Mariandale	12/4/32	39	39		
Welgevallen	11/4/32	43	43		
Elsenburg	12/4/32	62	59		3

A very large number of these animals are stud Frieslands and it will be seen that the incidence of tuberculosis is extremely low, probably due to the good hygienic conditions and the fact that all

new animals are tested before they are drafted into these herds. These herds are in the process of becoming accredited herds.

2. Herds in Rural Areas.

Herd.	Date of test.	No. of animals. tested.	Negative.	Doubtful.	Positive.
1. Umvoti	30/11/31	157	129	9	19
2. New Hanover ...	14/6/31	85	56		29
3. Washbank	7/4/31	98	89	9	
4. Pinetown	7/3/31	19	14	5	
5. Lions River.. ...	13/4/31	87	86	1	
6. Camperdown ...	6/1/31	10	9	1	
7. Camperdown.. ..	9/6/21	48	48		
8. Pinetown	25/8/31	11	9	1	1
9. Dundee	20/5/30	21	17	4	
10. Camperdown ...	18/3/30	97	97		
11. New Hanover ..	27/1//30	42	31	1	10
12. Richmond	10/8/31	264	262	1	1
13. Nelsrust	7/11/29	506	500	6	
14. Nelsrust	25/2/31	75	73	2	
15. Lions River.. ...	18/8/31	174	148	5	21
16. Nr. Capetown....	18/4/32	214	210	2	2
17. Alice (Eastern Province)	8/1/32	140	137	3	
18. Calvinia... ... ... (Municipal Areas.)	6/6/31	88	73		15

These animals include a large number of dairy cattle, and except for herds 1, 2, 11, 15, and 18 it would appear that the incidence of tuberculosis is fairly low. If the owners persevere with the policy laid down by the Department, there is no reason why the majority of these herds should not become accredited within a short space of time. On the other haud, it has been reported that infected dairy cattle drift from urban to rural areas; the data for herd No. 18 seem significant in this respect.

3. The Incidence of Tuberculosis in Dairy Cattle in the prescribed Durban Areas.

An attempt was made to classify all the animals tested into dairy herds and loose cattle:

	No. of animals tested	Negative	Positive
Dairy herds	2402	1469	933
Loose cattle	192	142	50

The percentage of positives in dairy herds was 38.8%, whereas in loose cattle only 25.5%.

An analysis of the 823 autopsies of reactors in the Durban Cam-

paign up to September 1931 showed that the lesions of tuberculosis were distributed as follows:

Generalised	15.7%
Udder	3.3%
Lungs	16.3%
Lymph glands (one or more)	56.4%
Other organs	4.3%
No visible lesions	4 %

These data from an urban area in South Africa, preliminary as they may be, seem to indicate that tuberculosis in dairy cattle in the Union is not in any way different from that found in European countries.

(b) *The prevalence of tuberculosis in animals as revealed by meat inspection* at the various Union abattoirs is given in The Report of Tuberculosis Research Committee, Publications of the S.A. Institute for Medical Research, No. XXX (Vol. 5), March 1932; Appendix 10, as follows:—

Bloemfontein 1924-29: 0.33% tuberculous.

Capetown 1928-29: Of 8,348 cows slaughtered, 0.80% tuberculous.

Durban 1921-29: Average number of cattle slaughtered annually 29,800 and average incidence of tuberculosis is 0.053% per annum.

Johannesburg 1917-29: 1,067,700 bulls, oxen etc. slaughtered, with 0.031% tuberculous.

1917-29: 228,435 cows, chiefly of native and Afrikander breeds, 0.152% tuberculous.

Note: This table shows the incidence in slaughtered stock only, and is not indicative of the prevalence in dairy herds.

Pietermaritzburg 1927-29: 19,210 cattle slaughtered, with 0.065% tuberculous annually.

Port Elizabeth 1926-28: 6,675 cows slaughtered, 0.046% tuberculous annually.

Pretoria 1928-29: 24,422 cattle slaughtered, with 0.176% tuberculous. A considerable proportion of these were in cows from dairy herds.

The report continues: "Considering these reports as a whole, the incidence of tuberculosis amongst cattle in South Africa, as shown by the figures for slaughter stock, appears to be very small."

The contrast between the extent of bovine tuberculosis in Europe and in the United States becomes apparent when it is remembered that,

according to American statistics during a 15 year period up to 1908, 400,000 cattle were tuberculined and 40,000 i.e. 10%, reacted, whereas in 1931 13,000,000 cattle were tested and only 1.5% reacted.

Before dealing with the *accredited herd plan of America*, it may be of interest to consider the following other important schemes for the eradication of tuberculosis:

A. *Bang's method of Denmark.*

B. *Ostertag's method of Germany.*

C. *1925 Tuberculosis order of Great Britain.*

A. *Bang's method* briefly entails the following:

1. Slaughtering of clinical cases.
2. Tuberculin tests of the remainder.
3. Seperation of reactors from non-reactors into separate stables. If reactors at any time show clinical manifestations, they are immediately slaughtered.
4. Yearly tuberculin tests of non-reactors.
5. Calves of reactors are separated 24 hours after birth and fed on milk from clean animals or milk heated at 80° C.
6. Subsequently tuberculin tests of these calves are undertaken, with the slaughter of reactors.
7. Tuberculin tests of cows before calving.
8. Use of clinically healthy and tuberculin negative bulls.

B. *Ostertag's Method.*

1. Veterinary inspection once a year, with bacteriological examination of excretions (lungs, udder, uterus, alimentary tract) of suspected cases.
2. Slaughter of bovines with "open" tuberculosis.
3. Tuberculosis-free rearing of calves by separating them from cows on second day after birth and feeding them on milk free from tubercle bacilli or milk heated at 85° C.
4. Tuberculin tests of these calves and slaughtering of reactors.
5. Re-inspection after three months of those herds where suspected cases of tuberculosis had occurred, using clinical and bacteriological methods.

C. *1925 Tuberculosis Order.*

The order schedules three classes of animals, namely:

1. Any cow which is or appears to be suffering from tuberculosis of the udder, indurated udder, or other chronic disease of the udder;

2. Any bovine which is or appears to be suffering from tuberculous emaciation;

3. Any bovine animal which is suffering from a chronic cough and showing definite clinical signs of tuberculosis.

It is made compulsory for any person in charge of such animals or any Veterinary Surgeon employed to examine such animals to notify the fact to an Inspector of a local authority. They are examined by him, and if he considers that they belong to any of the three designated groups, they are slaughtered and compensation paid.

In view of the difficulties and mainly the tremendous expenditure involved in a scheme of eradication, the 1925 Tuberculosis Order was introduced in Great Britain. This order aims at the destruction of cattle in an advanced and "more infectious" stage of the desease. It cannot, however, seriously be expected to affect the incidence of the disease in cattle or man.

Routine veterinary inspection plays no part in the prevention of bovine tuberculosis; all that it does, if efficiently carried out is to diminish to a certain extent infection in man. It does not actually eliminate the danger to man.

We must admit that by clinical examination we are not in a position to diagnose tuberculosis in cattle in the early infective stages, whereas it is known that mild, clinically unrecognisable cases readily spread tuberculosis. Furthermore, initial lesions of the udder passing tubercle bacilli into the milk cannot be detected clinically.

Bang's method for dealing with new introductions into a herd does not exclude an animal in the *pre-sensitive stage,* so much so that such an animal, before the next annual test, may become a source of infection to the rest of the herd. In the State of Michigan several breeders have tried this method of handling a herd, but failure resulted in almost every case. The expense was too great and the results too uncertain. For the satisfactory application of the method, two separate establishments, each independent of the other as regards buildings, pastures, staff, equipment, etc., are essential, one for the clean animals and the other for reactors.

The *Ostertag's Method* requires a big staff of veterinarians for clinical diagnosis and taking of suitable specimens for the veterinary institutes. This technique involves sources of error, e.g.

(a) Sputum in lung cases may not contain tubercle bacilli at the time it was taken.

(b) The same applies to milk samples.

(c) Biological tests are not completed for weeks.

(d) The early case not diagnosed clinically or bacteriologically escapes detection and so becomes an "infective" source for the whole herd before the next clinical inspection.

THE ACCREDITED HERD PLAN OF AMERICA.

In view of these anomalies, recourse was had to the tuberculin test. During the last 32 years tuberculin has been used in every country in the world and more especially North America. There it has gained favour solely because after its use on millions of cattle it has been demonstrated as the most reliable method for detecting the disease. Tuberculin and tuberculin tests have been attacked many times, but it would appear that the old test is now, more than at any previous time, considered reliable by veterinarians. The Americans have confidence in the reliability of the tuberculin test and its ability to eradicate the disease.

The cost of this campaign to the States has been enormous in spite of the fact that only 1.5% reactors were found during the last year. In 1917 Congress voted 75,000 dollars and the States 8,000, whereas in 1927 Congress voted 465,300 dollars and the States 12,403,100. The success of this eradication policy in the North American Continent has become fairly obvious. Of 8 million bovines slaughtered in the abattoirs only 0.73% were tuberculous, and this is said to represent a saving of about 3 million dollars yearly on meat alone.

It is interesting to note that the 13,000,000 head of cattle tested in the States in 1931 involved 1,162,414 herds, whereas about 30,000,000 head were under supervision for control and eradication of tuberculosis.

In the State of New York, from July 1st, 1926 to June 30th, 1927, 73,490 herds, involving 808,647 head, were tested, with 67,202 reactors. For this the following veterinarians were employed:

Federal	14
State	25
County	41
Asst. County	51

while 84 veterinarians assisted in re-testing accredited herds under the zone plan.

In Canada 1,500,000 head are now under federal supervision for control, of which 150,000 are in fully accredited herds, composed principally of pure-bred stock. During the past year 60,000 reactors were condemned and 1,400,000 dollars expended as indemnity.

DIFFICULTIES ENCOUNTERED IN THE BUILDING UP OF TUBERCULOSIS-FREE HERDS IN A PRESCRIBED DURBAN AREA.

The tuberculosis campaign in Durban, based on the accredited system, has given rise to so many difficulties that the Department of

Agriculture, in consultation with the Borough of Durban, agreed to suspend the tests until certain essential requirements had been attended to. It is useless on the one hand to clean up a dairy or herd, while on the other such tested animals are continually exposed to infection. The following were some of the main difficulties encountered:

(a) The very high percentage of infection, the number of reactors actually reaching 37%.

(b) Dairymen had to face considerable financial loss, not only from the number of reactors slaughtered, but from the loss of customers. As a result of this, dairymen have become antagonistic to the test and now contend that it is not reliable, especially in respect of the advanced clinical case.

(c) The owner had to face the risk of reinfection resulting from
   (i) highly infected byres, pastures, and paddocks;
   (ii) indifferently isolated doubtful and positive reactors, and newly introduced replacements.

(d) The market from which such tuberculosis-free replacements could be purchased was extremely limited.

(e) Many tested animals were continually subjected to infection from stock on neighbouring pastures, communal grazing, and at common water troughs or pools of water.

Some of these difficulties will be briefly considered in order again to stress the important fact that the application of the tuberculin test itself plays only a small part in any eradication scheme.

Specific Sources of Infection which play a part in the Re-infection of Tuberculin-tested Cattle.

These may by divided into two categories:

1. Primary, viz. from infected bovines;
2. Secondary viz. from polluted environment (in all its aspects) in which tubercle bacilli may maintain themselves in a viable if not virulent condition. There is good reason to believe that tubercle bacilli may live longer in an environmental situation than in the animal body itself.

1. *Infection of tested animals through contact with infected stock.*

There is no doubt that the greatest reservoirs of tubercle bacilli are infected animals. They can be considered the fountain head of all infection, and furthermore *every animal that reacts to the tuberculin test,* whether visibly affected or not, acts as a potential spreader of disease at an earlier or later date.

The importance of the reactor in the spread of infection was recently illustrated at Onderstepoort. Tuberculin-tested reactors, not yet showing clinical signs of the disease, were isolated in seperate

boxes in the isolation stables at Onderstepoort. They were thus completely separated from other Africander cattle (in the same building) which were being utilised for East Coast fever experiments. Four of these latter animals, subsequently destroyed for native rations, revealed fairly recent lesions of tuberculosis. Here actually infection had taken place in spite of the fact that the isolation and hygiene was regarded as sound.

Tuberculin-tested animals may come into contact with infected stock in the following ways :—

(a) newly introduced animals ;

(b) reactors or doubtfuls not properly isolated ;

(c) over boundary fences or on communal grazing ;

(d) advanced clinical cases.

(a) The danger of introducing replacements into tested herds without adequate safeguards has already frequently been stressed. One may again point out the importance of such animals as may be in the early stage of infection, i.e. in the pre-sensitive stage during which the tuberculin test is inadequate to diagnose the infection.

Purchased animals from untested sources may pass the *initial test* in the pre-sensitive stage due to previous contact with infection, and such animals drafted into tested herds may cause disasterous results as soon as they reach the *infective stage.* It is therefore proposed to establish a central station for the testing of replacement animals. Such tested animals will be drafted into tested herds only on the condition that they have passed two consecutive tests.

(b) One of the gravest sources of infection of tested animals in the Durban campaign has been the fact that in many instances practically *no attempt has been made to ensure strict isolation of reactors or doubtfuls.* Dairyman are inclined to disregard the danger of such contamination. They do not consider the apparently clinically healthy reactor as a source of danger, but here again it should be stressed that the healthy appearance of the animal can never be taken as an indication that the animal is incapable of spreading infection. So-called "open" cases of tuberculosis are not limited to those animals in which the disease can be recognised by clinical examination. On the contrary, evidence is available which indicates that a considerable number of apparently healthy animals may excrete tubercle bacilli from infected organs. **The Corporation should, therefore, insist on a system of complete isolation of reactors and doubtfuls.**

(c) In connection with adjoining infected farms and pastures, double fencing should be resorted to.

(d) *Veterinary inspection* is necessary to detect the *advanced clinical case.* It has ben maintained by many dairymen that in several animals suffering from chronic advanced tuberculosis there has been *no reaction to the test.* Although this has undoubtedly been exaggerated by the dairymen even to the extent of publishing in the newspapers reports of such cases, of which one at least was definitely not tuberculosis, yet the Department recognises that this is a decided difficulty in testing.

All forms of tuberculin tests are liable to give negative results in some cases of advanced tuberculosis, but this does not detract from the value of the test, since by the time an animal has reached the stage at which it fails to react to tuberculin, clinical signs of the disease are almost always in evidence. It is therefore essential to introduce frequent and thorough veterinary inspection simultaneously with the test to eliminate such advanced clinical cases of tuberculosis. Frequent clinical examinations should go hand in hand with the tuberculin test. Such clinical examinations, carried out frequently, will undoubtedly prevent animals from reaching this advanced stage of the disease, and in a short time this class of animal will be completely eradicated from the herds in Durban. Such frequent visits by a municipal veterinarian will moreover be of educative value for the dairymen and further assist in the frequent control of sanitary measures. Veterinary inspection should include microscopical and biological tests of milk, bronchial mucus, vaginal mucus, urine, faeces, etc.

2. *Infection from contaminated premises.*

This is undoubtedly of paramount importance. The crux of the whole question is that *apparently healthy cattle may excrete virulent tubercle bacilli in their faeces.* It is, therefore, essential that premises should be regarded as infected where reactors, although apparently healthy, have been detected by the tuberculin test. To-day this source of infection forms perhaps the most vexed, complicated, and difficult aspect of the whole campaign. In practice little account has so far been taken of the possibility of tuberculosis-free animals contracting the disease by grazing on infected pastures. Various workers have demonstrated that tubercle bacilli may be found alive and active for several months in infected dung. Under ordinary conditions in the South of England the bacillus of tuberculosis in cows' faeces exposed on pasture land may remain alive and virulent for at least 5 months during winter, for 2 months during the spring, and for 4 months during the autumn. In summer no living organisms were demonstrated after 2 months, although under special conditions, e.g. protection from direct sunlight, the survival period may be as

long as 4 months during the summer. This indicates that dung, either allowed to lie in the byre or stored in manure heaps, will remain a virulent source of infection for a surprisingly long period. The presence of sheds, shelters, overhanging trees, or even long grass has a material effect in prolonging the period during which the bacilli may remain alive.

It will be realised that the premises of every dairy should therefore be considered on its merits as regards the possibility of curtailing infection, because it is extremely difficult to indicate with any degree of certainty the exact mode of infection of tested animals reacting after being housed in contaminated premises. The disease may have been spread by manurial contamination either of the buildings or the pasture ; it may have been contracted through the use of a common water supply or of infected feeding troughs; it may occur in stalls which have previously been occupied by reactors, etc.

In many instances it would apear that even with drastic action it will be impossible on the limited ground available for a large number of the dairies to establish byres and pastures free from infection. In this respect the Corporation should, therefore, exercise the most careful control before issuing licences under the new Public Health bye-laws. Under such conditions some dairies will be forced to close down.

Schemes for the proper construction of byres, sheds, etc. should be introduced by means of which the best possible sanitation can be attained in the production of grade "A" tuberculin-tested milk. Considerable expenditure is not absolutely necessary. Success in this respect depends on the kind of building and equipment. In many cases adequate lighting and ventilation can be secured at a trifling cost. The provision of a good floor is undoubtedly the largest and most important item. The construction of the building should be such that thorough disinfection can easily and satisfactorily be carried out.

The following precautions should be taken to prevent the spread of infection on the farm itself :—

(i) Drastic disinfection should be carried out in any premises which have been occupied by reactors.

(ii) Manure from infected premises should not be spread on pastures. Similarly it is undesirable that fields which have been occupied by reactors should be used for grazing the tuberculosis-free stock.

(iii) All boundaries separating the farm from fields in which neighbouring untested stock are likely to graze should be double-fenced.

(To be concluded).

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The Veterinarian and the Law. III.

By C. P. BRESLER, M.A., LL.B., Pretoria.

PURCHASE AND SALE OF ANIMALS.

From the general we come now to the more particular, to the law in fact, as it relates to animals.

Domestic animals, like other movable and personal chattels, are the subject of absolute property, which is retained by the owner even if they stray, or are lost. The property in the young of domestic animals is in the owner of the mother, following the maxim of the civil law *partus sequitur ventrem.* There is, however, no absolute property in wild animals, although a qualified property arises, e.g. where they have been tamed or reclaimed, or where they remain on the land of the owner of the land. It follows from this that domestic and tame animals can be the subjects of "larceny" (as it is called in English law) at Common Law — stealing, killing, and maiming cattle, sheep, horses, etc. are punishable. It follows also, from domestic animals being regarded as goods and chattels, that the ordinary law as to the sale of goods applies to them.

One or two aspects of the law of sale, however, merit special attention. The first of these is the Roman-Dutch maxim *"respondeat venditor"* — which roughly means that the seller is bound to guarantee the buyer that the thing sold is free from such faults and defects as would render it useless for the purpose for which it is sold. The principle of our law is that anyone selling an article is bound, though nothing is said as to quality, to supply a good article without defect. The defect must be such that had the buyer been aware of it he would not have bought the thing. Such defects are called "redhibitory vices" and where they exist the sale is annulled and the article (or animal) returnable. The action of the implied warranty lies when the buyer can show :—

(1) That the vice or defect existed at the time the contract was made.

(2) That he did not know of it.

(3) That the warranty was not specifically excluded, i.e. that the sale was not "voetstoots" or the thing as it stood. No warranty is implied, however,

(1) where the purchaser *selects* the goods relying on his own judgment;

(2) where the defect was of so obvious a nature that it could not have escaped the buyer's attention;

(3) where goods have been sold under the authority of the Court, e.g. Sheriff's sales;

(4) where the defect has been completely cured ; when it is regarded as never having existed. In e.g. *Townshend & Campbell (26 N.L.R. 356)*, a bought cow was found to have and inflamed teat, but as this was only temporary, and the cow was sound at the time of the trial, it was held that such a defect did not entitle the purchaser to rescision of the sale;

(5) where purchaser has accepted article with full knowledge of defect. *(Theron v. Africa 10. S.C. 246).* It must be noted that the buyer loses his remedy if he fails to inspect the *res vendita* within a reasonable time;

(6) where the vendor, in ignorance of any defect, has made it a term of the contract that no guarantee is given. *(Durr v. Bam. S.C. 22: Hadley v. Savory 1916, T.P.D. 385.)*

In the latter case Hadley had purchased a thoroughbred colt at an auction of blood stock. The colt was described in an advertisement as very shapely, showing great promise and the advertisement was addressed to "Racing men and Breeders." The conditions of sale stated that the sale was for cash, purchasers were to see and judge for themselves ; no guarantee was given. After Hadley had taken possession of the colt he found that one of its shoulders was so severely injured as to make it useless for racing purposes. The vendor knew of the defect. Hadley repudiated the sale and sued for the return of the purchase price. The Court held that he was entitled to rescind on the ground that though the sale was "voetstoots" the vendor knew of the defect and so was liable to the purchaser. MASON, J. in the course of the judgment said :—"In my mind an advertisement of that nature amounts to fraud. It is a misleading statement made with the knowledge that it is untrue and for the purpose of misleading people. Statements of that kind may be called 'puffs' by auctioneers but in law they are fraudulent statements and it is clear that a fraudulent statement of that kind gives ground for action for the cancellation of the contract and the recovery of the money paid over."

It seems also that even if the misrepresentation were innocent but went to the root of the matter that the purchaser would be entitled to rescind. *(Parke v. Hamman, 1907. T.H. 47; Viljoen v. Hullier, 1904, T.S. 312).*

In *Durr's* case which arose out of a sale by auction where the conditions of sale stipulated that everything was to be sold as it stood, the auctioneer and the vendor had both stated that a certain cow offered for sale would calve in about three weeks' time. As a matter of fact

she did not calve until three months thereafter. The Court held that in the absence of any allegation and proof of fraud and in view of the fact that the statement had not been made with the object of varying the conditions of sale, but to express the defendant's own belief, erroneous though it was it did not amount to a warranty that the cow would calve in three weeks. It may be pointed out that the allegation as to the cow's calving in three weeks' time would probably not have been regarded as material in the circumstances of that case.

The purchaser who discovers that the article bought is suffering from redhibitory vices can claim :—

(a) Rescission of the sale ;

(b) that the purchase price, if paid, be returned with interest ;

(c) the return of all necessary expenses incurred.

The object of the action is to obtain restoration of the parties to the position they occupied at the time the contract was entered into. If, therefore, there have been fruits of the thing (animal) sold, these should be set-off against the interest on the purchase price. It is a controversial point whether damages can be claimed in addition to the return of purchase price, interest, and expenses. So far, however, there is no case in South African Courts where damages properly so-called have been awarded.

The case of *Erasmus v. Russell's Executor, 1904 T. S. 365,* has caused a certain amount of difficulty. It has certainly caused a divergence between the law of South Africa and the trend generally of modern law. In that case the plaintiff bought certain cattle which he alleged the defendant had expressly warranted to be free from disease. The cattle developed tick fever after the sale and other cattle of the plaintiff's were infected. The plaintiff sued for the return of the purchase price and the value of his own cattle lost through the disease. The purchase price was tendered by the defendant, but the other damages disputed. Although the warranty was doubted by the Court it proceeded on the assumption that such a warranty had been given and laid down that damages for the infection of the plaintiff's other cattle could not be recovered because the seller was not aware of the defect. That eminent Judge the late Sir WILLIAM SOLOMON in the course of his judgment said:—"An express warranty that they were 'free from disease' does not therefore appear to carry the case any further or to increase the liabilities of the seller." In reply it has been suggested that the express warranty against a defect raises a presumption that the damage that would flow from such a defect was in the contemplation of parties.

Where the defect in the thing sold is of such a trivial nature that it does not materially interfere with its use, or where the purchaser does not wish to have the sale rescinded, the purchaser sues under the *"Actio quanti minoris"* for the reduction of the purchase price pro-

portionate to the reduction in value owing to the defect. In addition to the above actions, the purchaser can avail himself of the "*Actio empti*" by which damages are claimable.

It is usual, however, for the buyer of any animal to require an **express** warranty of any qualities he may desire. No particular form or words is necessary to constitute a warranty, which must, however, not be confused with mere puffery, or expression of opinion—KOTZE, J. in *Corbett v. Harris, 1914, C.P.D. 543.* The question of the intention of any statement made before a sale is completed is one of fact for the Court. Where a warranty is given, it is simply necessary for the thing to comply with the warranty . In the case of animals, if a warranty is given, it is a warranty *de praesenti* and not *de futuro,* unless the seller specially binds himself—See *Commaille v. Steyn, 1914; C.P.D. 100.,* e.g. a warranty that a cow gives 25 bottles of milk is a warranty that she has been giving that, and not that she will continue to do so !

Another aspect of sale which I should like to mention is the incidence of the risk, which is often important where valuable animals are concerned.

The rule is that as soon as the contract of sale is complete, the risk of loss or deterioration of the thing sold passes to the purchaser. The sale is complete as soon as the parties to the contract have agreed on the thing to be sold and the price to be paid. This does not apply when the sale is subject to a suspensive condition, or where there has been a clear and specific agreement that the risk does not pass to the purchaser. Risk to an animal includes its death, physical injury, or loss. Until the sale is completed, the risk remains on the seller, as it does till all conditions suspensive to the sale have been fulfilled. Where there is a resolutive condition, the risk passes as soon as the article and the price have been agreed upon. Where things are sold in the alternative, whether the choice is left to the purchaser or the seller, and one of the two things perishes after the sale is complete, the loss falls on the seller. If both perish, the buyer is responible for the price agreed on . (*Voet 18.6.3*). Where several things are bought which are so interrelated that they constitute a whole, the death of one before the sale is complete reverts on the seller, and vitiates the contract.

In the period after completion of the sale and delivery, the duty of the seller is to show that degree of care about the custody of the thing that an ordinary careful person manifests in the case of his own property. Beyond that, the buyer continues to be responsible for the loss, death or depreciation of the thing. In the case of damage to the thing, the seller need only show that he exercised the degree of care indicated above.

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Two New Ascarids from Crocodiles. *

BY R. J. ORTLEPP, M.A., Ph.D.,
Onderstepoort, South Africa.

Dujardinia tasmani n. sp.

Among a collection of helminths collected and forwarded to this Laboratory by the Rev K. Tasman from Kutama, South Rhodesia, were a number of specimens of ascarids taken from the stomach of a crocodile. On examination these proved to be immature specimens of *Dujardinia helicina* (Molin) and the new species which is here described. Some of these were firmly embedded in an ulcer of the stomach which was sent with the specimens. Macroscopically the ulcer resembled that caused by *Triodontophorus tenuicollis* in the colon of the horse, and by *Acuaria* (*Dispharynx*) *spiralis* in the gizzards of fowls, turkeys, etc.

The worms are slender and are of a pinkish colour. The body tapers slightly towards both extremities and the anterior end is in most cases bent ventralward in both sexes. In the female the posterior

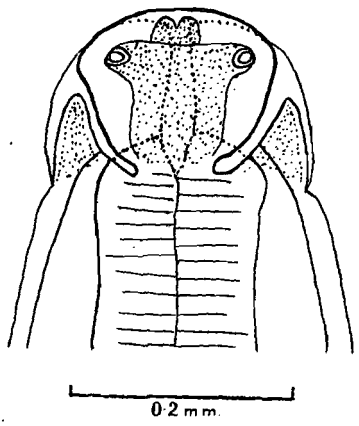


Fig. 1. *Dujardinia tasmani* n. sp. Dorsal view of anterior end.

extremity is more or less straight but in the male it is also bent ventralward in the form of a hook. The length of the females varies from 14 to 30 mm. with a maximum thickness of 0.7 mm. in the largest female. All are still immature, and, except for the vulva, show no development of the genitalia. The males vary in length up to 25 mm. with a maximum thickness of 0.56 mm.

The three lips are prominent and are set off from the body by deep grooves at their bases. They are more or less oval in outline,

* This work has been carried out under a grant from the Empire Marketing Board.

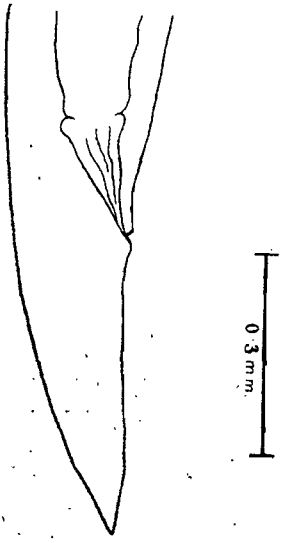
being about one-and-a-half times as long as they are broad; the dorsal lip, however, is larger than the laterals (Fig. 1). The pulp of the dorsal lip has a rectangular shape with a lateral projection at each of its anterior corners; these projections terminate externally in two large papillae; anteriorly the main pulp mass sends out a stout process which is deeply incised on its anterior face. The lateral lips each carry two papillae, one small and inconspicuous, situated towards its dorsal margin, and one large and rounded towards its ventral margin. Interlabia are present, which are about half the height of the lips. Dentigerous ridges are absent.

The oesophagus is long and slender and forms about one-eleventh of the total body length. In a 25 mm. long female it measured 2.36 mm. and in a male of the same size 2.4 mm. Its maximum thickness was 0.22 mm. The oesophagus is followed by a short and rounded oesophageal bulb, 0.13 mm. long by 0.2 mm. broad. The intestine sends forward a large and dorsally placed caecum, which is about three-quarters of the length of the oesophagus. The excretory pore is a rounded and conspicuous aperture found on the ventral surface just behind the lips, being located about 0.04 mm. behind the base of the ventral interlabium. The nerve ring encircles the oesophagus about 0.5 mm. from the anterior end. There are two small and inconspicuous cervical papilae which do not penetrate the cuticule; they are about 0.25 mm. posterior to the nerve ring.

The details of the female genitalia could not be made out as all the specimens are still immature. However, the vulva was found to be located just anterior to the middle of the body. As has been noted above, the tail of the female is straight (Fig. 2) and gradually tapers to a fine point. It is 0.45 mm. long in a 25 mm. long female and 0.62 mm. long in the largest female.

The male genital apparatus consists of a number of papillae arranged in two rows, one towards each of the ventrolateral margins of the body (Fig. 3). There are 4 pairs of large precloacal papillae and 5 pairs of post-cloacal papillae. The precloacal papillae are unevenly spaced. Of the post-cloacal papillae two pairs are large and are situated just behind the cloaca. The remaining three pairs are found towards the end of the tail, one pair being lateral in position. Caudal alae are lacking. There are two equal spicules which are very long, measuring up to 8.25 mm. in length. Their distal extremities are well chitinized and terminate in sharp points. Proximally, however, they are not so strongly chitinized. A conspicuous gubernaculum is present which is 0.25 mm. long (Fig. 4). Proximally it bears a knob on its dorsal aspect. Distally it tapers gradually to end in a sharp point. It is very similar to that described for *D. vanderbrandeni*, Baylis 1929.

Affinities: Of the ascarids from crocodiles, *D. helicina,* (Molin) is the only one which possesses spicules up to 8 mm. in length. This species is, however, easily distinguished from the species described



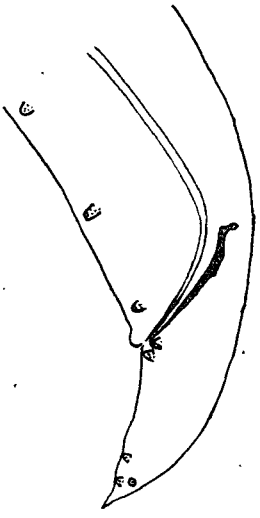


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Fig. 2, *Dujardinia tasmani* n. sp. Posterior extremity of female.
Fig. 3, *Dujardinia tasmani* n. sp. Posterior extremity of male.
Fig. 4. *Dujardinia tasmani* n. sp. Gubernaculum.

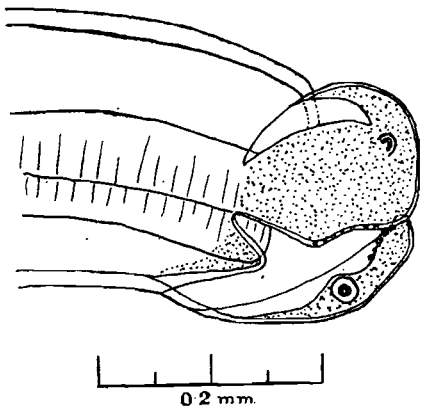
above by (1) the shape and nature of the pulp of the dorsal lip; (2) the nature of the gubernaculum, and (3) the shape and length of the tail in the male.

Porrocaecum assymmetricum n. sp.

Among a number of specimens of *Multicaecum agile,* (Wedl) obtained from the stomach of a Central African crocodile there were present two female specimens of an ascarid which appeared to differ from this species in that they were of a dark brown colour. On closer examination it was found that they were members of the genus *Porrocaecum.* As far as the writer is aware only one species of this genus has been recorded from crocodiles, namely *P. crocodili* Taylor, 1924, from a West African crocodile. A comparison of Taylor's description with the females in the writer's possession clearly showed that they were not co-specific. The shape of the dorsal lips and the nature of their pulps are different, also the position of the vulva and the shape and size of the tail. In *P. crocodili* the vulva is situated just in front of the middle of the body, whereas in the species here described the vulva is found roughly at the junction of the first and second quarters of the body. Also the tail of the female in *P. crocodili* is 0.21 mm. long and "rapidly tapers off to end in a short sharp point," whereas

in the new species it is much longer measuring 0.85 mm. and tapers gradually to end in a sharp point.

Description: The two females are both 16 mm. in length, and have a maximum thickness of 0.70 mm. They have a reddish-brown colour which makes the body somewhat opaque, and the internal organs could consequently not be definitely made out even after clearing. One of the specimens had thus to be sacrificed, and it is on the internal organs of this female that the description of these organs is based. The body tapers towards both extremities and the anterior end is bent ventralwards in the form of a hook. The posterior end is more or less straight, and behind the anus the body tapers gradually to form a relatively long and sharp pointed tail, 0.85 mm. in length (Fig. 9).



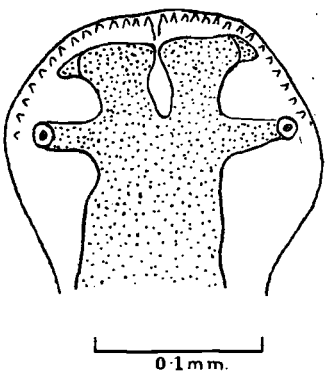


Fig. 5. *Porrocaecum assymmetricum* n. sp. Lateral view of anterior extremity.
Fig. 6. *Porrocaecum assymmetricum* n. sp. Dorsal view of dorsal lip.

The lips are asymmetrical in shape, the dorsal being much larger than the laterals (Fig. 5). The dorsal lip (Fig. 6) is almost rounded in outline and carries about 30 denticles on its anterior inner surface, and two large external papillae, one towards each of its lateral margins. These two papillae are provided with long pulps which extend transversely from the central mass of pulp in the form of two outstretched arms. Anterior to these "arms" the central pulp extends forwards in the form of two knobbed masses, the knobs being better developed towards the sides of the lips. The lateral lips are roughly semicircular in shape with the base of the semicircle towards the dorsal lip. Each carries a conspicuous papilla towards its ventral border and a row of small denticles on its opposite margin. Small interlabia are present between the dorsal and lateral lips, but none between the two laterals. The oesophagus (Fig. 7) is long, slender, and very slightly club-shaped, measuring 2.45 mm. in length. It is 0.13 mm. broad at the base of the lips and increases in size to attain a thickness of 0.23 mm. about 0.5 mm. from its posterior end which is 0.18 mm. in diameter. The oesophagus is followed by a short ventriculus, the gland-

ular nature of which could be detected only in the dissected organ. *In situ* it gave one the impression of being an oesophageal bulb. It is 0.14 mm. long and 0.27 mm. broad. The intestine sends forwards a dorsal caecum, 1.9 mm. long and about the same thickness as the oesophagus.

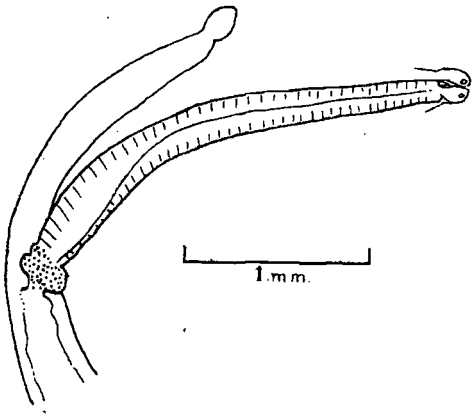


Fig. 7. *Porrocaecum assymmetricum* n sp. Oesophagus with intestinal caecum.

Very narrow cervical alae extend down the sides of the body for about one quarter of its length. No cervical papillae were seen. The nerve ring encircles the oesophagus about 0.5 mm. from the anterior end and what appears to be an excretory pore is found about 0.15 mm. posterior to the nerve ring.

As has been noted above, the vulva occupies a very anterior position, being situated 1.2 mm. behind the oesophagus or roughly at

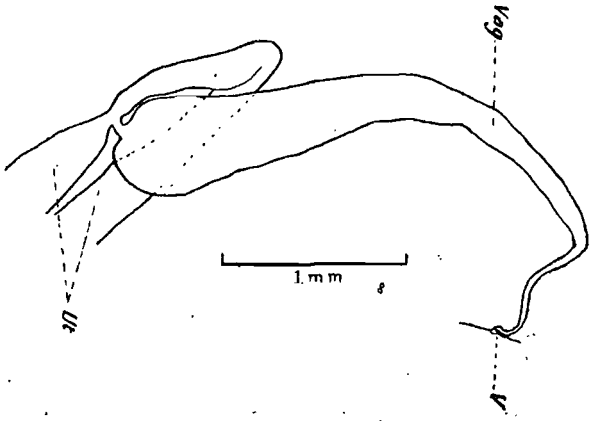


Fig. 8. *Porrocaecum assymmetricum* n. sp. Female genitalia (V=vulva; VAG=vagina; UT=uteri).

the junction of the first and second body quarters. It is a small rounded aperture, flush with the general body surface. The vagina (Fig. 8) is 3.6 mm. long and is markedly club-shaped, its posterior

portion being expanded to form an egg-chamber 0.52 mm. in diameter. A short and narrow duct arises from its posterior end and this joins the two uteri, which at their origin are opposed, but the anterior uterus soon recurves and passes backwards more or less parallel to the other uterus. The eggs are very thin shelled and are segmented *in utero,* but not embryonated. They vary in shape from circular to

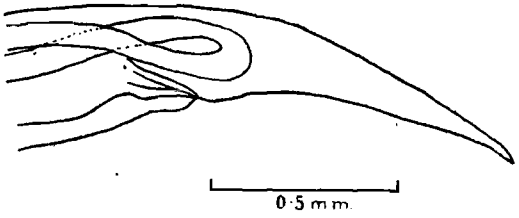


Fig. 9. *Porrocaecum assymmetricum* n. sp. Posterior extremity of female.

oval. The circular eggs have a diameter of 0.07 mm. and the oval eggs vary in size from 0.072 mm. by 0.054 mm. to 0.078 mm. by 0.051 mm.

The types of both the above described species are to be deposited in the Helminthological Collection of the Veterinary Research Laboratory, Onderstepoort.

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III (2) 1932.

Three Forms of Leg-weakness in Chickens due to Dietetic Errors.

By J. D. W. A. COLES, B.V.Sc., Onderstepoort.

The purpose of this short article is to provide for the practising veterinarian a description of the salient features characteristic of certain forms of leg-weakness in chickens. These are:

(a) Leg-weakness due to excessive magnesium carbonate in the diet.

(b) Leg-weakness due to "slipped tendon," "enlarged hock," or "range paralysis."

(c) Leg-weakness due to an inadequate supply in the diet of an anti-paralysis factor which is possibly a constituent of the substance now called vitamin G. This disease has recently been diagnosed in South Africa.

(a) This condition has so far not been diagnosed in the Union, although its presence must be expected in those districts where chipped marble and limestone are supplied in place of oyster shell. Such limestone may contain up to about 45% magnesium carbonate. Oyster shell and high grade limestone favour good growth of chickens and a high production of eggs. Halpin and Hayes report a decreased production of eggs if the limestone contains a relatively high percentage of magnesium carbonate. Wheeler states that rations poor in calcium but rich in magnesium produced a pronounced shortage of calcium and mineral matter in the bones of chickens.

Recently in the United States, Buckner, Martin, and Insko have studied the effects of magnesium carbonate on growing chicks. Experiments were commenced with day old chicks which received a basal ration of yellow corn 80 parts, wheat middlings 20 parts, sodium chloride 1 part, and vitamin tested cod liver oil 2 parts. One group of chicks received in addition tricalcium phosphate 5 parts and magnesium carbonate 5 parts. In three weeks these chickens revealed nervousness, weakness, and swollen leg joints. The swellings increased till at the end of six weeks the chicks would not move voluntarily. The toes were turned outwards. The birds walked on the distal end of the tarso-metatarsus. The magnesium carbonate was now withdrawn and these chickens improved markedly.

In two other lots of chicks symptoms were less severe and improved spontaneously after six weeks. One lot received the basal ration plus 5 parts magnesium carbonate, and the other 5 parts magnesium car-

bonate plus 5 parts calcium carbonate. Lameness was due primarily to a marked deformity (outward bending) of the metatarsals. The absence of a lateral rotation of the tibia in every case precluded confusion with the condition next to be described. Unless pulverised limestone, fairly rich in magnesium carbonate, is incorporated in the mash it is not likely that this disease will be seen every often in the Union.

(b) This condition has likewise not as yet been diagnosed in the Union. Norris and Bethke and their associates believe the cause to be the feeding of an excess of mineral matter, rich in available calcium and phosphorus, to chickens which are making very rapid growth. This belief, however, still requires confirmation. Titus states the condition can be prevented by the incorporation of rice bran in the diet.

The main observations of Hall and King are worthy of note. In the United States the condition is most prevalent in March and April, and up to 40 per cent. of chicks may die. It is seen mainly in chicks put on range after having been reared in-doors for four to eight weeks. The bird is at first slightly lame, but very shortly the entire limb may become useless. Sometimes the first symptom is a bowing of the leg at and below the hock, which becomes swollen. The leg usually becomes more or less fixed in an extended position. Often one leg is worse than the other. Frequently the leg below the hock shows lateral rotation. The weight of the chick often rests on the swollen and partly dislocated tibio-tarsal joint at which point the tendons often thicken and a good deal of fibro-cartilage may develop. The tendon of Achilles may be displaced either laterally or medially. The deformity is not due to abnormal composition or structure of the bone, the chemical and histological examination of which reveal no deviations from the normal. X-Ray examination shows the changes in the joints, tendons, etc.

(c) This condition was described first by Norris and his associates and more recently by Bethke and co-workers.

The chicks show a sudden and partial loss of control of their legs and then walk or rest on the hock joints. Complete or partial spontaneous recovery may be seen, but death often supervenes. In partial recovery a permanent paralysis of one or both feet remains, the chick now walking on the distal end of the tarso-metatarsus. If walking is impossible the chick lies on its sternum with the legs outstretched. In the early stages the chicks move surprisingly rapidly on the hock and metatarsus, and often aid progression by partial flight. Chicks become affected when three to ten weeks old. The hock joint remains normal and the toes curl and turn inwards—never outwards.

The disease has been seen by the author in chicks 21 days old sent from Johannesburg for examination. They were from three

different owners who purchased their food supplies from one dealer. The food consisted of a mash of wheaten bran, pollards, ground Sussex oats, yellow maize meal, fish meal, and charcoal. Feeding of thick sour milk caused the disappearance of all symptoms, even though marked, within one week. In this outbreak the toes were invariably turned inwards.

It is maintained by Norris, Bethke, and others that this anti-paralysis factor resists heating at 120 deg. C. for 6 hours and is found in abundance in milk, butter milk, skim milk, whey, and other milk products and also in yeast, high grade lucerne meal, and ox liver. Meat meal usually contains sufficient when fed in normal quantities, but fish meal is often very deficient. The fish meal was probably responsible for the above mentioned outbreak in Johannesburg.

The nature of this anti-paralysis factor is still a matter for speculation and research, but there is circumstantial evidence to support the view that Vitamin G is composed of more than one element and that this is one of them.

In conclusion it may be stated that the main points to be remembered are:—

1. In leg-weakness due to excess in the diet of magnesium carbonate there is a deformity of the metatarsal bones.
2. In "slipped tendon" the Achilles tendon is often displaced, usually laterally but sometimes medially. The joint is thickened and sometimes also the tendons. There is evidence that rice bran contains some element capable of preventing the condition.
3. In leg-weakness due to a supposed new form of avitaminosis the hock is never affected, and the toes are always turned inwards. Appropriate feeding rapidly rectifies the error.

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An Outbreak of Paratyphoid in Pigs.

By G. MARTINAGLIA, D.V.Sc., Johannesburg and
E. M. ROBINSON, F.R.C.V.S., Dr. Med. Vet., Onderstepoort.

The existence of Paratyphoid in pigs has frequently been suspected, but it had not previously been definitely diagnosed in South Africa. One of us (G.M.) during the course of regular meat inspection at the Johannesburg Municipal Abattoirs, observed an unusual condition in a number of pigs during 1931.

The lesions seen were as follows: The skin showed an intense hyperaemia either over the whole body or in parts only. This hyperaemia was patchy in some cases and in others diffuse, involving the ears, flanks, back, abdomen, and legs. The lymphatic glands especially the bronchial, mediastinal, and gastric appeared haemorrhagic. The lungs showed small atelectatic areas. There was a slight pulmonary oedema and in one case broncho-pneumonia. In all the cases the spleen was slightly enlarged and darker in colour than normal. In three of the cases punctate haemorrhages were noted in the cortex of the kidneys. Gastritis was observed in one animal only, but a mucoid enteritis was seen in all cases. In three of the pigs greyish ulcers were observed in the region of the ileo-caecal valve.

The observations were confined to six pigs, all from the same farm. The owner buys pigs to fatten up and send to the abattoirs. He has had losses from this disease from time to time, and the infection appears to be endemic on his farm.

In order to exclude the so-called African virus disease of pigs, a blood sample from one of the pigs was sent to Onderstepoort for inoculation purposes. The results were negative. Lung, gland, and spleen were also sent, and filtrates from these tissues were inoculated into pigs, again with negative results. True swine fever could therefore be excluded as well.

Swine erysipelas, another disease of pigs which had to be considered in the differential diagnosis, has not yet been diagnosed in South Africa.

Bacteriological cultures from the blood, spleen, and lungs of several of the affected pigs were sent to Onderstepoort for identification, and on examination (E.M.R.) proved to be pure cultures of *Salmonella suipestifer.*

The sugar reactions produced by the organism were as follows: Acid and gas in glucose, mannite, maltose, xylose and rhamnose. No

change in lactose, dulcite, saccharose and arabinose. No indol produced.

The organism was agglutinated by the various salmonella antisera available i.e. *S. enteritidis Gärtner, pullorum, sanguinarium* and *aertrycke,* but to a much lower degree than the corresponding Salmonella species.

Two pigs were given culture material. One received on 17/7/31 intravenously 5 c.c. of a 24 hour agar slope washed off with normal saline. This pig showed a high temperature (106 deg. F.) the following day and refused food. Breathing was rapid and the animal, a pregnant sow, aborted. On 19/7/31 the pig could not rise; in the afternoon it became comatose and it died during the night.

At *post-mortem* on 20/7/31, the lesions were found to be those of a septicaemia. The skin of the legs was a bluish-red colour. The visible mucous membranes were cyanotic and there was a discharge of reddish foam from the mouth and nostrils. Blood: dark red. Lymphatic glands: bluish-red. Lungs: dark red, mottled, reddish spots under pleura. Reddish foam in the trachea. Heart: petechiae on endocardium of both ventricles. Spleen: swollen, soft and enlarged. Liver: enlarged and congested. Numerous small pinhead size greyish centres present throughout. Stomach: diffuse bluish-red in colour. Small intestine: vessels markedly injected. Large intestine: reddish spots in the colon.

Cultures from the heart's blood and spleen gave pure growths of *S. suipestifer.*

The small foci in the liver were examined histologically and appeared to be similar to those seen in other Salmonella infections.

The other pig was given 100 c.c. of the culture per os. It did not show any symptoms subsequently.

This paratyphoid outbreak in pigs is of interest on account of its possible association with food poisoning in man. Reference to the literature, however, seems to show that most outbreaks of food poisoning in the human being can be traced to *S. enteritidis* or *S. aertrycke,* while those due to *S. suipestifer* are relatively rare.

Sand Filled Gall Bladder in a Sheep.

By A. D. THOMAS, D.V.Sc. Onderstepoort.

A most unusual morbid specimen was recently received from the Health Inspector of Ficksburg, O.F.S., for examination at this Institute. The parcel contained the gall bladder of a sheep which, as stated in the sender's covering letter, was found during the course of meat inspection at the local abattoirs, to contain sand. The bile ducts also were said to be much distended and likewise filled with bile stained sand. No other abnormality seems to have been noted, and only the gall bladder, its contents, and small pieces of liver attached were forwarded.

From the scanty information available and the incomplete material collected, it is unfortunately impossible to arrive at any conclusive or even likely explanation of the condition. Such as it is, however, the occurrence is so uncommon that it is thought worth while recording.

The specimen in the first place was badly preserved and partly dried up. It comprised a pear shaped sac (gall bladder) measuring 4.5 cm. in length and 2.5 cm. at its greatest width. There was a small cut across it, but apparently none of the contents had been lost.

After removal of some of the superficial fat in which it was embedded, this sac was opened along its length with a pair of scissors. The surrounding fat presented nothing abnormal but the gall bladder had a shrunken appearance. The bladder wall was thin, fibrous, and translucent, and was incrusted on its inner surface with particles of sand. It was somewhat difficult at first to recognise this as the gall bladder mucosa, but it was possible in histological sections to see a thin outer layer of smooth muscular and fibrous tissue, lined inwardly with compressed, atrophied, and partly necrotic remnants of epithelium. This fact seemed to indicate fairly definitely that the condition had existed during the life of the animal and was not merely a post mortem artefact.

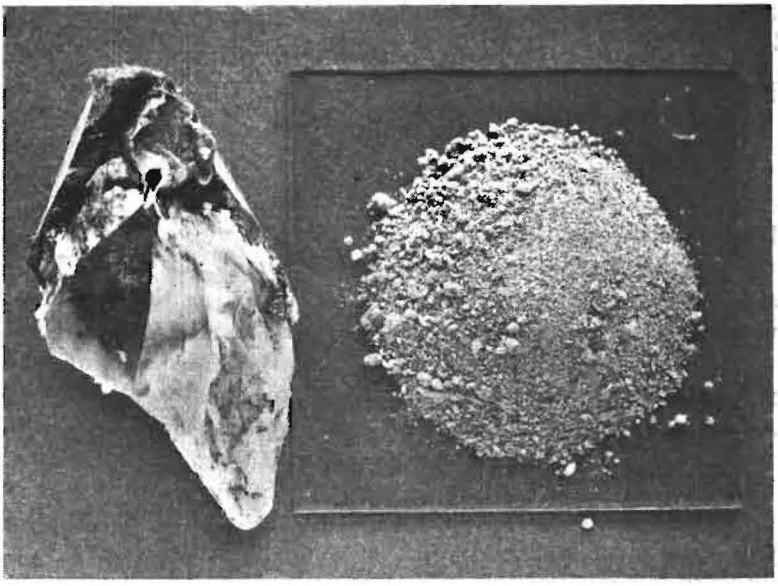
The contents of the bladder (air-dried) weighed about 22 gm. and consisted obviously of ordinary fine river sand, fairly clean, but mixed with very small particles of soft yellow substance (bile pigment). Ignition, microscopic examination, and various solubility tests all pointed to the silicious nature of almost the entire mass. As mentioned above the sender states that the bile ducts also contained large amounts of sand mixed with bile.

Histological examination of the smaller pieces of liver available did not reveal much of importance. Glisson's capsule was somewhat thickened and fibrous, and the bile ducts showed proliferation as well as desquamation of the epithelium. The only notable change in the parenchyma was the presence of scattered, very small centres of neutrophiles. There was no evidence of bile stasis.

How this quantity of sand found its way into this strange situation will, so far as this case is concerned, remain a mystery. A likely speculation of course is the existence, between the biliary system and some part of the alimentary tract, of a fistula through which sand could have passed.

Dilatation or injury of the duodenal papilla with retrograde penetration of food and sand, is another possible explanation. In both instances it must be assumed that for some time prior to death food had no longer gained access to the biliary canals so that only the sand remained behind. (The presence of sand in the digestive tract is a very common occurrence in sheep under certain conditions of grazing.)

There seems to have been no obstruction whatever to the bile flow, since the sender does not mention jaundice, nor did the fat



Left: Gall bladder opened showing constriction at junction with dilated cystic duct above. Right: Sand removed from gall bladder.

round the gall bladder show any signs of pigmentation. The gall bladder itself, however, could not have functioned at all since it was packed full of sand with traces only of bile products.

Furthermore the sheep in question does not seem to have been greatly inconvenienced, since at the time it was slaughtered it must, outwardly at any rate, have appeared healthy.

In conclusion it is hoped that more fortunate observers will encounter, or have encountered similar conditions and may be able to throw some light on the way in which such a peculiar occurrence could have taken place.

Theses for the Fellowship R.C.V.S. of Interest to South Africa.

By H. H. CURSON, Onderstepoort.

INTRODUCTION.

Whereas the practice in most universities is for a veterinarian (who has obtained a doctorate) to publish his thesis and to present a certain number of copies to the institution granting the degree, no such procedure is necessary in the Royal College of Veterinary Surgeons, London. All that is done is to deposit the original copy with the Registrar, the result being that access to such material is not so easy as is the case with a university.

Thanks to the courtesy of Dr. F. Bullock, Secretary and Registrar, Royal College of Veterinary Surgeons, it is possible to furnish the titles of theses presented by, (a) Fellows at present in South Africa, and (b) Fellows formerly in the Sub-Continent (some alas! now deceased).

(a) FELLOWS AT PRESENT IN SOUTH AFRICA:

Amos, S. T.	1909	East Coast Fever.
Canham, A. S.	1926	Blood of cattle.
Chase, W. H.	1907	Contagious bovine Pleuropneumonia.
Curson, H. H.	1926	Some little known South African Poisonous plants and their effects on Stock.
Crowhurst, J. W.	1893	No Thesis.
Dunning, F. J.	1911	East Coast Fever.
Elder, W. A.	1914	East African Coast Fever.
Jarris, E. M.	1910	A Pyo-lymphangitis in Equines in Southern Rhodesia.
Paine, R.	1907	Clinical notes upon some Poisonous Plants in Cape Colony.
Quinlan, J. B.	1928	Researches into Sterility of Cows in South Africa.
Robinson, E. M.	1931	The Serological Diagnosis of Trypanosomiasis in the Domesticated Animals.
Simson, W. A.	1912	Bovine Pleuropneumonia: Lung Sickness.
Spruell, J.	1908	Bluetongue of Sheep in South Africa.
Verney, F. A.	1905	The Etiology of South African Horse sickness.

Watkins-Pitchford, H.	1894	A Short treatise on Epilepsy in the Dog.
Webb, J. L.	1902	The treatment of Rinderpest.
Woollatt, S. B.	1905	Bovine Piroplasmoses.

(b) FELLOWS FORMERLY IN THE SUB-CONTINENT.

Bruce, G. S.	1908	East Coast Fever.
Chambers, F.	1917	Investigations into Posterior Paralysis: A disease of cattle in Northern Rhodesia.
Cochrane, R. C.	1907	African Coast Fever.
Coley, J. G.	1902	South African Horse Sickness.
Edwards, E. R.	1904	Rinderpest.
Goodall, A.	1921	The Anthrax Problem in South Africa.
Griffiths, J. A.	1922	Studies on Animal Diseases in South and Central Africa.
Head, A. S.	1908	Rinderpest.
Jowett, W.	1905	Tubercular Mastitis.
Lane, A. J.	1906	Rinderpest.
Lowe, W. C.	1907	Rinderpest.
Millar, W. M.	1907	South African Horse Sickness.
Stirling, R. F.	1912	East Coast Fever in Rhodesia and its Control.

"It should be noted that the regulations requiring a thesis came into force in 1893 so that there are no theses for Fellows" prior to this date. (Letter 13/4/32 from Dr. Bullock).

It is hoped in a future issue to give the titles of theses presented by South African members of the profession for the doctorate.

ABSTRACTS.

Die Organisation des Pferdeersatzes in den Heeren des Kulturstaten.

SEEHAWER. *Ergaenzungsbaende zur Zeitschrift fuer Veterinaerkunde.* Heft 4.

(No attempt has been made to give a comprehensive resume of this lengthy article. The following are a few of the many interesting points which emerge, and though selected at random give some idea of the scope and importance of the questions with which the author deals).

Events in the 1914-18 campaign soon discredited the opinion that with the advent of motor transport the value of the horse in modern warfare had declined. The replacement of army horses became for all the combatants a most important problem, and it is with the organisation of this replacement that the article concerns itself, as well as with the remount breeding policies followed by countries the world over during the pre-war, war, and post-war periods.

Although at the outbreak of war most of the combatting nations possessed sufficient horses for their immediate requirements, the replacements necessitated by the heavy losses was soon found to be a difficult problem (felt especially by the Central Powers, who unlike the Allies were not able to import horses from oversea). In time of war this problem is always most acute in regard to remounts, the heavier breeds being more readily available on account of their extensive use in agriculture and commercial transport.

The sources of replacement are the animals already owned by the various regiments, those obtainable from the private owners and breeders, and to a smaller extent those captured from the enemy. In most countries the breeding of remounts was not only state aided but also state controlled. England was an exception in that she followed the policy of leaving the breeding entirely in the hands of the farmers, although of course breeders were encouraged by the award of prizes. Some countries (Belgium, Italy) were forced to rely on importations. In most countries remounts were purchased from the breeder direct, but some (e.g. Austria) bought chiefly from horse dealers.

A tribute is paid to the efficiency of the veterinary services rendered during the war. Veterinarians had to deal chiefly with mange and glanders, diseases which were generally introduced by captured horses.

Of considerable interest is the present position of European States in regard to equine population. Hungary is at present the only European country in a position to be able to sell animals to foreign powers and during last year supplied 10,000 horses to Soviet Russia.

While there are on the whole enough horses for replacement during peace training, the numbers are quite inadequate to cope with the demand which would be involved by the outbreak of another war.

W. O. N.

The use of Carbozoo vaccine (Mazzuchi) in the preventive vaccination against anthrax.—F. Gerlach. Bulletin I, Vol. 5(2), Office International des Epizooties. 1931.

Gerlach reports the results in Austria of the use of the new Italian Anthrax Vaccine (Carbozoo) now being used on a large scale in Italy, and introduced by Mazzuchi and Belfanti. He recommends the use of this vacine very heartily as a result of his own experiences with it.

The vaccine produces a marked local reaction and there may be local necrosis in some cases. Gerlach does not give the method of preparation, but states that in the preparation *saponin* is used.

Kruska (*Compt Rend. Acad. Sc.* T. 192 No. 13), to whom Gerlach refers, gives a description of the preparation of the vaccine. It is based on the use of a 5% saponin solution to which one adds an emulsion of either an attenuated strain of *B. anthracis* or the virulent organisms. In the former case one can use the vaccine after the saponin has acted for 24 hours but with virulent bacilli it must act for 3 weeks before use. In inoculated animals an oedema develops at the inoculation site which may result in central necrosis, but recovery is rapid. The virulence of the bacilli used in the vaccine is unaltered and if virulent bacilli are used one finds that even after 15 months they are present in the vaccine without having suffered attenuation.

The vaccine is based on the idea that if one can introduce with the bacilli a substance which will cause a marked local reaction, even the virulent organisms do not develop and kill the animal, but cause a good immunity to develop.

E. M. R.

The present position regarding vaccination against tuberculosis by means of B.C.G. vaccine. J. Boes. *Bull. Off. Intern. Epiz.*, 5: 35—62, 217—223, and 254. 1931.

The author gives an excellent review of the present position with regard to the vaccine in practice. He refers to the lengthy discussion which took place at the International Veterinary Congress in London and the reserved attitude which it adopted.

He mentions that in the case of cattle it is not so much a question of saving animals as eliminating the disease and reducing the losses

from it. If, therefore, the vaccine is to be of real value it must help in the elimination of the disease. It would appear that the immunity from B.C.G. vaccine may be of a rather transitory nature, and Ascoli, one of the great protagonists of the vaccine, recommends inoculation twice annually. Some investigators doubt whether repeated vaccinations improve the immunity. Tuberculosis is capable of establishing a mass infection which will break down even a fully developed immunity. Vaccination against tuberculosis therefore should induce a continuous immunity of practically unlimited solidity.

The vaccine has not yet been tested on a sufficiently large scale in the various countries to justify the formulation of a definite opinion as to its practical value, but it is generally recognized that under favourable conditions it increases the resistance to infection.

The review may be summarized by saying that the vaccine appears to be harmless and the vaccinated animals are not a source of danger to others. A certain resistance is undoubtedly conferred and may assist prophylactic measures in infected places. The method places a scientific means of attacking the disease in the hands of the veterinarian, allowing him easy intervention in infected places.

The drawbacks are that even when vaccination is practised it is still necessary to impose the usual sanitary measures. In order that the best results may be obtained one has to try and reduce the infection to a minimum and, as far as possible, eliminate it from the place.

The reaction of vaccinated animals to tuberculin may prejudice their sale especially for export. This is of lesser importance where tuberculosis is very rife. An important point is that there is nothing to distinguish a vaccinated animal free from infection from a vaccinated animal which is infected. There may therefore be danger in introducing a vaccinated animal into a clean herd.

The conclusion is that the eradication of tuberculosis at the present time can only be undertaken with the full co-operation of breeders. Hygienic precautions and vaccination should be combined and prophylaxis against tuberculosis should be systematically undertaken in all countries, the results being published for the benefit of the world in general.

E. M. R.

The standardization of tuberculin: Okell, System of Bacteriology, 1930.

In this review the author describes the various methods which are in use or have been used for the standardization of tuberculin. The

subject is one of very great importance as the value of a tuberculin test depends entirely on the use of a properly standardized tuberculin.

The method on which most reliance is placed at present is the intradermal inoculation of tuberculous guineapigs. These guineapigs are tested at about 3 to 4 weeks after inoculation and a very small dose of virulent bacilli is used to set up tuberculosis, so that when the tuberculin test is carried out, the animals are not in an advanced stage of the disease.

A concentrated tuberculin is tested in dilutions of 1:500 up to 1:4000 against a standard concentrated tuberculin of known value. Three tuberculins can be tested on one guineapig at the same time and very definite local reactions are obtained. When testing tuberculin for subutaneous inoculation it can be used in the same way, but in doses ten times more concentrated (1:50 to 1:400). It is usual when testing the latter type of tuberculin, to inoculate it subtaneously into guineapigs in an advanced stage of the disease as well. It should if suitable kill 3 out of 5.

When concentrated tuberculin is to be used for cattle it is usual to test it on a number of tuberculous cattle, using it undiluted and in dilutions of 1:5, 1:10 and 1:20 and comparing it with a standard tuberculin in the same dilutions. As in the case of guineapigs one can test two or three tuberculins on one animal at the same time.

In this article there is a note on the stability of tuberculin. It has been shown that in the concentrated form it is very stable and will keep without loss of potency for years at room temperature. It will stand autoclaving at a pressure 15 lbs. per sq. inch for half-an-hour or at 10 lbs. for nearly two hours. When diluted, it is less stable.

E. M. R.

Infectious Entero-toxaemia (the so-called Braxy like disease) of sheep in Western Australia. H. W. Bennetts. Bulletin 57, Counc. for Scient. & Indust. Res., Australia. 1932.

The disease described in this article resembles in many respects the European Braxy or Bradsot and is of interest to the South African veterinarian who is constantly meeting with obscure diseases in sheep.

Infectious entero-toxaemia is an acute toxaemia of sheep following the rapid multiplication in the contents of the small intestine of a specific taxicogenic anaerobic bacterium, *B. ovitoxicus*, which is a type of *B. welchii*. It has a seasonal incidence and chiefly affects sheep in good condition. The onset of death is rapid, often without premonitory symptoms. In 30 affected sheep killed for investigation typical lesions of septicaemia were observed. Filtrates of the contents

of the small intestine were toxic, the intestinal contents of normal sheep or of sheep dead from other diseases being non-toxic. Inoculation of sheep with filtrates of the organism and dosing of whole cultures by the mouth have produced the disease. The relation of the organism to the disease is further supported by the fact that a vaccine (anaculture) made from it has reduced the mortality in a flock from 4.6 per cent. to 0.02 per cent.

The opinion is ventured that the predisposing factor is a sluggishness of the small intestine. Various factors which might induce such a condition, such as the eating of stinkwort (*Inuala graveolens*), achlorhydria, are discussed. Cross immunity tests with *B. welchii* and *B. paludis* (Romney Marsh disease of sheep) have shown that there is a close relaionship between the three organisms. It is rather unfortunate that new names are being coined for these recently described organisms which obviously come into the *B. welchii* class.

It is probable that the disease exists also in South Australia and in the South Island of New Zealand. Losses of 5 to 15 per cent. in a flock are quite common. Deaths begin to occur in April and continue until October, the losses being greatest at the beginning and end of the season. Young sheep are chiefly affected.

The time from the onset of symptoms to death is very short and sheep are generally found dead. There are two forms of the disease, a comatose and a convulsive form. The temperature remains normal. Tympanites is often marked just before death. In the convulsive form the animal falls on its side suddenly, and shows rapid, violent, galloping movements, rolling the eyes and salivating. The latter form is uncommon and usually seen in lambs.

At *post mortem* the carcase is generally found to be in good condition, but there is almost always evidence of recent diarrhoea. The *post mortem* lesions are rather indefinite and are those of a toxaemia. The mesentery is very much injected and the abomasum shows a patchy hyperaemia, a similar condition being seen in the small intestine which is usually tympanitic.

The liver is somewhat friable and the cortex of the kidney shows congestion. A condition resembling "pulpy kidney" is seen if the *post mortem* is delayed for an hour or more. Petechiae occur on the epicardium and endocardium.

The causal organism appears to be confined to the intestinal contents of cases at the time of death, and the symptoms are attributable to the toxin which it elaborates.

E. M. R.

Foot and Mouth Disease. Some peculiarities presented by the disease in Southern Rhodesia. L. E. W. Bevan. *Vet. Jl.* Vol. 88, 3. 1932.

The exceptional mildness of the disease is emphasized and some animals would appear to develop a temperature without visible lesions. The spread of the disease could in all cases be traced to actual movements of infected cattle, and game or other agencies apparently played no part in this. It was not found possible to transmit the disease with blood or with swabs of infected material rubbed into the buccal mucous membrane.

Transmission was successful by introducing infected swabs into the nasal cavity. Thermal reactions occurred and in one case typical foot and mouth lesions. Close contact between infected animals with thermal reactions and normal animals resulted in transmission of the disease, but apparently head to head contact is necessary. It is recorded that in the outbreak in South Africa in 1892, close contact was necessary for the spread of infection. The virus does not appear to live for more than a week or 10 days.

Bevan believes that foot and mouth disease as it occurs in South Africa differs in many respects from the European disease. The low infectivity and short viability justify the hope that the disease will be easily eradicated.

E. M. R.

BOOK REVIEW.

The almost entirely rewritten 1931 edition of Prof. Williams' well known work on Veterinary Obstetrics [1]) will be read with the greatest interest not only because it contains a wealth of experience, but also because of the "departure from tradition" in its preparation. It is presented in the usual detailed and emphatic manner to which the author has already accustomed us. Some of the views expressed are admittedly not quite in accord with those of many of our colleagues in Europe, but as one of the leading research workers as well as one of the pioneers on diseases of the genitalia of the domestic animals, Prof. Williams is more than justified in departing from tradition. His vast experience in this line of research, coupled with the way he presents statistics, makes the work most valuable. Research obstetricians who have carefully studied the clinical pathology, the *post-mortem* lesions, the bacteriology, and the histology of the genitalia of the domestic animals will not hold views widely different from those expressed in the chapters where the author deviates from tradition.

[1]) Veterinary Obstetrics by W. L. Williams, 2nd edition. Ithaca, N.Y. (The author). 1931; pp. xvii + 482, with 4 coloured plates and 101 illustrations; $6.50.

Prof. Williams will certainly succeed in the object, announced in the preface, of making the profession think more deeply and more critically so as to analyse the traditional views as compared with those which he expresses. In so far as South Africa is concerned, most of these views can be substantiated. As a research worker on diseases of the genitalia and sex physiology in this sub-continent for many years, the reviewer has followed with the utmost admiration the work of Prof. Williams and his co-workers in the United States.

This excellent book should be in the library of everyone of our colleagues, and should be read in conjunction with the same author's Diseases of the Genital Organs of the Domestic Animals (1931) to appreciate to the full its value in this important branch of veterinary science.

J. Q.

ASSOCIATION.

COUNCIL MEETING—24/3/32.

Held at 1.45 p.m. in the Committee Room, Witwatersrand Agricultural Society, Show Ground, Johannesburg.

Present: Mr. F. J. Carless (President), Drs. du Toit, Robinson, Quinlan, Mr. W. H. Chase, Mr. A. Kirkpatrick and Mr. J. L. Dickson. Dr. H. H. Curson, Hon. Secretary-Treasurer.

Apology for non-attendance: Col. J. G. Bush,

Minutes of Council Meeting of 24/10/31 read and approved.

Matters arising from minutes postponed for next Council meeting.

The following more important matters from the Agenda of the General Meeting were taken:—

Election of officers for year 1932-1933 (see Minutes of General Meeting 24/3/32).

Standing Committees appointed as follows:—

Finance: Dr. Quinlan, and Messrs. C. Jackson and Kirkpatrick. Hon. Sec.-Treasurer (Convenor).

Parliamentary: Drs. P. J. du Toit, de Kock and P. R. Viljoen. Dr. de Kock (Convenor).

Editorial: Drs. P. J. du Toit, Robinson, Thomas (Convenor).

Status: Messrs. Chalmers, Snyman and Coles (Convenor).

The President thanked past Committees for their work especially Dr. du Toit for his services in connection with the Veterinary Bill. The following officials were also thanked: Mr. C. Jackson, Hon. Libra-

rian, Dr. Steyn, Advert-Manager Journal S.A.V.M.A., and Mr. H. M. V. Brown, assistant to Hon. Secretary-Treasurer.

The nomination of Messrs. Mason M.R.C.V.S. and Brown, B.V.Sc. for membership recommended.

Members then attended the General Meeting which commenced at 2.15 p.m.

22nd GENERAL (AUTUMN) MEETING, 24/3/32.

Held in Committee Room, Witwatersrand Agricultural Society, Show Ground, at 2.15 p.m.

Present: Messrs. Carless (President), Quinlan, Dickson, Chase, McNae, Verney, Snyman, Steyn, Bekker, Martinaglia, E. M. Robinson, M. C. Robinson, Mrs. M. C. Robinson, de Kock, P. J. du Toit, Hamlyn, Neitz, Thomas, Fourie, Alexander, Graf, J. S. Watt, Mason, Elder, Kirkpatrick, Monnig, Quin, Parkin and Curson (Hon. Sec. Treas.).

The following visitors were welcomed by the President: Dr. J. Legg of Queensland and Mr. N. Reid, B.V.Sc. Tanganyika.

Dr. Legg was asked to convey the compliments of the S.A.V.M.A. to the members of his Australian Association.

Apologies for absence: Messrs. Bush, Dunning and Chalmers.

1. *Minutes* of meeting 2/4/31 (summary Jl. S.A.V.M.A. May 1931) accepted.

2. *Matters arising from minutes.* The president pointed out

(a) that Col. Bush had been elected Vice-President for the year 1931-32; and

(b) that several extra members (non-official) had been added to the Standing Committees during the year.

3. *Office bearers.* The following office-bearers for the ensuing year were declared elected:

President: F. J. Carless.

Vice-President: S. T. Amos.

Hon. Sec.-Treas.: H. H. Curson.

Members of Council: Messrs. Alexander, Chalmers, Coles, de Kock, P. J. du Toit, Kirkpatrick, Quinlan and Thomas.

Mr. Carless expressed regret that Dr. Viljoen was not on the Council. It was agreed that in the next call for nominations, attention should be directed to permissibility of double nomination.

The President then gave a brief summary of the year's activities stressing the value of the Parliamentary work done by Dr. P. J. du Toit. Dr. du Toit then gave a short account of his work and added that he would attempt to persuade the Minister of Agriculture to adopt the Veterinary Bill as a Government measure.

4. *Standing Committee Reports.* Since the Reports of the Standing Committees (except Finance) had been circulated, the Report of the Financial Committee only was read and adopted. The Sec.-Treasurer was instructed to convey the good wishes of the parent body to the Natal Branch, S.A.V.M.A., formed on 20/2/32. The new Standing Committees were approved. (See minutes of Council meeting.)

5. *Alteration of Constitution:*

(a) Rule 1. Add, "where local branches of the S.A. Veterinary Medical Assn. are formed, no candidate shall be accepted unless he is a member of the S.A.V.M.A." Agreed.

(b) Rule 9 "(g) The following shall be standing committees of Council: (i) Editorial, (ii) Finance, (iii) Parliamentary, (iv) Status and (v) State Veterinary". Lost by 14-9 votes.

(c) Rule 13. "The financial year shall be 1st April—31st March next." Agreed.

Regarding (d) Rule 3 and membership, it was agreed that this matter would receive the attention of Council when the Veterinary Bill actually became law. Council to have power to act.

6. *New Members.* Messrs. Mason F.R.C.V.S. of the Empire Marketing Board and H. M. V. Brown, B.V.Sc. were unanimously elected members of the Association.

7. *Resignations.* Mr. Pullinger's resignation was noted with regret.

8. *Correspondence.* The Hon. Sec.-Treasurer mentioned that (a) the S. Rhodesia Vety. Assn. was now affiliated to the S.A.V.M.A. and that (b) the R.A.V. Corps "Sir Frederick Smith Memorial" Committee had acknowledged with thanks the donation of £5 from the S.A.V.M.A.

9. *General.* No definite recommendation was made regarding the gazetting of veterinarians under Act 13/1928.

The meeting closed at 3.15 p.m., votes of thanks having been registered for the past services of standing committee members, Messrs. Jackson (Librarian), Brown (assitant to Sec.-Treasurer) and Steyn (Advertisement Manager Jl. S.A.V.M.A.), the President and Hon. Secretary-Treasurer.

FINANCIAL STATEMENT—CURRENT ACCOUNT.

Period 1/7/30—31/3/32.

Mch. 31	**To**	Balance b/f	£99	10	8	Mch. 31	**By**	Stamps	£29	17	10
	,,	Sale of Journal	9	5	0		,,	Stationery	11	17	9
	,,	Advertisements	33	15	0		,,	Memorial	5	0	0
	,,	Interest on Fixed Deposit	89	15	0		,,	Clerical and Typing	57	10	0
	,,	Subscriptions	327	10	3		,,	Printing	256	4	3
							,,	Union Loan Certificates	25	12	0
							,,	Goldfields Building Society	65	0	0
							,,	Miscellaneous	76	3	8
							,,	Bank Charges	9	16	9
							,,	Surplus Cash	0	8	3
							,,	Balance B/D	22	5	5
			£559	15	11				£559	15	11
1932											
April 1	To	Balance b/f			£22	5	5				

(Signed) C. O. WADNER.

NOTES AND NEWS.

WILLIAM ALFRED DYKINS, born at Holywell, North Wales on 4/8/1888, was educated at Ruthin Public School and graduated as M.R.C.V.S. at Liverpool University in 1910. He took a post-graduate course in the same year and was appointed to the Field Staff, Veterinary Division, Union Department of Agriculture in November 1910. He was stationed at no less than 7 centres during the past 20 years, and much of his service was spent in the Transkeian Territories where he took an active part in the immunisation of native stock against East Coast fever, when approximately 500,000 head of cattle were inocculated. Since 1922 he has been in Durban.

During the Great War he saw active service in German South-West Africa and was V.O. "E" Mobile Section, S. A. Veterinary Corps, which accompanied the Eastern Force across the Kalahari Desert. In German East Africa he was V.O. to the 7th S.A. Horse and then to the 3rd Battery, S.A. Field Artillery. He was mentioned in dispatches and was promoted to the rank of major for his services.

We congratulate him on having secured the post of Veterinary Officer, Durban Corporation, on March 15th of this year, and we are certain he will fill the position with honour not only to himself but to the profession.

He became a member of the S.A.V.M.A. in 1920 and through distance has not been able to give the Association the full benefit of his wide experience. We trust, however, that in his new position (and as a member of the Natal Veterinary Board) the profession will benefit by his independent views.

Since writing the above, we are pleased to announce that Mr. Dykins has been appointed Director of the Municipal Abattoir, Durban. We know that the interests of the profession are safe in his hands. It is understood that Major Barnes, M.R.C.V.S. will hand over to his successor at the end of July.

JL. S. AFR. VET. MED. ASSN.
III (3) 1932.

PAPERS AND COMMUNICATIONS.

The Bovine Tuberculosis Problem in South Africa.

By Dr. GILLES DE KOCK, Onderstepoort.

PART II.

I. THE DOUBLE INTRADERMAL TUBERCULIN TEST.

Veterinarians in the Union are recommended to consult the concise and clear statement in the Memorandum by the Tuberculin Committee of the Medical Research Council on the method for carrying out the double intradermal tuberculin test in cattle. It is recommended that the greatest attention should be paid to the character of the swelling.

The veterinarian, after performing the delicate operation of introducing the tuberculin at the proper part, is called upon to make the proper reading on the borderline deviations between reactors and suspicious cases. This undoubtedly demands a great deal of experience and careful consideration which should be co-ordinated with the autopsy findings on reactors. At present it is not possible to explain why the swellings of intradermal reactions vary so notably in size. It has been suggested that a code be adopted to record the swellings, and in this way obtain statistical efficiency in the intradermic test, but such a code to be effective demands uniform technique in respect of dosage, site of injection, force with which the dose is injected, thickness of the skin of the animal, etc.

Government veterinary officers in view of their many duties in the field will not be able to complete all tests required for freeing a herd from tuberculosis. Furthermore, the interpretation of the test, especially in borderline cases, is of paramount importance. It is for these reasons that the Department of Agriculture has thought it advisable to restrict the performance of the test to veterinarians specially trained for this work under the control of the Department. Such officers have the advantage of co-ordinating the observations made in respect of the tests with their findings at the autopsies on the reactors.

The Department is moreover taking the necessary steps to ensure that a properly standardised tuberculin will be available for all the tests carried out. In this connection it may again be pointed out that under the Stock Diseases Act the sale of tuberculin in the Union can be authorised only by the Department.

II. RETESTS AT 2-3 MONTHLY INTERVALS.

As long as reactors occur in a herd, tests should be carried out at 2 to 3 monthly intervals until all animals have passed *two* conse-

cutive tests. Furthermore, all animals in the herd on the farm should be tested simultaneously. These very essential features in any eradication policy, if not strictly adhered to, would lead to disaster. The animal in the *presensitive stage* should be eliminated before it becomes a source of infection to the rest of the herd.

The fact that a non-accredited dairy has only been annually tested is no guarantee that such a dairy is in any way free from tuberculosis. This was recently very well illustrated in the case of a well-known dairy in an urban area in the Union. Since 1922 the Department has been carrying out annual tests, but not simultaneously on all the cattle. In 1931 all the animals were simultaneously carefully tested by the double intradermal method. When the test on 300 had been completed no less than 100 reactors were found. In view of this unsatisfactory result the owner refused to allow the test to be completed on his herd of some 480 odd animals.

III. No-Visible-Lesion Cases.

The no-visible-lesion cases in the Durban campaign and elsewhere have given rise to a good deal of criticism. As stated above, in about 4% of the reactors at Durban no gross macroscopic lesions could be detected. According to statistics collected from the official records of the United States and Canada, in approximately 90-93% of all tuberculin-reacting cattle evidence of tuberculosis is demonstrated at post-mortem examination. The remaining 7-10% of reactors constitute the so-called no-visible-lesion cases, amounting to about 3-5 per 1,000 cattle tested.

By laboratory methods of examination and test inoculation it has been shown that 20-25% of no-lesion reactors in America are actual carriers of virulent tubercle bacilli.

Although the percentage of no-lesion reactors has a very low average in America, it varies considerably in initial and successive tests in different herds. The no-lesion case is used as a basis of attack by opponents of the test and is apt to give rise to misapprehension and mistrust on the part of the herd owners.

It should be stressed that a tuberculin reaction signifies an infection and not necessarily a tuberculous disease. The absorption or harbouring of tubercle bacilli sufficing to sensitise the animal tissues does not always of necessity result in or lead to tuberculous processes visible to the eye.

In South Africa very little or no attention has been paid to the presence or absence of skin lesions in tuberculin-reacting cattle. In the States this has formed an important and extensive study. It is stated that there has been in recent years a correspondingly marked relative increase in the number of so-called skin lesions and no-lesion

reactors. It is said that these cases often appear without any apparent reason *in herds that have for some time been tuberculosis-free and in which no contact with tuberculosis has occurred.*

Available evidence points to the probability of wound infection through the skin as the usual mode of entry of whatever organisms produce the usual so-called skin lesions of tuberculin-reacting cows. The lesions occur in almost all cases on the legs, shoulder, or teats. Definite determination of the organisms responsible for the large majority of the lesions is still to be accomplished.

With the exception of acid-fastness and the simulation of a tuberculin reaction which is not always typical, it is said that these organisms do not resemble tubercle bacilli. They do not produce tuberculosis in guinea pigs, rabbits, cattle, etc.

It may be mentioned that conditions such as actinomycosis, pyogenic abscesses in the liver, contagious abortion infection, etc. have been associated with typical tuberculin reactions without lesions of tuberculosis being found at the autopsy.

From the above it becomes apparent that the skin should be carefully examined, especially in those cases where no obvious lesions can be identified in the usual centres. If such lesions are found on the skin they should be carefully collected for biological and morphological studies at Onderstepoort: half of the lesion should be collected in the usual 10% formalin, and the remaining half placed in 50% glycerine.

IV. Publicity.

Antagonism to an eradication scheme is in the majority of cases due to lack of the necessary information. It is therefore essential that the co-operation of all cattle owners should be secured by means of suitable literature, demonstrations, discussions, lectures, and films depicting various phases of such a campaign. The full support and closest co-operation of the dairymen is a most essential factor. They have their animals under daily supervision and are thus placed in a position to detect at an early stage any sign of illness. Such cases should immediately be reported to the veterinarian and not allowed to progress to the dangerous infective stage.

V. What Policy Should be Advocated in the Union?

With the present veterinary staff and facilities and financial state of the country, it is impossible to launch on the 10 million odd cattle in the Union of South Africa an ideal universal eradication policy based on the American accredited plan. Nevertheless the problem is such that it demands immediate attention, especially now that steps are being taken to extend the meat trade of South Africa.

From the above it would appear that the *urban areas,* especially as regards their dairy cattle and breeding stock, should receive our

closest attention. Any policy affecting dairy cattle that is promulgated should be done with the fullest co-operation of the Department of Public Health.

In the *rural areas* we should enlist the co-operation of all Breeding Societies and evolve a scheme by means of which all breeding stock are freed from tuberculosis by systematic testing. Measures should be adopted by means of which the possible spread of infection from urban to rural areas could be curtailed.

In any policy undertaken the double intradermal tuberculin test should be made use of under the following conditions:

1. *Simultaneous testing* of all cattle in a herd at 2-3 monthly intervals until all animals pass two consecutive tests.
2. Tuberculin tests should be accompanied by careful veterinary inspection of all cattle, mainly with the object of *eliminating the advanced clinical case.*
3. All tuberculin tests in any scheme adopted should be carried out with *properly standardised tuberculin* and by *specially trained veterinarians* who will at the same time be responsible for the collection of all data in connection with the test.
4. All animals undergoing the test should be permanently branded on the horn or the hoof and a system of registration of all tested bovines should be evolved.
5. *All reactors should be destroyed,* or *completely removed from the herd.* In case of reactors destroyed, careful records should be kept of all autopsies, especial attention being paid to the distribution and age of the lesions.
6. Any *animals newly introduced* into a herd or on to a farm should not be mixed with the herd on the farm, but strictly isolated until they have undergone the requisite tests. No system of isolating reactors or doubtfuls on the farm itself should be tolerated.
7. All tested animals should be *protected from re-infection* by infected stock or polluted environment.
8. Every attempt should be made to enlist the fullest co-operation of dairymen and all other cattle owners in any area or place where an eradication policy is adopted.

VI. Problems of Research.

(1) *The chemical analysis of tubercle bacilli* is being studied as regards protein, fat, and sugar components. The reactions on the part of the tissues to these fractions when introduced into the animal body are being carefully observed. Sabin has recently maintained that in

the studies on cellular reactions to chemical fractions from the tubercle bacillus it has been shown that there are three different complex lipoids in the organism which can be discriminated by the cellular reactions they evoke. These studies may eventually lead to standdardised preparations in place of tuberculin.

(2) According to Sabin and her associates the *blood picture in tuberculosis* gives an indication of the reaction of the body to the infecting tubercle bacillus. In their studies on rabbits infected with the bovine type, the *monocytes* increased in number with dissemination of the disease, whereas with a decrease of monocytes a regression of the lesions was manifested. Furthermore, a lessened number of *lymphocytes* in the blood accompanies susceptibility, whereas these cells increase with resistance. The important feature of these observations and experiments appears to concern *the relationship of monocytes to lymphocytes in the peripheral blood* and tissues, i.e. the M/L index as it is termed. It would seem that high monocyte and low lymphocyte counts are correlated with low resistance.

Blood studies at Onderstepoort are being undertaken in the experiments on bovines naturally and artificially infected, in order to see whether similar relationships exist and whether they can be utilised in practice to indicate the state of the disease in an animal at any particular time.

(3) The common belief that tuberculosis is not readily propagated amongst animals under veld conditions in South Africa deserves serious consideration. Experimental work is now being undertaken to determine in how far this can be accepted as correct. There appears to be no doubt that infected animals are transferred from urban to rural areas. It is therefore important to know to what extent the disease can, when introduced in this way, disseminate under veld conditions. Several instances have been brought to our notice where, when infection was introduced, the disease has spread, not only amongst bovines but even in game. In this latter respect one should recall the outbreak of tuberculosis of a destructive character *in wild buck living under natural conditions in South Africa* recorded by Paine and Martinaglia (1928). Here the environment, however natural it may be, was not alone sufficient to prevent tuberculosis, in spite of the fact that the incidence of tuberculosis in domesticated animals in the area concerned is regarded as very low. It is suggested by the authors that during the record drought at that time dams and water holes were either dry or very low and that game and stock drinking from such a limited supply contaminated the water and so caused the disease to spread. Watson (1927) refers to virgin herds in which infection once introduced spread almost like a prairie fire. In a departmental communication (file No. 1658/8/17) the Director of Ani-

mal Health, Northern Rhodesia, referred to the presence of tuberculosis among cattle in the Fort Jameson District which is entirely isolated from other parts of the Territory, being entirely surrounded by Tsetse fly. During the past ten or twelve years there has been no introduction of fresh blood with the exception of an interchange of animals among different herds, and it is feared that the herds have become somewhat inbred. Infection with tuberculosis was demonstrated some five years ago and steps have been taken, by testing and segregation, to check as far as possible the marked progress of the disease. It was quite impossible to say in what manner the infection has reached Fort Jameson, particularly as other parts of the Territory are free from tuberculosis.

4. *The reaction of the animal body to infection with tubercle bacilli.*—The pathology of tuberculosis presents great variations, not only in the different species, but even in the same species and with the same type of tubercle bacilli. Why under certain circumstances is there an initial accumulation of neutrophiles, i.e. an initial inflammation, whereas in other instances there is an intense formation of monocytes, epithelioids, etc.? What is the significance of caseation and why does this, as well as calcification, not occur in certain cases? Is it true that the lymphocytes and granulation tissue do not cause the destruction of tubercle bacilli? Are the mononuclears of the liver, splenic pulp, and bone-marrow able to destroy tubercle bacilli more readily than those of the lung, kidney, or splenic corpuscles, etc.? These problems render it essential that the closest study of this aspect of tuberculosis be undertaken with the other studies outlined above, in order to see why lesions of such a varying character are manifested.

According to Opie, 98% of adults dying from diseases other than tuberculosis have healed or focal lesions somewhere in the lungs, mainly revealed by radiogram. Furthermore it is stated that the body re-infected with tubercle bacilli or experiencing an extension presents a different reaction to that manifested on the primary occasion. According to recent studies of Nieberle based on the teaching of Ranke, the great variation in the morphological picture in bovines depends on three important factors:—

(a) species of animal;

(b) type of tubercle bacilli;

(c) allergic state of the animal.

(a) *Species of animal.*

The contrast of lesions in horses on the one hand and in bovines and pigs on the other is very significant. Whereas in the latter we generally look for the typical tubercle, in the former the reaction is more of the nature of a diffuse proliferating process with rich inclu-

sion of epithelioids and giant cells and without caseation and calcification.

The lesions of tuberculosis in different species and even in the same species at different ages may vary pathologico-anatomically from a destructive regressive process to a more productive reaction.

(b) Regarding *the type of bacillus,* it is said that the organism reacts differently to the avian and bovine types. According to Nieberle it seems as if the action of the tubercle bacillus is a two-fold one, viz. that of a foreign body and that due to its toxic properties. To the former the reaction is characterised by occurrence of macrophagi, whereas to the latter it is more inflammatory in character. If the toxic effects are weak the inflammation is more chronic and productive, whereas if they are strong, it is more active, exudative, and destructive (e.g. caseous mastitis).

Under *newer bacteriological studies* should be mentioned the single-cell method of culture. Petroff and his associates are said to have succeeded in demonstrating two rather distinct genetic strains of bacilli, and they have been able to foretell quite accurately the pathologic changes that occur in the host in the course of the disease by determining the morphology of the organisms, and the ratio or percentage of "S" and "R" colonies obtained in the culture. Attempts have also been made by certain investigators to correlate the histopathological changes in the various organs of rabbits with the number of bacilli contained in them as indicated by the number of colonies isolated from each organ at various intervals following infection. The end in view is to determine, if possible, what reactions of the host are associated with the multiplication of the parasite, and what with its destruction.

(c) *Allergic state of the animal.*—This, if correct, is of great importance, especially where it is believed that a reactor which appears clinically healthy is not a danger to the herd.

The animal body is subjected to many variations in its environment, and it is believed that the tissues which the infecting tubercle bacillus enters may be in different states of resistance, with the result that different types of reactions manifest themselves.

Recovery from a first infection in the shape of a retarded primary complex (e.g. calcification in a mesenteric lymph gland, or a check in early generalisation revealed by calcified peritoneal tuberculosis, etc.) brings about a changed allergic state of the body. On the one hand an increased saturated resistance may be revealed with a later superinfection in the form of a productive process, whereas sensitization may subsequently result in extensive advanced exudative tuberculosis in the body. It is considered that the reaction of the organism in its

different allergic states to the tubercle bacillus may result in one of the following:

(A) The formation of a primary complex;

(B) generalisation;

(C) chronic organ tuberculosis.

The tubercle bacilli at the port of entrance in the young susceptible leave their traces behind, if not in the organ itself, then in its regional lymph gland. On the one hand the primary complex, especially as manifested in the regional lymph gland, is capable of a healing-out process, whereas on the other hand it may progress in the body in several ways, e.g. by the blood stream, by the lymph stream, by direct continuation, by the ducts (e.g. bronchioli in the lungs), etc. If tubercle bacilli are disseminated in these various ways in animals in different allergic states, it seems quite within reason to expect a great divergence in the character of the lesions.

In chronic organ tuberculosis of the adult bovine it is believed that the disease disseminates by means of the ducts, and as a result of this the regional lymph glands usually remain free from the disease. Furthermore, it is believed to be the outcome of either an endogenous or an exogenous superinfection in an animal with an acquired increased resistance. Chronic lung tuberculosis would appear to be of the nature of an exogenous superinfection, whereas chronic udder tuberculosis is probably endogenous. The superinfection is said to establish itself as a result of certain dispositional factors, such as increased physiological strain, (e.g. increased lactation, parturition, etc.), poor diet, poor hygiene, etc.

In view of the fact that the relation between host and parasite may at any time change, it is essential that *every reactor in spite of the fact it may be considered clinically healthy must be considered a danger and must forthwith be eliminated.* Furthermore, it is held by certain investigators that so long as there remains any possibility of a change under the influence of environmental or other circumstances, *no living virus should be used as a preventive or therapeutic measure.*

(5) *Non-specific factors influencing the tuberculin test.*—This is being very carefully considered and it is essential that all veterinarians applying the test should keep a careful record of the reactors, especially in respect of all the changes in the animal body at autopsy, including a careful examination of the integument, particularly in no-visible-lesion cases.

(6) *B.C.G. Vaccine Experiments at Onderstepoort.*—In view of the contradictory results published abroad about the value of this method of vaccination, the vaccine is being tried out under various

South African conditions. Calves from various sources and raised under various conditions are being vaccinated and their immunity tested under natural, stable, kraal, and pasture conditions.

ACKNOWLEDGEMENTS

As this is intended as a brief statement, to veterinarians in the Union, of the position of bovine tuberculosis, no attempt has been made to refer to the enormous bibliography, especially prominent in the *Journal of the American Veterinary Medical Association* since the accredited plan was commenced.

This preliminary communication will be followed by a more detailed review of the bibliography and a full report of the work being carried out in South Africa in which among others the following officers are engaged: Mr. P. S. Snyman: tuberculin tests and B.C.G. vaccine; Mr. W. G. Green: tuberculin tests and autopsies, Durban Campaign; Dr. Robinson: standarisation of tuberculin and bacteriology of various strains; and the author: pathogenesis, pathology, and haematology.

My thanks are due to many Government Veterinarians in the Union who have carried out tests and supplied valuable information.

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Poultry Management.

By E. VAN MANEN, M.Sc. Agric. (Cornell), Durban.

In the series of articles which I have been asked to write for this journal, I shall confine my remarks to the management of poultry, dealing with the subject from the egg-production side only. Space will not permit me to enlarge on the elementary phases of poultry husbandry, and for that reason I shall assume that my readers are acquainted with the basic facts as we know them to-day.

Our knowledge of poultry husbandry is based on facts gleaned largely from research in countries other than our own. Thus we must continue to apply this knowledge until such time as our own research may give us different facts. That there will be a drastic change I do not believe, for we are fortunately concerned with a branch of farming which can be practised with very slight variation in all parts of the world.

Poultry differs from larger stock in being more dependent on the human factor. Whilst cattle and sheep can live in the open and, generally speaking, can to a large extent find their own living by foraging and need comparatively little control or oversight, the welfare of poultry is largely dependent on the extent to which man is present to give them the necessary attention.

Those of us who are called upon to offer advice to farmers on problems of disease or management, before we can do so, must familiarise ourselves with the conditions existing on those farms. We must be aware that the pursuit of poultry farming attracts people of all ages and grades of society. Many rush into an ill-conceived venture without even an elementary knowledge of the subject. Some are doomed to failure very early, while others of this class become "hangers on" with scant ability to profit by past mistakes. Conditions on some farms still taste of the primitive, and advice rendered is passed on to the native attendant, by him to be applied with or without supervision.

Fortunately we are in a position also to give advice to farmers who are able to apply this advice correctly. Their plants are properly equipped and they practise modern methods of management. As we live in the age of standardisation, we hope that in time poultry farms will become standardised, so that it will become easy to offer scientific advice and to know that such advice will be correctly applied.

Laying stock also varies a great deal, variation mainly being noticeable in size and constitution. Thus, while such wide variation exists, we are unable to offer standardised advice as regards, for ex-

ample, a profitable feeding formula. A laying mash, which may give optimum results with large, well-constitutioned stock, may result in disaster if given to undersized and low-constitutioned stock. The percentage of animal protein in the laying ration is the bone of contention and for the uninitiated this offers a fair trap.

My object in introducing my subject with a note of warning is to foster closer co-operation between those of us who have to deal with advice from two different standpoints: the pathologist on the one side and the husbandman on the other, the former to maintain health at practically all costs, the latter to maintain production and consequently a profitable living for the poultryman. Lack of co-operation may lead to contradictory advice, hazardous to one or the other side.

Before going on to the subject of incubation, which will be my first subject for discussion, I wish to conclude these introductory remarks with a quotation from the preface of "Practical Poultry Management" by Rice and Botsford:—(1)

> Poultry Husbandry is both a science and an art. As a science it deals with the facts, principles, and natural laws underlying the successful management of poultry.
>
> The art of Poultry Husbandry is the skill needed to put these principles into practice. One may imitate one's neighbour's practice and thus unconsciously use scientific principles. In order to practise the true art of Poultry Husbandry, however, one must have a knowledge of these basic principles coupled with the skill to apply them successfully.

INCUBATION.

One of the most desirable points in general poultry management is to keep down the costs of propagating the flocks year by year. With some poultrymen losses due to inefficient incubation, coupled with heavy chick mortality, have reached alarming proportions. It is of vital importance that the poultry farmer should be able to hatch his own chicks, rear them successfully, and be able to place the pullets in the laying houses at as low a figure of cost as may be possible. Every egg which fails to hatch raises the cost of producing a chick, and for that reason a study of the factors affecting fertility and hatchability are of the utmost importance to the poultryman who hatches and rears his own stock.

With the rapid development and change within the egg during incubation, correct conditions must be provided if a good percentage of strong chicks is to be hatched. From this we not only refer to the conditions during incubation, but also to those preceding incubation. Successful incubation, therefore, depends on the following essentials:

I. Eggs of strong hatching qualities.

II. A good incubator.

III. Correct methods of management.

IV. A favourable environment.

I. Eggs of Strong Hatching Qualities.

The selection of the breeders is one of the most important steps towards ensuring eggs of strong hatching qualities. As the factor of hatchability is one of a complex nature we must continue to select our breeders by using the trap-nest, in order to eliminate those factors which we know to have a detrimental effect on hatchability, and consequently to lower the chances of impaired hatches caused by complicated factors which have hitherto defied identification.

The following are the most important factors to be taken into consideration in selecting birds for the breeding pens:—1. Longevity; 2. Constitutional vigour; 3. freedom from defects; 4. quality of eggs; 5. production.

1. *Longevity.*—Other things being equal preference should be given to the older birds. Breeding from pullets should only be allowed when quick results from certain matings are desired and then care must be exercised to select only those pullets that are large and mature. These pullets also should not have been laying heavily or too long prior to the breeding season. A pullet has yet to prove herself, but the mature hen of two or more years has proved herself and is therefore the desirable part of the breeding pen. Thus, in selecting female breeders from the proved mature birds, we have a quick and sure way of developing and fixing the quality of long life. In a pullet flock there are many short-lived, low vitality individuals, which, when bred, will pass on these characters to their offspring, thus indirectly lowering the percentages of hatch and of chicks raised. Pullet breeding is one of the main causes of low hatches and high mortality among chicks.

Breeding from proved mature birds instead of from cockerels is also a point worthy of consideration. Heys (2) in his work on the "Relation of age of parents to hatchability, livability and fecundity in the domestic fowl" indicates that mature males are more likely to have higher hatchability than cockerels.

2. *Constitutional vigour.*— The use of strong vigorous birds is essential as it means better fertility and hatchability and less mortality in chicks. In many cases poor hatches and high chick mortality can be traced directly to the breeding pen.

3. *Freedom from defects.*—It is only natural that birds suffering from physical defects should not be included in the breeding pen. Breed defects should also debar an individual from the breeding pen.

4. *Quality of Eggs.*—The quality of the egg is frequently a more important factor in determining the value of hens than is the number laid. Only eggs of large size, good shape, and the true colour of the breed should be used for hatching purposes. Large eggs from

mature hens give rise to large chicks, in contrast with small pullet eggs which hatch small and possibly weak chicks.

The age of the eggs is also a very important factor in successful incubation. Results of many experiments all point to low hatches as the result of holding eggs too long. A few such results are noted here:

One day, 68.8 per cent; seven days 45.6 per cent; fourteen days 41.7 per cent; twenty-one days 17.8 per cent; twenty-eight days 6.2 per cent; and thirty-five days 1.1 per cent. (3) 0-10 days 55.14 per cent; 11-20 days 41.77 per cent; 21-28 days 17.94 per cent. (4)

Eggs should ordinarily not be held longer than five or six days, and if held for this period only it is not necessary to turn them daily, provided that they are left to stand with the large end upwards.

The ideal temperature under which eggs should be stored while holding them for incubation is from 50° to 55° F. Eggs held at 68° F. or higher for any length of time will incubate very poorly.

Eggs for hatching should not be held in open containers but should be packed in the fillers of an ordinary egg box in order to ensure that excessive evaporation does not take place. A 30-dozen export egg box is a very suitable unit for the commercial poultry farmer. If the eggs are to be turned while in the egg box, the operation is simplified by placing the box at a sharp inclination and reversing the position at regular intervals.

The washing of hatching eggs is another detrimental factor. Washing destroys the protective coat on the shell and allows evaporation to take place more rapidly. A small amount of dirt is preferable to washing. If the eggs are very dirty, slight scraping or wiping may be the lesser of two evils.

5. *Production.* —As high egg-production is the object of every poultry farmer, the breeders should be selected particularly for this factor. Trap-nesting with its associated pedigree breeding should, therefore, be included in the management programme of every up-to-date poultryman. It is frequently claimed that our highest producers are very poor breeders. This is not necessarily so, and if this is the case, then the cause can readily be traced to faulty methods of management. In modern literature we find ample proof that high producers are good breeders. A Washington Bulletin (5) concludes that ten 300-egg hens, with an average fertility of 88 per cent., gave an average hatchability of 65 per cent, in comparison with the same percentage for the hatcheries of the State.

Fertility and Hatchability. —Infertile eggs can be expected at times to be laid by any hen of the breeding pen. More often, however infertility can be traced to one or more individual hens. It is only good management to remove such hens from the breeding pen as soon

as they are identified. The fault may also be due to the male on account of preferential mating. In such a case the hen should be mated to another male.

If all fertile eggs would hatch, then there would no longer be a hatching problem. It is a known fact that certain hens show higher hatchability than others under similar management. It is also known that certain hens, all of whose eggs are fertile, may fail to produce a liveable chick. A hen whose fertile eggs hatch better than the average of the flock is likely to produce pullets that will lay better than the average pullets from that particular flock.

In-shell mortality.— The question of "dead-in-shell" can best be treated by a summary of the causes of this particular problem of hatching. These may be grouped under three main headings:

1. Causes arising in the breeding pen.
2. Causes arising in the egg room.
3. Causes arising in the incubator.

1. A great deal of dead-in-shell can be eliminated by the trap-nest. The individual performances of the hens will soon come to light, and if only sound eggs from known good breeders are incubated the hatching results will be good. The main causes of low hatchability under this group may be enumerated as follows:

(a) Individuality of the hen whereby she produces "dead-in-shell", perhaps due to excessive fat around the reproductive organs, a diseased condition of the ovary, or to causes unknown.

(b) Poor physical condition of both males and females in the breeding pen.

(c) Lack of green food, vitamines, and mineral matter in the laying ration.

(d) Forced feeding for high egg-production.

(e) Lack of exercise for the breeders resulting in over-fat condition.

(f) Unfavourable reaction of the season on the physical condition of the breeders.

(g) Excessive inbreeding. According to Dunn (6) "the hatchability of eggs fell from an average of about 75 per cent. before inbreeding to a little more than 20 per cent. after three generations of brother-sister matings". Out-crossing, or outbreeding often results in an increase in hatching quality.

2. Under this group we find the following causes:—

(a) Eggs of poor hatching quality, the cause of in-shell mortality being associated perhaps with the size, shape or texture of the

shell. Probably we may correctly consider that normality in size and in shape of the egg are factors which favour the escape of the developed embryos from the shell at the close of the incubation period, but that abnormal size or shape would tend to make the process of leaving the shell more difficult. The same thing may be said of the shell texture; that is, normal shell texture is required for best hatching results.

(b) Holding eggs too long before incubation.

(c) Holding eggs at too low or too high temperatures before incubation. The germs of eggs may actually be killed before the eggs are placed in the incubator. The lowered vitality of those which survive may be the cause of "dead-in-shell".

(d) Excessive evaporation from eggs held too long and at too high a temperature, which breaks down the contents of the egg, with the natural effect of impaired hatching ability.

3. Eggs may still fail to hatch even when the causes enumerated under groups 1 and 2 (above) have been reduced or entirely eliminated. The final causes of low hatches and excessive in-shell mortality may be attributed to faulty methods of incubation. The chief causes of "dead-in-shell" under this group are the following:

(a) Insufficient moisture in the incubator resulting in excessive drying out of the contents of the egg. Eggs should not lose more than from 13 to 16 per cent. of their original weight during the first nineteen days of incubation. According to Dryden (7) the registration by a wet bulb thermometer of a temperature of 88° seems to indicate the best humidity of the incubator.

(b) Excessive moisture which results in a wet or (as it is commonly known) a green hatch, is also a factor causing "dead-in-shell".

(c) Insufficient ventilation especially during the second and third week of incubation.

(d) Incorrect temperatures at which the eggs are incubated; high temperatures being one of the chief causes of poor hatches. Low temperatures have the effect of retarding the hatch.

(e) Insufficient turning of the eggs in the incubator trays.

(f) All causes which collectively contribute to adverse conditions affecting the eggs especially during the first week of incubation. The first week is the vital week of incubation and conditions during this period should be perfect.

(g) Malposition of the embryo in the egg. A large percentage of

eggs which fail to hatch upon examination show the chick in an abnormal position. This proportion has been reported by investigators to be as high as fifty per cent.

II. A Good Incubator.

A large number of reliable makes of incubators are procurable in this country. Cheap machines are less reliable, require more attention, and wear out more quickly than higher-priced incubators. Poultrymen should have their incubator capacity large enough to hatch the bulk of their stock in two or three hatches. This saves time in looking after the incubators and the chickens are more even in size than those which are hatched in an incubator of limited capacity.

A fair estimate for a poultry farm is an incubator space of one-egg capacity per hen, provided that about one-half of the flock is to be renewed yearly. The larger machines also cost less in proportion to their capacity than the smaller ones. In this country especially the hot-water types have proved very satisfactory.

III. Correct Methods of Management.

It is always advisable to run the incubator at incubation temperature for two or three days before the eggs are placed in the trays. During this time any irregularities may be observed and corrected. It is fatal to wait until the eggs are in the trays and then to try and adjust the thermostats to secure an even temperature. Ups and downs in temperature during the first week of incubation are especially dangerous.

Incubation temperature varies between 101°—103° F. depending upon the type of thermometer in use. A standing type of thermometer is preferred, and with the bulb of this termometer between and a little below the level of the tops of the eggs, a temperature of 101° F. will give satisfactory results. This temperature is preferred to 103° F. because very little harm is done when the temperature rises one or two degrees in the machine. A rise of two degrees from 103° F. brings the temperature to 105° F. which is too high for successful incubation.

Moisture must be supplied to the eggs during incubation and this is satisfactorily done by placing moisture trays beneath the egg trays in the incubator. It is necessary always to supply moisture, notwithstanding instructions to the contrary which may be issued with the machine. Slight steaming of the eggs at the eighteenth or nineteenth day of incubation may sometimes turn failure into success as far as a tray of eggs is concerned.

The turning of the eggs in the trays should be done regularly at least twice a day until about the eighteenth or nineteenth day. A good method to follow in this connection is to turn the eggs until the

first signs of chipping are noticed. When the eggs are turned they should also be moved around in the tray so that each egg more or less finds a new position in the tray at each turning. The trays themselves may even be reversed at each turning.

Cooling during incubation is unnecessary. The eggs need be cooled only if for some reason or other the temperature has been allowed to rise above the safety line.

IV. A Favourable Environment.

Successful incubation depends to a large extent upon the room in which the incubators are operated. The building should be provided with good ventilation without objectionable draughts over the machines. Windows should preferably be near the plate and hinged at the bottom, to tip inwards at the top. The air will then pass over the windows. Special ventilators may also be provided especially when the room is built to hold a mammoth incubator. A room 8 to 9 feet high, and 7 feet from the floor to the bottom of the windows, is very satisfactory. A high ceiling is especially beneficial. The temperature of the room should be about 70° F.

Day-old Chicks.

Most beginners in the poultry business prefer to purchase day-old chicks rather than to buy eggs for hatching. In this way they avoid the troubles of hatching, the possibility of damage to the eggs in transit, and of poor hatching results, and in addition get a quicker start.

The day-old chick trade is a rapidly growing business and to-day we see in use mammoth incubators which hatch thousands of chicks practically every week during the hatching season. These chicks are sent by road or rail all over the country and it frequently happens that the chicks are *en route* for three days.

Special day-old chick boxes have been designed for the shipping of baby chicks. The box in use is one that is well ventilated, but admits no draughts, is light in weight and easily handled, and contains not more than 100 chicks in the whole box and not more than 25 chicks in each compartment. The box is made of corrugated cardboard with burlap fastened to the bottom to prevent the chicks from slipping and becoming bruised during shipment. A round cardboard device inside each compartment eliminates the corners and ensures greater safety for the welfare of the chicks.

The chicks should be left without feed and water in the incubator nurseries until time for shipping. They should not be placed in the boxes until they are strong and well on their feet. Baby chicks do not require any feed for the first thirty-six hours, so that they only receive their first feed after they arrive at their destination.

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Farming Conditions in the North Western Cape Districts and their Bearing on the Scab Problem.

By R. DU TOIT, B.V.Sc., Onderstepoort.

The Check Staff as constituted by the Dept. of Agriculture in its policy for the eradication of scab amongst the small stock of South Africa consists of experienced sheep inspectors under the supervision of a veterinarian or a senior sheep inspector. The duties of this mobile staff are briefly to comb systematically all districts in which small stock is kept, and conduct a thorough inspection of all flocks—so as to check the ordinary inspection carried out by the permanent staff.

During the period March 1929 to October 1930, when it was the writer's privilege to be in charge of this staff, the semi-arid districts of the North-Western Cape were traversed, where farming conditions differ considerably from those in other parts of the country.

In this article it is intended to give only certain impressions obtained in the course of the work which have a bearing on the scab problem, together with short descriptions of certain phases of farming in these areas which may be of interest to readers. The parts of the country more particularly referred to include portions of the Kenhardt, Calvinia, and van Rhynsdorp districts, Namaqualand and Gordonia.

The country mentioned embraces an area of winter and one of summer rainfall which varies on an average between five and ten inches per annum. A line extending north and south through the town of Calvinia may be looked upon as roughly the division between the areas, the western portion receiving its rain in winter and the eastern in summer.

In parts underground water is plentiful, but in others it is scarce and found only at great depths which makes its use at the surface both difficult and costly. In many cases the water contains mineral salts in such abundance that its use is possible only for stock and human beings thoroughly acclimatised to that particular locality.

Up to the present comparatively little has been done in opening up the country, due mainly to geographical and climatic factors and in parts also to the peculiar temperament and conservatism of the farming community and the type of pastoral farming adopted. With very few exceptions no attempt has been made to fence off the numerous farms which vary considerably in size, a farmer owning anything from 6,000 to 50,000 morgen of ground or more.

The central portion of the above mentioned area, composed of the western half of the Kenhardt district, the northern portion of the

Calvinia district and the eastern portion of Namaqualand, constitutes what is known as the Bushmanland. This is an arid, flat plateau, with scarcely any undulation to relieve the monotonous expanse of poorly colonised karroo veld. Large pans, or "floors" as they are known locally, ten miles or more in extent are scattered over the area. It is here the rule rather then the exception that these enormous farms possess only one source of water. The result is that for an area with a radius up to four or six miles around the homestead scarcely a vestige of any vegetation is to be found due to the trampling out by the stock. The veld within this radius presents a red, sun-baked surface, covered with dark, shiny, windworn pebbles known locally a "kanja" stones. It can readily be imagined that in this country, devoid of landmarks and where roads cross in all conceivable directions, such barren areas constitute useful guides for the stranger whose undeveloped sense of direction might otherwise lead him into difficulties; they indicate the approach to human habitations and their appearance brings a sense of relief to the motorist after, perhaps, some hours of continuous travelling.

Only small stock can subsist on this veld and considerable adaptation to local conditions is necessary before they can thrive. On account of the limited water supply the edible veld is found only at long distances from the water, and it was a frequent finding to encounter large flocks at distances of up to 16 miles from the homestead.

In spring and early summer, when the veld is fairly succulent, the stock drink only once in seven or eight days, and even in the hottest months (with the temperature well over 100° F.) one to two days elapse between watering. Under these conditions, where life for stock is a constant struggle for existence, even the method of drinking has become somewhat modified. For instance, on perhaps the seventh day after the last drink, the flock returns to the water. At a distance of from one to two miles from the water the pace is increased until the whole flock is running hard. No preliminary period is wasted in rest, but the sheep commence drinking immediately and rarely take longer than about one-and-a-half to two minutes to satisfy themselves. They then retire to a distance of about 30 yards from the trough and rest there for a couple of hours. A further drink is then taken and the flock moves off rapidly to the distant grazing veld, which is generally reached late at night. A whole day has thus been expended in procuring a drink of water.

These conditions have naturally had some effect on the sheep themselves. For the most part Afrikander or Cape sheep or crosses with Black-head Persian or Merino are met with, less frequently pure Merino. The latter breed is not capable of adapting itself adequately to the country, though it must be mentioned that a few flocks of Merino sheep in excellent condition were met with. These Merinos

were, however, higher on the leg and longer than those ordinarily met with. The Afrikander or Cape sheep are mostly of the fat-tailed variety, high on the leg, with a very sturdy constitution, and capable of considerable speed and endurance. They have to live off the extremely hard shrubs which fall mostly into the "Ganna" class. These shrubs are so tough and woody that it was not infrequent to encounter sheep (recently introduced into the area) with one or more incisor teeth missing due to the struggle they had had in the prehension of their food.

These conditions naturally render the inspection of sheep for the detection of scab an extremely difficult matter. Apart from the well known difficulties encountered in detecting visible evidence of scab in Afrikander and Bastard sheep, an inspector has usually to examine a large flock with perhaps only the native herd for help. The animals are wild and when rounded up in the veld mill around like terrified cattle. Generally only one chance of catching a suspicious looking case is possible before the flock stampedes, making a further collection of the flock, with the help available, a day's task.

In the Namaqualand portion of the so-called Bushmanland, drought conditions are even worse than further eastward. There are very few permanent residents, the inhabitants for the most part living in tents and moving about in search of grazing for their flocks. It is a general custom for farmers in this part to trek with their stock in winter to the mountainous country north-west of Calvinia where more suitable grazing is obtained. They are not able, however, to keep the stock here longer than the first few months of summer on account of the prevalence of the disease "Krimpsiekte" caused by the poisonous plant *Cotyledon wallichii,* locally known as the "Poppebos" or "Kandelaar bos". During September the shrub becomes so plentiful all over this area that it virtually drives them out.

It will be appreciated that this trekking enormously increases the difficulties in conection with the eradication of scab, since the moving sheep frequently trek together in very large flocks, later splitting up into separate smaller flocks when the grazing ground is reached. A large staff of sheep inspectors therefore becomes necessary in order to exercise any sort of control. In this connection another difficulty met with, especially in the north-eastern portion of Namaqualand, is the congregation of enormous numbers of sheep and goats at certain pans, situated in an area known as the game reserve, at times when they become filled with water. During March and April of 1930, no fewer than between 20,000 and 30,000 small stock were congregated round about these pans. Under such conditions the chances for the spread of the infection are practically unlimited.

It will be of interest to mention here the presence of ear scab in goats, which was found to be extremely prevalent in the eastern

portion of Namaqualand and also in Calvinia. This disease is caused by the mite *Psoroptes communis, var. capri,* and though it is as a rule not looked upon as of any great economic importance there is no doubt that where it has been present in a flock for a long time it is responsible for a marked unthrifty condition in goats which is often extremely difficult to diagnose. It is confined almost without exception to goats, although in very heavily infected mixed flocks an occasional case was encountered in sheep. The parasite, macroscopically, is exactly similar to the sheep scab mite, although it generally appears to be slightly larger and more active. Although the suspicion exists in the minds of many farmers that it is capable of setting up scab in sheep, we were never able to trace any connection whatsoever between this parasite and an outbreak of sheep scab.

Before leaving the subject of Namaqualand, it would be worth while to mention the farming conditions in the coastal belt. This belt, roughly 30 miles wide, consists almost solely of sand veld, the sand being mostly red in colour and undulating or in the form of dunes covered with very coarse, low, bushy vegetation. Here again the inhabitants are somewhat nomadic though not to the same extent as those in the Bushmanland portion. The type of dwelling used is peculiar and is known locally as a "matjieshuis" or mat house. It consists of a framework of sticks in the form of the conventional English beehive, covered with rush mats. Apart from one very small opening which serves as a door, no other intentional ventilation is provided, although plenty of air circulates through the meshes of the mats. These dwellings are preferred to any other type in this area where rain falls so rarely as not to be of any consequence.

The farms here are smaller and the stock are consequently not forced to move so far from the water for their grazing. However, the habits of the stock are for the most part similar and periods of up to a week elapse between drinks. Close to the coast (two to five miles) grazing is extremely limited owing to the very coarse and inedible nature of the bushes, which are about one to two feet in height. The stems and branches are, however, covered by a type of lichen which grows fairly profusely and which forms the major portion of the grazing. In this area some difficulty was experienced with the diagnosis of scab and the identification of the parasite, on account of the wool and hair becoming caked with sand which, just here, is white, and the grains of which resemble the parasite so closely as to obscure the picture.

On moving over to the Gordonia District, which embraces a portion of the Kalahari Desert, a somewhat different state of affairs was found. Owing to the great variations, geographically, of the inhabited portions, the plan of campaign had to be somewhat modified.

The Orange River, which forms the southern boundary of the district, contains many islands dividing the water into numerous channels. Some of these islands are up to 8,000 morgen in area, and the greater number are made use of for stock grazing. The location of the flocks presented an extremely difficult task and the use of boats wherewith to cross the river channels, and even swimming, were constant features of the work. On these islands, where grazing for stock consists largely of the leaves of shrubs and trees with small amounts of grass here and there, an extremely interesting condition in goats was encountered. One of the chief sources of food for goats is the dried leaves of the wild tobacco plant. The dried leaves remain adherent to the stem of this plant for some time, and in order to reach them the goats place the forelegs against the stems, rearing the body up on the hind legs. This constant erect position is responsible for considerable pressure being exerted by the viscera on the pelvic organs and habitual prolapse of the uterus in females is constantly met with. This condition becomes very serious in parts where it is exceedingly prevalent and nothing can be done to prevent it as the primary cause cannot be abolished.

In the more northern portions of the district, conditions are extremely arid. The veld consists for the most part of red sand-dunes, thirty or more feet in height, running for many miles parallel with one another. They are permanent in nature and covered with coarse grass and low trees interspersed with bushes. The farms are situated along the "rivers" which are in reality shallow depressions containing no open water, but where underground water is fairly accessible. The sand-dune veld is waterless but is made use of extensively for grazing. It is interesting to note here that sheep are sent into the dune veld in early spring and do not emerge again for 4 or 5 months. No water is taken, but the stock derive sufficient moisture from the fruit of a species of *Cucumis* known locally as "samma" (tsamma). As long as the "'samma" lasts the sheep thrive well in the desert, but they are eventually driven back to the water and poorer grazing. Lambs born in the desert and returning to water some months later at first experience a certain amount of difficulty in sucking in water. They can be seen to make biting movements at the water until they acquire the correct action.

In conclusion, it must be mentioned that this district gave rise to extreme difficulty in regard to the identification of sheep scab amongst the Afrikander and cross-bred sheep. The reason was that during October and portions of November of 1929 dipping of all stock in the district had been conducted. This had in many cases the effect of damping or retarding the development of the disease so that at the time of the check inspection (which was conducted in March, 1930, i.e. five months later) many potential outbreaks were in a

dormant or invisible condition so far as identification by inspection was concerned. Towards the end of April a number of these cases suddenly broke out and developed rapidly, when they were easily identifiable. In most of these outbreaks one or more animals was found on which lesions of scab, obviously of long-standing, covered by crusts of epithelial debris, and dormant in so far as development was concerned could be seen when the hair was opened. Generally a small area at the edge of the old lesion was present, where active development had suddenly occurred, after the lapse of some months and from which the infection had spread amongst the flock.

In these arid areas it is by no means an unusual finding, when dealing with severe outbreaks of scab by dipping, to discover scab breaking out again after a period of up to six months after the original outbreak, and where at the same time infection from external sources can be excluded.

The writer has endeavoured to convey an idea not only of the peculiar difficulties attendant on check inspection in these areas but also of the curious farming conditions and the adaptations to which they have, of necessity, given rise. It is hoped in a subsequent article to deal with the activities and history of check inspection in the Union in general.

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The Veterinarian and the Law.—IV.

By C. P. BRESLER, M.A., LL.B., Pretoria.

LIABILITY FOR DAMAGE DONE BY ANIMALS.

This subject is one of great importance, and particularly to owners of animals, and to those who come in daily contact with animals. But for the lawyer it can be claimed that it is fraught with as many embarrassments as for the layman.

It is necessary to introduce my brief survey of the subject historically, so that the possible sources of the law operating to-day may be understood.

Our knowledge of the Roman Law is scanty and to a certain extent conjectural, but it is certain there were three possible actions open to the person who had suffered damage through the animal of another.

I. The action based on the *Lex Aquilia* which lay whenever *culpa*, or negligence on the part of the owner of the animal could be proved.

II. The *Actio de Pauperie*, which dates at least from the XII Tables. This action lay where a quadruped acted *contra naturam* In other words, where a four-footed animal did damage by acting contrary to its usual habit of tameness, and suddenly manifested some ferocious disposition, the action was available. But where the damage caused was in the nature of the animal, i.e. cattle straying and grazing on a neighbour's crops, the *Actio de Pauperie* did not lie.

The interesting aspect of this action, however, and one which demonstrates its antiquity, is its noxal aspect. In Roman Law, where a slave had done damage, the owner of the slave could elect whether he would pay the damages, or simply surrender the slave to the person injured, as full satisfaction. In the XII Tables this was extended to cases of animals which, stirred into acting violently in spite of being normally tame, had caused injury to any person, so that the complainant could only get satisfaction by wreaking vengeance on the offending animal. Later the alternative of paying damages was allowed, as in the case of slaves, and later still damages became the normal redress, although the alternative of handing over the animal remained where its owner wished to escape making other redress.

The *Actio de Pauperie* being noxal, it had an interesting corollary, which was that the action lay against the person who owned the

animal at the time the action was brought, who had not necessarily been the owner at the time the damage was done.

III. The *Aedilitian Edict,* which was based on an Edict of the Aediles, who controlled the streets and markets of Rome. This forbade the keeping of certain animals, e.g. a dog, boar, lion, etc. in places which the public frequented; and the amount of the fine for contravention was appended. This edict has been described as a "Municipal bye-law of Rome".

LAWRENCE, J.P. in *Cowell v. Friedman,* summarised the law on liability for damage done by animals, as operating in the time of Justinian, in the following manner: "Either negligence must be proved on the part of the owner of the animal, or there must be some vicious perversion or unwarrantable behaviour on the part of the animal in order to make the owner liable, coupled with the right of the owner, in the latter case, to escape payment of damages by the surrender of the animal". When animals trespassed in search of grazing, they were acting in accordance with their natures, so only an *"Actio de pastu",* was open to the owner of the land. He could not detain the animals, as there was no system of pounds.

In general the Roman Law on liability for damage done by animals was accepted in Holland under the Roman-Dutch law, although the penalties under Aedilitian Edict became obsolete, and there was apparently controversy as to whether the right of noxal surrender survived under the *Actio de Pauperie.* GROTIUS says that surrender was retained. VAN LEEUWEN implies that it was extant; and VOET is clearly of opinion that the noxal action maintained in its entirety. VINNIUS, however, holds that it was obsolete. On the whole, it seems safe to suggest that in Roman-Dutch Law liability for damage done by animals was an absolute duty of the owner, not necessarily dependant on negligence on his part.

Coming now to a statement of the law as it maintains in South Africa to-day, it would be as well to start with the early case of *le Roux and others v. Fick, 1879, Buch. 29* in which judgment was delivered by SMITH, J. In it he lays down that a man has a right to keep any animal, but if that animal causes injury to any person who is where he has a right to be, then the owner of the animal ought to be held responsible for the damage if it was caused by the animal committing such act as it might naturally have been expected to commit, and if the commission of the act was not provoked by the person injured. This would indicate that an owner is liable *qua* owner, but is not a direct statement to that effect. In *Parker v. Reed* (*21 S C. 496*) the point was expressly decided, Lord DE VILLIERS holding that the whole of the *Actio de Pauperie* was obsolete in South Africa; and where liability was to be attached to an owner,

it must be on the score of *culpa* or negligence (i.e. under the *Lex Aquilia*). Failing proof of negligence, therefore, an owner would not be liable for the damage done by his animals. It is not surprising that the noxal aspect of the *Actio de Pauperie* should become obsolete, firstly because to quote from SMITH, J. in *le Roux v. Fick,* "No suitor would feel that a judge had acted in an equitable spirit and consonant with the customs of the age, who held that surrender of a kaffir dog was compensation for the loss of a valuable ostrich"; and secondly, because the action lay against the person who was owner at the time the action was brought. Neither of these aspects could be tolerated in modern times, but one cannot but remark that the abolition of the whole of the action on their account would be regrettable as a retrogressive step, and as imposing many hardships on injured persons who had no recourse to law because negligence could not be proved. MACKINTOSH, in his treatise on negligence in delict, basing his opinion on the arguments stated above, and the decision in *Parker v. Reed,* subscribes to the view that the *Actio de Pauperie* as a whole is obsolete in South Africa. His work, however, was published in 1926, when only one case on the point had gone to the Appellate Division, *Robertson v. Boyce,* (1912), in which the question was neither raised nor decided, except that DE VILLIERS, C. J. clearly indicated that culpa must be shown.

The contrary view, that liability may also be based on ownership of the offending animal, was taken by KOTZE, J. in *Smith v. Burger, 1917 C.P.D.,* and LAWRENCE, J. in *Cowell v. Friedman, 5 H.C.G.,* where a tame animal demonstrated vicious, perverse, or unwarrantable behaviour. Before going on to discuss the later decisions, it would be wise to mention defences open to the owner of the animal which has caused the injury. The first of these is that the person or animal injured was not lawfully at the place where he was injured.—*Drummondv. Searle, 1879 Buch, 8*, *Holmes v. Beest, 1914 C.P.D.*

The defence is based on the fact that an owner cannot reasonably be expected to anticipate the presence of trespassers. But an owner is liable if he is instrumental in trespassing stock being injured, e.g. putting dogs after things, as he may only drive out trespassing stock in a reasonable manner.

The second defence is that the attack was provoked by the person injured.—*Doig v. Forbes, 7 S.C.* But what would be considered provocation in an adult would not necessarily disentitle a child from succeeding.—*Smith v. Burger.*

Thirdly, there are the general defences of *volenti non fit injuria* and negligence on the part of the injured person which has contributed to the injury. This latter defence was successfully utilised in the case of *O'Callaghan v. Chaplin, 1927 A.D. 310,* in which case plain-

tiff's nurse-maid having with her plantiff's child, went to visit a maid in the employ of defendant, who had with her defendant's three Scottish terriers. The child was put on a bed with the dogs, which became very excited when it became evident that they were to have a walk. The child cried out soon after, and it was found that it had been bitten by one of the dogs.

HELD that though there was no proof of negligence on the part of the defendant, he would, as owner of the dogs, have been liable in an action *de Pauperie,* were it not for the fact that the nurse had been negligent in not taking proper care of the child and thus contributing to the injury.

The Appellate Division thus decided a long controversy, in that it was definitely laid down that although the surrender of an animal that has caused injury is not a portion of the Roman-Dutch Law of South Africa, it is not a necessary consequence that the liability for damage done by an owner's animal (*contra naturam*) is also not a part of our law. By that law, therefore, the owner of a dog that attacks a person who was lawfully at the place where he was injured, and who has neither provoked the attack nor by his own negligence contributed towards it (see also *Harmse v. Hoffman 1928, T.P.D. 572*) is liable as owner to make good the damage.

This principle was applied and discussed in the later case of *S.A.R. and H. v. Edwards 1930 A.D.* In this case, a pedestrian, while passing a stationary vehicle to which were harnessed four mules, was kicked by one of the mules and precipitated under a passing train, thereby sustaining severe injuries. In his judgment, DE VILLIERS, C. J. summarised the relevant principles of the law with regard to injuries by animals, in the following manner: (p. 9)

(1) The *Actio de Pauperie* is still in full force in South Africa, but the right of surrender is obsolete.

(2) The action is based on ownership. The English doctrine of "scienter" is not a part of our law. (i.e. It is not necessary to prove that the owner *knew* the animal to be vicious, or to have a mischievous disposition, to render him liable. His knowledge is merely evidence of negligence).

(3) The action lies against the owner in respect of harm done by domesticated animals, e.g. horses, mules, dogs, and cattle acting from inward excitement. When such animal acts from vice its behaviour is *contra naturam,* and not usual with a well-behaved animal of its kind.

(4) If the act was not due to vice but was provoked, the action does not lie.

(5) Dating back, as this form of remedy does, to the most primitive times, the idea was to render the owner liable only

in cases where, so to speak, the fault lay with the animal. In other words, there must be something equivalent to *culpa* on the part of the animals.

(6) Hence, if the fault lies with the injured person himself, he cannot recover. If, for instance, he has provoked the animal or acted in such a manner that the outburst could have been foreseen.

(7) But stroking or patting a horse is not considered to be provocation. If a horse kicks when patted, its behaviour is said to be due to vice unless the person kicked had reason to know that the horse might kick. But a kick on the part of a mule might be foreseen.

(8) The action does not lie if the animal was provoked by a third party. If, for instance, an animal kicks out after being struck by a goad.

(9) Nor does the action lie if the injury was due to pure accident. Here nobody is considered to be to blame, as in *Cowell v. Friedman 5 H.C.G.*

Applying the above rules to the facts of *Edwards v. S.A.R. and H.* (above) the Court held that a pedestrian passing a draught animal in a street of a city is entitled to assume that the animal is accustomed to the ordinary noises of a city, and will not be upset by an experience to which it is taken to be accustomed. An animal which is upset by such noises and injures a pedestrian must be held to have acted from inward excitement; the cause of the injury is not the noise but the innate wildness of the animal and the *Actio de Pauperie* will lie for the recovery of damages in respect of such an injury, whether the animal did damage through its own body, or through some external object.

HELD, therefore, that for the kick of the mule and the consequent fall under the train, with severe injuries, the pedestrian had been rightly awarded damages against the owner of the mule.

I feel I cannot do better than to conclude on the note of the above authoritative summary of the law, presuming to add, however, one further rule which I submit would have been included had it been necessary.

(10) Where two animals act in concert, then if it is possible to sever the damage, the owner of each animal is liable for the damage done by his animal. But if it is not possible to sever, the owner of each animal is jointly and severally liable for the whole damage (*Graan v. During 2 S.C. 308, Nel v. Halse 6 S.C. 275, Katz v. Bloomfield and Kieth, 1914 T.P.D. 379.*).

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Essays on the Cancer Problem.

I. The Veterinarian and Cancer Research.

By CECIL JACKSON, B.Sc., B.V.Sc., Onderstepoort.

It is to be hoped that the activities of representatives of the profession in South Africa at the inauguration of the National Cancer Association in Johannesburg last year, at which provision was made for veterinary representation on one of the permanent committees, will encourage veterinarians in the Union to take their rightful place in the anti-cancer movement, that is by playing an active part in assisting research into the neoplasms of domestic animals.

The peculiarly advantageous circumstances of the veterinarian for such activities are as yet obviously little appreciated, except by the few who recognise the contribution which the study of the comparative pathology of cancer offers to the solution of the cancer problem as a whole. A persual of a recent article by Cramer (1) on this subject will convey a clear idea of the evidence on which this claim is founded. It is pleasing to note in this review that the significance of the work of several veterinarians [e.g. Sticker (1902), Trotter (1911), Cohen (1927), Drabble (1929)] has been appreciated by research workers in the sister profession. In this article, as the author remarks, the literature reviewed is far from exhaustive of what has already been accomplished, and South African workers will miss reference to the work of Thomas (2) on the Angora goat and also to the work in connection with that peculiar sheep disease jaagsiekte—which pathologically according to de Kock (3) has all the characteristics of a pulmonary neoplasm and which is undoubtedly closely related to the problem of cancer.

From Cramer's article the following points of striking significance emerge:

(1) Great inaccuracy of still widely prevalent beliefs concerning the incidence of cancer. Inseparable from this are—

(2) The grave misconceptions which can arise from a misuse or an incomplete knowledge of statistical methods.

(3) The comparative worthlessness of observations which are not backed by complete details of the subject and the histopathological diagnosis of the tumour.

(1) Cramer, W. (1932). *Cancer Rev.* VII (5, 6): 242-261.

(2) Thomas, A. D. (1929). 15th Ann. Rep. Dir. Vet. Serv., U. of S.A., II; 661-761.

(3) de Kock, G. (1929). *Ibid:* 611-641.

ERRONEOUS BELIEFS REGARDING THE INCIDENCE OF CANCER.

Among such misconceptions are the following:—

(a) *That cancer is a disease peculiar to civilised man.*—This has been controverted by many authors and the final downfall of this and similar beliefs is due to the newer and better use of statistical methods. The incidence of cancer certainly appears higher in civilised countries, because—to put it bluntly—one of the functions of civilisation is to keep people alive until they are old enough to get cancer and to save them from so many other complaints that cancer remains among the relatively few diseases which get a fair chance of terminating life.

(b) *That cancer is essentially a human disease.*—The low observed incidence of cancer in animals is, as pointed out by Cramer, attributable to comparatively few animals reaching the cancer age. At abattoirs cases of cancer are therefore not frequently observed. Animals die early both because some are killed for food, and others are more exposed to the influence of injurious factors including disease (i.e. public health is less efficient as regards the four-footed citizens and professional advice is less sought in the case of animals than where man is concerned), while wild animals have altogether a harder struggle for existence not compatible with longevity, and in addition they are not easily observed as regards their pathology. In groups of animals in which these factors are inoperative, such as pensioned horses, pet animals, aged cattle (4) and laboratory-kept small animals, the incidence of cancer is far higher than is generally realised. Further, under certain constitutional or environmental conditions and in certain localities, extremely high incidence may be observed, in some species, of neoplasms affecting certain organs (skin cancer of Angora goats in South Africa, jaagsiekte in sheep, ovarian carcinoma of fowls). Lack of success in transmitting cancer from man to animals was at one time regarded as clear confirmation of this belief that animals were lacking in susceptibility, a good illustration of the dangers of arguing the problems of one disease by analogy with those of others.

(c) *That malignant neoplasms of animals are in any way dissimilar to those of man.*—This can only be attributed to a lack of knowledge of the pathology of animal neoplasms. It is scarcely necessary to stress that the classification of tumours as built up by human pathologists is applicable *in toto* to the neoplasms of animals, even minor varieties of tumours showing a close coincidence with those known in man and the tumours of even the lower vertebrates (fishes, etc.) falling readily into their proper positions in the classificatory scheme. Nowadays, of course, an era of cancer experimentation with the

(4) Statistics from the Glasgow abattoirs reveal that within a space of a year the incidence of cancer in slaughtered cattle was increased nearly sevenfold by the importation of aged slaughter cattle from Ireland, reaching a higher incidence (28 per 1000) than in man!

laboratory animals as subjects is firmly established, and on a larger scale than has been applied to any other disease.

(d) *That although cancer may occur in animals, its predominant incidence is under the influence of domestication.*—Here several factors have led opinion astray. As has already been pointed out, wild animals have comparatively little expectation of reaching the cancer age. Secondly, opinion was *a priori* biassed by the deeply-rooted conception of cancer as a disease of civilization. Thirdly, there has been a notable lack of direct observation on the pathology of wild animals. Cramer considers that "if anyone chooses to say that these (wild) animals do not suffer from cancer when living in their natural habitat... it is up to him to prove it by going out and examining hundreds of middle-aged or old lions, tigers, hippopotamuses and rhinoceroses living in their natural habitat, for the presence of a neoplasm." Unfortunately for the people so justly indicted in this delightfully pertinent statement, the qualities which constitute the big game hunter and the research scientist are not frequently to be found in the make-up of one and the same individual. It is, however, a source of pleasure to mention that the need for first hand evidence in preference to arm-chair speculation about the pathology of wild animals is recognised not only in other countries (America —Yellowstone Park), but also in the Union; and that two of our versatile colleagues at Onderstepoort have already undertaken the first of what we hope may be a regular series of study expeditions to the Kruger National Park, with encouraging results as regards the advancement of our knowledge of the diseases prevalent among the animals in the Game Reserve. It is trusted that the Division, seeing the importance of this work, will give not only permission but active encouragement for its continuation.

(e) *That cancer is more common in carnivores than in herbivores* —This erroneous conclusion has resulted from the misuse of statistical figures. The fact is, of course, that of domesticated animals the herbivores are kept for utilitarian purposes and killed young for food or destroyed when they have outlived their usefulness, while carnivores are kept for sentimental reasons and therefore have a greater chance of attaining the cancer age. Looking back, it seems incredible that conclusions based on so pointed a neglect of the age incidence factor could for a moment have escaped denunciation. However, it is easy to be wise after the event. These are lessons to be learned and to be borne in mind in the future, in which we hope that wisdom will indeed be found easy.

Psychology and Cancer Research.

If such errors inculcate into those interested in the problem the need for exhaustive critical examination of each and every thesis, and the maintenance of a reserved attitude to all new statements

until proven beyond question, the contents of our cancer libraries will shrink in quantity as rapidly as they will increase in quality. Further there will result the emergence of that all too rare quality in research—the unbiassed view point. Indeed we venture to say that in cancer research we have already witnessed the inauguration of this era of true freedom of thought (which lies far more in immunity from the tyranny of ones own mind than in protection from that of others). However, not all manifestations of scientific caution are laudable. Indeed, one may, with some justification, often read into it an easily understandable exhibition of excessive or even panicky reaction to such scientific "howlers" (they can be described in no more lenient terms) as have been mentioned above. The pendulum on its downward journey has tended to swing too far, just as it has done in so many other phases of sociology. Further it is only too true that under the guise of "scientific caution" also masquerades the intolerance which springs from the source of obsession with a "pet theory."

It is being increasingly widely recognised that research in cancer covers a wide field and ramifies into many subjects outside its more immediate and obvious sphere. When we admit the need for a still further extension in the direction of the psychology of the research worker we may be expected to make more constant progress and to avoid being sidetracked from the main issue by following lines of thought inaugurated by workers whose errors are perhaps more readily patent to the student of psychology than to their fellow biologists.

Cancer in Laboratory Animals.

Some curious points made by Cramer are listed below and it is hoped that they will be found by readers to be as stimulating of thought as they were by us:

Among animals kept in laboratories under identical environmental conditions

(i) mammary neoplasms are frequent in mice but rare in rats;

(ii) they are usually malignant in mice, but when they occur in rats, mostly benign;

(iii) uterine neoplasms are frequent in rats and rare in mice;

(iv) mice suffer from carcinoma, rats usually from sarcoma;

(v) in mice, females suffer from cancer much more frequently than do males. In rats, the distribution between the sexes is almost equal;

(vi) liver sarcoma arising from the cysts of *Taenia crassicollis* is common in rats, but rare in mice, although these animals are infected by the same parasite.

Data of Especial Veterinary Interest.

It is thought that the following data may be of particular interest to veterinarians:

(1) Frequency of incidence of cancer in animals:

The order may be accepted as follows: *dog, horse, ox, cat, pig, sheep.* This refers to *absolute recorded frequency,* and cannot be used as signifying actual relative frequency in the species mentioned. Further it will be realised that in many localities, due to the special factors operative, the order will be greatly modified. Cramer further points out that records which omit mention of the "age constitution" of the animals examined are useless and even misleading.

(2) Sites of predilection for cancer in different species:

Horse: Penis (geldings), testicle (stallions), nose.

Ox: Liver, rumen (Trotter). Adrenal (frequent). Uterus (5), kidney (Sticker).

Sheep: Liver.

Pig: Liver, kidney (embryonic nephroma).(6)

Dog: Mammary gland, skin, anus (anal glands).

Cat: Skin, mammary gland.

Fowl: Skin and bursa of Fabricius (sarcoma).(7) Ovary (carcinoma).(8)

Mouse: Mammary gland—carcinoma.

Rat: Uterus—sarcoma.

(3) Some well known local variations are as follows:—

Australia: Cattle—skin carcinoma.(9)
Sheep—skin of ears—carcinoma (tar-branding).

South Africa: Angora goats—skin carcinoma.(2)
Sheep—jaagsiekte (neoplastic?), (=lung adenoma).(3)

Argentine: Sheep—skin of ears—carcinoma (tar-branding).

India: Cattle—horns (irritation by "riems").

Germany: Cattle—lymphocytomatosis.

(5) Undoubtedly an exceptional group of cases.

(6) Apparently associated with the notorious frequency of other urinary malformations in this animal. See Jackson, C. 17th Rep. Dir. Vet. Serv. & An. Ind., U. of S.A., II: 869-872.

(7) One at once suspects that of these sarcomatoid growths many have been misinterpreted, and are in all probability cases of lymphatic leukaemia.

(8) These ovarian carcinomata, according to South African experience, are quite the commonest true neoplasms in heavy laying hens and almost always give rise to implantation metastases on the various parts of the visceral peritoneum, especially on the mesentery, resulting in generalised abdominal carcinomatosis (in which the primary tumour may often escape recognition as such if the birds be allowed to live). These cases are received at Onderstepoort in a steady stream from the egg laying competitions.

(9) Drabble J., 1929. *Aust. Vet. Jl.* 5:71.

Various: Dog—thyroid tumours (probably associated with the factors responsible for the great prevalence of goitre in canines in certain localities).

Furtherance of Research by Veterinarians.

In South Africa veterinarians fall into three chief categories all of which are curiously favourably circumstanced as regards their ability to assist in the new-growth problem. I refer to those

(a) in charge of abattoirs in all parts of the country,

(b) resident in areas where neoplasms or neoplastic diseases are prevalent in certain organs or endemic in certain species (skin cancer of goats, jaagsiekte of sheep, leucosis),

(c) whose work brings them into contact with poultry. Here we have in mind not only the common ovarian carcinoma especially prevalent in heavy layers, as emerges clearly from the autopsis on birds employed in the egg-laying competition at the Glen School of Agriculture,[10] but also the very prevalent fowl leucosis.

To such members of the profession, as well as to others who encounter neoplasms sporadically from time to time, we would appeal for assistance as follows: Let no case pass without submitting to Onderstepoort—

(A) *Specimen of the tumour in formalin:* It is preferable to send the entire growth together with the whole organ affected or at least a generous part of the surrounding tissue, for the reasons that:

(1) enucleated or closely exercised growths are uninstructive as museum specimens,

(2) a clearer idea can be formed of the exact place of origin, and

(3) the estimation of malignancy in doubtful cases is thereby greatly facilitated.

These specimens should be transferred to the fixative with as little delay as possible after death.

(B) *A full account of the case:* In this respect it is of especial importance to note age, sex (including whether entire or castrated), breed, source of origin (in the case of abattoir carcases), and when possible full clinical history and autopsy findings. If portions only of the growth have been sent, to this should be added a full description of the exact location of the tumour, its weight, degree of encapsulation, presence of pressure on surrounding organs, etc. It is scarcely necessary to suggest that wherever there is reason to suspect malignancy, autopsy examination should be as complete as possible (mention interim, body weight, weight of affected organs, etc.), with a

[10] The Government Veterinary Officer, Bloemfontein, is kind enough regularly to submit these cases for study at Onderstepoort.

view to discovering metastases, and if they exist an opinion expressed as to which focus is primary and which secondary.

(C) *Smears* have been found to be a most valuable aid to cytological studies on neoplasms, and in many respects, although they are essentially complementary to the sections, are more instructive than the latter. Satisfactory smears can be prepared from most soft cytomata by the simple process of drawing a clean slide over a newly cut surface, or alternatively by scraping away fragments of the growth with the point of a scalpel, transferring to a slide the material so obtained, and drawing a smear in the usual manner. The disadvantage of the second method (as in the case of all organ smears) is that the cytoplasm of many cells is torn away, leaving "smudges" and thereby depreciating the value of the preparations for morphological studies and for the type collection in the pathological section at Onderstepoort. It is our practice to overcome this difficulty by teasing the scraped fragments in a drop of homologous serum (physiological saline is less effective but may also be used) before drawing the smear. Smears, like the section specimens, should be taken as early as possible after death.

CONCLUSION.

It has not been attempted to give in this article a resumé of the review of Cramer to which extensive reference has been made. In particular, his views on the aetiology of cancer have been omitted. These will be dealt with at a later date and under a heading more appropriate than the title of the present essay. We have merely attempted to focus attention on those points of special interest to the veterinarian, whose rightful rôle in the elucidation of this fascinating chapter of animal pathology is likely to be denied him unless he makes full use of the privileged observational position in which he finds himself.

JL. S.AFR. VET. MED. ASSN.
III (2) 1932.

The Veterinary Profession in South Africa: (3) Professional Veterinary Societies.

APPENDIX.

BRIEF BIOGRAPHIES OF MEMBERS NOW DEAD.

(*a*) *Transvaal Veterinary Medical Association.*

By Dr. H. H. CURSON, F.R.C.V.S., Onderstepoort.

JOHN HENRY BELL (1866-1913). Born at Carlow, Ireland, (19/3/66) he qualified at the London College in 1889 and served in the Irish C.V.D.(1) In 1895 he was appointed Veterinary Adviser, West Indies. He came to South Africa as a C.V.S. (A.V.D.) in 1901 but later joined the S.A.C. He later served in the Transvaal C.V.D., his service dating from 6/9/04. Owing to ill-health he resigned on 31/5/08, his death taking place at Dublin on 24/6/13.

JAMES McNAB CHRISTY (1868-1917). Born in County Limerick (7/8/68), he qualified at the Royal (Dick) Veterinary College in 1889. After serving 10 years in the Irish C.V.D., he came to South Africa (1900) as a C.V.S. (A.V.D.) during the Boer War. From 20/7/01 to 30/4/03 he served in the S.A.C. and later (1/5/03) joined the Transvaal C.V.D., being A.P.V.S. After Union he was appointed S.V.O. Transvaal but on account of ill health left the service. He died at Pretoria on 29/6/17.

THOMAS HENRY DALE (1868-1917). Born 29/11/68 at Manchester he graduated at the New Edinburgh Veterinary College in December 1889 and came to South Africa as a C.V.S. (A.V.D.). After hostilities he served in the Repatriation Department, Transvaal, but on 7/10/03 joined the C.V.D. He died at Durban on 15th July 1917.

LIONEL NICOLAAS DEVENISH (1890-1922). Born at Wakkerstroom (6/7/90) and qualified at the Royal Veterinary College London in 1918, with the aid of a bursary from the Union Government. While stationed at Umzimkulu in 1922 he contracted enteric fever and died at the Addington Hospital Durban on 10/4/22. He joined the Union C.V.D. 28/7/19.

ALEXANDER GOODALL (1879-1930). See Jl. S.A.V.M.A. Oct., 1930.

GEORGE G. HENDERSON (18.-19.) Qualified at the Royal (Dick) Veterinary College in 1889. Transferred from the Natal C.V.D. to the Transvaal Civil Service as from 25/2/03 and was stationed at Lichtenburg. His name is not shown in subsequent records of veterinary staff and no further information is available. He was reported dead to the Royal College of Veterinary Surgeons in November 1921, but he died prior to this.

EDWARD ARTHUR HOLLINGHAM (18.-1912). Born in Sussex and qualified in London in 1881, was in private practice at Turnbridge Wells, Kent, prior to settling down in Johannesburg as a private practitioner in 1893. When early in 1896 W. Pye M.R.C.V.S., arrived in Johannesburg, a partnership was established. On the outbreak of the second Boer War both principals, as "uitlanders", were compelled to seek refuge in Natal when they joined the I.L.H.

(1) *Abbreviations:—C.V.D. Civil Veterinary Divison, Department of Agriculture. C.V.S. (A.V.D.) Civil Veterinary Surgeon attached to Army Veterinary Dept. (1899-1902). A.P.V.S. Assistant Principal Veterinary Surgeon. S.V.O. Senior Veterinary Officer. D.V.S. District Veterinary Surgeon.

Hollingham served in the ranks and it is not known whether he remained in the regiment after the siege of Ladysmith. Upon the termination of hostilities he was again in Johannesburg. From 1903-1910 he was in partnership with Mr. E. Kellett. M.R.C.V.S. and during the Natal Rebellion was attached as V.O. with rank of captain to the Transvaal Mounted Rifles.

Hollingham, who had travelled extensively, practised in Australia, India, England, China, and finally in South Africa. During his residence in Johannesburg (38, Dawe St., Troyeville), he was veterinarian to the S.P.C.A. In 1910 the partnership with Mr. Kellett was dissolved and two years later he died from pneumonia (August 20th). *(Vet. Rec.* 23/11/12).

SAMUEL IRVINE JOHNSTONE (1866-1929). See Jl. S.A.V.M.A. Nov., 1929.

JOHN FITZGERALD JOYCE (1877-1926). Born on 16/5/77 in Ireland and graduated at the Royal (Dick) Veterinary College in 1899. He came to South Africa in 1900 as a C.V.S. (A.V.D.), bringing 1000 mules from Spain. Early in 1901 he joined Driscoll's Scouts, but from July 1901 until the middle of 1906 he served in the S.A.C., being stationed at Bloemfontein. He then went to British East Africa intending to settle, but returned early in 1909 when he was appointed (25/2/09) to the Orange River Colony C.V.D.

When the Rebellion broke out in 1914, he served as a burgher with the Ficksburg Commando, but later became V.O. to the 5th Mounted Brigade. He then became a member of the S.A.V.C. and was attached for some time to the N.L.H. In May 1915 he was at Parow Veterinary Hospital and thereafter was sent to South-West Africa Protectorate, arriving there in November 1915. On his return from South-West Africa he served as G.V.O. for 3 days when he was sent to German East Africa on shipping duty. He was promoted major in 1917, and left the S.A.V.C. in March 1918. He gave evidence at the Commission of Enquiry at Upington in January 1919 regarding glanders in South-West Africa.

After his return from the Great War he was stationed as G.V.O. at Kroonstad where he died on 30/8/26, from heart disease.

DANIEL KEHOE (1888-1928). See Jl. S.A.V.M.A. August, 1928

GUILLAUME FRANCOIS MARAIS (1885-1918). Born at Potchefstroom (23/8/85) and qualified at the Royal Veterinary College London in December 1913, with the aid of a bursary from the Union Government. During the influenza pandemic he took ill and died at Volksrust, his station, on 4/11/18. He entered the Union C.V.D. on 9/2/14.

GEORGE RAPHAEL McCALL (1885-1930). See Jl. S.A.V.M.A. October 1930. (Died 16/7/20).

HENRY OSWALD OLIVER (18.-1918). Although qualified as M.R.C.V.S. on 14/7/98 was not registered until 26/10/1917). He came to South Africa as a C.V.S. attached to the A.V.D. during the Boer War. From March 1902 to June 1906 he served in the S.A.C. and then joined the Orange River Colony C.V.D. which, however, he left early in 1907. He received a commission in the Natal Veterinary Corps in July 1906 (Gazette 10/7/06). From 7/7/10 to 8/2/11 he was in the Southern Rhodesia C.V.D., thereafter he apparently went to Australia. He returned to England during the Great War, joined the Army, and died of wounds as a prisoner in Germany in 1918. (Partly from letter dated 10/11/30 from Dr. Fred Bullock).

JOHN PEDDIE (1870-1932). See Jl. S.A.V.M.A., this issue.

WILLIAM M. PYE (18.-1904). Qualified Edinburgh, June 1891, arrived Cape June 1893, was veterinary assistant to Dr. Edington, Colonial Bacteriologist

(Cape Colony), for approximately two years prior to settling down in Johannesburg as a private practitioner early in 1896. He was thus the first research veterinarian in South Africa. (2) Soon after arrival in Johannesburg he entered into partnership with E. A. Hollingham. Upon the outbreak of the second Boer War he proceeded to Natal where with his former partner he joined the I.L.H. After serving in the ranks until the relief of Ladysmith, he joined the A.V.D. as a Civil Veterinary Surgeon. At the end of hostilities he returned to Johannesburg and resumed private practice. For a few months at the end of 1902 he acted as Government Veterinary Surgeon for Johannesburg under the Glanders Law (8) of 1894, being relieved at the beginning of 1903 by Mr. J. Peddie, M.R.C.V.S. His death took place under tragic circumstances in Pretoria in 1904.

THOMAS LE BLANC REVINGTON (1887-1928). See Jl. S.A.V.M.A. August, 1928.

WILLIAM ROBERTSON (1872-1918). Born in Scotland on 22/6/72, he obtained his diploma in London in 1893. He entered the Cape service on 23/5/96 as veterinary assistant to Dr. Edington of the Colonial Bacteriological Institute, Grahamstown. He was transferred to the Department of Agriculture in 1899 and became Director of the Veterinary Laboratory, Grahamstown, in August 1906. After Union he became Assistant Director of Veterinary Research (Union). He died at Grahamstown on 22/12/18.

JAMES FRANCIS SCOTT (18.-1925). Qualified at the Royal (Dick) Veterinary College in 1895. The following year he came to Johannesburg and, it is believed, went into partnership with Mr. Britton, M.R.C.V.S., formerly of Port Elizabeth. At times he performed certain state duties for Dr. A. Theiler, who being stationed at Pretoria found it difficult to go to Johannesburg. He was the first Veterinary Officer to the Transvaal Volunteers, being appointed to the I.L.H. early in 1903. His death took place on 13/11/25.

FREDERIC M. SKUES (1866-1921). Born 9/7/66 in London, he graduated at the Royal (Dick) Veterinary College in July 1897, and came to South Africa as a C.V.S. (A.V.D.) during the Boer War. On 26/9/05 he joined the Orange River Colony C.V.D., having served previously in the Transvaal Repatriation Department. During the Great War he joined the S.A.V.C. (1/11/14) and saw service in German South-West Africa. On being released from his military duties, he returned to the Orange Free State and died at Bloemfontein on 18/8/21.

FREDERICK SMITH (1857-1929). See Jl. S.A.V.M.A. Nov., 1929.

STEWART STOCKMAN (1869-1926). Born in 1869 at Edinburgh and graduated at the Royal (Dick) Veterinary College in 1890. He first came to South Africa as a C.V.S. (A.V.D.) being attached to the Rhodesian Field Force (1900) along with Messrs. Kellett, Peddie, and Gregory (I.Y.), during the Boer War. For his services he received the Queen's medal and 4 clasps. In May 1903 he came from India to take over P.V.S. of Transvaal which office he held until 1905 when he became C.V.O. Board of Agriculture, London. His death took place in Glasgow on 2/6/26. *(J. C. P. & T.* **XXXIX** (1926) p. 164].

ERNEST E. STOKES (1867-1925). Born 8/4/67 at Southwark, London, he qualified at the Royal (Dick) Veterinary College in June 1899 and came to South Africa during the Boer War (1901). As his name is not given in the

(2) Dr. Edington was appointed to investigate animal diseases in 1891 and no doubt found the various maladies most confusing. At first Mr. Borthwick helped him but later he obtained a whole-time veterinary assistant.

list (3) of A.V.D. Officers (and Civil Veterinary Surgeon), it is likely he was employed on Sea Transport. At any rate in May 1902 he was stationed at Potchefstroom. Later it is believed he served in the Repatriation Department and thereafter settled in Port Elizabeth as a private practitioner. On 2/11/14 he joined the S.A.V.C. and served in German South-West Africa, later accompanying the force which in 1917 defeated Chief Mandume in Ovamboland. He died at Port Elizabeth on 27/11/25. (*Vet. Rec.* 20/3/26).

HUGH XENOPHON TURNBULL (1880-1910). Born in England (13/3/80), he qualified at the Royal Veterinary College London in 1902, and joined the Transvaal C.V.D. on 5/2/03. He was a keen volunteer, serving as V.O. to first the Eastern Rifles and later the Northern Rifles. A forthnight before his death (7/8/10) he transferred to the Reserve of Officers. He was D.V.S. for Barberton at his death which took place at that town (See *Vet. Rec.* 24/9/10).

JOHN MITCHELL WATSON (18.-1911). Qualified at the Royal (Dick) Veterinary College on 12/3/96. He joined the Union C.V.D. on 13/10/10, being one of the first appointments after Union (31/5/10). He died on 1/11/11 of cerebral haemorrhage and was buried at Smithfield, O.F.S.

(*b*) *Cape Veterinary Medical Association.*

ALEXANDER GOODALL (1879-1930). See under T.V.M.A.

CHARLES GOUNDRY (1874-1912). Born in England in 1874, he graduated at the Royal (Dick) Veterinary College in 1897. He came to South Africa as a Civil Veterinary Surgeon attached to the A.V.D. during the Boer War and later joined the Cape C.V.D. on 16/11/02 His death took place at Malmesbury on 26th August 1912.

DUNCAN HUTCHEON (1842-1907). Born near Peterhead, Scotland on 27/6/42, he graduated at the Royal (Dick) Veterinary College in 1871. He was appointed Colonial Veterinary Surgeon of the Cape Colony on 2/3/80 and so highly were his services valued that in August 1905 he was made Acting Director of Agriculture, which post was made permanent the following year. His death on 14/5/07 was a great loss not only to the profession but to South Africa (4). His final resting place is Mowbray Cemetery. He raised the profession from obscurity to honour. (For detailed obituary see *Cape Agr. Jl.* XXX. pp. 736-739, 1907).

W. G. PAKEMAN (1869-1916). Born in England on 22/5/69, he qualified at the London School in 1892. He came to South Africa as a Civil Veterinary Surgeon attached to the A.V.D. during the Boer War, and joined the Cape C.V.D. on 11/12/03. He died on 20/1/16 at Aliwal North.

WILLIAM ROBERTSON (1872-1918). See under T.V.M.A.

JOHN ANDREW ROBINSON (1864-1915). Born on 4/3/64 at Peterborough, England. He qualified at the New Veterinary College, Edinburgh, in May 1885. In 1896 he came to the Cape Colony in order to take part in the Rinderpest campaign, being stationed for a time at Victoria Compound, Kimberley under Professor Koch. In 1911 he was transferred to Grootfontein School of Agriculture (as lecturer on veterinary science) where he died on 3/9/15.

JOTELLO FESTIRE SOGA (1865-1906). Born in the Cape Colony, being the fourth son of the late Rev. Tiyo Soga and a Scotch mother. He qualified

(3) "A History of the R.A.V.C." by Sir Fred-Smith (1927) p. 259.

(4) So much was Hutcheon esteemed that a national subscription was raised, the proceeds, approximately £2,000, being invested in the Colonial Orphan Chamber, Capetown. On his widow's death, the capital amount will go to the Government as a nucleus towards sending a student from Elsenburg to study veterinary science in Great Britain.

at the Royal (Dick) Veterinary College in April 1886 and entered the Cape C.V.D. on 27/5/89. After giving valuable service for ten years he resigned in 1899 through ill-health. His death occurred at Amalinda on 6/12/06. (For detailed notice see *Cape Agr. Jl.* XXX. p. 6).

JAMES ARTHUR WORSLEY (1866-1914). Born on 10/10/66 in England, he obtained his diploma at the London Royal Veterinary College in 1887. He came to the Cape Colony in April 1897 and in 1903 transferred from the Agricultural Department to the C.M.R. with which regiment he remaintd as Veterinary Officer until 1907. He died at Prieska on 21/8/14 while on active service.

(c) *Natal Veterinary Medical Association.*

ARTHUR GOULE (18.-1918). Qualified at the R.V.C. London in 1871 and came to South Africa as a C.V.S./A.V.D. during the Boer War for which he received both medals. Prior to this he was at the Veterinary College, Melbourne. He later (7/12/05) joined the Natal civil service, being at Allerton until 1909 when he transferred to the field as D.V.S. After Union he continued in Government service, but in 1916 joined the R.A.V.C. and did duty in France. On his return to South Africa in 1918 he took passage in the "Galway Castle" and lost his life when that vessel was torpedoed on 12/9/18.

SAMUEL IRVINE JOHNSTON (1866-1929). See under T.V.M.A.

ARTHUR WILFRED SHILSTON (1885-1919). Born 1885 and qualified at the R.V.C. London in July 1908. He joined Col. Watkins-Pitchford as Assistant Government Bacteriologist in 1909 and after Union remained at Allerton, being in charge after Col. Pitchford's resignation in 1912. Early in 1914 he was appointed Assistant Bacteriologist under Col. Holmes at the Imperial Bacteriological Laboratory, Muktesar, and during 1915-16 he acted as Imperial Bacteriologist. While conducting investigations into glanders in 1919, he became infected (17/6/19) and died 6/7/19 at Muktesar.

CLINICAL AND GENERAL NOTES.

Keratosis of the Skin in Cattle.

G. MARTNAGLIA, D.V.Sc., Johannesburg.

During the course of inspection of dairy cows in Johannesburg, the writer has noticed a condition which may be described as keratosis or patchy cornification of the skin. It has been observed chiefly in black and white cattle of the Friesian strain, the predilection sites being the rump, back, and withers—namely, those parts of the body exposed to the sun. An interesting feature of this condition is the fact that only the white portions of the skin are affected, never the black or pigmented areas.

Fig. I.
Extensive Keratosis on withers and back.

In the initial stages the part shows local inflammation which is soon followed by loss of hair, and then by a whitish scurviness. This gradually develops into scaly layers or hornified strata which may reach an inch or more in depth. These scaly areas seem to cause irritation, for some animals show a tendency to lick the affected parts.

As in human keratosis, it is evident that various causes may act as keratogenic agents. The actinic rays of the sun, however, appear to be the primary stimulating factors, especially where the condition is associated with local areas of non-pigmented skin. Other causes which are undoubtedly often associated with or partly responsible for similar lesions have to be borne in mind; for instance: (a) Brands—the outline of the branded letters or symbols becomes thickened and keratinised. (b) Arsenic—dipping in too strong a wash, or application of too strong a hand-dressing or other preparation is often followed by the condition commonly known as "scalding," which may in turn be followed by keratosis. (c) Various other drugs and caustics would

probably lead to similar sequelae. The owner of one animal stated that the condition had resulted from application of paraffin oil for pediculosis, another that the affected cow had rubbed against a wall recently painted with coal tar. (d) Mange and the scratching it induces appear also to be a possible starting point for keratosis, as was suggested by another farmer. (e) Traumatism and old wounds probably may lead to similar affections in certain circumstances.

In veterinary literature Joest, Kitt, and Nieberle make only brief reference to keratosis, but R. Prosser White (1928) in his "Dermatogoses or Occupational Affections of the skin" of man, enumerates the following keratogenic agents:

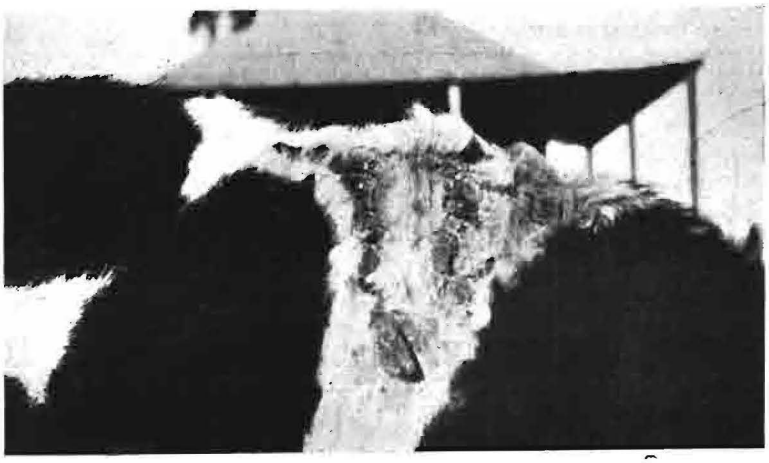

Fig. II.
Keratosis on Withers.

Arsenic, certain distillates of bituminous coal, petroleum and shale, certain radiations, aniline, etc. This is significant in view of the above observations.

Although, as has been pointed out above, the black-and-white skinned animals appear most vulnerable, cattle of other colour are not entirely immune. At least one case of keratosis in a red ox has come to my notice during ante-mortem inspection of stock at the market.

The observations made lead one to conclude that in tropical climates and with the finer, non-pigmented skinned animals keratosis is a condition to be reckoned with, especially when predisposing agents such as have been mentioned above are used indiscriminately.

Apart from the discomfort and disfigurement occasioned to the animal at the time, there is no doubt that the market value of the skin is materially decreased by this condition.

The following observations made on similar affections in man are quoted from Prosser White (1928) for the sake of interest:

"Tropical skin", the classical disease due to prolonged exposure to the rays of the sun, has long been known under the designation of "sailor's skin," the name given to it by UNNA. He observed that it is more frequent in blond than in dark-skinned people. Red-headed and fair-complexioned people are particularly likely to suffer. In America it is called "farmer's skin"; RASCH names it the "peasant's" skin. It is frequent in Australia amongst white people. It is a penalty exacted from white people for occupying countries normally destined for the coloured races. Though more usual in the third and fourth decades of life, PAUL writes of instances in younger persons under the name of "dermatitis solaris chronica." It is a particularly interesting condition, owing to its many clinical similarities to lesions of the skin caused by other irritants , such as pitch, tar, arsenic, etc. Apparently the same or a similar series of dermal and epithelial changes is brought about by all these keratogenic agents. Many of these similarities and differences are described in ULLMANN'S extensive article.

Fig. III.
Excrescences on the face of a bovine as a result of traumatic injury. Note the rough horny protuberance above arising from the nasal bones and the loose appendage of dark skin hanging on the white muzzle below.

WHITE, C., J., came across a most unusual instance in a baby who, the first time it was taken out, "became sunburned at once. It freckled heavily and developed this disease in all its hideousness." He has reported seven other cases in his own town (Boston, U.S.A.)

SUTTON says, and with this JADASSOHN agrees, that "typical examples of this condition are probably more frequent in agriculturists on the prairies of Kansas than in the sailors on the Newfoundland bank. Constant and frequent exposure to the violet and ultra-violet rays of the sun are its causes. The seats of predilection are the face, scalp, interscapular and sternal regions, and the backs of the hands." ADAMSON gives reference to the pioneer work of FERRER and DUBREUILH on this subject.

Cutaneous cancer is a comparatively common occupational disease, especially affecting the rural population. Labourers of Northern extraction working in Southern climes are more likely to suffer than the Mediterranean races. Agricultural labourers, farm servants, farmers, graziers, bailiffs, and foremen in this country are thus liable to be attacked. It chiefly affects the face. The keratoses

typical of the action of these radiations are not seen in town dwellers. Further, DUBREUILH states that "keratosis solaris" is identical with "keratosis senilis". They are one and the same thing caused by the actinic rays. Old age *per se* has no influence. The keratoses vary in size from a hemp seed to a shilling, and start from a scaly or crusted patch. If the conditions are suitable they lead to multiple epitheliomata. Carcinoma is rare, and keratoses never develop on the darkly pigmented face of the negro (SCHAMBERG).

Figure 3, illustrates a peculiar condition occasionally met with on cattle at the livestock market and which might easily be mistaken at first sight for the simple keratosis described above. In this case the lesion is confined to the region of the face, above the muzzle, and is apparently of traumatic origin. It would appear as if an elongated flap of skin had been cut from above downwards and thus left hanging to heal as an appendage. On the nasal bone thus exposed and firmly attached to it peculiar, hard, horny protuberances may develop, whose exact origin is not easily established.

Whether these injuries are deliberately inflicted to cattle by natives for some particular purpose or whether they are purely accidental is at present uncertain. It is hoped that the subject will be taken up by some of our colleagues who may have the opportunity of seeing this condition first hand.

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On Unusual Pyogenic Condition in Young Lambs.

By E. M. ROBINSON, Dr. Med. Vet. D.V.Sc., F.R.C.V.S.
Onderstepoort.

During May of this year a report was received from a farmer in the Eastern Orange Free State that a number of his young lambs were affected with a condition characterised by the occurrence of large swellings in the submaxillary region from which some had died. He forwarded two of the affected lambs to Onderstepoort for examination. The animals arrived on 21/5/32 and on inspection both showed swellings under the skin of the neck, extending to the chest. The swellings were largest in the throat region, where they were about the size of a tennis ball, becoming less prominent towards the chest. They were soft and fluctuating and appeared to contain fluid and gas. Both lambs were very weak and showed a slight diarrhoea.

One of the lambs, being in extremis, was killed on 23/5/32. At post mortem it was found that the swelling in the throat region was due to a large cavity situated ventral to the cervical vertebrae and extending round both sides of the trachea to the skin. This cavity was distinctly walled off and there were no actual lesions in the skin itself. The swelling lower in the neck was due to oedema. The cavity contained a greenish-grey, turbid fluid and a small amount of gas with a putrid smell. No communication could be found between the cavity and the surrounding tissues.

In the right lung the dorsal portion of the apical lobe was adherent to the thoracic wall and contained a cavity the size of a hen's egg, well demarcated and walled off from the surrounding tissues, and containing a greenish-yellow, semi-fluid material with a putrid odour and a little gas. The wall of the cavity was lined with a greenish-yellow necrotic material.

No communication could be found with the surrounding tissues, but in the thoracic region of the oesophagus at the same level as the cavity there was a small circumscribed thickening of the mucous membrane indicating some previous local injury to it.

Apart from a slight diffuse enteritis there were no other lesions of any importance. There were in the subcutaneous connective tissue a few awns of "steek-gras" (*Aristida* sp.), which had penetrated through the skin.

The second lamb died on 24/5/32 and at post mortem showed in the throat region lesions very similar to those seen in the first lamb; but in this case there were no lesions in the lungs. In the liver, however, in the region of the oesoprageal notch was a small abscess. The throat lesions in this case were more extensive than those described above and a small sinus was found communicating with the pharynx. In the sinus were found pieces of "steek-gras" seed which had obviously penerated from the pharynx. The contents of the cavity, similar to the material found in the first case, were greyish-green, putrid-smelling, and semi-fluid, with a fair amount of gas. Here again a number of "steek-gras" awns were found in the subcutaneous tissues, but had not caused any local pus formation. A slight enteritis was noticed.

This second case gave a clue as to the cause of the condition—apparently an infection of the peri-oesophageal tissues by bacteria carried in through local lesions of the mucous membrane of the oesophagus. These lesions were caused by "steek-gras" seeds which had been smallowed.

In smears of the pus from the lesions in both cases the bacterial flora was seen to be a mixed one in which small Gram-positive coccobacilli predominated. Cultures were made from the pus in the lesions

and a mixed infection of various bacterial types obtained. The predominating organism was a small Gram-positive organism of the diphtheroid type and was obtained in pure culture . It proved to be an organism of the *corynebacterium* species, very closely resembling *B. pyogenes,* one of the commonest causes of pyogenic conditions in cattle, sheep, and pigs. Other bacteria were present in large numbers, and included *B. coli,* streptococci, and a few bacilli of the *Cl. welchii,* type, and others which were not identified.

It is of interest to mention that the late Dr. Neser investigated in young lambs sent to Onderstepoort a number of cases in which small abscesses had formed in the subcutaneous tissues as the result of the penetration of "steek-gras" through the skin. These abscesses were usually caused by a pure streptococcus infection and he was able in some cases to produce the condition artificially.

SUMMARY.

A description is given of a condition in young lambs characterised by the occurrence of abscess cavities in the subcutaneous tissues and lungs, apparently due to infection from the alimentary tract and associated with "steek-gras".

An easy Method for the Preparation of suitable Spleen Smears by Laymen in the Field.

By C. H. FLIGHT, B.V.Sc., Butterworth.

In the Transkeian Native Territories, where only a very small proportion of the enormous number of cattle belong to Europeans, it has now been the practice for a number of years for the native owners to produce either a spleen or a portion thereof, in lieu of a report, for every beast that is slaughtered or dies from any cause.

As the majority of these spleens are handed to native dipping foremen or labourers for the preparation of smears, it is to be expected that a large proportion of such smears would be unsuitable for diagnosis.

With a view to reducing to an absolute minimum the percentage of unsuitable smears submitted from my area, I had time and again personally demonstrated to the foremen various ways of making such spleen smears, with indifferent results, until I introduced the following simple method, which has proved most satisfactory:—

On production of a spleen or a portion thereof, the man taking the smear instructs the owner to make with a knife an incision an inch or two in length into the freshest-looking portion of the spleen, and then to fold the spleen so that the two cut surfaces are everted. A clean glass slide held by its edges with the thumb and finger of the right hand, is then drawn gently but firmly horizontally across

either of the cut surfaces, *once only*. After a little practice, even a very unskilled person will by this means obtain an evenly distributed smear on the under surface of the slide.

Since the introduction, a few years ago, of this method, over 90 per cent. of the smears submitted from some districts in these territories have been entirely suitable for diagnostic purposes.

ABSTRACTS.

Spahlingers' Vaccines for Tuberculosis—Report in Vet. Rec. *Vol. XII, No. 6 (6/2/32).*

For some years a good deal of interest has been shown in the claims made by Spahlinger for his vaccines for use in tuberculosis of man and domesticated animals. Recently the essential lines on which the vaccines are prepared have been made public, but not as yet some of the finer details in the technique.

Two vaccines are made, one for human beings and one for cattle. It is with the latter that the veterinarian is most concerned and briefly its preparation is as follows:—

The medium used is made from bovine body fluids, such as defibrinated blood, serum etc. and is coagulated by heating to 65° C. in a sloped position; fresh, unheated serum or plasma is added to the tubes and allowed to soak in. The cultures are made direct from a bovine lesion without any passage through guinea pigs or culture media. When sufficiently grown the cultures are subinoculated on a fluid medium made of unheated bovine fluids such as plasma or serum and again incubated until sufficiently grown. The cultures then are emulsified in normal saline in the absence of oxygen and stored in ampoules in the dark until the bacilli are all dead. This may take a year. The vaccine is then ready for use.

The object is to obtain the products of the tubercle bacillus and the tissue reaction products without damaging or altering them unnecessarily.

The results claimed for the vaccine in cattle are remarkable and far superior to those obtained with any other vaccine.

The vaccine for human beings is made on similar lines but consists of three separate portions: (1) a bovine vaccine made as above, (2) a bovine vaccine made on human media, and (3) a human vaccine made on human media.

The vaccines are all made on the same lines. The final vaccine for human beings is a mixture of all three in varying proportions according to the nature and stage of the disease.

Spahlinger claims that this method of vaccine preparation can be used for other types of vaccine. It is of interest to note that Calmette, the originator of the famous B.C.G. vaccine for tuberculosis, claims that one has to have living bacilli in a vaccine for this disease if any immunity is to result, and that the immunity is therefore a premunition.

E. M. R.

The Development of Veterinary Bacteriology in South Africa.

E. M. Robinson, *S.A. Jl. Science*, Vol. 29, 1932 (in press).

In his presidential address to Section C of the South African Association for the Advancement of Science at Durban, July 1932, the writer gave a survey of the development of investigation into diseases of animals in South Africa of bacterial origin. In tracing the work from its earliest and scattered beginnings to its present important position, it was shown how the centralization of the investigations at Onderstepoort enabled them to be undertaken systematically. The importance of the subject was recently recognised by the Empire Marketing Board, in their institution of a fellowship at Onderstepoort to be devoted to a bacteriological investigation.

(Author's summary).

Tularemia in Cattle and Sheep—J. C. Geiger, *California and Western Medicine*, Vol. 34, No. 3, 1931.

After giving a brief review of the occurrence of the disease in man in the United States and its geographical distribution, the author describes the distribution in animals. The infection has been demonstrated in squirrels, wild rats, wild mice, quail, grouse, partridge, pheasants, cats, water rats (in Russia), wild rabbits (in the United States and Japan), coyotes, and sheep. Heavy losses have occurred in sheep in Montana and Idaho from this disease. The symptoms in sheep are a high temperature, scouring, high carriage of the head due to swelling of the regional lymphatic glands, stiffness of gait, and a persistent cough. The *B. tularense* was obtained from a number of cases and the sera reacted to the serological test. It is necessary to differentiate from ordinary tick paralysis.

In two groups of cattle on a ranch in California symptoms were seen which could be ascribed to tularemia. Several animals died. The diagnosis in these cases was only partially confirmed, but serological tests were positive in the one case from which material was obtained.

The occurrence of this disease in ruminants has been noted as it is known to be present in Scandinavia and Russia and there is a possibility that it will be encountered in South Africa.

E. M. R.

BOOK REVIEW.

An exceedingly useful and handy addition to the literature on the scientific feeding of all classes of animals has been made by Prof. Linton in his Animal Nutrition and Veterinary Dietetics. (1) For students and also for practical feeders the book should prove of great value since it deals concisely with practically every aspect of the question of dietetics, commencing with an excellent description of the functions of the various food constituents. In this connection it is noteworthy that considerable attention is paid to the function of the mineral constituents of feeds and their relation to disease—a welcome addition to a textbook of this sort. The chapters on the composition of foods include all the materials in common use and are ably supplemented by useful sections on nutritive value, preparation, and storage. The practical hints on the feeding of the various types of farm animals should be found very adequate, since in addition to the requirements of cattle, horses, and pigs for specific purposes, the feeding of sheep, dogs, and poultry also receives attention. The book concludes with a chapter on some harmful foods, and the usual appendices.

The subject matter, although adequate, is handled with a conciseness sufficient to avoid rendering the book bulky. It is written essentially for European conditions and a great deal of the information supplied, notably in connection with the feeding of sheep, would not be applicable to South African conditions. South African students would reap the greatest benefit from those chapters relating to the maintenance of animals under conditions of close confinement. In a word—an excellent book, but one which does not regard the problems of feeding in the light of our peculiar conditions.

R. A.

NOTES AND NEWS.

Mr. Charles Tyler, M.R.C.V.S. has retired from the Service and is at present on holiday in England. He was born on 6/7/77 at Burstem Staffs, and graduated at the London College in 1900. In 23/5/02 he entered the Natal C.V.D. and in 1904 joined the Natal Veterinary Corps, serving in the Natal Rebellion of 1906 with Royston's horse, for which he got a medal. He retired on 6/7/32 and we wish him a safe return and a long life to enjoy his well merited pension.

OBITUARY.

Edward Wilson.

The passing of Edward Wilson, M.R.C.V.S. on June 6th, 1932 has robbed the Veterinary Association of one of its foremost members.

(1) Animal Nutrition and Veterinary Dietetics, by R. G. Linton, M.R.C.V.S.; pp. 399. Edinburgh: Green and Sons Ltd. 21/-.

Born in Ireland in 1882, the late Mr. Wilson caught the war fever of 1899 and although only a lad of 17 managed to get away with the Cape Mounted Rifles and fought with distinction for three years.

Returning to Ireland he immediately commenced his studies for the veterinary profession and on qualitfying in December, 1910 he soon won success. It was only natural that the study of the thoroughbred should attract Mr. Wilson, raised as he was in a horse-breeding centre, and he quickly became one of the foremost authorities in the treatment of bloodstock.

The lure of South Africa was still in Mr. Wilson's blood and when Mr. Ben Runciman, M.R.C.V.S. decided to return to England, Mr. Wilson acquired the practice at Turffontein some nine years ago.

His qualifications were soon apparent and in a very short time he had earned the respect and esteem of a very wide circle in the racing world.

Apart from his very large private practice he was the official Veterinary Officer to the Jockey Club of South Africa, the Johannesburg Turf Club, the Johannesburg Pony & Galloway Club, the Germiston Sporting Club, and the Eastern Districts Sporting Club.

His work on the various race-courses was marked by its impartiality and those of us who know the difficulties surrounding this class of work will readily recognise the integrity of the deceased practitioner. Some years ago Mr. Wilson installed an up-to-date violet-ray apparatus at his veterinary hospital in Booysens and many hopelessly broken-down horses were successfully treated by this method.

The many expressions of sympathy and the large concourse at the graveside were eloquent tributes to the esteem in which the deceased gentleman was held.

To his wife and four young children the loss is an irreparable one and the sympathy of the South African Veterinary Association goes out to them in their hour of bereavement.

Robert Eustace Montgomery.

It is with deep regret that we have to record the death, at the comparatively early age of 52, of Robert Eustace Montgomery. Born in 1880, he graduated from the Royal (Dick) Veterinary College in 1903 and was appointed demonstrator in comparative pathology in the University of Liverpool in the same year. In 1904 he went to Muktesar in India as assistant Imperial bacteriologist and in 1905 was in Canada on special duty. In 1907-09 he and Kinghorn were sent on an expedition from the Liverpool School of Tropical Medicine to investigate sleeping sickness in Central Africa, where they did

very valuable work. Their investigations influenced the appointment of Mr. Montgomery as veterinary pathologist to the East African Protectorate in 1909. There he remained until 1917 and during that period developed a very fine institution at Kabete for the investigation of animal diseases, publishing many valuable reports and original articles. It was his outstanding ability that influenced Sir Arnold Theiler in recommending that he should be appointed to succeed him (Sir Arnold) on his retirement in 1918.

From 1918-1920 he was Director of Veterinary Research in the Union of South Africa and it was during this period that it was the privilege of some of us to meet him or serve under him. He was elected president of the Transvaal Veterinary Medical Association for 1918-19 and 1919-20. In 1920 he became veterinary adviser to the governments of Uganda, Kenya, and Tanganyika, a position which he retained until 1926, subsequently settling again for a time in East Africa in a private capacity. In 1930 he was appointed to the newly created position of Adviser on Animal Health to the Colonial Office, a position to which he was eminently suited and which he retained until his death in June of this year.

During his career he visited the Sudan, Egypt, Argentina, Uruguay, and Brazil in connection with his work and shortly before his death he undertook an extensive tour of Nigeria.

It will be a matter of diculty adequately to replace our deceased colleague, whose life was filled with an unusual wealth of varied experiences. To his widow and children we extend our heartfelt sympathy.

John Peddie.

JOHN PEDDIE (1870-1932). Graduating at the Royal (Dick) Veterinary College in 1893, he came to South Africa as a Civilian Veterinary Surgeon (attached A.V.D.) during the 2nd Boer War. From 15/10/01-15/1/03 he served in the S.A.C. as a Vet-lieut. and was then appointed Municipal Veterinary Surgeon for Johannesburg, which position he left on 13/3/05. From that time until his death he was engaged in private practice, his last address being 96, Siemert Road, Johannesburg.

Not only was he a Veterinary Officer in the Transvaal Volunteers, but on the outbreak of he Great War he proceeded on active service to South-West Africa as a member of the S.A.V.C.

He was for many years veterinarian to the Auckland Park Racing Club and the Witwatersrand Agricultural Society. His death took place at his residence on 5/8/32 and to his relatives we extend our heartfelt sympathy.

JL.S. AFR. VET. MED. ASSN.
III (4) 1932.

PAPERS AND COMMUNICATIONS.

A Study of the Duration of Motility of Spermatozoa in the different divisions of the Reproductive Tract of the Merino Ewe.

By Prof. J. QUINLAN, F.R.C.V.S., Dr.Med.Vet., D.V.Sc.,
G. S. MARE, B.Sc. (Agric.), and L. L. ROUX, M.Sc., Onderstepoort.

INTRODUCTION.

In a previous paper the authors (1932) discussed the vitality of spermatozoa in the genital tract of the Merino ewe, with special reference to its practical application in breeding. During that series of experiments it became apparent that the spermatozoa survived longer in the cervix than in the other divisions of the reproductive tract in the Merino ewe. It appeared that the secretions of the vagina and the divisions of the genital tract cranial to the cervix were in comparison with the cervix definitely unfavourable to the life of spermatozoa. In the cervix alone did the secretion appear to be favourable. It was therefore suggested that the cervix of the Merino ewe acts as a reservoir for spermatozoa where they are maintained under favourable conditions pending ovulation and the arrival of an available ovum in the Fallopian tube.

The present experiments were undertaken to ascertain whether, by isolating spermatozoa in the uterine horns and the Fallopian tubes, an accurate estimate of the duration of their vitality in the different divisions of the reproductive tract could be made; that is, to observe, from the point of view of motility, whether the secretions from the vagina, uterus, uterine horns, and Fallopian tubes act detrimentally as compared with the secretion of the cervix.

LITERATURE.

Although a considerable amount of work has been done on the vitality of the spermatozoon in laboratory animals, especially the rabbit, the guinea-pig, and the rat, the literature is not rich in reference to work done on sheep. No reference can be found to the particular aspect now under consideration, namely the motility of the sperms at different levels of the reproductive tract.

The literature relevant to the vitality of the spermatozoon in the genital tract has been discussed by the authors in the paper referred to above, so that it is considered unnecessary to repeat the discussion in detail here.

Hammond and Asdell (1926) have shown that there is some unfavourable influence on the vitality of rabbit spermatozoa by the female genital secretion. These authors point out that spermatozoa

taken from the male epididymis retain their vitality for three days, while those taken from the vagina of the female after copulation retain their fertilizing power for only 30 hours. Walton, Hammond, and Asdell (1928) found that spermatozoa collected from the epididymis of killed rabbits retained their fertilizing power longer when kept *in vitro* than those collected from the vagina immediately after copulation. Yochem (1929) has studied the life of the spermatozoon in the genital tract of the female guinea-pig and rat during oestrus and also during the interoestrous period. He found that in the guinea-pig sperms artificially inseminated during the oestrous period survived somewhat longer than those inseminated during the interoestrous period. In the case of insemination during oestrus, motility was maintained for 41.5 hours in guinea-pigs and 12.5 hours in rats. The duration of life of the sperms artificially injected during the interoestrous period was 36 hours in the guinea-pig. The sperms of rat semen injected into guinea-pigs survived only 4.5 hours, and guinea-pig sperms injected into rats only 11 hours.

Löw (1902) has observed in the case of rats that the vaginal secretion of the female is unfavourable to the life and the motility of spermatozoa, while the uterine secretion is favourable.

Sabotta's (1895) observations on the mouse have shown that the great majority of the sperms in the uterus are non-motile 6 to 10 hours after coitus. Kugota (1929) made observations on the influence of uterine secretions on the life and motility of the spermatozoa of the mouse during different periods of the oestrous cycle. He concluded that the secretions had different influences at different periods. He says:

> In der zweiten periode wirkt er höchst günstig. Diese Wirkung beginnt schon in der ersten Periode und ist in der dritten Periode plötzlich sehr gering. Diese Einwirkung auf die Lebensdauer der Spermatozoen scheint um so günstiger zu sein, je stärker der Uterussaft konzentriert ist. In der vierten Periode und im Dioestrum können wir weder eine günstige noch eine nachteillige Wirkung finden.

The division into five periods was made by Kugota according to the microscopic appearance of vaginal smears and sections of the vaginal wall.

Hammond (1930) working with rabbits has shown that sperms taken from the vagina and maintained outside the body at different temperatures may retain fertility at 35°C for 14 hours, at 10°C for 96 hours and at 0°C for 16 hours. Walton (1930) also working with rabbits, in co-operation with Hammond, has taken sperms from the epididymis of the male and maintained them outside the body at different temperatures. His results regarding fertility were more or less similar to those of Hammond. Above body temperature the spermatozoa were rapidly destroyed; at 37°C to 40°C the maximal survival

was about 13 hours. There was an increasing prolongation of survival as the temperature was lowered until a maximum of about 7 days at 15°C was reached.

These experiments were done with the object of testing the effects of temperature on spermatozoa, and the work of both authors is confirmatory; but on analysing their results from a point of view of the present work, it is evident that the spermatozoa taken from the vagina by Hammond were less vital than those taken from the epididymis by Walton.

Hutschenreiter (1915) has shown that motility of spermatozoa of the stallion has usually ceased after 4 hours in the vagina of the healthy mares during oestrus, while in the uterus sperms survived up to 10 hours. He found that spermatozoa survived somewhat longer in the vagina during the interoestrous period than during oestrus.

Quinlan, Maré, and Roux (1932) have shown that spermatozoa live longer in the cervix than in the other divisions of the genital tract in the Merino ewe. These authors have further observed that sperms obtained from the ram without having come into contact with vaginal secretion survive longer *in vitro* than sperms taken from the vagina after normal copulation. The maximum time of survival of spermatozoa, taken from the vagina of sheep immediately after copulation and kept in sterile pipettes at room temperature, appears to be about 48 hours; while in semen taken from the same ram without admixture with vaginal secretion and kept under similar environmental conditions, the spermatozoa have survived 56 hours.

In the case of the human sperm it appears to be recognised that the duration of life varies in the different divisions of the female genitalia. Giles (1919) states that spermatozoa in the vagina die within one hour after coitus; in the cervical canal they may be found 2 to 5 days after coitus; in the fundus they are frequently found 24 hours after coitus and occasionally after several days. More cranially, that is in the Fallopian tubes, their normal behaviour is unknown. Haussmann (1879) and Hühner (1913), quoted by Giles, maintain that the life of the sperm in the vagina is not longer than a few hours. Hühner (1913) has shown that living sperms have been found in the cervical canal after 15 to 24 hours only in 11.6 per cent. of cases; after 2 to 5 days in 20 per cent. of cases, and after 1 to 12 hours in 45.9 per cent. of cases. The same author's examinations for sperms in the uterus have shown living spermatozoa in 27 per cent. of cases after 1 to 12 hours; in 16.7 per cent. after 15 to 24 hours, and in 6.3 per cent. after 2 to 7 days.

METHOD.

The work was carried out during the months of November, 1931 and February, 1932, at the School of Agriculture, Middelburg, Cape

Province. The rams used, namely W.31, T.413, and T.417, had been extensively employed by the authors in previous experiments (1931, 1932). Their fertility records were known to be highly satisfactory, as is shown in Table II. They were in good, hard, breeding condition during the time these observations were being carried out. The ewes were full-mouth sheep selected from the flock at the School. They were in good breeding condition and appeared to be clinically normal. Their previous breeding record was known.

The ewes were tested twice daily for oestrus, at 6 a.m. and 5 p.m., with vasectomised teasers.

Only sheep which allowed copulation without restraint were used for observation. The sheep to be used were brought to the Laboratory immediately before service was allowed. Three services were allowed each ewe. The services followed in rapid succession and were completed in less than 15 minutes. Immediately afterwards the ewe was caught and the hind extremity elevated. Two samples of semen were withdrawn in sterile pipettes, which were introduced along the ventral wall of the vagina to its cranial extremity. The amount of semen collected varied from about 1 to 1.5 cc. in each pipette.

After collection of the semen the sheep were taken to the theatre for operation. The wool had been shorn from the left flank prior to service, so that as little time as possible was lost between copulation and actual insemination into the uterus and Fallopian tubes. When observations were first begun several sheep were operated upon after copulation before withdrawal of the semen. The vulvar lips were clamped to retain the semen during operation. The ejaculate was withdrawn only when the uterus was exposed. All these results have been disregarded in this series of observations, as it was considered that the semen had been too long in contact with vaginal secretion before final injection into the selected site in the genital tract, namely, the apex of the uterine horn and the Fallopian tube.

The sheep were anaesthetised by an intrajugular injection of chloral hydrate (10 per cent. in .9 per cent. saline solution). The amount of chloral hydrate injected was graduated according to the weight of the sheep. This method of anaesthesia is highly successful and has been used very extensively in this country for major surgery in sheep—[De Kock and Quinlan (1927); Quinlan, Maré, and Roux (1930)].

The genital apparatus was exposed through a laparotomy in the left flank. The left uterine horn and left Fallopian tube were withdrawn. At first the intention was to isolate the left horn and the left tube by ligation and subsequent section. After a couple of trials, this method of operation had to be abandoned as impracticable. In the case of the tube the operation produced no pathological change in

the mucosa, but the horn, as a closed sac (having been ligated and sectioned cranially and caudally) became filled with fluid so that the environment of the sperms between injection and examination could not be regarded as normal. This procedure had to be modified so that the normal conditions of the right side of the genital tract, which was used as a control, were simulated as closely as possible. The left tube was caught close to the uterine extremity in a small artery forceps and crushed. It was ligated with fine silk on either side of the forceps. The forceps was then removed and the tube sectioned in the crushed area. During the application of the ligatures care was taken not to include any blood vessels in the mesosalpinx.

The semen was now transferred to the tube by introducing the pipette deeply into it through the abdominal ostium and blowing out the semen. The introduction of semen into the horn was done by puncturing the left horn close to its apex with the point of the pipette. The semen was then blown into the lumen of the horn.

The semen was in every case controlled microscopically for activity of the spermatozoa at the time of injection. Further it was retained and examined from time to time for survival of the sperms *in vitro*. After injection of the semen the uterus was replaced in position. The laparotomy wound was closed by suturing the peritoneum and muscles with No. 1 cat-gut, and the skin with No. 2 suture silk. The sheep were then placed in a shed to await the time of observation. All the sheep had fully recovered from the effects of anaesthesia after 3 hours.

The sheep were killed by bleeding at intervals of 6, 9, 12, 15, 18, and 24 hours after operation. The abdomen was opened through a prepubic mid-ventral incision and the different compartments of the genitalia immediately clamped off with suitable forceps so as to prevent wandering of spermatozoa on the right or control side of the reproductive tract after death of the animal. The genitalia were not removed from their attachments. The different divisions were then opened, fresh preparations were made on glass slides and immediately covered with a cover slip. The microscopical observations for living sperms were all carried out in the natural secretion.

The preparations were immediately submitted to microscopical examination for living spermatozoa. Smears were also made and later examined for morphological changes.

It is realised that this method of examination presents disadvantages since it does not simulate the normal environmental conditions within the genitalia. However, there was little chance of sperms which were alive at the time of slaughter failing to survive the short interval between the death of the sheep and microscopical examination. It is taken, therefore, that dead sperms seen on microscopical examination of fresh preparations were actually dead before the secretions

containing them were removed from the genitalia. The examinations were done at the Grootfontein School of Agriculture at room temperature, which varied between 72°F. and 84°F.

The results of the experimental observations are summarised in Table I. They are, however, of sufficient interest to discuss in some detail first.

The sheep used for observation of the spermatozoa six hours after operation were about 24 hours in oestrus when served. The ovary had not ovulated at the time of slaughter.

Living sperms were found in all divisions of the genitalia both on the operated and control sides. There was, however, a greater percentage of living sperms in the control side: in the horns 68 per cent. as compared with 44 per cent., and in the tubes 40 per cent. as compared with 21 per cent. In the vagina only about 10 per cent. of the sperms were motile. In the cervix spermatozoa were very plentiful; about 55 per cent. being motile. The *pars indivisa* of the uterus contained relatively few sperms in comparison with the cervix; 71 per cent. were motile.

The sheep used for observation of the spermatozoa nine hours after insemination was about nine hours in oestrus when served. The ovary had not yet ovulated at the time of slaughter. Sperms were numerous in the vagina; about 50 per cent. were motile. Sperms in the cervix were also very numerous, 90 per cent. being motile. A few motile sperms were seen in the *pars indivisa*. A few non-motile sperms were seen in the control horn; no motile sperms were seen. Spermatozoa were very rare in the operated horn; only two intact sperms were seen of which one was sluggishly motile. No sperms were seen in the control Fallopian tube. Sperms were rare in the operated tube, only about 5 per cent. of those seen being motile. The explanation of the rarity of spermatozoa in the cranial divisions of the genitalia appears to be that they had not yet gone forward from the cervix.

The sheep used for observation of the spermatozoa 12 hours after insemination was about 22 hours in oestrus at the time of service. The ovary had not yet ovulated at the time of slaughter.

No spermatozoa were seen in the vagina; some disintegrated remains were present. Sperms in the cervix were very numerous; about 40 per cent. were motile. In the *pars indivisa* of the uterus sperms were infrequent; about 58 per cent. were motile. In the control horn sperms were infrequent; about 70 per cent. were motile. Sperms were difficult to find in the operated horn; only two motile sperms were seen. In the normal tube spermatozoa were infrequent, but about 90 per cent. of those seen were motile. No motile sperms were present in the operated horn; a few non-motile intact sperms were present.

The sheep used for observation of the spermatozoa fifteen hours after insemination was about 13 hours in oestrus at the time of service. The ovary had not yet ovulated at the time of slaughter.

About 2 per cent. of the sperms seen in the vagina were sluggishly motile. Spermatozoa in the cervix were very numerous; about 93 per cent. were motile. In the *pars indivisa* sperms were fairly numerous, about 50 per cent. being motile. In the normal horn spermatozoa were fairly frequent; about 25 per cent. were motile. A few non-motile sperms were seen in the operated horn; no motile sperm was seen. Sperms were rare in the control tube; only two motile sperms were seen. A few dead and disintegrated sperms only were seen in the operated tube.

The sheep used for observation of the spermatozoa eighteen hours after insemination was about 16 hours in oestrus at the time of service. The ovary had not yet ovulated at the time of slaughter.

Disintegrated sperms were seen in the vagina; one very sluggishly motile sperm was seen. Spermatozoa were numerous in the cervix; about 47 per cent. were motile. There was no difference in the frequency of the sperms in the control and operated horn; motility was sluggish in those seen which were still alive. In the control horn sperms were infrequent; only one of those seen was motile. Sperms were infrequent and mostly non-motile in the operated horn; one motile sperm was seen. Some non-motile sperms were seen in the normal tube. Only disintegrated remains were present in the operated tube.

The sheep used for observation of the spermatozoa twenty-four hours after insemination was about 14 hours in oestrus at the time of service. The ovary had ovulated at the time of slaughter. No spermatozoa were present in the vagina or in the divisions of the genitalia above the cervix. In the operated horn and tube there was no trace of spermatozoa. Sperms were fairly frequent in the cervix—about 10 per cent. showing motility.

A control operation was performed on sheep O.312, Table I, to ascertain if anaesthesia and puncture and insertion of the pipette into the tube and horn without ligature would have any detrimental effect on the genitalia and consequent unfavourable influence on the spermatozoa. The sheep used for this observation was about 17 hours in oestrus at the time of insemination. The ovary had not yet ovulated at the time of slaughter 18 hours later.

There was one motile sperm seen in the vagina. Sperms were frequent in the cervix, 70 per cent. being motile. In the *pars indivisa* the sperms were not nearly so frequent as in the cervix; about 40 per cent. were motile. The spermatozoa in the genitalia cranial to the *pars indivisa*, were equally numerous on the operated and control sides, just under 50 per cent. showing motility.

Table I shows in summarised form the results of the observations.

TABLE I.

Ewe No.	Period in oestrus when served.	No. of services.	Rams used.	Time elapsed since service and operation.	How examined.	Compartment of Genitalia examined.						
						Vagina.	Uterus.				Fallopian Tubes.	
							Cervix.	Pars indivisa.	Normal horn.	Operated horn.	Normal.	Operated.
311	±18 hrs.	3	W.31 x 1 T.413 x 1 T.417 x 1	6 hours (not ovulated).	F	† (10%)	††† (55%)	††† (71%)	††† (68%)	†† (44%)	†† (40%)	†† (21%)
					S	*	*	*	*	*	*	*
88	±9 hrs.	3	W.31 x 1 T.413 x 1 T.417 x 1	9 hours (not ovulated).	F	††† (50%)	†††† (90%)	Only few sperms, some motile.	Sperms very rare, no motile sperm seen.	Sperms very rare, two intact, one non-motile.	—	† (5%)
					S	*	*	*	*	*	*	*
259	±22 hrs.	3	T.413 x 1 T.417 x 2	12 hours (not ovulated).	F	o	†† (40%)	††† (58%)	††† (70%)	Sperms very rare, 2 seen.	†††† (90%)	o
					S	—	*	*	*	*	*	—
239	±13 hrs.	3	W.31 x 1 T.413 x 1 T.417 x 1	15 hours (not ovulated).	F	† (2%)	†††† (93%)	††† (50%)	†† (25%)	o	Very rare, two seen.	o
					S	*	*	*	*	*	*	* (disintegrated remnants).
96	±16 hrs.	3	W.31 x 1 T.413 x 1 T.417 x 1	18 hours (not ovulated).	F	One sperm showing slight motility.	†† (47%)	Sperms very rare, few sluggishly motile.	One motile sperm seen.	One motile sperm seen.	o	o (disintegrated remnants).
					S	*	*	*	*	*	*	—
292	±14 hrs.	3	W.31 x 2 T.417 x 1	24 hours (ovulated).	F	—	†	—	—	—	—	—
					S	—	*	—	—	—	—	—
312	±17 hrs.	2	T.413 x 1 T.417 x 1	18 hours (not ovulated).	F	—	†††	††	††	††	††	††
					S	—	*	*	*	*	*	*

††† 75 to 100 per cent. motile.
†† 50 to 75 per cent. motile.
† 25 to 50 per cent. motile.
† 1 to 25 per cent. motile.
o non-motile sperms only.
— No sperms seen.
* Sperms seen in stained preparations.
F Fresh preparations.
S Stained preparations.

Table II shows the breeding records of the three rams used for obtaining spermatozoa:

TABLE II.

Ram No.	First Service				Second Service.				Third Service.				All Services.			
	No. served.	No. fertilised.	No. not fertilised.	Percentage fertilised.	No. served.	No. fertilised.	No. not fertilised.	Percentage fertilised.	No. served.	No. fertilised.	No. not fertilised.	Percentage fertilised.	No. served.	No. fertilised.	No. not fertilised.	Percentage fertilised.
T.413	26	22	4	84.6	2	2	0	100					26	24	2	92.3
T.417	23	19	4	82.6	2	1	1	50					23	20	3	87.0
W.31	25	19	6	76.0	6	5	1	83.3	1	1	0	100	25	25	0	100.0
Total:	74	60	14	81.0	10	8	2	77.7	1	1	0	100	74	69	5	93.1

Discussion.

From the literature available of work done on laboratory animals, namely the rabbit, guinea-pig, and the mouse, it appears that non-specific genital secretions have a definite detrimental influence on the life of spermatozoa [Yochem (1929)]. Further it appears that admixture with female genital secretions curtails the duration of fertilising vitality and the duration of motility of the sperm as compared with contact with the male secretion [Hammond and Asdell (1926); Walton, Hammond and Asdell (1928)].

The female genital secretions are more favourable to spermatozoa during oestrus than during the interoestrous period. The unfavourable influence of the secretions of the vagina in comparison with the secretions of the uterus on the motility of sperms has been noted by Löw (1902) in the case of the mouse and Hutschenreiter (1915) in the case of the mare. Kugota (1929) has shown that the secretion of the uterus has a varying influence on the spermatozoa at different periods during the oestrous cycle.

There appears to be no doubt, in the case of sheep, that the sperm does not as a rule survive contact with vaginal secretion for more than 12 hours. Occasionally isolated motile sperms may be seen up to 18 hours or even 24 hours following coitus, but this is exceptional. Spermatozoa in the cervix survive up to 48 hours. This indicates that there is a different influence in the different compartments [Quinlan, Maré, and Roux, (1932)], which in one division is more favourable to spermatozoon life than in the others.

In the case of the human species the summary of Giles (1919) indicates that sperms survive longer in the cervix than in the uterus and vagina.

The literature is scanty in references to the influence of genital secretions on spermatozoa when their survival in the different divisions of the reproductive tract is studied. The point is, however, not without practical importance in breeding.

If, as the authors suggest, the cervix is the natural habitat of the spermatozoa in the ewe, while awaiting the arrival of an available ovum, a healthy condition of this portion of the reproductive tract is of the utmost importance in conception. Cervicitis does not appear to be a common condition in sheep, but its incidence in cattle is frequent. The uterine cervices of the bovine and the ovine have an anatomical similarity and it is highly probable that both perform similar physiological functions in relation to the spermatozoa.

It is evident from the previous work of Quinlan, Maré, and Roux (1932) that the vagina is not the natural habitat of the spermatozoa of the ewe after copulation. They lose motility within a few hours

in this part of the genital passage. The vagina appears to act only as a portal of entrance to the *os uteri.*

The cervix would appear to be the portion of the female reproductive tract physiologically adapted to act as the natural habitat of spermatozoa awaiting the arrival in the Fallopian tube of an ovum available for impregnation. Its secretion appears to be highly favourable to the life of the sperms. They remain numerous and active in this division even up to 48 hours after copulation.

It appears, in view of the relative infrequency of spermatozoa in the *pars indivisa* of the uterus, the uterine horns, and the Fallopian tubes, that the cervical reservoir is called upon for a constant small supply of sperms as long as any survive there. From the observations made in a very large number of ewes there appears to be no swarming forward of sperms to the tubes following copulation.

The results of the present series of experiments indicate that sperms which become located in the uterus, uterine horns, and the Fallopian tubes do not survive longer than 10 to 12 hours in these situations. If the uterine horns and tubes were the natural habitat of sperms why do not those placed there and isolated remain alive for longer than 10 to 12 hours?

So far as one can see there results from the operation no pathological change in the genital tract to account for the rapid death of spermatozoa transferred to the Fallopian tube and uterine horn, compared with those from the same ejaculation which become located in the cervix.

It is maintained that the few live sperms which were found in the operated horn after the 12th hour are not any remaining from those injected into its apex, but rather some which have come forward from the cervix, similar to the condition prevailing on the non-operated, control side. That the operation of manipulation and injection is harmless is definitely proved in the case of the control experiment on sheep 0.312, Table I, where the conditions in both sides of the genitalia were similar at slaughter, 18 hours after insemination.

Conclusions.

1. A study has been made of the motility of the spermatozoa of three highly fertile rams in the different divisions of the reproductive tract of normal Merino ewes.
2. The end-point of motility of spermatozoa in the vagina appears to be about 12 hours. The majority have ceased to be motile before the 12th hour; very occasionally sluggishly motile sperms are present up to 18 and even 24 hours.
3. Spermatozoa may be numerous and actively motile in the cervical canal 24 hours after copulation.

(The present series of experiments extended only to the 24th hour, but previous experiments carried out by the authors (1932) have shown that living spermatozoa may be found in the cervix 48 hours after copulation).

4. Spermatozoa injected into the lumen of the apex of the uterine horn do not survive contact with the uterine secretion for more than 12 hours: in fact the end-point of motility appears to be about the 9th hour.
5. Spermatozoa injected into the isolated Fallopian tube through its ovarian opening do not retain motility for more than a few hours; 21 per cent. were motile after 6 hours; 5 per cent. after 9 hours; no motile sperms were seen after 12 hours.
6. The secretion of the vagina is unfavourable to the motility of spermatozoa.
7. The secretion of the cervix is more favourable than that of the other divisions of the genitalia to the life of spermatozoa.
8. The secretion of the uterus and Fallopian tubes is unfavourable to spermatozoa artificially transferred to these situations without passage through the cervix.
9. The cervical canal appears to be the natural habitat of spermatozoa while awaiting the arrival of an available ovum; small numbers of sperms are constantly passing through the uterus to the uterine horns and the Fallopian tubes. Under favourable conditons the cervix acts as a depôt for spermatozoa from which there is a constant issue of actively motile sperms to the cranial divisions of the reproductive tract.
10. The injury to the Fallopian tube and uterine horn by the operation did not prevent sperms from acting normally, as shown by a control operation following normal copulation.

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NOTES AND NEWS.

Mr. A. F. Harber has been appointed to the position of veterinary surgeon to the Durban Municipality made vacant by the appointment of Mr. W. A. Dykins, M.R.C.V.S., as Director of the Municipal Abattoir. Mr. Harber was formerly a Government Veterinary Officer (1897-1920) but retired to take up private practice.

Major F. C. Gavin has succeeded the late Mr. E. Wilson as veterinary surgeon to the Johannesburg Turf Club. Major Gavin was, up to 1928, Superintendent of Sanitation to the Johannesburg Municipality and since his retirement has remained in the city, having taken over the vaccine agency controlled by the late Major S. I. Johnston.

The undermentioned volumes (belonging to the Association) have been placed in the library of the Division of Veterinary Services, Onderstepoort:—

(a) Bills pertaining to legal standing of veterinary profession (all pre-Union Colonies). Catalogue No:-Cl. 20. J. No. 5.

(b) Minutes T.V.M.A. Catalogue No:-Cl. 27. Z. 294.

(c) Minutes S.A.V.M.A. Catalogue No:-Cl. 27. Z. 318.

Those desirous of studying the recent history of the profession in South Africa will find the above references most useful.

JL. S. AFR. VET. MED. ASSN.
III (4) 1932.

A Diphtheroid Organism showing acid-fast Properties in Milk Smears.

By G. MARTINAGLIA, D.V.Sc., Johannesburg.

INTRODUCTION.

At the suggestion of Col. James Irvine-Smith, Director of the Johannesburg Abattoir and Livestock Market, the author undertook a bacteriological examination of milk from abnormal udders of cows supplying milk in the Municipal area. Milk was taken from all asymmetrical udders with due precautions as to sterility and the centrifuged sediment was examined for tubercle and other bacteria.

In the course of this work small Gram-positive bacilli, generally occurring in groups in an amorphous background, were often noticed in the milk smears. Among these, acid-fast organisms were occasionally seen which at first appeared to be leading a symbiotic existence with the non-acid-fast. Cultural work, however, subsequently revealed that all these organisms belonged to the diphtheroid group in which an acid-fast and non-acid-fast phase appeared as a peculiarity.

During further study of this organism, Herrold's agar-egg-yolk medium was found to be the most favourable for cultivation. It was observed that single colonies picked up and placed in milk or litmus-milk grew in mixed groups of acid-fast and non-acid-fast bacilli showing a close morphological resemblance, especially between the third and fourth day of incubation. Those occurring in the lighter areas of the smear, rich in fat globules, showed a greater tendency to acid-fast properties. These organisms failed to show acid-fast properties when cultivated on the other media in my possession. Staining was done by the Ziehl-Nielsen method; decolorizing with 20% sulphuric acid or alcohol containing 3½% hydrochloric acid.

The organism was encountered not only in asymmetrical udders, but also in a large proportion of apparently normal ones. In some cases this diphtheroid was abundant and could often be cultivated on Herrold's medium in pure culture directly from the centrifuged milk sediment.

In the perusal of the literature at my disposal, I found that references to acid-fast bacilli in freshly drawn milk were scanty. Rabinowitch (1897) and others have done pioneer work in this direction, but evidently much remains to be done on the systematic bacteriology in this field in general and on the acid-fast saprophytes of the udder in particular.

Albiston (1930) at the University of Melbourne, recorded valuable observations on acid-fast saprophytes of milk with special reference

to their pathogenicity for guinea pigs. All his isolations, however, were made from lesions produced in these animals by the injection of the centrifuged sediment from market milk samples. He also observed acid-fast bacilli in milk from five individual cows. The milk was drawn under sterile precautions, but no cultural data or guinea pig inoculation results are given. It would be interesting to establish definitely whether the lesions produced in guinea pigs were engendered by udder saprophytes or by some extraneous milk-borne acid-fast bacilli. Albiston did not type the strains isolated, but found they could be grouped into two main classes and concludes: "Where the detection of tubercle bacilli in milk is made by guinea pig inoculation, these saprophytic acid-fast bacilli are liable to cause confusion, especially where lesions of lymphatic glands are found in milk inoculated guinea pigs."

The organism here described differs greatly from the A strain tabulated by Albiston. It differs from his tabulated B strain as follows:—

(1) Shows no acid-fast properties on glycerine agar.

(2) Shows no chromogenesis.

(3) Fails to grow on glycerinated potato.

(4) Produces no lesions in small laboratory animals.

In Bergey's (1923) "Determinative Bacteriology" there appears the description of a corynebacterium isolated from milk drawn directly from the udder; this is designated *C. bovis*, but no mention is made as to whether this organism has acid-fast properties. Furthermore, this diphtheroid differs from the one under discussion in a few essential biochemical features.

Although aberrant strains are frequently encountered, the diphtheroid here described is the one most commonly found among dairy cows supplying milk to Johannesburg. One type occasionally found is a chromogenic saccharose fermenter with no apparent acid-fast properties in milk.

During the course of this work three freshly isolated strains of *C. ovis* and one of the common human diphtheroid, *C. hoffmannii*, were transferred to milk media and incubated, but no acid-fast staining tendency could be demonstrated in smears subsequently made from these cultures.

Bacteriological Features.

Morphology: In milk as drawn from the udder, the organisms appear as short rods, often barred, fairly uniform in size, usually straight, but occasionally curved and slightly pear-shaped. In stained preparations of the centrifuged sediment their measurements vary from 0.4 to 0.5 by 1.0 to 1.5 microns. Club-shaped and irregular

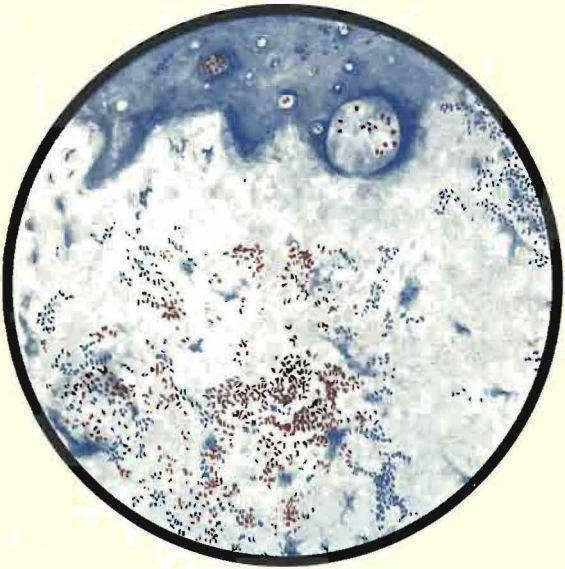

FIG. I.

Selected fields of four-day old milk cultures.
Note acid-fast and non acid-fast stages.

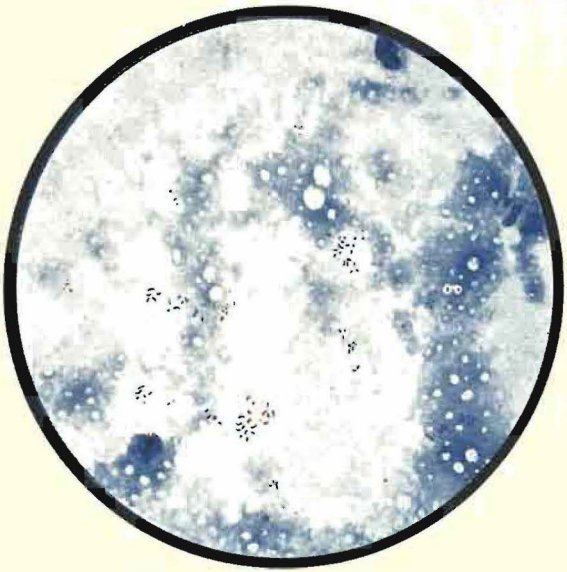

FIG. II.

Selected fields from centrifugalized sediment. (milk direct from udder). Note acid-fast and non acid-fast stages of the organism.

beaded forms are noted, particularly in Hiss' serum water and glycerinated agar.

Motility: No motility was observed.

Staining Reaction: The organism is Gram-positive. Pugh's stain shows the presence of many irregular metachromatic granules.

Cultural appearances: Herrold's agar-egg-yolk medium: Good growth during the first 24-72 hours. Large circular colonies having a mulberry, cone, or concentric ring appearance are generally noted. The colonies are easily broken and have a tendency to adhere to the substratum as they grow older. Confluent growth shows a heavy wrinkled appearance in older cultures, especially near the condensation water which remains clear with a deposit at the bottom. A pellicle similar to a primary tubercle growth sometimes develops on the condensation fluid.

Plain agar: Faint irregular colonies, slightly raised, of a dull, dry appearance are noted after 48-72 hours growth.

Glycerine agar: Very fine colonies, slightly raised and of dull colour are seen after 24-48 hours incubation; they are not as dry in appearance as those on plain agar.

Blood agar: Fine, slightly raised colonies are seen after 24-48 hours growth; no haemolysis is produced.

Serum agar: Growth confluent, whitish, soft and shiny.

Löffler's serum medium: Moderate, smooth, shiny growth after 24-72 hours. The colour varied from white to light cream. Medium not liquified.

Potato slant: No visible growth on glycerinated and non-glycerinated potato media.

Gelatin stab: No visible growth or liquefaction noted.

Glycerine broth: Medium remains clear, but a slight sediment settles in the bottom of the tube. When agitated this growth breaks up into fine granules. No pellicle formation observed.

BIOCHEMICAL PROPERTIES.

Litmus milk: becomes slowly acid and is not coagulated. After a week's growth a light cream coloured deposit generally settles at the bottom of the tube.

Indol is not produced.

Nitrates are not reduced to nitrites.

Sugars: Hiss' serum water containing 1% sugars with Andrade's indicator, after 6-14 days incubation, shows a moderate fermentation

of glucose, slight fermentation of galactose and laevulose, and very faint fermentation of lactose (some strains not changing latter at all).

GROWTH AND VIABILITY.

The optimum temperature is 37°C, but growth also takes place at room temperature. Centrifuged milk sediment treated for 10 minutes with 4% sodium hydroxide still produced scattered colonies on Herrold's medium after three to four days incubation. The organism was still viable after six weeks on Herrold's medium kept at room temperature.

PATHOGENICITY.

No lesions or untoward effects were produced in guinea pigs or rabbits injected subcutaneously and intraperitoneally with 0.5 cc. emulsion of a 48 hours old, recently isolated, pure culture of the organism.

CONCLUSIONS.

This organism is of common occurrence in the milk of dairy cows inspected. It is not pathogenic to small laboratory animals and appears to be a harmless saprophyte of the udder. It is of more than academic interest. It is of importance to the public health inspector inasmuch as it may be confused with the *Mycobacterium tuberculosis* or with *Corynebacterium pyogenes*, a diphtheroid so often associated with suppurative mastitis in the cow.

On morphological and cytological grounds, the experienced worker should have little difficulty in distinguishing it from *M. tuberculosis*. The diphtheroid under discussion is shorter and is not associated with the epithelioid cell-grouping of tuberculous udders as described by Torrance (1927).

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ACKNOWLEDGEMENT.

I desire to place on record my indebtedness to Sir Spencer Lister, Director of the South African Medical Research Institute, Johannesburg, for the facilities offered and to Dr. Becker of the same Institute for his generous assistance.

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The Veterinarian and the Law. V.

By C. P. BRESLER, M.A., LL.B., Pretoria.

RESPONSIBILITIES OF THE VETERINARIAN.

Pursuing the policy of narrowing down from the general statement of the law that which might be useful or interesting to the veterinarian, we come now to those cases in which the veterinary surgeon might find himself involved in the law.

The mere fact of registration as e.g. in Natal, Section 15, etc., Act 21 of 1899, as a veterinary surgeon is in itself a representation that the practitioner possesses the requisite knowledge and skill for the practice of his profession, and if he undertakes the treatment of an animal, even gratuitously, it is expected of him to make use of this skill. He is expected to show a reasonable amount of knowledge and skill, and where he falls short of this, he will be liable in damages. If, however, the veterinary surgeon professes to be a specialist in some particular branch of medicine or surgery, a higher degree of competence and skill will be expected of him. Normally a veterinarian does not undertake, any more than a doctor, that he will perform a cure, nor to employ the highest possible degree of skill. Where a plaintiff alleges negligence on the part of the veterinarian, the onus lies on him (plaintiff) to prove that the surgeon acted as no intelligent and properly qualified man would have done, and did not exercise a reasonable degree of skill.

It is necessary here to interpolate a few words on liability for the acts of servants and assistants. The rule has now been laid down by the Appellate Division that a master is liable to a third party for the act of his servant, if the act was done in the course of his employment, and while the servant was about the business of his master, even although the act was unlawful, such as trespass, or assault; or even an act specially prohibited by the master. *Est. v.d. Bijl v. Swanepoel '27 A.D.*

Following this decision, and the practice in England, a veterinary surgeon is liable for the negligent acts of his servant or assistant, whether qualified or unqualified, including his pupils, in the ordinary course of their duties. A qualified assistant, however, is also personally liable, and an action may be brought against principal, assistant, or both. A master is also liable to a servant who is injured as the result of the master's negligence in requiring him to work in dangerous conditions not appreciated by the servant. And a master who authorises or approves a dangerous procedure is in the same

position towards the injured servant as if he had specially ordered it. *Thomson v. Everitt 1921 E.D.L. 9.*

An employer wishing to rely on the defence that his injured servant voluntarily subjected himself to risk must show that the risk was known, and actually appreciated by the servant. *Waring and Gillow v. Sherborne 1904 T.S. 340.*

The various aspects of the work of a veterinary surgeon which might lay him open to a suit for damages on the ground of negligence require particular mention.

I. Operations. The rule in human medicine that life is to be saved at all costs does not apply in veterinary practice, so that, wherever possible, the sanction of an owner must be obtained before operating on an animal. Only where getting into touch with the owner is impossible, the veterinarian may proceed to do what he thinks the owner would desire; and if he does so honestly, he will not be in danger should an action follow.

If an accident should occur during an operation, and the patient be injured to the detriment of the owner, the veterinarian will only be liable if the owner can prove the want of the reasonable skill referred to above. *Mitchell v. Dixon 1914 A.D. 519.*

II. Certificates. Even in giving a certificate of soundness, the veterinary surgeon may, by neglect, render himself liable to an action for negligence. To undertake the examination of a horse or other animal for soundness, is to undertake to protect the client from loss, by ascertaining for him, and stating in writing, the real state of its health, and its fitness for the work, special or general, which may be required of it. As reliance is obviously placed on such certificate by the intendant purchaser, it is necessary for the practitioner issuing it to observe the greatest care and skill in testing the animal. The responsibility is continuing, and liable to be tested at any future date if the animal proves unsound. If litigation follows, and it is proved that there was gross neglect of the usual methods of examination, such as would not be permitted by any properly qualified veterinary surgeon, the practitioner will be held liable in damages for any loss to a person by reason of reliance being placed in his certificate. Also in giving these certificates, fees must not be accepted from the seller of the animals, as well as from the buyer, as the taking of fees from the former renders the practitioner the agent of the seller, which invalidates the certificate and hence the sale. *Shipway v. Broadwood 1899, 1. Q.B. 369.*

Again, where a practitioner has counselled the commission of an offence which is punishable—(i.e. by giving a certificate that a horse was free from pain, and fit for work, when in fact it was in great

pain), he may be convicted on a charge of having himself committed the offence as principal offender. *Benford v. Sims 1898 2 Q.B. 641.*

The same applies to certification where the slaughtering of injured animals is in question.

The veterinary surgeon's certificate may have the effect of a warranty on the sale of an animal, which might be either express or implied. If there is anything defective, an action for breach of warranty might follow, in which case the practitioner's methods would be harshly dealt with. In order to save trouble, many practitioners use printed forms for their certificates, which precludes their being read as warranties.

The points to be kept in mind with regard to the signing of certificates are, therefore:—

(a) the desirability of doing so only after the making of careful and conscientious examinations.

(b) the necessity of reading them carefully before signing. If any clause cannot be subscribed to, it is better struck out, or the reservation must be appended.

(c) the necessity of taking and filing copies of all certificates given, with a careful record of identity marks.

By the rules of the Royal College of Veterinary Surgeons any member who has signed, or given his name or authority to any certificate which is untrue, or misleading, or dealing with matters which have not received his personal attention, for use in a Court of Justice or for administrative purposes, is liable to be called upon to show cause why his name should not be removed from the register for unprofessional conduct.

III. Boarding of Animals. As it is usual for veterinary surgeons to house the animals receiving treatment, and also often without treatment, it is wise to have a grasp of the legal relationship which arises.

When an animal is delivered to a person by the owner, or an undertaking made by the former to care for it for a fixed period, the transaction is called a *bailment;* the owner being the *bailor* and the receiver the *bailee.* It becomes then the bailee's duty to take such care of the animals as a diligent and prudent man would take of his own property. But it would be safe to suggest that the bailee be strict in the observance of every duty that may be expected of him.

This entails proper accommodation which must be kept clean and wholesome, free from infection, and properly latched. Care should be taken to examine every animal on arrival, noting apparent symptoms

of illness, injury, or defect. These should be communicated to the owner and noted in the reception book.

In dealing with bailment, it is necessary to notice that the test of criminal liability for failure on the part of an owner of stock to report the existence of disease in terms of Section 9 (2) of Act 14 of 1911 is:—Did the owner at the time of the alleged offence have the control or not of the stock? The person who has the physical custody and management of the stock has the "control" and is the "owner" in terms of the definition contained in the Act. *R. v. Harvey 1913, T.P.D. 602. R. v. Conradie 1920 O.P.D. 46.* In case of such disease care must be taken that no other animals are infected, as the bailee throws himself open to actions for damages for his negligence in this matter as does the owner of the animals.

IMPORTANT.

Members are earnestly requested to keep the Hon. Secretary-Treasurer informed of any changes in their addresses. Circulars, voting papers, the Journal, etc., are mailed according to the list of addresses in the Secretary's office and unless this is kept up-to-date by members themselves, delays are liable to occur.

It is proposed to hold the next International Veterinary Congress at New York during the week 13-18 August, 1934. Any members of the S.A.V.M.A. who can be present are asked to communicate with the Hon. Secretary-Treasurer.

JL. S.AFR. VET. MED. ASSN.
III (4) 1932.

New Strongylid Nematodes of Antelopes (Preliminary Notes).

By H. O. MONNIG, B.A., Dr.Phil., B.V.Sc., Onderstepoort.

Full descriptions of the following parasites will be published in the next Report of the Director of Veterinary Services and Animal Industry, Union of South Africa.

Trichostrongylus thomasi, n. sp.

(Measurements in mm.)	Male.	Female.
Length	4.19-5.3	4.2-5.6
Breadth	0.094-0.108	0.082
Width of head	0.011	
Oesophagus length	0.82-0.92	
Spicules length	0.229-0.236	—
Gubernaculum length	0.13	—
Tail length	—	0.07-0.11
Vulva from posterior extremity	—	0.92-1.19
Ovejectors each	—	0.21-0.26
Eggs	—	0.071-0.078x0.037

This species is characterised by its small size, the spicules which are slightly curved and without dorsal hook-like projections, a long postero-lateral ray and finger-like projections to the latero-ventral and antero-lateral rays.

HOST: Impala (*Aepyceros melampus*).
LOCATION: abomasum.
LOCALITY: Transvaal.

Bigalkea sabie, n. sp.

(Measurements in mm.)	Male.	Female.
Length	8.19-8.82	11.07-15.7
Breadth	0.1-0.12	0.124
Width of head	0.034-0.04	
Oesophagus length	0.69-0.8	0.75-0.86
Spicules length	0.16-0.176	—
Gubernaculum length	0.07	—
Tail length	—	0.165-0.2
Vulva from posterior end	—	1.97-2.3
Ovejectors each	—	0.15-0.17
Eggs	—	0.067x0.041

This species differs from *B. albifrontis* mainly in the absence of a dorsal lobe in the male bursa, the divergence of the postero-lateral from the medio-lateral ray, a sharp bend in the externo-dorsal ray,

the long stem of the dorsal ray, and the tail of the female which has a tip like that of *Ostertagia circumcincta*.

HOST: Impala (*Aepyceros melampus*).
LOCATION: abomasum.
LOCALITY: Transvaal.

Cooperia hamiltoni n. sp.

(Measurements in mm.)	Male.	Female.
Length	5.67-6.4	7.2-8.2
Breadth	0.12-0.14	0.14-0.15
Width of head	0.045-0.049	
Oesophagus length	0.49-0.6	
Spicules length	0.2-0.23	—
Tail length	—	0.16-0.2
Vulva from posterior end ...	—	1.32-1.6
Ovejectors each	—	0.32-0.37
Eggs	—	0.067x0.037

There are about 12 longitudinal cuticular striations. The externo-dorsal ray arises near the base of the dorsal; it is long and slender, lying close to the postero-lateral. The dorsal bifurcates about half-way to the bursal margin, the branches being divergent, slender, and digitate. Each spicule bears a prominent dorsal spur. The tail of the female has a mucronate tip.

HOST: Impala (*Aepyceros melampus*).
LOCATION: small intestine.
LOCALITY: Transvaal.

Cooperia neitzi n. sp.

(Measurements in mm.)	Male.	Female.
Length	8.44-9.83	10.49-12.4
Breadth	0.14	0.108-0.13
Width of head	0.043-0.048	
Nerve ring from anterior end	0.33-0.37	
Excretory pore anterior end	0.44-0.53	
Oesophagus length	0.457-0.49	0.49-0.57
Spicules length	0.195-0.217	—
Tail length	—	0.187-0.23
Vulva from posterior end ...	—	2.16-2.6
Ovejectors each	—	0.44-0.59
Eggs		0.079-0.09x0.041

There are 20-30 longitudinal cuticular striations. The externo-dorsal rays arise from the base of the dorsal and run close to the externo-lateral. The dorsal gives off two small branches at its middle and then bifurcates into two digitate branches. The spicules are of the *C.pectinata* type, with large pectinate expansions. The females

usually have lateral alae on either side of the vulva and the terminal portion of the tail is transversely corrugated.

HOST: Koodoo (*Strepsiceros strepsiceros*).
LOCATION: small intestine.
LOCALITY: Transvaal.

Cooperia verrucosa n. sp.

(Measurements in mm.)	Male.		Female.
Length	8.2-12.6		13.85-14.8
Breadth	0.22-0.26		0.16-0.18
Width of head		0.052-0.06	
Oesophagus length		0.457-0.53	
Spicules length	0.384-0.42		—
Tail length	—		0.195-0.225
Vulva from posterior end ...			4.1-4.48
Ovejectors each			0.55-0.73

There are 18-24 longitudinal cuticular striations. The dorsal ray of the male bursa bifurcates at its middle, each branch bearing a small lateral branch and two terminal digitations. The spicules are of the "pectinata" type with small pectinate expansions at the middle and marked corrugations on the following part. The female is thickened in the region of the vulva, which is provided with a flap and two lateral alar formations of the cuticle.

HOST: Eland (*Taurotragus oryx*).
LOCATION: small intestine.
LOCALITY: Kenya.

Cooperia africana n. sp.

(Measurements in mm.)	Male.
Length	4.57-4.8
Breadth	0.11-0.12
Width of head	0.04
Oesophagus length	0.26-0.28
Spicules length	0.191-0.206

The cuticle has 14 longitudinal striations. The dorsal ray of the bursa bifurcates at its middle, where it is somewhat thickened, and also gives off two short lateral branches. The main branches are distally bidigitate. The spicules resemble those of *C.punctata* but the small expansion is behind the middle and there are a few transverse corrugations.

HOST: Eland (*Taurotragus oryx*).
LOCATION: small intestine.
LOCALITY: Kenya.

Oesophagostomum walkeri n. sp.

(Measurements in mm.)	Male.	Female.
Length	12.35	18.3-20.3
Breadth	0.256	0.42
Width of head	0.142	0.169
Oesophagus length	0.82	0.91-0.97
Cervical groove from anterior end	0.2	0.26-0.27
Spicules length	0.787-0.84	—
Tail length	—	0.27-0.31
Vulva from posterior end ...	—	0.897-1.04

The cephalic vesicle is prominent and extends to the dorsal aspect. Cervical alae are well developed. There are 25-28 elements in the external leaf-crown, each as long as the radius of the buccal capsule, and double that number in the internal leaf-crown. The vagina is short and the female organs resemble those of *O.columbianum*.

HOST: Eland (*Taurotragus oryx*).
LOCATION: colon.
LOCALITY: Kenya.

Oesophagostomum africanum n. sp.

(Measurements in mm.)	Male.	Female.
Length	12.7-13.725	13.07-19
Breadth	0.41	0.42-0.59
Width of head	0.1-0.124	
Oesophagus length	0.8-0.82	0.88-0.91
Cervical groove from anterior end	0.17-0.2	
Spicules length	0.75-0.84	—
Tail length	—	0.29-0.348
Vulva from posterior end ...	—	0.86-0.9

The cephalic vesicle and cervical alae resemble those of *O. walkeri*. The external leaf-crown has 28-31 elements, each half as long as the radius of the buccal capsule; the internal leaf-crown has twice as many elements as the external. The female organs resemble those of *O. columbianum*.

HOST: Springbuck (*Antidorcas marsupialis*).
LOCATION: colon.
LOCALITY: Onderstepoort, recently from Theunissen, O.F.S.

Pneumostrongylus calcaratus, n. gen., n.sp.

Only portions of the worms were obtained from infested lungs, in which the parasites are lodged in the alveoli and small bronchi.

The longest portion of a male worm recovered from the lungs measured 29.7 mm. The males are 0.082-0.109 mm. wide. Heads

found measured 0.03 mm. in diameter. There are apparently three minute lips and the mouth opening leads directly into the oesophagus, which is 0.33 mm. long. There are two equal spicules, 0.384-0.421 mm. long, pigmented brown in the distal half. A gubernaculum is absent, but there is a very strong telamon with two curved arms which are each 0.056-0.06 mm. long, project from the cloacal opening, and are pigmented dark brown. The bursal rays are well developed.

HOST: Impala (*Aepyceros melampus*).
LOCATION: lungs.
LOCALITY: Transvaal.

GENERIC DIAGNOSIS.–Metastrongylidae: body filiform; mouth with apparently three minute lips; buccal cavity absent. Male bursa with large lateral lobes, dorsal lobe absent; ventral rays close together, antero-lateral divergent from fused medio- and postero-laterals, the latter separate only at the tips; externo-dorsals arise separately; dorsal ray very short, bent in under the body and ending in a few papillae. Spicules equal, stout, expanded, and pigmented. Gubernaculum absent. Strongly developed telamon present. Oviparous, eggs segmenting when laid.

Type species—*P. calcaratus* n. sp.

OBITUARY.

Edward Bromley Kellett.

Edward Bromley Kellett graduated at the New Edinburgh Veterinary College in 1889 and came out to South Africa during the 2nd Boer War as a C.V.S. attached to the A.V.D. From 25/6/01 to 10/10/01 he was a Vet. Lieut. in the S.A.C., but in the following year (Nov., 1902) he was appointed Vet. Surgeon to the Transvaal Town Police (part time). He then entered private practice with the late E. A. Hollingham, who at one time had his dispensary and surgery at the old Goldfields Stables, now the site of Locarno House in Johannesburg.

The deceased gentleman was a foundation member of the Transvaal Veterinary Medical Association and later retained membership of the S.A.V.M.A. He took ill at the end of August and died of double pneumonia on the eve of 6/9/32. Mr. Kellett is mourned by his widow and six daughters, to whom we extend our deepest sympathy.

JL. S. AFR. VET. MED. ASSN.
III (4) 1932.

An Outbreak of Ulcerative Stomatitis in Cattle.

By J. J. G. KEPPEL, M.R.C.V.S., Bloemfontein, and
E. M. ROBINSON, D.V.Sc., F.R.C.V.S., Onderstepoort.

During the months of April and May 1932, a disease made its appearance in cattle in the eastern portion of the Orange Free State, the symptoms of which, on account of a slight resemblance to those of Foot and Mouth Disease, caused no little misgiving in that area. These suspicions were soon allayed, but the disease itself is of sufficient interest to warrant description. The first cases brought to the notice of the veterinary department occurred on a farm in the Wepener district close to the border of Basutoland. One of us (J.J.G.K.) visited the farm early in April owing to these reported suspicious allegations.

Seven cases in all were seen in various stages of the disease. Some had recovered since being seen by the local veterinary officer, Mr. S. W. de Villiers, a few days previously. In one case symptoms of marked stiffness were noticed when the animal walked and there was marked salivation. Ulcers were present on the tongue, dental pad, gums, and the inside of the cheeks. The neck of the animal was markedly swollen. No actual lesions of the feet were noted. In another case the animal was very stiff and walked with difficulty. The dental pad showed ulceration where the teeth came in contact with it, but no other mouth lesions were noted. Several other cases were examined, all of which showed marked muscular stiffness and in some ulceration of the dental pad and small ulcers on the gums. In some cases only was there an elevation of temperature.

Owing to further urgent messages reporting the occurrence of this disease in this area the writers proceeded to investigate on the spot. The reports were unfortunately rather exaggerated, as is often the case, but this was perhaps pardonable on account of the existence of Foot and Mouth disease in Rhodesian territory. Ladybrand district, where cases were reported to be occurring, was visited, but although a good deal of information was obtained from farmers, very few actual cases were seen. On one farm, however, close to the Basutoland border, three cases were actually seen. These animals showed marked stiffness in the fore legs. In one animal there was a granulating ulcerated area completely occupying the lower surface of the tip of the tongue and causing the animal to salivate. In another one the dental pad showed small granulating sores where the teeth came in contact with it. In both these animals the temperature was in the region of 103 deg. F. The third animal did not show mouth lesions. Swabs

were made from the surface of the ulcerated portions and blood was taken from the first two animals for inoculation purposes. The blood was inoculated into an animal at Onderstepoort and the swabs were rubbed into scarified areas on the gums, but no symptoms developed subsequently.

While in the Ladybrand area the opportunity was taken of visiting Mr. Verney, Principal Veterinary Officer for Basutoland, to enquire as to the occurrence of the disease in the territory under his charge. It would appear that it had occurred very extensively, a very large number of animals having been affected. His own attempts at transmission of the disease were equally unsuccessful. He was able to recall a similar outbreak 17 years previously, but had not seen the disease in the interval. The symptoms as described by him corresponded very closely to those mentioned above.

From enquiries made in the Ladybrand area, it would appear that the disease had occurred all along the Basutoland border during April and always with similar symptoms. Swelling of the neck was described by some farmers, but it appeared to be rather an inconstant symptom. Stiffness was invariably seen and in most cases marked salivation and disinclination to eat. The mortality from this condition appears to have been very low.

It is difficult on the available evidence to ascertain whether the stomatitis seen in these cases was a symptom accompanying a general septicaemic condition such as might be caused by a filtrable virus. The symptoms were to some extent certainly reminiscent of those seen in three days stiffsickness of cattle, except for the absence of the marked febrile reaction typical of that condition. The stomatitis was not seen in all cases but was present in most of them.

The object of writing this brief and incomplete description has been to draw attention to the existence of this disease. It is also hoped that observations by other veterinarians on similar conditions will be recorded or at any rate suspicious cases reported so that further investigation may be carried out.

JL. S A. VET. MED. ASSN.
III (4) 1932.

Known Poisonous Plants in the Union of South Africa.

By D. G. STEYN, B.Sc., L. Med. Vet., Onderstepoort.

About a hundred and twenty different plants occurring in the Union of South Africa are definitely known to be poisonous. In presenting these brief particulars of the more important ones in tabulated form, the writer hopes that some assistance will be rendered to his field colleagues. It is obvious that no great detail can be given in such a list.

By "general symptoms of poisoning" is meant accelerated or laboured respiration, accelerated and weak pulse, anorexia, and listlessness.

I am very much indebted to Dr. Phillips, Principal Botanist, Dr. Schweikerdt, and Miss Verdoorn of the Division of Plant Industry for supplying information regarding the distribution of the plants mentioned in this list.

NAME.	COMMON NAMES	FAMILY.	DISTRIBUTION.	ACTIVE PRINCIPLE	SYMPTOMS OF POISONING.
1. *Mesembrianthemum expansum* Linn.	Channa	Aizoaceae	South Western Cape	Narcotic acid (in bark)	Action similar to that of cocaine.
2. *Mesembrianthemum Mahoni* N.E.Br.	do.		Southern Transvaal	Oxalates	As in poisoning with oxalates.
3. *Mesembrianthemum tortuosum* Linn.	Kougoed		South Western Cape	Narcotic alkaloid	Action similar to that of cocaine.
4. *Psilocaulon absimile* N.E.Br.	Vygie, asbos, loogbos.		North Western Cape	Oxalates and an alkaloid	As in poisoning with oxalates.
5. *Psilocaulon sp.* (N.H. No. 8819).	Vygie, asbos, loogbos		Willowmore area	Oxalates	As in poisoning with oxalates.
6. *Amaryllis belladonna* Linn.	Maart lelie, March lily, amaryllis, belladonna lily.	Amaryllidaceae	South Western Cape Province.	Alkaloid.	Digitalis-like action, gastro-intestinal irritant and causes paralysis.
7. *Buphane disticha* Herb.	Gifbol		Widely distributed in South Africa.	Alkaloid (haemanthin).	A spastic-paretic poison.
8. *Haemanthus amarylloides* Jacq.			Eastern Cape Province and Kalahari.		Gastro-intestinal and cardiac poison.
9. *Haemanthus natalensis* Pappe.	Blood-flower, Snake lily.		Natal, Griqualand East		Gastro-intestinal irritant.
10. *Nerine lucida* Herb.			Griqualand West (Bechuanaland) Transvaal.	Unknown	Spastic paretic poison.
11. *Vallota, purpurea* Herb.	Berglelie, George lily, Knysna lily.		Transvaal, Southern Cape.		Gastro-intestinal irritant.
12. *Acokanthera spectabilis* (Sond) Benth.	Gifboom.	Apocynaceae	South Eastern and Eastern coast region.	One or more glucosides,	Severe gastro-intestinal irritant with a digitalis-like action.
13. *Acokanthera venenata* G.Don.	Gifboom.		Tropical Africa, Transvaal, Natal and coastal belt of Mosselbay.	Glucoside (acokantherine).	do.
14. *Nerium Oleander* Linn.	Oleander, Ceylon rose.		Native of Levant, Ornamental tree in South Africa.	Unknown	Gastro-intestinal irritant with a digitalis-like action.

NAME.	COMMON NAMES	FAMILY.
15. *Asclepias crispa* Berg.	Bitterwortel.	Asclepiadac
16. *Asclepias fruticosa* Linn.	Gansies, melkbos, tondelbos, wilde-kapok, fire-sticks, shrubby milk weed, wild cotton.	
17. *Asclepias physocarpa* Schltr.	Melkbos, milkweed	
18. *Cynanchum africanum* R. Br.	Klimop, bobbejaanstou, davidjies, excelsior.	
19. *Cynanchum ~~capense~~ ellipticum* Thunb.	do.	
20. *Cynanchum obtisifolium* L. f.	Klimop.	
21. *Raphionacme divaricata* Harv. (*Rhaphionacme purpurea* Harv.)		
22. *Aster filifolius* Vent.	Draaibos.	Compositae
23. *Centaurea picris*, D.C.		
24. *Chrysocoma tenuifolia* Berg.	Bitterkaroo, bitterbossie, brandbossie, beeskaroo.	
25. *Dimorphotheca cunteata* Less.		
26. *Dimorphotheca Ecklonis* D. C.	Bietou.	
27. *Dimorphotheca spectabilis* Schltr.	Bietou.	
28. *Dimorphotheca Zeyheri* Sond.	Bietou, Jakkalbos.	
29. *Geigeria aspera* Harv.	Vermeerbossie.	
30. *Geigeria passerinoides* Harv.	Vermeerbossie.	
31. *Geigeria pectidea* Harv.		
32. *Geigeria Zeyheri* Harv.		
33. *Matricaria nigellaefolia* D.C.	Staggers weed.	
34. *Pteronia pallens* Linn. f.	Wit bossie, Witgatbossie. Scholtzbossie.	
35. *Senecio Burchellii* D.C.		
36. *Senecio ilicifolius* Thunb.	Sprinkaanbos.	

DISTRIBUTION.	ACTIVE PRINCIPLE	SYMPTOMS OF POISONING.
South Western and Southern coast region.	Unknown	Gastro-intestinal irritant.
Ubiquitous	Unknown	Convulsant (appears to cause paralysis of centre respiration).
Coast region from Worcester to Delagoa-bay.	Unknown	Gastro-intestinal irritant.
Southern and Eastern Cape.	Unknown	Krimpsiekte in sheep, cattle and horses.
do.	Unknown	do.
Southern and Eastern Cape	Unknown	do.
Eastern South Africa	Unknown	Bulb has a narcotic effect on cats.
Grahamstown and Aliwal North area.	Unknown	General symptoms of poisoning.
Weed on cultivated lands (De Aar).	Unknown	Gastro-intestinal irritant. do.
Karoo, Kaffraria, Natal Orange Free State.		Alopecia (Kaalsiekte) in kids and lambs.
Grahamstown	Prussic acid (Cyanogenetic glucoside).	Prussic acid poisoning.
Port Elizabeth, Johannesburg, Magaliesberge.	do.	do.
Transvaal.	do.	do.
Southern Free State, Karoo and Natal.	do.	do.
Eastern Transvaal and Free State.	Unknown.	Vermeersiekte in sheep.
North Western Cape Griqualand West	Unknown.	Vermeersiekte in sheep, goats and cattle.
Griqualand West	Unknown.	Vermeersiekte in sheep.
Transvaal.	Unknown.	Vermeersiekte in sheep experimentally,
Eastern Cape and Natal.	Unknown.	Staggers in cattle.
Southern Karoo.	Unknown.	General symptoms of poisoning. Gastro-intestinal irritant.
Very widespread in the Union.	Unknown.	Straining or Molteno cattle disease.
South Western Cape	Unknown.	Bread poisoning in human beings.

NAME.	COMMON NAMES	FAMILY.
37. *Senecio isatideus* D.C.	Dan's cabbage.	Compositae (contd.)
38. *Senecio retrorsus* D.C. (*Senecio latifolius* D.C.)	Dan's cabbage. Molteno disease plant.	
39. *Cotyledon cacalioides* Linn. f.	Nenta, Krimpsiektebos.	Crassulaceae
40. *Cotyledon decussata* Sims.	Nenta, Krimpsiektebos.	
41. *Cotyledon eckloniana* Harv.	Nenta, Krimpsiektebos.	
42. *Cotyledon orbiculata* Linn. (*Cotyledon leucaphylla* C.A. Sm.)	Hondeoor, varkoor, plakkies.	
43. *Cotyledon paniculata* Thunb.	Botterboom.	
44. *Cotyledon ventricosa*, Brom.	Nenta, Krimpsiektebos.	
45. *Cotyledon Wallichii* Harv.	Karkei, Kandelaarbos.	
46. *Raphanus raphanistrum* Linn.	Knopkerik, ramenas, jointed charlock, wild mustard, wild radish.	Crucifarae.
47. *Cucumis africanus* Linn.	Wilde komkommer, wild cucumber, bitter apple.	Curcurbitaceae
48. *Cucumis myriocarpus* Naud.	Wilde komkommer, wild cucumber, bitter apple.	
49. *Dichapetalum cymosum* (Hook) Engl.	Gifblaar, blaargif, blinkblaar.	Dichapetalaceae
50. *Equisetum ramossissimum* Des. f.	Drilgras, drinkgras, horse tail.	Equisetaceae
51. *Hyaenanche globosa* Lamb. (*Toxicodendron capense* Thunb.)	Boesmangif, gifboom, wolwegif, wolweboontjie.	Euphorbiaceae
52. *Jatropha curcas* Linn.	Physic nut tree, purging nut tree.	

DISTRIBUTION.	ACTIVE PRINCIPLE	SYMPTOMS OF POISONING.
Transvaal, Eastern Cape Province and Natal.		Dunsiekte in horses and poisoning in sheep.
Very widespread in the Union.	Seneciofoline (retrosine). Seniofolidine (alkaloids).	Dunsiekte in horses, straining or Molteno cattle disease in cattle.
Southern and Western Karoo.	Probably Cotyledon toxin.	Krimpsiekte in sheep and goats.
do.	Cotyledon toxin.	do.
do.	do.	do.
Transvaal and Basutoland.	do.	do.
Southern and Western Karoo.	do.	do.
do.	do.	do.
do.		do.
Weed on cultivated lands.	Mustard oil.	Severe gastro-intestinal irritant (especially the seed).
Very widely distributed.	Crystalline substance (chemically not identified).	Sudden death with no characteristic symptoms. In subacute poisoning diarrhoea may develop.
Very widely distributed (especially on cultivated lands).	do.	As in *Cucumis africanus* Linn.
In Transvaal, north of Magaliesberg range.	Unknown.	Heart poison. Sudden death.
Very widespread.	Unknown.	Trembles (drilsiekte, dronksiekte) in stock.
Van Rhynsdorp, Calvinia in mountains. Clanwilliam.	Bitter principle.	It has a strychnine-like action on the brain, but does not affect the spinal cord.
Cultivated in Natal and Transvaal.	An acid of chronolcic type and curcin (toxalbumin).	Severe gastro-intestinal irritant.

NAME.	COMMON NAMES	FAMILY.
53. *Ricinus communis* Linn.	Casteroil tree, kasterolieboom.	Euphorbiaceae (contd.)
54. *Chironia transvaalensis* Gilg.		Gentianaceae
55. *Cynodon spp.* and some other valuable grasses, when wilted contain dangerous amounts of prussic acid (geilsiekte).	Kweek (Quick) gras.	Graminae
56. *Lolium temulentum* Linn.	Drabok, darnel, cheat.	
57. *Paspalum dilatatum* Poir.	Breed-saad, large water grass.	
58. *Setaria sulcata* Raddi.	Buffalo grass	Graminae
59. *Sorghum saccharatum.*	Soetriet	
60. *Sorghum sudanense* Stapf.	Sudangrass	
61. *Sorghum vulgare* Pres.	Kafferkoring, kafircorn.	
62. *Zea Mays* Linn.	Mielies, mealies	
63. *Homeria aurantiaca* Sweet.	Rooitulp, red tulip.	Iridaceae
64. *Homeria bulbifera.*		
65. *Homeria collina* Vent.	Yellow tulp, geel tulp.	
66. *Homeria lucasii.*		
67. *Homeria pallida* Baker.	Transvaal yellow tulip	
68. *Moraea polystachya* Ker.	Cape blue tulp	
69. *Moraea spathacea* Ker.	do.	
70. *Moraea rivularis* Schltr.		
71. *Abrus precatorius* Linn.	Love or lucky bean minini-minmis.	Leguminosa
72. *Crotalaria Burkeana* Benth.	Klappers, rattle bush, stywesiekte bossie.	
73. *Cratalaria dura* (Wood & Evans).	Jaagsiektebos	
74. *Crotalaria globifera* E. Mey.	Jaagsiektebos	
75. *Elphantorrhiza Burchellii* Bth.	Elandsboontjie	
76. *Erythrophloeum lasianthum* (Corbishley)		

DISTRIBUTION.	ACTIVE PRINCIPLE	SYMPTOMS OF POISONING.
Very widespread occurrence. Cultivated and naturalised.	Ricin (toxalbumin).	do.
Pretoria district and throughout Transvaal.	Unknown.	General symptoms of poisoning.
	Prussic acid.	Geilsiekte.
Weed on cultivated lands (very prevalent in South Western Cape.	Temulin (alkaloid)?	Dizziness and headache in human beings. Bread poisoning.
Natal.	Only poisonous when infected with ergot (*Claviceps paspali*)	Inco-ordination of movement, muscular tremors and constipation.
Eastern Cape Province and Natal.	Unknown.	Seeds poisonous to birds.
Cultivated.	Prussic acid when wilted only.	Prussic acid poisoning.
Cultivated under the name of Sudan grass	do.	do.
Cultivated.	Prussic acid when wilted.	do.
Cultivated.	do.	do.
Cape.	Unknown.	Gastro-intestinal irritant and heart poison (digitalis-like action).
Cape.	Unknown.	
Cape.	Unknown.	
Cape.	Glucoside	
Transvaal.	Alkaloid (homeridine).	
Cape.	Unknown.	
Cape.	Unknown.	
Natal.	Unknown.	
Transvaal, Natal, Zululand.	Abrin (toxalbumin)	Gastro-intestinal irritant.
Transvaal and Bechuanaland.	Unknown.	Stywesiekte in cattle.
Natal.	Unknown.	Jaagsiekte in horses.
Natal and Transvaal	Unknown.	do.
Transvaal	Unknown.	In large amounts the bean is a gastro-intestinal irritant.
Natal and Zululand.	Erythrophlein (alkaloid).	Seed causes convulsions.

NAME.	COMMON NAMES	FAMILY
77. *Lotononis involcrata* Bth. 78. *Lessertia brachystachya* D.C. 79. *Medicago denticulata* Willd. 80. *Mundulea suberosa* Benth.	Klavergras, kliskklaver	Leguminosae (contd.)
81. *Agapanthus umbellatus* L'Her.	Agapanthus	Liliaceae
82. *Bowiea volubulis* Harv.		
83. *Dipcadi glaucum* Baker.	Malkopui	
84. *Gloriosa superba* Linn.	Superb Lily	
85. *Gloriosa virescens* Lindl.	Superb Lily	
86. *Ornithogalum lacteum* Jacq.	Chinkerinchee	
87. *Ornithogalum saundersiae* Baker.		
88. *Ornithogalum tenellum* Jacq.	Chinkerinchee	
89. *Ornithogalum thyrsoides* Jacq.	Chinkerinchee, witviooltjie, star of Bethlehem.	
90. *Ornithoglossum glaucum* Salisb.	Cape slangkop	
91. *Urginea altissima* Bkr.	Maarman	
92. *Urginea Burkei* Bkr.	Transvaal slangkop	Liliaceae
93. *Urginea capitata* Baker.		
94. *Urginea macrocentra* Baker.	Natal slangkop	
95. *Strychnos henningsii* Gilg.	Hardepeer, hard pear	Loganiaceae
96. *Malva parviflora* Linn.		Malvaceae
97. *Melia azederach* Linn.	Bessieboom, sering, beadtree, Indian lilac.	Meliaceae
98. *Melianthus comosus* Vahl. 99. *Melianthus major* Linn.	Kruidjie-roer-my-nie. Truidjie-roer-my-nie.	Melianthaceae
100. *Oxalis cernua* Thunb.	Geelsuring, Klawersuring, pypsuring, Wildesuring, Sorrel.	Oxalidaceae

DISTRIBUTION	ACTIVE PRINCIPLE	SYMPTOMS OF POISONING.
South Western Cape	Prussic acid.	Prussic acid poisoning.
Cape Eastern Province.	Unknown.	Poisonous to stock, no symptoms described.
Cape, Free State and Transvaal.		Photosensitisation in stock (Australia).
Swaziland, Portuguese E. Africa, Transvaal, Bechuanaland.	Glucoside.	Considered to be poisonous to stock in the United States America.
Widely distributed in Karoo.	Scillitoxin and scillipiain.	No symptoms described.
Eastern parts of S.A.	Unknown.	Gastro-intestinal irritant.
Griqualand West.	Unknown.	Severe gastro-intestinal irritant.
Transvaal.	Colchicine.	Gastro-intestinal irritant, also spastic-paretic action.
Eastern South Africa	Unknown.	Severe gastro-intestinal irritant.
Southern Cape Province.	Unknown.	do.
Natal, Zululand and Transvaal.	Unknown.	do.
Swellendam District	Unknown.	do.
South Western Cape Province.	Unknown.	do.
Cape Province.	Unknown.	Gastro-intestinal irritant (digitalis-like action.
Natal & Uitenhage, Graaff Reinet.	Unknown.	do.
Transvaal, Griqualand West.	Glucosides.	do.
Natal, Transvaal, Griqualand East.	Unknown.	Gastro-intestinal irritant.
Natal and Transkei.	Unknown.	Gastro-intestinal irritation.
Eastern Cape Province and Natal.	Alkaloids (in bark)	Paralytic action.
Widely distributed weed.	Unknown.	Staggers in stock (proved in Australia).
Introduced. Widely cultivated tree.	Unknown.	Narcotic poison.
Karoo.	Unknown.	Gastro-intestinal irritation.
South Western Cape Province.	Unknown.	do.
Cape Province.	Oxalates.	Oxalate poisoning (nervous symptoms).

NAME.	COMMON NAMES	FAMILY	DISTRIBUTION	ACTIVE PRINCIPLE	SYMPTOMS OF POISONING.
101. *Adenia digatata* Engl.		Passifloraceae	Transvaal	Prussic acid and modeccin (toxalbumin).	Symptoms of prussic acid poisoning and severe gastro-intestinal irritation.
102. *Ranunculus pubescens* Thunb.	Kankerblare.	Ranunculaceae	South Africa—general	Unknown.	Gastro-intestinal irritation.
103. *Pachystigma thamnus* Robyns. (*Vangueria pygmaea* Schltr.)	Witappeltjie. Gousiektebossie.	Rubiaceae	Transvaal and Natal	Unknown.	Gousiekte in sheep and cattle.
104. *Cestrum laevigatum* Schlocht.	Inkberry bush.	Solanaceae	Eastern Cape Province and Natal.		Staggering gait, inco-ordination of movement.
105. *Datura stramonium* Linn.	Stinkblaar, olieblom, thornapple.		Ubiquitous weed.	Atropine and hyoscyamine.	Symptoms as in atropine and hyoscyamine poisoning.
106. *Datura tatula* Linn.	Stinkblaar, olieblaar, Pietjielaporte, Bloustinkblaar, olieboom.		do.	do.	do.
107. *Nicotiana glauca* Grahm.	Wilde tabak, wild tobacco.		Very widespread.	Nicotine.	Symptoms as in nicotine poisoning
108. *Solanum incanum* Linn.	Bitter apple.		do.	Probably solanine.	Symptoms as in solanine poisoning. Only unripe fruits are poisonous.
109. *Solanum nigrum* Linn.	Nastergal, black nightshade.		South Africa (Hawaiian Forester and Agriculturist March 1920).	Solanine (Alkaloid).	Only unripe fruits are poisonous.
110. *Solanum panduraeforme* E. Mey.	Bitter apple.		Very widespread.	Probably solanine.	Both unripe and ripe fruits are poisonous.
111. *Hermania paucifolia* Turcz.	Goewermentsbossie, skitterybossie.	Sterculaceae	Karoo, Barkly West, Bechuanaland, Western Transvaal.	Unknown.	Gastro-intestinal irritant.
112. *Gnidia burchellii* Meisn.	Harpuisbos.	Thymelaceae	Bechuanaland, Ntl., Tvl., Eastern Cape Province.	Unknown.	Gastro-intestinal irritant.
113. *Gnidia ovalifolia* Meisn.				Unknown.	do.
114. *Gnidia polycephalus* Linn. (*Arthrosolen polycephalus* C. A. Mey).	Januariebos.		O.F.S., Karoo, Griqualand West, Transvaal.		do.
115. *Lasiosiphon anthylloides* Meisn.			Transvaal, Natal, Eastern Free State, South Eastern Cape.	Unknown.	do.
116. *Tribulus terrestris* Linn.	Dubbeltjie, Volstruisdoring, morgenster, devilsthorn.	Zygophyllaceae	Ubiquitous.	Unknown.	Geeldikkop in sheep and goats (photosensitisation).
117. *Zygophyllum microcarpum* Lichts.	Ou-ooi-bos, armoedsbos, sandrepuis.		Northern Cape Province.	Unknown	Paralysis.

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Studies in Native Animal Husbandry.
5.—Indigenous Cattle in the Transkeian Territories.

By F. R. B. THOMPSON, Director of Agriculture, General Council, Umtata, C.P.

INTRODUCTION.

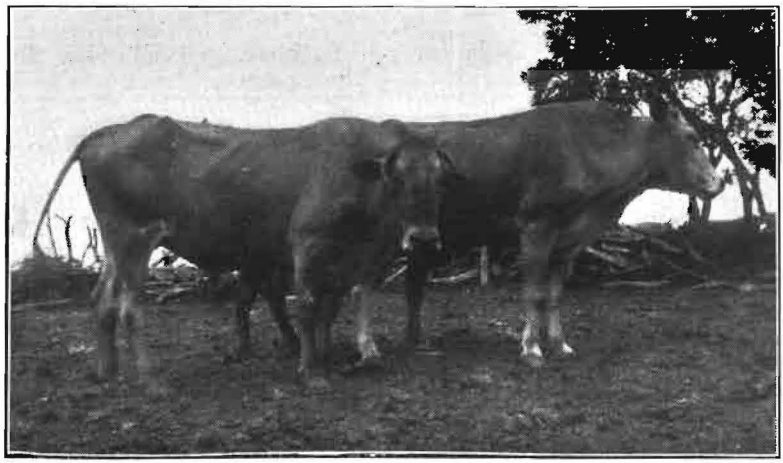
In the district of Elliotdale in the Transkeian Territories lives a section of the Ama-Bomvana tribe of Kaffirs and the chief of this section of the Bomvana is Ngubezulu, the son of Gwebindlala.

Ngubezulu has in his possession, in safe keeping for his tribe, a definite type of so-called *Sacred Cattle* called *Bolowana Cattle,* and sometimes referred to by the natives as *Izankayi.*

THE AMA - BOMVANA.

The Ama-Bomvana Kaffirs are descended from Nomafu, the first of the Ama-Ngwana tribe, but more directly from Bomvu, who gave rise to the Ama-Bomvu tribe.

Bomvu's Great Son, who carried on the Bomvu dynasty, was Nyonemnyama. The Right-Hand Son of Bomvu was Njilo. This son was the progenitor of the Bomvanas.



Indigenous "Bolowana" Cattle, Transkei Territory.

Our earliest historical knowledge of the locality of the Bomvana tribe places it in the country about the Mkomaas River, but some Bomvanas state that their original home was on the Umgeni River, just North of Durban.

About 1650 part of the Bomvana tribe left Natal and settled in Pondoland, because of some difference over the "Isizi" cattle through the death of Njilo's wife, who was living with her grandson, Dibandlela. Njilo demanded the "Isizi" cattle from Dibandlela and he refused to deliver up the cattle and was threatened.

Dibandlela decided to flee and seek a new home, and collecting all his followers with their families and cattle he set out for the South, directing his course to Pondoland.

The Bomvanas remained in Pondoland until the early years of the nineteenth century, when they were compelled by circumstances to get out of the country, and obtained permission from the Ama-Xosa chief, Hintsa, to occupy the territory between the Bashee and Umtata rivers and along the coast south east of Tembuland, which country is now known as Bomvanaland.

The Bomvanas have now in a little over a hundred years become a considerable tribe, numbering over 30,000 souls, and Bomvanaland has been their home since the early years of the nineteenth century.

THE BOLOWANA CATTLE.

Origin. Among living people there are none who know with certainty the name of the chief in whose reign the breed was started, but it is many years ago, and it is quite possible that they could be traced back to the flight of Dibandlela several centuries ago.

Description. In colour Bolowana cattle vary from red to dark brown and dun. They are inclined to be small, and most of them are hornless or have short horns pointing downwards, known by the Natives as "amaxaka." They are inclined to be wild, and resemble the Africander more closely than any other pure domesticated breed in South Africa.

System of Breeding. According to custom, it is stated by the oldest Councillors living, all bull calves are castrated at an early age before they are old enough to breed, the belief being that otherwise all the cattle would putrify, and that the blood of the Bolowana herd could never mix with that of ordinary stock. I cannot quite understand why these cattle still remain so definite a type if bull calves have been castrated at an early age, for one would imagine that by all the ordinary laws of breeding the type would have long since been lost, which is not the case.

I am unable to ascertain what bulls are used on these cattle as the native Councillors are not communicative on the point.

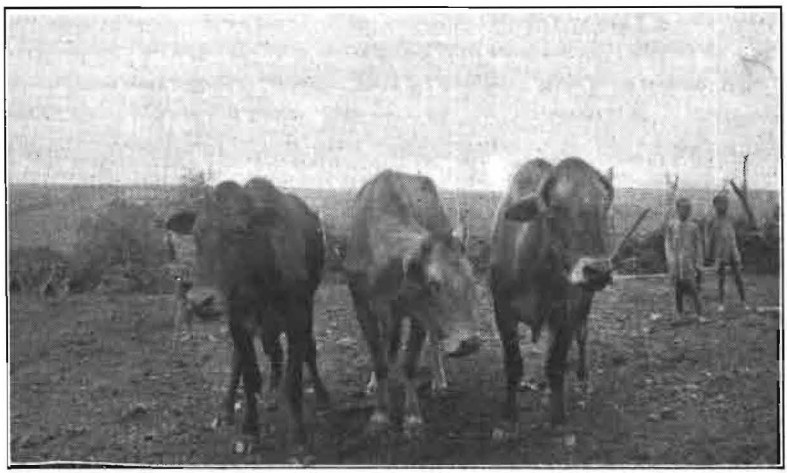
Domestic Use of these Cattle. Bolowana cattle are used for ploughing and other draft purposes, and are used for racing purposes. The cows are not good milkers compared with milking strains of the

domesticated breeds, but produce more than sufficient for the needs of the calf.

The milk of these cattle is not used by men and young women, but by small boys, girls, and old women.

Present Ownership and Control. As stated above, the paramount chief of the Bomvanas, Ngubezulu, is the owner of these cattle in trust for the tribe. The custom is for the cattle to be kept at the "Great Place" and that they belong at, but not to, the principal house (the hut of the great wife), but they are not controlled by the Chief alone, such control being vested in a council consisting of minor chiefs, the male relations of the Great Chief, and principal trusted Councillors.

Not even the Great Chief can sell these cattle or give them out as "lobola," as they are regarded as tribal property. Recently an educated chief of the tribe sold some of these cattle to a trader, but



Bolowana Cattle Types.

the Councillors and other chiefs protested, purchased the cattle back again for the tribe, and threatened to depose the chief concerned.

Sacred Beliefs. Bolowana cattle are regarded by the Bomvanas as sacred animals and their principal use is for sacrificial purposes for the tribe in times of trouble such as war, calamity befalling the chiefs or their rule, and in times of drought or other national troubles.

When circumstances call for a sacrifice to be made a meeting of the proper people mentioned above is called, and special men are selected from the Councillors, who are sent with the most attractive fat ox to be sacrificed on the banks of the Kapi river in the St. Johns

district. The messengers carry with them a basket containing seeds of agricultural produce such as maize, mellon, tobacco, kaffir-corn, pumpkins, sweet-cane, kaffir melon, etc., all of which are used in the ritual of the ceremony at the river bank.

ADDENDUM.

(By J. H. R. BISSCHOP and H. H. CURSON, Onderstepoort.)

The above contribution from Mr. Thompson is most welcome as it gives us information about one of our many neglected native types. The Bomvana herd apparently represents the most southerly of our indigenous cattle, in fact it may be compared with an island of the original native stock in a sea of mongrel grades. It is most instructive to learn of the native customs regarding this herd, facts known by few of our cattle men.

Most of the native cattle types of the Subcontinent have lost, or are fast losing, their identity owing to the erroneous grading policy initiated by Europeans. As a result they do not possess that breeding value as basic stock. In 1931 one of us (H.H.C.) in a Report dated 19/3/31 to the Chief Veterinary Officer, Bechuanaland Protectorate, regarding Ngamiland cattle, recommended "selection among Batawana and Damara Cattle" and that "to get the best animals local shows could be held and the most suitable animals noted." Crew (1932), too, emphasises that "the animal in its form and function is fashioned by a variety of agencies."

From the zootechnical aspect more particulars are required not only of the type in question but also regarding the environment. It would be interesting to obtain (a) the measurements of a number of cattle, (b) a precise description of the conformation, (c) details concerning milk and beef production, and (d) observations relating to fertility, longevity, prepotency, weights at different ages, etc. Accompanying this, data regarding climate, grazing, diseases and system of husbandry would be valuable.

According to Soga (1931) there is another sacred herd in Bomvanaland, namely, the Ondongolo Sacred Cattle at Chief Tyelinzima's Kraal. Tyelinzima is the chief of the principal house of the Ama-Tshezi, the right hand house of the Bomvana. Apparently at one time similar herds existed throughout the Transkeian Territories. Soga gives much useful information in regard to description of horns and colours (p. 386-388).

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The Brooding and Rearing of Chicks.

By E. VAN MANEN, M.Sc. Agric. (Cornell), Durban.

Modern methods of brooding have resulted from a number of methods tried successively in the attempt to become independent of the broody hen. Some of the original methods were rather crude, and the kitchen stove was asked to do overtime on more than one occasion. Hot water bottles wrapped in a blanket, and placed in the centre of a box, was another method of keeping chicks warm. The box brooders eventually began to play an important role in the brooding of chicks. These were used with or without artificial heat. Where no artificial heat was used, attempts were made to keep the chicks warm by the use of feather dusters suspended from above just clear of the bodies of the chicks.

COLD BROODING.

With this system of brooding various types of box brooders have been used with only partially successful results. No artificial heat was used, and the chicks were kept warm by the heat generated from their own bodies. This method entailed considerable labour, in that chicks could be brooded together only in very small units. A large number of boxes were needed, and the irksome task of transferring the chicks from the range to these boxes at night very soon put an end to this method on progressive commercial farms.

HOT BROODERS: PORTABLE TYPES.

Some of the earliest types of hot brooders consisted of the box brooder heated by a paraffin lamp. These brooders were made portable and in sizes to accommodate from 50 to 150 chicks. Thus they could conveniently be moved from house to house and were especially adaptable to the colony type of house. These box brooders soon paved the way for the portable or adaptable paraffin hovers, which had the advantage of thermostatic control, thereby reducing considerably the danger of overheating.

THE COAL-STOVE COLONY BROODER.

One of the most popular types of colony brooders to-day is the coal stove colony brooder. It can be defined as a movable house heated by means of an automatically regulated coal stove hover. This type of brooder may be adapted to from 150 to 750 chicks, and is a very satisfactory method of artificial brooding for the farmer, small poultry keeper, or commercial poultry man. The house most suitable for the coal stove hover is one of a shed-roof type with the upper portion of the front open, but screened with wire netting. This house

should preferably be built on steel runners in order that it may be moved conveniently to new ground should occasion arise. The size of the house will depend on the size of the hover and the number of chicks to be brooded in each unit. It is usually safe to allow one square foot of floor space for each three baby chicks. At eight weeks allow one square foot of floor space to each 1½ chicks. The following are convenient sizes for different units: 8 feet by 8 feet, 150-200 chicks; 8 feet by 10 feet, 200-250 chicks; 10 feet by 10 feet, 250 to 300 chicks, 10 feet by 12 feet, 300-350 chicks; 12 feet by 16 feet, 500 to 750 chicks.

The coal stove should be set about equal distances from the rear and side walls of the house. In this way a more equal distribution of heat in all parts of the house will result. The temperature under the hover at chick level should be about 98°F. for the first two days. Towards the end of the first week the temperature should be about 95°F., the second week 90-95°, the third and fourth week 85 to 90°, and about 5° less each week until the heat is removed. These temperatures are only approximate. The action of the chicks and their rate of growth is a better guide.

Many poultrymen are over zealous in their attempts to provide warmth for the chicks, and tend to close up the house too thoroughly by the use of curtains on the front. In this way they interfere with ventilation and draught, with the result that the chicks become badly overheated.

Hot Brooders: Permanent Types.

The permanent types of hot brooders are generally referred to as the continuous or long-house systems. The brooding device consists of a coal stove at one end with hot-water pipes running the entire length of the house. The hot-water pipes are usually boxed in, and with proper thermostatic control this type of brooder is very efficient. This type of house gives the advantage of brooding a large number of chicks under one roof, and with the use of only one coal-burning stove. The pipes should be located near the back wall of the house, and for ease in operation a passage should be provided either behind or above the pipes.

A house from 40 to 50 feet long, 16 feet deep, 8 feet high in front, and 6 feet high at the back, of the shed-roof type, forms an ideal house for hot-water installation. This house will conveniently brood from 1500 to 2000 chicks. Each section of the brooder should contain about 150 chicks, and the sections need not be wider than four feet. The pipes are generally close to the floor at the coal stove end of the house. With a gradual rise the pipes are at a different height from the floor in each of the various sections of the brooder. In this way the baby chicks are given more heat than those of one week of age and older.

The Furnace Type Brooder.

The Furnace Type Brooder, or the Dutch Oven type as it was first called, makes use of hot air instead of hot water for the brooding of chicks. The advantages claimed for this system are, that the building is inexpensive and the heating unit simple and cheap to construct. This system is also less complicated than other systems of brooding and in all is found to be no less efficient.

The furnace is located at one end of the house, and the hot air is carried in a flue, running under the floor through the middle of the house. In order to give a uniform supply of heat the flue is covered to a depth of ten inches near the furnace end, and to a depth of four inches at the chimney end. Some form of brooder is also used on the floor immediately above the flue. For warmth the young chicks lie on clean sand all along and in the immediate neighbourhood of the flue.

The Electric Hover.

Where electric current is both dependable and economical, the use of electric equipment for brooding is frequently resorted to. Other advantages are the ease by which it can be started and stopped and the accuracy of its heat control. Ventilation must be properly controlled with the electric hover to prevent "sweating," and the hover itself must be large enough to heat the house to some extent.

The Battery Brooder.

One of the most recent innovations in the way of brooding devices is that known as the battery brooder. As its name implies this system suggests a sort of battery construction. The brooding compartments are relatively small and built in tiers, usually four high. They may be placed side by side, and even back to back. Four hot water pipes, heated by one coal-burning stove, supply heat to the rear of each compartment. The compartments themselves measure about 36 by 36 inches in floor area and are about 14 inches high. Feed troughs and water vessels are affixed to the front of each compartment. The floor of each compartment is made of half-inch mesh wire cloth, and a galvanized iron sheet is provided beneath this floor on which all droppings are collected.

The type of house required for the battery brooder is very simple in construction, and should preferably have a pitch roof, with controllable ventilation both at the ridge and at the eaves. The width of the house should be about 12 feet, and the length according to the size of the brooder to be installed. Suitable windows should be provided so that the chicks may receive the benefit of an abundant supply of direct sunlight.

First Care of the Chicks.

When the chicks are moved from the incubator to the brooder, care should be exercised to prevent them from becoming chilled. Chicks that become chilled at this stage soon develop diarrhoea followed by a heavy mortality before they are ten days old. It is generally wise to leave the chicks in the nursery trays of the incubator for at least twenty-four hours after they are all hatched. If the chicks are placed under the brooder towards evening they will immediately settle down to sleep. If the correct heat is provided at this stage the chicks will not huddle, but will spread out around the rim of the hover.

The first feed may then be given the morning after the chicks are placed in the brooder. It may be found necessary to dip the beaks of a number of chicks in water or milk as the case may be, in order to ensure that the chicks will find the drinking vessels. Tapping with the finger on the side of the food hoppers, or drinking vessels, will also serve to attract the chicks to these. This early training will be found to be beneficial as the chicks will respond to a later call in the same way. Poultrymen are often heard to complain that their chicks will not eat this or that food. Baby chicks will eat any kind of food provided they have been trained to do so.

Chicks should also be taught to perch early. When they are a fortnight old perches should be provided, and placed in such a way that they extend partly under the hover, and raised at a very slight incline away from the brooder. The chicks will thus automatically find the perches, and when the heat is removed, no trouble will be experienced in getting them to roost properly. Placing half-inch mesh wire under the perches will prevent the chicks from dropping between the perches to the floor, and possibly finding a corner to crowd in. As the chicks become older the perches should be raised and placed in a horizontal position. It should thus be a common practice to have the chicks perching at from four to six weeks of age.

There is no fixed time for removing the heat supplied to young chicks. In mild weather the chicks will not require the heat as long as in colder weather. A good guide is to watch the behaviour of the chicks especially during the night and early hours of the morning. If the heat is removed too quickly crowding will result, and this may lead to severe losses in the brooder house. Crowding causes overheating or "sweating," the worst evil of the brooder house.

(To be continued).

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Sour Milk in Avian Coccidiosis.

By J. D. W. A. COLES, B.V.Sc., Onderstepoort.

Coccidiosis has been one of the most widespread and fatal diseases of poultry in the Union for many years. Until recently its appearance often meant the ruination of the poultry plant concerned. With the introduction of the sour milk treatment, however, a simple, inexpensive, yet very effective method of controlling the disease has been placed at the disposal of all poultrymen.

Diagnosis: This often presents great difficulties. Fowls of all ages may be affected, though cases are uncommon in birds more than four months old. The symptoms may vary from a haemorrhagic diarrhoea to a general state of unthriftiness, anaemia, and even legweakness. The post-mortem appearances are just as varied as the symptoms. The only reliable way of diagnosing the disease is by means of the microscope. Three small drops of scrapings (from the duodenum, midgut, and caeca) mixed with equal amounts of saline are examined under a coverslip with reduced light, for oocysts. Large schizonts filled with merozoites may sometimes also be seen and are very striking. The oocysts may be very rare and even escape notice.

For these reasons no veterinarian is justified in making a negative diagnosis until he has examined carefully scrapings from the duodenum, midgut, and caeca of at least three birds. The number of the parasites gives no certain indication of the severity of the disease and steps should be taken to prevent serious damage to the flock wherever they are found.

Treatment and Prevention. Limited space forbids a critical review of the literature. In the author's opinion there is nothing to excel sour skim milk. The results in South Africa have been very satisfactory. The sour milk probably acts in two ways. The acidity is supposed to prevent the development of the parasite in the bird, and the high value of milk as a foodstuff undoubtedly assists during convalescence.

In acute and subacute cases the birds should be given nothing but sour milk *ad lib.* for the first four days. The following week sour milk, mash, and tender greens are fed. After this the usual ration may be given, but the addition of sour milk for another month is recommended.

In chronic cases, birds three months old and over may receive up to three to five gallons of sour milk per hundred per day, the usual

ration being adjusted so that the food value of the milk may be taken advantage of. This treatment should be continued for at least two months. If the former ration is reverted to, the change should be gradual to prevent a partial moult.

In winter, milk often goes putrid instead of sour. Such putrid milk must not be fed to fowls.

It is as well to remember that young birds may be cured, and then contract the chronic form of the disease when exposed to infection as pullets ready to lay. To obviate this possibility sour skim milk may be fed during the first six months of life. Besides being a reliable prophylactic, it is cheap, rich in vitamins, and contains proteins of great value.

If the outbreak is serious it may be worth while keeping the young birds on half inch mesh wire netting, so that all the droppings may be collected and destroyed. It is most important that infected droppings should not be used to fertilise green food intended for the fowls.

Disinfecting houses and digging over and liming runs will achieve little. Infected birds infect them again immediately afterwards. Even chicks on concrete floors scoured daily will become infected unless the strictest of precautions are taken, e.g. the infection may be carried in on the attendant's footwear.

CLINICAL AND GENERAL NOTES.

I. Catarrhal Cystitis and Retention of Urine due to Calculi in the Bladder of a Dog.

By Prof. J. QUINLAN and W. MALHERBE, Onderstepoort.

On 3rd August, 1932, the following case was presented at the out patients' clinic for examination: Black and white cocker spaniel; male; age: 10½ months.

History. On 18th June he had suffered from acute retention of urine. This was overcome by catheterisation. A tonic containing arsenic and strychnine had been prescribed. On the 2nd August the condition recurred. During the morning of the 3rd August the dog was very sick and had vomited several times.

Clinical Examination. The dog was recumbent and on being approached evinced signs of pain and obvious distress. There was intermittent tenesmus; temperature 103.2°F.; abdominal palpation produced great pain. The prepubic region was very tense. Palpation of the kidneys was negative. A catheter was passed and about 4 ounces of semi-opaque, brownish-red, strongly smelling urine removed. On withdrawing the catheter a small amount of blood was seen at the urethral opening. Dhommees' reagent revealed a moderate albuminuria. The urine was centrifuged. The sediment, stained wet with brilliant cresyl blue, showed large numbers of desquamated epithelial cells, pus cells, red blood corpuscles, clumps of coccus-like bodies, and bacilli, together with large numbers of crystals of oxalates and triple phosphates. There were no casts or epithelial elements of renal origin present. A diagnosis of catarrhal cystitis was made.

On 4/8/32 the catheter was again passed and a quantity of urine, similar to that removed on the 3rd, collected. About an hour afterwards the dog urinated voluntarily, the urine being blood stained. It was then considered possible that a small calculus had caused interference and had become dislodged. The high crystalline content of the urine and the above fact justified a tentative aetiological diagnosis of catarrhal cystitis with retention of urine due to obstruction of the urinary outflow by a calculus.

On 5/8/32 on being taken out the dog voluntarily passed a fair quantity of brownish, slightly opaque urine. The habitus of the dog suggested more ease and freedom from pain. Palpation produced no pain. From this date to the 9th the urine improved daily. An examination on 8/8/32 revealed a trace of albuminuria and catarrhal changes. The triple phosphates now dominated the crystalline elements.

The dog was clinically healthy till the 16/8/32, when the urine was again brown, odoriferous, semi-opaque, with a heavy sediment of catarrhal cells and triple phosphate crystals. On the 17th it had again recovered.

Röntgen photographs taken at this stage showed two ovoid calculi in the fundus of the urinary bladder. (Fig. I).

On the 18th, rectal palpation was carried out and crepitation could be determined in the bladder. A further radiograph was taken which

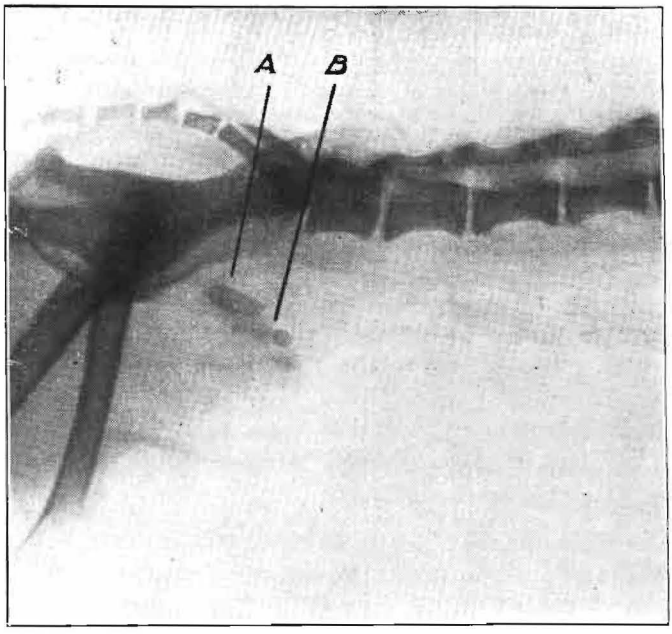

Fig. 1. Radiogram showing cystic calculi A and B in situ.

showed that the calculi had moved and were now lying near the neck of the bladder.

The diagnosis was now quite definite and it was decided to remove the calculi by cystotomy.

After 20 hours starvation the dog was anaesthetised with 2 cc. of eukodal subcutaneously, followed 1 hour later with 1.8 cc. of pernocton intravenously (weight of dog 8½ kilos). Anaesthesia was deep and prolonged.

A laparotomy was performed on the right side of the prepuce in the prepubic region and the bladder withdrawn. It was emptied of urine by puncture with a hypodermic needle. Cystotomy was performed on the dorsal surface of the bladder about 2.5 cm. caudal to the fundus. The two calculi were removed, size 1.9 cm. and 1 cm.

(Fig. 2). The incision in the bladder was closed by Czerny-Lembert catgut sutures; the peritoneum, muscles, and the skin being sutured separately.

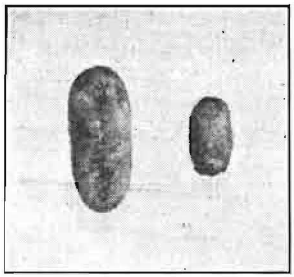

Fig 2. The two calculi after operative removal, natural size.

There was some subcutaneous inflammatory exudate following the operation, otherwise recovery was uneventful. An interesting feature in this case is the fact that the dog was less than a year old.

II. Rupture of the Abdominal Wall with Partial Incarceration of the Spleen in the Inguinal Region.

The following case was presented on June 6th, 1932, at the out patients' clinic for examination: Black and white, smooth-haired fox-terrier pup; male; 4 weeks old.

History: The pup suddenly went "off-colour." It showed pain on handling and a swelling was noticed underneath the abdomen. There was no history of trauma, although an injury could easily have been overlooked, as the pup was the pet of a young child.

Symptoms: The pup was quite bright, but showed stiffness in the left hind leg. There was marked abduction during movement. There was no general disturbance; temperature, pulse, and respirations showed nothing unusual. There was a tense, flattish swelling filling up the left inguinal region, 8 cm. by 6 cm. There was a slightly fluctuating area in its centre, otherwise the swelling was firm. Attempts at reduction failed. The dog was too small for rectal examination. Exploratory puncture somewhat complicated the diagnosis of a hernia as a few drops of blood issued from the needle when it was pushed deeply into the centre of the swelling. There was no change in the dog from the day of admittance until the 8th June, when it was decided to do an exploratory operation.

The dog had been starved for 24 hours. It was anaesthetised with subcutaneous eukodal, 1 cc., followed an hour later with intravenous pernocton, 0.35 cc. (weight of dog 1.4 Kg.).

An incision 5 cm. long was made through the skin over the swelling. The underlying tissues were adherent to the skin and infiltrated with blood. After careful dissection a fluctuatnig swelling covered with a thin capsule was exposed. The swelling contained blood-stained serum with a blood clot. Further dissection revealed an opening in the abdominal wall through which about half the spleen protruded. The haematoma had developed underneath the splenic capsule. There was a marked constriction on the spleen at the site of compression by the hernial ring. The protruding portion was dark bluish-red in colour, collapsed, and apparently lifeless from incarceration.

The spleen was withdrawn slightly. A catgut ligature was placed on the healthy tissue above the constriction and the collapsed portion removed with scissors. The healthy remnant of spleen was returned to position in the abdominal cavity. The peritoneum, which was ruptured during the accident, the muscles, and the skin were sutured separately with catgut. The sutures were removed on the fifth day following the operation and recovery was uneventful.

There appears little doubt that the rupture was due to increased intra-abdominal pressure, such as may have resulted from the animal's being trodden upon.

An Unusual Case of Anthrax in a Horse.

By A. M. HOWIE, M.R.C.V.S., East London.

Subject: A brown gelding, seven years old, the property of a native constable attached to the South African Police, East London. The animal's condition was good.

History: The horse had been working as usual, and was apparently normal at evening stables on the night of the 7th September last. At 6.30 p.m. he began to show symptoms of spasmodic colic, and at 8 p.m. a colic drench was administered.

Symptoms: I first saw the animal at 10 p.m. He was lying down in the stable evincing signs of abdominal pain, but the spasms were mild and of short duration. The membranes were pallid. Pulse was almost imperceptible and not accelerated, and as I was uncertain of the ingredients of the colic drench which had been given, I did not know in how far the condition of the pulse might be attributed to the drench, and in how far to other causes. Temperature 105°; respirations 50 per minute, and slightly laboured. A small amount of normal looking faeces was passed, but this might have been well back in the rectum prior to the onset of the spasms of pain, and I did not pay much attention to it from a diagnostic standpoint. One peculiar

symptom puzzled me, namely a very wild expression of the eyes which occurred at intervals between the pain spasms, and lasted for less than thirty seconds at each onset. Throughout, the horse was very quiet to handle.

As there was an absence of intestinal peristaltic sounds, I administered a full dose of nux vomica and ammonium carbonate, and left instructions that I was to be called if the animal's condition became worse.

The horse died at 5 a.m. on the following day, approximately eleven hours after he had first shown symptoms of pain.

The constable who was in attendance during the night informed me that the animal never appeared to be severely pained, and he described the symptoms as being of an "uneasy" nature, the horse lying down, resting for a brief period, rising, again lying down, and so on. The animal died without a struggle.

General appearance after death: I saw the carcase at 8 a.m. There was an entire absence of tympanitis, and no discharge or oozing was noticeable from any of the natural body openings. Rigor mortis was not well marked. There were no swellings on the chest, abdomen, sheath, throat, or head.

I had the carcase removed to the Municipal Abattoirs, and a post mortem was conducted in the vicinity of the destructor.

Post Mortem: As soon as I saw the blood and spleen, I suspected Anthrax, and microscopical examination of the blood confirmed the presence of this disease. The spleen was about six times its normal size and its consistence typical of anthrax infection. With the exception of the lack of swelling and the absence of putrefactive gases, the autopsy in every respect pointed to Anthrax as the cause of death.

I have recorded this case because of certain differences in the symptoms from those usually described in text books. As already mentioned, the membranes were pale, with no signs of cyanosis or haemorrhages. There were no swellings on any part of the body either before or after death. After death there was an entire absence of swelling of the carcase, and positively no sign of oozing from the nostrils or anus.

ABSTRACTS.

A New Septicaemic Disease of Young Ducks with a description of the Causative Organism *Pfeifferella anatipestifer* N.sp. Hendrickson and Hilbert, *Cornell Veterinarian* Vol. 22, 3, 1932.

On a certain duck ranch, 2,000 young ducks died out of 12,000. The losses were confined to birds 7-10 weeks old at first but afterwards

birds were affected even at 3 weeks. The same disease was encountered on other duck ranches.

Symptoms: Depression, sleepy attitude, and ruffled feathers were noted. Severe diarrhoea of a greenish colour developed. The birds were soon unable to stand, and there was a continuous bobbing or jerking movement of the head. A serous discharge ran from the eyes. Later, complete prostration supervened. Death usually occurred in 6-12 hours from onset of symptoms. The mortality was 100%.

Lesions: These were essentially those of a septicaemia. Petechiae were seen on all the serous surfaces. In most cases there was a yellowish-white oedematous exudate covering and adhering to the liver. A similar exudate was sometimes seen on the epicardium.

The spleen was a peculiar brown and showed mottling. Severe haemorrhagic enteritis was present. The lungs were congested and sometimes showed pneumonia. The blood was dark and uncoagulated.

Etiology: A characteristic organism was isolated from the blood and organs being a fine Gram-negative bacillus which was tentatively classified as a pfeifferella and given the name *Pf. anatipestifer.*

Using cultures of the organism it was possible to produce a condition in ducks resembling the natural disease. Intravenous inoculation was successful, but feeding even of large amounts of culture produced no ill effects. Chickens were resistant to inoculation by any method. Rabbits were insusceptible but large amounts intraperitoneally killed guinea pigs.

Attempts to demonstrate anti-bodies such as agglutinins in the sera of recovered ducks were unsuccessful. Diagnosis, therefore, depends entirely on the isolation of the causative organism.

E.M.R.

A *B. coli*-like organism causing abortion in sheep. J. A. Howarth, *Cornell Veterinarian* Vol. 22, 3, July 1922.

This article calls attention to the existence of numerous organisms associated with abortion in ewes and describes an organism of the *B. coli* type which appeared to be the aetiological factor in an outbreak of abortion in ewes in California.

The lambs appeared to have been carried almost to full term. A few abortions occurred early in pregnancy and some were born at full time but were weak. Retention of the afterbirth in the ewes was usually seen and it rapidly underwent putrefaction with a foetid chocolate coloured discharge. 26% of abortions occurred and nearly 50% of the aborting ewes died.

At post-mortem the uterine wall was very thick, swollen, and oedematous. The cotyledons were enlarged and the crypts filled with a

brownish-white pus, while the cavity of the uterus contained a dirty brown secretion and portions of decomposing placenta. The apparent causal organism was a small Gram-negative bacillus corresponding to and giving the biochemical reaction of *B. coli.*

Pregnant ewes inoculated with the organism aborted. Agglutinins for the organism were demonstrated in small amounts in the sera of affected ewes, but a reaction of over 1:40 was unusual. The serological tests were, therefore, of very little use in diagnosis.

It was thought that the infection may have been associated with the ewes' drinking at stagnant pools or contaminated water supplies, such as irrigation furrows from rice fields.

E.M.R.

The Viability of *Brucella abortus*. H. S. Cameron. *The Cornell Veterinarian.* Vol. 22, No. 3, 1932.

Experiments conducted to determine the duration of viability of *B. abortus* showed that this organism lived

(1) Four and a half hours when exposed to direct sunlight.

(2) Five days when dried in sacking kept on a table in the laboratory,

(3) Thirty days when dried in sacking and kept in a cool cellar,

(4) One hundred and twenty days when dried in the presence of nutrient material,

(5) Seventy-two days when dried in the absence of nutrient material,

(6) Less than four days in soil which dried quickly in petri dishes in summer,

(7) Twenty-seven days under the same conditions but in winter.

(8) Twenty-seven days in soil in test tubes and dried slowly.

(9) Sixty-six days in wet soil.

(10) Four days in normal bovine urine at room temperature.

(11) One hundred and twenty days in bovine faeces in test tubes and dried slowly.

(12) One hundred and twenty days in bovine faeces kept moist,

(13) Seventy-seven days when exposed to putrefaction.

(14) Seventy-seven days in tap water at room temperature.

(15) One hundred and fourteen days in tap water kept at - 4 deg. C.

E.M.R.

Quackery in Germany (from *Mitteilungen der Tierärtzlichen Geseltschaft zur Bekämpfung des Kurpfuschertums).* No. 2, February, 1932.

The great difficulties and competition encountered by the veterinary profession in Germany as a result of quackery led in 1925 to the formation of a society whose main object is to safeguard the rights of qualified men. Such a society was created as far back as 1903 by the medical profession.

In Germany, peculiarly enough, anybody is at liberty to treat or cure for reward, both man and animals. As long as a person does not pose as qualified, sell or prescribe dangerous drugs, grossly defraud the public, or meddle with infectious diseases, the State does not interfere. The use of the terms Physician (Artz) and Veterinarian (Tierartz) is of course restricted to persons officially recognised as qualified.

The Society's aim is to promote the claims of qualified practitioners, and expose the work of quacks at every possible opportunity. Towards this end efforts are made to enlist the co-operation of all concerned, particularly the salaried employees (state, municipal, and other veterinarians) in collecting useful evidence.

Active propaganda by means of freely distributed pamphlets (such as the one abstracted), the press, and other available channels is also undertaken. W.O.N.

BOOK REVIEWS.

Professor Watt and Dr. Breyer-Brandwyk, both of the University of the Witwatersrand, Johannesburg, have rendered a valuable service to those interested in, and studying South African medicinal and poisonous plants. The book they have written is particularly intended for the medical practitioner, the pharmacist, the missionary, and the forensic worker, to all of whom it will undoubtedly appeal as filling a long-felt need in the subcontinent. Special credit is due to the authors for recording native plant remedies as these are "vanishing before the advancing tide of civilisation with its synthetic medicines." The book(1) comprises three hundred and fourteen pages and is very well indexed. The authors do not claim to have exhaustively treated the subject in all its aspects, the veterinary literature quoted, for instance, being far from complete, as the following examples selected at random will show:

The literature referred to with regard to some poisonous plants (for example, *Polygonum fagopyrum* Buch.-Ham. or L, *Andropogon sorghum var. sudanensis* Pejer, *Lolium temulentum* linn.) is very meagre. Nothing, for instance, is mentioned of the toxicity of

(1) The Medicinal and Poisonous Plants of Southern Africa by John Mitchell Watt and Maria Gerdina Breyer-Brandwyk. 1932. Edinburgh. E. and S. Livingstone p. 314 + xx; 25/- net.

Raphanus raphanistrum Linn. Bull (Australia) in 1929 proved *Oxalis cernua* (Thunb.) Linn. poisonous to stock, and in the same year Mettam (Kenya Colony) showed that *Gloriosa virescens* Lindl. produced poisoning in stock. With regard to *Zea mais* Linn, present to do all they could to assist in throwing some light on this Watt and Breyer-Brandwyk quote Walsh as follows: "He states that animals are sometimes poisoned from eating the green plant. This poisoning has been variously ascribed to tympanitis or hoven, to potassium nitrate, or to some parasitic growth upon the plant. The first seems to be the most likely cause." It is, however, a well established fact that poisoning with the green wilted plant is due to presence of prussic acid.

The results of Steyn's work on *Psilocaulon sp.* (S. Afr. Nat. Herb. No. 8819) are, furthermore, wrongly interpreted. This plant from the Willowmore district was definitely poisonous owing to its high oxalate content, and possibly also due to the presence of a poisonous alkaloid. It is an established fact that the oxalic acid content of some Mesembrianthemum spp. varies to a considerable extent at different times of the year.

This work would indeed have been of greater value to veterinarians and veterinary students,if the available information regarding distribution, symptomatology, post-mortem lesions, toxic and lethal doses, prevention, and treatment of a large number of plants poisonous to stock had been included. Detailed information on the above points is of the utmost importance in the diagnosis and treatment of plant poisoning, one of the vital stock problems of South Africa.

D.G.S.

Dr. Malherbe's Scientific and Technical Dictionary(2), of which Vol. I has just been published, has been planned on a most ambitious scale, for it embraces the equivalent and synonyms in English and Afrikaans of terms in use in Mathematics, Engineering, Physics, Chemistry, Botany, Zoology, Geology, Astronomy, Medicine, Agriculture, Music, Architecture, Mining, Carpentry, Metalurgy, Motoring, Aviation, Shipping, Railways, Photography, Typography, Diamond Cutting, together with those in use in the various subsidiary sciences of the above. A wide enough field surely—and, to give greater assurance for the validity of the terms used in the "Dictionary," the compiler has had the assistance of no less than 25 collaborators, who nearly all occupy prominent professional positions on the staffs of our universities, museums, etc.

(2) *Vakwoordeboek* by Dr. D. F. du Toit Malherbe, Professor of Chemistry in the University of Pretoria. Vol. I, English-Afrikaans, pp. xiv + 353, 1932. Pretoria: J. H. de Bussy. Capetown: H.A.U.M. op Jac. Dusseau & Co.

Volume I, now available, will thus serve as a measure of the success with which the difficult task has been crowned, and if one may judge from a test applied to the contents by the reviewer over one day, there can be little doubt that the publication will assuredly "supply a long-felt want" in the best sense of this somewhat overworked phrase. This much as to general function. As to the spelling adopted for the Afrikaans equivalents, the pundits will doubtless have something to say—and the compiler seems to anticipate something in this direction—but those who are less concerned with the practical value of the work than with such contentious issues as to whether preference should be given to a more Nederlands, or an even more phonetic rendering of the spelling of the terms, will agree that not spelling but content is the principal thing. At any rate, it can be safely said that those whose education and training have been exclusively conducted through the English medium will find the book invaluable (especially when once Volume II is also available) in mastering the Afrikaans terminology, and by adopting the spelling given, however much the pundits may frown upon it, will no doubt err in good company.

A welcome addition to the vernacular names of plants and animals given is their corresponding scientific names, which are especially useful to those who have not the convenience of a reference library at their immediate disposal, and in connection with these the following points may be noted:

Some lack of consistency appears in the decapitalising of the initial letter of the specific epithets, though decapitalisation seems to have been generally adopted. One finds, for instance, *Tetrodon Honckenii* (p. 323), *Scolopia* (not *Slolopia* as given) *Mundtii* and *S. Zeyheri* (p. 230), *Trifolium Burchellianum* (p. 69), but *Haematopus moquini* (p. 226), *Tichornis naumanni* (p. 176), etc. Decapitilisation is certainly a matter of individual preference, though nearly all botanists are agreed at least as to the undesirability of decapitalising (a) old generic and (b) vernacular names which are used as specific epithets; e.g. (a) *Intybus* (p. 62), *Stramonium* (p. 320), *Rhafanistrum* (p. 61), etc. and not *intybus*, *stramonium, rhaphanistrum,* etc.; (b) *Molle* not *molle* (p. 232). *Cacao* not *cacao* (p. 63), *Papaya* not *papaya* (p. 227), etc. This is not a question of mere finicky detail, but can be substantiated by cogent reasons.

Some of the scientific names have certainly not been viewed with critical care in regard to their "validity." Thus: *Pentzia incana* and *P. virgata* are cited as representing separate species (p. 175), whereas these actually indicate the same species, the first being correct under International Rules of Plant Nomenclature; *Fagara* is used on p. 54, *Xanthoxylum* on p. 352, and then again *Fagara* (*Xantoxylum*) *capensis* on p. 177; *Tasus lalandii* occurs on p. 83, but *Paliurus*

(*Tasus*) *lalandii* on p. 188; *Poa abyssinica* (p. 316) is used instead of the widely accepted *Eragrostis Teff*; *Opuntia pusilla* (pp. 49, 173) instead of *O. aurantiaca*; *Phoenix reclinata* (p. 90) instead of *P. dactylifera*, the former being the wild date palm, and not the one from which dates are obtained. Such aberrancies may not mislead the critical botanist, but certainly will not make for accuracy in the hands of other workers who are not necessarily botanists, but who have cause to utilise the names (veterinarians, extension officers, etc.).

A number of typographical errors also occur, e g. *Latana* for *Lantana* (p. 38), *virides* for *viridis* (p. 203), *Exebergia* for *Ekebergia* (p. 25), *Afriplex* for *Atriplex* (p. 274), *halepensis* for *halepense* (p. 173) *Slolopia Mundtii* for *Scolopia mundii* (p. 320), and some others

Two equivalents given also call for comment. Thus that for Ealworm, given as "knopwortel, vrotpootjie," is unfortunate, since the two latter are the equivalents for the disease and not for the causative organism, i.e. the Ealworm (see also under Eelworm). Less felicitous, too, is the equivalent for *Synclastic at P* given as "P. is 'n elliptiese punt"—an "elliptiese punt" being a rather paradoxical concept in view of the accepted definition of a point (= punt).

Needless to say none of the items noted above seriously interferes with one's first estimate of the book, the more so since typographical and other errors can easily be rectified in an "Errata" list in Vol. II if there be still time.

It should be noted in conclusion that the Dictionary is not intended to supersede those of Kritzinger, Bosman, etc., for by its very nature it deals with a specialised field only, a point also set out by the compiler in useful prefatory notices—a detailed one in Afrikaans and a shorter one in English.

The publishers are to be congratulated on their producing a fine strongly bound volume and printed in clear type on excellent paper. Indeed a volume, which with its prospective companion, should be in the hands of veterinarians, as well as their colleagues in the allied sciences. J. S.

THE ASSOCIATION.

23rd General Meeting, Onderstepoort, 26th and 27th September, 1932.

Present: Drs. P. J. du Toit, G. de Kock, E. M. Robinson, G. Martinaglia, J. Quinlan, J. G. Bekker, J. Quin, D. G. Steyn, A. D. Thomas, H. O. Monnig, J. R. Scheuber, and Messrs. H. Graf, R. du Toit, J. H. R. Bisschop, R. A. Alexander, J. D. Coles, P. S. Snyman, B. S. Parkin, A. E. Lund, L. Stonier, J. L. Dickson, V. Cooper, J. Zwarenstein, W. H. Chase, J. A. Thorburn, N. F. Viljoen, W. J. Ryksen, F. A. Verney, N. Starke, A. M. Howie, C. v. E. Maré, G.

May, J. Spreull, J. J. G. Keppel, C. J. van Heerden, M. Henning, A. S. Canham, J. Chalmers, W. P. Hamlyn, F. J. Dunning, A. Matthew, C. Jackson, M. H. V. Brown, J. H. Mason, E. T. Henderson, G. Melck and H. H. Curson (Hon. Secretary-Treasurer).

Visitors: included Dr. A. I. Malan, Mr. A. O. D. Mogg, and all the cadet members.

Apologies: Mr. and Mrs. M. C. Robinson, Mr. W. A. Elder, Col. J. G. Bush, Mr. R. Paine, Mr. F. J. Carless (President), and Mr. S. T. A. Amos (Vice-President).

The Chair was taken by Dr. P. J. du Toit. A short and hurried business meeting was held from 11 a.m. to 12.15 p.m. of which the following is a brief summary. Members of Council agreed that a preliminary meeting of that body should be dispensed with.

1. Minutes of 22nd General Meeting (24/3/32) were read and adopted. See June issue 1932, Jl. S.A.V.M.A.

2. Nothing arising from minutes in question.

3. There was no discussion on Reports of Standing Committees previously circulated.

4. The following resolutions were passed and are to be added to the constitution:—

(a) *Benevolent Fund.* "That a sum of money be set aside and be at the disposal of the Council to be expended by the Council as they deem fit, in rendering assistance, in whatever manner they decide, to members of the profession (or their families or dependants) who have been members of the Association." Carried by 19-17 votes.

(b) Paragraph 10 General Meetings. Insert (j) as follows: "When with the sanction of Council an early expression of opinion by members of the profession is sought, a referendum shall be held and the decision shall have the value of a resolution passed at an ordinary or special general meeting. The voting papers must be in the hands of the Hon. Secretary-Treasurer within 30 days of their original despatch." Carried unanimously.

5. Messrs. W. G. Barnard, W. S. B. Clapham, and L. W. Rossiter were elected to membership.

6. The deaths of Messrs. E. Wilson (7/6/32), J. Peddie (5/8/32), and E. B. Kellett (6/9/32) were reported, also that of the first President of the S.A.V.M.A., viz. Mr. R. E. Montgomery.

7. The coat of arms, as drawn up by the Sub-committee of Council (with the advice of Prof. Blommaert of Stellenbosch), approved unanimously. The suggested mottoes to be submitted to a referendum of all members in good standing.

8. *General:* (i) grievances, e.g. S. & T. 7/6 p.d., to be addressed to Secretary Protechnical Section, P.S.A. (ii) Notice of motion *re* Faculty and Students to be considered by Council.

The scientific part of the meeting took the form of discussions and demonstrations on selected subjects.

On the first day Dr. P. J. du Toit gave an interesting review of the position with regard to foot and mouth disease in Southern Rhodesia. After tracing the course of the disease in that territory, he described the precautions taken to prevent its introduction into the Union. He considered that it was very probable that Rhodesia would soon be free from the disease, which was no longer widespread there.

Dr. Quinlan made a strong plea in favour of more humane methods of dehorning cattle than at present used in many instances. He considered the dehorning of cattle over four months as a cruel operation. A resolution was later put forward and carried in favour of using all possible influence in getting stockowners to dehorn cattle as young calves.

The afternoon was devoted to a discussion of the bovine tuberculosis problem in the Union. Dr. de Kock outlined the policy which it was proposed to adopt in combating the disease. He mentioned what had already been done in this connection and the tremendous difficulties which had been met with. He gave a demonstration of some of the lesions met with in cattle and mentioned some of the more recent ideas on the development of the disease in the animal body. There followed then a demonstration by Dr. Robinson on the standardization of tuberculin. Mr. Snyman also gave a practical demonstration of the intradermal tuberculin test and its interpretation, which gave rise to considerable interchange of views and opinions.

The evening was devoted to a discussion of the papers read during the day.

On the second day Dr. du Toit gave a resume of the most important features of the proposed Cattle Improvement Draft Bill and mentioned other important points in connection with the chilled meat industry which is now being fostered in the Union.

At 11 a.m. Dr. Quinlan gave a practical demonstration of modern methods of producing anaesthesia in the domesticated animals, after which Dr. Quin showed the effects of photosensitization in sheep.

Dr. Quin and Dr. Thomas then made a brief statement regarding sweating sickness in calves and an appeal was made to the members present to do all they could to assist in throwing some light on this obscure disease.

The afternoon was devoted to a discussion on poultry diseases.

Mr. Canham dealt with chicken-pox, fowl typhoid, and bacillary white diarrhoea and Mr. Coles with roup, leg weakness (neurolymphomatosis), and coccidiosis. A very interesting discussion on these and other poultry diseases followed.

The following resolutions were passed unanimously by the meeting:—

(a) This meeting of the South African Veterinary Medical Association wishes to express its indebtedness to the Minister of Agriculture for the way he has met the Director of Veterinary Services in making the 1932 Spring Meeting a great success. This interchange of thought, knowledge and experience is not only of material benefit to the members present, but undoubtedly assists the officers of the Division in obtaining a new outlook on the problems that have to be solved. The meeting realises that veterinary science is daily becoming more important and essential, not only to the State and to all forms of local Government, but also to all owners of stock. For these reasons the great necessity of the early passage of the Veterinary Bill is again stressed, and the meeting expresses the hope that the Minister will again use his influence and support to pave the way for the early introduction and passage of the Bill at the next Session of Parliament.

(b) *On dehorning of Cattle.* That this meeting of the S.A.V.M.A. subscribes to the general principle of the dehorning of cattle. It urges that the object should be attained by the "debudding" of calves. It strongly objects to the dehorning of cattle over four months, as this operation is associated with excessive pain and serious economic loss and painful sequelae.

(c) *Cattle Improvement Act.* That this meeting of the S.A.V.M.A. supports the principles of improving the cattle industry and welcomes the draft bill. With this object in view it suggests the appointment of a Committee to be called the "Cattle Industry Improvement Committee of the S.A.V.M.A." to watch the interest of the profession in the development of this industry. The following members were accordingly elected: Messrs. Verney, Quinlan, Bisschop, Melck, Snyman, and Bekker, with Dr. Quinlan as convenor.

After votes of thanks to the Chairman and Dr. de Kock and to the ladies for serving tea, the meeting terminated at 4.15 p.m. 27/9/32.

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