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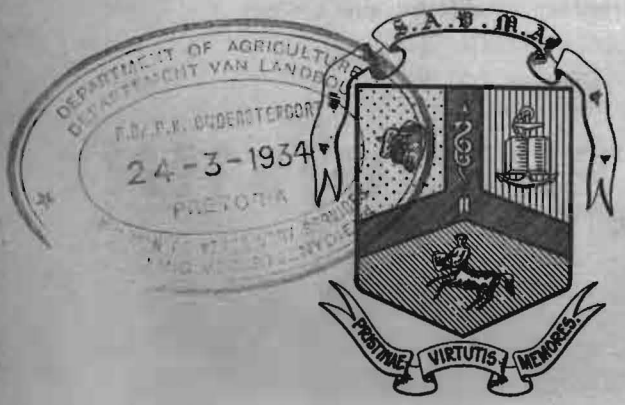

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EDITORIAL.

THE S.A.V.M.A.

We have all at one time or another asked the familiar questions: "What has the Association done? Is it worth while being a member? In seeking a reply thereto the enquirer should examine carefully the various circumstances attendant on the functions of this body. He should remember that its achievements are limited by its size and strength and by the goodwill of its members. Much rather should he ask himself—Where should we be without an Association?

During its 13 years of existence the Association has not perhaps achieved anything very spectacular until the recent passing of the Veterinary Bill, but it has at any rate succeeded in maintaining that necessary corporate feeling in a very scattered, young, and struggling profession, in number scarcely exceeding a hundred. It is a remarkable fact that the membership throughout these years has been so high, and that considerable interest has always been displayed in the all too rare scientific meetings that have taken place yearly. It is also an important sign of progress that the need for a printed record of the activities of the Association, scientific, social and otherwise, gave rise to a Journal. This was at first, it is true, but an annual report of Proceedings, which has since evolved into a modest, but nevertheless recognised periodical in the veterinary world.

The passing of the Veterinary Bill is now an accomplished fact and, no matter what the many shortcomings of the Act may be, forms an important milestone in our profession's development in this country. The mere passing of the Act is, however, most emphatically not the panacea for our profession's ills that many anticipated. The Act undoubtedly fills an urgent need in so far as protection of the public and the private practitioner is concerned, but was never by any means intended to exalt the profession to an unearned Utopia. Even those advantages which reasonably may be expected to flow from this Act depend to a large extent on the vigour and foresight with which it is administered by the Board. In any case, it must clearly be understood that the responsibility for any improvement in our status ultimately devolves on the members of the profession themselves, both individually and collectively.

It may be of some use at this stage to recapitulate a few of the main factors on which depend the strength and weakness of the Association.

Factors which make for strength.

Individual social status of members depending especially on standard of general education.

High professional standing and integrity.

High percentage Association membership.

Live and independent executive.

Sound financial policy and reserves.

Judicious propaganda in lay press.

Live Journal to act as Association's mouthpiece as well as to afford means for interchange of thought and dissemination of knowledge.

Causes of weakness.

Very small veterinary population which is widely scattered so that contact and intercourse are hampered.

Sprinkling of private practitioners amongst whom little or no concerted action is possible.

Great proportion of public servants who have limited freedom of thought and action.

Lack of confidence in the future status of the profession and between members.

General apathy in all Association business, particularly in election of executive. (Only 50-60% of members actually take the trouble to vote).

Competition and conflict between state and private veterinary enterprise instead of co-operation.

Inefficiency and low earning capacity.

Several of these factors, it will be appreciated, are entirely beyond immediate control. By far the greater number, however, can and should be influenced directly or indirectly by a slight effort and a spirit of goodwill on the part of each member. In other words, before we look for progress in the face of the handicaps mentioned and before we blame and criticise our executive for their various shortcomings, we must realise that the root of all this weakness can be remedied only by a change in the individual attitude, by the cultivating of true *esprit de corps*.

With all our disabilities as a profession, the future in this country is nothing like as dark as certain pessimists would have us believe. The indispensability of the services performed by veterinarians in South Africa and the extent of their scope, embracing as it does animal health, animal husbandry, public health and private practice, is sufficient to discountenance such opinions. Indeed we cannot help feeling that the magnitude of the free veterinary aid which it has been the

policy of the government to provide has, far from being to the lasting disadvantage of veterinarians, been responsible for the development of animal husbandry and a certain reliance on veterinary advice. In other words free veterinary services, which have from no direction been so bitterly criticised as from within the profession, should, if the future policy is rightly handled, prove to be a blessing in disguise. To put it bluntly, the State has rendered free veterinary services until the recipients of this privilege cannot do without us; for a strong and united profession it would remain to turn to its own advantage the reliance which has come to be placed on veterinary advice by the public. Granted that there is room in this country for a small but contented section of our honourable profession, then the conditions of service, remuneration, professional status, and many other discrepancies which at present leave much to be desired are matters the remedy of which lies in our own hands.

Let there be no mistakes about that. A strong and live Association, although small, can in time by itself and by enlisting public opinion on its side do all that is required to ameliorate and consolidate its position. The sacrifices and efforts required of each member are small indeed compared to the beneficial results which would sooner or later accrue were we to present a united front against all adverse contingencies.

JL. S.A.V.M.A.
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A General Survey of the Veterinary Act No. 16 of 1933 (Concluded).

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

There remain certain observations of a practical nature to be made on *sections* 14, 15, and 17 of the Act. It is one's experience that departments do not always apply the machinery of enquiries correctly and that in many cases the decision of a Supreme Court is invoked. It will be seen that the Board has a discretion in the matter of postponing its enquiry into a complaint, charge or allegation which may form the subject of criminal proceedings in a Court of Law. Such discretion is unfettered, but it would undoubtedly as a rule be wise to approach the Attorney-General of the particular province and enquire from him whether a prosecution is to be instituted and if so the date thereof. The Attorney-General has the advantage of the smooth machinery and a trained staff for investigation. The ventilation of the matter in Court provided it is sufficiently serious would normally be the most satisfactory way of disposing of the matter. The domestic discipline of an enquiry does not generally serve as a real deterrent, whereas the publicity of a prosecution is to persons in a profession a matter of very real significance. A departmental enquiry may—on the other hand it may not—be conducted with that meticulous regard to detail and fairness which characterises the Courts of this country so that once a conviction has been obtained in any Court the department may proceed to take the relevant steps permitted to it without hesitation of any sort. It may be urged that an appeal from a conviction might delay the issue, but it is well known that recourse by way of review is generally equally open in cases of a finding at an enquiry. One knows that very frequently an enquiry is embarrassed by the fact that the officer appearing before it is personally well known to the members of the Board with the result that one or more of them feels hampered by knowledge not strictly relevant and of a nature either to influence the course of the case favourably or adversely against the person charged. On general principles one is entitled to affirm that if possible enquiries ought to be deferred pending the result of a hearing by a competent Court. It is admitted of course that there are very many cases in which the department's file is eloquent witness to the fact of continued negligence and insubordination on the part of an officer, but one may assume that except in the case of minor contraventions or those not amenable to our Courts the department would prefer to see what the verdict of a proper Court was, rather than submit too readily to the rule of administrative law which is making far-reaching inroads upon the liberty of the subject. It is true that *section* 15 provides

for representation by means of counsel at an enquiry, but one knows (one can hardly expect it to be otherwise) that the exclusionary rules of the law which safeguard the liberty of the subject are not fully applied at such enquiries. Without wishing to dictate to departmental policy, the writer submits that the provision as to postponement pending the result of criminal proceedings was wisely inserted and should in appropriate cases be relied upon. It would obviously appear ludicrous if proceedings were simultaneously incepted and different conclusions were arrived at by the Court and the Board, or if the result of a subsequent prosecution were to be contrary to that of the preceding enquiries.

In this connection it may be noted that the *Railways and Harbours Service Act, No. 23 of 1925, section 16*, has the following provision :

> If a servant is accused of an act or omission regarded as misconduct in connection with which he is at the same time being criminally prosecuted, departmental disciplinary action shall not be proceeded with until the Court has finally disposed of the criminal case or the prosecution is withdrawn unless the servant intimates in writing within fourteen days after the receipt of the departmental disciplinary charge his desire that disciplinary action shall be proceeded with.....

It is interesting to note that in England the general rule is that in cases of members being convicted of misdemeanour or higher offence the Council on receiving a report from the committee that it finds the charge proved proceeds to direct the registrar to remove the member's name from the register. But there have been exceptional cases where such drastic action did not follow. The Council reserves to itself the right to come to an independent decision in all cases and if it thinks the circumstances warrant such a proceeding it will decide either to dismiss the case or to censure the accused or to defer the case for six months or more, putting the accused on his good behaviour in the meantime. If in such a case the accused produces satisfactory evidence of his good conduct since the previous hearing the Council may decide to impose no further penalty (*Bullock* : *Law Relating to Medical Dental and Veterinary Practice*, p. 183).

It would seem that the consent of the Minister is necessary to hold an enquiry (*Section* 15 (1)). This is another instance of the new despotism which has crept into legislation and perhaps a cogent reason why the decision of the Attorney-General should be awaited. It is curious that there are provisions for imposing fines on witnesses who "commit offences" whilst appearing before the Board, which Board may with the *approval* of the Minister appoint a legal assessor to be present at an enquiry in an advisory capacity.

Nothing is said in the Act about giving the person charged notice of the complaint against him, although there is much in the Act regulating the procedure to be followed. The manner in which compaints

or charges against a registered veterinarian shall be lodged and the method of summoning an accused person have still to be promulgated in the regulations to be framed by the Governor-General. One may assume that ample notice would be given in order to allow an officer to prepare his case and that the distance of his station from the venue of the enquiry will be an important factor in determining the time to be allowed. In England the enquiry may at the election of the accused be held in public on ten days' notice being given to the secretary.

It will of course be difficult for the Board (or perhaps a Court!) to decide what improper or disgraceful conduct is. The meaning of the words "infamous conduct" in relation to medical practitioners has been decided in England by the Master of the Rolls in *Allinson v. General Medical Council*, 1894 1 Q.B. 750, where it is said :—

> I am prepared to adopt a statement of one ground of guilt, amounting at all events to infamous conduct in a professional sense which has been drawn by my brother LOPES. It is this: If a medical man in the pursuit of his profession has done something with regard to which it will reasonably be regarded as disgraceful or dishonourable by his professional brethren of good repute and competency then it is open to the General Medical Council, if that be shown, to say that he has been guilty of infamous conduct in a professional respect.

The application of the doctrine is not easy but I think that no Court will be anxious to interfere with a *bona fide* conclusion made by a Board. As Bullock says (p. 176), "On this question the decision of the Council will be left untouched by Courts of law." In *Allinson v. General Council of Medical Education and Registration* (1889), 23, Q.B.D. 400, it was held that if the Council acting *bona fide* and after due enquiry adjudged a medical practitioner to have been guilty of infamous conduct in a professional respect, the Court has no jurisdiction to review their decision by granting a mandamus to restore the erasure. The word "infamous" as interpreted may be taken as a guide in construing "improper" or "disgraceful" and the same protection will be granted the Board if it *bona fide* comes to its conclusion. The bye-laws of the three professions in England dealing with professional conduct are very much alike.

Section 17 (1) of the South African Act follows the language of our *Medical Dental and Pharmacy Act No.* 13 *of* 1928, *section* 34 (b) and the decisions on this latter section will be found very useful in construing the former. In England the corresponding provisions seem to be embodied in *sections* 16 *and* 17 *of the Veterinary Surgeons Act* 1881 and the leading case seems to be *Royal College of Veterinary Surgeons v. Kennard*, 1914 1.K.B.92. The opinion seems to have gained firm ground in England—and special committees have said so—that any attempt to control unregistered practice by restricting the use of titles will inevitably fail and cannot be relied on to protect public interests.

JL. S.A.V.M.A.
V(1) 1934.

The Study of Anatomy: A Discipline and a Philosophy.*

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

In introducing students to the study of anatomy I feel that they are being launched on a sea which is so closely charted that its manifold beacons may obscure their view of the water itself. It is prudent therefore to offer some advice on the means whereby they may avoid being wrecked on those very obstacles which properly should serve for their guidance and which should never be allowed to command that fascination of the attention which too often leads to collision with the very object of contemplation that it is desired to negotiate; whereby they may come to discover in their studies instead of the disheartening tedium which in former years was and (I fear) in some institutes still is the lot of the student, a wealth of inspiration which will render their stay in this department a period to which they may in later years look back with pleasure, pride, and satisfaction.

Little blame can justly be attached to the student who has been led to expect and subsequently learns to regard anatomy as a monotonous routine of memorization of facts to be forgotten so soon as he attains his liberation from the tyranny of our academic régime. He cannot always be expected to find for himself that line of approach to scientific study which at its best has characterised the methods of only the great names in science.

A certain degree of tedium is perhaps inseparable from the study of anatomy, especially at the outset. It can, however, be reduced to a minimum by applying to the work the methods which I have ventured to commend to the notice of my students :—

Most important among these is the development of that interest in the correlation and general biological and philosophical implications of the subject which can quicken dead facts into vital centres of interest. Without this effort anatomy will be presented from an essentially three-dimensional viewpoint, i.e. the body as a 'dead' preparation. We require to add the fourth factor of function (i.e. the phenomena which occur essentially in time as well as in space) in order to effect this transformation of our standpoint: thus embryology (growth and development), the sciences of evolution, physiology, pathology, and even surgical and medical diseases should at this early stage appear upon our mental horizon. Unfortunately anatomy has to be taught

(*Based on a Lecture delivered to students of Anatomy in the Faculty of Veterinary Science, University of Pretoria; Semester I, 1932).

at the beginning instead of at the end of the course, when the student would be better equipped for a broader appreciation of its significance. Under these circumstances, however, much can be done by the teacher in remarking on functional aspects of the structures from time to time under observation and by the student in collateral reading which will serve at once as a relief from the tedium of systematic anatomical study and as a valuable asset in those cultural and educational refinements which veterinary students, as biologists and as future members of a profession covetous of an enhancement of its status, can never afford to neglect.

Secondly, it is essential to develop that enthusiasm for technique both material and mental (i.e. dissection methods and memorization methods respectively) which is so unconvincingly explained by words but which wells up inspiratively in the mind after diligent and constant application to study, of which it is the legitimate reward. This mental attitude is hard to define, and has occupied the attention of many distinguished psychologists. Like many other parallel inspirational or intuitional mental experiences, it is to be appreciated and comprehended only by direct personal experience.

The burden of memorization may be further lightened by the adoption of a system of teaching and learning based on mental imagery. For this purpose students are required to habituate themselves to the formation of mental pictures of the bodily structures both in themselves and in relation to their environment. This environment, be it remembered, is partly anatomical (and forms the standpoint of topographical anatomy) and partly functional (i.e. the 'physiological' or 'biological topography' must be thought of, as suggested above). These latter images are of course not visual : they concern biological philosophy and are, therefore, the philosophical aspects of structure in its relation to function. They will serve to order our knowledge on lines harmonious with those natural 'biological fields,' the conception of which has, to the lasting advancement of science, been developed by several recent biological philosophers (e.g. Bertrand Russell, Haldane, Hogben, Thompson, Smuts and more obscurely by Bergsen, Lloyd Morgan, and many others).

The acquiring of clear visual images is dependent on practice in observation. The experience gained by such concentrated visual contemplation of the structures studied is to be mentally consolidated by constructing drawings thereof, first from nature and later from memory. A sound technical equipment in the art of sketching is, therefore, a considerable asset to the anatomist, and its study will be repaid in anatomical proficiency as well as in cultural refinement. It is, however, not to be considered as an essential : ability in the technique of art cannot be demanded at present from students of science. But

art is not technique alone, being primarily dependent on observation, the seizing on of relationships, and at its highest, on the philosophical or spiritual significance or the holistic interpretation of the subjects of observation. This part of the artistic faculty should be cultivated by every biologist as an essential in his education and outlook, whether or not he is (in the narrower sense) artistically inclined.

(Technical difficulties in drawing are assisted by the employment of tracing methods. For this purpose glass screens set up parallel with the plane of the subject which it is proposed to represent will be found very valuable by those poorly endowed with the sense of proportion and perspective. On these the outlines and main landmarks can be roughly sketched in indian ink and the lines then transferred to tracing paper and finally to drawing paper on which the sketch can be completed free-hand. This roundabout method is valuable for the very repetition it entails, serving to impress the subject the better on the memory).

Similarly the perception of the general correlations or holistic aspects of biological studies is engendered by practice in reflection, first by contemplating and mentally copying the thought-models set by great thinkers and later by achieving the independence of individual constructive thought.

A complete knowledge of even macroscopic morphology being beyond the scope of any one mind, it matters but little if the student is unable to describe every minute structure in the body, and failure to realise such an ambition should not be made a cause for discouragement. Anatomy is to be regarded as a *system* of studying the patterns of the animal body—a system both (a) of pedagogic, biological and philosophical value, and (b) having direct practical applications. These two aspects should respectively be satisfied, therefore, by acquiring (a) the ability to apply oneself intelligently and with appreciation to the study, and (b) a close knowledge of those structures and regions of especial importance in clinical medicine and surgery; and, later on, of any structures which from time to time come to form the basis of special research study i.e. serving as a technical equipment or a basis on which to build arguments, to seize upon significant relationships, and to formulate general conclusions. Such important aspects of the systematic and the topography will of course be pointed out by the teacher from time to time and they comprise more particularly that knowledge which is sought after in the course on topographical anatomy given in the second semester. These latter aspects are meanwhile, as it were, to be "taken on trust" by the student. He must, however, be assured by the teacher that their full value will be realised later in the clinic, the operating theatre, and the research laboratory, and at the same time his interest must be stimulated by elementary

and preliminary explanations of the clinical and pathological significance of alterations in the regions concerned.

Anatomical study has a value to mental discipline that deserves more than passing notice. It offers an unquestionable opportunity for the display of precision in several spheres, among which may be mentioned the following :—

(1) *Nomenclature and vocabulary* : Students are encouraged to learn to use the correct terms : they are the most economical and lead to the avoidance of confusion and misunderstanding. Further, students will be well advised to cultivate a good scientific literary style. In reading texts and journals, they should practice discrimination between authors with ability to express themselves and those who merely cast their facts before the reader in clumsy language and disorderly arrangement.

(2) *Dissection* : Efficiency in this technique is acquired merely by practice and by intelligent application of the reading which the student finds in his texts. It can scarcely be taught. It is a means to an end, and while enthusiasm for dissection as an art is a most valuable asset to the future surgeon, it must not be allowed to run riot to the extent that the end becomes forgotten. While pride in neat dissection is very admirable and quite proper, it must be remembered that time is valuable and that tasks must be completed within a reasonable period. One must therefore strike a mean between considerations of thoroughness and the time-limitations which the magnitude of this course imposes.

When dissecting, the student should know what he is aiming at and why, before he proceeds. He should have always a definite object in mind, even if it be no more than to neaten and clarify the field of dissection. The knife and forceps are to be handled with accuracy and boldness. Efforts should not be pressed to a degree where the muscles of the hands and arms become severely fatigued. Frequent pauses of a few minutes duration are beneficial. Tired muscles are as inefficient physiologically as tired brains are psychologically. The future surgeon has need of boldness tempered with delicacy and refinement of movement, and endurance in physical posture and dynamic muscular activity to all of which fatiguing the neuro-muscular system is not conducive, and therefore an inefficient method of training.

(3) *Visualisation* : The student should be able (mentally) to turn a dissection subject upside-down or from back to front without feeling constrained to stand on his head or run round to the other side to reorder his visualisation of topographical relationships.

(3) *Correlation* : He is encouraged to develop scientific arguments with his colleagues and maintain his thesis with restraint and efficacy,

but not with obstinacy or by the use of extravagant apologia when he finds himself in a tight corner.

We must strive to make anatomy a 'living' subject. It must never be forgotten that the study of the dead body is, in at least one important sense, a convention and a necessary evil. We must employ all our mental resources, summon all our observational and correlative faculties to convert what would otherwise become a mere senseless tedium, an arbitrary discipline, into a vital, four-dimensional study—of fundamental significance as a basis not only of the technical knowledge which the student will acquire later in his course, but of his general outlook in biology, in the philosophical aspects of the phenomena of life which as veterinary biologists it is our great privilege to study; and a cultural equipment which is capable, if correctly used, of moulding his moral and spiritual development in no small degree.

A certain minimum of arbitrary memorization is, as has been admitted, unavoidable, and indeed is quite desirable as a discipline for the patience and concentration which every scientist must have at his command, and as a test for the staunchness of our scientific ambition and our faith in the value of our calling. Achievement is the sweeter for the striving, for the difficulties faced and overcome, for the singleness of purpose which enthusiasm has engendered.

It will be realised and perhaps may even be remarked, that many of the foregoing reflections are not peculiar to the study of anatomy. They are not intended to be. Just as our division of morphology into cytology, histology, and gross anatomy is a mere matter of visual convenience; just as our separation of biology into its structural and functional aspects is arbitrary, creating an artificial demarcation between anatomy and physiology; just as our classification of bodily structure into systems (myology, osteology, splanchnology) and of bodily function into categories (respiratory, digestive, genital) is a series of biologically false distinctions; so the consideration of the field of knowledge under the heads of 'subjects' like anatomy, physiology, embryology, pathology, and therapeutics constitutes a mere academic convention, a fiction convenient for the ordering of our rosters and the classification and preparation of our literature.

There are, in fact, no natural divisions in biology and veterinary medicine. Our study is and should strive to remain a whole. Nature will not be card-indexed. We are simply the observers of life and the appliers of our gleanings therefrom, and, as such, students will be well advised to adopt and maintain, throughout their present studies and future practice, a uniform and monistic outlook based on tried and fruitful principles of scientific methodology and to submit to a discipline constructed on a sound basis of applied psychology and educational method.

Such a broad standpoint from which to survey the fields (behind) of our acquired knowledge and (before) of our further studies will bring its own rich reward. He who ignores the fundamental truth of the wholeness of biological and indeed of all natural phenomena and contents himself with a niggardly interpretation of the universe in a series of watertight compartments, whose boundaries have no existence outside his own cramped mentality, does so at his peril. The widening of our scientific and philosophical horizon is an irresistible movement led by the greatest thinkers of our age and cannot be withstood. It is the most remarkable aspect of our cultural progress in the present remarkable century, and one that it is our privilege to subscribe to and to further with all our energies. It offers a real and promising chance of arriving at last at an intelligent and satisfying concept of the field of natural events which constitute "the universe around us."

Our students must cultivate this breadth of vision if they are ambitious of making any distinguished contribution to the sum of knowledge and of playing their part in the great developments that the present generation is witnessing and sponsoring. And let them be content with no aims less lofty than these, when they will be possessed of a stimulus to enthusiasm, an ideal of service which will sustain them through the frequent trials and occasional disappointments of the discipline of scientific study and research.

Such appear to me to be the means whereby students may find in their studies that inspiration which has gladdened the hearts of their great and illustrious predecessors in these sciences, whereby they may reap from their arduous labours such full fruits as will inspire them with those ideals of service in the advancement of knowledge and the welfare of their fellows that are the greatest mental asset of the scientist and the secret of a contented spirit among those of our calling.

Abscesses in the Salivary Glands of Cattle.

By Dr. K. SCHULZ, Kimberley.

"Pampoentjies" or "mumps" is the name given by South West African farmers to an inflammatory affection of the salivary glands in cattle in the Otjiwarongo and Outjo Districts. The disease is characterised by large swellings in the submaxillary space and the parotid region.

Aetiology.

Hutyra and Marek describe mumps in cattle as a specific infectious disease. The malady under discussion differs from this in that one of its causes is traumatic in nature, viz. the entrance of grass-seeds into the salivary ducts, paving the way for micro-organisms which set up a purulent condition of the ducts and gland-tissue. A specimen of the grass concerned was forwarded to Onderstepoort on 3/8/29 and was identified as an *Enneapogon* probably *E. mollis*. Unfortunately the grass could not be identified definitely as no complete specimen could be obtained at that time and owing to my departure from that area no specimens could be collected during subsequent seasons. The grass in question is very abundant on a number of farms in the Otjiwarongo and Outjo Districts and it is grazed with relish by sheep and cattle.

Distribution and Occurrence.

The disease is fairly prevalent on the farms on which this grass is very abundant and it may appear endemically during the time when the seed ripen or shortly after they have fallen. All the cattle, except the suckling calves, grazing on such a farm are liable to the disease. Calves let out to graze show signs of the disease from the age of 10 months and even quite old cows may be affected.

Symptoms.

The symptoms varied according to which of the salivary glands was affected and whether the disease occurred in an acute or chronic form. Even in the acute stage the symptoms were more pronounced in some animals than in others. A prominent swelling in the submaxillary space extending to the posterior angle of the mandible and to the parotid region was usually seen. This proved painful on palpation and of somewhat firm consistency. Puncture of the swelling with a hypodermic needle yielded a small amount of yellowish clear fluid. Prehension of food and water was interfered with, mastication was difficult, and the affected animals lost in condition. In more severe cases marked salivation was seen. The saliva appeared somewhat stringy.

The lower lip was slightly retracted and the tip of the swollen tongue protruded from the mouth. The buccal mucous membrane was slightly reddened and swollen, and under the tongue a definite oedematous swelling was observed. The orifices of Wharton's ducts were swollen and were slightly raised above the surrounding mucous membrane. Improvement accompanied subsidence of the swellings. From between the tongue and the teeth and below the tongue, masses of vegetable matter could be removed. When these were broken up they were found to consist mainly of the seeds of the grass mentioned above. The habitus of the affected animals was dull, especially of those which showed the more severe symptoms. They were unable to take water and food for several days and looked very depressed, standing with their heads held downwards. In the chronic cases abscesses developed along the course of the salivary ducts and one after another broke out to the exterior. This was reflected by thickenings of the skin and scars in the submaxillary and parotid regions. In some animals abscesses formed right up to the base of the ear. Where such abscesses were lanced, thick, greyish-white, opaque, very foetid pus was obtained, containing grass seeds of the species mentioned above.

Anatomical Changes.

Unfortunately only a very small amount of material was at our disposal, but it was sufficient to establish that the seeds of this plant could be incriminated as the cause of some of the trouble. The periglandular tissue was oedematous. The colour of the gland-tissue was variegated, yellowish red areas intermingling with dark red ones. On cutting into these areas a yellowish purulent material was obtained, which contained several of the grass seeds mentioned. Especially the anterior portions of the salivary ducts enclosed a number of these grass seeds.

Diagnosis.

Inflammation of the salivary glands caused by seeds of an *Enneapogon* species entering the salivary ducts, later followed by abscess formation.

Prognosis.

A favourable prognosis is justified except in the very severe cases, which may end fatally.

Treatment.

This consists in opening the abscesses followed by ordinary wound treatment.

Epicrisis.

The fluffy seeds of this grass have several awns on which a number of minute hooks may be detected by microscopic examination. These probably assist the seeds in their ascent to the gland tissue once

they enter the openings of the salivary ducts. This migration is reminiscent of that of an ear of barley when inserted (as by children in play) into the lower opening of a coat sleeve.

Conclusion.

Similar affections caused by foreign bodies, grass seeds, certain grains, and wood splinters have been described in horses and cattle by European authors such as Hutyra and Marek, Schwendimann, and Kitt and Nieberle, but it is of interest to note that in South West Africa the grass seeds of an *Enneapogon* (probably *E. mollis*) could be incriminated as being one of the aetiological factors leading to abscess formation in the salivary glands of cattle.

Literature.

HUTYRA & MAREK (1922). Diseases of the Salivary Glands, *Spec. Path. and Therap. of the dom. animals,* Vol. 2.

NIEBERLE & COHRS (1931) : *Lehrbuch der Speziellen Pathologischen Anatomie der Haustiere,* p. 225.

SCHWENDIMANN, F. (1931) Speicheldrüsenerkrankungen. *Tierheilkunde und Tierzucht,* Bd. IX, Stang u. Wirth.

Field Observations on Ecthyma Contagiosum of Goats in South-West Africa.

By Dr. G. SCHMID, Omaruru, S.W.A.

History.

In June 1933, I visited the farm Habis, Karibib District, South West Africa, to investigate an outbreak of disease among goats. The number of small stock kept on this farm was about 1,500 Karakul sheep and 260 goats. For about six days, the owner had noticed a disease, the nature of which was unknown to him, spreading amongst his goats. He suspected plant-poisoning, and was afraid that the disease might also affect his valuable Karakul sheep.

Fig. 1. Ecthyma contagiosum in a goat, Karibib District, S.W.A.

Symptoms.

When I examined the animals, I found that about 40 per cent. of the goats, all white in colour, of different age and sex, were more or less affected. The most conspicuous symptoms noted were pronounced salivation in many animals and a swelling of the lips and cheeks. On the lower and upper lips, up to the nose, wart-like eruptions of the skin were seen. In animals less recently affected, these eruptions were covered with a dry, brown crust, and closely resembled the skin lesions described by Zeller (1920), Theiler (1928), and Marais (1928). In all

cases examined, the buccal mucosa was also severely affected, and large ulcers and erosions were present on the tongue. The buccal membranes, including the gingival, were covered with a purulent secretion having an offensive smell. The general condition of the animals was good, and no signs of general illness were apparent. No fever was recorded. Some animals were recovering already, the pox becoming dry and falling off. No deaths had occurred from the disease, but a few goats had to be killed by the owner as they were not able to feed. The owner also reported that some animals had aborted. No affection of the udder or any other parts of the body could be observed. Apparently the disease remained confined to the lips and buccal cavity.

Susceptibility.

In spite of the fact that the goats were kept together with a large flock of Karakul sheep in the kraal and in the veld, only a few sheep were found to be affected, and the disease showed a much milder character in these animals. Only slight eruptions on the lips and slight lesions in the mucous membranes of the mouth were seen. A second flock of sheep kept in another kraal was not affected by the disease. This fact would indicate that the virus in this outbreak was much more virulent for goats than for sheep. A peculiar fact also, and one which can scarcely be regarded as a mere coincidence, is that all the goats affected in this outbreak were white goats, some of them having Angora blood, thus suggesting that some relationship may perhaps exist between the colour of these animals and their susceptibility.

Treatment.

The affected animals were isolated, and treatment consisted of cleaning the mouth with a solution of alum, and application of creolin ointment to the skin eruptions. According to a letter received from the owner, all the animals had recovered within about two weeks, with the exception of two kapaters which had to be killed.

Diagnosis.

Some crusts from the lesions were despatched to Onderstepoort in order to have the diagnosis of Ecthyma Contagiosum confirmed, and a reply was received that the lesions provoked by the virus contained in the crusts were typical of Ecthyma Contagiosum as described by Theiler (1928). As Theiler does not describe lesions in the mouth of his natural and experimental cases, and as Marais mentions these lesions only in a very few cases, it may be of interest to have these observations recorded here.

References.

ZELLER, H. (1920): Uber Pocken bei Ziegen Suedwestafrikas. *Reichsgesundheitsamt*, Bd. 52, Heft 3.

THEILER, A. (1928): Ecthyma Contagiosum of sheep and goats. *13th and 14th Reps., D.V.S., U. of S.A.*:7.

MARAIS, I. P. (1928): Some experiments with Vuilbek (Ecthyma Contagiosum). *Jl. S.A.V.M.A.* I. (2) :63.

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V(1) 1934.

The Effect of Sulphur on Merino Sheep and a Further Experiment to determine the Safe Dose of Sulphur for Cattle.

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

I. The Effect of Sulphur on Sheep.

The results obtained in a previous experiment conducted by the author (Steyn, 1931 and 1932) seemed to indicate that sulphur when administered to sheep at the rate of 5.0 gm. once, thrice, or six times weekly, over prolonged periods, stimulates increase in body-weight and wool yield.

It was pointed out (Steyn, 1931) that the experiment had been conducted in order to determine the quantity of sulphur that could be administered to sheep with safety over prolonged periods. Records of the weight of the experimental animals were kept as it was expected that there would be a loss in weight in case of chronic sulphur poisoning. Mr. L. Roux, Nooitgedacht Experimental Station, Ermelo, was asked to examine the wool of the experimental animals and the controls before and after the experiment, and records of the wool yields were kept. This was done also with a view to ascertaining whether or not the continuous dosing of sulphur has any deleterious effects on the wool and wool yield. It is, therefore, clear that the above experiment was planned to determine the toxic dose, and not the nutritional value, of sulphur. If the latter had been the purpose, the experiment would have been planned on entirely different lines as explained in the following paragraphs quoted from a previous publication by the author (Steyn, 1931) :—

> The sheep employed in the foregoing experiments were chosen at random, and before any definite conclusions can be drawn about the effects of sulphur on the quantity and quality of the wool and on the weight of the sheep, it is advisable to conduct experiments on the lines given below.
>
> All the animals should be obtained from the same locality, or preferably should be born in the locality where the experiments are to be conducted. This is essential in order to exclude the possibility of obtaining sheep from areas differing in the quality of the grazing. Animals obtained from areas poor in grazing will, when put on good daily diet, gain more weight than animals accustomed to good grazing, and favourable changes in this respect might erroneously be attributed to the feeding or dosing of sulphur. Animals of the same sex, age, and type should be employed, and in studying the effects of sulphur on the wool, sheep with the same class of wool should be employed.
>
> Furthermore, it would be of interest to study the effects of sulphur on sheep at different ages and on pregnant and lactating ewes.

It should have been mentioned that the twenty sheep employed in the above experiment were chosen from among some six hundred sheep that had recently been brought to Onderstepoort from the Karroo. Sheep fairly poor in condition were selected for the experiment, in order to make sure of the safe dose of sulphur: A dose of sulphur which proves to be harmless to animals in good condition may have deleterious effects upon animals in poor condition. The fact that animals in poor condition were employed rendered the increase in weight the more striking.

Subsequently Seddon (Seddon and Chamberlin, 1933) also conducted experiments upon sheep with sulphur. He compares the results of his experiments with those obtained by the author. This is hardly fair as Seddon's experiment was conducted on entirely different lines: (1) Seddon's sheep were "entirely grazed," whilst the author's were confined to a small experimental camp and hand-fed; and (2) Seddon's sheep received 10 gm. of sulphur three times weekly, whilst the author's sheep were dosed six times weekly with 5 gm. of sulphur.

If the influence upon animals of a certain factor is to be ascertained, it is obvious that *all conditions for all the experimental animals* must be the same except the one factor to be tested. The diet of the sheep in Seddon's experiment was a most varied one, as they grazed at will, whilst all the sheep in the Onderstepoort experiment received the same diet throughout the course of the experiment, which lasted two years. It is quite conceivable that the Onderstepoort sheep would show a greater increase in weight than Seddon's, whose animals had much more exercise than had the former sheep.

The method of dosing was also different from that used at Onderstepoort, in spite of the fact that Seddon's animals received the same amount of sulphur (viz. 30 gm.) per week. As large quantities of sulphur have an irritating effect on the gastro-intestinal mucosa (diarrhoea), an endeavour was made to prevent this effect by giving small daily doses in preference to larger doses at longer intervals. It is quite possible that in Seddon's experiment the repeated doses of 10 gm. three times weekly over a period of two years had adverse effects on *the thirteen-months-old sheep* in view of the fact that a single dose of 15-30 gm. of sulphur is laxative for *mature sheep*—(see any textbook of veterinary pharmacology). The most noticeable effect would probably be a retarded increase, or even a decrease, in weight (with a consequent fall in the wool yield) in growing animals.

It may be added that all who saw the sheep employed in the Onderstepoort sulphur experiment were astonished at the remarkably good condition of the animals which were receiving sulphur. Such a remarkable quantity of subcutaneous, intermuscular, and intra-abdominal fat as was present in the sheep which died from the effects of

urinary calculi had never before been seen by the author. What is more, the sheep treated with sulphur were in such remarkably good condition that they fetched twenty-three shillings and threepence on the Pretoria market, whilst other sheep from Onderstepoort did not fetch more than sixteen shillings and eightpence, although all the animals had received the same diet.

Pierce (1933) found that (a) "the administration of 2 gm. of sulphur per day for a period of seven months did not increase the wool production of mature sheep," and (b) "the addition of sulphur to the diet of these sheep did not cause an increase in weight greater than that of the controls." The experimental animals were fed "a slightly super-maintenance ration for the ewes, although not for the wethers, which were about 30 per cent. heavier; it was decided, however, to feed the same ration to both ewes and wethers."

The results of the experiment conducted by Pierce can hardly be compared with those obtained in the Onderstepoort experiment as (a) the quantities of sulphur given to the sheep were different, and (b) the animals in the former experiment were fed a maintenance ration, whilst the Onderstepoort sheep received feed *ad lib.* [½ lb. of maize per head, hay (veld or teff) *ad lib.*, and green feed (barley, oats) when available.]

II. The Effect of Sulphur on Cattle.

As outbreaks of "geilsiekte" (prussic acid form) in cattle due to the ingestion of wilted grasses were being reported from various areas (Griqualand West, Vryburg, C.P., and Standerton), it was decided to ascertain the safe dose of sulphur for the bovine. Owing to stringent economic measures only the four bovines mentioned in this article were available for this experiment. This was unfortunate, as much more reliable results would have been obtained had more animals been included in the experiment.

The heifer (3511) was kept as control, as it was thought essential to dose the three oxen with sulphur in order to ascertain whether there was any tendency for the formation of urinary calculi in the sulphur-dosed animals. It will be noticed that during the period 25/3/33 to 9/7/33 the animals were not weighed. The author was absent on official duty for the greater part of this period. During this period there was a decrease in the weight of all four animals. This drop in weight, which was most pronounced in the heifer, was due to the temporary scarcity of foodstuffs owing to the prevailing drought.

It was anticipated that 45 gm. of sulphur given daily (except Sundays) would have deleterious effects on cattle. This was found not to be the case. All animals receiving sulphur showed a monthly increase in weight much higher than that of the control: The three animals,

Experiment to ascertain the safe dose of Sulphur for Cattle.

No.	3511 (control—no sulphur)		3056 (15 grams sulphur daily*)		3668 (30 grams sulphur daily*)		3686 (45 grams of sulphur daily*)	
Age	±3 years		±3 years		±3 years		±3 years	
Sex	Heifer		Ox		Ox		Ox	
Date of weighing	Weight†	Increase†	Weight †	Increase †	Weight †	Increase †	Weight †	Increase †
28.1.32	803		840		810		917	
23.2.32	840	37	900	60	864	54	955	58
29.3.32	879	76	990	150	915	105	1027	110
29.4.32	870	67	975	136	910	100	1040	123
26.5.32	900	97	991	151	955	145	1073	156
23.6.32	940	137	1050	210	1015	205	1135	218
22.7.32	930	127	1035	195	1043	233	1190	273
25.8.32	895	92	1105	265	1060	250	1230	313
26.9.32	905	102	1130	290	1095	285	1270	353
24.10.32	910	107	1130	290	1095	285	1295	378
28.11.32	895	92	1135	295	1120	310	1300	383
21.12.32	935	132	1130	290	1110	300	1310	393
30.1.33	925	122	1210	370	1190	380	1400	483
24.2.33	920	117	1200	360	1165	355	1370	453
24.3.33	930	127	1210	370	1220	410	1410	493
10.7.33	802	1 (decrease)	1121	281	1118	308	1310	393
26.7.33	792	11 (decrease)	1119	279	1172	362	1348	431

*Except Sundays.

†All weights are given in pounds.

which had received a daily (except Sundays) amount of 15, 30, and 45 gm. sulphur respectively, had increased in weight 370, 410, and 493 lb. respectively after a period of fourteen months, whilst the control had only gained 127 lb. during this period. The increase in weight in the animals receiving sulphur is proof that the sulphur caused no digestive disturbances. The breath of the animal that received 45 gm. sulphur daily had a most unpleasant smell.

Another striking feature of the experiment was that the loss in weight of the control during the period of scarcity of foodstuffs (i.e. 24/3/33 to 10/7/33) was much greater than that of the animals receiving sulphur. It is realised that no definite conclusions as to the effect on the body-weight can be drawn from the above experiment owing to the facts that (a) a heifer was kept as a control, (b) the breed of the animals was not known, and (c) too few animals were employed in the experiment. In spite of these drawbacks the results obtained in the above experiment indicate that full-grown cattle can be dosed with safety with 30 gm. of sulphur daily over prolonged periods.

Conclusions.

Although no definite proof has been brought forward to the effect that small daily doses of sulphur have the effect of stimulating an increase in weight of Merino sheep, the experiments conducted by the author seem to indicate the existence of such an effect in sheep confined to a small enclosure and receiving feed *ad lib.*

This result is not at all astonishing, as it is well known that sulphur when given repeatedly in small doses acts as a tonic on the system and stimulates the activity of the skin.

It was found that cattle can be safely dosed with 30 gm. of sulphur over prolonged periods.

References.

PIERCE, A. W. (1933). The effect on the body-weight and wool production of Merino sheep of adding sulphur to the diet. *Jnl. Coun. of Scient. & Indust. Res.* 6: 294-298.

SEDDON, H. R., & CHAMBERLIN, W. E. (1933). On the effect of the administration of sulphur to sheep. *Australian Vet. Jl.* 9 (4): 154-159.

STEYN, D. G. (1931). The effects of sulphur on Merino sheep. *17th Rept. Dir. Vet. Serv. & Anim. Indust.* U. of S. Africa: 481-492.

STEYN, D. G. (1932). The effects of sulphur on Merino sheep and their resistance to potassium cyanide poisoning. *18th Rept. Dir. Vet. Serv. & Anim. Indust.* U. of S. Africa: 597-610.

Milk-Fever in Sheep: A Contribution to the Record of Clinical Cases.

By Dr. M. ZSCHOKKE, Keetmanshoop, S.W.A.

Although milk-fever (*paresis puerperalis*) is commonly thought to occur in cattle only, yet some cases have been described in pigs (Ellenberger, Herz, Wöstendorf) and goats (Schmid, Giovanoli, Tobiassen), and still rarer cases have been observed in sheep (van Hoopen).

On 11.7.33 I was called to the farm Orab, District Gibeon, S.W.A., to investigate the cause of the sudden death of 6 valuable karakul stud-ewes. On arrival I found three sheep dead and one animal sick.

Anamnesis.

Orab is situated near Mariental, S.W.A. The Fish River runs through the western portion of the farm, providing ample drinking water in its many pools. The eastern half lies mostly on the so-called "Kalk," a plateau conspicuous by its lime formation. The veld at the time of investigation was scarce, consisting of old grass and bush and is, like that of the whole south of S.W.A., considered to be deficient in phosphates. As practically no rains had fallen in that part for several years, the herbage would be expected to lack vitamins. The herds among which the casualities had occurred were stationed on the "Kalk." The drinking water there is derived from a borehole. It is hard but palatable. The lambing season was in full swing and the ewes, particularly the stud-stock, received an additional daily ration of lucerne hay as well as mealies and oats, 1 lb. per head per day, mixed with 5-6 gm. of calcium phosphate.

Suddenly (between 7.7.33 and 9.7.33), and for no obvious reason, 3 ewes of the best stud flock of 40 head died. The animals had lambed without difficulty. The lambs were strong and healthy.

On the 10.7.33 three more deaths followed, occurring in every instance within 48 to 72 hours after parturition. All the animals which succumbed were in good to fair condition and from five to six years old.

The onset of the illness was sudden. The sheep became apathetic, showed a weakness of the hind-quarters, causing them to sway from side to side, and soon fell to the ground. Once down they were not able to rise again. Their eyes looked sad and sunken. From the nostrils a greyish, dirty liquid was discharged and saliva dripped from the mouth. After death the tongue protruded. In some cases the head and neck were stretched out, in others bent back, presenting the position seen in cattle suffering from milk-fever.

Investigation.

As already mentioned only one sick sheep was available for examination. The swaying gait and the discharge from nostrils and mouth was noticed. The respirations were infrequent and deep. The pulse was somewhat accelerated (120-125). Examination of the lungs revealed nothing unusual and auscultation of the abdominal cavity gave no clue to a disturbance in the gastro-intestinal tract. The udder was large, giving normal milk.

Post-mortem examinations were made on the three carcasses. Generally speaking the findings were negative: all three animals were in fair to good condition, the body-fat being well developed. The udders abounded in milk. The uteri were in a fairly contracted condition, containing a small amount of chocolate-coloured, opaque fluid. Their mucosa was of a brownish-grey colour. The kidneys showed no lesions. The spleen was not swollen, but the liver and the caecum were in all three cases distinctly hyperaemic. In one case oedema of the lungs and a dilatation of the heart was observed. The brain and the spinal cord in every instance were normal. Microscopically no pathological changes were found in the blood, whilst the muscles showed a hyaline degeneration.

Treatment.

No udder-canula nor any indicated drugs (calcium salts) being at hand, the administration of strong coffee was resorted to at once. It has since been reported that the sick animal recovered, and no more deaths have been recorded.

Conclusion.

Out of a herd of 40 stud-ewes, six animals died within a short period after parturition. It is a well-known fact that karakul-sheep are particularly rich in milk. Towards the end of pregnancy the animals had been fed well with a diet contrasting much with the scarce and poor veld-grazing to which the sheep in this territory are forced to become accustomed. All the sheep were multipara. The course of the disease as well as the clinical symptoms and pathological lesions are so analogous with the conditions found in cattle suffering from milk-fever, that I feel justified in recording this as an outbreak of milk-fever in sheep.

Investigations into Horsesickness.
II.—The Nature of the Immunizing Agents in Formolised Virus.

By Dr. G. G. KIND, Johannesburg.

In my last article* on the influence of light on formolised virus it will be noticed that in some cases immunity was established 8 days after vaccination (exps. 15, 23, 27, 30, 33, 39), and in other cases after 18 to 21 days (exp. 114). The following experiments will show why the interval in experiment 114 was made 21 days. (See tables III and IV in previous article).

TABLE I.

Exp.	Formald Conc. 1 in:	Prepared	Horse No.	Injected	Immunity tested	Result
114	714	16-12-32	549	22-12-32	30-12-32	died 5-1-33
	,,	,,	550	,,	,,	died 5-1-33
112	714	8-12-32	545	16-12-32	6-1-33	no reaction
	,,	,,	546	,,	26-12-32	died 4-1-33
	,,	,,	547	,,	26-12-32	died 3-1-33
	,,	,,	548	,,	6-1-33	no reaction
	,,	,,	577	27-1-33	10-2-33	died 22-2-33
	,,	,,	578	,,	17-2-33	no reaction
104	714	9-8-32	523	15-8-32	———	"dikkop" from 27-8-33 to 5-9-33
	,,	,,	524	,,	———	"dikkop" from 27-8-33 to 5-9-33

Horses 549 and 550 of exp. 114 and horses 546, 547, and 577 of exp. 112 were not immune 8 to 10 days after vaccination, but in both experiments immunity was established after an interval of 18 to 21 days. This is logical as experiment 104 shows that a horsesickness reaction can last up to 3 weeks after an injection of formolised virus. This is also a common occurrence in the immunization method used by the Government. It is more surprising that immunity should be established one week after vaccination if the immunizing agent is an attenuated virus, as a reaction lasts longer if caused by a less virulent virus.

In all the above experiments the formolised virus was prepared from 1 part of spleen pulp and 2¼ parts of normal saline, and was neutralized after one to four days with ammonia using litmus as indicator. Urotropin, a reaction product of formaldehyde and ammonia, was proved to have no attenuating effect on horsesickness virus.

*1933 KIND, G. G. *Jl. S.A.V.M.A.* IV (4): 202-5. The effect of light on the immunizing properties of formolised horsesickness virus.

In my early experiments the virus exposed to formalin for longer than 4 days proved totally ineffective and the following experiment was carried out to test whether the exclusion of light would give different results.

TABLE II.

Exp.	Formald Conc. 1 in:	Prepared	Neutralized	Horse	Injected	Immunity tested	Result
126	1000	21-6-33	5-7-33	587	8-7-33	16-7-33	died 25-7-33
	,,	,,	——	588	,,	,,	no reaction
	,,	,,	7-7-33	589	25-7-33	5-8-33	died 13-8-33
	,,	,,	——	590	,,	,,	no reaction
	,,	,,	——	618	22-9-33	29-9-33	no reaction

The explanation for the present results is that the virus was killed after a 14 days action of formalin and an anatoxin was left which accounted for the immunity in horses 588, 590, and 618. The ammonia which was not all taken up immediately by the formalin, destroyed the anatoxin in the preparation used for horses 587 and 589 and therefore these animals proved not immune.

TABLE III.

Exp.	Formald Conc. 1 in:	Prepared	Neutralized	Horse	Injected	Immunity tested	Result
127	1250	21-6-33	——	591	5-8-33	18-8-33	died 28-8-33
	,,	,,	25-6-33	592	,,	,,	no reaction
	,,	,,	——	604	30-8-33	6-9-33	no reaction

This shows that anatoxin immunity is established after 7 days (horse 604) but does not last 13 days (horse 591) whereas the neutralized attenuated virus established immunity after 13 days in this case (horse 592).

In the following experiment virus in colourless 4 oz. bottles was exposed to the sun for 5 minutes. Half was then treated with formalin and the other half was added to equal parts of the usual virus preservative :—

TABLE IV.

Exp.	Formald Conc. 1 in:	Prepared	Horse No.	Injected	Immunity tested	Result
130	1000	23-7-33	593	8-8-33	18-8-33	died 26-8-33
	Virus-Preservative	,,	594	,,	——	died 13-8-33

This shows that the untreated virus was not affected by exposure to sunlight whereas the anatoxin was destroyed.

Most of the early experiments with blood as a source of virus for vaccination purposes were unsatisfactory. In horsesickness this could not be attributed to a lesser concentration of virus in blood, as it is well known that blood is very infective. The only explanation is that in spleen tissue the virus and the anatoxin are better protected against chemical action and light.

For the following experiment blood was collected at night. For exp. 122 the blood was defibrinated with sodium oxalate and for exp. 123 it was mechanically defibrinated.

TABLE V.

Exp.	Formald Conc. 1 in:	Prepared	Horse No.	Injected	Immunity tested	Result
122	1000	9-6-33	579	21-6-33	1-7-33	died 6-7-33
123	,,	,,	580	,,	,,	no reaction
	,,	,,	598	18-8-33	28-8-33	no reaction
	,,	,,	609	6-9-33	13-9-33	no reaction

Experiment 122 proves that sodium oxalate has a detrimental effect on horsesickness anatoxin. According to experiment 123 defibrinated blood, if protected against light, is well suited for immunizing purposes.

The following experiment was conducted to determine the period of immunity produced by anatoxin :—

TABLE VI.

Exp.	Formald Conc. 1 in:	Prepared	Horse No.	Injected	Immunity tested	Result
132	1000	10-8-33	600	22-8-33	29-8-33	no reaction
	,,	,,	601	26-8-33	30-8-33	died 10-9-33
	,,	,,	602	26-8-33	9-9-33	died 15-9-33
	,,	,,	603	26-8-33	26-8-33	died 31-8-33
132	1000	10-8-33	607	4-9-33	6-9-33	died 15-9-33
	,,	,,	608	4-9-33	10-9-33	no reaction
	,,	,,	612	13-9-33	25-9-33	died 5-10-33
	,,	,,	619	25-9-33	3-10-33	no reaction to date
	,,	,,	620	25-9-33	30-9-33	died 9-10-33

Horse 620 shows that 5 days after an anatoxin injection insufficient immunity was present to protect against a virulent injection, whereas horse 608 proved to be immune 6 days after receiving anatoxin. Horses 602 and 612 show that the immunity had disappeared 12 to 14 days after injecting anatoxin. Other experiments confirm this observation (exps. 126 and 127).

At this stage I should like to return to my last article on the influence of light as the investigations here may explain a certain phenomenon which might have been wrongly interpreted. In experiment 96 the vaccine in red bottles produced an immunity, but not in experiments 97 and 98. This may not have been due to a lack of protection by red glass: it seems that the attenuated virus had established an immunity after the 18 days in experiment 96, but that the interval of 9 and 10 days in experiments 97 and 98 had been too short to produce an immunity. This would mean that the protection given by red glass may be higher than that given by blue glass, which is very likely since it is most probable that actinic rays are harmful and these can be partially excluded by brown and red bottles and to a lesser extent by the blue bottles which also had a reddish tint. More exact experiments on the harmful rays are being conducted.

The duration of immunity after attenuated virus and after virus injections following anatoxin is to be the subject of a special article.

SUMMARY.

1. Horsesickness virus produces an anatoxin.

2. The virus can be eliminated by exposure to a formaldehyde concentration of about one in a thousand for 12 days.

3. The anatoxin is extremely sensitive to light.

4. The anatoxin is not affected by formaldehyde concentrations of one in a thousand and below.

5. The anatoxin is destroyed in a medium made alkaline with ammonia.

6. The anatoxin is destroyed by the presence of sodium oxalate.

7. Immunity produced by anatoxin lasts from about the 6th to the 10th day after injection.

8. Virus can be attenuated by exposure to formalin and subsequent neutralisation with ammonia.

9. Anatoxin can be eliminated by the exposure of virus to sunlight before treatment.

10. Attenuated virus is very sensitive to light. (See exp. 114 and table IV of previous article).

11. Immunity produced by an attenuated virus appears to be established between 10 and 21 days after injection.

12. Blood appears to be as suitable as spleen pulp for immunizing purposes.

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Dogs and Human Migrations (Concluded)

By Capt. R. D. S. GWATKIN, Roberts Heights.

5. The Second Dog of Antiquity—*Canis pallipes*.

From the days when the Antipodes were first discovered it has been simple for naturalists to recognise in the dingo or wild-dog of Australia something foreign to the natural marsupial population of the Continent and which must have been imported by man.

Fortunately too we can trace the dingo to its source. According to Sollas (1924, *Ancient Hunters*) :—

> The dingo, which is about as large as a sheep dog, with long legs and a bushy tail, is also tamed and used for hunting the kangaroo. How it got into Australia is a question which has been much discussed; most probably the aborigines brought it with them. Nehring, who has given much attention to the origin of domesticated animals, concludes from an examination of the skull that the dingo is closely related to the Indian dog (*Canis pallipes*). The skull of the dog prevalent in Europe during the Bronze Age is also said to be almost identical with that of *C.pallipes*. See A. Nehring "Die Abstammung der Hundenrassen" *Zoologisches Jahrbuch*, iii; A. von Pelzehn, ibid., i,p. 225; Brehm *Illust. Tierleben*, 2nd ed., i, 568. At Lake Timboon, W. Victoria, the bones of the dingo are found fossil along with those of the Tasmanian devil (now extinct in Australia) and an extinct species of kangaroo.

It is clear that although the dingo is found in a fossilised state in Australia and must have inhabited the country for a considerable period, he is an intrusive foreigner (just as is the Australian Aborigine) from Asia. The dog population of the East Indies and the Pacific islands has similarly been drawn from Asiatic sources. The fundamental element in that dog population is the *pariah* dog.

G. F. Scott Elliot (*loc.cit.*) points out that the pygmies of Dutch New Guinea discovered by Captain Rawlings have

> the usual yellow pariah dog ..... If a fruit is thought to be poisonous, they soak it for two or three days; then they give it to one of their dogs, and if he does not seem to be any the worse, they will eat it themselves. They seem to be expert hunters, fishing with arrows, and driving their game by dogs.

These *pariah* dogs or mongrels are of great interest. According to the *Encyclopaedia Brittanica* they are dogs

> of a domesticated breed that has reverted, in a greater or lesser degree, to a half-wild condition. Troops of such dogs are found in the towns and villages of Eastern Europe, Asia and Africa; and they probably interbreed with wolves, jackals and wild dogs. The Indian breed is near akin to the Australian Dingo.

According to MM. Boule and Trouessart a wild dog of India, *C.pallipes*, was the chief ancestor of modern dogs. G. F. Scott Elliot (1917), on the contrary, favours as ancestor *C.poutiatini*, a very dog-like wolf discovered by Prince Poutiatini in a deposit of early Post-Glacial Age near Lake Bologoia in Russia. The interesting point about this dog, according to him, is the great elevation and width of the skull as compared with those of either modern or extinct wolves. It is closely allied to the dingo of Australia and to the half-wild dog of Java, *C.tengerranus*, and it may have been one of the past ancestors of Neolithic dogs of Europe.

I mention these facts to show that the *C.pallipes* of India appears on the one hand in Australia as the dingo and on the other hand in Post-Glacial Russia as *C.poutiatini*. It is therefore, next to the kitchen-midden dog, the most widespread of dog types. This early appearance in Europe of a *C.pallipes* relative is not isolated.

It is apparent from the evidence cited by Keller and Van Giffen that the small kitchen-midden and megalithic dogs are extremely similar. Then as in the lake-dwellings of pure stone-culture times *large dogs were absent*. With the coming of the Bronze Age and the "tumuli," large dogs of certain types came to Europe. The first (*vide* MacCurdy) to come was the "Bronze-age" dog into Central Europe as *C.poutiatini* and along the coast to Switzerland and the west as *C.matris optimae*.

Eastman states :

> There are found in Ancient Egyptian monuments, and also among mummified remains, numerous indications of an erect-eared, short-muzzled, smooth-haired dog, which, in the opinion of experts, "seems to correspond well with the Anan dog" of a sub-species which has received the distinctive name of *C.familiaris matris optimae*. Through commercial intercourse this type was carried from Egypt into Ancient Greece, and from the Balkan region it spread into Austria and Central Europe during the early historical period.

He also says :

> Directing our attention as far backward as the earliest culture strata in Turkestan, which correspond to the metal periods in Europe, we find several varieties of Canidae abundantly represented, among them the so-called "dog of Anan" brought to light in the excavation of the citadel of that name. This was a domesticated canine of moderate size, standing with respect to its cranial structure very near to the primitive dingo, and also to a small wild dog of the palaeolithic period (*C.poutiatini* Studer) which latter is regarded as the probable ancestor of the shepherd dog.

It is not surprising that this very widespread dog type carried by man into the Pacific on the east and the Hesperides on the west, the first *large* dog, the prototype of the shepherd dog, and the characteristic dog of the earliest metal-gathering period should have been regarded by certain authorities as the ancestral type of all dogs. Isolated from the

wolf of India or some Central Asiatic representative of that race it gave new meaning to previous conceptions concerning the dog to the Egyptians and Western Europeans who had hitherto to content themselves with the jackal (Pomeranian) type. To what extent metal-gathering migrating man profited by this new discovery, its wide dispersal from Bronze Age times forward is adequate testimony.

6. The Third Dog of Antiquity—*Canis simensis*.

The successive importation (e.g. into Switzerland) of ordinary and then improved types of dogs affords evidence of the increasing trading contacts of Western Europe with the Eastern Mediterranean in Neolithic times. A consideration of the dogs which were held in esteem by the denizens of the Fertile Crescent about the same period, affords an understanding of the sources of the dogs.

During the Pyramid Age deep interest was taken in all domestic animals and the arts and dogs came in for special attention. In the tomb of Aniten of the Fourth Dynasty (*circa* 3,500 B.C.) there is sculptured a type of dog which is neither the bushy-tailed jackal type of the hieroglyphics nor the pariah hound. It is something entirely new—the first known greyhound of which we have record. These dogs were the possessions and particular favourites of kings over a long period; four of them lie at the feet of Anafee (*circa* 3,000 B.C.) in the sculpturings of his tomb. Even in Queen Ti's time (*circa* 2,300 B.C.) two of them are seen held in leash by a kneeling slave (*vide* Obermaier, *loc.cit.*).

This dog is the commonest type of hunting dog depicted in Egyptian tombs of the Fourth Dynasty and is that which modern writers commonly call the "Fox-dog." It has erect ears similar to those of the "hieroglyphic" dog, but it has a longer slender body, long lean legs, and more especially a long non-bushy tail which is carried characteristically curled upwards over its back.

Now this dog is said by Scott Elliot (*loc.cit.*) to be similar to *C.simensis*, the wild dog of Abyssinia, and he has noted too that it is very like the modern dogs of Majorca. He says: "In Egypt and North Africa, as well as in the Balearic Isles, one would expect traces of *C.simensis*," though he does not explain very clearly why one would expect it. According to Eastman (*loc.cit.*)

> The supposed descendant of the erect-eared Ethiopian hound has maintained a continuous existence in Crete, from a date which may be roughly assigned to the fourth millenium before Christ down to the present day; and what is not less remarkable, the identical strain appears to have been carried by trade routes, possibly by way of Carthage into the Balearic Islands, and still exists there, comparatively unmodified. Thus, the modern varieties known as the Cretan and Ibaza hounds belong to an extremely ancient lineage, which may be traced in unbroken continuity back to a prehistoric domestication of a North African feral species.

> The Cretan hound is abundant in the island to-day, and manifests all the characteristics which we would expect to find in a primitive greyhound. Historical evidence shows that, at about the beginning of the Christian era, this breed of canine was held in high esteem, and became fairly widespread in the countries bordering on the Aegean Sea. It figures frequently on Cretan coins, dating from at least as far back as 500 B.C., and it is readily distinguishable by its erect ears, slender flanks, and long light limbs, among pictorial representations of animals in the minor arts. The most ancient of these drawings, now preserved in the Museum of Candia, belongs to Early Minoan times, or to a period corresponding to the first Egyptian dynasties. It shows a hound in recumbent posture, and is painted upon the cover of a vessel made of black steatite. Probably from this race is derived the modern Russian *borzoi*, commonly called in this country [United States] the Russian wolfhound, and also the famous long-limbed Sicilian coursing hound of antiquity. Likenesses of these animals, stamped on Sicilian coins, attest the fondness with which they were regarded by the ancient Greek inhabitants of Trinacria.

From these data we know that the "Egyptian" greyhound was dispersed through the Mediterranean and Southern Europe. It was the favourite hunting dog of the Pharaohs of the Pyramid Age and reached Crete very shortly afterwards or almost simultaneously in Early Minoan times. But in those early times it does not seem to have been common enough to be widespread. The *C. leineri*, represented by a single skull from the neolithic pile-dwellings of Bodmann at Bodensee and referred to by Obermaier, is a big slender animal reminiscent of the greyhound and came apparently from this primitive and valuable greyhound stock of Egypt. I have quoted also MacCurdy's statement concerning the appearance of a greyhound type towards the end of the Bronze Age in Austria. The usual inference drawn from the emergence of different varieties of dogs in Europe during the Neolithic period is that the local inhabitants were responsible for selecting and breeding them. It is apparent from the evidence that they came to Europe as foreign importations.

A few years ago, well within the last decade, a Mr. Norman Goodan, well known in kennel circles in England, paid a visit to the Balearic Islands. There he discovered what he considered to be an entirely new variety of dog. Its real home was on the small island of Ivitsa, some distance from the shores of Majorca. Mr. Goodan was so fascinated by this novel dog that he secured a pair and took them back with him to England. The breed thus established was called the Ivicienne. But a comparison of Iviciennes with the sculptures and paintings of the Egyptian greyhound shows that they are identical. The Ivicienne instead of being a new type is a direct descendant of the hunting favourite of the Pharaohs of the Pyramid Age and one of the oldest dogs known to science and art.

It is easy, because of their isolation, to understand how a small group of Western Mediterranean Islands (little disturbed by dog fan-

ciers until recent years) were passed by the earliest coast-hugging navigators with their inferior dogs. They as well as Crete apparently became well known to the more adventurous open-sea navigators of the Early Dynastic metal-searching epoch. They received some specimens of the kingly greyhound breed at a stage when this Egyptian breed was kept relatively pure and untainted by excessive foreign importation. After that period these islands (or Ivitsa at least) must have had few or no further dog immigrants. The presence of the Ivicienne there to-day forms strong if not incontestible evidence of the colonisation of the Balearic Islands and probably the adjacent Spanish coast by Egyptians or by a people who loved the same dogs as were admired by the Egyptian aristocracy of the Pyramid Age.

The financial value placed upon dogs by the Egyptians and other nations in the Fertile Crescent is indicated by the fact that dogs were worthy to be received as tribute from subject peoples. There is a coloured painting from the tomb of Redmera at Thebes which depicts the tribute from various parts of Asia. Eight dogs form a part of the tribute, among them a greyhound, a mastiff, and a large spotted type not unlike the Dalmatian hound.

The coming of another greyhound, a mastiff, and another strange type from Asia is a matter of great interest. The *C.simensis* of Abyssinia and North Africa may be merely the Egyptian greyhound run wild. There is much to be said for the hypothesis that all greyhounds originated in Asia. The relative lateness of Egyptian acquaintance with the "Egyptian" greyhound may be due (as has been suggested) to the discovery of a pre-existing *C.simensis;* on the other hand both the "Egyptian" greyhound and *C.simensis* may have been derived from Early Dynastic imports from Asia.

In any case the greyhound has always been the predominant type of the Middle East, with its huge tracks of habitable plain and desert. There speed more than scenting ability was essential. The Borzois of the Russian steppes, the Selugi or Persian greyhound common throughout Arabia and Mesopotamia, and the closely related Afghan greyhound are three outstanding derivatives of an ancestral greyhound that must have been isolated by man somewhere near Turkestan. The "Egyptian" greyhound may well have been derived from the same Central Asiatic stock. It is important in this connection that the appearance of the greyhound as the favourite dog in Egypt synchronises roughly with the invasion of Egypt by the broad-headed Alpine or Armenoid human stock that began to characterise the aristocratic population of Egypt during the Pyramid or Ancient Empire Period. It is evidential of the deep interest taken in dogs by the nomadic Central Asiatic peoples that the Zend-Avesta, the book of Zoroaster, concerns itself considerably with the dog. Two of the deadly sins were to smite a

bitch when with young and to offer a dog bones too hot or too large for it to eat. This book also deals with the care of puppies, etc. In the Rig-Veda, the oldest document of Aryan literature, the dog is prominently mentioned and is recognised as the companion and ally of man. Whether these examples of Central Asiatic interest in the dog are traceable to Egypt, it is not possible to say at the moment. They may have been spontaneous or have been evoked by remote cultural contacts. In any event when the Aryan interest in the dog was stimulated it appears to have been permanent and characteristic.

As the writers of the article on Dogs in the *Encyclopaedia Brittanica* have pointed out, "Greyhounds have been bred from time immemorial in Eastern Europe and Western Asia ..... The hairless dogs of Central Africa are greyhounds and there are somewhat similar varieties in China, Central and South America." Lankester in the article on *Carnivora* in the same work states that "The slender-jawed *C.simensis* of Abyssinia and the South American *C.jubatus* and *C.antarticus* are generally placed in this (lupine) group."

The close affinities between the greyhound stock and the "aberrant" dogs of Central and South America find an explanation along natural lines if we look upon the skulls and whole mummies of dogs "found in Peruvian graves of the most ancient period" as belonging to dogs that were brought across the Pacific by the bringers of the Central American culture. Standing nearer to the Asiatic source of greyhounds and receiving their culture from Asiatic sources at a relatively recent date, dogs of a greyhound type may have been carried by the ocean-crossing culture heroes to Central America. At the same time it is to be borne in mind that insufficient investigation has as yet been carried out upon Central American and Eastern Asiatic and Pacific Island dogs to determine their precise interrelationships.

7. The Fourth Dog of Antiquity—*C.molossus*.

In *Animals and plants under domestication* Darwin says:

> I have looked through the magnificent works of Lepsin and Rosellini, and on the monuments from the fourth to the twelfth dynasties (i.e. from about 3,400 to 2,101 B.C.) several varieties of the Dog are represented; most of them are allied to Greyhounds. At the later of these periods a Dog resembling a Hound is figured, with drooping ears, but with a large back, and more pointed head than our Hounds.

He also pointed out that an undoubted mastiff of enormous size is figured on the tomb of Esarhaddon, about 640 B.C.

Eastman suggests that the

> huge coursing hound with drooping ears used in the chase of large animals ..... may have come from India as a modified descendant of the Thibetan hound. Indian effigies of the latter date back to the second millenium before our era, but in Egypt hunting scenes showing the lop-eared sight-hound have

come down to us from the earliest dynasties. This creature appears to have been introduced into Crete, through trade relations with that island, as early as 3,000. B.C.

The date set for the passage of the type to Crete may be too early, but Keller admits this type to have crossed over Crete into Greece with the greyhound from Egypt during the Bronze Age, and van Giffen finds a predominance of large bull-dogs, hounds, and the like amongst the dogs of the Bronze Age "tumuli" of Western Europe. We must remember too in this connection the mastiff type depicted as tribute from Asia in the tomb of Redmera.

Eastman illustrates his article with a drawing from a Theban royal monument of the XI Dynasty (about 2,100 B.C.). Concerning this picture Miss Caroline Ransom says :

> The stela shows King Horus accompanied by one attendant and five of his dogs. The latter were evidently of a southern race, for all have Berber names inscribed in Egyptian hieroglyphs above their figures, and in three instances a translation of the foreign name into Egyptian is written vertically before the dog's breast.

The three dogs so distinguished are of the lop-eared coursing type; of the other two one is jackal-like, the other the usual greyhound. That the three hounds were foreign to Egypt is unquestionable; they are also relatively recent comers. They probably arrived from India through the Red Sea or Mesopotamia. The fact that they have "Berber" names signifies little concerning their source for the Berber (or Hamitic) language may have existed north, east, south, or west of Egypt at the time in question. Even to-day "the Berber language is still essentially one, and the likeness between the forms current in Morocco, Algeria, the Sahara and the remote Siwah Oasis on the confines of Egypt, is much closer, for instance, than between Norse and English."—Keane's *Man, past and present* (1919).

Whatever may be the relation of this hound of smaller mastiff type to the Thibetan mastiff, it is tolerably certain that Obermaier is correct in recognising that there were no mastiffs in Egypt during the palmy days of the greyhounds. Attention has previously been directed to the appearance of the greyhound in Egypt coincidentally with the intrusion of foreign Armenoid peoples in the Second Dynasty until the foreigners became common in graves of the Twelfth Dynasty. It is consonant with the gradually increasing foreign contacts of Egypt with Asia that the mastiff type should be highly prized in the Eleventh Dynasty even if it came from as far afield as India.

From 2,000 B.C. to 700 B.C. there is a great gap in our knowledge of dogs and what was happening to them. We can only assume from the presence of large bull-dogs, hounds, etc., in the tumuli and the presence of a mastiff in Savoy at the end of the Bronze Age (Mac-

Curdy) that the passage of the Pomeranian, Pariah, and Greyhound types to Western Europe was succeeded during the Bronze Age by the mastiff introduced into Egypt and handed on to Crete.

In the seventh century, however, the mastiff came into special favour amongst the victorious Assyrians and was the pre-eminent dog of the chase in that period, being used for lion and wild-horse hunting.

Eastman (*loc. cit.*) says: "The so-called *C.molossus* of the ancients, and also the modern St. Bernard, seem to have been derived from that domestication in Western Asia to which the powerful mastiff-like Assyrian hunting dogs belonged such as we find represented in the monuments."

If, as Obermaier suggests, this *Canis molossus* is derived from the thick-set Thibetan wolf the later domestication of this dog and its gradual subsequent percolation into Europe and Africa is understandable. His idea that this dog reached Greece, Italy, and Western Europe as a result of Alexander's conquests may be correct and perhaps that invasion of *Canis molossus* gave Europe some of her bull-dogs.

On the other hand Van Giffen finds the large bull-dog type in "tumuli" of the Bronze Age and the Newfoundland type (which Obermaier derives for certain from Roman breeding material) was known in Greece before the time of Alexander. A dog of Newfoundland type is preserved in a piece of sculpture to-day and is "said to have been the favourite dog of Alcibiades and to have been the production of Myron" (Parker); and MacCurdy quotes the representation of a bull-dog of Pre-Etruscan age on a bronze situla at Bologna.

The Asiatic source of the mastiff breed then is attested, firstly, by such types being introduced into Egypt as Asiatic tribute; secondly, by their early representation in Early Indian sculpture; thirdly, by their intensive cultivation at the hands of the Assyrians; fourthly, by their being regarded as worthy gifts to Alexander during his Indian expedition; and, fifthly, by the persistence in Thibet of the wild form as Thibetan wolves (*C.laniger* and *C.niger*).

The late origin of the mastiff type and the lack of interest concerning dogs amongst Hindus and Mohammedans seems to have been responsible for the relatively meagre distribution of this type in the Orient and in Africa. In the western world, on the contrary, as a result of Assyrian, Grecian, and particularly Roman enthusiasm for dogs, this fundamental type was cared for, interbred, and developed with enormous profit to the modern dog population of the world.

From this period onwards the tracing of dog origins becomes a complicated puzzle. With the attention given to breeding and isola-

tion of fancy types (to say nothing of their unavoidable intermixture) in Mesopotamia, Egypt, Rome, and elsewhere, a great many breeds have arisen.

8. A South African Dog Immigrant from Asia.

Hitherto we have concerned ourselves with dogs in general and evidences of their migration. I shall now deal with a dog found amongst the Hottentots when Europeans first came to South Africa and endeavour to show how by means of this evidence we can prove cultural contacts between Southern Africa and Eastern Asia.

Theal (in *The history and ethnography of South Africa*, Vol. I, p. 40) writes: "The only other domesticated animal was the dog. He was an ugly creature, *his body being shaped like that of a jackal, and the hair on his spine being turned forward,* but he was a faithful and serviceable animal of his kind"—(italics mine).

Here we have a description of a dog possessing a peculiar, one might even have said, unique characteristic. Many dogs, especially those found in uncivilised countries, have a jackal-like appearance, but the hair on the spine turned forwards towards the head renders the Hottentot dog almost unique. But it is not unique. Its counterpart can be found, and in the very quarter in which scientists have been led to look for an explanation of Mongolian characteristics in the Hottentots, namely the East.

In the Indo-China seas lies a small island by the name of Phu-Quoc or Fu-Oc. Indigenous to this island is a breed of dog which has been named after its island home. A certain Marquis Barthelemy, who had a concession in this island from the French Government, stated that, through lack of interest, this particular type of dog was dying out. Fortunately for science. however, the breed excited interest and a full description and account of it is available.

Marquis Barthelemy succeeded, after a lot of trouble, in bringing three specimens to Europe and, at that time, there were two others in the Jardin d'Acclimatation.

It is also on record that a certain Comte Henri de Bylandt once judged the breed in Antwerp. This is of great interest as it shows that a considerable number must have been introduced into Europe. Its existence and description are well authenticated. The description of this dog, furnished by the same Comte Henri is:

> A long head with powerful jaws, *erect* ears, reddish eyes, with a savage expression, somewhat coarse body, neck very long and flexible, shoulders sloping, belly drawn up, loins broad and strong. Straight and lean legs, stifles rather straight with muscular thighs, longish feet with hard pads. Coat, on the whole body, and lges very short and dense, *on the back the hair is growing the wrong way, towards the head,* and is much longer and harder. Colour, reddish fawn with black muzzle, the hair on the back being darker. Height, about twenty-one inches, weight about forty pounds.

The breed is described as being intelligent and, although intractable, able to be trained for hunting.

The Phu-Quoc, with its long head, reddish eyes, erect ears, tawny coat with darker hair on the back, and drawn-up belly, irresistibly recalls the jackal, while the *forward-turned hair on the spine* is a peculiarity shared only by the Phu-Quoc and the Hottentot dog. In fact, there appears to be little doubt that the description of either dog tallies with that of the other. Now, like the Phu-Quoc, the Hottentot dog, through lack of interest, or perhaps open hostility on the part of the early settlers, has entirely disappeared; or rather, it would have been lost completely if it had not been resuscitated in another form: There still remains a dog in South Africa whose peculiarity is that of having the spinal hair turned forward towards the head. This dog is now known as the Rhodesian Ridgeback or Lion dog.

Although this dog has been adopted by Rhodesia and standardised and improved out of all recognition by enthusiasts of the breed, I do not think that there can be the slightest doubt that it did come from the Cape and that it is the direct descendant of the Hottentot dog described by Theal. The Rhodesian Ridgeback has undoubtedly been crossed with other breeds introduced by Europeans and certainly in a most haphazard manner; none the less this dominant characteristic of the Hottentot dog has stamped all its descendants: The reversed trend of the spinal hair remains the escutcheon and *sine qua non* of the modern Rhodesian Ridgeback.

It was a few years ago, when I was conducting the Kennel section of the "Farmer's Weekly," that I first became interested in the origin of the Rhodesian Ridgeback. For some time I was led to believe that it must have been introduced from overseas; but, having read Theal's description of the Hottentot dog, I began to doubt that theory of its origin, and attributed the Ridgeback to the Hottentot. I then searched for evidence of the Ridgeback in the Union. I asked for information from my readers and received many letters from various parts of the Union. A resident in the Northern Transvaal wrote: "Being interested in the Rhodesian Ridgeback, and reading your notes on the subject, I am giving the following for what it is worth. I understand that in the northern parts of the Bushveld, along the Palala and Pongola rivers, about fifteen years ago quite a number of the original settlers had these dogs. The Burkes, van Vuurens, van Ecks, and Viviers were some of the names mentioned to me." Another correspondent stated that about the time of the Boer War he first saw Ridgebacks in the possession of Jacob Coetzee, who was then post-cart contractor between Dordrecht and Jamestown, C.P. Mr. A. Giese of Wankie, pegger of the Wankie Colliery and one of the pioneers of Rhodesia, gave information that he knew these dogs along the Crocodile river in 1889, but he did not see one in Rhodesia until 1910. He also stated that the hunter, van Rooyen, always had some of these dogs with him.

The most conclusive proof that the Ridgeback did originally come from the Cape was furnished by Mrs. Lovemore of Rhodesia. She wrote: "The various articles on this new Ridgeback breed of dogs always interest me. In 1875 my parents (Rev. Charles and Mrs. Helm) trekked by wagon up from Swellendam to Bulawayo. On their way up someone gave them a pair of dogs with a ridge down their backs. I remember, as a child, having these dogs, and later on, when Mr. van Rooyen went on his hunting trips he used to borrow some from us and he found them very brave when hunting lions and leopards. . . . About twenty years ago Mr. Selmes, Mining Commissioner, imported a dog with a ridge and a short tail from Ceres district."

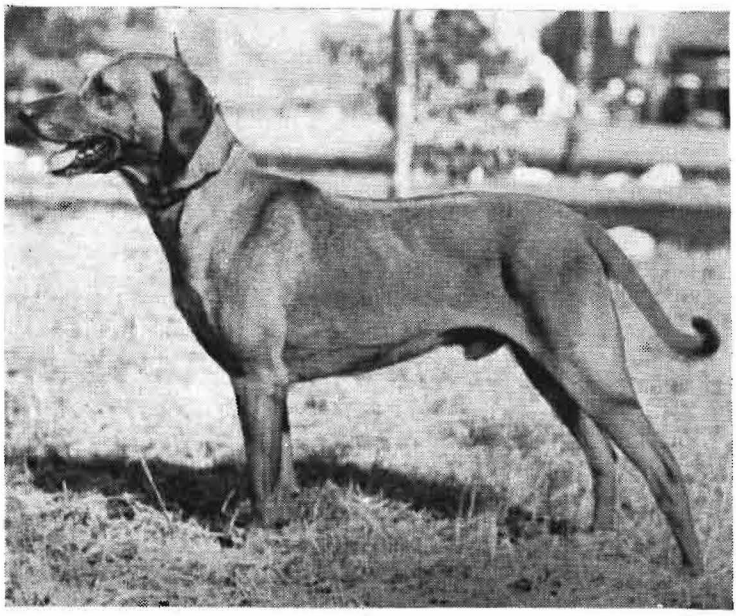


Fig. 2.—Rhodesian Ridgeback dog "Umvukwe Garry," Salisbury 1932 (Reproduced by courtesy of *The Farmer's Weekly*)

The above records prove conclusively that the dog now known as the Rhodesian Ridgeback definitely came from the Cape and as the Phu-Quoc was not brought here by Europeans and these characters are unlikely to have arisen here spontaneously, there is little doubt that the Ridgeback is the descendant of the old Hottentot dog mentioned by Theal. Further the Hottentot dog, if not actually the same as the Phu-Quoc, is definitely derived from the same Asiatic stock that originated the Phu-Quoc. The *Canis sumatrensis*, described by General Hardwicke, was a small, fox-like dog. Ears long, erect, and somewhat rounded. Limbs remarkably large and strong in relation to the bulk of the animal, its size being intermediate between the wolf and the jackal. *Canis scylax*, also from the East, is of similar type.

These eastern dogs are probably derivatives of the Egyptian jackal breed that produced the Chow-Chow and the other related types of the East. The ridgeback seems to have been a characteristic which emerged in one of these Eastern breeds, and its possessors, selected in similar fashion to the spaniels of the East, became favourites of the navigating Easterners.

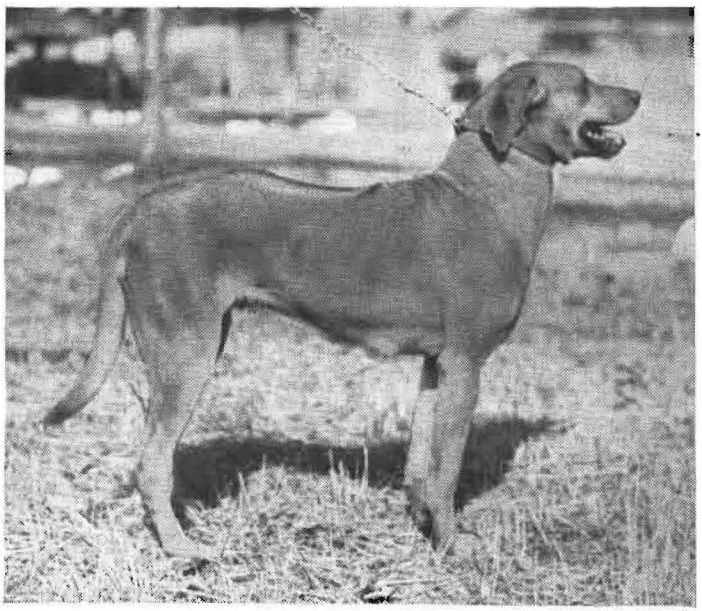


Fig. 3.—Rhodesian Ridgeback bitch "Viking Felicity," Salisbury (Reproduced by courtesy of *The Farmer's Weekly*).

The breed must have been brought to the Hottentots from the East because the Hottentots were not navigators whereas the Easterners were. A canoe made of Malayan wood was found in Algoa Bay a few years ago. It was reported in *Nature* and is now in the Port Elizabeth Museum. Madagascar is generally believed to have been colonised by Malayans. Alberuni (*circa* A.D. 1030) records that "The reason why in particular Somanath (in India) has become so famous is that it is a harbour for seafaring people, and a station for those who went to and fro between Sufâla in the country of the Zanj and China" (E.C. Suchan, 1910, Vol. 2, p. 104).

Thus for a considerable period before the 10th century down to Marco Polo's time we know that the Chinese and other Eastern nations were navigating the Indian Ocean, and it was doubtless from this source that the Hottentots received these and perhaps other dogs. It would be interesting to know to what extent the whole of South Africa's dog and jackal population has been derived from these and more ancient imported dogs.

JL. S.A.V.M.A.
V(I) 1934

Visceral Gout of Fowls.

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

At the Pan-African Agricultural and Veterinary Conference held in Pretoria in 1929, a paper on poultry diseases in the Union was read by Martinaglia. Under the heading "Nutritional Diseases," he described a condition "generally seen in young hens in lay." According to him there is loss of appetite, a slimy diarrhoea, a bright scarlet to purplish-blue comb, frequently impaction of the crop, and a temperature usually subnormal but sometimes even one degree above normal. Usually there are no bacteria in the blood and organs. (The occasional bacteria found are to-day regarded as post-mortem invaders—author). In his discussion on the lesions revealed at autopsy he states: "In *other* cases there is a whitish chalk-like deposit round the pericardial sac or on the epicardium..... The serosa of the intestine sometimes displays a greyish granular deposit. The kidneys often show punctiform foci which appear like urates." These remarks imply clearly that not all cases exhibit these deposits of amorphous powdery material. Further, he states: "All attempts to isolate an organism playing an aetiological rôle have failed. The disease seems to be closely associated with a ration rich in protein. In all outbreaks the joints were not implicated." The last sentence is of interest because up to the present we have no record of articular gout in fowls in South Africa. The above is the only reference in South African veterinary literature to a disease of great economic importance, which is called visceral gout as it bears such a close resemblance to the disease of the same name in Europe.

In the *Handbuch der Geflügelkrankheiten und der Geflügelzucht*, p. 64, v.d. Plank says that gout is a serious and apparently frequent nutritional disease of fowls. Prolonged feeding on horse flesh, the administration of yohimbin, ligation of the ureters, and chronic oxalic or carbolic acid poisoning are all said to produce a similar picture, but it is clear that v.d. Plank is not greatly impressed by these factors as possible causes of visceral gout.

In South Africa the disease has been prevalent and known for at least ten years, and the author saw many cases in Pietermaritzburg in 1927. A record has been kept of outbreaks dealt with at Onderstepoort since 1931, and this paper deals with these outbreaks and attempts to draw certain conclusions from them.

1.

April 1931. Mr. G. (Pretoria) had about sixty white leghorn hens. A virulent disease suddenly appeared and many died. The birds were

very depressed and had black combs and diarrhoea. The temperature was normal. There was coma before death. At autopsy there was intestinal catarrh, slight enlargement of the liver and kidneys, and slight tumor splenis.

2.

November 1931. Mrs. J. (Gezina) had 150 white leghorn hens laying well. A disease appeared with explosive violence and in one week 100 died. Hens sickened rapidly, there was a marked watery diarrhoea and the combs rapidly turned black. The normal odour of the birds was accentuated, as happens when the plumage becomes moist. The temperature was always about normal. In most cases the fowls died in coma within one day. At autopsy there was marked cyanosis, severe intestinal catarrh, impaction of the crop, which was filled with mash, and slight enlargement and degeneration of the liver and kidneys. Those birds which lived longer than one to two days had extensive chalky deposits on the epicardium and on the peritoneum covering the liver and intestinal coils, and the kidneys bristled with "spicules" of the same amorphous material. The runs were devoid of vegetation and the water and food appeared to be satisfactory. The ration did not contain more than 10% digestible protein.

3.

April 1932. Mr. E. (Natalspruit) reported that 60 hens had died suddenly within five days and that many others were ill, showing diarrhoea, dark combs, and ruffled plumage. He suspected green barley to have been responsible. Three dead white leghorn hens were sent for autopsy and all showed to a varying degree the chalky deposit on the liver, epicardium, and as "spicules" in the kidneys. The other lesions were the same as those noted in outbreak 2.

4.

April 1932. Mr. J. (Pretoria North) reported about ten deaths and a larger number of sick birds in one week in a flock of 500. Two were brought for autopsy and revealed blue combs, fairly marked cyanosis, intestinal catarrh, and "spicules" in the kidneys.

5.

October 1932. Mr. G.D. (Meyerton) reported frequent deaths in his hens. Two adult birds were sent for autopsy. One showed a black comb, intestinal catarrh, congestion of the liver and kidneys, and very slight tumor splenis. The other showed all these, plus the characteristic deposits on the epicardium, pericardium, liver, and intestines, and in the kidneys.

6.

November 1932. Mrs. M. (Johannesburg) said that practically her whole flock suddenly took ill, egg production dwindled almost to zero,

and many birds succumbed. Damaged maize was held responsible, but some of it was fed here on arrival, and some after fermentation, without unpleasant sequelae. Three white leghorn hens were sent for examination. In each case the spleen was normal, the liver rather congested, the kidneys were slightly swollen and degenerated, and there was intestinal catarrh. Only one hen showed the deposits on the liver and heart, and in the kidneys.

7.

January 1933. Mr. McD. (Johannesburg). Pullets laying heavily in one house began to abort soft eggs *at night*. Many of them died, two or three at a time. After three weeks the disease disappeared. All fowls were reputed to have been fed the same diet. Four sick pullets were examined here. All had watery diarrhoea and bluish combs, but no elevation of temperature. At autopsy there was intestinal catarrh, cyanosis, and congestion of the liver and kidneys, and the ova were very slightly turbid. One had a broken ovum in the peritoneal cavity, and this had resulted in yolk peritonitis. No deposits were seen.

8.

March 1933. Mr. D. (Middelfontein). This poultryman reported frequent deaths in his laying pullets. He brought five for examination. There was no temperature. The birds were moulting and the combs were very blue. There was severe diarrhoea and the birds smelt strongly. At autopsy the spleen was normal; there was intestinal catarrh and cyanosis. Only one showed deposits on the liver, etc.

9.

March 1933. Mr. H. (Balfour North). The author visited this farm. Second season hens living in a house, with a run in which lucerne grew, were dying at an average rate of one a day. About fifty out of a hundred were already dead. This house and run actually adjoined the next house and run, but the disease never spread. Soft eggs were often aborted *at night* in the affected house. All birds on the property received the same food, which appeared to be beyond reproach. Ailing birds had blue combs and a yellowish very watery diarrhoea. There was no temperature. There was marked dullness. Sick birds always died within a day and at autopsy there was cyanosis, intestinal catarrh and congestion of the liver and kidneys. Sometimes the ova were slightly turbid. In one case there was slight tumor splenis. No deposits were seen.

10.

May 1933. Mr. H. (Indwe) reported several rather sudden deaths in one fowl house. Two hens were sent for autopsy. There were the usual lesions and only one showed deposits, which were extensive.

11.

August 1933. Mr. Q. (Pretoria) had among others, one pen of white leghorn hens which suffered casualties at the rate of about one daily. There was sudden illness with a blue comb and diarrhoea, and death in a few hours. At autopsy there was cyanosis, intestinal catarrh, congestion of the liver and kidneys, and the ova were very slightly turbid. Aborted soft eggs were never seen and there were no deposits on the epicardium, etc. The food was actually rather poor in protein.

12.

September 1933. Mr. B. (Roberts Heights). This outbreak, which occurred very suddenly, was visited by the writer. Forty-five out of fifty white leghorn hens sickened and numerous soft eggs were aborted *at night*. Fifty Rhode Island Red hens in an adjacent pen (only a wire netting partition) remained apparently healthy, even though the feeding and general management were said to be the same. About thirty-five white leghorn hens died within a week, and then the disease disappeared as mysteriously as it appeared. There were the usual symptoms and post-mortem lesions. Many showed impaction of the crop, and some had a little slime in the mouth. The spleen was never enlarged. Some showed marked deposits on the liver, etc. In other cases there was little or no deposit.

13.

October 1933. Mr. H. (Hennops River). The author visited this plant when the disease appeared. Of 500 white leghorn hens, 400 became ill and about 50 died. The disease appeared with explosive violence in one pen, and then appeared in other pens on the days immediately following. The disease disappeared after three weeks. The owner accused wilted rye, but this definitely could not account for some cases. Soft eggs were apparently not encountered. In addition to the usual symptoms the cornea was often very slightly turbid in appearance. Many showed impaction of the crop, and many smelt strongly of moist stagnant fowl manure. Some showed deposits on the liver, etc., others not. Two samples of blood from affected birds, examined for the writer by Dr. H. Graf, had 9 and 23 milligrams of uric acid per 100 c.c. respectively. Samples of food were taken and fed to test fowls for a week with negative results.

14.

October 1933. Mr. N. (Pietersburg). Of sixty white leghorn hens practically all sickened and died within two days. Wilted lucerne was suspected. There were the usual symptoms, which were very marked. At autopsy of one hen sent in for examination there was cyanosis, intestinal catarrh, impaction of the crop, congestion of liver and kidneys,

and slightly turbid ova, but no deposits. Food sent was fed for three days but gave negative results.

15.

December 1933. Mr. K. (Bon Accord). In a small flock of about seventy fowls there were two or three deaths daily for over a fortnight. After showing symptoms of diarrhoea, blue comb, and depression, the affected fowls died within twelve hours. At autopsy the usual lesions were seen, but no deposits were observed in two hens sent for examination.

16.

December 1933. Messrs. P. & T. (Bloemfontein) reported several sudden deaths after the birds had shown diarrhoea and black combs. Two dead hens were sent for autopsy: there were the usual lesions, but no deposits. In the peritoneal cavity of one was a ruptured ovum. A sample of mash was sent and fed here with negative results.

17.

December 1933. Mr. J. (Eerste Fabrieke). The disease appeared suddenly and in one week there were 400 cases among 1,200 birds, with 60 deaths, 40 of which occurred in one night. The birds in six out of seven camps were reported affected, although all received the same food and water. In this outbreak even pullets three months old became affected. As usual the egg yield fell almost to vanishing point. There were the usual symptoms and post-mortem lesions. Some showed slight deposits. Some had ova lying broken in the peritoneal cavity. One bird turned the head to one side and walked towards the other side.

18.

January 1934. Mr. H. (Roberts Heights). The writer visited this plant when the outbreak commenced. There were 300 adult birds and they received a good diet, except that the greens were limited to coarse grass and weeds growing in the runs. Within a week the egg yield dropped from 120 to 2 per day. There were forty-five deaths spread over 10 days, although judging by the appearance of the fowls and the drop in egg production, there must have been well over 250 cases. There were the usual symptoms, and odd birds appeared to suffer from cerebellar derangement as they tended to walk sideways. In many cases the cornea had a slightly turbid appearance. The skin of some birds felt abnormally hot though the temperature was not elevated. The heaviest layers suffered most. There was frequently impaction of the crop. The post-mortem appearances were the same as already described, but no deposits were noted in four hens examined. There were no aborted eggs found.

In all the above outbreaks the fowls were being kept on the semi-intensive system, and most of them were infested to a greater or lesser extent with round worms. Many of them were infested also with fleas

and lice. Aerobic blood cultures on agar and in broth, and anaerobic blood cultures in Hibler's and chopped meat media were negative.

A study of these outbreaks will reveal that what is known in South Africa as visceral gout is, in its simplest form, an apparently afebrile peracute condition characterised in life by depression, weakness, very watery diarrhoea, cyanosis, and coma, and in death by intestinal catarrh, cyanosis, congestion of the liver and kidneys, and only a very slight tumor splenis. Additional symptoms are an accentuated smell of fowl droppings, a slightly turbid cornea, cerebellar disturbances, abortion *at night* of soft eggs, increased thirst, loss of appetite, cessation of laying and a little slime in the mouth. The birds often sit together in groups in the shade and will not move when approached; the feathers are often dirtier than usual; emaciation is frequently rapid; just before death the head is often rested on the ground. Additional post-mortem lesions are impaction of the crop, slightly turbid ova, ruptured ova in the peritoneal cavity with occasional yolk peritonitis, and deposits of greyish amorphous material on the epicardium (where it may be 2 mm. thick), on the pericardium, on the abdominal air sacs, on the peritoneum covering the liver and intestinal coils, and in the kidneys where it appears in agglomerations resembling fine spicules. The joints are normal.

The percentage of available protein in the diet seems definitely not to be associated in any way with the disease. The disease usually occurs in laying birds, but may be seen in pullets only three months old. Cockerels also become ill occasionally. Most outbreaks are encountered in the spring and summer. The disease is undoubtedly very widespread in South Africa and is known to be of great economic importance. It is not recognised by poultrymen.

Sometimes the disease is present in odd cases which occur regularly at short intervals. At other times it appears like an exploding bomb in the flock, and this is when the unfortunate poultryman may in one week find himself faced with utter ruination. But even though an entire flock may become infected at once, only a few birds may die each day for a fortnight or more; in such cases, however, the egg yield will almost invariably drop to zero. Up to ninety per cent. of a flock may become affected, and of the sick birds up to ninety per cent. may die.

The prognosis should be very guarded; in any case it is always rather grave. Birds frequently recover, but the process is slow, lasting as long as a month, and a partial moult can always be expected.

Treatment should be directed towards relieving the acidosis. Sick birds may be treated by individual dosing with sodium bicarbonate, given preferably in milk. A 1-2% solution of sodium bicarbonate may be given as drinking water. Withhold food for two or three days,

keep the fowls in a warm, clean shelter, and provide plenty of water and milk. Bad cases will not respond to treatment and should be destroyed. Since the food may in some obscure way be associated with the disease, it may be wise to purchase an entirely new supply. The old supply can be fed later to a few birds and, if it proves harmless, it may then be fed to the others as well.

Various diseases must be considered in the differential diagnosis. They are :—

1. *Fowl typhoid.* This is frequently confused with visceral gout. Here the diarrhoea is usually yellowish green, and there is fever. At autopsy there is a tumor splenis, and the liver is usually much enlarged and has a characteristic bronze colour. *B.gallinarum* is easily isolated from the heart blood.

2. *Fowl cholera.* There is fever, with an elevated temperature unless diarrhoea has been in evidence for some time. The liver usually has small yellowish necrotic foci. Bipolars are easily found in blood smears.

3. *Botulism.* The necks are usually paralysed and the heads rest on the ground. Paralysis is an important symptom. A culture of chopped meat medium seeded with caecal contents and incubated for about five days is usually toxic. This disease has not yet been seen in fowls in the Union, as it is due to the A and B types of *Clostridium parabotulinum.*

4. *Fowl plague.* As far as is known this is not present in South Africa. It is a febrile condition, the blood contains the virus as a rule, and normally sub-inoculation of susceptible fowls is successful.

5. *Pseudo fowl plague* (Newcastle Disease). The same remarks apply as in the case of fowl plague.

6. *Arsenical poisoning.* This is a not uncommon condition. Nearly all the birds are down and dying within two hours, as a rule. There is usually thick tenacious mucus in the duodenum. Arsenic is easily detected in the liver.

7. *Avitaminosis A.* This is a slowly developing disease that is unlikely to occur where the birds are fed green food and yellow maize products. There are usually pustules in the pharynx and oesophagus, and conjunctivitis. The only point of resemblance is the chalk-like deposit on the heart and liver and in the kidneys.

8. *Nephritis.* Sporadic cases occur, and the clinical and pathological pictures resemble subacute visceral gout with the deposition of chalk-like material on the liver and heart, etc. In nephritis, there is frequently a deposition of hard cheesy material in the ureters, which may occasionally be as thick as lead pencils.

9. *So-called epizootic abortion of fowls.* Information concerning this condition is meagre, and it is even possible that some of these outbreaks were really due to visceral gout.

No useful purpose can be served at this juncture by discussing the aetiology of visceral gout. Frankly we do not know the cause, and to dwell on the various possibilities and theories and to record experiments that have been and are being done would most likely not lead us anywhere.

REFERENCES.

1929. MARTINAGLIA, G. "Poultry diseases in South Africa." Report of Proceedings of the Pan-African Agricultural and Veterinary Conference, pp. 178-187.

1929. v.d. PLANK, G. M. Handbuch der Geflügelkrankheiten und der Geflügelzucht, pp. 64-66.

Femoral Paralysis in a Horse.

By J. H. SCHOEMAN, B.Sc., B.V.Sc., Umtata.

Subject.—A bay mare aged 9 years.

History.—Owing to scarcity of food, the animal was turned out to graze. Two months afterwards it was found by a native, who reported to the owner that the animal had fractured a hind limb.

Symptoms and Examination.—The near hind limb was held in a flexed position and was unable to support weight. On walking the animal, I noticed an incomplete extension, slow forward movement, and knuckling over at the fetlock. From behind there was seen a distinct dropping of the hip on the affected side. No distinct atrophy of any muscles could be noticed, possibly on account of the very poor condition of the animal.

A thorough examination of the tuber coxae, ilium, and patella as well as a rectal examination for fractures and thrombosis, revealed nothing unusual. The animal did not resist manipulation of any kind. A definite skin reflex (as shown by response to needle pricks) was present over the whole limb, except in the region of the quadriceps group, supplied by the crural (femoral) nerve.

A diagnosis of femoral paralysis was made.

Treatment advised was rest and massage, and strychnine internally. Six weeks afterwards the owner reported that there was marked improvement, so much so that he turned the mare out to graze again. Two weeks later the animal was found dead in the veld. Unluckily a post-mortem examination could not be made, as I was informed of the death only after the animal was buried. Although I was unable to ascertain the cause of the condition (possibly backward slipping) I thought this case was worth recording on account of possible differential diagnosis.

JL. S.A.V.M.A.
V(1) 1934.

The Veterinary Profession in South Africa: 8. Natal Act of 1899 and the Natal Veterinary Board.

By H. H. CURSON, Dr. Med. Vet., F.R.C.V.S., Pretoria.

Introduction.

Material for the compilation of a brief history of the Natal Veterinary Board has been available for some time, but the recent entire repeal of certain Natal legislation[1] makes the writing and publication of this record now necessary. The reason the repeal is important is that the Natal Veterinary Board owed its existence to Natal Act No. 21 of 1899 (Act to amend the Medical and Pharmacy Act, 1896), which was to "be read and construed together" with Natal Acts No. 30 of 1896 (Dentists Act) and No. 35 of 1896 (Medical and Pharmacy Act). Since 8/3/33 Act No. 16 of 1933 has not only replaced the above Natal measures, but has provided for the registration of veterinarians throughout the Union of South Africa.

Information concerning the introduction and passage of Act No. 21 of 1899 (formerly the Medical and Pharmacy Act Amendment Bill —No. 32 of 1899) is to be obtained from Hansard, Vol. XXVIII of the 3rd Session, 2nd Parliament of Natal, for the period 11th May—23rd August 1899.

Owing to the representations of the Principal Veterinary Surgeon (Watkins-Pitchford, W.) and the practical sympathy of the Hime Ministry (1899-1903) the bill, which in the previous year had been referred to a Select Committee, was again presented before Parliament, the principal addition "including veterinary surgeons and trained nurses under the regulations of the Medical Board." The measure was sponsored by the Colonial Secretary, the Hon. C. J. Smythe, member for Lions River Division, and the Second Reading was moved on 28th June 1899. After adjourned debates, the bill was read a second time by 23 votes to 4 on 5th July. In his reply to the debate, the Colonial Secretary had emphasised that "the object was not to prevent laymen giving medicines, but merely to prevent them calling themselves what they were not."

[1] When the consolidated Act No. 13 of 1928 (Medical, Dental and Pharmacy Act) was passed (*U.G. Gazette* 22/5/28), provision was made for the non-repeal of Natal legislation which had any bearing on the legal protection of veterinary surgeons. By Section 89 of Act No. 13 of 1928 veterinary surgeons dealing in poisons and habit forming drugs require the authority of the Minister of Public Health.

On 11th and 12th July the bill was in Committee, and the points raised are not of much interest, except for some discussion on unprofessional conduct. The Colonial Secretary, however, stressed the fact

Fig 4.—Col. H. Watkins - Pitchford, F.R.C.V.S., whose influence led to the Act of 1899 being placed on the Statute Book. (*Vet Jl.*)

Fig. 5.—Hon. C. J. Smythe, who sponsored the measure in the Natal Parliament.

Fig. 6.—Hon. H. D. Winter, Minister of Agriculture from 1899-1903.

that it was the Governor-in-Council who caused a name to be erased and not the Board. The Third Reading was taken without debate and the Act as finally passed may be seen in the *Statutes of Natal* 1845-1899

(Vol. II, p. 14), edited by R. L. Hitchins, and published by P. Davis & Sons, Pietermaritzburg, in 1901.

The Objects of Act 21 of 1899.

The main purpose of Act 21 was (see *Section* 15) that "No person shall be allowed to assume the title of veterinary surgeon or hold himself out to be such unless he shall first be registered as provided in this Act." In order to carry out registration, the Natal Veterinary Board was created (*Section* 11), the five members consisting of three veterinary surgeons (appointed in the *first* instance by the Governor) and two medical men (appointed by the Natal Medical Council). The term of office was five years and at subsequent elections the veterinary members were to be elected by "veterinary surgeons registered under this Act." Three members constituted a quorum.

The Board had also the power to (a) examine candidates not already possessing a recognised qualification, (b) collect fees for examination, (c) enquire into cases of professional misconduct, (d) draw up regulations for the guidance of the profession, and (e) institute legal proceedings where necessary. No veterinary surgeon, however qualified, could sue for fees in a court of law unless he was "licensed under this Act" and the register of the names, addresses, dates of admission, and qualifications was to be kept in the office of the Colonial Secretary, Pietermaritzburg.

In terms of *Section* 18 of the Act, Rules and Regulations were published in the *Natal Government Gazette* of 2nd December, 1902, under Government Notice No. 773. Provision was thus made for (i) the conduct of business at Board meetings, (ii) procedure in regard to registration (including a form of declaration by an applicant), and (iii) details in connection with examinations.[2] The fee payable for a certificate issued after examination was ten guineas; but by Government Notice No. 809 published in the *Natal Government Gazette* of 5th December 1905, an additional guinea was specified for registration in such cases.

Apart from Government Notices relating to elections (e.g. No. 596 of September 1904) and notifications of registered veterinary surgeons (e.g. No. 2305 of December 1925) two call for special mention, viz.—(a) Government Notice 48, published in the *Natal Government Gazette* of 19th January 1904, regarding the first veterinary examination to be held at Allerton Laboratory on 16th February 1904, and (b) Govern-

(2) In the Regulations in question, provision was made for the examination of candidates for registration, who, not being entitled to practise as Registered Veterinary Surgeons in Great Britain, "desired to obtain the certificate of the Natal Veterinary Board." In 1924 and again in 1928 a veterinary graduate, not possessing the requisite qualification as laid down by law, was nevertheless granted the certificate of the Board.

ment Notice No. 907, appearing in the *Union Government Gazette* of 11th November 1910, appointing the Minister of Agriculture (General the Right Hon. Louis Botha) of the Union of South Africa to administer Act 21 of 1899 in place of the Colonial Secretary, Natal (C. O'Grady Gubbins), which office no longer existed after Union (31st May, 1910). On 24/2/14 the P.V.O. enquired of the Secretary, Natal Veterinary Board, "whether any regulations have been framed"! Copies of the above legislation are to be found in the volume containing the Appendices referred to by Curson (1930), and which has since received the Catalogue mark, Cl. 30. J. No. 5, of the Library of the Division of Veterinary Services, P.O. Onderstepoort (see *Jl. S.A.V.M.A.* I (4) : 16, 1930).

Constitution of Boards.

Apart from the appointment of three veterinary members by the Governor (Sir Walter Hely-Hutchinson) (Government Notice 515 in *N.G.G.* of 3rd October 1899), and two medical men by the Medical Council (Government Notice 629 in *N.G.G.* of 21st November 1899), nothing further was done regarding Act 21 of 1899 until 1902, when the Anglo-Boer War (1899-1902) came to an end. The first election was held at the end of September 1904, nominations having been received up to 4 p.m. on 24th September.

The following table gives the members up to 25th March 1933, the date of the last meeting of the Natal Veterinary Board, due to the passing of Act 16 of 1933.

Office-Bearers.

	1899	1904	1909
President :	H. Watkins-Pitchford	H. Watkins-Pitchford	H. Watkins-Pitchford[5]
Secretary :	C. H. Cordy S. B. Woollatt Dr. Campbell Watt Dr. Ward	C. H. Cordy[3] S. B. Woollatt[4] Dr. Campbell Watt Dr. Ward	C. M. Sharpe Dr. Campbell Watt Dr. Russell Strapp

(3) Mr. Cordy resigned in 1907 and his place was filled by Mr. S. T. Amos, who from 8/1/08 was Secretary.

(4) When in 1907 Mr. Woollatt resigned from the post of Principal Veterinary Surgeon, the Board agreed that his successor (who was not a member of the Board) could attend meetings in an unofficial capacity. Mr. Power thus attended unofficially from 1908 until his election to the Board in 1909.

(5) Resigned 22/4/1912 and was succeeded by Mr. A. W. Shilston (20/8/12) who again resigned at the end of 1913 and was succeeded by Mr. Cordy (1/4/14). On his departure Dr. Watt was appointed President.

OFFICE-BEARERS (Cont.)

	1914	1919	1924	1929[6]
President:	W. M. Power	Same as previous period	W. M. Power	W. M. Power
Secretary:	C. M. Sharpe C. H. Cordy Dr. Campbell Watt Dr. Russell Strapp		C. H. Cordy C. M. Sharpe Dr. Campbell Watt Dr. Russell Strapp	W. M. Power S. T. Amos C. Tyler[7] Senator Dr. A. McKenzie Col. Dr. Davies

As will be seen from the List of Registered Veterinary Surgeons (page 56, *infra*), the number of votes was always small, and it would appear that in some instances veterinary surgeons voted who were not entitled to do so.

Although in colonial days the Colonial Secretary was nominally responsible for control of the Board, and the Minister of Agriculture after Union, yet actual supervision was vested in the Government Bacteriologist (H. Watkins-Pitchford) up to 1910, and thereafter in the Principal Veterinary Surgeon, Union (C. E. Gray 1910-1921, and J. D. Borthwick 1921-1927). In 1927, when the Divisions of Veterinary Education and Research and Veterinary Administration were amalgamated as the Division of Veterinary Services, the Head, the Director of Veterinary Services (Dr. P. J. du Toit) naturally became responsible for supervision. It is of course understood that in each case the veterinary chief concerned would advise his immediate chief, i.e. the Secretary of Agriculture, the permanent official responsible for the Department of Agriculture, and in whose keeping was the Register.[8]

MEETINGS OF BOARDS.

Thanks to Mr. S. T. Amos, F.R.C.V.S., the last Secretary of the Natal Veterinary Board, it has been possible to peruse the Minutes of the period 1908-1931 (2 volumes). Previous Minutes are apparently missing but short annual reports concerning the Board appear in the Conjoint Registers published by the Colonial Secretary. Four meetings were held in 1902, and as the result of the labours of a sub-committee,

(6) Medical members appointed by South African Medical Council. Note Act 13 of 1928 (Medical, Dental and Pharmacy Act).

(7) Resigned 3/10/30 on account of transfer to Capetown. Vacancy filled by Mr. W. A. Dykins.

(8) It is interesting to note that the Secretary, Natal Veterinary Board, in a letter dated 27th May 1922, to the Secretary for Agriculture, asks that the Register be *returned* to him (i.e. to the Natal Veterinary Board)!

Rules and Regulations (published under Government Notice No. 773 of 1902) were drafted.

An outline has been given of the headings of the Regulations, but it is worthy of notice that a state veterinarian attending a meeting of the Board was entitled to travelling allowance "according to the tariff paid to members of the Medical Council"[9] Owing to the Natal Native Rebellion only three meetings of the Board were held in 1906. From 1908-1931 the meetings held were as follows :—1908—5; 1909—6; 1910—8; 1911—1 (last meeting attended by Col. Watkins-Pitchford); 1912—3; 1913—5; 1914—7; 1915—3; 1916—1; 1917-1919—no meetings; 1920—2; 1921—no meeting; 1922—2; 1923—3; 1924—2; 1925—3; 1926—2; 1927—1; 1928—1; 1929—3; 1930—3; 1931—2; 1932—no details available; 1933—the last meeting, presumably the only one of the year, was on 25th March.

Meetings were usually held at Pietermaritzburg (otherwise at Durban), the venue varying from a private residence to a government office.

Proceedings of Board.

Space precludes reference to even a summary of the proceedings of the Board, but it is quite evident that shortly after Union, the authorities, if not hostile, were certainly not sympathetic to the Board, a state institution! On the other hand, the actions of the Board do not strike one as being particularly vigorous. Complaints were certainly brought forward, but it seemed a matter of indifference whether these were remedied or not. One obtains an impression of apathy, which should not be associated with a young profession.

Apart from the registration of applicants (see next section) the following were the chief activities of the Board :—(a) matters regarding professional etiquette, wherein the requirements of the Royal College of Veterinary Surgeons were observed; (b) examination of candidates desiring the certificate of the Board. Only three were examined in all, two being successful; and (c) matters of general professional importance, e.g. at meeting of 12/8/30 (at Senator Dr. McKenzie's house, Musgrave Road, Durban) the draft milk laws of Durban were studied "to see that the Natal Veterinary Act was in no way infringed."

The Minutes are at present in Natal and the Register with the Secretary for Agriculture, Union Buildings, Pretoria.

(9) A copy of Natal veterinary legislation was sent to other Colonial Governments in South Africa through the Minister of Agriculture (Hon. H. D. Winter, born 26/10/1851 and died 4/11/1927), but it is clear that it produced no good effect, for the next administration to enforce registration was Northern Rhodesia (Ordinance 14 of 1930 of *Northern Rhodesia Government Gazette* dated 11th April, 1930).

Colony of Natal.

VETERINARY SURGEON'S LICENSE.

Issued under Section 17 Act No. 21, 1899.

Sidney Thomas Arundel Amos

M.R.C.V.S. of Durban,

is hereby authorised to practise as a VETERINARY SURGEON in the Colony of Natal.

W. Bazley

Colonial Secretary.

Pietermaritzburg,
Natal,
7th January 1905.

Fig. 8.—Certificate of Registration.

COLONY OF NATAL.

NATAL VETERINARY BOARD.

Certificate in Veterinary Medicine and Surgery.

This is to Certify that

Frederick Charles Simpson

has, to the satisfaction of the Natal Veterinary Board, passed an Examination in Veterinary Medicine and Surgery, which entitles him to be placed on the Veterinary Surgeons' Register of this Colony.

Matthews Surgeon R.C.V.S.

President.

C. H. Cordy M.R.C.V.S.

Secretary.

Pietermaritzburg,
Natal, March 4th 1904

Fig 7.—Certificate after Examination.

Registered Veterinary Surgeons (Act 21 of 1899).

	Name.	Qualified.	Registered.	Govt. Not.	Further remarks
	Cordy, C. H.	M.R.C.V.S.	1890 6.7.03		
(10)	Harber, A. F.	M.R.C.V.S.	1897 6.7.03		
	Nadal, F. I.	M.R.C.V.S.	1885 6.7.03		Died 12.6.23
(10)	Woollatt, S. B.	M.R.C.V.S.	1897 6.7.03		
(10)	Hutchinson, F.	M.R.C.V.S.	1889 3.10.03		
	Pitchford, H. W.	M.R.C.V.S.	1889 3.10.03		
	Verney, F. A.	M.R.C.V.S.	1896 3.10.03		
	Hogg, T.	M.R.C.V.S.	1900 6.10.03		Address unknown 1910
	Florens, F. A.*	M.R.C.V.S.	1867 1903-4		Name removed from Register 1908
	Fyrth, W.	M.R.C.V.S.	1894 1903-4		Address unknown 1909
	O'Neill, O. A.	M.R.C.V.S.	1893 1903-4		do. do.
(10)	Simpson, F. C.	Board Exam	1904 3.5.04		
	Collyer, J. B.	M.R.C.V.S.	1897 14.11.04		
(10)	Sharpe, C M.	M.R.C.V.S.	1899 14.11.04		
(10)	Webb, J. L.	M.R.C.V.S.	1896 14.11.04		
(10)	Amos, S. T. A.	M.R.C.V.S.	1896 7.1.05		
	Power, W. M.	M.R.C.V.S.	1896 7.1.05		
	Oldfield, T. L.	Board Exam	1905 12.4.05		Died 1921
	Tyler, C.	M.R.C.V.S.	1900 3.6.05		
(10)	Carless, F. J.	M.R.C.V.S.	1890 14.11.06		
(10)	Hodder, A.	M.R.C.V.S.	1898 14.11.06		
	Goulé, A.	M.R.C.V.S.	1871 17.11.06		Died 12.9.18 at sea
	Dawkins, T. B. S.	M.R.C.V.S.	1872 14.1.07		Died 1912
(10)	McNeil, J.	M.R.C.V.S.	1896 10.12.09		
	Matthews, R. C.	M.R.C.V.S.	1896 2.5.10		
	Shilston, A. W.	M.R.C.V.S.	1908 2.5.10		Died 6.7.19 in India
	Mitchell, D. T.	M.R.C.V.S.	1908 9.6.14		
	Barnes, W. G.	M.R.C.V.S.	1888 27.7.14	G.N. 1237	
	Hay, W.	M.R.C.V.S.	1915 20.9.24	G.N. 1549	
(10)	McIntyre, F. F.	M.R.C.V.S.	1901 20.9.24	G.N. 1549	
(10)	McCall, D. B. J.	M.R.C.V.S.	1910 20.9.24	G.N. 1549	
	Brandsen, J. G.	Staatseksamen Holland	20.9.24	G.N. 1549	
(10)	Viljoen, N. F.	M.R.C.V.S.	1925 22.12.25	G.N. 2305	
	Knight (Miss) E. G.	M.R.C.V.S.	1923 8.1.27	G.N. 69	
(10)	Sterne, M.	B.V.Sc. (S.A.)	1927 19.10.28	G.N. 1810	
	Webster, G. C.	M.R.C.V.S.	1908 19.7.29	G.N. 1283	Resigned C.V.D. 11.4.31 and returned England
(10)	Henning, M. W.	M.R.C.V.S.	1919 19.7.29	G.N. 1283	
(10)	Wadlow, C. H.	M.R.C.V.S.	1903 19.7.29	G.N. 1283	
(10)	Howie, A. M.	M.R.C.V.S.	1910 19.7.29	G.N. 1283	
(10)	Ewing, S. H.	M.R.C.V.S.	1909 19.7.29	G.N. 1283	
(10)	Dykins, W. A.	M.R.C.V.S.	1910 4.7.30	G.N. 1210	
(10)	Jackson, S. T.	M.R.C.V.S.	1915 4.7.30	G.N. 1210	
(10)	van Heerden, C. J.	M.R.C.V.S.	1923 18.2.32		

(10) Indicates that veterinarian has been recognised under Section 10(1) of Act 16 of 1933.

* Francois Albert Florens was a native of Mauritius (Port Louis).

Difficulties of the Board.

The following seem to have been the chief difficulties encountered by the Board :—

(a) *Legal Adviser.* (i) Acting on the representations of the Principal Veterinary Officer, Pretoria (who appeared to resent the presence of an independent body possessing the powers of the Board), the Legal Adviser in September 1914 (Min. 4/491/14 of 19/9/14 from Department of Justice) ruled that the only fee authorised was £3 :0 :0 for examination (see *Section* 18 of Act). In 1902 the fees of £1 :1 :0 for registration and £10 :10 :0 for the examination certificate had been legalised by their publication under Government Notice 773, but in spite of this, the fees in question were held to be *ultra vires*[11]

(ii) Again, by request of the Principal Veterinary Officer, on October 1st 1915, the Department of Justice advised that it was not imperative for a state veterinarian to register in Natal, as he does not "hold himself out" (see *Sect.* 15 of Act) to be a *veterinary surgeon.*[12] It was further suggested that veterinarians should sign not as Government Veterinary Surgeons but as Government Veterinary *Officers.*

Considering that the Board was a State institution and that supervision was in the hands of the Principal Veterinary Officer, it would have created a better spirit had an attempt been made to improve the administration of the Board rather than oppose it. Further, in connection with the question of registration, although the position is clear in the Act (see *Sect.* 15), yet Regulation 1 (of Government Notice 773) unfortunately contains the word "desirous" in regard to a person who should register. The authorities took this to signify that registration was optional!

To summarise : Where the Regulations (Nos. 4 and 12, Examinations) refer to fees, they are held to be *ultra vires*, but where (in spite of the Act) some option seems to be indicated (Regulation No. 1 Registration), there is no objection!

The Natal Veterinary Board shirked a responsibility when it did not assert itself in cases such as those given above.

(b) It must be stressed here that had veterinarians loyally abided by the Act when in Natal, the Principal Veterinary Officer would not have taken up the matters referred to under (a). In both cases, members of the profession were responsible for trying to evade payment of a fee, and in appealing to the Principal Veterinary Officer succeeded on personal grounds, but lowered the prestige of their profession.

(11) Under Act 16 of 1933 (Section 11(3)) it was intended that the registration fee of £10 be waived in the case of State veterinarians in the Union.

(12) The designation veterinary surgeon only is mentioned in the Act.

(c) The Board itself should have amended regulations, e.g. Regulation 4 (Procedure), which were obviously futile, a quarterly meeting (and not a monthly meeting) being in the circumstances all that was necessary. Further, as "veterinary" chemists were evading the Act, suitable measures should have been taken.

Sources of Information.

Thanks are due to (a) Dr. P. J. du Toit, Director of Veterinary Services, and (b) Mr. Basson, Archivist, Pietermaritzburg, for the loan of the following records respectively :—

(a) File V. 137, Dept. of Agriculture, Pretoria, and

(b) Natal Medical, Dental, Pharmacy and Veterinary Registers for the years 1903, 1904, Supplementary 1905, 1906, Supplementary 1907 (printed by P. Davis and Sons, Pietermaritzburg), 1/4/1908, 1/4/1909, 1/4/1910, and 1/4/1911 (printed by *Times* Printing and Publishing Company, Pietermaritzburg).

Mr. Simpson and colleagues in Natal, e.g. Mr. W. A. Dykins in particular, have given me information regarding matters pertaining to the Board and to them I hereby express my indebtedness.

Conclusions and Summary.

Whatever may have been the imperfections of the Act[13], it certainly checked the unqualified practitioner in Natal. It is nevertheless significant that two unqualified men from Natal applied for registration under Union Act No. 16 of 1933! Further, although the Regulations were faulty, no amendments or additions were made after 1905!

It is convenient also to summarise here some of the main differences between the former Natal Veterinary Act (and Board) and the present South African Veterinary Act (and Board) :—

Natal Veterinary Act.	*South African Veterinary Act.*
1. Introduced as Government measure.	A public measure[14]. Introduced by a private member (Dr. Hjalmar Reitz).
2. No reference to any Veterinary Medical Association.	South African Veterinary Medical Association recognised.
3. A registering, disciplinary and examining Board provided for.	Board only concerned with registration and discipline.

(13) The writer succeeded in 1929 in gaining the support of the S.A.V.M.A. in regard to a proposal that the Natal Act, with minor adjustments, be applied throughout the Union of South Africa *and South-west Africa Protectorate* (see Appendix IX, *Jl. S.AV.M.A.* I (4), 1930), but the authorities stated this was impossible.

(14) It may be explained that bills may be (1) public or (2) private. The former may be sub-divided as follows: (a) government bills, (b) private member's bills, and (c) hybrid bills. (Letter 3/10/33 from R. Kilpin, Esq.).

4. Reciprocity not provided for.	Reciprocity an important feature.
5. Medical men could not sue in a court of law for veterinary services rendered.	Medical men registered under Act 13 of 1928 may sue in a court of law for veterinary services rendered.
6. Membership of Board (5) included 2 medical men.	All 5 members are veterinarians.
7. Chairman may be any member elected by the Board.	Chairman is the nominee of the Minister of Agriculture.
8. The Secretary was paid £25 p.a.	There is no provision for a secretary, but a registrar is appointed by the Minister.
9. Members received same allowance as granted to members of Natal Medical Council.	Members receive £1 :5 :0 p.d. whereas members of S. African Medical Council receive £3 :3 :0 p.d.
10. Board elections held every 5 years.	Board elections held every 3 years.
11. Names of registered persons gazetted.	Names of registered persons not gazetted.

Appendix I.

Brief Biographies of Members now Deceased.

THOMAS BUTCHER SCOTT DAWKINS qualified at the London School on April 19th, 1872. He joined the C.M.R. as Veterinary Officer on 29/8/79. When on 29/1/80 the regiment was divided into Right and Left Wings, Dawkins was attached to the Right Wing, but it is certain he left before amalgamation of the two wings in 1884. It is probable he took part in the Moirosi War (1879) and 5th Basuto War (1881). He is described by Mr. A. H. Gentle, M.R.C.V.S. (who also served in the C.M.R. for a short period) as "a tall distinguished looking man." Later he resided in Natal and died at Pietermaritzburg in 1912. It is believed a daughter survives him and lives in the Richmond district.

ARTHUR GOULE. See *Jl. S.A.V.M.A.* III (2): 137. 1932.

FRANCOIS ISAII NADAL is believed to have been born in Mauritius. He qualified at the New Veterinary College, Edinburgh, on July 25th, 1885. He is supposed to have settled in Durban in private practice soon after the Anglo-Boer War (1899-1902) and his death took place on 12/6/23.

THOMAS LAMBERT OLDFIELD, born in 1858 in England, was an unqualified practitioner who passed the examination of the Natal Veterinary Board in 1905. He arrived in Natal in 1881, being a veterinary corporal in the 6th (Inniskilling) Dragoons. He was registered on 12/4/05 and practised in Durban, where he died in 1921.(15)

ARTHUR WILFRED SHILSTON. See *Jl. S.A.V.M.A.* III (2): 137. 1932.

Nothing is known of F. A. FLORENS whose name was removed from the *Register* in 1908, his address being unknown.

(15) His practice was taken over by Mr. J. MacIntyre, M.R.C.V.S.

Appendix II.

Steps Leading to Replacement of Natal Act 21/1899 by Union Act 16/1933.

Introduction.

The struggle for legal recognition up to September 1930 was described in a former communication.[16] It was explained that the S.A.V.M.A. Parliamentary Committee, Messrs. P. R. Viljoen (convenor), Kirkpatrick and Curson, had "agreed to accept the principle that any veterinary measure should be administered *by the Government*, and that the Minister of Agriculture[17] should introduce "next year a bill providing for registration." The Committee was also particularly anxious that something should be done, for in 1930 registration had been effected in Northern Rhodesia through the influence of the Hon. Capt. John Smith, M.R.C.V.S. (see Ordinance 14 of 1930, *Northern Rhodesia Government Gazette* dated 11th April, 1930).

After a preliminary attempt (see Appendix A), the Veterinary Bill, 1931 (see Appendix B) was at length drafted, being published in the *Government Gazette Extraordinary* on 26th January 1931.

The Position from 1931 to 1933.

Fortunately for the profession, the services of Dr. Haljmar Reitz, M.P. had been secured by the Minister of Agriculture for the difficult task of piloting the Bill through Parliament; but in spite of his energy the measure failed to pass the Second Reading by 69 votes to 29. It was clear that Clauses 12 (examination of unqualified persons) and 16 (forbidding "any act specially pertaining to the calling of a veterinarian") made the Bill unpopular especially with the farmer M.Ps., and since the voting was not on a party basis defeat was inevitable. See *Hansard*[18] No. 1, 30th January to 6th February 1931, pp. 162-175.

Undaunted, the S.A.V.M.A. set to work again and at the Easter General Meeting Messrs. P. R. Viljoen, W. M. Power, and J. I. Quin (convenor) were appointed to serve on the Parliamentary Committee [19]. At this time a Parliamentary Committee had been formed in the Faculty of Veterinary Science (members: Drs. P. J. du Toit, de Kock,

(16) See The Struggle for Legal Recognition, *Jl. S.A.V.M.A.* I (4) :3. 1930.

(17) This is emphasised because a section of the profession, impressed by the way that the Minister of Education (Dr. D. F. Malan) had piloted the University of Pretoria (Private) Bill through Parliament in 1930, was anxious that the Rector of the University (Prof. A. E. du Toit) should approach Dr. Malan on behalf of the profession, a large proportion of which consists of B.V.Sc. graduates.

(18) For all copies of *Hansard* the Association is indebted to Mr. J. Spreull, F.R.C.V.S., who presented copies to the Library, S.A.V.M.A.

(19) Mr. J. Chalmers was later added.

Mönnig, and Curson), with the idea of exerting influence if necessary through the Senate of the University, and at a joint meeting in August the following points were adopted :—(1) The Bill to be introduced at the next Session of Parliament; (2) a preamble to be inserted; (3) Clauses 12 and 16 to be modified; and (4) a memorandum explaining the aims of the profession and a revised copy of the Bill to be sent to each M.P.

Changes were made again in the context (see Appendix C), a preamble was inserted (see Appendix D) but later withdrawn, Dr. P. J. du Toit was delegated to do the lobbying in Capetown, and again Dr. Hjalmar Reitz came to the assistance of the profession. The Bill was accordingly introduced on the 19th February 1932 for the Second Reading and, wonderful to relate, was read a second time (see Appendix E). Valuable work was done in Capetown by Dr. du Toit, who succeeded in removing opposition especially from farmer members. According to *Hansard* (No. 5, 15th Feb.-19th Feb. 1932), the House was to go into Committee on 26th February, but owing to the precedence of Government business and the early prorogation of Parliament, this step was not possible until early in the next Session, i.e. 27th January 1933[20]. Fortunately, owing to the amicable relations existing at this time in Parliament (prior to the formation of a Coalition Government), and to the ability of Dr. Hjalmar Reitz, with the assistance of the Minister, the Bill on 3rd February passed the Committee stage of the whole House with a few amendments (see Appendix F). The debates in Parliament are recorded in *Hansard* (Nos. 1 and 2, 20th-27th January, and 30th January-3rd February, 1933, respectively).

As a result of the consideration of the Bill (as amended in Committee of the whole House) on 10th and 17th February, the membership of the Board was increased to five, the nominee of the Minister of Agriculture, provided he was a veterinarian, was accepted as chairman of the Board, and medical practitioners were allowed to sue in any court of law for veterinary services rendered! On the latter of the two dates mentioned above the Bill was read a third time (see *Hansard* Nos. 3 and 4, 6th-10th February and 13th-17th February, respectively).

In the Senate the only important amendment was that the examination of unqualified persons prior to registration was omitted. The Bill on 2nd March 1933 was accordingly read the Third Time and Passed (see *Hansard* No. 2, 28th February-2nd March).

[20] At the 1932 Easter General Meeting of the S.A.V.M.A. Drs. P. R. Viljoen, P. J. du Toit, and G. de Kock were appointed members of the Parliamentary Committee.

The Veterinary Act of 1933 duly became law on 8th March when it was promulgated as No. 16 in the *Union Gazette Extraordinary*[21] (see Appendix G).

All that remains is to record the appreciation of the profession to Drs. Viljoen, du Toit, and de Kock to whose influence, tact, and energy respectively, the passage of the Veterinary Act was primarily due. Much more remains to be done and, given the same loyalty and energy which has characterised the profession in recent years, progress should be made.

The references regarding Appendices A-G concern various draft bills which have been bound by the Association and placed in the Libraries of the S.A.V.M.A. and Division of Veterinary Services, Onderstepoort.

(21) Prior to the passage of the Union Act 16 of 1933, the profession in the Transvaal possessed some standing, for the T.V.M. Assn. had been "registered under Ordinance No. 56 of 1903, which deals with the incorporation of Societies." Strangely, when the T.V.M.A. ceased to exist in 1920 the Registrar of Companies, Pretoria, was not informed; but in the *U.G.G.* of 24th October 1930 (p. 21), the S.A.V.M.A. was recognised by the Registrar of Companies (see Act 46 of 1926) by the insertion of the following notice: "The name. Transvaal Veterinary Medical Association was changed to South African Veterinary Association as from the 1st April, 1920, and again to South African Veterinary Medical Association as from 11th April, 1922." See File 2020, Registrar of Companies, Pretoria.

An Unusual Case of Dystokia in a Cow.

By J. H. SCHOEMAN, B.Sc., B.V.Sc., Umtata).

Subject.—A grade Friesland cow, the property of Mr. Clarke, a dairyman.

History.—The animal had been bought in calf six months previously from a Queenstown breeder. She had been in labour for three days, but was unable to give birth to her third calf.

Clinical Examination.—On the 7th September the owner fetched me to attend to the case. The cow, which was down, was lifted up. Externally there was a big swelling close to the root of the tail on the left side. On examining the vulva, I noticed a big swelling which

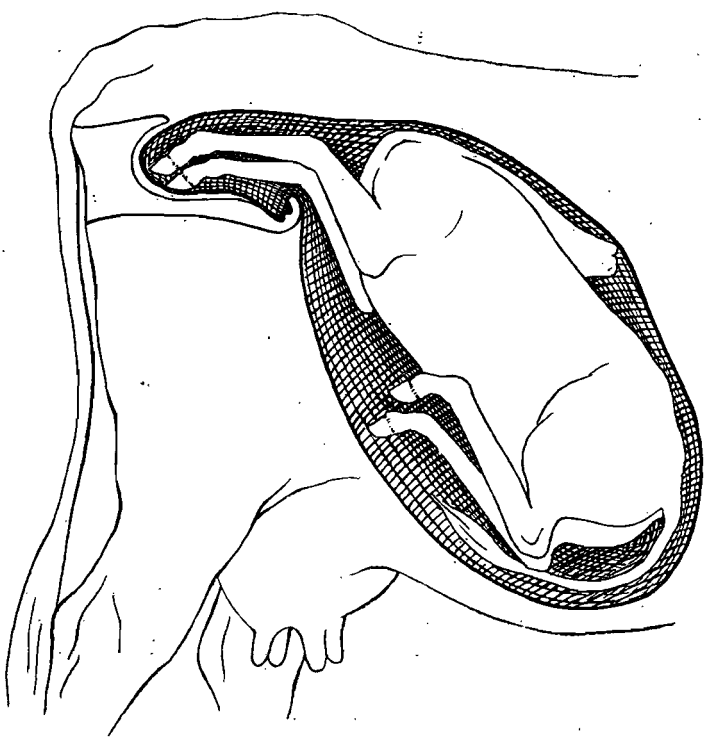


Fig. 9.—Sketch to show main features in presentation described. Note dislocation of vagina and cervix, and position of head. (In order to show the head, the foetus is depicted partly in the dorso-sacrol position).

obstructed almost completely the anterior two-thirds of the vagina. This pouch-like swelling was the dorsal wall of the uterus and the vaginal wall forced by the feet of the foetus into the lumen of the vagina. The *os uteri* was naturally pulled right forward, so that it faced in an antero-ventral direction, and was so narrow and constricted

that the little finger could just be passed through with difficulty. In other words it resembled the normal os of a non-pregnant cow.

10 cc. of a 5% novocain and adrenalin solution was injected between the last sacral and first coccygeal vertebrae, to stop the straining, which it did within a short time afterwards. On examination per rectum, I encountered the following: an anterior presentation of the foetus in the right dorso-ilial position, with complete backward deviation of the head on the back.

Operation.—The foetus was pushed back into the abdominal cavity. Since all attempts to get my hand through the *os* failed, it was decided to enlarge the opening surgically. After having explained to the owner the dangers of attempting such an operation with the instruments available (in this case only a small dissecting scalpel and an ordinary artery forceps) and also that all prospect of preserving the breeding life of the animal had to be abandoned, I proceeded with the operation.

The cervix was caught in the artery forceps and pulled backwards. The scalpel was then carefully inserted into the os and an incision was made dorsally into the fibrous-like tissue.

The scalpel was discarded and the opening was further enlarged by tearing, by expanding the fingers of the hand.

The anaesthetic (mentioned above) was most effective; the cow was actually chewing the cud. The waterbag was ruptured and then the forefeet were pulled into the vagina and roped separately.

By retropulsion and rotation, the position of head and body was corrected and then, by forced extraction, a strong heifer calf was delivered. The afterbirth came away six hours later.

The whole operation took 4½ hours, mainly because appropriate instruments like a uterine forceps and a Colin scalpel were not available.

What actually caused the dystokia I am not prepared to state here. Firstly, an induration of the cervix might have been the cause, but this is a diagnosis which, without experience and a reliable previous history it is dangerous to make. Secondly, the abnormal position of the foetus combined with excessive straining of the cow might have been the main or only cause of this delayed birth.

A Mule Foster Mother.

By J. R. FREAN, M.R.C.V.S., Ladysmith.

The photograph is of a mule mare with a foal reared by herself. This is the second foal that she has reared, the first one being a horse foal whose mother died of horsesickness; the mule adopted the

foal and shortly afterwards the owner noticed the foal sucking. On closer examination of the mare he found the mammary glands fully developed, "resembling the udder of a newly foaled horse mare"—as he described it to me The foal thrived and the following year the mule adopted the foal shown in the picture and whose mother was

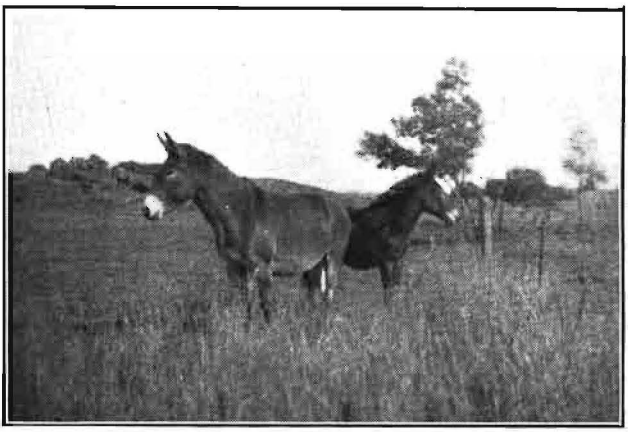


Fig. 10.—Mule mare with foster foal.

killed accidentally shortly after parturition. In this case the mammary glands again developed and produced sufficient milk to rear the foster foal.

The above information and the photograph were given to me by Mr. F. Robertson, Quaggasdrift, Klip River District.

A Recurrence of Cystic Calculus in a Dog.

By Prof. J. B. QUINLAN and I. P. MARAIS, B.V.Sc.,
Onderstepoort.

In a previous issue of this journal the occurrence of cystic calculi in a black and white cocker spaniel, 10½ months old, was recorded.[1] The calculi were removed and the dog maintained good health for about 11 months, until July 1933. About this time he developed symptoms of catarrhal cystitis, with occasional ischuria. On 18th July he was again presented at the clinic for examination. The dog showed the same symptoms as those described in the previous communication.

(1) 1932 QUINLAN, J. and MALHERBE, W. Catarrhal cystitis and retention of urine due to calculi in the bladder of a dog. *Jl. S.A.V.M.A.* III (4) : 200-202.

The chief symptoms observed during three days while the dog was kept under observation were haematuria and dysuria, with listlessness and rapid loss of condition.

A Röntgen photograph (Fig. 4) shows a large ovoid calculus in the bladder.

Central portion of Rotter-Bucky diaphragm. Calculus.

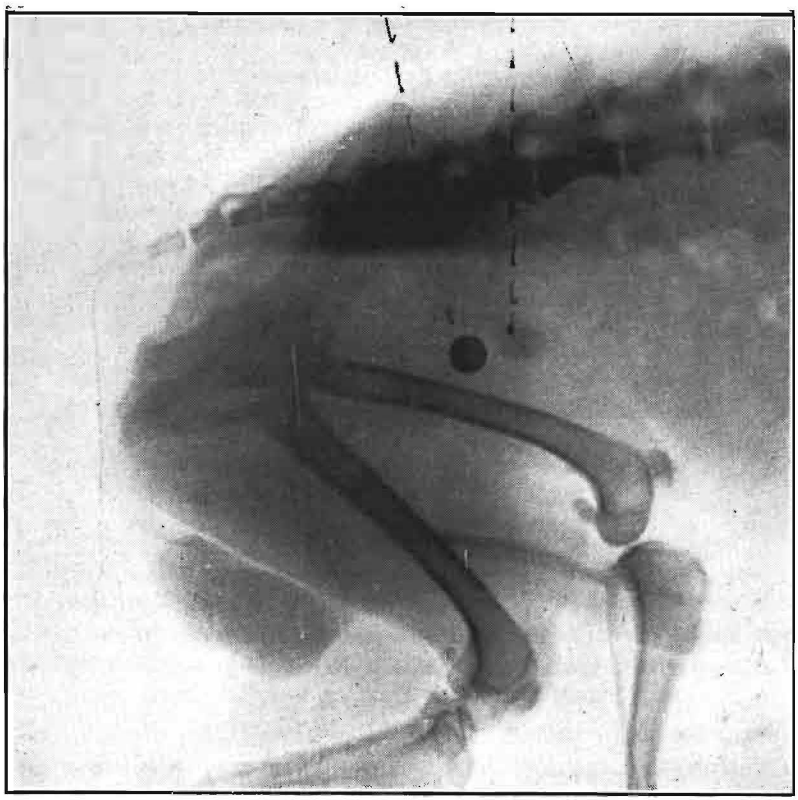


Fig. 11.—Radiogram showing large calculus in the bladder.

The calculus was removed under eukodal and pernocton anaesthesia (eukodal 2 cc, pernocton 2.8 cc; weight of dog 23 lbs; duration of anaesthesia 3½ hours) on 21st July. Recovery was uninterrupted.

REVIEWS.

Those of us (and whom nowadays does this not include?) accustomed to make constant use of that model periodical, the *Veterinary Bulletin*, have come to associate the publications of the Imperial Bureau of Animal Health with a degree of thoroughness, exactitude, and un-

failing uniformity which already on a previous occasion has led us to venture our respectful congratulations to the editorial staff of that Institute. We are not surprised, therefore, to find in the first issue of their *Index Veterinarius*[1] a standard of efficiency which is beyond praise. The introduction, setting out the method of indexing adopted allows one—by reading between the lines, of course—to realise what wealth of careful thought and planning was necessary to the attainment of this standard.

Some 700 or 800 journals or periodical publications have provided the sources of the references. No pains have been spared with the cross-indexing which indeed is planned on an almost over-generous system. This Index marks a new era in veterinary literature and is a fitting tribute to the growth of the science. It is no small achievement to have produced by means of a duplicator a volume of this size that is so easy to read and so free from typographical errors and defects that we feel impelled to offer our congratulations also to those responsible for the mechanical side of the work.

Research workers who had come to despair of the arrival of the day when from their research hours it would no longer be essential to set aside whole days in each week for the purpose of perusing conscientiously the indices of an evergrowing number of journals and who suffered from a constant fear of overlooking important references have breathed the second of two sighs of relief now that the institution of the Index, following that of the Bulletin, permits them with confidence to leave this arduous part of their work to be done for them by the patient and able editorial staff of the Bureau. C. J.

(1) *Index Veterinarius*, Vol. I No. 1, April 1933. Weybridge: Imperial Bureau of Animal Health. Pp. xxxvi + 304. Annual subscription £4.

Kastration intersexueller Saugetiere. By Prof. Dr. G. KREDIET. *Acta Veterinaria Neerlandica.* Tome I, Fascicule I, 1933.

Thanks to the courtesy of Messrs. D. B. Centen's Wetenschappelijke Boekhandel of Amsterdam, we have received the above publication, the first of a series of monographs of importance to the veterinary profession.

Prof. Krediet of the Veterinary Faculty of the University of Utrecht has carried out a fine piece of research in these observations in connection with the results of castration of hermaphrodite pigs (18) and goats (3). The castrations were arranged in three series: (a) bilateral castration at the same time, (b) an interval between the castration of one side and then the other, and (c) removal of one gonad only. Not only are the genitalia described in great detail anatomically, but

the histological changes are dealt with in a similar manner. An interesting observation was the presence of an ovary in the scrotum (pig C6).

Prof. Krediet concludes that the genital apparatus is regulated by the influence of the gonads, and that a hermaphrodite is not an animal in which the male and female characteristics are jointly present, but that it is an animal which up to a certain degree stands between the male and female. The sexual organs and character are governed by specially developed intersex gonads which yield only inter-sexual hormones.

Great credit is due to the publishers for the manner in which they have performed their share of the task. The use of a good quality paper has made it possible for the histological figures and printing to be most distinct. H. H. C.

Report on the Available Evidence showing the Relation of Game to the Spread of Tsetse Fly Borne Diseases in Africa. *Special Publication of the American Committee on International Wild Life Protection.* Vol. I, No. 1. 1931.

We welcome this first contribution by the American Committee on International Wild Life Protection which was made possible by the help of Mr. Geo. D. Pratt, the New York Zoological Society and the Department of Tropical Medicine, Harvard Medical School. The authors (Messrs. Strong, Bequaert and Cleveland) have prepared their work in a most excellent manner and the summary will serve a most useful purpose.

The relationship between game and pathogenic trypanosomes and between game and tsetse flies has been well considered and the salient points of the summary are :—

(a) The evidence that there are two distinct species giving rise to sleeping sickness "is not conclusive." Considerable evidence suggests that "*T.gambiense* and *T.rhodesiense* constitute slightly varying races . . . . . of a single species."

(b) The evidence that game acts as a "reservoir for the trypanosome of human sleeping sickness is not extensive."

(c) The evidence concerning game as a reservoir "for the trypanosomes which cause disease in domestic animals" is conflicting.

(d) The theory that the abundance of game has a definite relation to the tsetse fly "population" appears to be largely one of opinion.

Since the above summary appeared, Whitnall (1932) and Neitz (1931-1933) have recorded interesting observations in the *Reports of the Director of Veterinary Services*, Pretoria.

It is hoped that subsequent summaries will consider the question of flora, presence of domesticated animals in and around Glossina country, etc. H. H. C.

L'élevage et les services vétérinaires dans les domaines portugais d'outre-mer. By Professor A. Monteiro da Costa of the Lisbon Veterinary College (1933).

Professor da Costa, in the above reprint from "Les Colonies Portugaises" made available at the Colonial Exhibition at Paris in 1931 by the Portuguese Government, naturally divides his subject into two main sections: (a) The Livestock, and (b) Veterinary Problems. With regard to the former he describes (i) the native stock; (ii) the relationship between the Alentejana breed of Portuguese cattle and the Afrikander; (iii) the polled Mocha breed of Brazil; and (iv) European stock.

Of particular interest to us in South Africa is his grouping of the indigenous cattle of the Portuguese African Colonies, and his calculated statement showing the relationship between the Alentejana breed and the Afrikander. He gives the following groups of native cattle: (1) animals that have a straight profile and no hump, the representatives of *Bos taurus Asiaticus*, the oldest type of Africa; (2) the humpless cattle of West Africa characterised by a concave profile; (3) a humped type which is not related to the Afrikander; and (4) a recent type encountered in South Mozambique, resulting from crossing between the original native cattle and the Afrikander. This is conspicuous by a convex profile and a hump.

Further, while many features of the Alentejana resemble those of the Afrikander, the withers (judging from photographs, opposite page 14) appear quite different, the former being apparently humpless, while the Afrikander has a well marked and characteristic hump.

Finally the geographic distribution of disease, being always a fascinating subject, the remarks on the communicable maladies of the Portuguese African colonies are interesting.

H.H.C.

OBITUARY.

Otto Henning.

It is with deep regret that we record in this issue the death at Grootfontein, South West Africa, on the 10th November, 1933, of Otto Henning, at the age of 68 years.

The late Otto Henning, whose name will justly find a place on record as that of one of the pioneers of the veterinary profession in

the Union of South Africa and in South West Africa, was born in Germany on the 21st of November in the year 1865. He qualified in Germany as a veterinary surgeon in the year 1885, after which he was appointed Assistant in the Pathological and Bacteriological Institute of the Veterinary High School at Stuttgart. He was thus employed for a period of two years, and in 1887 he qualified as a Government Veterinary Surgeon for the district of Creilsheim, in which capacity he was employed until he left Germany in order to take up an appointment in the Cape Colony in March, 1892.

Otto Henning was Assistant Veterinary Surgeon, Agricultural Department, Capetown, from 1892 to 1896. In 1896 he was despatched to the Orange Free State to suppress the incidence of rinderpest, and from 1897 to 1900 he transferred to the Orange Free State Government Service as State Veterinary Surgeon and member of the Agricultural Council.

After the occupation of Bloemfontein by Lord Roberts in March 1900, Otto Henning placed himself at the disposal of the Civil Administration under General Prettyman. During, and after the Anglo-South African war he served in the following capacities: 1900 to 1901, as Divisional Veterinary Officer to the South African Constabulary, Division 'E,' ranking as Captain, and receiving the Queen's Medal; 1901-1902, as Government Veterinary Surgeon of Basutoland, having been detailed by His Excellency the Lieutenant Governor to undertake the eradication of contagious diseases, especially rinderpest prevailing in that country; 1902-1904, as Principal Veterinary Officer (Orange River Colony) to the Repatriation and Government Relief Department; 1904-1907, as Chief Veterinary Surgeon to the Basutoland Government.

In December 1907, he received an appointment in the German South West Africa Administration, as Chief of the Agricultural, Veterinary, and Bacteriological Departments in South West Africa, which position he held up till the time of the occupation by Union troops in 1915. During the military operations in South West Africa, he worked as a prisoner of war, being put in charge of dairy supplies to hospitals, established by Colonel Muller at Gamans, Windhoek, and later under Colonel Lee. In 1921 Otto Henning received an appointment in the new South West Africa Administration as Government Veterinary Officer at Keetmanshoop, which post he occupied until 1923, when he retired, to take up farming at "Felzenquelle," Grootfontein District, South West Africa.

The writer, a member of the younger generation of veterinarians, had the honour and privilege of being closely acquainted with Otto Henning during the latter years and days of his life. Although some years have passed since Otto Henning retired from active veterinary practice, yet it can be said of him that he loved his profession till the very end. He was a true lover of animals, and it was a revelation to

those of us who have visited his farm to observe how he knew each animal by name, and how each animal would respond to his call.

Interpreting the motto of the South African Veterinary Medical Association, of which Otto Henning was a member, we, the younger members of the profession in South Africa, can "extract much that is good from his past record of service, and build it into our future,"—"rich examples to those of us who follow on."

At the funeral of the late Otto Henning, the veterinary profession was represented by J. A. Maybin, M.R.C.V.S., and amongst the floral tributes was one inscribed "FROM MEMBERS OF THE VETERINARY PROFESSION, IN DEEPEST SYMPATHY."

Otto Henning is survived by his sorrowing wife and three daughters, to whom the deepest sympathy of members of the profession, and the wide circle of friends by whom he will be greatly missed, is extended. J.A.M.

TWELFTH INTERNATIONAL VETERINARY CONGRESS.

This Congress will take place in NEW YORK from August 13 to 18, 1934. It will be the first one to be held in the United States.

The Waldorf-Astoria Hotel has been selected as the official headquarters. This is the largest hotel in the world and offers with its variety of meeting rooms an extremely ideal place, especially during summer, when all the rooms are cooled by artificial refrigeration.

The President of the United States of America, the Honourable Franklin D. Roosevelt, has kindly accepted the patronage of the Congress.

The Organizing Committee and its sub-committees, composed of members of the American Veterinary Medical Association, are already at work preparing all the necessary details for the Congress.

The complete programme of subjects, as well as the list of the reporters, will be published as soon as the reporters have indicated their acceptance of the nomination.

The membership fee has been fixed at $5 (U.S.A.) for ordinary members. According to the Bye-Laws of the International Veterinary Congresses, ordinary members are the following :—

(a) Delegates appointed by foreign governments;

(b) Delegates of veterinary colleges and universities;

(c) Delegates of veterinary associations;

(d) Delegates of agricultural corporations;

(e) Delegates of authorities, and of state and municipal administrations;

(f) Veterinary Surgeons; and

(g) Other delegates of medical science and practice admitted by the Organizing Committee, and, in case there is a National Committee, only on proposal of the latter.

The membership fee entitles the members to receive a set of the printed reports before the Congress convenes and also a complete set of the General Reports, published after the close of the Congress. These contain not only all the reports submitted but also the minutes of the opening and closing meetings, of the discussions during the week of the Congress, lists of members and delegates, etc. This right to receive the complete literature of the Congress goes not only to those attending the Congress, but also to those members who are unable to attend. All those who are deprived of the privilege of being present at the Congress will therefore be in a position to follow its proceedings by reading the General Reports.

For this reason, the Organizing Committee expressed the hope that a large number of veterinarians from all over the world will join the Congress.

The Secretary of the South African National Committee, *Dr. P. J. du Toit*, Director of Veterinary Services, Onderstepoort, Pretoria, has at his disposal a supply of application blanks and he will be only too glad to furnish them to those desiring to become members. He will also accept remittances covering the membership fees in order to transfer same to the Congress officials.

More details concerning plans for the Congress will be published later. However, the early filing of applications for membership is desired, as this will be of very great help to the Organizing Committee in preparing for the Congress.

Jl. S.A.V.M.A.
V (2) 1934.

Some observations on Foot-and-Mouth Disease in the Bechuanaland Protectorate.

By J. WALKER, O.B.E., M.R.C.V.S., D.V.Sc. (Zurich).

The Bechuanaland Protectorate comprises an area of approximately 275,000 square miles which lies roughly between latitudes 18° and 27°S. and between longitudes 21° and 28° E., at a mean height of some 3,300 feet.

The climate is on the whole sub-tropical but varies considerably with the longitude and latitude; latitude 22° passes approximately through the centre of the country and the part north of this line may be regarded as definitely tropical.

The population according to the census of 1921 was 1,743 Europeans, 1,055 coloured persons, and 150,185 natives, a total of 152,983; the population at the present time is probably in the neighbourhood of 200,000.

The native population is chiefly concentrated in eight tribal reserves, aggregating 102,000 square miles; about 7,500 square miles have been granted to Europeans; the remaining area of approximately 163,000 square miles is Crown lands. The total number of cattle in the Protectorate is 1½ million head.

The two main branches of the cattle industry are both represented, viz. the beef and the dairying sections, the former being the more important. The cattle trade is almost entirely one of export. One of the chief needs of the Protectorate is more water both for human and animal use; there is practically no flow in most parts of the territory except in the rainy season; the exceptions are on the north west and on the eastern border; over the remainder of the Protectorate water can be obtained in the dry season only through storage from the summer rains, through making temporary or permanent wells, or through boreholes. During the rainy season 1932-1933 the rainfall was exceptionally low, a severe drought was experienced until November 1933, and cattle, especially the native-owned, were in poor condition.

Game of various species is fairly numerous and during the drought they were forced to seek water at the cattle watering places. The existence of foot-and-mouth disease in the Protectorate was officially confirmed in January 1933, and the Chief Veterinary Officer of the Administration was confronted with the task of combating one of the greatest threats to the stock industry since the years when bovine pleuro-pneumonia was still in existence in the territory.

The measures recommended for its suppression were put in operation in February, 1933; they consisted in the active immunisation by the intra-nasal inoculation of blood virus of the cattle of the Protectorate, with the exception of those in the Kalahari and N'gamiland areas, and the establishing of police cordons: the latter, originally, to prevent the spread of infection from areas in which the disease was then found to be localised, and subsequently to guard against the disease being introduced into the Kalahari and N'gamiland areas.

Immunisation operations were completed in August 1933, since when inoculated herds have been kept under supervision by the field veterinary staff, with the exception of one instance in a herd in August 1933, there has been no recurrence of infection.

It is estimated that 741,570 cattle were submitted for immunisation in an area extending over 40,000 square miles.

The result of the campaign must rank as a notable achievement in the domain of veterinary science and veterinary organisation.

From April to June 1933, the writer assisted in the field operations and from July 1933 to January 1934 was stationed at Mokoro which was utilised as a depot for the preparation and maintenance of vesicle virus. During these periods an opportunity was afforded of investigating various aspects of the foot-and-mouth disease problem as occuring under the conditions of the Bechuanaland Protectorate, and the results obtained are now put on record.

Observations on the Virus.

1. *Type of the virus.*

On 13.5.33, vesicle virus was collected at Gaberones from a beast reacting to intranasal inoculation, and on 18.5.33 despatched by air-mail to Dr. W. Horner Andrews (Director, Veterinary Research Laboratory, New Haw, Weybridge, England), who very kindly had it typed, and advised that it had been identified as a variant of O-type. A further lot was subsequently forwarded from the Southern Protectorate and also identified as a variant of O-type.

The blood virus used in the field immunisation operations was originally obtained from the herd in which the disease was first detected and subsequently from reactors in herds undergoing immunisation with this strain of virus. The virus of the original outbreak thus became disseminated throughout the different sections of the Protectorate in which immunisation was carried out.

2. *Pathogenicity.*

Generally the reactions which resulted from intra-nasal inoculation were mild in character; indeed, a number of cattle showed no distinct re-

action, but were subsequently proved to have acquired an immunity. The mortality and accidents (abortions) arising from immunisation have been negligible.

The writer had under observation 170 head of cattle (cows and oxen) which reacted to the intramucosal tongue inoculation of vesicle virus. The reactions were clinically characteristic, but no mortality resulted. It has thus to be concluded that the Protectorate virus is of low pathogenicity.

3. *Infectivity.*

Under natural conditions the common mode of spread of infection was found to be direct contact with animals in the infective stage. The virus soon loses its infectivity when exposed to external influences.

4. *Effect of climatic conditions on the vitality of the virus.*

Throughout the year the incidence of sunshine in the Protectorate is high and the temperature rarely falls to freezing point. During the winter of 1933, two frosts were recorded at Mokoro in July. The temperature was recorded daily by the writer at Mokoro from 29.10.33 to 31.1.34 at 4 a.m., 8 a.m., noon, 3 p.m., and 8 p.m. The mean shade temperature for this period was 76.2° F. with a maximum of 100° F. (31.10.33) and a minimum of 56° F.

On different occasions the sun and shade temperature of the surface of the ground was recorded for comparison with the temperature registered in a thatched rondavel (shade temperature). The temperature of the surface of the ground in the shade corresponded approximately with the rondavel temperature, but a higher temperature of the surface of the ground in the sun was recorded during the day as compared with the shade temperature, the differences being most marked on a sunny day from approximately 8 a.m. till 4 p.m.

The following was recorded on the 18.1.34 :—

TABLE I.

	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	
Rondavel temperature ...	68deg.	72deg.	76deg.	80deg.	84deg.	
Surface of ground (shade)	70deg.	74deg.	76deg.	80deg.	86deg.	
Surface of ground (sun) ...	70deg.	90deg.	106deg.	110deg.	118deg.	
	Noon	3 p.m.	4 p.m.	6 p.m.	8 p.m.	
Rondavel temperature	86deg.	90deg.	93deg.	82deg.	78deg.	
Surface of ground (shade)	88deg.	92deg.	90deg.	84deg.	82deg.	
Surface of ground (sun) ...	121dg.	125deg.	102deg.	90deg.	82deg.	(no sun)

Mean temperature, rondavel ... ... 80.2deg.F.
Mean temperature, surface of ground (shade) 82.2deg.F.
Mean temperature, surface of ground (sun) 101.4deg.F.

The first rainfall at Mokoro in 1933 occurred on the 11.11.33, since when heavy falls were recorded on the 17th, 20th, 23rd and 28th November, the 12th, 16th, and 25th December, and the 6th, 14th, 17th, 21st, 29th and 30th January. A heavy rainfall was usually preceded for two to three days by a gradual rise in temperature to approximately 90-95° F. (shade temp.) and a marked fall occurred after the commencement of the downpour.

Different lots of virus were exposed to external influences (sun) or kept obscured from the light at shade temperature, and after a varying period emulsified in preservative and inoculated intramucosally into the tongue of cattle to determine their infectivity, with the following results :—

A. Vesicle Virus.—On the 22.9.33 twenty-four hour old vesicles on the tongues of 4 cattle were ruptured, saliva then collected from each beast and then pooled, the bulk diluted in normal saline, 1 :10 and two lots (*a* and *b*) of kraal litter each of 100 grammes saturated with the diluted saliva; the saliva was proved infective at 1 :10 and 1 :100 normal saline dilutions (end point of infectivity not determined).

Lot *a* was exposed, on the surface of the ground in the sun, for 3 hours on each of three successive days, 22.9.33 to 24.9.33 inclusive and for 6 hours on 26.9.33—total exposures to sun 15 hours. The temperature of the surface of the ground during the period of exposure ranged from 112° to 120° F. This lot was dry on 23.9.33 and was kept, when not exposed to the sun, in a room in an open tin canister. Until 12.10.33 the maximum temperature of the room during this period registered 102° F.

Lot *b* was kept in an open tin canister from date of collection until the 12.10.33 in the same room as lot *a*. It was still moist on 29.10.33.

On 27.10.33, 20 gm. each of lots *a* and *b* were emulsified in 20 cc. normal saline, the emulsion filtered through filter paper, and 1 cc. of each lot inoculated each to a susceptible beast.

Result.—No reaction occurred in either, both beasts proved susceptible when subsequently tested for immunity.

On 12.10.33 (20 days after collection) a further test of each lot was made, 50 gm. of each lot was emulsified in 50 cc. normal saline, filtered through filter paper and 1 cc. of each filtrate inoculated to a susceptible beast.

Result.—No reaction occurred in either; both cattle were subsequently proved susceptible.

B. Vesicle coverings.—Vesicle coverings (lot 1) were collected on 30.10.33 from cattle with 24 hour old unruptured vesicles and placed

on the surface of dry *kraal* litter which was exposed to the light in a room until 28.11.33. The mean daily temperature of the room during this period was 82° F. (maximum 110° F., minimum 78° F.). On the 29th day after collection (28.11.33) 1 gm. of the coverings was emulsified in 10 cc. preservative and three susceptible cattle inoculated each with 1 cc. of the emulsion.

Result.—None reacted, the three cattle were subsequently proved susceptible.

Vesicle coverings (lot 2) collected from unruptured tongue vesicles on 2.12.33 were exposed on the surface of the ground in the sun for 3 hours on 3.12.33, four hours on 5.12.33, four hours on 6.12.33, two hours on 7.12.33, and 3½ hours on 8.12.33. Total exposure 16½ hours. The temperature during period of exposure ranged from 106° F. to 113° F. The coverings were kept, when not exposed to the sun and until 12.12.33, in a room in a glass bottle exposed to the light, the mean temperature of the room being 90° F. (max. 106° F., min. 70° F.).

On 12.12.33, 10 days after collection, 1 gm. of the coverings was emulsified in preservative 1 :10 and two susceptible cattle inoculated each with 1 cc. of the emulsion.

Result.—Neither reacted.

Vesicle coverings (lot 3) collected on 15.11.33 from 24 hour old unruptured tongue vesicles were kept in a thatched *rondavel* in a cardboard box until 27.11.33—12 days; the mean temperature of the rondavel during this period was 72° F. (max. 94 ° F., min. 62° F.). A portion of the coverings was emulsified in preservative 1 :10 and three cattle inoculated each with 1cc.

Result.—The three cattle reacted to foot-and-mouth infection. Vesicle coverings, collected on the 15.11.33 from the same cattle as lot 3, were exposed to the sun on the surface of the ground for 2½ hours on 15.11.33, two hours on 16.11.33, and two hours on 17.11.33. Total exposure 6½ hours. The ground surface temperature in the sun ranged from 117° F. to 123° F. The coverings were kept until 27.11.33 exposed to the light in a room at a mean temperature of 80° F. (max. 98° F., min. 68° F.).

On 27.11.33—12 days after collection—a portion of the coverings were emulsified in preservative and three cattle inoculated each with 1 cc.

Result.—One reacted at the 72nd hour; one of the two non-reactors was subsequently tested for immunity and proved susceptible.

Vesicle coverings collected on 2.12.33 from the same cattle as lot 2, kept for 10 days in a cardboard box in a thatched rondavel at a mean

temperature of 80.4° F. (max. 96° F., min. 64° F.) and emulsified in preservative were still infective.

5. *Conservation of the Virulency of the Vesicle Virus in Preservative at (a) low dilutions and (b) high dilutions.*

Production of Vesicle Virus.—Susceptible adult cattle were inoculated intramucosally into the tongue with 1 cc. of a 1 :10 dilution of vesicle virus (in buffer phosphate plus glycerine preservative) of a potency which produced a tongue vesicle within twenty-four hours. In some instances the vesicle ruptured before the 24th hour, while in others, although unruptured, it contains little or no fluid. As a routine, several cattle were inoculated and virus collected usually at the 24th hour from suitable vesicles by inserting the needle of a 10 or 20 cc. syringe through the unbroken covering of the vesicle and aspirating the contents into the syringe; to avoid blocking of the lumen a needle of large bore was used. The quantity of virus obtained from a vesicle varied from approx. 1 cc. to 3 cc. The vesicle virus was then diluted 1 :10 or 1 :20 in the preservative. When large pieces of vesicle coverings were added or when the coverings alone were collected the quantity of preservative was increased to 1 :50.

Storage.—The vesicle virus in preservative with or without the addition of pieces of covering was put in rubber-stoppered bottles which were wrapped in wet cotton wool and kept in a metal canister, wet cotton wool being substituted for the lid. The canister was wrapped in a layer of cotton wool which was kept continually wet and was suspended day and night from a tree and protected from the sun; by this means the virus could be kept at a temperature of approximately 68° F.

(*a*) *Low dilutions* 1 :10 *or* 1 :20.—Different lots were inoculated intramucosally (tongue) to susceptible cattle and were proved virulent at 21 days storage for adult cattle but not always for young calves.

(*b*) *High dilutions up to* 1 :100,000.—Two different lots of vesicle virus, without the addition of coverings, were tested at high dilutions. One lot had been stored in buffer phosphate plus glycerine preservative pH7-5, the other in preservative made up as follows: sodium chloride 8 gm., sodium citrate 20 gm., dissolved in 1000 cc. of water, to which was added 360 cc. glycerine.

Dilutions in buffer phosphate.—The dilutions made were 1 :10, 1 :100, 1 :1000, 1 :10,000, and 1 :100,000. They were tested on their infectivity at 2, 10, and 24 days storage respectively, and produced tongue vesicles within 24 hours, with the exception of the 1 :100,000 dilution in which the reaction was delayed until the 48th hour.

The 1 :100,000 dilution was tested again at the 27th day of storage, but produced no reaction up till the 144th hour in a beast which

was subsequently proved susceptible. A freshly prepared 1 :100,000 dilution of the original 27 days stored 1 :10 dilution failed to produce a reaction up till the 144th hour, when the animal was tested and proved susceptible.

Dilutions in sodium citrate, sodium chloride, glycerine preservative.—The dilutions were 1 :10, 1 :100, 1 :1000, 1 :10,000, and 1 :100,000. At 13 days storage 1 cc. of each dilution was inoculated to a separate animal, the 1 :10 and 1 :100 dilutions produced primary tongue vesicles within 24 hours, the 1 :1000 at the 48th hour, the 1 :10,000 at the 168th hour, and the 1 :100,000 dilution was inactive; the latter dilution was tested again at the 24th day of storage and the 1 :1000 after 30 days storage, with negative results. The 1 :100 dilution was retested on its infectivity at the 34th day with positive results (two cattle in experiment), both cattle presented tongue lesions at the 96th hour.

A freshly prepared 1 :100,000 dilution of the original 24 days stored 1 :10 dilution was inactive.

Immunisation of large numbers of cattle by the intramucosal tongue inoculation of vesicle virus is practicable but would necessitate the use of dilutions of the virus. The keeping properties of high dilutions and their rate and energy of action was found to be proportional to the concentration of virus which varies in different samples, and some difficulty would be experienced in standardising high dilutions for field use. This could be overcome by using weaker dilutions (1 :500) which if stored at approximately 68° F. should remain sufficiently active for a week, to produce a tongue vesicle within 24 hours after intramucosal tongue inoculation.

Mode of Spread.

With a view to obtaining some data on the spread of infection under natural conditions susceptible cattle were exposed as follows:—

(1) to direct contact with animals in the infective stage;

(2) on grazing recently grazed over by infected cattle;

(3) in *kraals* recently occupied by infected cattle;

(4) to contact with recovered cattle.

1. *Direct Contact.*

Observation 1. Gaberones April—May 1933: Nineteen susceptible oxen were herded, "kraaled," and watered from 22.4.33 till 18.5.33 (26 days) with 38 oxen which had been intranasally inoculated with blood virus on 22.4.33; of the latter 37% reacted to inoculation or contact infection during this period. Both lots were on daily morning temperature up till the 18th day, and were examined at intervals

up till the 26th day. On the 26th day both lots were tested on their immunity to intramucosal (tongue) inoculation of blood virus and on the 36th day a percentage of each lot was retested on their immunity to intramucosal (tongue) inoculation of blood virus; only cattle which showed foot and mouth lesions were recorded as reactors. Owing to the slight rise in the morning temperature which occurred in some of the reactors, the temperature reaction was not always characteristic. Cattle which showed an irregular temperature with no specific lesions recorded amongst the 19 contacts up till the 26th day: 11th day 1 reaction; 13th day 3 reactions; 14th day 1 reaction—total 5 reactions =26.3%.

Immunity Test.—On the 26th day of contact the 19 in-contacts received intravenously 5 cc. of blood virus (in preservative) of the same bleeding which produced a percentage of reactions in other lots of cattle intranasally inoculated. They were examined for lesions on the 5th day with negative results.

Immunity Retests.—Ten of the doubtful reactors were retested on their immunity to intramucosal (tongue) inoculation of blood virus and examined on the 6th day; one presented tongue and foot lesions, and three tongue lesions only—total reactions 4=40%.

Observation 2. Gaberones April—May—June 1933: Forty-two susceptible oxen in poor condition were herded, "kraaled," and watered from 4.5.33 to 26.5.33 (22 days) with 56 oxen which had been inoculated on 4.5.33 with blood virus by various routes, viz. intra-nasal, intra-muscular, intravenous, intradermal, and subcutaneous, and of which 39 (69.6%) had reacted to inoculation or contact infection up till the 22nd day. The following reactions were recorded amongst the 42 in-contacts up till the 22nd day:—6th day 1, 9th day 3, 13th day 5, 18th day 5, 22nd day 2; total 16=38%.

Immunity Test.—Twenty of the non-visible-lesion reactors received intramucosally (tongue), on 26.5.33, 1 cc. of blood virus from oxen Nos. 29 or 30, and were examined on the 5th and 8th day after.

Result.—11 reacted (55%), four of which presented foot and mouth vesicles and seven tongue lesions only.

Immunity Retest.—Three of the non-reactors received intramucosally (tongue) 1 cc. vesicle virus on the 12.6.33.

Result.—None reacted.

Observation 3: During the period 24.7.33 to 20.12.33 a total of 29 susceptible cattle were kept for varying periods in contact with cattle reacting to foot-and-mouth disease. They were on daily morning or evening temperature and examined daily; the non-reactors to contact infection were tested on their immunity to intramucosal (tongue) inoculation of vesicle virus.

TABLE 2.

No. of susceptible Cattle exposed.	Days Exposed.	No. of reacting cattle with which the susceptible were in contact for varying periods.	No. contracted infection.
4	6	8	2
1	6	6	Nil.
3	8	11	3
1	9	16	1
1	11	20	Nil.
1	12	20	1
1	14	11	1
1	15	23	Nil.
1	15	28	1
4	16	27	1
5	18	11	Nil.
3	31	35	1
3	36	1	Nil.
—	—	—	—
29	6 to 36 days	1—35	11

Immunity Test of non-visible reactors.—15 of the 18 non-clinical reactors were tested on their immunity to tongue inoculations, and of these 13 reacted=86%.

2. *Exposure of susceptible cattle on grazing.*

Foot-and-mouth disease appeared in a herd of cattle which were grazing and watering in one of the camps (north camp). The incidence of infection in the herd was high. The herd remained in the camp for approximately a month during which time fresh cases were occurring. Eleven days after removal of the infected herd 107 susceptible adult cattle were put in the north camp. They have, with the exception of animals drafted from the herd to another camp, grazed and watered in the north camp continuously up till 23.1.34 and have remained free from infection.

3. *Exposure of susceptible cattle in an infected kraal.*

Nine susceptible oxen were "kraaled" for seven consecutive nights 26.7.33 to 16.9.33 for "kraaling" and "temperaturing" infected cattle in foot-and-mouth disease experiments. The nine head were grazed and watered during the day in a separate camp. During the period 25.9.33 to 11.10.33 they were "temperatured" daily in a kraal in which reacting cattle were "kraaled" at night. The nine oxen thus did not come in direct contact with the infected cattle. They remained free from infection and were subsequently proved susceptible.

4. *Exposure of susceptible cattle to contact with recovered cattle.*

Since 5.9.33 several lots of cattle which had been used for virus production and foot-and-mouth disease experiments at Mokoro were, after recovery, drafted to a clean camp and from 9.9.33 till 28.11.33 ten head of susceptible cattle were herded, "kraaled," and grazed with the recovered animals (see table 3). The susceptible cattle remained free from infection and, on being tested on 28.11.33, proved susceptible. Of the 83 recovered cattle, 29 presented tongue or mouth lesions during the reaction and the remaining 54 generalisation of infection.

TABLE 3.

Susceptible cattle in contact with recovered cattle in middle camp.

Date of drafting recovered cattle to middle camp.	No. of recovered cattle drafted to middle camp.	Period elapsing between commencement of reaction in recovered cattle and their being drafted to middle camp.	Period of the contact of the 10 suspected cattle with the recovered cattle.
5.9.33	1	17 days	80 days
,,	2	21 ,,	80 ,,
,,	2	22 ,,	80 ,,
,,	7	24 ,,	80 ,,
,,	1	27 ,,	80 ,,
,,	7	37 ,,	80 ,,
,,	5	41 ,,	80 ,,
9.9.33	5	17 ,,	80 ,,
,,	4	25 ,,	80 ,,
,,	2	26 ,,	80 ,,
18.9.33	2	19 ,,	71 ,,
,,	1	21 ,,	71 ,,
12.10.33	1	16 ,,	46 ,,
,,	3	18 ,,	47 ,,
,,	6	19 ,,	37 to 80 days
,,	3	20 ,,	37 to 47 days
,,	5	21 ,,	37 to 80 days
,,	1	25 ,,	80 ,,
,,	4	27 ,,	47 ,,
,,	1	30 ,,	47 ,,
,,	5	36 ,,	47 ,,
12.11.33	1	24 ,,	15 ,,
,,	11	30 ,,	15 ,,
,,	2	31 ,,	16 ,,
,,	1	37 ,,	16 ,,
	83		

GAME AS A FACTOR IN THE SPREAD OF INFECTION.

Some species of game, wildebeest in particular, are considered to be responsible for the spread of infection. Foot lesions corresponding

with those seen in cattle have been detected in wildebeest, but there is no record of tongue lesions. Wildebeest do undoubtedly mingle in some cases with herds of grazing cattle, and during the 1933 drought often watered at the same watering places as cattle, but as far as the writer is aware there is no record of foot-and-mouth disease having been transmitted from cattle to wildebeest or vice versa, experimentally or otherwise. The spread of infection by game, especially wildebeest and eland, needs investigation.

Artificial Transmission.

With a view to obtaining some data on the percentage of cattle which react to various methods of inoculation of blood virus and to comparing the results with those of the intramucosal tongue inoculation of vesicle virus, cattle were inoculated and put under observation. The blood virus was bled into sodium citrate-sodium chloride-plus-glycerine preservative, from cattle with unruptured tongue vesicles and a temterature of 104° F or over. The cattle in the experiment were put on daily morning or evening temperature and examined for lesions, and in some instances subsequently tested for immunity.

(*a*) *Intranasal method.*

Observation 1 : 38 susceptible oxen were each inoculated intranasally with 5 cc. of blood virus on the 22.4.33. They were on daily morning temperature until the 18th day and examined at intervals of three days up till the 26th day.

Result.—6 (15.5%) reacted clinically up till the 10th day. The non-reactors (32) remained in contact with the reacting cattle up till the 26th day, during which period 8 (25%) reacted to contact infection.

Immunity Test.—The 38 cattle were inoculated intravenously with 5 cc. of blood virus which was proved infective in other herds.

Result.—None reacted.

Immunity Retest.—22 of the 24 non-reactors to inoculation or contact infection were inoculated intramucosally (tongue) with blood virus and examined on the 6th day.

Result.—4 presented tongue and foot lesions and 8 tongue lesions only. Total 12 (=54.5%).

Observation 2 : 23 susceptible oxen were inoculated on 4.5.33 intranasally with 5 cc. blood virus (*ex* ox No. 60) in preservative and examined at intervals of 3-4 days up till the 22nd day after inoculation.

Result.—9 reacted to inoculation infection (=36%).
9 reacted to contact infection (=36%).

Immunity Test.—6 of the non-reactors were tested on 26.5.33 by intramucosal tongue inoculation of blood virus *ex* oxen Nos. 27 or 30.

2 (=33%) presented a generalised infection. One of the reactors to contact infection was proved to possess a tissue and humoral immunity.

Observation 3 : 10 susceptible oxen were inoculated intranasally on 20.5.33 with blood virus *ex* ox No. 60. They were examined on the 4th and 10th day thereafter.

Result.—No visible reactions up till the 4th day. 40% reacted between the 5th and 10th days. Non-reactors were not tested for immunity.

Observation 4 : 10 susceptible cattle were inoculated intranasally on 20.5.33 with blood virus *ex* ox No. 27 and examined on the 4th and 10th days thereafter.

Result.—No visible reactions up till the 4th day. 20% reacted between the 5th and 10th days. The non-reactors were not tested for immunity.

(b) *Intravenous method.*

Observation 1 : 11 susceptible oxen were inoculated on 4.5.33 each with 5 cc. blood virus and examined on the 6th day.

Result.—All showed foot and mouth vesicles

Immunity Test.—Nine of the eleven reactors received intramucosally (tongue) on 12.6.33 1 cc. vesicle virus, and were proved to possess both a tissue and humoral immunity.

Observation 2 : 10 cattle inoculated on the 20.5.33 with blood virus *ex* ox No. 27 and examined on the 4th and 10th days.

Result.—None reacted up till the 4th day, 30% reactions from the 5th to the 10th day.

Observation 3 : 10 cattle inoculated on 20.5.33 with blood virus *ex* ox No. 60 and examined on the 4th and 10th day .

Result.—None reacted up till the 4th day, 20% from the 5th to the 10th days.

(c) *Intramuscular method.*

Observation 1 : 5 cattle inoculated on 4.5.33 with the blood virus *ex* ox No. 60; 2 (=40%) reacted.

Immunity Test.—2 of the 3 non-visible lesion reactors received intramucosally (tongue) blood virus *ex* ox No. 30 on 26.5.33.

Result.—Neither reacted.

(d) *Intramucosal (tongue) method.*

Observation 1 : 5 cattle inoculated on 20.5.33 with blood virus *ex* ox No. 27.

Result.—None reacted up till the 4th day; 2 (=40%) reacted from the 5th up till the 10th day:

Observation 2 : 5 cattle inoculated on 20.5.33 with virus *ex* ox No. 60.

Result.—Three reactions were recorded between the 4th and 6th day (=60%).

(e) *Intradermal, caudal fold.*

Observation 1 : Five cattle inoculated on 4.5.33 with virus *ex* ox No. 24.

Result.—Two reacted (=40%).

Immunity Test.—3 non-visible-lesion reactors received on 26.5.33 intramucosally (tongue) blood virus *ex* oxen Nos. 29 or 30.

Result.—One reacted and presented foot and mouth lesions.

Immunity Retest.—2 of the non-visible lesion reactors received on 12.6.33 1 cc. vesicle virus intramuscosally (tongue).

Result.—Neither reacted.

TABLE 4.

Summary.

Method of inoculation (blood virus)	Number inoculated	Number visibly reacted	Percentage of visible reactions
Intranasal	38	6	15.5%
Intranasal	25	9	36 %
Intranasal	10	4	40 %
Intranasal	10	2	20 %
Intravenous	11	11	100%
Intravenous	10	3	30 %
Intravenous	10	2	20 %
Intramuscular	5	2	40 %
Intramucosal (tongue)	5	2	40 %
Intramucosal (tongue)	5	3	60 %
Intradermal (caudal fold)	5	2	40 %
Method of inoculation (vesicle virus)			
Intramucosal (tongue) ...	170	170	100%

FIELD IMMUNISATION.

The intranasal inoculation of blood virus was employed in the field operations. The blood virus was collected from cattle with unruptured tongue lesions and with a temperature reaction of 104°F or over and bled into winchester bottles containing a solution of sodium citrate 20 gm. and sodium chloride 8 gm. in 1,000 cc. water, to which glycerine

was added. The usual method was to measure the capacity of the bottle and fill it to one-third of its capacity with the sodium citrate-sodium chloride solution, and one-third glycerine, and to bleed into the bottle one-third of blood. Approximately 4 litres of blood was usually taken from an adult animal, occasionally more. The virus was used with as little delay as possible after collection, but on occasions as long as a week elapsed. During the interval the bottles were stored in a cool place and kept covered with wet sacks.

The advantages of the intranasal methods are :—

1. The method is a practical one.
2. Large numbers of cattle (up to 1,000) can be dealt with at a crush in a day.
3. Disinfection of the site of inoculation is unnecessary.
4. The risk of conveying other infections (anthrax, etc.) from animal to animal by the syringe is negligible.
5. The risk of transmitting any protozoal infections which may exist in the blood is eliminated.

The disadvantages are :—

1. Foot-and-mouth disease is not transmitted to a percentage of the inoculated animals, but this is overcome to some extent by a percentage of the non-reactors contracting infection from the reactors of the herd.
2. Variations in the virus content of the blood of individual cattle reacting to foot-and-mouth disease.
3. The necessity of bleeding reactors in the early stages of the reaction before the immune body content of the blood is high necessitates the examination of a number of animals of the herd from the 4th day after inoculation, sometimes with negative results, for suitable virus producers. This difficulty was subsequently overcome by inoculating cattle destined for virus production intramucosally (tongue) with vesicle virus, which ensures a supply of virus producers in 24 hours or thereabouts.

The dose of virus in preservative is 5 cc., 2.5 cc. being injected into each nasal cavity with a syringe usually of 20 cc. capacity. Reactors may be detected as early as the 4th day after; on the 6th day a number are usually showing clinical symptoms. A percentage of the animals which escape inoculation infection contract contact infection, hence fresh cases may still be occurring in the herd for some weeks after inoculation.

Immunisation of Calves.

It was the writer's experience rarely to find calves reacting to in-

tranasal inoculations of blood virus, and the following were investigated :—

1. Experimental infection.
2. Contact infection.
3. The reaction in experimentally infected calves.
4. The infectivity of the blood of reacting calves.
5. Whether the foetus *in utero* acquired any immunity from a maternal reaction to foot-and-mouth disease.

1. *Experimental Infection.*

Observation 1 : 22 calves varying in age from 2 days to approximately 3 months were put in the experiment. Generally the tongue inoculation of vesicle virus was used for infecting calves. In some instances tongue inoculation of blood virus was used but with variable results.

The following results were obtained :—

Intramucosal tongue inoculation of vesicle virus : In experiment—10, reacted—10 (=100%).

Intramucosal tongue inoculation of blood virus : In experiment—9, reacted—1 (=11%).

Immunity Test.—8 non-reactors inoculated (tongue) with vesicle virus.

Result.—8 (=100%) reacted.

2. *Contact Infection.*

3 exposed for 14 days; visibly reacted—nil.

Immunity Test.—Non-reactors in experiment—3, reacted—2 (=66%).

3. *The reaction in experimentally infected calves.*

The reaction to intramucosal tongue inoculation was less marked than in adults. 6 of the 21 reactors (28%) presented tongue lesions and secondary vesicles in one or all four feet. The remainder of the reactors showed tongue lesions only. The tongue vesicles are smaller and salivation is less pronounced than in adult cattle. A definite temperature reaction was recorded in some instances.

4. *The infectivity of the blood of reacting calves.*

Blood of reacting calves was placed in preservative and inoculated into the tongues of susceptible calves and adults :—

Blood *ex* calf No. 117 produced 75% of reactions; 4 in experiment.
Blood *ex* calf No. 68 produced 20% of reactions; 5 in experiment.
Blood *ex* calf No. 84 produced no reactions; 7 in experiment.

5. *Acquirement of immunity by the foetus* in utero.

Six calves, the progeny of immune mothers, reacted to intramucosal tongue inoculation of vesicle virus.

Thirteen calves aged 2 weeks to 5½ months, whose mothers had been exposed to natural infection six months previously, reacted to intramucosal (tongue) inoculation of vesicle virus. The mothers were subsequently tested by tongue inoculations and proved to possess a humoral, but not in all cases a tissue immunity.

Immunity Tests of Cattle.

The intramucosal tongue inoculation of vesicle virus was employed for testing the immunity of cattle, as it was found that the inoculation of blood virus by other channels did not invariably produce a reaction in susceptible cattle.

Observation 1 : Immunity in cattle which reacted to natural infection—herd T.

On 15.5.33 a natural outbreak of foot-and-mouth disease occurred in a herd of 130 cattle. The herd was kept under observation until 15.6.33. Animals which visibly reacted were horn-branded. 12 of the horn-branded cattle were tested on their immunity in August 1933 to tongue inoculation of vesicle virus.

Result.—2 reacted, tongue lesions only (16.6%).

Observation 2 : August—September 1933. Immunity in cattle of herd T which were not horn-branded.

17 were tested on their immunity to tongue inoculation of vesicle virus.

Result.—11 presented tongue lesions only (64%).

Observation 3 : Immunity in cattle of herd T six months after the cessation of the outbreak.

Nine cattle were tested on their humoral immunity, eight by intramuscular inoculation of blood virus and 1 by contact infection. Of the 9, 2 had been horn-branded as reactors to natural infection six months previously.

Result.—None reacted.

Tissue Immunity Test.—The nine were then tested on their immunity to tongue inoculation of vesicle virus.

Result.—4 reacted (44%) which included the 2 which had reacted six months previously; none showed generalisation of infection.

Observation 4 : Cattle herd M. 20 cattle which had been exposed to natural infection from April to May, 1933, were inoculated into the tongue with vesicle virus in August, 1933.

Result.—14 reacted (70%) with tongue lesions only.

Observation 5 : Cattle herd M. 10 other cattle of the herd were inoculated intramuscularly with blood virus in November, 1933.

Result.—None reacted. They were then inoculated into the tongue with vesicle virus, and 5 (50%) reacted, presenting tongue lesions, but no generalisation of infection.

General Summary.

1. The Bechuanaland Protectorate comprises an area of 275,000 square miles. The climate is on the whole sub-tropical, but all north of latitude 22°, which passes through the centre of the country, is tropical. The population is in the neighbourhood of 200,000. The cattle population is approximately 1½ million. Game of various species is fairly numerous.

2. The existence of foot-and-mouth disease in the Protectorate was officially confirmed in January 1933. Active immunisation by intranasal inoculation of blood virus was commenced in February 1933; approximately 741,570 cattle were submitted for immunisation in an area of 40,000 square miles. Immunisation operations were completed in August 1933. Foot-and-mouth disease has been unknown in the Protectorate since August 1933.

3. The Protectorate virus has been identified as a variant of O type; it is of low pathogenicity. During the hotter months of the year at least, it soon loses its infectivity on exposure to the sun and heat. Vesicle virus in preservative stored under field conditions at a temperature of approx. 68° F. conserves its infectivity for at least 21 days. The concentration of virus varies in different samples; the rate and energy of action of the virus is proportional to its concentration. The keeping properties of high dilutions varied in different lots. The intramucosal tongue inoculation of vesicle virus is a practical method of immunisation. A difficulty would be experienced in standardising the infectivity and keeping properties of high dilutions. Dilutions of 1 :500 should be sufficiently active for a week at least if stored at approximately 68° F.

4. Foot-and-mouth disease is commonly spread by animals in the infective stage; infection occurs by direct contact. The incidence of contact infection varies :—

Observation 1. Five (26.3%) of 19 cattle exposed to contact infection for 26 days visibly reacted. None of the 19 reacted when tested subsequently by intravenous inoculation of blood virus. Ten of the non-visibly reacting animals were retested on their immunity to tongue inoculation of blood virus; of these 60% did not react, 30% possessed a humoral immunity, and 10% no immunity.

Observation 2. 16 (38%) of 42 cattle exposed to contact infection for 22 days visibly reacted. Twenty of the non-visibly reacting ani-

mals were tested by tongue inoculation of blood virus; of these 45% did not react, 35% possessed a humoral immunity, and 20% no immunity.

Observation 3. Nine of 29 cattle exposed to contact infection for varying periods, 6 to 36 days, visibly reacted. Two did not visibly react but were subsequently proved immune. Total 11 (37.9%). Fifteen of the 18 non-visibly reacting animals were tested by tongue inoculation of blood virus; of these 15 (86%) reacted.

Susceptible cattle exposed on grazing vacated 11 days previously by an infected herd and which watered from the same troughs previously used by the infected herd remained free from infection.

Susceptible cattle kept of a night in a *kraal* which had been occupied by infected cattle for approximately 2 months and vacated by infected cattle the same day on which the experiment commenced remained free of infection.

Susceptible cattle herded, "kraaled" and watered with recovered animals for varying periods (15 to 80 days) remained free from infection. The period elapsing between the date of the commencement of the reaction in the recovered cattle and their being put in contact with susceptible cattle varied from 16 to 41 days.

Foot lesions corresponding to those seen in infected cattle have been observed in wildebeest, but mouth lesions have not been detected. Wildebeest mingle with herds of cattle and watered during the drought period at the same watering places as cattle. The spread of infection by game, particularly wildebeest and eland, needs investigation.

5. The percentage of cattle which react to blood virus introduced by various channels varies. 100% of reactions were produced by the intramucosal tongue inoculation of vesicle virus. The intranasal inoculation of blood virus in preservative was employed in the field immunisation operations; the method is a practical one, large numbers of cattle can be dealt with in a day, the risk of transmitting other infections is eliminated. A percentage escape infection, but contract infection from the reactors of the herd.

The blood virus used for field immunisation was usually obtained from cattle of herds undergoing immunisation. In addition to the delay a difficulty was sometimes experienced in obtaining cattle suitable for bleeding. This was overcome by inoculating cattle destined for virus production into the tongue with vesicle virus.

6. In the writer's experience calves rarely react to intranasal inoculation. The tongue inoculation of vesicle virus is indicated for the immunisation of calves. The reaction to foot-and-mouth disease is less marked in calves than in adults. Immunity was not acquired by the foetus *in utero* when the mother reacted to foot-and-mouth disease.

7. In view of the varying results obtained from inoculation of blood virus, the tongue inoculation of vesicle virus was employed for testing the immunity of cattle. In herds where a natural outbreak had occurred 3 to 4 months previously, a large percentage of the cattle proved to possess a humoral, but not a tissue immunity; six months after the cessation of the outbreak the cattle still possessed a humoral, but not always a tissue immunity.

Immunity tests indicate that cattle which have presented a characteristic clinical reaction to natural or experimental infection possess a humoral and tissue immunity.

Of those which show no characteristic clinical symptoms, a percentage were proved to possess a humoral and tissue immunity, others a humoral immunity, and a varying percentage no immunity. Cattle possessing a humoral immunity were not always resistant to intramucosal tongue inoculation of vesicle virus.

Conclusions.

1. In a territory in which one type of virus occurred, where game is fairly numerous, where the climatic conditions of sunshine and heat favour the destruction of virus when exposed outside the body, and where the risk of reintroduction of infection from adjoining territories is remote, foot-and-mouth disease can be successfully combated and eradicated by the intranasal inoculation of the cattle in the territory with blood virus.

2. A generalised immunisation campaign speeds up the dissemination of infection, eliminates the menace of an epizootic and hastens eradication.

3. Climatic conditions of sunshine and heat favour the destruction of the virus outside the body. This explains the disappearance of infection from the Bechuanaland Protectorate shortly after immunisation operations had ceased and the non-spread of infection other than by direct contact with animals in the infective stage of the disease.

Act 16 of 1933.

Members of the S.A.V.M.A. are invited to submit to the Secretary any amendments to Act 16 of 1933 they deem desirable. Their attention is especially directed to item 8 of the minutes of 26th General Meeting published in this Journal.

Jl. S.A.V.M.A.
V (2) 1934.

Modern Tendencies of Haemopoietic Theory.

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

Of recent years such important variations have been introduced into the original themes of haemopoietic theory that the familiar contrast between monophyleticism (unitarianism) and polyphyleticism (including dualism and trialism) no longer appears clear-cut. Both dualists and trialists have evolved conceptions which, if unpalatable to the unitarian in their wider theoretical implications, have at least very materially contributed to our practical knowledge of haemopoiesis under the conditions of the normal adult organism. Among the members of each school of thought many subdivisions of opinion have come to exist. Many of the old and bitter points of controversy have, with the accumulation of more extensive data, come to appear less vital and essential, and in some directions it is possible to compromise to the extent of admitting that the claims of both groups of protagonists are not mutually exclusive, providing that these claims are clearly defined. It appears to me that, while many important questions of haemopoiesis will for some time remain unsettled, it is profitable to re-examine, in the light of modern knowledge, the grounds on which unitarian and polyphyleticist take their stand.

Unitarianism may be defined fundamentally as the belief that there exist *in post natal life* cells having the *potentiality* of giving rise to any one of the definitive blood cells. Thus defined, the theory stands in contrast with dualism to the following extent :—

Dualism contends that the common lympho-myelo-potent ancestor of the blood cells (for such must of course be admitted to exist, even if it be necessary to go back as far as the fertilized ovum in search of it) does not persist in post-embryonic life : Having accomplished its work of differentiating into specific precursors of the different blood cells, each of whose subsequent fate is pre-determined, it can no longer be identified in the mature organism.

It will thus be appreciated that the solution of the controversy can never depend on embryological evidence alone, although useful analogies may be drawn between what occurs in the embryonic tissues and what may possibly be expected to occur in similar tissues in the adult, providing of course that the persistence of these tissues in the adult can be demonstrated.

In its fundamental form, as above defined, unitarianism to-day still stands supreme. Many of the supplementary views held from time to time by unitarians have had to be abandoned, thanks to the

valuable evidence presented by representatives of the other schools, and it is well to admit that perhaps the bulk of the writings of the unitarians are no longer valid as a guide to the comprehension of the process of normal haemopoiesis. The basic thesis however remains undisturbed, as I am confident that it will for all time.

My object here is to present, in condensed form, the extent to which unitarianism can be upheld at the present time, and my own views, acceptable as a working hypothesis, of the cytological affinities and divergences among the elements of the blood and blood-forming organs. Realising that my readers are in large proportion practical men who are perhaps impatient with barren academic theorization, I may do well to mention the importance of haematological theory for the proper understanding of the pathology of diseases such as the anaemias, avian leukosis, mammalian leukaemias and aleukaemias (including diseases like East Coast fever and snotsiekte), and many important neoplastic diseases as well as the great problem of the reticuloendothelial system and its function. In addition to these aspects of immediate practical importance, one should also realise the light which has been and may be expected to be thrown on the fundamental biological characters of cells by haematology, which has provided by far the most detailed and extensive study yet undertaken of the cells of vertebrates.

For a complete and orderly conception of the development of the blood cells in the adult a somewhat detailed consideration of the cellular elements of the reticular connective tissue is essential.

The Cytology of Reticular Connective Tissue, including the Reticulo-Endothelial system.

The finer framework of the blood forming organs consists of reticular tissue, that is to say, a tissue characterised by a syncytium of reticulum cells which is traversed by argyrophil reticular fibres. The reticulum cells may be classified from two points of view :—

(1) *Morphological classification.*

(a) Supporting reticulum cells not lining spaces in direct communication with blood or lymph circulatory channels. These cells I call *central cells* to distinguish them from

(b) lining reticulum cells, known as *littoral cells*, which line actual or potential spaces through which blood or lymph circulates or may come to circulate, and which are in syncytial continuity with the central cells.

Side by side with this distinction we have a

(2) *Physiological classification*, based on the response of the reticulum cells to injected vital dyes :—

(i) Undifferentiated "resting" cells, non-phagocytic and non-dye-storing.

(ii) Fixed histiocytes (reticulo-endothelial cells) which are phagocytic and store vital dyes.

If the reticular tissue be examined from animals injected with vital dye, it is seen that only a portion (ii) of the cells take up the dye, while many elements (i) characterised by extremely amblychromatic and vesicular nuclei remain unaffected. If now more of the dye is injected, or more especially another kind of vital dye, it will be found that more elements of group (ii) are present than was the case previously. These additional dye-storing histiocytes have been differentiated at the expense of the resting elements (i).

It must be emphasised that the two systems of classification are not mutually exclusive. Thus both a central cell and a littoral cell of the reticulum may be either an undifferentiated (resting) cell or a phagocytosing histiocyte. The littoral cells, whether phagocytic or not, have commonly been termed endothelial cells. This is unfortunate, since they have many important properties distinguishing them from the endothelial cells lining the general blood- and lymph- vascular systems. The latter are non-dye-storing and non-haemopoietic in adult life, having become specialised for a purely lining function. They do not in general form reticular fibres and they have different physiological characteristics which make them a congenial medium for the development of the causal organism of heartwater (*R. ruminantium*), which cannot complete its life cycle in the littoral cells of the reticulum, which it shuns. It will, therefore, be seen that even a lowly organism such as a Rickettsia may display considerably superior cytological discrimination to many histologists who confuse the general endothelium with the littoral reticulum cells in regard to haemopoietic and phagocytic function. In organs like the liver, it is probable that nearly all the littoral cells (Kupffer cells) have become specialised in the direction of phagocytosis. It is only in the embryo that normally the hepatic reticulum cells, before so specialised, retain wide haemopoietic potentialities. This function is lost before birth.

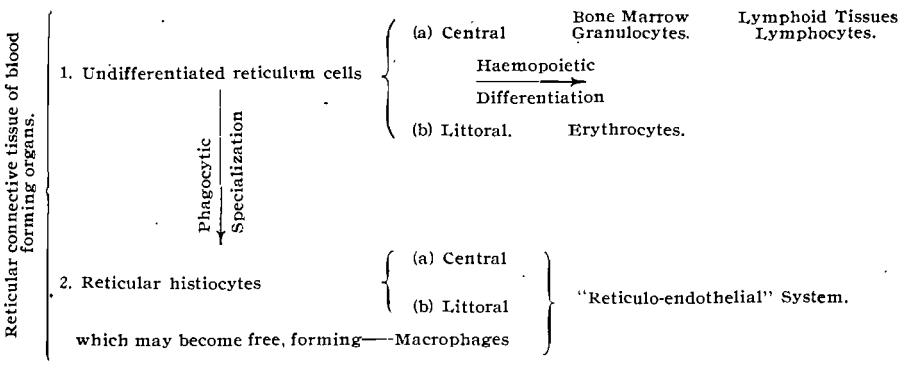
An undifferentiated reticulum cell is regarded as representing a persistent mesenchymal cell in the adult and it may subsequently differentiate in either of two directions: (1) for phagocytosis, becoming a histiocyte, either central or littoral in position according to the position of the undifferentiated precursor, (2) for haemopoiesis, becoming a haemocytoblast which likewise may be central or littoral in position. In either case, the differentiated cells may become freed from their syncytial relationships, forming in the first case a macrophage, and in the second ultimately a free blood-cell.

The cells differentiated for phagocytosis, be they littoral or central, fixed or free, collectively constitute what has rather unsuitably been termed the reticulo-endothelial system. One frequently hears nowadays of the blood-forming properties of the cells of this system and it is important to realise that it is not the reticulo-endothelial cells themselves (i.e. the dye-storing cells) which manifest these potentialities, but the undifferentiated cells, which, had their development not been decided along haemopoietic lines, could have manifested their power to differentiate as dye-storing histiocytes.

It has been established by the researches of Danchakoff (for birds) and more recently by those of Cunningham, Sabin, and Doan (for mammals as well as birds) that the usual mode of production of erythrocytes is from littoral cells only. This is a more precise method of expressing the familiar dictum that erythrocytes are formed intravascularly, in contrast with granulocytes, which are formed extravascularly from the "central" cells of the reticulum.

At first sight this seems to contradict the unitarian theory, as indeed Sabin and also Krumbhaar have contended. Krumbhaar says that if leucocytes and erythrocytes develop from the same cell, both must be formed extravascularly, because we already know that granulocytes are formed extravascularly from mother cells with an extravascular localization. But I cannot agree that this necessarily follows, since it has not been shown that the collapsed blood spaces lined by the littoral cells from which the red cells are derived are permanent structures. There is in fact no reason why a cell should not, at one stage of its existence be littoral and at another central in position. This variation of course occurs during embryonic development and in tumours (e.g. endotheliomata) and it would not be at all surprising to find that littorality of cells with reference to the smaller blood and lymph sinusoids is a temporary and transient condition. Littoral cells are everywhere in continuity with the central cells of the reticulum. They have a common origin from the mesenchyme. They have the common potentiality of becoming dye-storing fixed histiocytes and of becoming free as free histiocytes. Both develop reticulum fibres. When one considers how intensively this rounding-up process to become free histiocytes (macrophages) may occur in central as well as littoral cells thus depleting the reticulum of its supporting elements, and the extensive changes in the sinusoidal system of lymphoid organs which have been observed by workers such as Jordan and Dawson, it is easy to accept that the littoral cells of the bone marrow are not different in potentialities from the central cells, that intravascular development of erythrocytes signifies nothing more than the response to a physiological stimulus affecting the multipotent littoral cells because of the "accident" of their position and causing them to manifest their eythrocytogenic rather than their granulocytogenic or lymphocytogenic capacity.

We may tabulate these conceptions as follows :—



THE UNITARIANISM OF MAXIMOW AND THE FATE OF THE LYMPHOCYTE.

With this viewpoint we are confronted with the task of reconciling the unitarianism of Maximow. This great authority concluded in effect that the common stem cell of the blood cells could be traced further in its differentiation than the undifferentiated reticulum cells, and that it could be identified as a circulating haemocytoblast which was identical with the lymphocyte. He did not go so far as to say that the erythrocytes and granulocytes which mature in the bone marrow are derived actually from lymphocytes produced in the lymphoid tissues, but seems to have left this question open, contenting himself with the statement that the haemocytoblast (lymphoid cell) of the bone marrow was identical with the lymphocyte (though presumably derived only from the reticulum of the bone marrow under normal conditions of haemopoiesis?). Yoffey has emphasised this haemopoietic function of the lymphocyte, by regarding the differentiation into blood cells in the bone marrow as the normal fate of this cell. He sees in the lymphoid tissues organs whose main function is to maintain a constant supply of lymphocytes, which are filtered out from the bloodstream in the marrow, differentiate there, and are returned to the bloodstream as granulocytes and erythrocytes. This conception that the haemopoetic potency of the ordinary small lymphocyte (which Maximow demonstrated beyond doubt to exist) is of fundamental practical importance in normal haemopoiesis and has many attractive aspects : It would explain how the number of lymphocytes in the circulating blood is maintained at a constant level in spite of the fact that daily some six thousand millions, the product of the lymphnodes, are added to the bloodstream *via* the thoracic duct, replacing the blood lymphocytes (numbering in the region of two thousand millions) thrice every twenty-four hours.† It would assign a definite function justifying the existence of the elo-

† These data apply to the dog.

borate system of lymphoid tissue in the body and of the large numbers of lymphocytes which it produces.

But there are insuperable difficulties in the way of its acceptance: It postulates a degree of heteroplastic haemopoiesis which cannot be shown to occur in the bone marrow, as will be mentioned again later; for the great bulk of the blood cells in the marrow arise by homoplastic regeneration (i.e. from cells of the same type, such as granulocytes from already granular myelocytes, normoblasts from haemoglobiniferous erythroblasts, and the latter again by multiplication of less mature but already partially differentiated erythroblasts).

That lymphocytes do possess the ability to differentiate into the other cells of the blood is abundantly proved by the observations on lymphnodes under abnormal conditions (e.g. Jordan and his co-workers) and by Maximow on tissue cultures of lymphocytes, as well as by certain observations in cases of experimental extramedullary haemopoiesis. But that the differentiation of lymphoid cells which have originated in the lymphoid tissues plays any important part (if indeed any part whatsoever) in normal adult haemopoiesis is unlikely. Lymphocyte-like cells locally differentiated in the bone marrow and known as myeloblasts provide the reserve for myelocytes when such a reserve is needed. For the most part, as has been mentioned, there are already abundant myelocytes to supply the definitive granulocytes of the blood, and further these myelocytes can and do increase their number by their own proliferation.

From the recent researches of Wiseman and also of Hu and Ch'in it appears increasingly probable that at least the majority of the lymphocytes pass through a definite series of transitions discriminable by morphological changes and which the former worker has designated as young, medium, and old and the latter authors as lymphoblast, intermediate form, and lymphocyte. This conception obviously affords further opportunity for a reconciliation between the dualism of Naegeli and the unitarianism of Maximow; the haemopoietic potencies ascribed to all lymphocytes by the latter theory should on this basis be limited to only the young forms (lymphoblasts), which it is emphasised may be either large, medium, or small in size. The widespread conception that the small lymphocyte is necessarily the oldest cell of the series should thus be abandoned, inasmuch as the young or lymphoblastic stage may be a small, medium-sized, or a large cell.

The Myeloblast Question.

The existence of the myeloblast, the *free* stem cell in the marrow, should be admitted by unitarians. The eminent authority on this question, Prof. Hal Downey, has met the dualists by freely admitting the morphological difference between this cell and the large lymphocyte

(lymphoblast) while remaining an advocate of the unitarian theory. He and others have carefully shown the delicate but nevertheless detectable differences between this cell and the "lymphoblast." It is quite reconcilable with the monophylectic view and even with Maximow's unitarianism to consider the myeloblast as a further stage in the differentiation of the lymphocyte which is on its way to becoming a granulocyte or erythrocyte. But it is perhaps simpler and more correct to regard the lymphocyte-like stem cell (myeloblast) which arises from bone marrow reticulum cells as a cell already slighty modified in the direction of specialization for granulocytopoiesis, it being only the reticulum cells themselves of lymphoid tissues and bone marrow which are the true common ancestors (haemoblasts) under normal and usual conditions. The wide potentialities of lymphocyte (lymphoblast) and the myeloblast are reflections of or heritages from the multipotent undifferentiated reticulum cell from which both are derived.

The Monocyte Question.

A few words must be said here regarding the origin of the monocyte, at present the most difficult and uncertain phase of the problem of the genesis of the blood cells.

(1) We have already seen that the macrophage, the free histiocyte, which constitutes an important element of the "reticulo-endothelial" system, is considered to arise by the desquamation of the phagocytic reticulum cell (fixed histiocyte) in various organs, and that the latter cells in turn are derived from the undifferentiated reticulum cells. The chief difficulty in assessing the evidence at present offered regarding the origin of the monocyte is that a majority of authors fail to distinguish the monocyte from the macrophage. For these authors, of course, the "monocyte" arises from the fixed reticulo-endothelial cells, and while their observation that, on stimulation of this dye-storing system, free dye-storing cells do arise from such fixed histiocytes in large numbers, is of much practical importance, statements on the derivation of the monocyte are valueless to haematological theory in the absence of a clear definition of the cell in question. The monocyte is to be regarded as a relatively non-dye-storing cell. Like the undifferentiated reticulum cell it can at any time become a phagocytic (histiocytic) cell. It may perhaps reasonably be regarded as a free cell of the blood, held in reserve for an immediate phagocytosing function should the need arise. The multitudinous observations of desquamation of the littoral cells of the liver (Kupffer cells) and lymph nodes (sinus cells) as free pigment-hoarding cells, which reach the bloodstream under certain conditions, throw little if any light on the question of the monocytes. Here one is, by definition, dealing with macrophages.

(2) Some authors have carefully distinguished between the morphology of the monocyte and that of the macrophage and claim that

for a certain identification of the monocyte, only the supravital staining technique is an adequate criterion. These include Forkner, who derives the monocytes from the "central" reticulum cells, while the littoral reticulum cells of the lymph nodes give rise only to macrophages.

(3) Maximow and also Bloom, who has devoted especial attention to the origin of the monocyte, derive this cell by a transformation of the lymphocyte which occurs especially when the latter is stagnating in the sluggish circulation of organs (e.g. spleen, etc.) whose vascular bed is characterised by the presence of a sinusoidal system. We believe with these authors that the lymphocyte can and does undergo this transformation into the monocyte. But since the lymphocyte is a daughter cell of a reticulum cell with equal if not actually superior potentialities, we think it natural to expect the possibility that these reticulum cells may give rise to monocytes, as well as to macrophages (a) without the intervening lymphocytic stage or (b) with the intervention of a lymphocytic stage which is passed over so rapidly as not to be noticeable or of practical importance. The monocyte itself, of course, when need arises undergoes further differentiation to become a macrophage. The monocytes may reasonably be regarded, as has been said, as a circulating source from which phagocytic cells are probably instantly available on demand.

(4) Most dualists derive the monocyte from the myeloblast, which is regarded as being able to give rise to either myelocyte, erythoblast, or monocyte. It is quite probable that the myeloblast—being a lymphocyte-like cell—has this potentiality. But it is wrong to exclude the lymphocyte as a source of the cells in question.

(5) The trialists postulate a separate and distinct stem cell for the monocyte. But we have seen that this is unnecessary. Any cell of, or immediately derived from, the reticulum cell has this potentiality.

The Derivation of the Blood Cells.

If now, one is asked the question : What precisely are the ancestors of the blood cells? one is (as will by now have been gathered from the foregoing outline) bound to reply with a series of other questions if a succinct answer is to be given : Does the questioner refer to adult conditions; if so, only to normal adult conditions; if so, again does he refer to only the more usual mode of derivation, accounting for immediate origin of the bulk of the cells? Since these counter-questions usually disconcert or disgust (!) the student of haematological cytology one is forced to reply less briefly, but none the less definitely, as follows :—

1. *The Lymphocytes* arise mainly by homoplastic multiplication of pre-existing lymphocytes in the lymphoid tissues. These in turn are derived from undifferentiated cells of the reticulum, but there are probably already ample lymphocytes endowed with vigorous proliferative

ability in existence in the lymphoid tissue under normal adult conditions to supply the bulk of the lymphocytes to the blood. Ultimately the lymphocytes are derived from the reticulum cells which are considered the remains of the embryonic mesenchyme and in the embryo from the mesenchyme itself.

Recently much doubt has been cast upon the significance of the secondary nodules of lymphoid tissue ("germ centres") as the site of lymphocyte production. That they are not the only site is of course well established from the circumstance that they are not present at birth (when the lymphocyte count is actually higher than in adult life), and from the presence of abundant evidence (mitotic figures) of lymphocyte multiplication everywhere in the active lymphoid tissue. But the thesis that lymphocytes are not produced in "germ centres" has not been proved. The supporters of this idea see in these structures centres of reaction against toxic influences. The apparent contradiction disappears if it be remembered that the "germ centres" are rich in reticulum cells. From what has been said, it is easy to understand that these reticulum cells may differentiate in the direction of lymphocytopoiesis, and equally well can, when occasion arises, turn into phagocytic histiocytes concerned in the defensive mechanism of the body. Under such circumstances the lymphocyte production naturally falls temporarily into abeyance. Phagocytes of the secondary nodules contain the *tingible körper* of Flemming, cytoplasmic inclusions evidential of their phagocytic activity. From the reticulum of the bone marrow, probably including certain of the littoral cells (those "endothelials" which line the intersinusoidal capillaries described by Doan), arise cells which the strict unitarian considers identical with lymphocytes, but which the dualists and more liberal unitarians recognise as myeloblasts, and which are lymphocytic cells already slightly differentiated in the direction of granulocytopoiesis and erythrocytopoiesis.

2. *Granulocytes* arise for purposes of the bulk of normal replacement requirements from myelocytes in the bone marrow (i.e. by homoplastic proliferation of the cells which have already acquired, in part at least, their specific granules). The myelocytes in turn are derived heteroplastically from the non-granular precursor, the myeloblast, a cell which probably is already present in sufficient numbers to renew the quota of myelocytes of the marrow under normal conditions. Embryologically this cell has been freed from the undifferentiated mesenchyme which persists in the adult marrow as the undifferentiated reticulum cells. As a rule there is little need in adult life for this reticulum to form myeloblasts, but on demand the transformation readily occurs. Further, although as a rule the granulocytes arise from an ancestry derived from cells of the bone marrow, they can also arise from lymphocytes of lymphoid tissue origin, both within and without the marrow, and without the intervention of a myeloblast stage. For

example, under pathological conditions they may derive from a type of lymphocyte (lymphoidocyte) which serves as a common blood cell ancestor, as occurs in lymphocytomatosis (lymphoid leukaemia) of cattle. In the lymph nodes, spleen, thymus, and intestinal mucosa of domestic ruminants for example, many, including the writer, have seen evidence of the direct transformation of small lymphocytes to granulocytes or erythroblasts. This observation in the thymus gland that the thymocyte (as the small lymphocyte of the thymus is named) has a granulocytopoietic potency in common with that of lymphocytes, is of peculiar interest in that these cells, of all the lymphocytes of the body, do not ordinarily respond in cases (in which the lymphoid tissue as a whole is hyperplastic) of lymphoid leukaemia; for which reason their identity with lymphocytes has been disclaimed. Finally, in tissue cultures Maximow has firmly established the origin of granulocytes from lymphocytes.

(3) *Erythrocytes* arise similarly mainly from homoplastic proliferation of pre-existing erythroblasts in the bone marrow, these again being replaced by multiplication of pro-erythroblasts as occasion demands. That these cells are ultimately derived from the littoral reticulum cells of certain sinusoids (which normally are in a collapsed condition but potentially in communication with the marrow circulatory system) must be accepted in view of the more recent work on this question. This was found to apply to conditions of severe demand (regeneration following an anaemia produced experimentally), but probably also applies to normal conditions. This observation explains how the non-motile red cells gain access to the circulation, by means of the opening of the collapsed vessels, the site of intravascular haemopoiesis, when they become distended with cells and the establishment of an active communication with the venous sinusoids of the marrow. [It was previously thought that in mammals eythrocytes were produced extravascularly along with the granulocytes and it was difficult to explain how they gained access to the circulation (the granulocytes of course can penetrate into the vessels by virtue of their own motility). The question of an open versus a closed circulation in the marrow was largely an outcome of this difficulty.]

A less usual form of eythrocytogenesis is from the lymphocyte as such, as is seen outside the marrow in organs such as the spleen, possibly occurring only under pathological and embryological conditions. But always the first free precursors of erythrocytes are lymphocyte-like cells, as is seen most clearly in erythroleukosis of fowls; and any lymphocyte, whether existing in the marrow as a myeloblast, as a basophilic cell derived from littoral reticulum, or as the ubiquitous free lymphocyte of the blood and tissues, has the potency to give rise to haemoglobiniferous cells, as well as to any other cells of the blood.

4. *The monocytes* arise by a direct transformation of the lymphocyte, a circumstance which explains the difficulty of separating (even by supravital staining methods) the two cell types, which seem to merge (through the "large mononuclears") into one another. They can probably also arise from any cell which has the potency of giving rise to a lymphocyte (reticulum cells, myeloblast?) since these, as the parent cells of lymphocytes, naturally have potencies not inferior to those of their offspring—*Effectus nequit superare causam.*

5. *The macrophage* (or clasmatocyte or free histiocyte, etc.), arises as a desquamated cell of the fixed histiocytic system. Since both the histiocytes and the lymphocytes are derived from the undifferentiated reticulum cells, it is not surprising that the monocyte also, through its lymphocytic or reticulum cell ancestry, retains the potency for further differentiation into the macrophage.

6. *The megakaryocyte* (which enters the blood stream only under certain pathological conditions) develops from the undifferentiated reticulum cells through repeated nuclear division unaccompanied by cytoplasmic fission and followed each time by partial re-fusion of the daughter nuclei.

7. *The blood platelets.*—Regarding the origin of these (non-cellular) elements of the blood of mammals, Wright's theory of derivation from the fragmented cytoplasm of the megakaryocytes seems acceptable to the writer. Impressive evidence is afforded anyone who takes the trouble to examine sections of bone-marrow prepared by Wright's technique, when the similarity between the megakaryocyte cytoplasm and the protoplasm of blood platelets is most strikingly seen. It appears better, however, to keep an open mind on the question of the derivation of the thrombocytes ("blood platelets") of birds. Further evidence would seem to be required before this can be profitably discussed, although their derivation from the erythrocytes has some morphological evidence in its support, as will be recognised by all who have had experience of avian blood smears.

Summary.

Summarising this statement, we may believe that in the adult derivatives of the mesenchyme persist in the form of undifferentiated reticulum cells of the blood-forming organs which produce either lymphocytes or myeloblasts under conditions of normal haemopoiesis. The lymphocytes are haematologically totipotent cells, but do not manifest all their potentialities to supply the ordinary demands of haemopoiesis, with the one exception that they probably supply an important proportion or even all of the monocytes. That part of the reticulum of the bone marrow which occupies a littoral position in relation to certain intersinusoidal capillaries forms the ultimate ancestor of the red cells

under normal conditions. It is questionable whether under ordinary conditions and for normal demands a cell of the myeloblast type intervenes in the ancestry of the red cells.

This liberal and extended unitarianism, admitting freely the existence of the myeloblast, and also that under normal adult conditions the important bulk of the blood cells are derived in a manner rendering applicable the dualistic outlook, but retaining the conceptions of fixed cells with haemotologically totipotent prospective properties and of the immediate lymphoid derivatives of these fixed cells as elements which, in normal haemopoiesis to a slight extent but in abnormal haemopoiesis to an unlimited extent, retain their haematologically totipotent capacity, I think offers as intelligent a concept of haemopoiesis as our present information enables us to construct. This general view is a modified neo-unitarianism. The common stem cell is regarded as the undifferentiated reticulum cell, whether littoral or central in position. A distinction is emphasised between this cell and the "reticulo-endothelial" cell (histiocyte) which already is differentiated along the alternative line for phagocytosis. Maximow's unitarianism is believed to have practical application in pathological conditions or at least not to constitute the most important line of haemopoiesis under normal adult conditions, inasmuch as it is the fate of the vast majority of lymphocytes to be eliminated from the body *qua* lymphocytes (via the mucosa of the digestive tract) and not to undergo further differentiation.

Conclusion.

The biological truism that specialization carries with it a sacrifice of potentiality (again recently emphasised by Dr. Robert Bloom in dealing with the restricted evolutionary potentialities of present day organisms) applies just as much to cells and to tissues as to the organ or organism as a whole. The higher we ascend in the evolutionary tree the more limited we find tissue potentialities both for regeneration (cf regeneration of limbs in crustaceans, or of half the cell body in protozoans) and for evolutionary change. What is as important to appreciate is that the potentiality for organ and organism change depends on an underlying cell potentiality. Higher organisms have lost their regenerative and evolutionary capacity because the price paid for specialization is a loss of cell potentiality both for multiplication and for heteroplastic differentiation (cell evolution).

The point I now wish to emphasise is that just as in its climb to specialization the history of the whole organism and of the organs is repeated in the embryology, so in the underlying cell ascent phylogeny is broadly recapitulated by ontogeny. This is perhaps a self-evident truth, but it is helpful to realise that many of the cells concerned in haemopoiesis are in the embryo more plastic in their potentialities and

greater in vigour than in the adult, and a similar difference exists between the cells of lower and higher animals. It is for this reason that unitarianism, triumphantly demonstrable at the amphibian and avian levels of the evolutionary scale has to become more modest in its practical implications when applied to mammals.

But let us carry the principle a little further: It must be understood that potentialities are not necessarily entirely lost; they remain, but are merely less likely to be exercised. The genetic factors conferring multipotentiality and regenerative ability burn more dimly, flicker, and in some cases may be entirely extinguished. But the bellows of disease and injury are capable often of fanning into life the guttering flame, as is witnessed in inflammation, when relatively specialised fibrocytes proliferate as fibroblasts and endothelium may regain some of its pristine mesenchymal potentialities; in injury when depending again on the degree of specialization a whole organ may be rapidly restored; in neoplasia when embryonic regenerative power and potentiality are recovered but in a distorted fashion (malignancy of growth and anaplasia respectively); and in the pathological phenomenon of metaplasia which perhaps best of all illustrates recovery of the power to manifest latent potentialities and the discussion of which has been so important in the theory of the leukaemias.

So in haemopoiesis in the higher animals, the cells have become relatively "sedate." One does not expect surprising or violent behaviour from an elderly gentleman whose outlook is moulded on the culture of centuries of ancestors—unless he happens to sit upon a pin or slip on a banana peel. But in such eventualities his reaction would be quite unpredictable by one who had studied his behaviour in repose and equanimity only. Much of the laboured and bitter controversy between the opposed schools of haemopoiesis rests upon failure to recognise kindred distinction in the behaviour of the haemopoietic cells. It is important to study them in animals of all classes and under pathological as well as normal conditions if a clear understanding is to be gained. It is from such a standpoint easy to appreciate that the lymphocyte of mammals does not lightly assume the function of a haemocytoblast. In these animals (unlike birds, etc.) the lymphoid and myeloid tissues have become segregated—an important example of haematopoietic specialization.

The study of haematology should be undertaken in its ontogenetic and phylogenetic aspects side by side with that of the normal and pathological haemopoiesis of the higher animals. Haematologists, pathologists, and oncologists just as much anatomists and evolutionists must be embryologists first and foremost. I feel that this holistic aspect of study and teaching, the value of which has so clearly been demonstrated by those scientists of the past whose contribution to bio-

logy have been monumental, is coming to be increasingly appreciated in our educational curricula. The holistic outlook in pedagogics must not, however, be left to a chance development. It must be inculcated into our future biologists at the start of their training.

On the basis of such an outlook only can a connected account be given to those seeking information on haemopoiesis as well as on other obscure and fundamental biological problems. It is usually the less important question in biology that can be answered by a simple "yea" or "nea." The fundamental ones have to be examined with a widely tolerant and pragmatistic outlook. And how much more satisfying it is to *solve* a problem than merely to supply an answer to a question. Indeed a problem should be solved in the more literal sense, actually *dis*solved in the reality of biological philosophy. It should be shown not to exist and never to have existed, as can be done with the old controversy between unitarian and dualist. A problem indeed is in a sense unreal, having only subjective existence in our minds in consequence of an unclear vision. The more this vision becomes clarified by a wider holistic outlook, the fewer problems will resist a demonstration of their artificiality.

Duty of Owner.

Must Get Expert Advice for Sick Animals.

"Sunday Times," 8/4/34.

Potchefstroom, Saturday.

A Potchefstroom magistrate has laid down that just as it is the duty of a parent to secure medical advice for a sick child when necessary so is it incumbent upon owners of animals to call in veterinary assistance for ailing animals, the more so, said the magistrate, because animals were not able to state their symptoms.

The case concerned a European who was charged with ill-treating a horse which, the evidence of a veterinary surgeon went to show, was in a pitiable condition. It had to be shot.

The European, in evidence, said that he had treated the animal with "condition powders," but it grew worse. He had called twice to get assistance at the house of the Government veterinary surgeon, the only veterinary surgeon here, but he did not find him at home. He left no message.

He was fined £5, or 20 days' hard labour.

A previous conviction in respect of the same animal—working it while it was unfit—was brought forward.

Jl. S.A.V.M.A.
V (2) 1934.

Rapid Methods of Diagnosing Hydrocyanic (Prussic) Acid and Arsenical Poisoning under Field Conditions.

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

The present procedure adopted by Government Veterinary Officers in suspected cases of poisoning, namely submission to Onderstepoort of all specimens for the hydrocyanic acid and arsenic test, causes a serious delay in the diagnosis of the disease investigated. This delay could be avoided if field officers were supplied with easy and rapid methods of detecting these two poisons, which are the cause of enormous losses in stock. Such a procedure would be of great assistance to officers in making a correct diagnosis on the spot and would incidentally raise the prestige of field veterinarians in the eyes of the farming community. It is with these objects in view that this paper is written.

The box shown in the illustration is equipped with the following :

I. *Requisites for the hydrocyanic acid test.*

(1) Sodium picrate solution (at bottom of compartment M).

(2) Chloroform (at bottom of compartment M).

(3) Filter paper (to be cut in strips measuring ½in. x 3in. (in box L).

(4) 4-6 large sized test tubes (1, 2, 3, 4) with corks to fit, for testing stomach contents.

(5) 6 or more small test tubes (6-14) with corks to fit for testing suspected plant material.

(6) Scissors and scalpel for cutting up plant material.

For details of method of testing for hydrocyanic acid see *Jl. S.A.V.M.A.* IV (4) : 196-7, 1933.

II. *Requisites for the arsenic test.*

(1) Two bottles (O and P) of 70% sulphuric acid. The compartments containing these bottles are lined with lead in order to prevent damage being done by the acid in case the bottles should break. The stoppers should be secured with a piece of rubber as shown in the figure.

(2) One bottle of 2 per cent. silver nitrate (at bottom of compartment M). Silver nitrate crystals should be dissolved in distilled or rain water, as the chlorides in

tapwater form a white precipitate (AgCl) with silver nitrate.

(3) Copper sulphate crystals (at bottom of compartment M).

(4) Arsenic-free zinc (at bottom of compartment M).

(5) Octyl (capryl) alcohol (at bottom of compartment M).

(6) Two 300 cc. Pyrex or Jena flasks (A and N), one (N) to serve as spare.

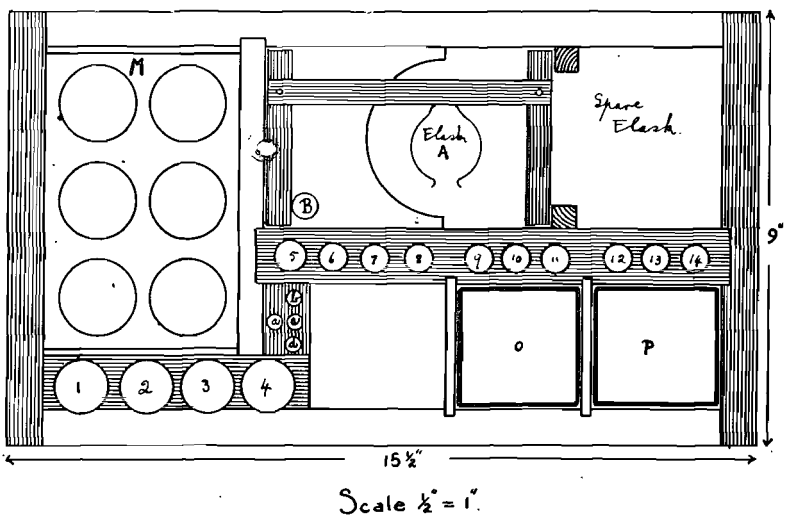


Fig. 1.—Plan of box to show general arrangement of outfit. (N.B. the scale of measurement applies to the original drawing which has been reduced by half in this reproduction).

(7) Two test tubes (¾in. to 1in. in diameter and about 6in. in length) and bent glass tubes with rubber stoppers, with cotton wool soaked in a saturated solution of lead acetate and dried. A few pieces of anhydrous calcium chloride could be placed in the cotton wool to keep it slightly moist. One tube (5) serves as a spare. Each tube is fitted with a rubber stopper containing one long bent glass tube (D) leading to the bottom of the test tube and one short bent glass tube (E).

N.B.—Stand F fits into compartment H.

III. *It is of value also to include the following in the box* :—

(1) Thermometer (a).

(2) Glass slides for preparation of smears (in box L).

(3) A few glass rods (b, c, d).

(4) A piece of spare rubber tubing (N) with the same diameter as that used for connecting the flask and test tubes referred to under II.

(5) A small filter and filter paper (the latter in box L).

(6) Blue and red litmus paper for testing whether solutions are acid or alkaline (in box L, which fits into upper portion of compartment M).

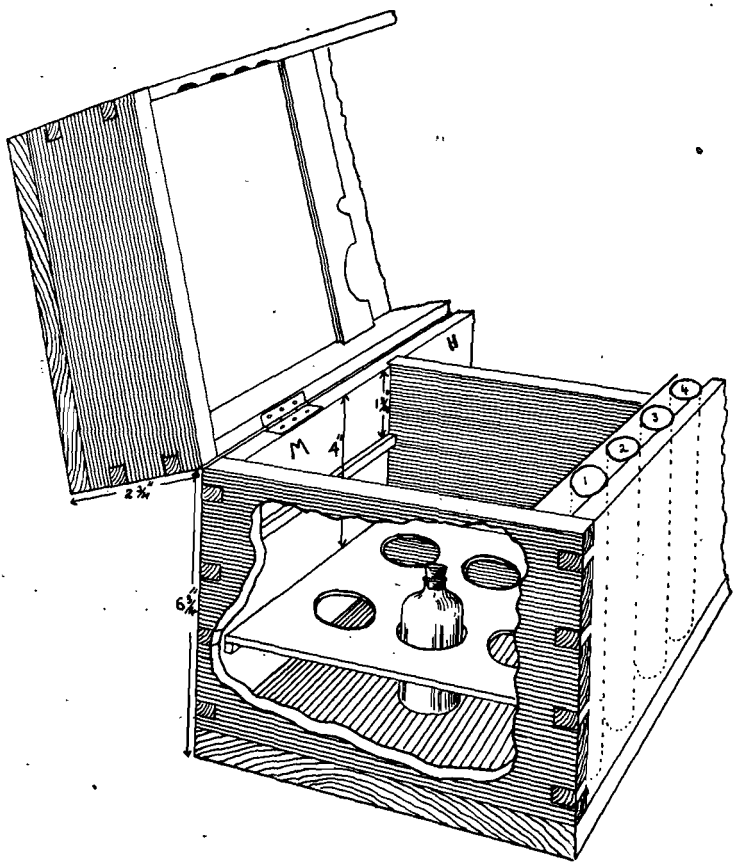


Fig. 2.—The outfit box with hinged lid and cutaway side to show construction. (Reduced scale as in 1).

Rapid Test for Arsenic.

Approximately 60 cc. (± 2 oz. If too small a quantity of liquid is used liberation of hydrogen is very slow) of the liquid (water, gastro-intestinal contents, etc.) to be tested is placed in flask A. The flask must be heat resistent (Pyrex or Jena) as the liquid in the flask reaches a high temperature when sulphuric acid is added. If a large amount of organic material is present in the gastro-intestinal fluid it should

be strained through butter muslin or filtered through filter paper. A few drops of octyl (capryl) alcohol added to the liquid to be tested reduces foaming when organic material is present. To the 60 cc. of liquid to be tested a few lumps of *arsenic-free* zinc and *a small crystal* of copper sulphate, which acts as a catalyst, are added. Sulphuric acid (±70 per cent.) is now slowly added until there is rapid evolution of gas (hydrogen). If arsenic is present arsine (AsH_3), an extremely poisonous gas, is evolved. This gas passes through the rubber tube C, which is connected to the long glass tube D, into the test tube B, and is thus brought into contact with the cotton wool saturated with lead acetate. The arsine then passes out of the test tube B through the

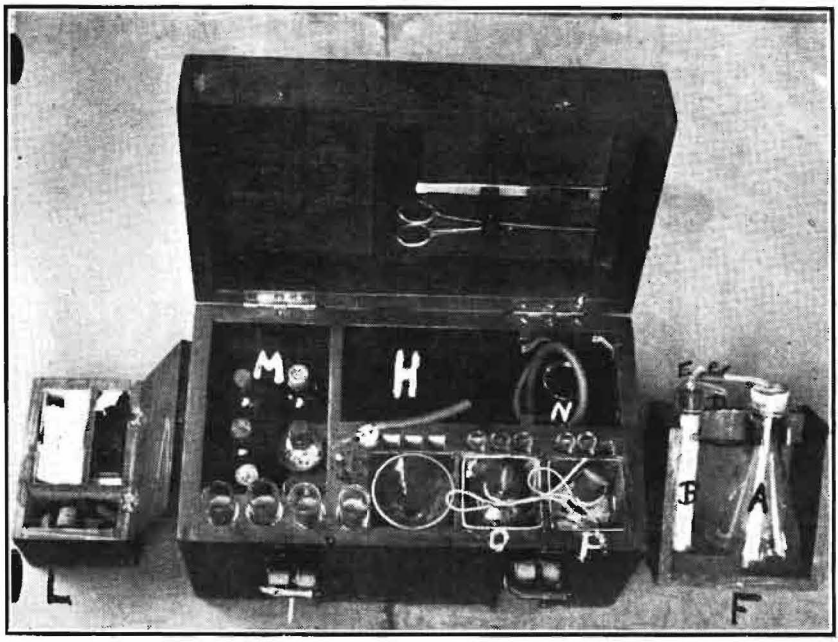


Fig. 3.—The complete outfit.—See text for description.

short glass tube E. A piece of filter paper moistened with silver nitrate solution is held at the outlet of the short tube E and is blackened when arsenic is present in the liquid tested —($2\ AsH_3 + 12\ Ag\ NO_3 + 3\ H_2O = 6Ag_2 + 12\ HNO_3 + As_2O_3$). The black colour is caused by the precipitation of silver on the filter paper. For detailed information in regard to this test see Green (1918).

According to tests conducted by the author it is possible to detect 0.05 mgm. (= ± 3/4000 grain) of sodium arsenite. The rapidity with which the filter paper, moistened with silver nitrate, blackens is a rough indication of the amount of arsenic present. In the case of 0.05 mgm. sodium arsenite the blackening is very slow and even after half-a-

minute is only very slight. When large amounts of arsenic are present blackening commences almost at once and is very intense within a few seconds. For the approximate quantitative estimation of arsenic in fluids officers would find it advantageous to conduct a few preliminary tests with known small amounts of arsenic commencing with a fraction of a grain.

The test described above also yields *positive results* when *antimony or its salts* are present in the liquid tested, as stibine (SbH_3) is evolved and also causes blackening of the silver nitrate paper. The evidence obtained from the owners of the animals concerned, or persons in charge of such animals, will, however, in most cases, allow of a definite diagnosis of arsenical poisoning being made. Antimony salts (tartar emetic, etc.) are very rarely or never used by stock-owners except in Nagana areas.

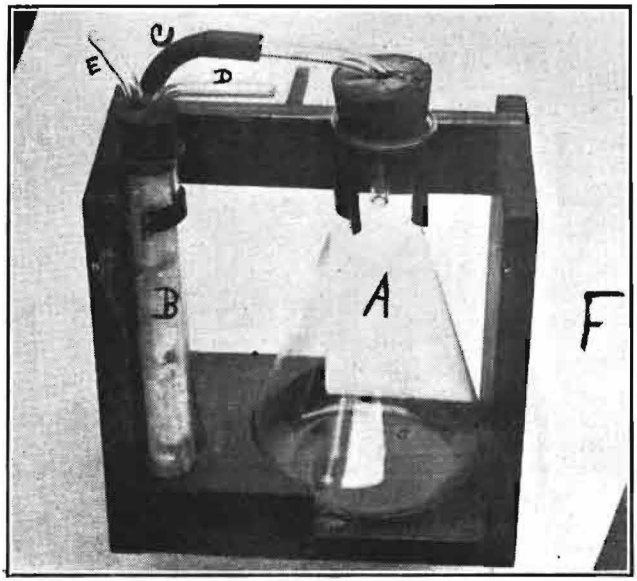


Fig. 4.—The arrangement of flask and tubes for the generation of AsH_3 in the test for arsenic.

Hydrogen sulphide (sulphuretted hydrogen, H_2S) liberated from sulphur, sulphides, sulphites and thiosulphates will also yield positive results unless this gas is fixed by the lead acetate in the cotton wool in test tube B. If H_2S is evolved the cotton wool is blackened and should then be replaced by fresh wool impregnated with a saturated solution of basic lead acetate, before carrying out the next test. Should the stomach contents examined be found to contain a large amount of sulphuretted hydrogen (as may happen in the case of animals which die shortly after having been drenched with sodium thiosulphate—now

being recommended as an effective chemical antidote in cases of arsenical poisoning) it would be advisable to allow the gas escaping from tube E to pass through a saturated solution of basic lead acetate before it impinges on the filter paper moistened with silver nitrate.

N.B.—After each positive test the flask, cork, and glass tube should be *thoroughly* cleaned and air blown (with the mouth) through the tube B in order to remove all traces of arsine.

THE DIAGNOSIS OF ARSENICAL POISONING FROM RESULTS OBTAINED WITH THIS TEST.

According to Green (1918) the presence of 0.4 to 0.8 mgm. arsenious oxide (As_2O_3) per 100 gm. of liver is suspicious of arsenical poisoning, whilst quantities of 2 mgm. and above, of arsenious oxide per 100 gm. liver is indicative of fatal arsenical poisoning.

It is, however, in most cases essential to have at your disposal the circumstantial evidence of the case, the symptoms and post-mortem appearances, and the amount of arsenious oxide present in the liver and stomach contents in order to make a definite diagnosis of arsenical poisoning. At Onderstepoort a definite diagnosis of arsenical poisoning is made if 100 gm. liver contains 0.5 mgm. As_2O_3 and the stomach contents 3.0 mgm. As_2O_3 per 100 gm. provided the symptoms and post-mortem appearances resemble those seen in arsenical poisoning.

In the rapid test for arsenic described for field conditions, arsenic can be detected in fluids (water, gastro-intestinal contents, etc.) only and not in organs (liver, kidney, etc.). The fact that the amount of arsenic in the liver cannot be determined with this test, renders a diagnosis of arsenical poisoning, in cases where relatively small amounts of arsenic are present in the gastro-intestinal contents, more difficult. If a large amount of arsenic be found in the gastro-intestinal tract and the symptoms and post-mortem appearances resemble those seen in arsenical poisoning, a diagnosis of poisoning with arsenic may safely be made. In spite of this disadvantage the test is of great value to the officer in the field (a) in differentiating between arsenical and irritant plant poisoning, and (b) in tracing the origin of the poison (if arsenic be concerned). About 60 cc. (=2 oz.) of the suspected drinking water should be used, whilst suspected foodstuffs and licks (about 300 gm. or more if necessary) should be vigorously shaken for a few minutes with a small quantity of water. After the suspension has been allowed to settle, about 60 cc. of the supernatant fluid should be used for the test. The most easily accessible arsenic compound in South Africa is arsenite of soda, which is fairly soluble in water, and would thus be detectable in this way if it had been added to foodstuffs or licks.

If there is a possibility of legal proceedings being instituted in cases of arsenical poisoning, stomach contents and specimens of the

liver should be submitted to Onderstepoort for quantitative determina- of arsenic.

ACKNOWLEDGEMENTS.

I wish to thank Mr. C. G. Walker for drawings, Mr. T. Meyer for the photographs and Mr. F. A. Appleton for fitting the necessary equipment into a neatly made box secured with a pair of strong leather straps.

REFERENCE.

GREEN, H. H. (1918). The fate of ingested and injected arsenic in sheep, with special reference to treatment of haemonchosis. *5th and 6th Reps. Dir. Vet. Res.* 1918, pp. 485-550.

A Cement Concrement in a Horse.

By G. F. CAMERON-DOW, Capetown.

Subject—a chestnut gelding.

History—On the 15th of April I was called to the owner's stable at Woltemade and found this animal and also another young bay mare purging severely.

Treatment—A suitable sedative draught in mucilage was prescribed.

On the 19th I was sent for once more and found the animal purging severely again. The drinking water and forage were examined but nothing unusual was noted. On examining the animal per rectum, however, I encountered a hard body about two feet from the anus. This was removed and proved to be a hard mass of cement about two pounds in weight.

The groom after close questioning admitted having left a packet of loose cement on the wall above the crib some weeks previously, and had not troubled to find out what had become of it.

After removal of this foreign body the animal seemed to experience great relief and is now recovering rapidly.

Jl. S.A.V.M.A.
V (2) 1934.

Note on the Occurrence of the Tongue-Worm—*Linguatula serrata* in a Dog in South Africa.

By Dr. R. J. ORTLEPP, Onderstepoort.

The veterinary officer, Mr. R. Payne, in charge of the Veterinary Laboratory at Grahamstown, recently forwarded a "worm" to this institute for identification and report. This parasite had been obtained from a dog on which Mr. Payne reported as follows :—

"Subject : farm dog, fox terrier (not seen), owner reported that dog suddenly went off feed ; no sign of biliary fever ; it developed a cough ; dog's appearance appeared to be normal (apart from wasting as result of not feeding) ; would be bright and alert when called, but stoutly refused to feed ; cough persisted and after about 8 days dog was seized by a violent fit of coughing and vomited ; on examining the vomit the specimen forwarded was found. For days after the dog had to be forcibly fed ; cough continued and recovery was very gradual."

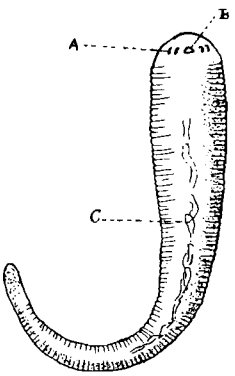


Fig. 5.—The tongue worm—*Linguatula serrata*.

An examination of the specimen showed that it was one of those aberrant Arachnids which are grouped together in the family Linguatulidae. The parasite has been identified as an adult female of *Linguatula serrata* (Froelich, 1789).

The finding of this parasite is of interest in that, so far as the writer is aware, this is the first record of its occurrence in South Africa. In Europe it is of fairly common occurrence, the adult being normally found in the nasal fossae of various carnivores, and rarely also in horses and goats. The larval stages are found encysted in various grass-eating animals, especially those on which the carnivores

feed; their presence, however, has also been recorded in man. The parasite is of considerable economic importance because the larval stages are very often found in beef.

In view of the importance of this parasite it is here briefly described and a short account of its life-history is given. The adult is more or less tongue-shaped, broad and rounded at the anterior end and tapering gradually towards the posterior end. The body is flattened dorso-ventrally, is soft and has about 90 transverse annulations which give the edges of the parasite a somewhat serrated appearance. The mouth is towards the anterior end, ventrally placed, and lies flush with the general surface. On either side of the mouth there are two cuticular hooks which are characteristic of this group of parasites. Limbs are entirely absent in the adult although present during the larval stages. The adult female is from 8 to 10 cm. long with a maximum breadth of 8 to 10 mm.; the respective sizes for the male are 18 to 20 mm. by 3 mm.

Life-History.—The embryonated eggs pass to the exterior with the nasal discharge and can thus contaminate the veld where they adhere to the vegetation. Any animal or man swallowing these eggs becomes infected, the eggs hatching out in the digestive tract. The liberated larvae pierce the gut wall and penetrate any of the digestive organs (spleen, liver, mesenteric glands, etc.); here they undergo further development for 5 to 6 months during which time they have several moults. They now migrate out of the organs into the abdominal cavity where they become encapsuled and remain in this stage until devoured by a suitable host. In this host the capsule is dissolved in the stomach and the larvae migrate from the stomach up the oesophagus and find their way into the nasal fossae where they become adult. Sometimes the larvae instead of migrating to the nasal fossae penetrate the stomach wall and become encysted in the peritoneal lining.

Medical Benefit Association.

Members of the Association are reminded that the Public Service Medical Benefit Association, Bloemfontein, O.F.S., is willing to accept for membership all persons in the employment of the Union Government or Provincial Administration. Application for membership should be made to the Secretary Treasurer. The fee is 16/- per month for married members and 10/6 per month for single members.

Maternity accounts are paid in full up to a maximum of £10. The maximum refunds allowed per annum are: married members £60 (in addition to any maternity benefits), single members £45.

The Association will pay 60% of medical accounts, hospital charges, nursing charges, etc.

Jl. S.A.V.M.A.
V (2) 1934.

Culling of Poultry: I. Body Conformation.

By E. VAN MANEN, B.Sc. Agric. (S.A.), M.Sc. Agric. (Cornell), Onderstepoort.

A bird cannot lay well unless it has a sound body, and for that reason it should be vigorous and healthy. The criteria of vigour and health are a bright, clear eye, a well set body, an active disposition, and a good circulation. Further, the bird should not be hampered by physical defects such as crooked beak, excessively long toenails, and eyebrows that overhang, impeding vision.

The number of eggs a bird can lay during a month is indicated by shape or type. Birds of high intensity are different in shape from those of low intensity and type is an infallible criterion of the productivity of birds irrespective of age, sex, or the time of the season at which they are observed.

For birds to make high yearly production records, heavy laying over a long time is demanded. Poor producers either have a short period of laying or they lay sparingly over a long period. In order to lay heavily, a bird must have a large body capacity in order that she may consume large amounts of food rapidly. Large capacity is only associated with a body that is relatively deep, with fairly straight underline and a comparatively horizontal back. The back of a high producer should be flat and wide with the width carried well back to the tail. Poor producers generally show tapering backs or backs which slope downwards.

The breast should be full, deep, and prominent, the neck fairly short, blending well with the head and body. The head should be moderately fine with large, bold, prominent eyes. Viewed from the back of the head, the eyes should be seen bulging out from the sides of the head. They should be free moving, well set in an oval eye socket with plenty of white showing in front of the eyeball. The head should be broad between the eyes at the base of the comb with a depth which is in proportion to the width of the head. The crow-headed type always indicates a poor producer. Birds that are cross-eyed or have thin flat heads and overhanging eyebrows generally do not pay for the food which they consume. The head should not be fat nor should it show a sunken face. The comb should be soft, warm, and waxy with wide serrations. The small, upright, coarse, and extremely narrowly-serrated combs belong to the low producers or culls. The size of the comb should be in proportion to the head, but naturally varies with breed and sex.

The keel or breastbone should be long and straight. Length is desirable in order to support the abdominal development and the keel bone can be looked upon as the corset of the hen. A short keel frequently results in a broken down abdomen in a heavy producer. In a good male, the abdomen will appear rather small than large in that the keel is long and generally curved. Depth is relative, and the length of the keel will augment or diminish the apparent depth.

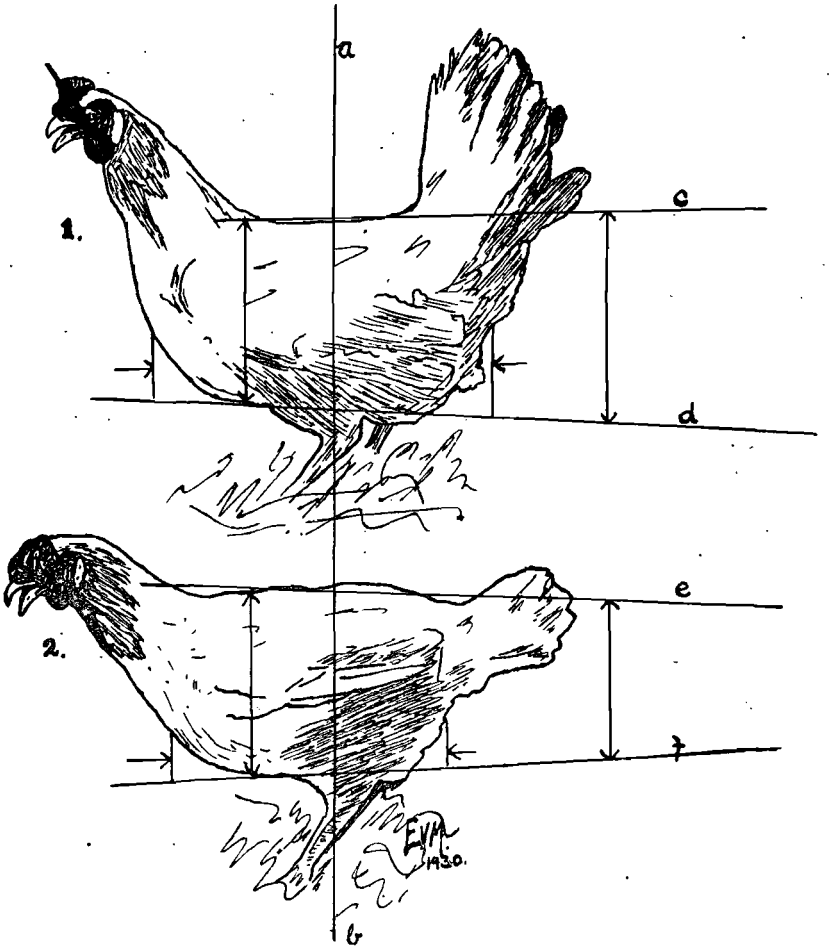


Fig. 8 illustrates the difference in type or shape between high (upper fig.) and low producers: c and e and d and f represent imaginary lines drawn along the backs and keels of the birds respectively. Note particularly the length of body, shape of back and depth of abdomen. The line a, b is drawn through both birds to indicate balance of body (see also fig. 9).

The legs should be of moderate length, and set well apart showing a full, wide breast. The shanks should be flat-sided, almost wedge-shaped in cross section, and soft at the back. Avoid long legged, round-shanked individuals.

The feathers should be short rather than long, broad rather than narrow, and close fitting. The long narrow feathers indicate a late maturing bird. Do not confuse birds that appear deep because of long, loose feathering with those that have actual bone and flesh depth.

A high producer should have a deep body with flat sides. This depth or slab-sidedness can be measured by placing the thumbs on the middle of the back, the little fingers on the front end of the keel bone, and the middle fingers on the rear end of the keel bone and then pressing in with the palms without actually squeezing the bird with the hands. The deeper and more slab-sided a bird feels, the better. Again, do not confuse relative depth with actual depth. A large hen may be actually deep and yet relatively shallow and hence may be a poor layer. To measure the relative depth of the body from front to rear, place the thumb of one hand on the back and the middle fingers on the breast. Now slide the thumb and fingers along the back and keel and measure the depth. The narrow, short, tucked-up body generally indicates a bird of low vitality and poor productivity.

Body changes due to laying.

With the development of the ovaries and the dilatation of the digestive organs to allow greater assimilation of food material for the developing ova, the whole abdomen expands so that the pelvic bones are spread and the keel bone is forced downwards away from the pelvic arch.

The vent also dilates with the enlargement of the abdomen. It becomes large, loose, and moist, and is in distinct contrast to the small, round, puckered vent of the hen that is not laying. The more eggs a bird is going to lay during the week following examination, the greater will be the size of the abdomen. The actual size of the abdomen is influenced by the length of the keel, the size of eggs laid, and by the size of the bird. It should not, however, be so large that it shows a drooping or sagging condition.

A good producer may be distinguished from a poor layer also by the quality of the skin and the thinness and pliability of the pelvic bones. With increasing production, the fat is lost from the skin as well as from other regions, so that the heavy producers have a soft, velvety skin that is not underlaid by hard layers of fat. A good test for looseness and pliability of skin and body is to lay the bird sideways on the palm of the hand and then to roll it on the hand by gently shaking the hand to and fro. The high producer possessing the high quality skin with a loose and pliable condition will move freely on the hand with almost the feel of a jelly, while the poor producer will be tense and will move with the hand.

The sternal processes are very prominent and are generally bent outwards in good layers. The thicker and blunter the pelvic bones and the greater the amount of hard fat in the abdomen, the less is the production or the longer the time since production.

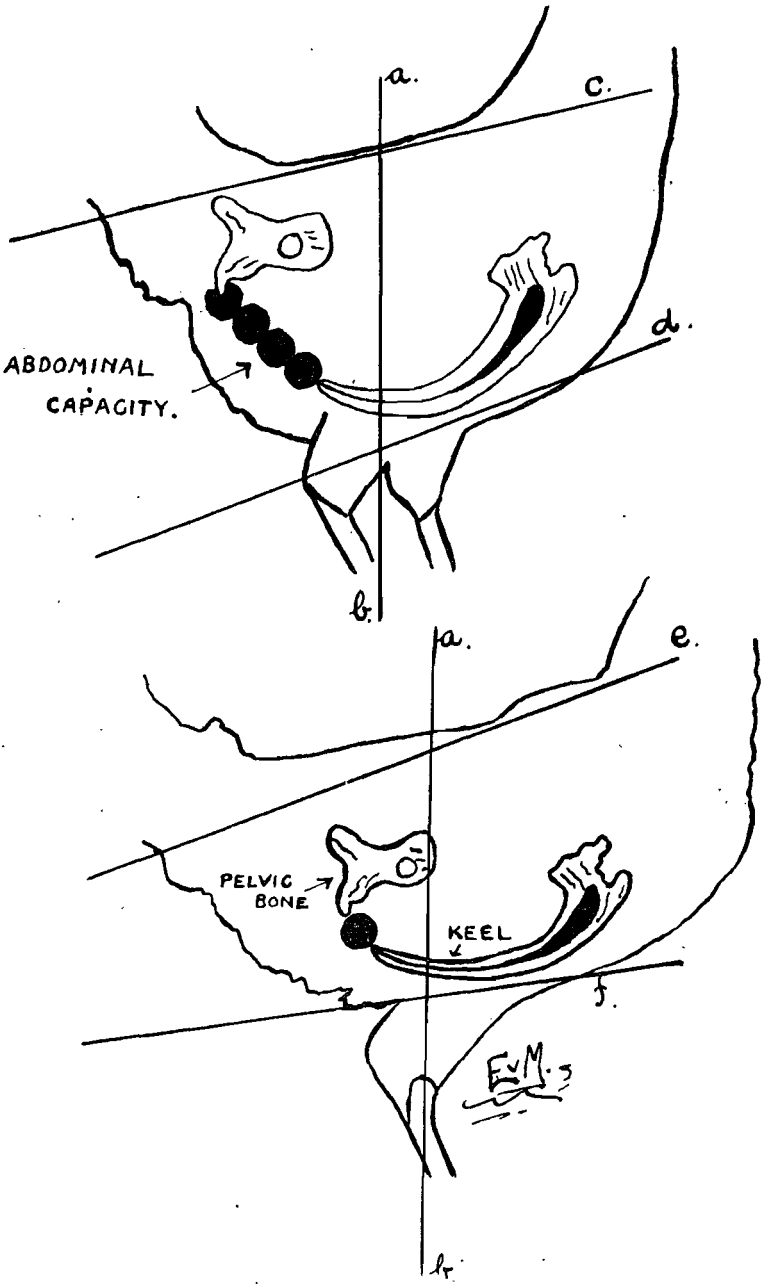


Fig. 9.—Body outline alone is not a reliable index for the selection of layers. A part of the skeletal structure is shown here to indicate the difference between real and apparent body conformation.

The comb, wattles, and ear-lobes enlarge or contract, depending on the activity of ovary. If the comb, wattles, and ear-lobes are large, full, plump, and smooth or hard and waxy, the bird is laying heavily. If the comb is limp, the bird is laying slightly. It is not laying at all when the comb is dried down, especially at moulting time. Warmth of the comb is an indication that the bird is coming into production.

(To be continued).

A Case of Purpura Haemorrhagica.

By C. C. WESSELS, B.V.Sc., Kuruman.

Purpura haemorrhagica is a condition so rarely encountered in South Africa, that a typical case such as described seems worthy of record.

Subject : On 6/11/33 an aged black mare was presented to me.

History : The animal had recovered from strangles a few weeks previously.

Clinical Symptoms : Extensive, marked, oedematous subcutaneous swellings especially of the extremities, the swellings being sharply demarcated from the non-affected parts, and the legs being twice their normal diameter. On the hind legs the swellings extended upwards along the semimembranosus and semitendinous muscles and involved the udder. There were also marked swellings under the chest. The facial region showed oedematous infiltrations, especially the lips and alae of the nostrils, causing severe dyspnoea. There was great swelling of the eyelids. The nasal mucous membrane revealed petechiae and ecchymoses and there was an abundance of serous discharge mixed with blood. The buccal mucous membrane also revealed ecchymoses. The conjunctiva and membrana nictitans showed marked haemorrhages and actual blood mixed with a serous fluid was discharged from between the swollen lids. The swellings pitted slightly on pressure and in some parts there was haemorrhage from the skin over the affected regions. The animal was markedly distressed and although the appetite was good prehension and deglutition were impaired. The pulse was slightly accelerated.

The temperature was only slightly elevated throughout the whole course of the disease.

Treatment : Symptomatic treatment was resorted to in combination with the following drug administration :

Protargol injected into the jugular vein on one side twice daily in a dose of 0,5 gm. in 5 cc. of water, followed by an injection of 200 cc. of a 1% solution of Lugol's iodine into the jugular of the other side.

Recovery was slow.

A Review of the more recent work on the Brucelloses.

By Dr. E. M. ROBINSON, Onderstepoort.

A great deal of work has been done in recent years on the Brucelloses or diseases caused by organisms of the abortus melitensis group. In this article it is proposed to deal only with that done in the last few years and to compress the subject matter into as small a space as possible. In an article on the results of the more recent research work on the Brucelloses, by H. Zeller, published in the *Bulletin of the International Office for Epizootic Diseases*, a very full review of the subject is given and the present article is to a large extent based on this review. The excellent short abstracts published in the last three years in *The Veterinary Bulletin* have been made use of extensively.

Introduction.

The more recent research work on the brucelloses may be said to date from the discovery in 1918 by Alice Evans that a very close relationship existed between *Brucella abortus* and *Brucella melitensis*, the causal organisms of infectious abortion in cattle and malta fever in man respectively. Although many tests, biochemical and serological, have been introduced for the differentiation of these organisms, it is only with the recent publications of Wilson and others that the subject of their relationship has been somewhat clarified.

In many parts of the world it has been shown in recent years that undulant fever of man may be due either to the organisms causing malta fever or those causing infectious abortion in pigs and cattle. In the United States of America research work on the brucella organisms is so arranged that an institute working on *Brucella melitensis* will not do any experiments with *Brucella abortus* for fear that the cultures may accidentally be mixed and wrong conclusions drawn. The research work to be discussed may for the sake of convenience be grouped under the following headings: (1) Biology of the organisms, (2) Virulence and pathogenicity, (3) Diagnosis, and (4) Prophylaxis.

(1) Biology of the Organisms.

Most of the work done in recent years on the biology of the organisms of the brucella group has centred round the differentiation of the members of the group. For this purpose many different features of the group have been used. Of these one may mention the following:

(a) Abundance of growth in culture.
(b) Pigmentation.
(c) Crystal formation.
(d) Production of alkali in peptone water.

(e) Glucose utilisation test.
(f) Sensitivity to carbon dioxide.
(g) Hydrogen sulphide formation.
(h) Dye sensitivity.
(i) Thermoagglutination.
(j) Serological differentiation.

In an article which appeared in the *Journal of Hygiene*, vol. 33, 4, 1933, by G. S. Wilson, a very good survey of the methods mentioned above for the differentiation of the brucella types is given. In all over 300 brucella strains were obtained from all over the world and compared. Wilson summarises his results as follows :—

> For the purposes of differentiation little weight can be attached to the use of morphological appearances, abundance of growth in culture media, pigmentation, the appearance of crystals in the medium, the production of alkali in peptone water or the utilisation of glucose.
>
> The presence of 5-10% of carbon dioxide in the atmosphere is essential for the growth of most freshly isolated bovine abortus strains. Melitensis may be favoured by it but not porcine abortus strains. A concentration of 40% of CO_2 inhibits melitensis and porcine abortus strains. It may actually inhibit bovine strains sometimes but growth of a strain in 40% CO_2 indicates a bovine origin.
>
> Most bovine abortus, para-abortus or American porcine strains produce H_2S, while melitensis, paramelitensis or Danish porcine abortus strains produce little or none.
>
> Huddleson's dye sensitivity method is the only certain one for differentiating bovine and porcine abortus types. It is of very real value and by its use one can divide Brucella strains into three main groups, viz. bovine abortus and para-abortus, porcine abortus, and melitensis and paramelitensis. Individual strains of all the types may give irregular results and it is often difficult to interpret the reactions.
>
> The thermoagglutination test is a method of determining antigenic roughness. A positive reaction means that one is dealing with a rough strain of one of the types. The para-abortus and para-melitensis strains are usually rough which means that they are probably only variants of abortus or melitensis strains which have lost their smooth characteristics.
>
> The agglutination absorption method carried out strictly quantitatively enables a differentiation to be made between bovine and porcine abortus strains on the one hand and melitensis strains on the other, provided that smooth strains are employed for the pre-

paration of the antisera and for absorption. The use of direct agglutination by monospecific abortus and melitensis sera affords a rapid and accurate means of typing individual strains. It is of great value for the detection of mixed strains.

In the examination of the main group of strains the serological method proved more valuable than any other method in the correct alocation of individual strains and the results agreed closely with those afforded by the dye method.

In this latter method, media containing different concentrations of the four dyes—thionin, basic fuchsin, methyl violet, and pyronin—are used. Wilson found that in a group of brucella strains obtained from France there was a disagreement between the results of the H_2S and dye tests on the one hand and the serological tests on the other.

The two main conclusions that emerge from Wilson's work are :—

i. That besides the existence of three main groups—bovine abortus, porcine abortus, and melitensis—with their rough para-abortus and para-melitensis derivatives, there exist within each group a number of sub-groups containing transitional strains frequently associated with a certain geographical location. The suggestion is that members of the Brucella group easily respond to altered environmental conditions. In how far this peculiar lability is responsible for their power to adapt themselves to a number of different hosts and for their varying pathogenicity is still to be decided.

ii. In the classification of individual brucella strains one should not rely on any single method of examination. If reliance is placed on any one or two methods, some strains are bound to be classified wrongly.

(2) Virulence and Pathogenicity.

Each of the three well known brucella types affects a particular species of animal but is not confined to it, all three types for instance being capable of infecting the human being. Various species of animals may harbour brucella types. Several observations have recently been made of *Br. melitensis* infection in cattle. When pregnant cows are inoculated intravenously with *Br. melitensis* culture they abort as a rule within two to three months, the foetal stomach containing the organism. *Br. suis* has been isolated from a cow. Many of the observations made on the infection in calves, bulls and cows have been confirmed by further work carried out in recent years. Isolation of *Br. abortus* from the blood, urine and faeces of infected cattle has been successful in a few cases, and in rare instances from animals with negative serological reactions. Attempts have been made to clear up the infection in udders of cows but without success. In cases of tendon infec

tion and capped knee due to *Br. abortus*, treatment has been unsuccessful as regards clearing up the infection. It is thought that a capped knee or hygroma may act as a reservoir of infection just as the udder does. Further attempts have been made to determine the distribution of the organism (*Br. abortus*) in the bodies of infected cattle. Apart from the udder it has been found in the iliac glands, liver, thyroid, spleen, muscles, and the pillars of the diaphragm in isolated cases. It is unusual, however, to find the bacteria elsewhere than in the udder, supermammary glands and the pregnant uterus in the cow, or the genital tract in the bull.

An interesting recent observation is that which has been made in connection with infection via the skin or conjunctiva. It has been shown that infection may occur through the skin even where there has been no irritation, scarification, or depilation. This route of infection may be of considerable importance in some herds. In the case of the conjunctiva even small amounts of infective material have been shown to be capable of setting up infection.

Brucellosis of the horse has been studied by many workers in recent years. It was first observed in cases of fistulous withers in horses on the Russian front in the Great War. Brucella organisms were isolated from a number of cases of fistulous withers and poll evil in horses in France. Brucella infections in the horse have been reported from many different countries in the last few years, but it is curious that it is usually difficult to establish any relationship with outbreaks of contagious abortion in cattle. The causal organism is always of the bovine type and there is an undulant fever and the affected horse may show weakness, fever, and rheumatic symptoms. Apart from poll and withers infections, arthritis or synovitis may occur in other parts of the body. *Br. abortus* may be cultivated directly from the pus in the lesions or by guinea pig inoculations. It is not definitely known how the infection occurs. The sera of affected horses give positive reactions to serological tests for brucella infection. The infection probably occurs by the mouth or the skin and mucosae.

Brucellosis in pigs is rare in Europe. It spreads very little and is a "self-limiting disease." The causal organism can locate itself in the udder of the sow or the genital tract of the boar and is seen in some cases of purulent arthritis in pigs. The diagnosis is usually made by serological tests. Points of interest in connection with the disease in pigs is that in cases of abortion the infection may be confined to some of the foetuses and the afterbirth may not be infected. The blood of infected pigs often contains the causal organism, the *Brucella abortus suis*. Apparently transmission to cattle does not occur in nature nor does the cattle type infect pigs. Infection of man with the *Br. abortus suis* is more dangerous than that produced by the bovine type.

Of the small ruminants, the goat appears to be the most dangerous as a transmitter of *Br. melitensis* where Malta fever exists, but the disease is widespread in sheep in Sardinia and Greece. It appears to be rare in sheep in other countries.

Brucellosis of carnivores is rare. A case is recorded of a dog whose serum agglutinated in a dilution of 1-500. The right testicle was enlarged and contained pus from which *Br. abortus suis* was isolated. The sera of dogs on farms where contagious abortion in cattle exists often show positive agglutination reactions.

In birds there have been numerous records of brucella infection in recent years. Cases have been noted in fowls, ducks, pheasants, and turkeys. The diagnosis is usually made by serological tests. When symptoms occur there is loss of condition and diarrhoea, and at post mortem lesions may be found in the liver, spleen, kidneys, and ovaries. Affected birds may cease laying, but generally very few birds die from the disease. Artificially fowls can be infected with all three brucella types if large doses are used. It is possible that birds may play some part in the spread of brucellosis.

It would appear that all species of domesticated animals may be affected with brucellosis infections and be a possible source of infection to man.

In the case of the human being cultures of all three types have been applied to the unbroken skin but without infection taking place. When the skin was scarified infection took place in 6 cases out of 8. In man infection experimentally with cultures of *Br. melitensis* by the mouth occurred with ease, with *Br. abortus suis* only after two or more doses, and with *Br. abortus* in one case only was infection successful after seven doses. The resistance of man to bovine abortus infection must be considerable as cases are rare in spite of a widespread infection. About three times as many cases occur in men as in women and the disease is rare in children. It is possible that contact with infected cattle is more important than drinking infected milk. A cutaneous infection characterised by the occurrence of a rash is not uncommon in people such as veterinarians who frequently handle infected cattle and remove retained afterbirths, for instance. The rash is not accompanied by general symptoms and has a tendency to recur so that some consider it to be probably an allergic condition.

From the work done in the last few years there is no doubt that an undulant fever closely resembling Malta fever occurs in man and is due to infection with brucella organisms of the bovine or porcine types. The mortality is low and the symptoms are less pronounced than in true Malta fever especially when due to the bovine type. The febrile period may last from a few weeks up to many months. The fever is accompanied by headache, loss of appetite, weakness, sweating, and

wasting. Pains in the joints and muscles may be experienced. Figures from countries such as Germany show that between 500 and 600 cases may occur annually. Abortion in women due to this infection does not appear to be common and infection from man to man does not occur.

In cases of undulant fever in the United States of America, where the organism was isolated from the blood, about 50% were due to *Br. abortus suis*, 50% to *Br. abortus bovinus* and 1% to *Br. melitensis*. When one considers the extent to which milk supplies are infected with *Br. abortus* one realises that they must be an important source of infection although attempts to infect human beings—experimentally—have not been very successful. In some countries 50% of market milk samples are infected, but an average would be 37%. The infection of cows' udders is not usually heavy except when colostral milk is being secreted. There are usually about 30,000 organisms to the cc. There is considerable variation in the number at different times and they may sometimes disappear and recur, so that a single examination of a quarter of the udder may not be sufficient. Cream, ice cream, butter, and cheese are sources of infection, particularly cream on account of the concentration of the organisms present. Inoculation of guinea pigs is still probably the best method of demonstrating *Br. abortus* when not in large numbers, but cultural methods have been so improved in recent years that with media such as liver agar with the addition of 1 :250,000 gentian violet and cultivation in 10% CO_2 atmosphere results approximating to those with guinea pig inoculation can be obtained.

(3) Diagnosis.

No great advance has been made recently in the diagnosis of brucella infections. The agglutination test is still the method universally used, but modifications such as the rapid agglutination test are being tried with good results. The rapid test depends on the use of a concentrated emulsion with dilutions of serum to correspond and one can read the result in less than 5 minutes as a rule. Colouring the antigen with a dye enables the result to be read more easily in border line cases. Bevan introduced a modification of the agglutination test, called the "abortoscope." It consists of an emulsion of *Br. abortus* in a tube and a drop of blood is added, taken from the ear with a loop of wire. This method could be used by the veterinarian without the necessity of sending blood samples to a laboratory, but it would be a mistake to allow it to get into the hands of laymen.

The complement fixation test is still being used in some countries and Holth, in Norway, uses it on a big scale. Allergic methods have been re-introduced recently. Holtum described a double intradermal test for cattle (on similar lines to the tuberculin test, and using an

abortin made of killed bacillary emulsions) for which he claimed good results, but very little work has been published in confirmation of his claims. It has been shown that infected guinea pigs will give intradermal reactions with extracts of *Br. abortus*. In the case of cattle it would appear that one gets a number of non-specific reactions with products of the "abortin" type and though a test of the tuberculin type would be valuable, reliance must at present still be placed on the serological tests such as agglutination.

(4) PROPHYLAXIS.

Legislation has been introduced in some countries for the control of bovine contagious abortion. In Norway a quarantine is imposed and cattle may be sold only to the butcher. In Finland infected animals may not be sold for breeding, go to shows, or to common pasturages. Bulls may not serve strange cows, milk has to be pasteurised. The quarantine is maintained for two years after the last abortion. The consensus of opinion is that one cannot hope to eradicate the disease without the fullest co-operation of the cattle owner. In the United States of America a scheme (Pennsylvania plan) on the lines of the accredited herd system for tuberculosis has been started, infected animals being eliminated by agglutination tests at intervals. There is no question that this is the best method for eradication where it can be applied, but to be really successful it will have to be undertaken on a co-operative basis.

Vaccination with living cultures is still carried out in most countries on a large scale, but reliable statistics regarding its value are difficult to obtain. It is far from being an ideal method of dealing with the disease and must be regarded as merely palliative. There is some evidence that the wholesale inoculation of cows may increase the incidence of sterility. There is a difference of opinion as to whether a vaccine made from freshly isolated virulent cultures gives better results than one made from old stock cultures which have lost their pathogenicity. If analogy is of any value one would expect the old stock cultures to be less effective on account of having to a large extent become "rough" in type and consequently antigenically weaker.

In a recent article McFadyean has severely criticised the favourable results claimed for the vaccine in England over a period of twenty years. He considers the claims unjustified as no proper controls were kept and there does not appear to be any diminution in the prevalence of the disease. Statistics from Germany would seem to show that vaccination greatly reduces the number of actual abortions in an infected herd as judged by controls.

No advance has really been made in the treatment of infected cattle. Drugs such as acriflavin have been tried, but have little value.

Inoculation with extracts of *Br. abortus* seem to exert very little influence on the course of the infection but may assist cows to recover from the effects of an abortion more quickly. In the prevention of the disease it does not appear to be of much value.

It is difficult to include in a review as short as the foregoing an adequate survey of the large number of articles on brucella infection which yearly appear in scientific periodicals. An attempt has been made, however, to mention the more important of the recent observations in this field.

An Observation on the Preparation of Blood Smears for the Diagnosis of Piroplasmosis.

By R. PAINE, F.R.C.V.S., Grahamstown.

Some years ago, on encountering a case of biliary fever in a dog, in which the blood smear revealed an excessively heavy infection, and wishing to send a number of good smears to England, I instructed the assistant to make a number of smears from the animal. Subsequent examination of these slides showed a very light infection, and I found that the assistant had made a rather severe incision in order to obtain blood for these smears.

Since then I have repeatedly observed the same occurrence both in canine and bovine subjects. For a long time my instructions have been that all smears made from suspected cases of piroplasmosis must be made from the first minute drop of blood which appears when the smallest possible incision has been made in the tip of the ear, and that on no account must deep cuts be inflicted which cause large drops to appear or considerable haemorrhage to occur.

The observation is easily explained when one remembers that infected corpuscles are enlarged by the presence of a parasite and consequently tend to be hindered in their progress through the smallest capillaries, so that stasis of infected corpuscles takes place in these vessels, whilst they can move freely in the larger vessels.

Similarly, infected red corpuscles like leucocytes are much more frequent towards the end of a smear, having been carried along by the slide in drawing the smear.

This observation is of considerable clinical importance, since a negative diagnosis may well be made in positive cases if smears are incorrectly prepared, especially if the blood changes are insignificant.

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V (2) 1934.

A Note on "Club Foot."

By M. BERGH, B.V.Sc., Louis Trichardt.

"Club Foot" is the name given to a condition prevalent among cattle on the Club Ranch which is situated in the Zoutpansberg District at the junction of the Magalakwin and Limpopo Rivers. The ranch is about 13,000 morgen in extent and is typically "bushveld" with *mopani* predominating. The country is flat with a few *kopjes*. The soil is sandy and stony. The number of cattle running on the ranch has varied considerably from time to time. At present there are 512 head, but the figure has been as low as 200. About 600 sheep are also running on the ranch. All the stock are "kraaled" at night. Dipping is carried out, but not very regularly. Hitherto the disease has been confined to this ranch: although I have received a report of a similar condition on an adjoining farm, I have not been in a position to investigate its occurrence there.

History.

The condition was first brought to my notice during June 1933 by one of the owners. He stated that the disease had been known to exist on the ranch for a number of years and had been the cause of great loss.

Symptoms.

The disease runs a chronic course of several months. The first symptom noted is that the animal goes slightly stiff on the fore limbs. Examination at this stage reveals only the fact that the claws are more widely separated than usual, but no further lesions are seen. Gradually the stiffness in the fore legs increases until the animal shows actual lameness in the fore limbs. During this period it would seem that the claws contract, giving the appearance of very upright pasterns. At this stage the feet on examination reveal a thickening which is bony hard to the touch and which extends from the fetlock down to the phalanges which are also affected in the same way. In advanced cases small ulcers were found on the coronary band. The claws show excessive wear on the toes and the resultant lengthening of the heels gives the feet a very "boxy" appearance—hence also the term "club foot." As a rule there is a slight flexion of the carpal joint. On account of the difficulty in walking there is a rapid loss of condition. Recoveries have not yet been observed.

Pathological Changes.

One animal in an advanced stage of the disease was slaughtered and the forelimbs sent to Onderstepoort. The examination was carried

out by Dr. Thomas. Unfortunately the limbs did not reach him in a state suitable for thorough pathological examination, but he was able to note the presence of a marked chronic periostitis ossificans affecting the phalanges including the *os pedis*. As a result of this there were marked exostoses all round the affected bones and there must have been a chronic arthritis deformans judging by the macerated specimen of which a photo is included. (See fig. 6).

Aetiology.

The aetiology of this disease is obscure and up to now has not been ascertained. In an endeavour to determine the aetiology the following possibilities were taken into consideration : (1) trauma, (2) calcium and phosphorus deficiency, (3) heredity, (4) infection, and (5) plant poisoning.

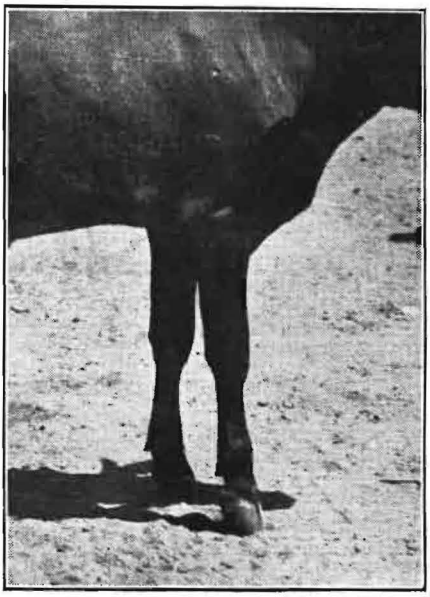


Fig. 6.—One form or the so-called "Club foot"; note body weight borne on the extreme point of toe.

(1) *Trauma*—Under this heading all possible forms of injury which might have a bearing on the disease were thought of, such as bruises by stones in the veld, tick bites, burrs (*leeuwdubbeltjie*), etc. Such could not, however, be responsible, having regard to the gradual onset of the symptoms as well as to the fact that no lesions of a traumatic nature could be detected in animals in the initial stages of the disease.

(2) *Calcium and Phosphorous Deficiency*—The possibility that this condition may be in the nature of a deficiency disease had to be rejected

on account of the fact that it affected all classes of animals, including young animals, lactating as well as dry cows, working oxen, etc. In blood taken from a few advanced cases as well as from apparently healthy animals as controls and analysed at Onderstepoort by Dr. Malan, no deficiency in mineral content was found.

(3) *Heredity*—At first it was noticed that only the polled animals seemed to suffer from this condition and it was thought that this might explain the incidence of the disease in view of the fact that at one time polled Angus bulls were introduced for breeding purposes and some of the progeny are still to be found on the ranch. On closer examination it was pointed out by the manager that all types of animals are affected. If this disease were hereditary only certain types on the ranch would be affected and not all the animals.

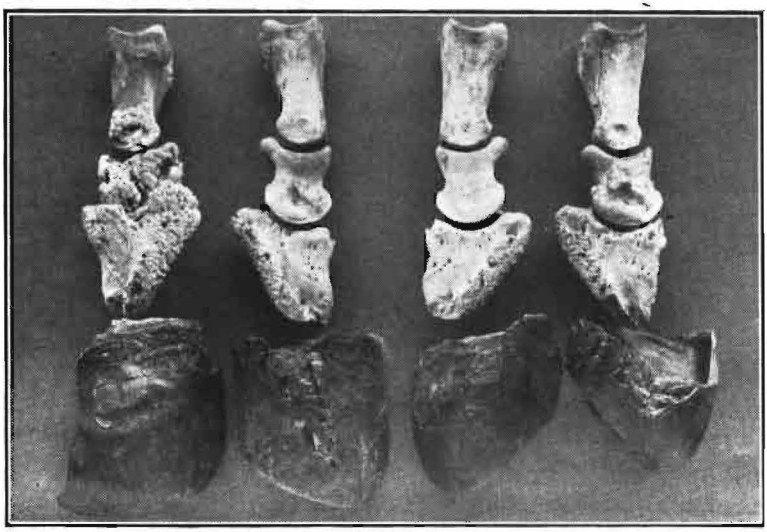


Fig 7.—Bones and claws from a case of "Club foot."

(4) *Infection*—If the disease were of an infectious nature it would be reasonable to expect that the spread would be much more rapid and that cattle in other parts of the district would also be affected, whereas only cattle on the Club Ranch are affected.

(5) *Plant Poisoning*—The possibility that the disease might be caused by shortening of the flexor tendons consequent on a tendinitis which might be set up by certain toxic plants was borne in mind. A small quantity of suspected material (*Kalanchoe sp.*) was forwarded to Onderstepoort where feeding experiments on rabbits gave negative results. A thorough survey of likely injurious plants, together with extensive feeding tests, would naturally be necessary before any conclusion on this score could be entertained.

Morbidity.

The morbidity varies from year to year and may reach up to 20% according to the owners. At the time of investigation it was only about 4%.

Treatment.

As might be expected from the nature of the lesions, treatment would seem to be of no value and no specific treatment has been tried up to now. One affected heifer was fed 5 ounces of bone meal daily for a month. Except for an improvement in general condition, no alleviation resulted.

An Outbreak of Aegyptianellosis in Pekin Ducks.

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

Brumpt has recorded that the parasite *Aegyptianella pullorum* may be transmitted to the duck, but there appears to be no record of the disease occurring naturally in this species.

In January, 1934, a farmer at Pretoria North brought a sick Pekin duck, about two months old, for examination. According to the history, about ten ducks of a similar age had developed a green diarrhoea, the legs and eyes had become yellowish in colour, and most of the affected birds had died. The loss of ducklings from this obscure disease was said to be an annual event.

An examination of the duck revealed a normal temperature and a severe green watery diarrhoea, and the legs and feet were pale yellow in colour. The conjunctiva and even the iris had a decidedly yellowish tinge. The blood was very watery in appearance, and a smear showed marked anaemic changes and fairly numerous *A. pullorum*. The duck was kept for observation and made a good recovery in four days. Recoveries from Aegyptianellosis appear to be the rule if the birds are confined and fed nourishing food.

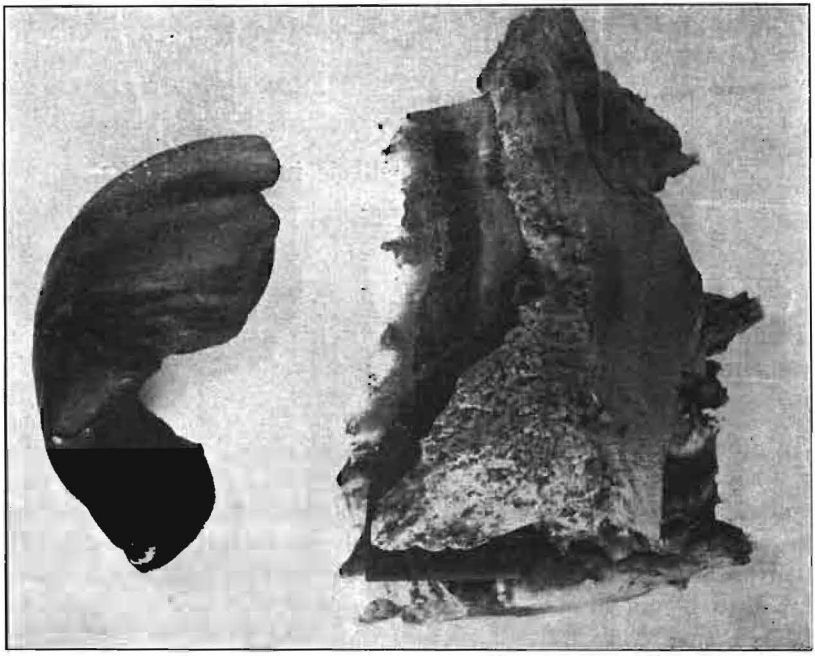
It is interesting to note, in connection with this outbreak, that the writer diagnosed the disease in chickens on the same farm about a year previously. *Argas persicus* was plentiful in the fowl houses.

A Horn "Growing" in the Mouth of an Ox.

By A. D. THOMAS, D.V.Sc., and M. J. N. MEESER,
Dept. of Pathology, Onderstepoort.

Subject.—A Friesland grade ox aged about 15 years. This animal was used for farm work and later was stall fed in preparation for slaughter. During the whole of this period nothing unusual was noticed nor did the animal show any difficulty in taking and masticating its food.

It was only after slaughter and while preparing the head for consumption that natives noticed the abnormality to be described and brought it to the owner.



At the time of description the specimen (see photo reproduced above) had been cleaned of all soft tissues and consisted of two parts: (a) portion of the left maxilla with two molars attached, and (b) a small horn.

(a) The portion of the maxilla presents on the lateral aspect opposite the fifth and sixth molars a curved spongy exostosis evidently forming the core bearing the horn. It has a wide base (2.5 cm.) at the level of the alveoli and tapers rapidly as it curves upwards and backwards to a point, forming a short core fitting into the base of the horn.

(b) The horn itself resembles the small horns carried by wethers. It has a flattened elongated hollow base which tapers rapidly as it curves spirally through one complete turn to a blunt point (length along greatest curvature 9 cm.). This horn fits snugly by its hollow base over the bony core described in (a) and in life must have been firmly attached to it and to the gums by connective tissue and mucosa.

In this position the horn was close to the molars, in fact one of these (the fifth) shows a distinct shallow groove at the point touched by the horn's spiral edge. The general axis of the horn was more or less parallel to the maxilla with the free end pointing forwards. The exposed aspect of the horn is worn and smooth evidently from the constant masticatory movement and contact with food, whereas the inner aspect of the spiral is thick, rough and laminated in structure as is usual for normal horn. The whole structure can, therefore, definitely be said to have been within the *vestibulum oris*.

CONCLUSION.

Two hypotheses seem to present themselves regarding the possible origin of this peculiarity.

1. That the horn is of endogenous origin growing on the gum as cutaneous horns occasionally do from the epidermis of the ears and face and other parts of animals. It seems highly unlikely that the squamous epithelium of the gum could, in the presence of the macerating influence of saliva, give rise to horny tissue fully keratinised and hard enough to produce a groove on the side of one of the molars.

2. That the horn is in reality a foreign body, probably a sheep's horn, which during mastication became firmly lodged in this situation. By pressure the hollow base of the horn would act as a leech on the gum, and the resultant inflammation and periostitis could give rise to the penetrating core-like exostosis.

It is of course no uncommon thing in phosphorus deficient areas of South Africa for bovines to chew horns and carrion, in their craving for this mineral. The horn may have been picked up in this way. The state in which this most interesting specimen reached us unfortunately precludes of any more accurate description and deduction being made.

The Veterinary Profession in South Africa: 9. Coats-of-Arms of Interest to Veterinarians.

By Dr. H. H. CURSON, Onderstepoort.

The accompanying plates show at a glance some coats-of-arms of particular interest to the profession.

Reference to Figures.

Union of South Africa.

1. Transvaal University College (since 1930 University of Pretoria), established 1908, and until 1930 a constituent college of the University of South Africa. A Faculty of Veterinary Science was created in 1920 but this body does not possess its distinctive arms. See Fig. 3. This was the first Faculty in any English-speaking country to have a five years' course.
2. University of South Africa, founded 1918. Headquarters are in Pretoria.
3. Coat-of-arms adopted by students of the Faculty of Veterinary Science. It is not official.
4. University of Pretoria (formerly Transvaal University College), established 1930. In 1932 Afrikaans was adopted as *the* official language.
5. South African Veterinary Medical Association. Formed 1920 and coat-of-arms adopted 1932. See *Jl. S.A.V.M.A.* IV (2) : 107.

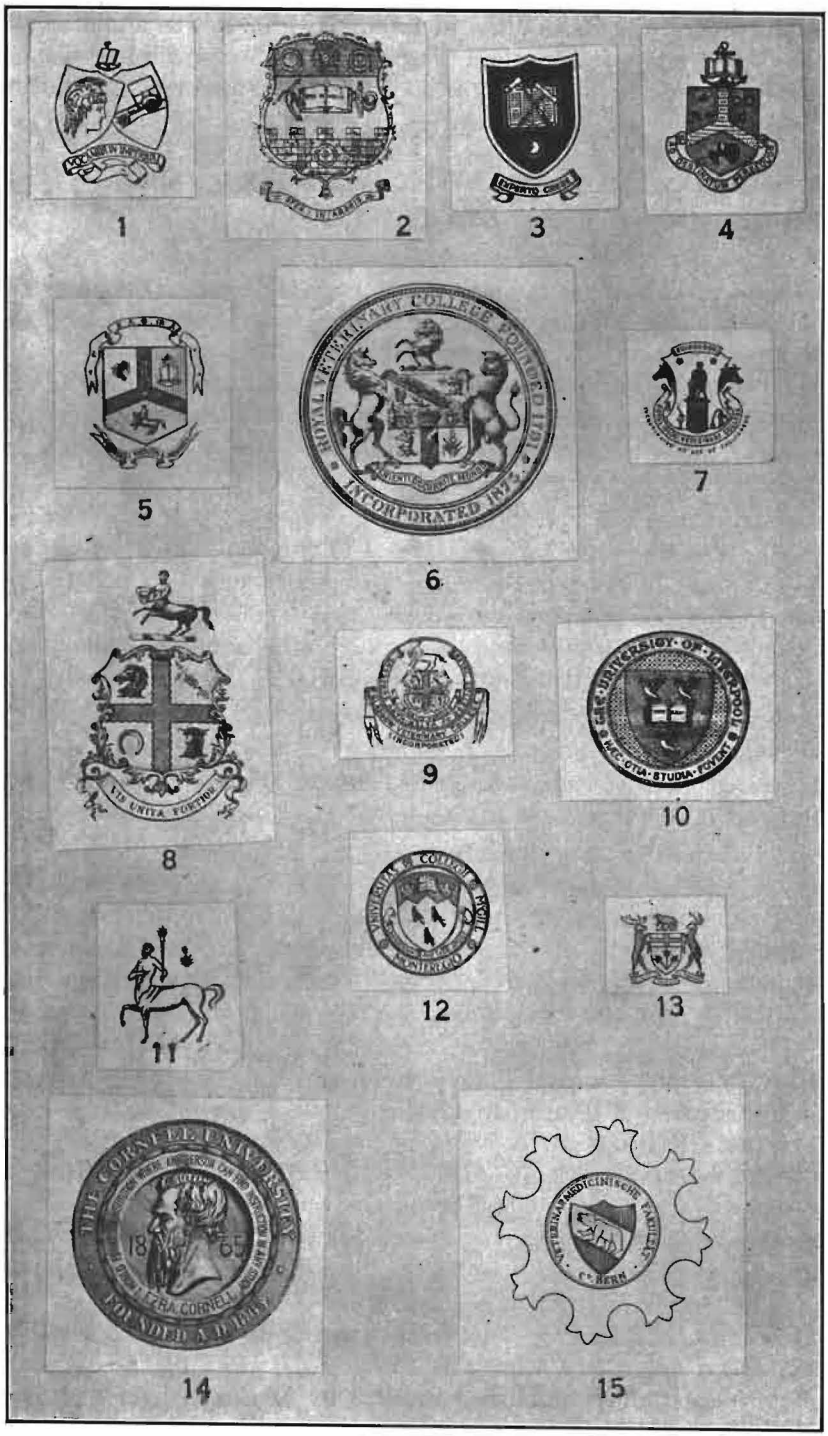
Great Britain.

6. Royal Veterinary College, London, founded 1791, the mother College of the Empire. See footnote for description of Arms.
7. Royal (Dick) Veterinary College, established 1823.
8. Royal College of Veterinary Surgeons, instituted 1844. Headquarters are in London. For description of Common Seal see *The Register*.
9. Glasgow Veterinary College, established 1862.
10. University of Liverpool, created 1903. A School of Veterinary Science was established in 1904, this being the former New Veterinary College, Edinburgh.
11. National Veterinary Medical Association of Great Britain and Ireland, formed 1882. Headquarters are in London.

Canada.

12. McGill University, Montreal, created 1821. A Veterinary School, founded by Duncan McEachran, F.R.C.V.S., existed between 1889-1903.

See Fig. 6. Arms, on a fesse gules an Imperial Crown between two Anchors, Or, in chief Or and Argent on a bend azure an Arrow entwined by a serpent Or between a Poppy-head proper in dexture and a Ram's head erased sable holding a trefoil in the mouth vert in sinister—in base Or and Argent on a pale azure a hand holding a broken Dart Argent between a Greyhound's head erased sable collared Or in dexture and an Aloe proper in sinister.
CREST, a demi Horse Argent.
SUPPORTERS, dexture a Horse Argent and sinister a Bull proper.
MOTTO, *Venienti occurite morbo.*



13. Ontario Veterinary College. This was established at Toronto by Andrew Smith, F.R.C.V.S., in 1862. In 1908 it was affiliated with the University of Toronto. The College since 1922 has been at Guelph, being under the control of the Department of Agriculture, Ontario.

United States.

14. New York State Veterinary College at Cornell University established in 1868 by James Law, F.R.C.V.S.

Switzerland.

15. Faculty of Veterinary Science, University of Berne. The Veterinary School was established in 1808, and became a Faculty in 1900 (See *Schweiz. Archiv. f. Tierh.* Feb. 1933).
16. Faculty of Veterinary Science, University of Zurich. The Veterinary College was founded in 1820 and in 1901 received University status. The University was established in 1833. (See *Deut. Tierärz. Wochenschr.* 29.4.1933).

Germany.

17. Berlin Veterinary College dates from 1790.
18. Faculty of Veterinary Medicine, University of Giessen. In 1828 Dr. Karl Vix established within the Medical Faculty of the University of Giessen a veterinary school. It became in 1914 *de jure* a Faculty of the University. (See *Berl. Tierärz. Wochenschr.* Vol. 48, No. 21. 20/5/32).

Holland.

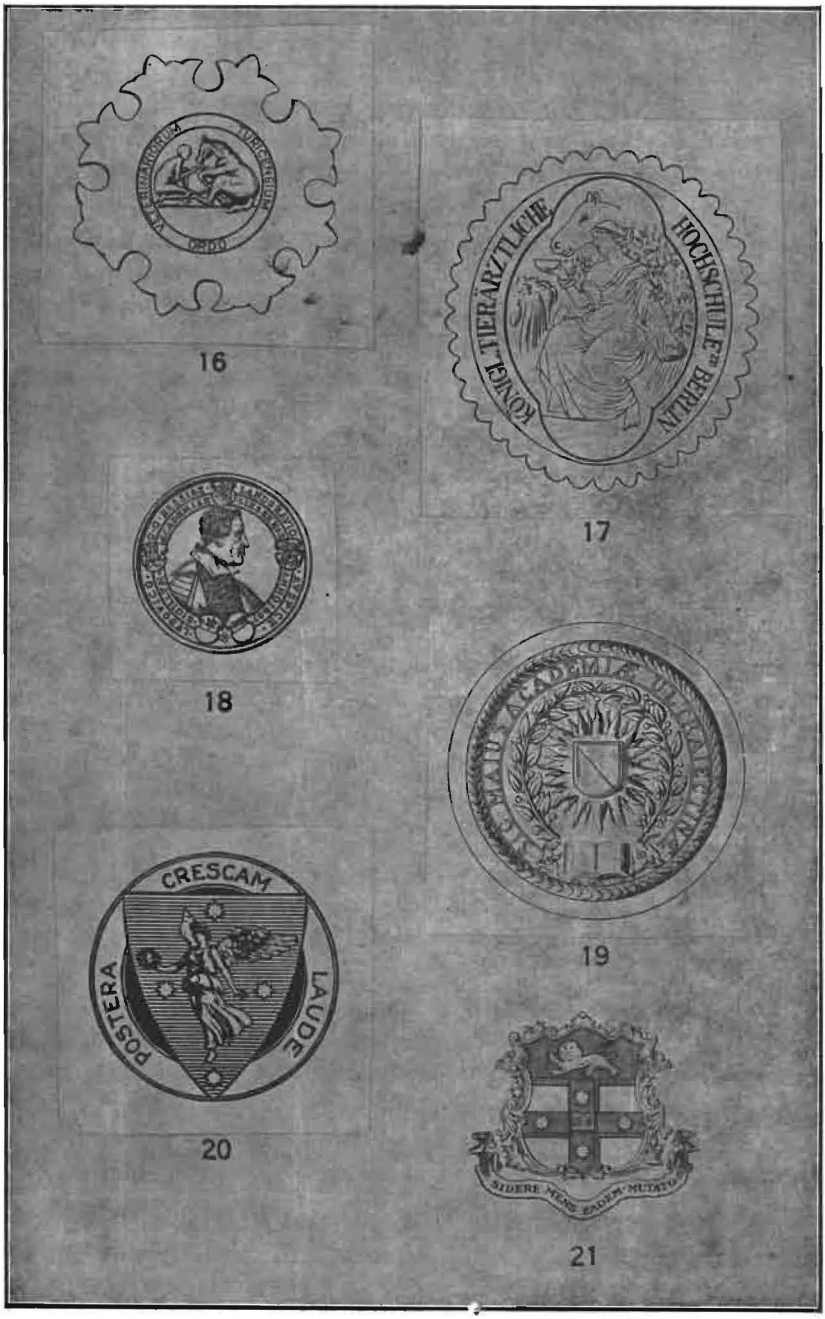
19. University of Utrecht, established 1636. The Veterinary School, created in 1821, became a Faculty of the University in 1925.

Australia.

20. University of Melbourne Veterinary School. The School from 1888-1909 was a private institution having been founded by W. T. Kendall, M.R.C.V.S. (See *Vet. Rec.* 21.2.31). It "was the first College in any English-speaking country to have a four years' course." In 1909 the School became part of the University of Melbourne.
21. University of Sydney. The Department of Veterinary Science was established in 1910, the first principal being Prof. J. D. Stewart, B.V.Sc., M.R.C.V.S.

The seals of Vienna (1777) and Hannover (1778) Veterinary Schools are not shown for, being the same as that of Prussia and Austria respectively, they are well known. It will be noted that among the Universities only the Swiss veterinary faculties have retained their distinctive coats-of-arms.

A useful reference concerning the date of origin of some of the European veterinary schools is Bradley's *History of the Edinburgh Veterinary College* published in 1923 by Messrs. Oliver and Boyd, Edinburgh (p. 5).



THE ASSOCIATION.

Council Meeting S.A.V.M.A. held at Polley's Hotel, Pretoria, 13.2.34.

MINUTES.

Present : Mr. F. J. Carless (in the chair), Drs. P. J. Fourie (Hon. Sec.-Treas.), P. J. du Toit, H. H. Curson, G. de Kock, A. D. Thomas, G. Martinaglia, Messrs. C. Jackson, A. C. Kirkpatrick, and M. H. V. Brown.

1. The minutes of the last council meeting held on 23.11.33 were taken as read and were approved.

The Hon. Sec.-Treasurer apologised for the rather short notice which was given for this meeting, and drew attention to the fact that he had asked Mr. M. H. V. Brown to be present in order to record the proceedings.

2. *Matters arising from minutes of previous meeting.*

(a) Report of the committee appointed to interview the Secretary for Agriculture in connection with part-time appointments, consisting of Messrs. Carless, Fourie, and Quinlan.

Dr. Fourie stated that the committee had interviewed the Secretary for Agriculture and that the latter had intimated that he could give no statement of policy until certain details and definite facts were presented to him. As a result of this members of the Association were circularised and asked to give their opinions and to state whether they would be willing to accept part-time appointments and to mention the area or district they would prefer. Members had been asked to reply by the end of February and up till now very few replies had been received.

It was therefore decided to leave this matter over till the next meeting.

(b) Report of committee consisting of Drs. du Toit and Quinlan *re* S.A.V.C.

Dr. du Toit said that although repeated attempts had been made to see Sir P. van Ryneveld no interview had been held due to the latter's absences and asked that the matter be left over till the next meeting.

This was agreed to.

(c) Report of the Secretary concerning a complaint by a certain member.

Dr. Fourie explained that since the last Council meeting he had received a letter from the member concerned withdrawing his complaint. (This letter was read to the meeting). After receiving this letter he was asked by a member of Council to show him the previous correspondence dealing with this matter. He informed this member that he did not see how he could show him these papers, as the matter

was no longer before Council. He asked the member, however, to put his request in writing when he would make an attempt to find out what the correct constitutional practice would be in such circumstances, as he in any case did not have the papers at the time. Later, in an interview with Mr. Carless, the latter ruled that any member of the Council could have full access to such papers once they had come before Council, and the member in question was shown the papers, as was also another member who subsequently asked to see them.

Dr. Thomas intimated that he was attending this meeting at the invitation of the President, as he had already handed in his resignation from Council (the letter of resignation was here read by the President); he wished, however, to make the following points clear :—

(a) The extreme irregularity with which this matter was treated at the last Council meeting, some members having seen the papers and correspondence and some not, yet the matter purported to come before the full Council. (Actually the only people who saw the papers officially were the Secretary, the President, the Vice-President in the absence of the President, and the two disputants).

(b) The unsatisfactory method of recording minutes of proceedings, resolutions were stated verbally only, etc., in Council meetings.

(c) The uncertain position obtaining when matters were received by the Secretary for consideration and action by Council. Had the Secretary full power to act on his own discretion in such matters, or should he wait (often a considerable time) for the next Council meeting before taking any action?

Dr. de Kock stated that everything in connection with the recording of the minutes, etc., was entirely in the hands of members of the Council, as each member had the right to ask for the alteration of minutes, if incorrect, and to add to them in the case of important omissions.

Mr. Carless reaffirmed the opinion (based on experience from the procedure of other councils and public bodies) he had expressed to the Secretary and ruled that any member of Council should have full access to any matter before Council. He said that steps had been taken to ensure proper recording of minutes and ruled that all motions should be written and handed to the Secretary.

With regard to the Secretary's discretion in dealing with matters intended for Council when no meeting could be held at the time and some action was imperative, Mr. Carless proposed that he should have full power to act on behalf of the Council.

This was agreed to.

Dr. Curson here proposed "That Dr. Thomas' resignation be not accepted."

Mr. Jackson seconded and the motion was passed unanimously.

Dr. Thomas accordingly withdrew his resignation.

Dr. de Kock asked that the whole matter of competition by government veterinary officials with private veterinary practitioners be reopened and discussed.

Dr. du Toit pointed out that :

1. Only cases of interest and value to the students were admitted to the Onderstepoort hospital.
2. Such cases were also only admitted if accompanied by a certificate from a private practitioner stating that he had no objection to the animal being treated at Onderstepoort.

The following committee was appointed, after some discussion, to investigate and collect evidence concerning any cases of hardship to private practitioners as a result of the action of state officials : Messrs. P. J. Fourie (convenor), A. C. Kirkpatrick, H. H. Curson.

3. *Accommodation of photographs of historical interest.*

Dr. Curson explained that he had a number of photographs of great interest and value to the profession and no room was available to hang and accommodate these pictures.

Dr. du Toit replied that he hoped, if not at once, then in the near future, to have suitable accommodation at Onderstepoort, especially in view of the fact that new buildings were now being erected.

4. *Amendments* : *Act* 16 *of* 1933.

Dr. Fourie pointed out that several complaints regarding registration under the Act had been received :

(a) From South-west African veterinarians in the public service, who, if they wished to register, had to pay the fee of £10.

(b) R.C.V.S. graduates not born in South Africa, but in the government service, had to pay the fee of £10.

(c) Municipal veterinary surgeons, though in a public service, had also to pay the fee of £10 for registration.

Dr. du Toit said that the only way to get round these difficulties was to have amendments added to the Act. Reciprocity with the Royal College of Veterinary Surgeons, the solution of (b) above, was not yet established, not even with all the Colonies—in many of the latter the South African degree had to be specially sanctioned by the Governor-in-Council of the Colony. In time, however, these difficulties would all be smoothed over.

Dr. Thomas proposed "That the Parliamentary Committee be delegated to receive and consider all complaints relative to the Act." This was seconded and agreed to.

5. *Minutes of Finance Committee meetings* held on 19.12.33 and 14.1.34.

These were read and approved.

Dr. de Kock read a letter received from the Deputy-Master, Royal Mint, Pretoria, informing him that the presentation box of cutlery for Dr. Reitz had arrived from overseas and was ready, and asked when and by whom the presentation should take place.

It was decided :

(a) That Drs. du Toit and de Kock make the presentation.

(b) That the time be left to the discretion of the Secretary.

6. *Correspondence.*

(a) A letter from Dr. Hartig, Cape Town, was read, detailing a scheme to have made and to sell a distinctive motor car badge for veterinarians, in order to increase S.A.V.M.A. funds.

It was agreed to let this stand over until the sample badge from Dr. Hartig arrived.

(b) Several letters in reply to the part-time appointments had been received by the Secretary. These were referred to the part-time appointments committee (Messrs. Carless, Quin, and Fourie).

7. *New members to be proposed at the next general meeting.*

Dr. Fourie said that two applications for membership had been received viz. from Messrs. G. C. van Drimmelen, B.V.Sc., and G. F. Cameron-Dow. These were approved for proposal at the general meeting.

8. *General meeting, Easter* 1934.

Dr. Fourie informed the meeting that the date for the next general meeting had been provisionally fixed for 29.3.34.

Mr. Carless suggested that the Registrar, S.A. Veterinary Board, should be informed of this in case a Board meeting be arranged for the same day.

This was agreed to.

9. *Motion by Dr. Curson.*

Dr. Curson proposed "That in order to raise the status of the profession the standard to be aimed at be that of the medical profession." This was seconded and passed unanimously.

During the discussion Dr. Curson said that much unfair differentiation went on relating to Government Veterinary officers, etc., on the part of the Department.

For instance :

(a) Members of the Veterinary Board received only £1 :5 :0 p.d. for their services, whereas members of the S.A. Medical Council were paid £3 :3 :0 p.d. and in no other board he knew were members paid less than £2 :2 :0 p.d.

(b). Government veterinary officers received only 7/6d. S. & T. allowance in urban areas as a result of a recent reduction which appeared to affect veterinarians only. He realised, of course, that the officers could claim for excess expenditure on production of receipts, but the unfairness existed in the fact that the veterinarian's original allowance was reduced while others, especially members of other professions, were unaffected.

Dr. de Kock proposed that the Secretary S.A.V.M.A. approach the Secretary for Agric. in regard to (a) above, i.e. inadequate remuneration for members of the S.A. Veterinary Board, and this was agreed to.

Further, in regard to (b) above, he intimated that the Department had taken the matter up and had asked all G.V.Os. to submit accounts for a period of 12 months in order to prove cases of hardship and loss on account of the inadequate allowance. When such evidence had been gathered the Department would be able to act.

10. *General.*

(a) Mr. Jackson asked what would constitute advertising in a publication such as the South African "Who's Who." Veterinary Surgeons had been circularised by the editor of a volume now in production and if not warned might give information which might amount to advertising.

Mr. Carless replied to the effect that the S.A. Vet. Board would consider this point.

(b) Mr. Jackson drew attention to the fact that no propaganda existed for the English-speaking prospective veterinary student. The calendar of the University of Pretoria was issued in Afrikaans only.

Dr. du Toit said that an English translation of the veterinary syllabus had been prepared already and that the department would take further action in this direction.

(c) Dr. du Toit remarked that he had recently attended the S.A. Medical Congress and was very courteously treated there. From various indications it appeared that a seat for a veterinarian on the Public Health Board would soon be an accomplished fact.

(d) Dr. de Kock mentioned that a set of the Journal S.A.V.M.A. had been sent to the S.A. Veterinary Board and the latter were unwilling to pay for them : so he proposed that the journal be supplied free to the Board in view of services rendered to the profession.

This was agreed to, Dr. Curson objecting, unless it was found that the Medical Association also supplied their Journal free to the Medical Council.

(e) Dr. Fourie asked the Chairman what letters, if any, a registered unqualified veterinarian was entitled to place after his name. Dr. du Toit replied : R.V.S. or R.V.

Dr. de Kock pointed out that the few people concerned were mostly older members of the profession and no more such men would be registered in the future, so the point did not have any importance.

(f) Dr. Curson asked the Hon. Sec. : (i) to inform members that they were free to make use of the Bloemfontein (and other) medical benefit societies; (ii) to remind the various committees that their reports should be duly submitted before the next general meeting; (iii) to approach Mr. Maybin of S.W.A., with a view to securing certain periodicals and journals bequeathed by the late Dr. Otto Henning to the Association.

(sgd.) P. J. FOURIE,
Hon. Secretary-Treasurer, S.A.V.M.A.

Twenty-sixth General Meeting held at the Johannesburg Agricultural Show on 29.3.1934.

Members Present : Messrs. F. J. Carless (in the chair), P. J. J. Fourie (Hon. Sec. Treas.), W. H. Chase, J. G. Bekker, R. du Toit, J. I. Quin, D. G. Steyn, P. J. du Toit, H. H. Curson, I. P. Marais, C. J. van Heerden, W. J. Ryksen, N. F. Viljoen, A. D. Thomas, J. R. Scheuber, A. C. Kirkpatrick, R. A. Alexander, W. P. Hamlyn, E. M. Robinson, J. H. Mason, H. P. Steyn, J. H. R. Bisschop, G. May, and M. H. V. Brown.

Apologies for Absence : Messrs. G. Martinaglia, J. L. Dickson, W. O. Neitz.

1. *Minutes of the 25th General Meeting* : These (as published in the Journal, Dec., 1933) were taken as read and approved.

2. *Matters arising from* 1 :

(a) The Secretary stated that, mainly through the initiative of Dr. de Kock, an invitation had been extended to the Director of Veterinary Services to attend meetings of the Public Health Council.

Dr. du Toit said that he had attended such a meeting in Cape Town where he had been very courteously received. The Minister of Public Health had expressed his approval of such co-operation between the Departments of Public Health and Veterinary Services. Soon, it was to be hoped, a full seat on the Council would be provided for a veterinarian.

Mr. Carless asked if a veterinarian was eligible for a seat on the Council.

Dr. du Toit replied that a veterinarian could occupy a seat on the Council as a member of the public.

Dr. Curson moved that the appreciation of the Association be recorded for Dr. de Kock's activities and work in this connection. The motion was seconded by Dr. Steyn and carried unanimously.

(b) Resolutions passed at the 25th General Meeting.

The Secretary explained that these resolutions were in connection with—

i. Rabies.
ii. Dourine.
iii. Encouragement of Private Practice.

These had been referred by the Council S.A.V.M.A. to the Director of Veterinary Services and by him to the Secretary for Agriculture for action by the Department. With regard to the second portion of (iii) above, i.e. part-time Government and Municipal appointments for veterinarians, the question had been fully discussed by Council and a sub-committee consisting of Messrs. Carless, Quin, and Fourie appointed to interview the Secretary for Agriculture. This had been done and the latter had intimated that some definite proposals were necessary before the matter could be properly discussed. As a result of this a circular had been sent out to members laying the matter before them. So far eleven replies had been received and some very constructive suggestions had been offered by Government Veterinary Officers for the Committee's consideration.

It was agreed that this matter be referred to the incoming Council.

3. *Election of New Members* : The Secretary moved that Messrs. G. C. van Drimmelen, B.V.Sc., Pietermaritzburg, and G. F. Cameron-Dow, Capetown, be elected to membership S.A.V.M.A.

Dr. Curson seconded and the two new members were declared duly elected.

4. *Office-Bearers for* 1934 : The Secretary announced the result of the annual election as follows :—

President : F. J. Carless.
Vice-President : H. H. Curson.
Hon. Sec.-Treasurer : P. J. J. Fourie.

Council Members : A. M. Diesel, P. J. du Toit, C. Jackson, G. Martinaglia, A. C. Kirkpatrick, D. G. Steyn, A. D. Thomas, and C. J. van Heerden.

Mr. Carless thanked members present for once again electing him President.

5. *Presidential Address* : Mr. Carless here presented his address (reported elsewhere in this Journal).

6. *Reports of Standing Committees.*

a. *Status Committee* : The Secretary said that a full report dealing especially with part-time appointments had been presented to Council earlier and had been fully discussed.

He regretted to record the resignation of Mr. J. Chalmers from the Status Committee and the Council.

b. *Parliamentary Committee* : No report had been received.

c. *Editorial Committee* : The Editor's report had already been circulated and was approved by the meeting.

d. *Librarian's Report* : In the absence of the Hon. Librarian, Mr. C. Jackson, the Secretary read the report to the meeting and this was approved. Briefly, the report detailed additional publications now received regularly (an extra 19 titles), thanked donors for generous gifts to the library, and mentioned that the contents of the library had recently been re-indexed, the total comprising some 466 titles, to any of which instant reference could be made.

e. *Finance Committee* : The Secretary here read the financial statement (published elsewhere in this Journal), and said that the credit balance of £12 :7 :4 on the year's working was made possible only by the fact that the £20 odd in the Goldfields Building Society had become negotiable this year and had been withdrawn and placed in the current account, thus virtually drawing upon capital. He drew attention to the fact that some £34 was still due in arrear subscriptions. Subscriptions from cadet members totalled £7 :10 :0.

The reserve fund, amounting to £1,168, has been invested temporarily in two Building Societies owing to the low rates of interest offered by the banks, and a portion still remained in Union Loan Certificates as follows :—

St. Andrews Building Society	£300
Standard Building Society	£728
Union Loan Certificates	£140

The Finance Committee now awaited the decision of the General Meeting as to how this money should be invested. Union Loan Certificates offered a good investment, but no interest would be available until 5 years after the certificates had been bought, so that the Association's yearly income would be considerably depleted were all the capital invested in Union Loan Certificates.

Mr. Carless proposed that this discussion be postponed until item No. 7 on the agenda was dealt with when the position would be clearer. This was agreed to.

7. *Resolution of the Secretary on behalf of outgoing Council* : "That the annual subscription for members be increased to £2.2.0 and that 5/- of this sum be earmarked for benevolent purposes."

The motion was seconded by Dr. Curson.

STATEMENT OF REVENUE AND EXPENDITURE FOR PERIOD 1:4:33 TO 31:3:34.

To Balance Goldfields Building Society				£20	14	11
,, Journal	£5	18	8			
,, Advertising	48	9	0			
,, Subscriptions	181	9	0			
,, Benevolent Fund	4	12	6			
,, Printing Blocks	4	8	6			
,, Reprints	1	0	6			
,, Union Loan Certificates	128	2	6			
,, Interest on Goldfields account	2	12	1			
,, Fixed deposit transferred to current account	1,000	0	0			
,, Interest on Fixed deposit	30	0	0			
				1,406	12	9
				£1,427	7	8

1.4.34 To Balance B/F				£12	7	4
,, Balance in Standard Building Society ...				728	2	6
,, Balance in St. Andrew's Bldg. Society				300	0	0
,, Balance in Union Loan Certificates				140	16	0

By Balance				£1	9	6
,, Presentation Dr. H. H. Curson ...	£5	5	0			
,, Presentation Dr. H. Reitz	100	0	0			
,, Standard Building Society	728	2	6			
,, St. Andrew's Building Society ...	300	0	0			
,, 10% Loss on closing Goldfields Ac.	2	1	6			
,, Administrative expenses	24	18	0			
,, Typing and Roneo work	14	15	0			
,, Printing	222	16	6			
,, Benevolent Fund	5	0	0			
,, Entertainment and Sundries	4	10	6			
,, Pictures	1	7	6			
,, Bank Charges	4	14	4			
				1,413	10	10
,, Balance B/D.				12	7	4
				£1,427	7	8

Reconciliation with Bank Pass Book as at 31:3:34.

Balance as per Bank Pass Book	6	3	6			
Cheque on hand (E. T. Perossi)	1	1	6			
Postal Order on hand (van Beeck) ...		3	6			
Cash on hand 31:3:34	4	18	10			
				12	7	4

29:3:34.

Sgd. C. O. WADNER.

Discussion: The Secretary said that in a circular letter members had been informed of the proposed resolution and asked to express opinions upon the subject. Twelve replies had been received, of which six were in favour of the motion and six against it. The letters objecting to the motion came, unfortunately, mostly from private practitioners, although it was widely agreed that the Journal largely benefited the private men and in general many of the activities of the Association were for the benefit of the private practitioners.

If the subscription were raised to £2.2.0 the Association would be able to do better work and progress would be assured. Our financial reserve at the moment was a little over £1,000, which would soon be depleted were any serious emergency calls to be made upon it; it could be augmented with a £2.2.0 subscription in force.

He included the clause in connection with the benevolent fund because he thought it desirable to establish such a fund and this was the only way to do it. No headway whatever had been made during the last year with the benevolent fund on the basis of voluntary 10/- annual donations from members.

Mr. Alexander agreed with the first part of the motion, i.e. raising the subscription to £2.2.0, but thought that the Association was far too small a body to attempt to establish a benevolent fund. He proposed that the second part of the motion be omitted

No seconder could, however, be found for this proposal.

Dr. Fourie's motion was then voted upon and carried, there being no dissentients.

8. *Act* 16 *of* 1933. The Secretary said that he had included this item in the agenda for the purpose of initiating a discussion on the shortcomings of the Act, concerning which there seemed to be much dissatisfaction, viz. :—

(a) South West African veterinarians felt that the Act should include them.

(b) Certain veterinarians in the Union Government Service were obliged to pay the £10 registration fee if they wished to be registered under the Act, because they were not domiciled in the Union of South Africa before they qualified as veterinary surgeons.

The speaker hoped that the discussion might bring forth a resolution to the Secretary for Agriculture asking him to endeavour to have certain desirable amendments introduced. It would not be difficult, legally, to extend the scope of the Act to South West Africa, and with regard to (b) above it was obvious that the spirit of the Act conveyed that all Government servants be registered free. A brief addition to Section 10 of the Act would get over this difficulty. However, it had been stated that amendments to the Act might be dan-

gerous at this stage in that they might create an opportunity for other undesirable ones to be brought forward at the same time.

Mr. van Heerden asked if these were the only faults in the Act that had been encountered; he thought that all such faults should be collected and dealt with together.

Mr. Chase said that it appeared to him possible that many members might have discovered flaws in the Act but had not informed the Secretary S.A.V.M.A. officially of these. He himself felt aggrieved in that the Board had refused to register him while many unqualified practitioners were registered—in fact he felt that he was penalised because he was a veterinary surgeon. He proposed, therefore, that the Secretary circularise members and ask them to point out any additions or changes they might consider desirable in the Act.

This was agreed to.

9. *General.* 1. *Cape Veterinarians*: The Secretary explained that when in Cape Town recently he met the veterinarians there and discussed the possibility of forming a Cape branch of the S.A.V.M.A. He now read a letter received from the Cape signed by Messrs. J. W. Crowhurst, F.R.C.V.S., C. H. Wadlow, M.R.C.V.S., J. Spreull, F.R.C.V.S., J. H. L. Lyons, M.R.C.V.S., J. McNeil, M.R.C.V.S., and L. O'Dowd, M.R.C.V.S.

In the letter these gentlemen intimated

(a) that at a meeting of qualified practitioners in the Peninsula it was unanimously decided not to form a Cape branch, S.A.V.M.A.

(b) that they were not in favour of the increased subscription;

(c) that they objected to the registration of unqualified practitioners in the Peninsula and their election as members S.A.V.M.A. without due enquiry concerning their eligibility being made.

With regard to (a) the meeting regretted that no Cape branch would be formed at present.

(b) The Secretary mentioned that of the six signatories two were not members S.A.V.M.A. and that one of the four members had since altered his opinion and was in favour of the increased subscription when the true financial position of the Association was explained to him. It was suggested that in his reply to the four members the Secretary should fully explain the reasons necessitating the increased subscription when perhaps more of the four gentlemen concerned might change their views.

(c) The Secretary said that in his opinion it was preferable to have the unqualified registered practitioners within the Association than without. As members S.A.V.M.A. there would be even greater in-

centive to uphold professional status and remain worthy members of the veterinary profession. With regard to their election as members he explained that at the general meeting in October 1933, when they were proposed for election he made it very clear that they were unqualified registered practitioners and even went so far as to refuse to sanction a proposed invitation to certain of these gentlemen to attend the meeting in order not to embarrass any member who might have wished to object to their election. Before election to the S.A.V.M.A. such unqualified practitioners had, of course, to be registered; the regulations shortly to be promulgated by the Board would curb any unprofessional activities.

Dr. Quin asked how many unqualified practitioners were registered.

Dr. du Toit replied that ten or twelve had been registered. One or two cases were still under consideration and after these there would be no more. He remarked that he wished to correct the impression that such men found no difficulty in becoming registered, in fact, it was no easy matter for them. They had to conform to all the requirements laid down by the Act and registration was refused in many cases where such requirements were not exactly fulfilled.

Dr. Thomas suggested that the above explanatory remarks be included in the reply to the Cape veterinarians. This was agreed to.

2. *Association Badge.* Dr. Fourie exhibited a large embossed badge of the Coat of Arms S.A.V.M.A., executed in coloured enamel on brass, and read a letter from Dr. Hartig of Cape Town, in which the latter suggested that in order to raise funds the Association should sell such badges to members for use on motor-cars, etc., as distinctive for the veterinary profession.

The meeting expressed its keen appreciation of the initiative and originality displayed by Dr. Hartig, but felt that at the moment members in general would not care to make use of such a badge on account of its size. The Secretary was requested to write to Dr. Hartig to this effect.

3. Dr. du Toit moved a formal vote of thanks to the President, Mr. F. J. Carless, for his past services to the Association and for once again accepting the office.

This was carried unanimously.

The meeting adjourned at 4 p.m.

Minutes of Council Meeting S.A.V.M.A. held at the Johannesburg Agricultural Show on 29th March, 1934.

Members Present: Messrs. F. J. Carless, H. H. Curson, P. J. J. Fourie, P. J. du Toit, C. J. van Heerden, A. C. Kirkpatrick, D. G. Steyn, A. D. Thomas, and M. H. V. Brown.

Mr. Carless welcomed Messrs. Steyn and van Heerden as new Council members.

STANDING COMMITTEES OF COUNCIL.

Members of the above for 1934 were then elected as follows :—

Status Committee : Messrs. J. I. Quin (Convenor), R. A. Alexander, A. McNae, A. C. Kirkpatrick, C. J. van Heerden.

Finance Committee : Messrs. P. J. J. Fourie (Convenor), J. B. Quinlan, H. H. Curson, C. Jackson.

Parliamentary Committee : Messrs. C. J. van Heerden (Convenor), P. J. du Toit, P. R. Viljoen.

Editorial Committee : Messrs. A. D. Thomas (Convenor), C. Jackson, P. J. du Toit, E. M. Robinson, M. H. V. Brown.

Hon. Librarian : Mr. C. Jackson.

Assistant Hon. Secretary : Mr. M. H. V. Brown.

It was agreed that the Status Committee should deal with circulars, replies, etc., in connection with part time appointments, and that the committee consisting of Messrs. Kirkpatrick, Fourie, and Curson appointed at the Council Meeting of 13.2.34 to investigate cases of hardship to private practitioners as a result of activities of State officials was to stand for 1934.

President's Address.

Five meetings of the Council were held during the year, all being well attended. The General Meeting, held at Onderstepoort in October, is reported on all sides to have been a great success. I much regret it was impossible for me to attend. Several of the papers read at that meeting have since been published in the Journal, thus giving absent members a knowledge of what took place. Most of the business dealt with by the Council has also been reported in the Journal. The remainder will be dealt with, no doubt, by the Secretary-Treasurer in his report.

The Finance Committee's report will deal, amongst other matters, with the proposed increase in the annual subscription. The Council has given this matter long and serious attention before recommending the increase. I was, personally, apprehensive that any proposal to increase the subscription might lead to resignations. I did not, at first, favour the idea for this reason. If the Association is to function on the basis of a guinea subscription the publication of the Journal would have to be cut down fifty per cent. I do not think any member would wish to see the Journal cut down, indeed most of us would advocate an increase in the size of the quarterly publication. There is any amount of interesting material which has to be left out owing to neces-

sary restriction of space. We want to continue our Journal on interesting lines and therefore I hope this meeting will agree to the proposed increase of subscription. After all, two guineas is well below the average subscription to similar professional associations.

The Status Committee has been mainly occupied in searching for means to improve the position and prospects of the private practitioner, present and future.

The Veterinary Board, created under Act No. 16 of 1933, came into being in June last, and has therefore been functioning for eight or nine months. Three meetings of the Board have been held which were mostly occupied dealing with applications for registration. No regulations, so far, have been published, but our Secretary, Dr. Fourie, acting in collaboration with a Sub-Committee of the Board, has drawn up a set of regulations for submission to the Board at its meeting on the 28th inst.

As was to be expected, the present Act contains several anomalies which will require an Amending Act in the near future. The position of members in S.W. Africa and of state veterinarians born overseas and not domiciled in the Union at the date of their qualification is prejudiced in the present Bill as compared with their confreres domiciled in the Union. Other criticisms in regard to the Veterinary Act are occasionally heard, but on the whole I think I may safely say there is a greater feeling of security under the Act than there was previously. Comparatively few unqualified practitioners have applied for registration and only a small percentage of these have been approved.

Twelve months ago, at the date of our Annual Meeting, the Union was threatened with foot-and-mouth disease. To-day I am happy to say the Union is reported free of it. In this respect the Union of S.A. can congratulate itself on escaping what at one time appeared to be an inevitable extension of this dread disease. Very great credit is due to the Director and his staff of veterinarians for the effective organisation of protective and other measures. The Department of Agriculture as a whole is entitled to the thanks, not only of the stock breeder, but of the whole population for the phenomenal success of the campaign. This success was in no small measure due to the splendid co-operation of the Protectorate Administration and we are grateful to Mr. Chase and his staff for most valuable assistance in protecting the Union border of several hundred miles. It is hoped that when time permits a full history of the recent outbreak of foot-and-mouth disease will be written. There are many points of interest, particularly regarding the mildness of the symptoms and the tardiness of the spread as compared with European experience. The "carrier" theory has greatly interested me and I shall be glad to hear the experience of our officials in regard to it.

I have to record my thanks to members of the Council for their support and assistance during the past year. Occasionally meetings have been called at short notice to suit my convenience, but the attendance has always been excellent. The various Sub-Committees—Status, Finance, and Parliamentary—have devoted considerable time to the work of the Association often at great inconvenience to themselves.

Dr. Thomas and his fellow members on the Editorial Committee continue to do yeoman work in the production of the Journal. The regular quarterly appearance entails sacrifice of what is rightly their leisure time. Their work is on record for you all to read and appreciate. On your behalf I tender them our grateful thanks.

I want especially to thank our Hon.-Secretary Treasurer for all the hard work he has put in. Dr. Fourie has had the assistance of Mr. Brown, who has taken much interest in the Association's work on the clerical side. We thank him accordingly.

BOOK REVIEWS.

Dr. Steyn's *Toxicology of Plants in South Africa*[1] forms Vol. XIII of the Central News Agencys' South African Agricultural series, several[2] of which contributions are of particular importance to veterinarians.

This work may be divided into two chief parts, (a), General Plant Toxicology taking up 72 pages, and (b), Special Plant Toxicology, occupying the rest of the volume. The former is divided into sections, the most important for the field veterinarian being those on Diagnosis of Plant Poisoning, General Principles of Treatment, Prevention of Poisoning (Sections XIV and XV), and Investigation of Plant Poisoning in the Field. An extraordinarily useful section (XII) deals with the factors concerned in the Determination of the Toxicity of Plants, where both the plant and the animal are discussed. Hitherto comparatively little information has been available; but Steyn, who has had exceptional opportunities for observation, not only summarises the various factors well, but gives us the benefit of his own views.

The latter part is divided into five sections, namely, Poisonous Foodstuffs, Photosensitisation, Food Rashes, Fungi in Relation to

(1) The Toxicology of Plants in South Africa together with a Consideration of Poisonous Foodstuffs and Fungi. By D. G. Steyn, B.Sc., Dr. Med. Vet., D.V.Sc., Onderstepoort. Pp. XII + 631, Fig. 135, £2.7.6. Central News Agency, Johannesburg, 1934.

(2) See (a) Vol. IX. Farm Management in South Africa. By S. Dawson.
(b) Vol. X. Cattle Farming in South Africa. By J. A. Bosman.
(c) Vols. XI and XII. Animal Diseases in South Africa. By M. W. Henning.

Health and finally Toxic Plants. The last named naturally takes up the largest space—(367 pages). A helpful annexure is a list of plants (122) tested at Onderstepoort (by the author) with negative results.

Under Poisonous Foodstuffs is discussed cyanogenesis, an important problem for the stock owner, and a phenomenon that is being recognised in a rapidly increasing number of plants. Photosensitisation including the effects of *Tribulus terrestris* is also dealt with, especially in the light of recent work done at Onderstepoort.

The poisonous plants are described as to (i) common names, (ii) distribution, (iii) doses, (iv) active principle, (v) degree of toxicity, (vi) symptoms, (vii) postmortem appearances, (viii) diagnosis, and (ix) treatment.

It is, of course, understood that the matter of plant identification is no easy task and Steyn, in order to avoid some of the errors of the past, has preserved "specimens of all plants submitted for investigation." Both with regard to identification and distribution, the services of the Division of Plant Industry have been invaluable.

It will be observed that a great deal of work is necessary concerning distribution, and the determination of the various active principles. Only when the latter has been satisfactorily investigated will antidotal treatment be more scientific and less empirical.

Common names have received fair consideration, but are sometimes apt to mislead. In this connection it may be mentioned that C. A. Smith, who rendered assistance to the author, intends publishing a work dealing entirely with common names of plants.

Symptoms and postmortem appearances and treatment have been well described as befits a clinician. The literature has been thoroughly searched, there being 660 references, while the index is exceedingly detailed and, being general, is simple to follow. The numerous illustrations will be particularly helpful.

Altogether Steyn's Toxicology is an exceptionally fine compilation and will be a standard reference for many professions. It is undoubtedly the most reliable plant toxicology in the English language.

Finally a word of praise to the printers, Messrs. Wm. Claves and Sons. It will probably be urged that the price, £2.7.6, is high, but when the excellenct of the work, e.g. clearness of type and quality of paper, as well as the great number of illustrations, is considered, this objection may be dismissed. H.H.C.

Professor Udall, head of the department of Veterinary Science and Superintendent of the Ambulatory Clinic in the New York State Veterinary College, has supplied a long-felt want amongst English-speaking veterinarians by the publication of *The Practice of Veterinary Medicine.*

In this book[3] he gives a concise description of the most important diseases of herbivorous animals, and of the methods of treatment which have been found most successful. No unnecessarily complicated or expensive prescriptions are included; on the contrary, most of the prescriptions are simple and are made up of easily obtainable and comparatively inexpensive drugs.

The book is divided into ten sections: the first eight deal with the non-specific disorders of the various systems. There is a section on the commoner infectious diseases and finally one devoted to poisons.

A number of the infectious diseases peculiar to South Africa, e.g. bluetongue, heartwater, and horsesickness, are not mentioned, while the chapter on poisons is almost entirely devoted to the minerals which are most frequently concerned in stock poisoning.

This book can be recommended to veterinarians with confidence, inasmuch as they will find it extremely useful for reference in every day practice. It will also be of considerable value to students of veterinary medicine. South African veterinarians will find the tropical infectious diseases and livestock poisoning inadequately dealt with, but since specialised works by South African authors are now available on these subjects, these defects are not serious drawbacks.

The book is illustrated with a large number of original photographs, which unfortunately lose much of their value through bad reproduction, and it is hoped that an improvement will be made in this respect in future editions. J.G.B.

THE TWELFTH INTERNATIONAL VETERINARY CONGRESS.

The programme for the 12th International Congress, which will be held in New York from August 13th to 18th of this year, has been drawn up by the Permanent Committee as follows:—

GENERAL MEETINGS.

I. (a) New plans for the Combating of Enzootic Diseases under a State Veterinary Service.
   (b) Relationship of Veterinary Science to Animal Breeding and Public Health. Legal Protection of the Practice of Veterinary Science.

II. (a) Veterinary Control of the Marketing of Milk.
   (b) New Researches on Filtrable Viruses.
   (c) New Researches on Contagious Abortion (Bang's Disease).

SECTIONAL MEETINGS.

Section I. Pathology, Bacteriology, and Contagious Diseases.—(1) Tuberculosis (eradication, immunity, and protective inoculation). (2) Foot-and-Mouth Disease (specific preventive measures). (3) Hog

[3] The Practice of Veterinary Medicine. By D. H. Udall, D.V.M., etc. Pp. 274, illustrations 81. Price $5 post paid. Published by the author, Ithaca, New York, U.S.A.

Cholera (Swine Fever), (active immunization). (4) Anthrax (new methods of protective inoculation). (5) Gas oedema Diseases (aetiology, classification, and prophylaxis). (6) Classification of Paratyphoid diseases. (7) Infectious Anaemia of Horses. (8) Lymphadenitis of Sheep. (9) Mosquitoes as Vectors of the virus of Equine Encephalomyelitis. (10) Active Immunization of Domestic Animals against Tetanus.

Section II. Medicine, Surgery, and Obstetrics.—(1) Parturient Paralysis (Milk Fever). (2) Sterility. (3) Diseases of young animals. (4) Infectious Mastitis. (5) Recent Progress in Veterinary Surgery.

Section III. Veterinary Parasitology and Parasitic Diseases.—(1) Therapeutics of Worm Diseases. (2) Immunity against Parasites. (3) Coccidiosis.

Section IV. Fowl Diseases.—(1) Pullorum Disease (Bacillary White Diarrhoea). (2) Fowl Plague. (3) Coryza. (4) Psittacosis. (5) Fowl-Pox. (6) Leukaemia. (7) Neurolymphomatosis gallinarum.

Section V. Tropical Diseases.—(1) The Piroplasmoses (classification). (2) Spirochaetosis. (3) African Horse Sickness. (4) Anaplasmosis.

Section VI. Hygiene of Meat and Milk.—(1) Pasteurization of Milk. (2) Unification of the methods of meat inspection.

Section VI. Animal Breeding and Dietetics.—(1) Genetics. (2) Deficiency Diseases. (3) Scientific Principles of Feeding. (4) The Blood-Group Question.

A Post-Congress Clinic is being arranged, to the programme of which some of the most famous veterinary clinicians and surgeons from all parts of the world are expected to contribute.

Our readers are reminded that membership to the Congress, entitling them to receive all the printed transactions, is open to all veterinarians upon payment of $5. Forms of application obtainable from Dr. P. J. du Toit.

INVITATIONS.

Informal invitations to all veterinarians in this country to attend the 12th International Veterinary Congress have been received from the President, American Veterinary Medical Association (reproduced below), the President, New York State V.M.A. (Prof. H. J. Milks), the Chief of the U.S.A. Livestock Sanitary Service (Dr. John R. Mohler), and the Chief of the U.S.A. Army Veterinary Service (Col. Robert J. Foster, V.C.).

My dear Colleagues:

The American Veterinary Medical Association is proud of the opportunity to act as host to the Twelfth International Veterinary Congress; the first assembly of this Congress in America. We extend to all veterinarians in every country, a most cordial invitation to attend this Congress. The Organizing Committee is doing everything possible to make this an outstanding meeting. The members of the American Veterinary Medical Association are taking an active interest in

this International Congress. We keenly appreciate the opportunity to serve as host to the distinguished group which will visit our country on this occasion.

Veterinary medicine in America is youthful compared with the profession in many other countries. We however, think we have made progress which may interest others, and sincerely hope that many veterinarians and others interested in the welfare of animal industry, will visit this Congress that we may have the opportunity of entertaining them and demonstrating what has been done in the conservation of animal health in the United States.

We desire in particular to invite practitioners of veterinary medicine. We realize that this is the largest group. Our practitioners are anxious to meet you and to demonstrate the work which has been carried on in the United States to alleviate the ills of animals. I am sure you will find things of interest and of profit to you in your daily practice.

Side trips are being planned which will enable visiting delegates to gain definite information concerning and an understanding of the problems of veterinary medicine in this country, and the way in which they are being met. Every effort will be made to make your stay in this country pleasant, and your sojourn here a profitable one.

We again desire to extend a most cordial invitation to attend the Twelfth International Veterinary Congress to be held in New York City, August 13-18, 1934 We shall do everything possible to make this meeting an outstanding one.

C. P. FITCH, President,
American Veterinary Medical Association.

University of Minnesota,
St. Paul, Minn.

JL. S.A.V.M.A.
V (3)1934.

The Veterinary Profession in South Africa: 10. Natal Volunteers (1854—1913).

By Dr. H. H. CURSON, Onderstepoort.

INTRODUCTION.

Keenness in volunteering[1] was perhaps more marked in Natal than in any other part of the Empire. As far back as the fifties an Ordinance, No. 8 of 1854, promoting the formation of volunteer units, was passed by the Legislative Council, and as a consequence was formed the Natal Carbineers, which is to-day the senior mounted regiment of the Active Citizen Force.[2] Probably no volunteer force has been so well represented in the many local campaigns as that of Natal and its record is such that the Garden Colony is rightly proud of her sons. Apart from minor operations, volunteers took part in the Langalibalele Rebellion (1873), Zulu War (1879), 2nd Boer War (1899-1902), and Natal Rebellion (1906).

It was not long after the establishment of the volunteers that it was realised that a militia system was preferable, and in 1862 His Excellency, Governor Scott, referred to the matter at the opening of the Legislative Council. It was, however, not until 1903 that the militia system was adopted. In the meantime the defence organisation was gradually improved as a result of legislation, especially by Act 23 of 1895[3]. Natal, too, was fortunate in having at that time Sir John Dartnell, not only as commanding officer of the Natal Police[4], but also as Commandant of the Volunteers, for the period 1874-1898 During these long years the result of his administration brought the various regiments to the high state of efficiency seen during Natal's greatest crisis, i.e. the 2nd Boer War (1899-1902).

At the time of the Langalibalele Rebellion (1873) the volunteer establishment was 1,000, including 600 mounted men. The men on mobilisation were expected to "provide camp equipment, commissariat and transport of every description, including that required for the reserve

(1) In Great Britain the volunteer movement dates back to 1859.

(2) Formed before the Natal Carbineers, i.e. in 1854, was the Royal Durban Rangers, which in 1888, along with other corps, became amalgamated under the title "Natal Mounted Rifles."

(3) See also Laws 26/'63, 19/'65, Volunteer Laws of '72 and '73, 25/'75, 27/'85, 19/'88, 19/'89, and Acts 23/'95, 25/'96, and 36/'03.

(4) Originally known as the Mounted Police of Natal, this fine corps served Natal faithfully from 1874-1913.

ammunition, according to the Volunteer Law''[5]. During the Zulu War (1879) transport was provided by the Imperial Authorities. Khaki was worn for the first time in 1894. As a result of the Volunteer Act of 1895, Natal was divided into four military districts; a volunteer joined for three years and underwent 10 days annual training. The pay was 6/- p.d. for mounted men, with an increase of 3/- p.d. after sixty days in the field. A volunteer had to provide his own horse and saddle, and when efficient received a horse allowance of £10 p.a. with the option of joining an insurance fund. The capitation grant was £3 p.a. for each efficient man.

At the outbreak of the 2nd Boer War there were approximately 1,800 volunteers, of which 1,000 belonged to the four mounted regiments. As a result of the experience gained during the war was passed the Militia Act of 1903 which provided for universal compulsory service and for the organisation of the eligible European male population into Active Militia and three classes of Reserves. For financial reasons, the Active Militia was at first not brought to the authorised peace establishment of 4,000, and when the Natal Rebellion broke out, instead of resorting to the ballot, irregular corps, e.g. Royston's Horse, were formed. In 1910 (G.* 30/5/10), of an establishment of 4,685 men for the entire Active Militia force, 3,000 were mounted and divided among six regiments. Under the Militia Act of 1903 the horse allowance was increased to £15, but from 1/1/07 it was reduced to £7 :10 :0, except in 1910, when it was £10. There was also a personal service allowance after 2 years efficient service as well as a daily wage for camp attendance.

As in the Cape Colony, relations between the Natal Volunteers and the Imperial garrison were always of a most cordial nature. Not only did they associate during peace training, but on more than one occasion they died side by side fighting the battles of the King and Empire. It is interesting to note that the following Natal regiments are affiliated to Imperial cavalry regiments :—1st and 2nd Mounted Rifles (Natal Carbineers) allied to the 3rd Carabiniers (Prince of Wales' Dragoon Guards) in 1910, 3rd Mounted Rifles (Natal M.R.) to 3rd Hussars in 1930, and 4th Mounted Rifles (Umvoti M.R.) to 7th Hussars in 1926.

Headquarters were at Maritzburg and during Crown Colony Government, i.e. until 1893, the ministerial head was the Colonial Secretary. Thereafter from 1893 *until* 1899 the Attorney-General was the Minister responsible for both the Volunteer and Police Departments. From 1899 to 1904 the control of both Departments was in the hands of the Minister for Lands and Works. During the period 1905 to 1906 the Departments were taken over by the Minister of Justice. During

(5) Stalker, Rev. J. (1912) *Natal Carbineers* 1856-1911. P. Davis & Sons, Maritzburg.

* G=Natal Government Gazette.

the final period of 1906 to 1910, the Militia Department (as it was then called) was in charge of the Minister of Agriculture, but the Police Department remained under the Minister of Justice.

Veterinary Service.

The mounted volunteer regiments will be treated under two heads : (A) Regular corps and (B) Irregular corps. Since the latter only come into consideration during the 2nd Boer War and Natal Rebellion, the former will be discussed first. Little, however, is known of the veterinary officers of these units prior to July 1899. Since at this time the Natal Volunteer Veterinary Corps was created and officers of the corps were attached for duty to regular regiments, it will be convenient to discuss this section, under Regular corps, (a) prior to July 1899; and (b) Natal Veterinary Corps.

(*A*) *Regular corps*, (*a*) *prior to July* 1899.

Very little information is available, but before the advent of the first Colonial Veterinary Surgeon an incident, not without veterinary interest, is worth recording[6]. A detachment of Natal Carbineers had been sent to take part in the coronation of Cetywayo on September 1st, 1873, and after the proclamation appointing him king had been read, the assembled Zulus struck their shields as a mark of pleasure. On hearing this the horses of the volunteers, who at the time were dismounted, took fright and each section of four horses (in charge of one man) stampeded towards the king; but so great was the restraint exercised by the troopers that they soon succeeded in checking the panic-stricken animals.

When the Colonial V.S. was appointed in 1874, with headquarters at Maritzburg, it is probable that he (as well as the local private practitioners) was sometimes called upon either to inspect remounts or to give certificates of casting or death. During the Zulu War, Wiltshire assisted the Authorities greatly by the examination of remounts. Col. Hurst[7], formerly O.C., N.M.R., a coastal unit, states that Wiltshire was present at the annual training encampments and sometimes issued death certificates, but in Durban and district "there were only two so-called veterinary surgeons ..... where my old regiment was recruited—both ex-Farrier Majors of the Imperial Cavalry. Very occasionally they were called in for veterinary advice." Wiltshire himself was a member of the N.C. with the designation Veterinary Surgeon, but his name is not included in the lists of officers given for the various periods by Stalker.

In the Annual Report of the Colonial V.S. for 1889, Wiltshire mentions that the only cases of horsesickness that year were at the

(6) *Loc. cit.* (5), p. 57.

(7) In a private letter dated 16/5/1929.

Volunteer Camp held at Umlaas during April, and at which a photograph showing him was taken. Horsesickness was the greatest menace of the mounted corps and in April 1886 it was responsible for the non-attendance of the Natal Hussars[8] at Pinetown camp. Wiltshire's period of service with the N.C. is not known, but in any case he was the first civilian veterinary surgeon in South Africa to belong to a regular volunteer corps.

It was not until 1896 and 1897, when the Government imported veterinary surgeons from Great Britain to assist in the campaign against rinderpest, that it was possible for each of the mounted corps to have a V.O. Since they were at first busily engaged in their civil duties[9], it is not likely that they sought appointments in the volunteer regiments; but it is certain that early in 1899 some, at any rate, had joined, for Thurston[10] states, "The following year (1899) I was attached to the Natal Volunteers for their annual encampment which was held at Balgowan as the Principal Veterinary Surgeon could not spare the services of the District Veterinary Surgeons, some of whom were attached to the various regiments as Veterinary Officers." Unfortunately further details are lacking.

(b) Natal Veterinary Corps.

It was during the anxious months preceding the 2nd Boer War that the veterinary corps, or, as it was then officially known, the Natal Volunteer Veterinary Corps, was created, the first unit of such a nature to be formed within the Empire. According to the *Veterinary Journal*[11], Watkins-Pitchford, the Principal Veterinary Surgeon, "was asked by the Imperial authorities to undertake the formation of a veterinary corps," but this was naturally done with the approval and assistance of the Natal Government. The response of the staff was immediate and on July 11th (*Gazette* 18/7/1899) the following appointments in connection with the "Veterinary Department of the Volunteer Service" were sanctioned:—Hon. Veterinary Surgeon Herbert Watkins-Pitchford to be Principal Veterinary Surgeon with the rank of Major; and Veterinary Surgeons S. B. Woollatt, F. Hutchinson, J. P. Byrne, S. T. A. Amos, and J. L. Webb to be Lieutenants. On the 25th August (G. 5/9/99) W. M. Power was appointed Lieutenant in the Volunteer Veterinary Corps, this being the first official use of the

(8) A Greytown unit which from 1888-1891 formed the left wing of the N.C. From 1892 it became independent and was known as the U.M.R., now the 4th M.R.

(9) Owing to many men being on rinderpest duty (as border guards) the annual N.C. camp at Estcourt in April 1897 was not so well attended as in former years.

(10) In a private letter dated 28/11/26, Thurston, F. J., was the first veterinary surgeon to the Natal Police (1897-8).

(11) Vol. XIII. February, 1906.

title. On 30/9/1899 C. H. Cordy received his commission (G. 10/10/99). Thus on the outbreak of war (11/10/1899) the N.V.V.C. along with Q.M.S. Potter was nine strong and included all the state veterinarians with the exception of F. A. Verney and A. F. Harber. Verney joined the local squadron, N.C., as a special service volunteer, receiving the rank of Vet.-Lieutenant ,and Harber joined the 1st Imperial Light Horse (then an irregular corps) as Vet.-Lieutenant.

On the outbreak of war Lieuts. Power, Amos, and Byrne were in Ladysmith with their regiments, B.M.R., N.M.R., and N.C. respectively, and with their O.C., Major Watkins-Pitchford and Q.M.S. Potter, were besieged in that town[12]. Lieuts. Woollatt (N.F.A.) and Verney (N.C.) accompanied the Relief Column which raised the Siege on 28/2/1900. On 11/10/99, Lieut. Cordy was at Helpmakaar with his regiment, U.M.R., Lieut. Hutchinson was V.O. at the Point, Durban, and Lieut. Webb carried on with his civil duties which in the circumstances were exceedingly difficult.

The officers of the N.V.V.C. besieged in Ladysmith not only had charge of all animals belonging to the various Natal corps, but also supervised the filtration of water used by the volunteers, the subordinate personnel of the Corps consisting of convalescents from the several volunteer regiments. "As the siege lengthened it was realised that it would be necessary to use horse flesh as a diet. The Natal Volunteer Staff therefore set an example by partaking, on 7/1/1900 for the first time, of the flesh of a horse killed by a piece of shrapnel. A few days later this article of food became a regular daily ration."[13] Soon after the relief of the town, Q.M.S. Potter had to resume his civil duties, his place being taken by P. X. Kearney, who had been stationed at Allerton Laboratory, Maritzburg. As a result of the privations of the campaign Lieuts. Woollatt, Amos, and Byrne were incapacitated for some time owing to illness.

After Buller's army had driven the invaders from Natal in June 1900, the Natal Volunteers were placed on garrison duty in the northern part of the Colony until October when, except for the Natal Volunteer Composite Regiment (made up of detachments from the Natal units), most returned to civilian duty. Thus at the close of the year all the veterinarians of the Natal Civil Veterinary Department had returned to their several duties. Lieut. Power, however, was an exception for he elected to serve with the Composite Regiment[14] until 18/11/01. Further, Lieuts. Cordy and Amos were called out during the period Sept.-

(12) Harber also served in the Siege of Ladysmith. It is pleasing to know that Col. Watkins-Pitchford insisted on full or non-compound rank. This was not granted in the A.V.D. until 1903.

(13) A private letter from Q.M.S. Potter dated 17/6/28.

(14) The only Regiment entitled to the King's Medal as a unit.

Oct. 1901 when Botha threatened Natal from the north, but the N.V.V.C as a unit was not mobilised for active service again. Transport for the volunteers during the campaign had been obtained from the P.W.D.

On October 1st, 1901, a change in the organisation of the Civil Veterinary Department occurred and this apparently had some effect on the N.V.V.C. Watkins-Pitchford, who had acted as P.V.S. since his appointment in 1896, handed over that office to Woollatt in order that he might give the research or laboratory side of his duties more attention. General Leader, the Commandant of Volunteers, in his annual report for 1902, explains the position as follows: "Prior to the late War my predecessor (Col. Royston) formed what I am pleased to consider one of the most useful branches of the Defence Force—the Veterinary Corps. This Corps consisted of the G.V.O.'s, and during the war was the means of a very great saving to the Government. With the change of Principal Veterinary Surgeon, the Corps practically disbanded, not, I understand, from any desire to leave on the part of the officers, but owing to the attitude assumed to them by the Agricultural Department. I understand that the officers of this Department have been informed that time spent in camps of exercise will count as leave against them. I do not wish to deplete the Agricultural Department of its servants, but I do think a percentage of its officials should have been spared. When it is remembered, too, that these men are responsible in camps of exercise for over £40,000 worth of horses, insured by the Government, the amount of money saved by these Veterinary Surgeons during a ten days camp more than compensates for what little inconvenience the Department may have been placed under. I am, however, reforming the corps upon somewhat different lines."

At the end of 1902 the V.V.C. numbered 7 (6 officers and 1 N.C.O.), Byrne having died during the year and Webb having resigned. Neither of these details, however, were gazetted.

The reduction in strength of the Corps, referred to above, took place not at the change of P.V.S., but 21 months later, when by Volunteer Notice 54 (G. 2/6/03) Lieuts. Woollatt, Amos, Hutchinson, Cordy, and Power resigned. At the time, too, a thorough reorganisation of the Natal defence system was contemplated, since the Boer War had shown that the volunteer system could not be relied upon to produce sufficient men in time of need. It was to be replaced by a Militia force, the necessary legislation for which, Act 36, had been passed in 1903; its operation, however, was delayed until December, 1904.

In the Annual Report of the Commandant of Volunteers for 1903, it is stated that the Natal Veterinary Corps[15] "has been re-established

[15] The first time this title was used as such.

on a sound footing''; but actually the necessary appointments were not made until February, 1904. It was then that the first corps badge (see fig. 1) was adopted, as during the Anglo-Boer War the shoulder badge N.V.V.C., and maroon tab had been worn. At the Hermansburg Road Camp, where all mounted units had assembled during April, Major Watkins-Pitchford was the only veterinary officer available and his report on the camp dated 15/5/03 shows a total of 8.76% sick with a mortality of 0.46%, due, it would appear, to horsesickness. As usual, sore backs formed a large proportion (one-sixth) of hospital cases. The District Adjutant, Northern Natal and Zululand, stated that the death-rate among horses had been the heaviest on record and that veterinary assistance was unprocurable, further that valuators appointed for the January Insurance Parades had not assisted him. At the other end of the Colony, i.e. along the East Griqualand border, the District Adjutant speaks highly of the services of the Veterinary Surgeon in his area. He adds, "336 horses were insured at a total value of £8,882. The losses were 13 horses from horsesickness, 1 biliary fever, 2 influenza, 1 glanders, 1 mange, 2 bots, 1 inflammation of the bowels, and 5 accidents, total 26, at a total value of £691 :10 :0. Insurance premiums to the amount of £428 :15 :0 were paid in, leaving a loss of £262 :15 :0."

Fig. 1.—First Corps Badge, 1904.

Early in 1904 the N.V.V.C. was again on a sound basis, Volunteer Notices 18 and 34 giving the names of both the old officers who had rejoined and the new appointments. Woollatt was to command the Corps with the rank of Major, since Watkins-Pitchford had been transferred to the staff of the Volunteer Force as P.V.O., with rank of Lt.-Colonel (G. 16/2/04). The total number of veterinary officers was therefore 11, as follows: Capts. Power, Amos, Cordy, and Hutchinson, and Lieuts. Harber, Tyler, O'Neill, Fyrth, and Sharpe, with the P.V.O., and Major Woollatt. Maurice J. Hime was Quartermaster (Hon. Lieut.), and there were in addition 1 N.C.O. and 8 troopers. The personnel was recruited almost entirely from the Civil Veterinary Department. The Regulations, under the Militia Act of 1903, having

come into force on the 20/12/04, the P.V.O.'s Annual Report appeared as an Appendix (VII) in the 1904 Report of the Commandant of Militia. He reproduces the form used for insurance and registration returns and tabulates the "loss incurred by accident or disease in the various Militia Districts" as follows :—

District	Total No. horses	Total Deaths	Percentage of deaths
Southern, Durban	880	162	18.4
Southern, B.M.R.	383	51	13.31
Central	1,215	154	12.66
Northern	433	41	9.46
Totals	2,911	408	14.01 average

The loss in the Durban District, as will be seen, is nearly 100 per cent. greater than that in the Northern District, the great bulk of such deaths occurring from horsesickness, which was always the greatest menace, being responsible in 1904 for over £8,000 loss in the Militia Force alone. Woollatt's report to the P.V.O. is attached and in it he states that "about 2,000 horses were examined for insurance purposes," and that Veterinary officers were attached to the undermentioned units for the annual encampment as follows :—

Capt. Amos	N.F.A.	Gillets
,, Cordy	U.M.R.	Greytown
Lieut. Harber	N.R.R.[16]	Nottingham Road
,, O'Neill	N.C.	Colenso
,, Sharpe	B.M.R.	Park Rynie
,, Tyler	N.D.M.R.	Blood River
,, Fyrth	Z.M.R.	Zululand

As a result of the reorganisation following the passing of the Militia Act in 1903, the N.V.C. (see Reglns. in G. 20/12/04) was placed seventh in the list of precedence, coming next after the N.M.C. Rank was not compound as had been the case in the Imperial A.V.C. In fact, even in the former N.V.V.C., compound rank had not been used. The establishment was laid down as follows: Officers, 12, including P.V.O. and Q.M.; N.C.O.'s, 4; and rank and file, 14. Total 30. In 1906 (G. 20/2/06) at the beginning of the Native Rebellion the peace establishment, all ranks, was given as 20, and the war strength as 100. The O.C. was to arrange for supernumeraries, i.e. difference between the two establishments. In order to bring certain units up to strength for the Rebellion, special service men were enrolled at 5/- per day with extra pay of 1/-per day (G. 29/5/06); but it would not appear that this was done in the N.V.C. In the Field Service Manual of the N.V.C.

(16) The Natal Royal Regiment had an M.I. Company.

issued early in 1907, the War establishment was detailed as : 1 Major, 9 Captains, 1 Lieut. (Q.M.), 1 Sergt.-Major, 1 Q.M.S., 8 Sergts., 20 corporals, and 59 troopers, totalling 100. In 1910 (G. 30/5/10) (just at Union) the establishment of each of the Natal Militia units was given. Of a strength of approximately 4,700 Active Militia, 3,000 were mounted men, and to attend to the veterinary requirements of this large number, there was a veterinary corps of 35 men, including probably a dozen officers.

In February, 1905, the P.V.O. transferred Q.M.S. Potter from the Natal Veterinary Corps to assist him with staff duties (G. 7/2/05), and two months later Lieuts. Harber, Tyler, O'Neill, Sharpe, and Fyrth received their captaincies (G. 25/4/05). While Major Woollatt was absent on leave (from 5/7/05-4/2/06) Capt. Power took command of the corps (G. 4/7/05). At a camp of exercise held at Taylor's in April, the general report of the Commandant on the corps was as follows : "The Veterinary Corps, under Major Woollatt, carried out their duties with every satisfaction." At this camp the P.V.O., among others, was presented with the Queen's war medal by the Governor, Admiral Durnford[17]. In the same report, the Commandant, in discussing clothing and equipment, states that the Colonial saddle, then in use, had two disadvantages : (a) difficulty in restuffing in order to fit the horse (as condition is lost on service), and (b) not built with the idea of carrying a blanket underneath, as on service one blanket at least should be carried. He recommends a new saddle, called, he believes, the "Edwards' Patent."

Early in February 1906 the first of a series of native insurrections broke out in Natal and these, grouped together under the name Natal Rebellion, meant much extra work for the staff of the Civil Veterinary Department, for in addition to the control of scheduled communicable diseases, "the whole of the work in connection with the care and treatment of Militia horses, together with all the remount work," was carried out by officials of the Civil Department. From the 9th February, "four of the District Veterinary Surgeons have, more or less continuously, been employed on Militia duty."[18] It is proposed to discuss elsewhere the Rebellion itself from the veterinary aspect, but it may be recorded that the following officers saw active service : Capts. Sharpe (Royston's Horse), Harber (N.M.R.), and Cordy (U.M.R.). Major Woollatt, who was mentioned for meritorious service, played a most important part in the campaign[19]. Capt. Hutchinson was en-

(17) *Loc. cit.* (5), p. 282.

(18) Ann. Rpt. P.V.S. Natal, year ended 30/6/06.

(19) The following veterinarians received the medal "Natal Rebellion 1906" :— Watkins-Pitchford (Natal Militia Staff), Woollatt, Amos, Power, Cordy, Oliver, O'Neill, Harber, Tyler, Sharpe (N.V.C.), and Collyer (N.P.). Hime and Hill also received the medal. Purdy and Potter gained medals both for the Boer War and Natal Rebellion.

gaged in the purchase and examination of remounts. At the end of the Rebellion he took over veterinary charge of all transport used in Zululand.

At the commencement of the April 1906 operations, seven officers were in the field and 10 more were available[20]. In the mobilisation of November 1907, 10 N.V.C. officers and eight other ranks were called up.

FIELD SERVICE

MANUAL.

NATAL MILITIA FORCE.

VETERINARY CORPS.

Fig. 2.—Title page of *Field Service Manual*. The publication had a maroon cover, measured 7 x 4 4/5 inches, and numbered 30 pages.

Reference must now be made to the Field Service Manual of the N.V.C. (Fig. 2). This appeared early in 1907, i.e. seven years before the R.A.V.C. issued its first manual. It was drawn up as a result of

[20] Collyer, of the N.P., also rendered valuable veterinary service, being attached for part of the time to the T.M.R.

experience gained during the Boer War (1899-1902) and included a preface which, although naturally signed by the Commandant, Natal Militia, was no doubt drafted by the P.V.O. The preface gave details concerning the duties of the various officers, e.g. the P.V.O. was responsible not only for the efficiency of the Veterinary Service but also for that of Remount Department. This is the first intimation regarding the dual nature of this officer's duties. Later, as will be described, a separate Natal Remount Corps was formed; but it is clear that at the time of the Natal Rebellion (1906-7) the P.V.O. was responsible for both the Veterinary and Remount Services. The O.C., N.V.C., was responsible for the detailed working of the corps, for the efficiency of the sections or units into which the N.V.C. was organised, and for the revision of all daily states, casualty lists, etc., sent in by Veterinary Officers. Further O.C.'s were reminded to keep in close touch with the V.O.'s attached to the various regiments. The Manual itself dealt with: (a) War establishment of N.V.C. Since two V.O.'s at least were to accompany each section, there was provision for four sections; (b) Equipment of officers, N.C.O.'s and men; (c) Equipment of a section: (d) Contents of universal field veterinary chest; and (e) General directions, e.g. shoeing, transport, animal rations, etc.

With regard to the above, it should be mentioned that the corps-unit, the section, had just been adopted by the Imperial A.V.C., the great advantage of the system being that the independence, mobility and usefulness of the Veterinary Corps generally was assured. Further (in fact a start had been made in 1904), with the provision of a subordinate corps personnel, efficiency was possible.

In view of what has just been stated, it is somewhat disappointing to learn[21] that "The Veterinary Corps was insufficiently organised", (i.e. for the Natal Rebellion of 1906), "with the result that, generally speaking, officers were called on to treat more animals than they were able to cope with." As in the struggle of 1899-1902, the fault here lay, not with the Veterinary Authorities, but with the Government, who, for the sake of mistaken economy, did not engage more veterinary officers.

It was not until December 1906 that the War Honours gained by Natal regiments in the Anglo-Boer War (1899-1902) were gazetted (G. 11/12/06). These, "Defence of Ladysmith" and "Relief of Ladysmith," were not granted to Departmental Corps, such as the N.V.V.C. (later N.V.C.), since no force ever takes part in a campaign without their services. It is understood that Departmental Corps have contributed to the honour gained by the Army in all parts of the world. The Honour "Natal 1906" was similarly gazetted towards the end of

[21] Stuart, J. (1913). *A History of the Zulu Rebellion.* Macmillan & Co., Ltd., London, p. 58.

September 1908 (G. 22/9/08), while the Distinction "South Africa 1879" (Zulu War) was granted by the King early the following year (G. 9/2/1909).

At the 3rd Pan-African Veterinary Congress (Pretoria 1909) the following interesting resolution was carried :—"That this Conference recommends that the delegates of the various Colonies of South Africa report to their various Governments the necessity of forming a volunteer veterinary corps for the service of their troops in the event of military operations being necessary." Later in the year the Transvaal Veterinary Corps was created.

It has been seen that the *Field Service Manual* made it clear that the P.V.O. was responsible not only for the supervision of ineffective animals in a campaign but also for the provision of healthy animals from the base to the front. It was, however, not until after the major operations of the Natal Rebellion that the P.V.O. was appointed Staff Officer, Remounts (G. 10/9/07). Soon after the December 1907 phase of the campaign, Major Woollatt transferred (3/2/08) to the Supernumerary List and Lt.-Col. Watkins-Pitchford[22] again took command of the N.V.C. (G. 11/2/08). Just before this, there had been formed the Natal Remount Corps, with seniority dating 2/12/07, (although the *Gazette* announcing this did not appear until 3/3/08), and with Lt.-Col. Watkins-Pitchford as O.C. Obviously the P.V.O. could not be in command of two corps, so amalgamation of the N.V.C. and N.R.C. took place under the title Natal Veterinary and Remount Corps (G. 10/3/08), with effect from 29/2/08. Actually the gazetting of the creation of the N.R.C. took place three days after amalgamation of the two corps had been consummated. Capt. Power was promoted Major (G. 31/3/08) and at the same time Hon. Lieut. Hime, Quartermaster, resigned. No successor was appointed until March 1910, when Sergt. Wallace Purdy was promoted Quartermaster, with rank of Hon. Lieut. Capt. Sharpe was appointed Adjutant as from 1/10/09 in place of Capt. Amos who had previously held this office. On 27/10/09 Sergt. G. McManus, who had transferred from the N.F.A. early in 1908, was made Sergt.-Major (G. 2/11/09) and the following January he was awarded the Colonial Forces Long Service and Good Conduct Medal (G. 18/1/10). Although N.V. and R.C. was the correct title of the Corps, yet frequently, even officially, the designation N.V.C. was employed. The telegraphic address of the Corps was "Vetremount," Pietermaritzburg.

As to the class of horses available, the Commandant-General in his Report for 1909 clearly indicates the position. He states that

[22] In January 1909 Capt. W. Watkins-Pitchford, N.M.C., Assistant to the P.V.O. at Allerton Laboratory, Maritzburg, was appointed Adviser on sanitary matters to the Militia, with rank of Major as from 24/12/08. He made several contributions to veterinary literature

artillery horses of a good stamp are obtained from cartage contractors with excellent results; but in the mounted regiments only those living in the country districts have serviceable animals. Owing to expense, militia men living in towns borrow their mounts from owners of carriage horses. He adds that an increased horse allowance might check this practice. The P.V.O. was keenly alive to the importance of the remount service, and in a paper read before the S.A. Inter-Colonial Agricultural Union in 1909 he emphasised the need for breeding good animals.[23]

Reference should now be made to both the Insurance Fund and to the part played by the P.V.O. in combating horsesickness, which disease made insurance so necessary. It is obvious that for the proper functioning of the former an efficient veterinary service was indispensable, but in the Commandant-General's Report for 1908 the large number of horses cast as unserviceable during the year was explained by the fact that "the majority of the animals had to be insured without veterinary advice, there being no Veterinary Surgeons available at the required times for the purpose."

Owing to the severe mortality occasioned by horsesickness a remount fund existed in the N.C. as far back as the eighties and under both the Volunteer Act of 1895 and the Militia Act of 1903 there was an insurance scheme which was optional. A Board of Valuators, consisting of a Staff Officer, an officer of the N.V.C. or a G.V.O., and a regimental officer, was responsible for the acceptance of a horse. The maximum price for officers' chargers and artillery horses was £35, and for troopers' £30. The premium varied from £1 p.a. for horses over £20 and under £25 to £1 :15 :0 for animals over £30 (G. 20/12/04). From time to time the regulations were altered, a general tightening up being the result. From 1/7/1906 (G. 27/6/05) all claims for payment of horse insurance were submitted to the P.V.O. Militia direct; later (G. 17/4/06), in submitting a claim O.C.'s were to see that a V.O.'s report accompanied it. At the end of the same year (G. 13/11/06) pack horses were not accepted for insurance, and early next year, just at the horsesickness season, the following regulation appeared : "During the Horsesickness season, when premiums are tendered one week after inspection of a horse, a further veterinary certificate will be required, and in cases when this is unobtainable, the insurance will date 10 days after the receipt of the premium." (G. 26/3/07). In 1909 it was decided that when the inspection of a horse for registration and insurance was carried out by a civilian veterinary surgeon, at a time other than at the annual parade, a fee of 5/- must be paid "unless it is a horse to replace one which died or was cast and

(23) Watkins-Pitchford, H. (1909). The S. African remount. His breeding and conformation. Paper S. African Inter-Colonial Agric. Union, 1909.

which was inspected at an annual general horse parade." (G. 6/7/09). In 1910 officers who must be mounted were permitted to insure in the Fund (G. 5/4/10).

Although sufficient has been mentioned to indicate that horsesickness was a most serious disease (e.g. in 1904 of the total deaths, 77.3% were due to this malady) yet the mortality varied within wide limits.[24] In 1908, of the insured Militia animals 8.4% died, and of this number only 46.4% were due to horsesickness. In 1909 there were 14.6% deaths of which 63.9% were caused by horsesickness. Watkins-Pitchford, as far back as 1898, had interested himself in the problem, in fact he had secured the co-operation of Surgeon-Major Bruce; but shortly afterwards, owing to the gravity of the military situation, the investigations had been abandoned. After the war the work was taken up again, and Watkins-Pitchford submitted reports indicating that a flying insect, probably a mosquito, was responsible for transmission. In 1905 the P.V.O. issued a memorandum to all units outlining the precautions to be adopted in order to prevent the heavy losses of the previous year (G. 10/1/05). These measures included light dressings with paraffin and the filling of stables with smoke at night. In 1907, in his Presidential Address to Section D of the South African Society for the Advancement of Science, he estimated the monetary loss sustained in Natal as a result of horsesickness during the past season at approximately £12,000. Further he indicated that a more substantial degree of immunity could be obtained by the use of attenuated virus (Natal method), rather than by the adoption of serum therapy. A year later he announced in a Progress Report that he had "been employed in the effort to adapt or incorporate the various strains of South African horsesickness, so as to form a polyvalent or widely applicable vaccine." Results obtained by exposing 5 immunised and 5 control horses in the Lower Tugela Valley near Dartnell (under supervision of A. F. Harber) were encouraging since the immunised animals remained healthy, whereas all controls had contracted the disease of which 3 had died (G. 20/6/08). Six months later a further Progress Report was issued (G. 19/1/09) and this showed that of 22 protected mules none had died, whereas of the 8 control mules 3 had succumbed. Of 13 immunised horses 3 had indeed died, but all of the 12 control had died. Although the protection was not absolute, yet the power of resistance to natural infection was enhanced to such a degree that the P.V.O. suggested to the Commandant-General the inoculation of the horses of one of the mounted regiments. At the end of the year a Further Progress Report (G. 7/12/09) gives details of the application of the Natal vaccine "on more ample lines"; R. C. Matthews, who supervised the experiment, inoculated 76 horses of the Z.M.R., an approximately equal

(24) Watkins-Pitchford, H. (1903), "Horse-sickness: Its origin and spread. *Vet. Rec.* XV: 729 (23/5/03).

number being kept as controls. Thirty-seven horses were reinoculated a month later, "in order to determine the reinforcing effect of a repetition of the process." Only 15 owners failed to notify Matthews of the result of the inoculation, but if there had been deaths, it is certain this information would have been received. Where records were returned, no deaths were reported and approximately 75% horses reacted clinically. As to the fate of these animals during the 1910 horsesickness season, no Final Report has been traced, although the horses were to be kept under observation during that period. Soon after the publication of the Further Progress Report, a memorandum advising paraffin applications and smoking of stables on the same lines as indicated in 1905 was issued under Militia Orders (G. 21/12/09).

The unit during its existence had two corps badges, the first adopted in 1904, and the second in 1908 after the amalgamation of the Veterinary and Remount corps. The former was borrowed from the Common Seal of the R.C.V.S., being the crest and motto of that institution, with the following differences: The Centaur stood on the scroll bearing the motto *Vis unita fortior*, the shield was held nearer to the

Fig. 3.—Second Corps Badge, 1908.

body. and on the shield instead of an aloe was a horse-shoe with a branch, probably laurel, on either side. Above the horse-shoe was a small star-like flower. The second badge (see Fig. 3), which has been described as it occurred on the note-paper of the Corps, again includes the Centaur, but depicts him in a far more pugnacious mood. The armed Centaur grasps a spear in the throwing position, while the left arm holds the shield as for protection. The shield now bears "an arrow in bend entwined by and piercing a serpent," a device apparently borrowed from the second quarter of the armorial bearings of the R.C.V.S. Surmounting the badge is a scroll bearing the title, "Natal Veterinary and Remount Corps Militia," while beneath is the motto *Hostem aut morbum obsto*, which means, "I withstand the enemy or sickness."[25]

[25] Thanks are due to Prof. Boxwell, T.U.C., Pretoria, for this translation (letter 2/6/29). He adds, "with *obsto* one would expect a dative ... but ... one must not be too critical with motto Latin."

Both the crest and motto denote the combatant and departmental characters of the Corps' duties.

The first badge described above appeared on the tunic buttons and was worn throughout the existence of the unit, probably because a good supply existed. Maroon was the corps colour.

Some of the regulations (G. 20/12/04), e.g. establishment and precedence of corps, relating to the veterinary service have already been discussed. Other details concerning the appointment, precedence, examination, promotion, and retirement of a veterinary officer will now be briefly stated. On appointment, captain's rank was granted, but an examination was held within 12 months, the subjects being regimental duties, military organisation and military law. Rank carried precedence corresponding to that of combatant officers, except that it did not entitle holders to military command of any kind, or to the presidency of courts martial. After seven years service a captain received promotion to major. The clause requiring officers of a certain age, e.g. 46 years in the case of a major, to be transferred to the supernumerary or reserve list did not apply to veterinary officers, nor was the annual musketry course compulsory for officers of the N.V.C. The annual efficiency requirements were (a) attendance at annual encampments for a continuous period of ten days, and (b) for officers attached to mounted corps, attendance at all quarterly drills of such corps. The duties of V.O.'s included the supervision of all animals belonging to units to which they were attached and if necessary treatment was to be applied. Appendix VII concerning camps contains useful hints on animal management. Although attendance at annual encampments was a necessary qualification for efficiency, yet owing to the exigencies of the Civil Veterinary Department, this was not always possible. In such cases the civilian veterinary surgeon nearest the camp would attend and as the Militia authorities were sufficiently broad-minded in such instances, there was little difficulty about payment of the various grants. In July 1912, it being impossible for all N.V. and R.C. officers to be present at the various regimental camps, the following arrangements were made :—

G.V.O. Joyce attended the B.M.R. camp at Highflats.

G.V.O. J. L. Webb attended the U.M.R. camp at Umvoti.

Capt. Harber attended the N.M.R. camp at Emberton.

G.V.O. Ewing attended the Z.M.R. camp at Eshowe.

Of the above only Capt. Harber was a member of the N.V. and R.C. and, as under Union conditions, G.V.O.'s were transferred from province to province, it is seen how G.V.O. Joyce, formerly of the O.R.C. administration, came to act as a V.O. at a Natal Militia encampment.

With the advent of Union (31/5/1910) the disbandment of the N.V. and R.C. was not far distant. Lt.-Col. Watkins-Pitchford, the founder of the unit, relinquished his association with the Corps as from 19/4/12 (U.G.G. 18/6/12), having by his patriotism, dogged perseverance, and love of profession set an example which future veterinary officers might well follow. Major Power was appointed his successor. Previous to this, however, Capts. Amos (U.G.G. 9/9/10) and Hutchinson (U.G.G. 27/6/11) were promoted majors and in June 1912 Capts. Sharpe and Tyler (U.G.G. 18/6/17) were promoted majors on probation, this step being necessary under the new U.D.F. regulations. Their appointments were, however, confirmed by U.G.G. 1/7/13..

Since the Union Defence Authorities at the time apparently had but little sympathy for a veterinary service, nothing was done to popularise the corps under the new regime. The Commandant-General decided that the training to be performed by members of the corps in order to entitle them to certain grants and allowances during the period January-June 1913 should include musketry course, a requirement not insisted upon before. When it was realised that the N.V. and R.C. was not to be embodied in the new A.C.F., Majors Amos and Sharpe transferred to the S.A.S.C. and N.C. respectively (U.G.G. 25/11/13 and 2/1/14), and Majors Woollatt, Power and Hutchinson to the R. of O. (U.G.G. 17/4/14, 25/8/14). Major Tyler's and Capt. Goulé's resignations have not been traced.

The position can be best summarised by an extract from Major Power's letter of 25/7/13 to the Staff Officer, No. 5 District, A.C.F., Durban, as follows: "I feel certain that had the N.V. and R. Corps been taken over in a body to the Active Citizen Force all the members would have been willing to have transferred, but under the conditions offered them do not see their way clear to be drafted into separate regiments."

Had the authorities possessed a little vision, the officers of the N.V. and R.C., all men of wide experience, would have remained in the unit under the new system and thus formed a nucleus for a Natal section of the S.A.V.C.[26] Two N.C.O.'s, Q.M.S. Brown and Sergt. Hill, and three troopers, Smith, A. F., Clarke, S., and Wolhuter, A. F., also expressed willingness to remain if the corps had been retained. Officially the corps ceased to exist on 30/6/13, but there was certain correspondence which the O.C., N.V. and R.C. had to attend to until May 1914. The balance of the corps fund, £166 :12 :1, was paid to the Department of Defence on 18/11/13. Thus ended the short but useful career of the N.V. and R.C. No greater tribute can be paid than that of Col. Hurst, formerly O.C., N.M.R., who writes,[27] "I cannot refrain

(26) This was not organised until the outbreak of the Great War. Possibly if there had been no war, the S.A.V.C. would not have yet been formed.

(27) In a private letter dated 30/5/29.

from repeating that they were a very fine lot, and did wonders for our horses and towards improving the stamp of mounts."

In concluding this section, it should be mentioned that, while several officers, notably Col. Watkins-Pitchford, Major Sharpe, and Major R. C. Lange (Union Defence Force), have helped with information bearing on the Corps, yet special thanks are due to Messrs. W. Purdy, H. H. Potter, and L. Hill for valuable assistance, especially with regard to photographs.

A list follows (see Appendix 1) not only of the V.O.'s of the N.V. and R.C., but also of the N.C.O.'s. As has been explained, with the exception of one or two individuals all were employed in the civil veterinary department of Natal.

(B) Irregular Corps.

As in the case of the irregular corps of the Cape Colony not only is it difficult to trace the history of the units raised for the various campaigns, but, owing to the absence of facilities, it is also impossible to follow the movements of private practitioners in the Colony before the 2nd Boer War. There was at least one private veterinarian in Natal at the time of the Zulu War, but whether he[28] took part in the campaign is not known. A little information, however, has been gathered regarding veterinary surgeons who served in irregular corps raised for the 2nd Boer War and the Natal Rebellion.

Reference has already been made to Lieut. Power's service with the Natal Volunteer Composite Regiment after the return of the volunteers to their homes late in 1900. He remained with this unit until 18/11/01. As has been mentioned, Lieut. A. F. Harber was attached to the Imperial L.H., which was raised in Natal largely from Transvaal refugees. Among these were two Johannesburg veterinarians, Messrs. Hollingham and Pye, who served in the ranks. After the Relief of Ladysmith, Pye joined the A.V.D. as a C.V.S. It is believed W. Newman, formerly of the C.M.R., was in Bethune's M.I., but not as a V.O. Walker, who had accompanied the South African L.H. from Capetown, was transferred by Col. Matthews, P.V.O., to Gough's M.I., a composite regiment of Imperial troops, after the Relief of Ladysmith. Smith[29] lists him as a C.V.S./A.V.D.

During the Natal Rebellion a mounted regiment, composed mainly of men belonging to the Transvaal volunteers, was sent to assist the

[28] James W. Winter, qualified 1836, was one of the 4 members appointed by the Natal Government to serve on the Redwater Commission (see Govt. Notice 32, 1874). Winter's Horse Condition Powders were once exceedingly popular, especially for horsesickness. He died in 1886 (*Vet. Jl.* XXII: 467).

[29] Smith, F. (1927). *A History of the R.A.V.C.* 1796-1919. Baillière, Tindall & Cox, London, p. 260.

Natal Government. It was given the name Transvaal M.R. and its V.O. was Capt. E. A. Hollingham of the Johannesburg M.R.[30] For a short time, however, Major Collyer of the N.P. also acted as V.O. The Natal Government, although in a position to call up the Militia reserves, refrained from so doing (probably on political grounds) and instead raised an irregular corps, Royston's Horse, and to this unit Capt. Sharpe of the N.V.C. was for some time V.O.

In addition to the names given for the 2nd Boer War, the following have been taken from *Veterinary Records* of the period: Capt. Knapp (Thorneycroft's M.I.), W. G. Steele (S. African L.H.), McNamara (Kitchener's H.), Tustin (Bethune's M.I.), and Andrews (Colonial Scouts). These all appear to have been unqualified.

(30) Information supplied by Lieut. Col. Rowlands, his letter 25/7/29.

Appendix I.

Natal Veterinary Corps (1899-1913).

OFFICERS.

Name.	Date, 1st Commission	Resigned	Rejoined	Resigned	Born	College and qualified	Died	Further Remarks.
Watkins-Pitchford, H.	G. 18/7/99				1866	1889, Lond.		
Woollatt, S. B.	,,	G. 2/6/03	G. 16/2/04			1897, Lond.		To R. of O. (U.G.G. 17/4/14)
Hutchinson, F.	,,	,,	G. 22/3/04		17/1/69	1889, N. Edin.		To R. of O. (U.G.G. 25/8/14)
Byrne, J. P.	,,					1894, N. Edin.	1902	
Amos, S. T. A.	,,	,,	G. 22/3/04	S.A.S.C.		1897, Lond.		See U.G.G. 25/11/13 and 20/2/14
Webb, J. L.	,,				20/9/73	1896, ,,		
Power, W. M.	G. 5/9/99	G. 2/6/03	G. 22/3/04		29/12/74	1896, ,,		To R. of O. (U.G.G. 25/8/14)
Cordy, C. H.	G. 10/10/99	,,	G. 22/3/04	G. 18/1/10		1890 ,,		
Harber, A. F.	G. 22/3/04	G. 16/4/07			1875	1897 ,,		
Tyler, C. (31)	,,				6/7/77	1900, Edin.		
O'Neill, O. A.	,,	G. 11/9/06				1893, Edin.		
Fyrth, W.	,,	G. 22/8/05				1894, Lond.		
Sharpe, C. M.	,,	G. 5/11/07	G. 14/7/08	N.C.	27/3/76	1899, Lond.		See U.G.G. 2/1/14
Hime, M. J.	,,	G. 31/3/08						Quartermaster
Beckett, A. J.	G. 24/4/06	G. 12/11/07				1893, Edin.		
Oliver, H. O.	G. 10/7/06					1898, Lond.	1918	Supernumerary List
Goulé, A. (31)	G. 31/3/08				24/7/51	1871, Lond.	1918	
Purdy, W.	G. 8/3/10	U.G.G. 11/2/13			18/7/76			Quartermaster

	Joined	N.C.O.'s Resigned	Rank on leaving
Potter, H. H.	July 1899	8/3/10	Q.M.S.
Kearney, P. J. X.	April 1900	1900	Q.M.S.
Bowles, E. W.	22/4/04	1913	Sergt.
Brown, A.	9/2/06	30/6/13	Q.M.S.
McManus, G.	G. 28/1/08	1911	R.S.M.
Hill, A. L.	13/8/09	30/6/13	Sergt.

(31) Photographs taken of N.C. officers at annual encampments include these Veterinary officers (*Loc. cit.* (5), pp. 352 and 320 respectively).

Appendix 2.

Brief Biographies of Veterinarians now dead.

(A) Natal Veterinary Corps.

JOHN PETER BYRNE.—Qualified at the New College, Edinburgh, in December 1894. He entered the Natal C.V.D. in September 1898 and joined the Natal Veterinary Corps in July 1899, serving in the Siege of Ladysmith with the N.C. He died in 1902 at Richmond, Natal.

ARTHUR GOULÉ.—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 (7/1205) joined the Natal civil service, being at Allerton until 1909, when he transferred to the field as D.V.S. During the Natal Rebellion (1906) he saw active service. 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.

HENRY OSWALD OLIVER.—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 7/7/10-8/2/11 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).

(B) Irregular Corps.

EDWARD ARTHUR HOLLINGHAM.—Born in Sussex and qualified in London in 1881. He was in private practice at Tunbridge 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 Boer War both principals, as *uitlanders*, were compelled to seek refuge in Natal, where they joined the I.L.H. 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 to 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 South Africa. During his residence in Johannesburg (38, Dawe Street, Troyeville), he was veterinarian to the S.P.C.A. He died from pneumonia on 20/8/1912 (*Vet. Rec.* 23/11/12).

WILLIAM PYE.—Qualified Edinburgh, June 1891, 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[32]. Soon after arrival in Johannesburg he entered into partnership with E. A. Hollingham. Upon the outbreak of the 2nd 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.

Appendix 3.

Natal Campaigns and Veterinarians Present.[33]

Zulu War (1879)—Wiltshire, S.

2nd Boer War, 1899-1902[34]—*Natal Veterinary Corps*: Watkins-Pitchford, H., Woollatt, S. B., Power, W. M., Amos, S. T. A., Byrne, P., Cordy, C. H., Hutchinson, F., and Webb, J. L.
Regular Volunteer Corps: Verney, F. A. (Natal Carbineers).
Irregular Volunteer Corps: Harber, A. F., Hollingham, E. A., and Pye, W. (Imperial L.H.), Walker, J., and Bray, C. T. (S. African L.H.), Newman, W. (Bethune's M.I.).

Natal Rebellion (1906)—*Natal Veterinary Corps*: Watkins-Pitchford, H. (Natal Militia Staff), Woollatt, S. B., Power, W. M., Amos, S. T. A., Cordy, C. H., Tyler, C., Sharpe, C. M., Harber, A. F., O'Neill, O. A., and Oliver, H. O.
Regular (Permanent) Corps: Collyer, J. B. (Natal Police).
Irregular Volunteer Corps: Hollingham, E. A. (Transvaal M.R.).

The position with regard to Messrs. Goulé, A., and Beckett, A. J., is not clear.

(32) 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.

(33) It is believed all received medals for the campaigns indicated.

(34) Only the names of non-A.V.D. veterinarians present in Natal at the beginning of war are given.

Jl. S.A.V.M.A.
V (3)1934.

An Attempt to Transmit Canine Biliary Fever to the Domestic Cat.

By A. D. THOMAS, D.V.Sc., and M. H. V. BROWN, B.V.Sc.,
Onderstepoort.

Introduction.

One of the commonest canine diseases encountered in South Africa is Biliary Fever, caused by *Piroplasma canis*, transmitted by the ubiquitous *Haemaphysalis leachi* and *Rhipicephalus sanguineus*. The disease affects almost every dog—usually during the first year of its life. The domestic cat must be exposed to infection, as these ticks are very commonly found on cats, as well as on other animals. Since this disease, or a similar one, has never been recorded in cats an experiment was carried out to determine whether cats are susceptible.

Experimental.

Two common cats, one male and one female each about six months old, were used in the experiment. They were first examined clinically and appeared perfectly healthy : blood smears were normal except for a few Jolly bodies in both cases.

As the disease is readily transmissible from dog to dog by means of intravenous injections of citrated blood, this method was selected for use and the two cats were each injected on 18.1.33 with 4cc. of citrated blood from dog 1176, a known *P.canis* carrier—the parasites being present in the blood smear made on 17.1.33.

The animals were then kept under observation until 14.2.33. During this period temperatures were recorded and blood smears made and examined daily. Except for a transient hyperthermia in the female cat on the eighth day after injection (the temperature rose to 103.6°F. but was normal next day) no rise in temperature was observed during this period. Similarly the blood smears were negative except for the presence of a few Jolly bodies in both cases. These bodies were given as Jolly bodies on account of their staining reaction and constant position in the cell, i.e. near the margin, but never actually on the margin, and it was noticeable that their number (i.e. about one in every 4 fields) remained more or less constant throughout the whole period of observation. They were also considerably larger than the characteristic *Anaplasma* body and unlike the latter, presented a smooth margin.

As the injection of blood seemed to have no effect, and following the work of de Kock and Quinlan[1] who showed that susceptibility to protozoan disease could be considerably increased by removal of the spleen, it was decided to splenectomise the two cats. This was accordingly done after suitable preparation, under chloroform anaesthesia, on the 15.2.33. Both animals stood this operation remarkably well and within a week the wounds were healed and the subjects feeding well. The temperatures showed a rise to 104°F. in both cases the day after the operation but were down to normal (101-102°F.) again the following day.

Observation until the 29.3.33 disclosed no sign of any infection developing, so on that day the cats were again given 3cc. citrated blood from dog N. 1176, whose blood still showed the presence of *P.canis*.

The temperatures showed no rise and the blood no parasites until the end of June 1933, when observations were discontinued. Jolly bodies were constantly present in apparently unvarying numbers throughout this period.

Discussion.

On epizootological grounds it seems hardly likely that cats are susceptible to *Piroplasma canis* infection. As pointed out above, they must be exposed to infection since the two varieties of ticks abound and are frequently found on cats and since the disease is so commonly met with in dogs many of these ticks biting cats must be infected. Yet no case of piroplamosis in cats has been recorded in South Africa.

As far as the authors are aware the only record of piroplasmosis of cats in the literature is the article by Davis[2] who records the appearance of a piroplasm (which he named *Babesia felis* n.sp.) in the Sudanese wild cat. In these cases the parasite was often very frequent in the blood stream, but only a slight degree of anaemia and no other symptoms were produced; even after splenectomy no deaths resulted from the infection, although haemoglobinuria appeared.

The same author (*loc cit.*) noticed a number of "marginal points" in the smears from his cats. He discusses the question of anaplasmosis and remarks that "whether they are actual parasites or merely Jolly bodies it is difficult to determine." It is interesting to note that in the blood smears examined in the experiment now under discussion

(1) 1926. De Kock, G., and Quinlan, J. B. The appearance of *Gonderia ovis* in the blood of splenectomised sheep. *11th and 12th Reps. D.V.E. and R.* Pt. I.: 255.
1926. De Kock, G., and Quinlan, J. B. Splenectomy in domesticated animals and its sequelae with special reference to *Anaplasmosis* in Sheep. *Ibid*: 369.

(2) 1929. DAVIS, L. J. On a piroplasm of the Sudanese wild cat—(*F.ocreata*) *Trans. Roy. Soc. Tr. Med. and Hygiene.* XXII (6): 503-534.

in every case the presence of a few Jolly bodies was recorded. It is possible that Davis was dealing with similar bodies, and it appears that they are constantly present in cats in certain numbers.

Although only two experimental animals were used the results obtained in this experiment seem to indicate that cats are not susceptible to canine biliary fever. Even after splenectomy no rise in temperature, no sign of parasites in the blood and no anaemia resulted after subinoculation from a known *P.canis* carrier.

Note. One cat was killed accidentally in September 1933, the other is still alive and healthy (July 1934), and blood smears made on 16.7.34 showed no parasites but a few Jolly bodies.

Jl. S.A.V.M.A.
V (3) 1934.

Culling of Poultry: 2. Pigmentation and Moulting.

By E. VAN MANEN, B.Sc. (Agric.) S.A., M.Sc. (Agric.) Cornell,
Poultry Research Officer, Onderstepoort.

Pigmentation.

Pigmentation is a factor freely used in culling. It indicates what a fowl has done and gives us a very conclusive test of whether a fowl is laying or not. The yellow colour is found in all yellow-skinned fowls and is given to the fat by a pigment called xanthophyll. It is present in the body wherever there is fat. It is to be seen more readily in the softer parts of the body and where the circulation of the blood is most rapid.

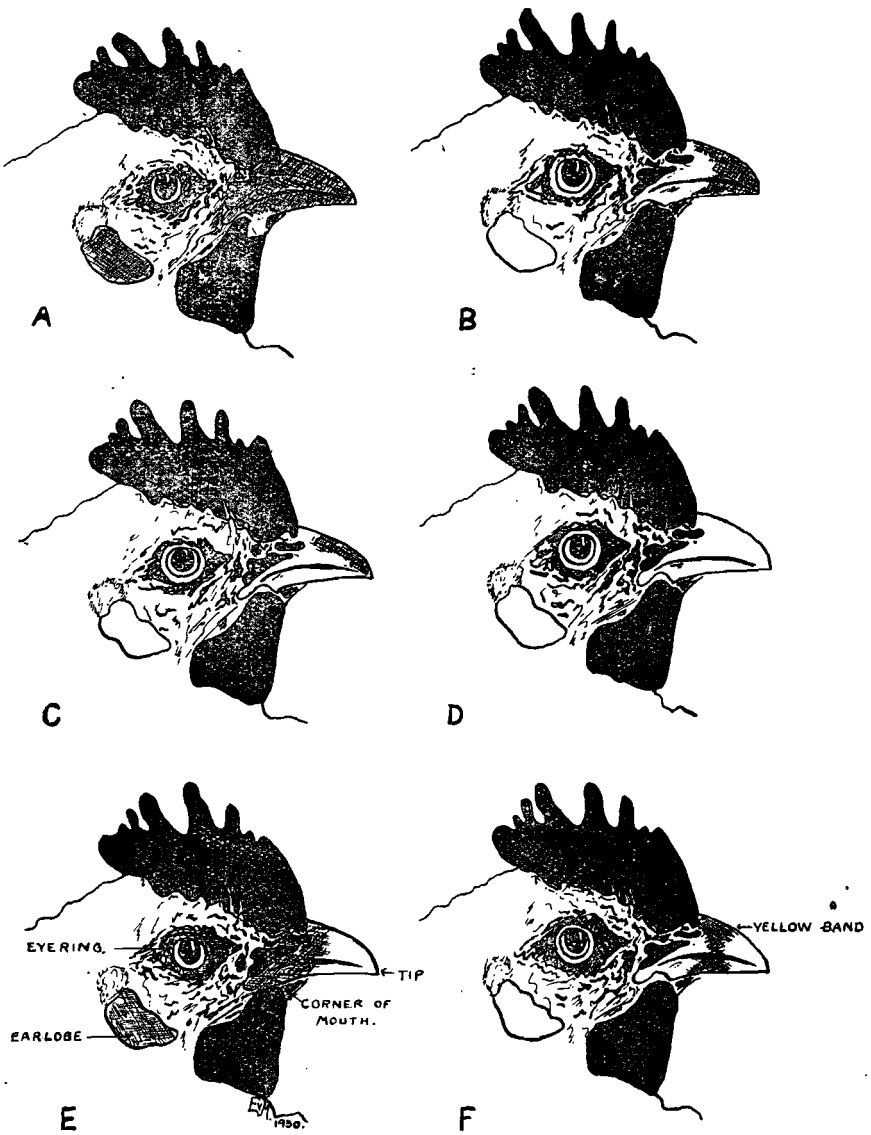
When a fowl starts laying, whether as a pullet or as a hen after the moult, this yellow pigment gradually disappears. A well matured and healthy pullet and one which has been reared on foods rich in pigment-producing substances, will be heavily pigmented before she starts laying. After the laying of the first two or three eggs the vent becomes bleached and almost at the same time the eye ring loses colour—(Fig. 4B). The ear lobes are the next to bleach, and a white ear lobe is generally an indication of two to three weeks of laying, or approximately ten to fifteen eggs. During this time the beak has also undergone some bleaching, and this has occurred mostly at the corner of the mouth. With increased laying the beak becomes entirely bleached, the last part to lose its colour being the arch on the upper mandible—(fig. 4C.D). Such a condition in a layer generally indicates six to eight weeks of heavy laying or a matter of from thirty to forty eggs.

The shanks are the last to bleach and well bleached shanks generally indicate a period of production equivalent to from four to six months of heavy laying or approximately 120 to 150 eggs.

When a fowl ceases laying, the yellow pigment is again deposited in the body, but it now returns more rapidly than it disappeared; further, it returns in the same order in which it was removed, viz. (1) vent and corner of beak; (2) eye ring; (3) ear lobes; (4) beak; (5) shanks. Fig. 4 E shows a bird that is resting and which has been out of production for about a month. A few weeks more of resting will have the result of bringing the colour back to the entire beak. A case of a bird which has again started to lay after having taken a rest is shown in F, fig. 4.

Although pigmentation is an important factor in culling, it should never be used as the only means of distinguishing between good and bad layers. The bird should be carefully handled and the pigmentation

used to assist in determining the length of time the bird has been out of production. A hen with a very yellow beak and shanks has not been laying very heavily for several months. The beak alone may be used to tell what a hen has been doing during the past month or six weeks.



PIGMENTATION.

Fig. 4.

MOULTING.

The moult is a natural process and all hens follow a regular order in which they tend to moult their old plumage. The regular order for

the moult is: first, neck feathers, then body, tail, and wing. There appears to be a wide variation in the progress of the moult, so that it is not at all uncommon to find birds losing all their feathers at one time. Others again follow the regular order and moult section by section. After shedding the neck and body feathers, the bird grows these in as rapidly as possible in order to provide warmth for the body. Thus nature has provided that the bird should finally moult those feathers which help her in escaping from her natural enemies, so that the two risks shall not come at the same time; viz. those of exposure and inability to elude natural enemies.

The Wing Moult.—There appears to be a regular order for the wing moult as well. It is generally believed that when a general moult, as opposed to a partial moult, starts, that fact is registered in the primaries of the wing. The primary feather next to the axial feather is the first one to drop. Each subsequent feather is then dropped. Birds do not shed the feathers from the one wing without shedding the same from the other wing at nearly the same time. When one feather is lost from one side of the axial feather, the companion feather (secondary) on the other side disappears very shortly afterwards. It is also very common to find two or more feathers dropped from the wing at the same time.

The growth of the primaries occurs in the same order in which they were moulted. Thus, the first feather to grow in is the one next to the axial feather and then the others in succession until they are all renewed. It may also happen that some feathers are not dropped at all, but are carried over until the following moulting season. In such a case the moult again starts with the first primary feather. Moreover, one may find that while renewing the primaries the bird may shed some of the feathers she has already grown in, only to grow these in once more. It takes approximately six weeks for the first or inner primary to be completely renewed and about two weeks for each additional primary. Accordingly, it will take twenty-four weeks to renew all the primaries of the wing. The main tail feathers are also moulted in pairs, the two centre ones being the first to drop.

The False Moult.—The natural season for the regular moult of adult fowls is during late summer or autumn, and moulting at any other season is both unnatural and unnecessary. When hens moult out of season, the direct cause is generally some form of mismanagement. This phenomenon is the so-called false moult and is generally preceded by a fall in egg production. Where hens are not sufficiently fed, or where the rations are not properly balanced, with a consequent fall below normal weight, a false moult is apt to occur. It takes place most commonly in the winter and spring. Special precautions should be taken to keep the hens up in weight, and any changes which may have to be made, especially with regard to management, should be

very gradual. Hens should not be alarmed in any way, neither should they be subjected to any kind of shock. Where pullets have been laying heavily during winter, they are very liable to lose condition during spring, owing to increased production during this favourable period, and they may go into a false moult if not properly cared for.

The false moult, if checked in time, is generally confined to the neck and feathers only. If, however, it is allowed to continue there may be a more or less general moult of the body feathers, so that the birds will be out of production for quite a while.

The false moult is generally dreaded by poultry farmers as it may come during the valuable winter egg production period or during the spring when so many eggs are needed to pay for the feed of old and young stock. This moult can generally be averted if the causes are understood. As long as birds lay at whatever rate is normal to them, whether that be 18, 20, or 25 eggs each per month (according to capacity of birds), there is no danger of the false moult. When, however, the production drops to 40 per cent., a plentiful supply of green food should be supplied, for then only can a moult be prevented by overcoming the fall in egg production.

A serious study of feeds and their purposes, as well as of the natural conversation of the birds from day to day, is the one safe way to learn how to avert an out-of-season moult.

Forcing the Moult.—Under proper and careful management birds will tend to moult during late summer or early autumn or even during late autumn or early winter. The moult, however, can be brought on at any earlier date if it is so desired. By changing the nature of the feed or by starving the birds they can be induced to begin to moult early. *This method of forcing the moult does not appear to be advantageous to the poultryman. The birds ought to be left to moult at the natural moulting season.*

There is a more or less prevalent idea that if hens are forced to moult by being starved, a large number of eggs will be produced when the hens are put back on full feed. What actually results when the forced moult is attempted is the loss of those eggs the hens would naturally have produced during the late summer and early autumn, with no compensating winter production.

Moulting versus *Quitting (of Production).*—These two terms, although not synonymous, are almost always used in such a way that they denote the same thing—thus the inference is that a moulter is a quitter or that a quitter is a moulter.

Moulting refers to the shedding of the plumage for the purpose of its renewal, whereas quitting refers to the ceasing of egg production.

The question naturally arises: which comes first? The answer is—either, depending upon many factors, of which the time of the year seems to be one of the most important.

During the early part of the moulting season more birds will be found that first quit and then moult, and during the later part of the season more birds will be found that start their moult before they stop laying. Also, the poorer layers start to moult after they have ceased laying, while the productivity of good layers declines after the commencement of the moulting. These, however, are not invariable rules, for there are birds that in the early part of the season will start to moult before they stop laying, even as there are birds that later in the season will start to moult only after they have finished laying. Thus, the two terms referred to above are not synonymous and should never be used as such.

Early versus *Late Moulters*.—It has generally been conceded that the early moulters are the poor layers and the late moulters the good layers. The most trying period of the moult seems to be when the bird starts her wing moult. In the regular moult, the birds will have been moulting her neck and body feathers for some time before she starts her wing moult. It frequently happens that good layers start moulting quite as early as do poor layers, but that the poorer birds grow in their primary wing feathers faster than the better producers, owing to the fact that the better producers are laying and moulting at the same time. Thus it becomes evident that, using the term moulting in its correct meaning, we cannot say that all early moulters are poor producers. A bird that has definitely quitted laying for the season and then moults early may safely be called a poor producer. Again, we may find that there are some good hens that may moult during the summer because they are fed on an insufficient ration that does not allow them to lay eggs.

There is no disputing the fact that the very late moulters are the best layers. However, birds should be classed as poor or good, not on their moulting, but rather on their final ceasing of production, for almost invariably the poor producers are early quitters and the heavy producers late layers.

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Studies in Native Animal Husbandry.
9. The West African Shorthorn.

By Dr. H. EPSTEIN, Jerusalem.

1. General Characteristics of the West African Shorthorn.[1]

The shorthorned or brachyceros cattle of West Africa are the dominant type in the coast regions of Rio de Oro, Senegambia, Liberia, the Ivory and Gold Coasts, Togo, Dahomey, and Nigeria. Their absolute number, however, is small, with the exception of the two last-mentioned countries, where they are found further inland as well, on the shores of the huge swamps. Otherwise their range is restricted to a coastal belt not deeper than about 25 miles. They live in the neighbourhood of the native villages in a half wild state.

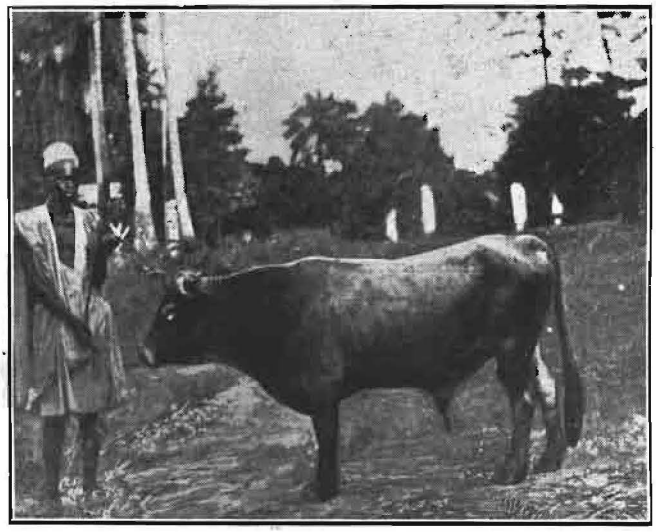

Fig. 5.—West African Shorthorn Bull (with loose horns). After Pierre.

The importance of the Shorthorn to the native tribes of the West Coast is not considerable, owing as much to the small number of these animals as to their low milk and beef production. Only in point of hardiness are they superior to other breeds of cattle found in the coastal regions of North-West Africa, being completely acclimatised to the moist and deadly forest climate.[2]

(1) The term "shorthorn" here refers to the type found not only in West Africa but also along the northern and north-eastern parts of Africa. It must not be confused with the Shorthorn breed.

(2) H. J. Johnston, *Liberia*, Vol. II, p. 909.

Their resistance against disease is stressed in a report by Leplae[3] who mentions that in the forest regions of the Belgian Congo, where other breeds of cattle do not thrive, splendid results have been obtained with dwarf animals from Dahomey and Nigeria.

The West African Shorthorn cattle are, according to Pierre[4], very small in size, fairly uniform in conformation, and either horned or hornless. They stand about 36 to 42 inches at the withers, thus being among the smallest dwarf breeds in existence.

Fg. 6.—West African Shorthorn Cow (hornless). After Pierre.

The head is relatively short, the profile straight, and the ears are large. The horns are very small. Their direction is generally outward and downward, sometimes lateral and slightly forward. In numerous instances the horns are devoid of cores and loose, or entirely absent. Some animals possess one loose and one normally developed horn. It is an interesting observation that the smallest and most degenerate members of a herd are also those which are most commonly devoid of horns. The surface of the horns is rough and uneven, rarely smooth.

The forequarters show a comparatively better development than the narrow hindquarters. The neck of the bull is short and thick, the dewlap fairly well developed. In cows the dewlap is hardly noticeable. The loin and hips are narrow and the thighs thin. The rump is prominent, and the tail strong at the base, with a fairly high setting. It reaches almost to the ground, ending in a prominent switch.

(3) E. Leplae. *Organisation et exploitation d'un élevage au Congo Belge. I. Bêtes Bovines*, p. 260.

(4) C. Pierre. *L'Elevage dans l'Afrique Occidentale Francaise, pp.* 112—113.

The following measurements are recorded by Pierre :

Height at withers	42	inches
Height at rump	42	,,
Girth of chest	61	,,
Height of foreleg	24	,,
Length of head	17.6	,,

The colour of the West African Shorthorn is generally black and white, or brown and white. Red animals are rare.

The live weight of mature cattle varies between 155 and 300 lbs. The dressing percentage does not exceed 40%. The meat is tough and almost devoid of fat.

The milk production of this breed is not superior to its beef qualities. The udder is very poorly developed. The natives make no use of the milking qualities of their cattle, the dams feeding their offspring until they dry off in the course of nature.

Fig. 7.—Dwarf Shorthorns from Dahomey. After Leplae.

2. Description of a Male Skeleton from Nigeria.

In the Museum of the Veterinary Research Laboratories at Onderstepoort is the skeleton of a dwarf shorthorn beast from Nigeria, which has been presented by Captain Henderson. The skeleton is that of a bull which was about three years of age. See Fig. p.

The height of the skeleton, at the highest point of the spinous processes of the dorsal vertebrae, is 890 mm, a measurement which

closely corresponds with the height of living animals, as recorded by Pierre. The spinal column shows a slight depression in the region of the loins, the ribs are narrow, and the bones of a fairly dense texture.

The tips of the spinous processes of the dorsal vertebrae do not show the slightest suggestion of a cleft, that unmistakable sign of an admixture of zebu blood. This is of importance since zebus, or at least cattle carrying a share of zebu blood, have wandered as far west as the Gold Coast and the regions beyond, in the bend of the Niger.

The skull of the West African Shorthorn shows all those features which are characteristic of the original breed of the primitive lake dwellers of Switzerland, named by R. Owen *Bos taurus longifrons* and by L. Ruetimeyer *Bos taurus brachyceros*.

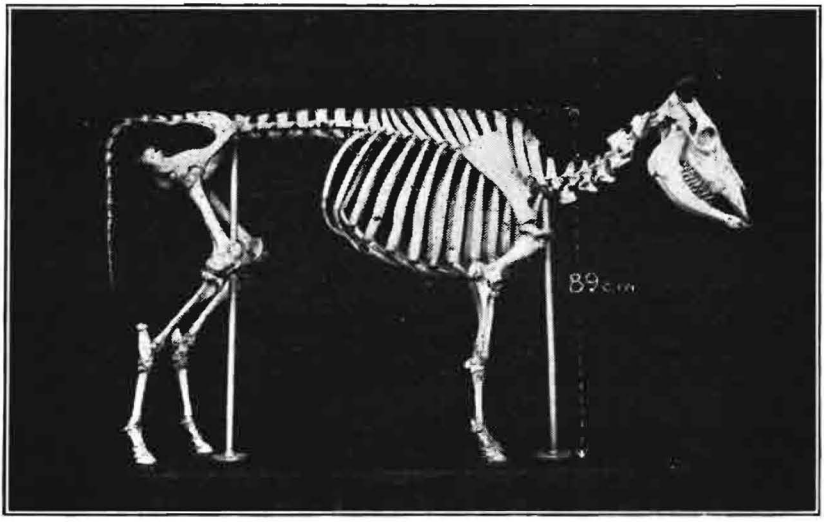

Fig. 8.—Male Shorthorn Skeleton from Nigeria. Onderstepoort.

The forehead is very uneven, mainly owing to a bony elevation in the median line which rapidly declines on all sides. Between the orbits this elevation passes into a distinct concavity. Its decline towards the nasals is separated from the orbits by broad supra-orbital fossae.

There is another elevation at the point where the parietals send a triangular lap into the forehead, taking part in the formation of the latter. This crest declines rather steeply towards the horn cores. From the frontal elevation in the centre of the forehead it is separated by a shallow depression.

The elevations and concavities on the surface of the forehead give the skull a very uneven appearance, a phenomenon which is described

by all authors on this subject as a typical feature of the brachyceros skull. In particular, it has been pointed out by Adametz[5] in connection with the skulls of the primitive Illyrian and Albanian brachyceros cattle. Skulls of shorthorn cattle from Palestine, in the Museum at Onderstepoort, are very similar in this respect.

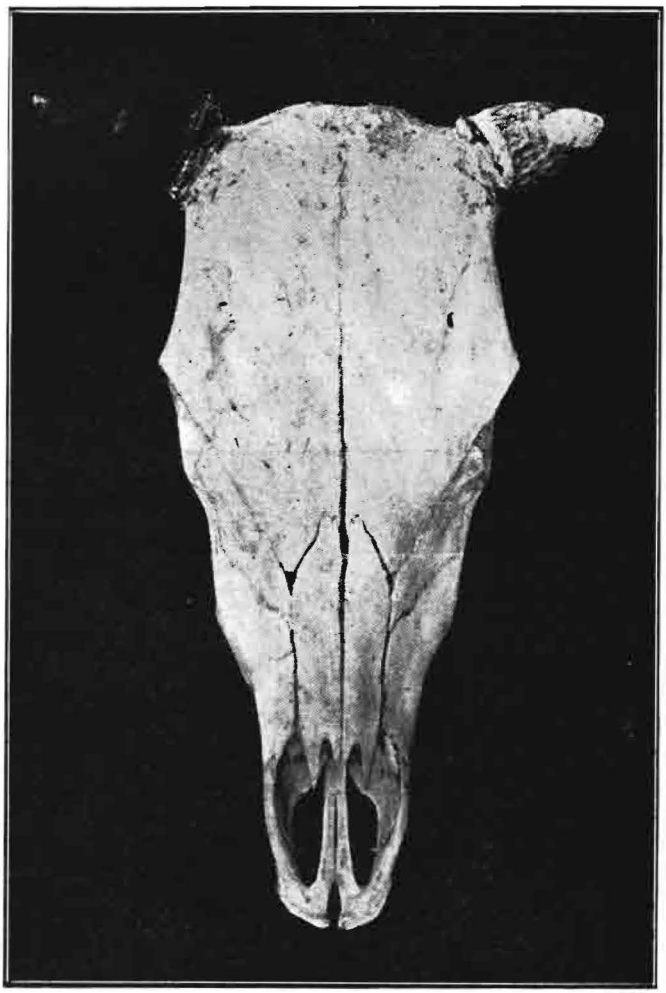

Fig. 9.—Frontal surface, West African Shorthorn bull (A.82). Actual frontal length 38.4 cm.

The horns of the skeleton at Onderstepoort are normally developed. They are short and relatively thick and leave the skull in an outward and upward direction, their tips pointing slightly forward. The length

(5) L. Adametz. Studien zur Monographie des Illyrischen Rindes. *Journal für Landwirtschaft,* 1895.

Idem. Untersuchungen über den Schädelbau des Albanesischen Rindes. *Zeitschrift für Landwirtschaftliches Versuchswesen,* 1898.

of the horn is 78 mm, its basal girth 156 mm, whilst the basal girth of the core measures 132 mm.

The horn cores are not attached to stalk-like projections of the frontals, as in the case of some other types of African cattle, but are placed directly upon the skull. They are typically "brachyceros" in shape and direction, being very slightly compressed and turned forward around their axes.

The colour of the horn is greyish-black throughout.

The angle formed by the occipital plane and forehead is 77°, i.e. more acute than the average figures of primitive brachyceros cattle which vary between 85 and 90°. The exact measuring of this angle is very difficult owing to the unevenness of the forehead and the height of the crest. As a matter of fact, the size of this angle depends to a large extent on the development of the latter. It is therefore of less importance to the classification of brachyceros skulls than is generally believed.

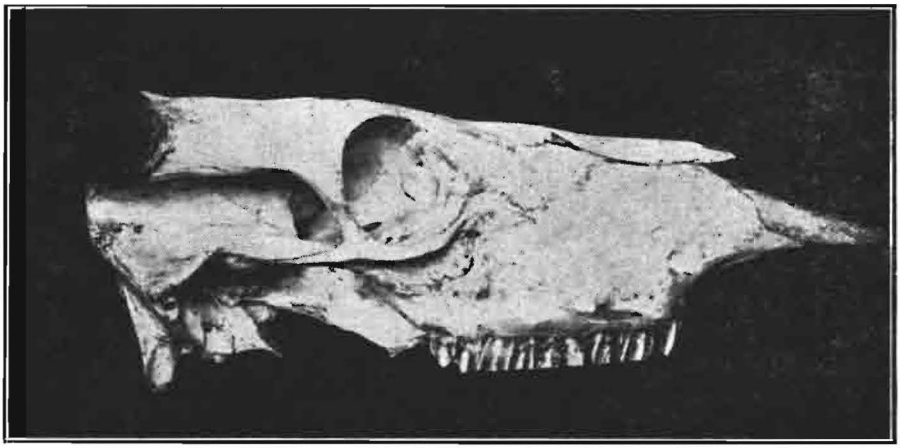

Fig. 10.—Lateral surface, West African Shorthorn Bull.

The nasals are fairly broad and slightly bent at the root. The outer edges are curved, and the exterior processes well developed. The malar point is prominent, the palate flat. The lacrimals run in a straight line from the orbits to the nasals. The intermaxillaries end at a distance of 20 mm. from the latter. There is a triangular hole where the frontals, nasals and lacrimals join.

Laterally, the orbits stand out considerably. Their temporal edges are fairly sharp and rugged. The orbital cavities are turned slightly forwards and are almost circular in outline.

The temporal cavities are narrow in front and fairly deep. Towards the back of the skull they broaden considerably. Their length is 117 mm, their breadth at the narrowest point 28 mm, and their depth 26 mm.

The posterior edge of the upper branch of the lower jaw bone ascends almost vertically. The horizontal branch begins to rise gradually from the region of the first molar. The length of the alveolar border is moderate.

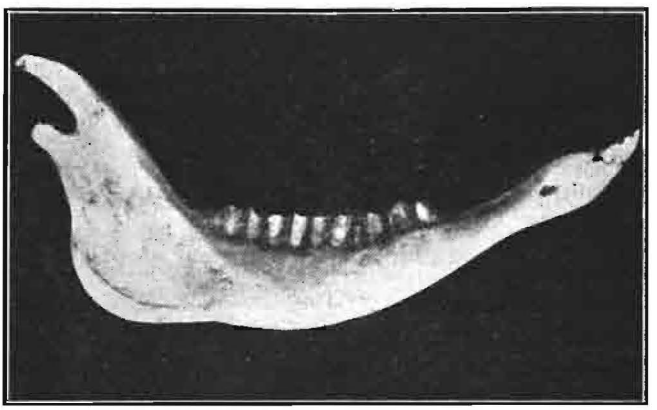

Fig. 11.—Lower jaw of West African (Nigeria) Shorthorn Bull (A 82).

The teeth are typically "brachyceros" in character. The glossal surfaces of the upper cheek teeth form a flat concavity. The tables form a convexity. The upper molars and premolars are fairly vertical, whilst the lower premolars are bent slightly backwards. The lower teeth form a concavity which fits into the convexity of the upper teeth.

The Nigerian skull shows in every respect pure "brachyceros" features, i.e. those characteristics which are typical of the palustris cattle of the lake dwellings, the Ehringer and Tuxer breeds of Switzerland, the Jerseys of the Channel Islands, the Albanian and Illyrian cattle of the Balkans, and the shorthorned breeds of Asia Minor, Syria, and Palestine as well as those of Egypt, Tunis, and Algeria. The West African Shorthorns must therefore be considered a pure brachyceros breed, entirely devoid of any admixture of zebu or primigenius blood.

3. Skull Measurements.

Anterior length of skull	391 mm.
Posterior length of skull	356 ,,
Length of forehead	197 ,,
Post-orbital lateral length of forehead	123 ,,

Total lateral length of forehead	172	mm.
Facial length	200	,,
Distance between horn bases	111	,,
Narrowest part of forehead	149	,,
Broadest part of forehead...	164	,,
Width of facial tubercles...	123	,,
Length of nasals	125	,,
Width of nasals	48	,,
Length of intermaxillaries	86	,,
Width of intermaxillaries...	56	,,
Height of supra-occiput	96	,,
Height of entire occiput	128	,,
Smallest width of occiput...	106	,,
Greatest width of occiput...	161	,,
Length of temporal fossa...	121	,,
Depth of temporal fossa	30	,,
Length of palate	216	,,
Distance from basi-occipital sphenoid to end of palate	96	,,
Width of palate	67	,,
Length of lower jaw	300	,,
Length of lower dentition...	126	,,
Length of upper dentition	119	,,
Toothless part of palate	112	,,
Depth of frontal concavity	9	,,
Depth of crista	28	,,
Lateral depth of crest	38	,,
Projected depth of crest	5	,,
Height of crest above horn base...	8	,,

4. The Origin of the West African Shorthorn.

Johnston and Pierre, in whose works reference is made to the origin of the shorthorn cattle of West Africa, are both of the opinion that this breed has been imported from Europe. Says Johnston[6]: "The black and white or brown and white dwarf small-horned cattle which are the dominant breed in the coast regions of Liberia seem to be entirely of European origin and to have come from Holland," and two pages further..."the parti-coloured short-horned cattle, though they may have been brought direct from Northern Europe, have in the course of three centuries become a well established local breed." Pierre[7], on the other hand, expresses the view that "this animal presents all the characters of the Iberian breed which has been imported to Madeira, the Azores and Angola long ago."

(6) H. Johnston, *op. cit.* pp. 907 and 909.

(7) C. Pierre, *op. cit.* p. 112.

Neither of these authors, however, produce any proof of their assertions. As a matter of fact, the racial character of the cattle population of the Netherlands has never been brachyceros proper, even the modern Friesland cattle being of mixed primigenius and brachyceros type. Considering this, in addition to the fact that no records exist of such early importations of Dutch cattle into western Africa, it appears that Johnston arrived at his view purely from a consideration of the black and white or brown and white coloration common to the West African Shorthorn and the cattle of Holland.

It is more difficult to refute Pierre's theory that the shorthorn cattle of West Africa have been imported from the Spanish Peninsula where pure brachyceros cattle indeed occur, especially in the Pyrenees and the Cantabrian Mountains.

It must, however, be remembered that the West African Shorthorns are of very ancient stock, as is apparent from their complete acclimatisation to the moist forest climate of the tropics, and that their range is not restricted to West Africa, but that it extends from there, in an uninterrupted stream, to the shores of the Mediterranean coast of the continent. It is therefore much more likely that the shorthorn cattle of West Africa are a natural offshoot of the shorthorn cattle of Morocco, to which they are very nearly allied racially, than that they are of relatively modern European origin. It should be noted in this connection that the cattle of Portugal, whose seafarers are so often credited with having imported their stock to almost any part of Africa, are of longhorned primigenius, and not of brachyceros, type.

The countries of the north coast of Africa, i.e. Morocco, Algeria, Tripoli, and the outskirts of the Libyan Desert, are inhabited by a bovine type racially identical with the West African Shorthorn, although not quite so dwarfish. The slight difference in bodily size, however, is of no racial importance, since in the regions of the tropical rain forest practically all domestic animals, in addition to man, are dwarfed.

The shorthorn cattle of northern Africa do not originate from the Iberian Peninsula; on the contrary, the shorthorn cattle of eastern and northern Spain have come from Morocco, by way of the Straits of Gibraltar, and have thence spread northwards, along the west coast of France, to the Channel Islands (Jerseys) and Britain (Celtic Shorthorn).

The West and North African Shorthorns originated from Egypt whither they were imported from Asia at the end of the Neolithic period (fossils from Toukh), by way of the Isthmus of Suez. From the Nile Valley they spread westwards, along the north coast of Africa, and southward, to Nubia, Massowah, and Eritrea.

They came to Egypt in the train of the Hittites, one of the most powerful peoples of ancient times, who inhabited Palestine, Syria, and the countries to the north; and, afterwards, with the Hyksos, who were closely related to the Hittites. In later times, Phoenician traders brought numerous shorthorn cattle into the continent—(the cattle of the Phoenician colony Carthage were of brachyceros stock)—until finally the shorthorned breed completely replaced the indigenous longhorn cattle in the valley of the Nile and all along the north coast of Africa.

The reasons for this change from the longhorn to the brachyceros type are not quite clear. Biological factors were probably decisive. It is likely that the shorthorn cattle possessed a greater power of resistance against disease, a view which is supported by a remark of Johnston's that, although the longhorned cattle of the Mandingo Plateau seem to stand the moist forest climate of Liberia fairly well, they have not become so completely acclimatised as is the case with the shorthorned cattle. The Shorthorns also seem to have been tamer than the long-horned cattle, and their milk production higher.

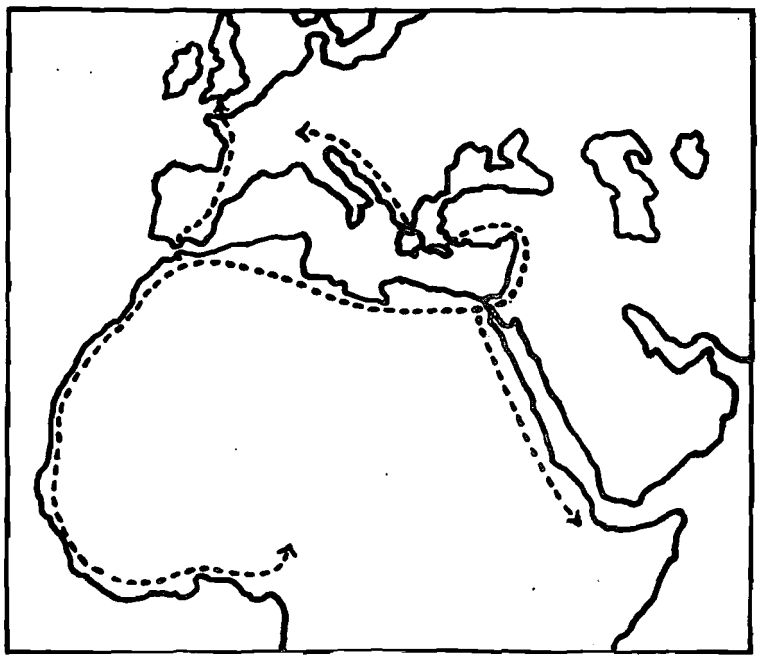

Fig. 12.—Migration Routes of the Shorthorn Cattle from Asia Minor to Africa and Europe.

In the countries which flank the migration route of the shorthorn cattle from Asia Minor, the centre of the Hittite Empire, to Egypt, the cattle are to this day of true brachyceros type. There is hardly any osteological difference, except in point of size, between the skulls of

two brachyceros animals from Palestine, in the Museum at Onderstepoort, and the West African Shorthorn, particularly as regards the character of the occiput, forehead, horn cores, and teeth. The same applies to the cattle of Syria and those of Asia Minor.

The fact that the migration route of the West African Shorthorn cattle can be traced back to Asia Minor does not imply that the westernmost part of Asia was actually the original home of the brachyceros cattle. Asia Minor was the starting point of two important migration routes of the breed: the one to Africa, and thence through eastern Spain to France and Britain; and the other to Greece, the eastern coastlands of the Adriatic, Switzerland, and Central Europe. But the habitat of the brachyceros cattle is much more extensive than the countries hitherto mentioned.

The original home of the Hittites, who played such an important rôle in the introduction of the shorthorned breed into Africa, is thought to have been in that part of Armenia where the Euphrates, the Halys, and Lycus approach nearest to one another. But whether Armenia was also the home of the shorthorn cattle or whether their origin has to be traced to Turkestan or a country east thereof, we do not, and probably never shall, know. For the range of the brachyceros cattle in Asia extends from Asia Minor through Armenia, Turkestan, Mongolia, and China to the Japanese Isles, occupying a stretch of land more extensive than that of any other bovine race in the world.

5. The Ancestors of the Shorthorn Cattle.

Three different theories have been advanced on the subject of the ancestry of the brachyceros cattle. One of the oldest and widest known is that of Keller[6] who tries to trace the progenitors of the shorthorn cattle to the zebus of Africa. His view is primarily based on the study of a number of skulls of Somali zebus which show certain brachyceros features.

If Keller's theory were correct, we would be driven to the conclusion that those shorthorned zebus which migrated from Somaliland to the north have lost their humps, the cleft in the spinous processes of the dorsal vertebrae, and all other zebu features, changing gradually into true brachyceros animals, whilst those wandering southwards have preserved their pure zebu character to this day. And we could not support this strange theory even by reasons of climate and surroundings since the climatic conditions of northern Africa are very similar to those of the southern part of the continent.

(6) C. Keller. *Das Afrikanische Zebu-Rind und seine Beziehungen zum Europäischen Brachyceros-Rind.* Zürich, 1896, pp. 480—487.

Again, if the shorthorns of Egypt were to have come from the south, we ought at least to find some ancient records in support of this theory; yet there are none. On the contrary, all records go to show that the brachyceros cattle entered Egypt from the north through the Isthmus of Suez.

But Keller's theory of the zebu descent of the brachyceros cattle is not refutable only by geographical and historical facts. It lacks support from an anatomical viewpoint also. Even a superficial comparison between the narrow, convex, and horse-like zebu skull and the fairly broad, dishing, and expressive head of an African shorthorn precludes the possibility of such a relationship. And the examination of zebu and brachyceros skulls shows that there is no resemblance between these species in any important osteological feature. There are certain similarities between the zebus of Somaliland and the African shorthorns. But the Somali cattle are, racially, by no means the purest members of the zebu group; on the contrary, they have been considerably influenced, particularly in their more northern representatives, by the admixture of shorthorn blood.

Having disposed of the theory of the zebu descent of the brachyceros cattle, we need not concern ourselves with the relationship between the latter and *Bibos sondaicus* to which Keller traces, through the link of the zebu group, the ultimate descent of the African shorthorn.

But this does not settle the problem of the descent of the West African brachyceros cattle. For there are two other theories which have to be investigated. The one regards the brachyceros cattle as the progeny of a wild dwarfed ox; the other theory considers that they are descended from *Bos primigenius*, and that their anatomical peculiarities are due to the effects of domestication.

The size of the skull of *Bos primigenius* is by no means uniform throughout the whole species. There are skulls of truly gigantic dimensions and others which are fairly small. But even these small skulls are of pure primigenius character and show none of those characteristics which distinguish the skull of *Bos taurus brachyceros*. They probably belonged to animals that were stunted.

There is only one fragment to which reference can be made in support of the theory that the brachyceros cattle are descended from a dwarfish wild ox, namely, the back portion of a skull which has been found in the oldest Quaternary or the youngest Pliocene in Italy. This piece, which shows differences from *Bos primigenius* similar to those shown by the shorthorn bull, has been described by Pohlig who named the animal to which it belonged *Bos brachyceroides*.[9]

(9) H. Pohlig. Bovidés fossiles de l'Italie. ***Bull Soc. Belge de Géologie,*** Tome XXV, 1911.

The theory has been advanced that this skull fragment belongs to a wild species, because it has been found together with molars of *Elephas meridionalis*. Beyond this skull no further proof exists that there actually lived a dwarfed wild ox with brachyceroid features at the side of *Bos primigenius* throughout Europe and Asia. The possibility has therefore to be considered that the skull of *Bos brachyceroides* is that of a domestic animal, and that it has come to lie near the molars of *Elephas meridionalis* merely by accident. Similar coincidences are by no means rare.

From an historical viewpoint, in any case, it is impossible to consider a European origin of the brachyceros cattle. At the time when the nations of Mesopotamia and Egypt had already passed through thousands of years of civilisation, the inhabitants of Europe were still on the lowest step of their cultural development. All historical, linguistic, cultural, archaeological, and anatomical factors prove that the shorthorn cattle of western and northern Africa, as well as those of the lake dwellings of Switzerland and the Balkan Peninsula, originated from Asia where they had been domesticated long before the beginning of the Babylonian civilisation.[10]

We can therefore turn to the third theory of the descent of the brachyceros cattle, namely, that which regards *Bos taurus brachyceros* as a stunted and dwarfed domestication form of *Bos primigenius* which has become constant through mutation. The scientific foundation of this view has been laid by Klatt in his study on the influence of the total body size on the skull formation.[11]

According to Klatt, all differences of the shorthorn skull from that of *Bos primigenius*, such as the relative height of the occiput, the broad palate, the big orbits, the shallow temples, and the steep ascension of the vertical branch of the lower jaw, are due to the fact that the brachyceros skull as a whole is smaller than that of *Bos primigenius*.

The differences in the relative skull measurements of big and small animals are explained by physiological reasons. The most important part of the head is the brain, which is the expression of the major part of the "total inner energetic situation" of an animal. The inner energetic situation of a small animal is relatively greater than that of a big one. Small animals show a relatively more intensive metabolism. The surface of their bodies is also larger in comparison. The result is a relatively greater number of sensory nerve endings and correspondingly larger nerve centres in the brain. The same applies to the motor nerves.[12]

(10) J. U. Dürst. *Die Rinder von Babylonien, Assyrien und Agypten*, p.85.

(11) B. Klatt *Uber den Einfluss der Gesamtgrösse auf das Schädelbild*, pp. 449—550.

(12) B. Klatt, *op. cit.*, p. 400.

If the skeleton, with the skull, decreases in size, the brain does not become smaller in the same ratio, nor, of course, the bones surrounding the brain. If the size of all bones does not decrease in the same proportion, it is evident that the relative skull measurements must differ in large and small mature animals of the same species. It is, therefore, a general rule that in small animals the bones surrounding the brain are relatively larger than in big animals.[13]

All domesticated bovines are smaller than their wild ancestors. This is due to the unfavourable influence on their growth and development of the primitive and unnatural conditions under which they were kept in captivity. Those features and measurements of the skull, whether absolute or relative, by which the shorthorn cattle differ from *Bos primigenius*, can thus be explained as the natural outcome of the domestication process. They do not refute the theory of the close relationship between the brachyceros cattle and the ur; on the contrary, they support it from every point of view. We have therefore no reason to look, in our quest of the ancestors of the West African Shorthorn, for a new species of wild ox, or to assume that the brachyceros cattle are descended from a dwarfish form of *Bos primigenius*.

The brachyceros form of *Bos taurus* probably owes its origin to a mutation which occurred in a certain Asiatic form of *Bos primigenius* through the influence of the domestication process. Since this mutation has made permanent such features as are in practically all bovines the natural outcome of the unfavourable conditions of domesticity, it is not likely that the factors governing this mutational change of the racial character made their appearance in the chromosomes before the domestication of the wild *Bos primigenius* took place.

We can assume that there lived once in some part of Asia a local subspecies of *Bos primigenius* in the domestic descendants of which those physical characteristics that, throughout the animal world, are found only in the state of domestication, and which in *Bos taurus* are called "brachyceros," became fixed by mutation.

REFERENCES.

ADAMETZ, L. Studien zur Monographie des Illyrischen Rindes. *Journal für Landwirtschaft*. 1895.

——— Studien über Bos brachyceros Europaeus. *Journal für Landwirtschaft*. 1898.

——— Untersuchungen über den Schädelbau des Albanesischen Rindes. *Zeitschrift für Landwirtschaftliches Versuchswesen*. 1898.

ANTONIUS, O. *Grundzüge einer Stammesgechichte der Haustiere*. Jena 1922.

DUBOIS. *Sur le rapport de l'encéphale avec la grandeur du corps chez les mammiferes*. Paris 1897.

(13) H. Gans. *Banteng (Bibos sondaicus) und Zebu (Bos indicus) und ihr gegenseitiges Verhältnis*, p. 33.

DÜRST, J. U. *Die Rinder von Babylonien. Assyrien und Aegypten.* Zürich 1899.
—— *Animal Remains from the Excavations at Anau, Turkestan.* Washington 1908.
EPSTEIN, H. *The Origin of Africa's Indigenous Domestic Animals.* (In preparation).
GANS, H. *Banteng (Bibos sondaicus) und Zebu (Bos taurus) und ihr gegenseitiges Verhältnis.* Merserburg 1915.
JOHNSTON, Sir H. *Liberia.* London 1906.
KELLER, C. *Das afrikanische Zebu-Rind und seine Beziehungen zum europäischen Brachyceros-Rind.* Zürich 1896.
KLATT, B. *Ueber den Einfluss der Gesamtgrösse auf das Schädelbild.* Leipzig 1913.
LAURER, G. *Beiträge zur Abstammung und Rassenkunde des Hausrindes.* Königsberg Pr. 1913.
LEPLAE, E. *Organisation et exploitation d'un élevage au Congo Belge. I. Bêtes Bovines.* Brussels 1926.
NEHRING, A. *Riesen und Zwerge des Bos primigenius.* Berlin 1889.
PIERRE, C. *L'Elevage dans l'Afrique Occidentale Francaise.* Paris 1906.
POHLIG, H. Bovidés fossiles de l'Italie. *Bull. Soc. Belge de Géologie.* Tome XXV 1911

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I desire to record my indebtedness to Mr. J. H. R. Bisschop for his assistance in taking measurements of the West African Shorthorn skeleton at Onderstepoort, and to Dr. P. J. du Toit, Director of Veterinary Services, for his permission to publish photos thereof.

My work in connection with this study has been rendered possible by a grant awarded by the Research Grant Board of the Union of South Africa from funds provided by the Carnegie Corporation of New York, United States of America.

It was originally intended that Drs. Curson and Epstein prepare a joint article on the West African Shorthorn. Owing to the latter's extended sojourn in Palestine and elsewhere Dr. Curson submitted his part independently of Dr. Epstein's which arrived later, but just in time for inclusion in this number of the journal.

The two articles treat the subject from different angles and are thus complementary.

This will also explain the absence of reciprocal acknowledgement in their respective articles of the mutual assistance which they have undoubtedly rendered each other and which they intend continuing to render in the pursuance of this research.—(Ed.)

Jl. S.A.V.M.A.
V (3) 1934.

Native Animal Husbandry: Study No. 10. The West African Shorthorn *(Bos brachyceros)*.

By H. H. CURSON, Dr. Med. Vet., F.R.C.V.S.

Introduction.

Although called the West African Shorthorn, it must be emphasised that the type to which this beast belongs is represented throughout North Africa and North-east Africa as far south as Eritrea. The type is *Bos brachyceros* which, originating in Asia, accompanied human migrations through North Africa and throughout Europe (Epstein). It would appear that Stewart (*Annual Rpt., Gold Coast*, 1929-30, p. 10) first used the name West African Shorthorn "owing to their similarity to the old Celtic Shorthorn of Roman days."

Stewart remarks (*Annual Rpt., Gold Coast*, 1930-31, p. 23) that the similarity of the native cattle to certain British breeds is so striking that "there is a popular idea ... that the Coastal cattle were introduced by the Portuguese or Dutch." Obviously, as will be seen later, this is incorrect.

Distribution in Africa.

Since most information is available from the Gold Coast and Nigeria the type will be first described as it occurs in these countries.

The Gold Coast and Nigeria.

Origin.—As the cattle "are owned solely by the pagans[1] while the Zebus[2] are mainly the property of the Mohammedan tribes, of alien origin, it is believed by Stewart that "these Shorthorn cattle are the oldest domesticated breed in West Africa," domestication having taken place in the Sahara "when it was a fertile well-watered country[3]."

Stewart proceeds as follows :—"All the pagan tribes claim as their original home, Ghana or Walata," a dynasty "which had its centre in the Western Sudan to the W.N.W. of Timbuctoo on the Upper Niger

(1) Stewart writes (his letter 404/96/1930 dated 10/3/34) that "the cattle are owned by the settled indigenous farmers, many of whom are Mohammedans, while most of the zebu cattle of Nigeria are owned by nomads, mostly Fulani, many of whom are pagans and not Mohammedans." The West African Shorthorns are sometimes referred to as Pagan Cattle.

(2) Including the Sanga of Epstein, *i.e.* a cross between the Egyptian Longhorn and the Longhorned Zebu.

(3) Even in pre-dynastic times (prior to *c.* 3400 B.C.) desert conditions existed in the Sahara!

(2,000 years ago). According to tradition the people were pastoral ... The people of Ghana were undoubtedly driven south by the later Mellestines and Songhais." Stewart adds, "The descendants of Ghana are negro or negroid types and are definitely not Hamite, Berber nor Semitic as are the owners of the Zebu cattle of the Western Sudan."[4] They now occupy country "far to the south of Ghana, some of them even on the coast of the Gulf of Guinea."

A noteworthy point regarding the pagan owners is that they are now agriculturists, while their cattle are resistant to local diseases, especially trypanosomiasis. These facts indicate a long residence in West Africa.

Numbers and Distribution.—Stewart states as far east as Dahomey the general distribution is south of the 12th degree of latitude, where the pagan tribes occur. While they are abundant in the Gold Coast, "there are far more in French West Africa." In Nigeria they are to be found in the south which cannot, according to du Toit (1927), "be regarded as a stock-raising country" on account of the tsese fly. Stewart writes (on 6/12/32 to Hornby of Tanganyika) that in Nigeria "nearly all the cattle are Zebu. In the Gold Coast there are very few Zebu cattle."

Simpson (1912), in 1910 encountered the West African shorthorned cattle, regarding which he wrote as follows:—"The most noteworthy feature in this district (Ifon and Benin) is the presence of large herds of a dwarf variety of cattle, which, according to native evidence, supported by a low rate of mortality, seems to be immune from trypanosomiasis ..... In the districts of Ondo, Ilesha, Ifon, Ishan in South Nigeria, and in the Kabba and Bassa Provinces of N. Nigeria, all forested regions and tsetse habitats, this peculiar dwarfed variety with short legs may be seen in numbers. Their appearance is remarkable. The predominant colours are black and white, and more rarely brownish; there is no dorsal hump and the forequarters are generally lower than the hind ....."

Conformation.—Information relating to conformation occurs in the previous paragraph, but as regards size, Stewart (*Annual Rpt.* 1931, p. 23), summarises the situation by his comment that "size varies from a minute deer-like animal in the forest belt to an animal of about

(4) The extracts are taken from unpublished references. In a letter dated 6/12/32 from Stewart to Hornby of Tanganyika, it is stated that the Zebu would appear to have been brought to West Africa by the Fulani. He writes that their first appearance in Africa is recorded in the period of the "Shepherd Kings in Egypt," i.e. *c.* 1788-1580 B.C. The Hyksos (Shepherd Kings) were Semitic invaders from Syria. (See *Harmsworth's Universal History of the World*, 1927, part 4, pp. 415-436)

Ayrshire size in the north." It is remarkable that Brandt (1925) describes the Pagan Cattle as possessing "a small hump," but his observations will be shown in greater detail when discussing breeds, *i.e.* within the Brachyceros type.

The main facts regarding conformation and skull characteristics, especially in order to differentiate from the other foundation types of African cattle, namely, Egyptian Longhorn and the Longhorned Zebu (Afrikander), have already been summarised by Epstein and Curson 1934).

Stewart describes the type as being "rather similar to the Kerry in conformation. It is inclined to be light in the bone, but is well developed in the best beef points, and is well ribbed up." In order to improve size, he advocates "crossing Zebu[5] bulls with Shorthorn cows. The good conformation is, as a rule, maintained and the Zebu points can be bred out again while maintaining increased size and bone." He adds, "almost the exact appearance and markings of well known British breeds are often seen. The following are common :— Jersey, Ayrshire and Friesian ... ... Where Fulani herdsmen are employed, selection is largely practised and special 'types' are evolved. Red appears to be a recessive character and red herds are always the result of Fulani selection." White, black and dark brown cattle are often seen, the darker shades being associated with forest. Stewart mentions that he encountered 6 polled cattle (all cows) "among about 200,000 horned."

"*Breeds.*"—Brandt, in describing Nigerian cattle, mentions six breeds which when grouped, according to Epstein, appear to be of the following types :—

Egyptian Longhorn	*Brachyceros*	*Zebu*	*Sanga*[6]
—	(f) Pagan or West African Shorthorn	—	(a) and (b) Humped white Fulani cattle.
		—	(c) Humped red Fulani cattle.
—	—	—	(d) Humpless white Bornu cattle.
—	—	—	(e) Shuwa cattle of Bornu with practically no hump.

Incidentally du Toit suggests that the White Fulani cattle and the Shuwa breed be tried for beef and milk production respectively. As mentioned above, in Nigeria the West African Shorthorn is not

(5) He apparently means Sanga bulls, some of which in Nigeria are very much like the true Zebu.

(6) Often referred to as Zebu but is not a true Zebu. Increasing experience may result in a re-arranging of the breeds.

well represented. In the Gold Coast, however, Stewart (letter of 6/12/32 to Hornby) has introduced bulls[7] from French Guinea in order to improve the local cattle. He quotes Curasson[8] as expressing the opinion that "these Fouta (or N'Dama) cattle (from the Fouta Djallon Mountains) ..... are the best cattle bred in the French tropical African colonies."

Anatomical.—According to Henderson (*Annual Rpt., Veterinary Dept., Nigeria*, 1929, p. 42), the West African Shorthorn is "not a special and distinct breed of small cattle," but "the dwarf[9] descendants of a one time much larger and possibly humped type and that the dwarfing has been due to ... having been bred for generations under the combined adverse effects of trypanosomiasis and mineral deficiency." His evidence is based on "the weight and size of the internal organs of the head." For comparison he tabulates the accompanying data as follows :—

	Pagan bull. Height 36 ins. Weight about 350 lb.	*Fulani bull.* Height 39 ins. Weight about 300 lb.
Spleen	800 gm.	420 gm.
Kidney	380 gm.	190 gm.
Heart	800 gm.	650 gm.
Liver	4,000 gm.	2,000 gm.
Lungs	2,000 gm.	1,040 gm.

He adds, "The head of most Pagan cattle is also out of proportion to the general size of the body."

On osteological grounds, both Stewart, and Epstein and Curson (1934) consider that the West African Shorthorn is a representative of the basic *Bos brachyceros* type, the evidence of the latter authors being furnished by a skeleton kindly donated by Capt. W. W. Henderson to the Onderstepoort Museum after the Pan-African Veterinary Conference at Pretoria in 1929.

Economics.—The advantages of the West African Shorthorn will be briefly discussed as follows :—

(a) *Adaptability to environment.*—Stewart summarises this point by stating (letter 6/12/32) that the type "can exist and, what is more

(7) Stewart adds "wrongly called Malinke cattle in my annual report," but subsequently (his letter of 10/3/34) again accepted as a synonym.

(8) Director of Veterinary Services, French West Africa.

(9) Stewart writes (30/3/33 to Hornby) that the specimens examined by Henderson "may have been dwarfed," but, "the breed is not a dwarf breed and is very widely distributed." He recommends in the same letter the study of *Elevage de lAfrique occidentale—Haut-Senegal-Niger*, by Pierre, and published in 1912 by Emile Larosse, 11 Rue Victor-Cousin, Paris.

to the point, can thrive nearly everywhere." He adds in another communication, that although the owners are settled people (not nomads), their cattle "stand journeying very well indeed and arrive at the journey's end in much better condition than the Zebu. This must be due to their hardier frame and ability to thrive on rougher fodder combined sometimes with their higher resistance to the diseases of the country."

(b) *Inherited resistance to local diseases, e.g. enzootic protozoa.* (See Stewart, *Annual Rpt.*, 1932-33, p. 25).—Most is known regarding the resistance to nagana, and in the Gold Coast, Stewart reports that in the Wa district, "where trypanosomiasis is so common that Zebu cattle cannot survive, the adult West African Shorthorn cattle are generally in very good condition and of a good type." Trypanosomes may be seen in blood and gland smears, particularly in calves. This resistance was transmitted in crossing experiments with English or Zebu bulls, "though much diluted in the English crosses" (*Annual Rpt.*, 1929-30, p. 11). In Nigeria Henderson writes (18/9/30 to Director of Veterinary Services, Pretoria): "That they are not immune to trypanosomiasis is proved by the fact that the parasites of the disease can usually be detected on blood examination, more especially when the animals are reacting to rinderpest of which they usually die."

Concerning other protozoa, Stewart (*Annual Rpt.*, 1932-33, p. 25) states "that the West African Shorthorn cattle have a definite inherited resistance to enzootic protozoa" (redwater, anaplasmosis, and theileriasis). He adds (p. 17) that there are two forms of the last mentioned, namely, *T.mutans*, and *T.parva* or some allied pathogenic form, but both Zebu and West African Shorthorn cattle appear highly resistant.

With regard to rinderpest, Stewart (*Annual Rpt.*, 1931-32, p. 8) believed that "the small unhumped breed ..... the West African Shorthorn is much more susceptible than the Zebu (humped) type." In his next *Annual Report* (p. 15), when referring to the north-eastern part of the country, he states that the resistance of West African Shorthorns is "as high .. as Zebu cattle, judging by the doses of anti-rinderpest serum." According to Henderson (*Annual Rpt.*, 1929, p. 43), "it was proved that these dwarf animals possessed an almost abnormal degree of susceptibility to rinderpest as was evinced by the 100% mortality which resulted from double inoculation." No doubt, much depends on the origin of the cattle and whether rinderpest is enzootic.

(c) *European criteria of economic advantages*, e.g. milk and beef production have naturally received but scant attention, and selection in breeding is a policy for the future.

(d) *Native advantages, e.g.* for dowry and sacrificial uses, are of no interest to the European livestock farmer.

Policy for the future.—Stewart has already made a beginning in (a) education of the native, (b) castration of undesirable bulls, (c) in-

troduction of superior bulls (the Fouta Djalon cattle), (d) eradication of disease, and (e) attention to nutrition problems.

By the holding of native stock shows and the breeding from selected animals (and of course a continuance of the measures referred to just previously) a great improvement should be manifest after a few years.

French Cameroons.

According to a memorandum submitted to the 1929 Pan-African Veterinary Conference at Pretoria[10], among the problems receiving attention was "the study of resistance again trypanosomiasis in the native cattle, the so-called Kirdi breeds. These animals are of small size and without a hump and appear to have some similarity with the N'Dama race of High Guinea." It would appear that these are cattle of the Brachyceros type, and if so represent apparently the most southerly limit of West African Shorthorn cattle in Africa.

French West Africa.

According to Stewart the type exists in greater numbers in French West Africa than elsewhere, and as mentioned previously, he has introduced into the Gold Coast from French Guinea bulls of "the tawny and well boned" Fouta Djalon breed. The type is, of course, to be found in Dahomey, French Togo, along the Ivory Coast, and in French Sènegal.

Liberia.

In describing the cattle of Liberia, Johnston (1906) states, "The black and white or brown and white dwarf small-horned cattle which are the dominant breed in the coast regions of Liberia seem to be entirely of European origin and to have come from Holland." It is safe to assume that this type is the Brachyceros and that it is indigenous and therefore did not come from Europe. It is of course true that representatives both in Europe and in Africa arose from a common stock.

Portuguese Guinea.

Da Costa (1931) in his review on animal husbandry in the Portuguese possessions refers to *Bos brachyceros* in Guinea as follows :— "est composé de boeufs dépourvus de bosse, mais présentant un profil concaviligne. Ces animaux sont les représentants du *Bos primigenius*, de Thomas, et proches parents des boeufs du Maroc et de l'Algerie."

Concerning Sierra Leone and Gambia no precise data are available.

Morocco.

According to a publication issued by the Service de l'elevage of Morocco in 1923[11], the territory is well suited for cattle breeding, the

(10) *The Veterinary Service in Cameroon. 1. Administration and Organisation, P. 12.*

(11) *Grande Semaine Agricole au Maroc. Service de l'elevage. La production bovine au Maroc. 1923.*

type being characterised by lack of uniformity. It is possible, however, to recognise two distinct breeds :—(a) *La race brune* of North Africa, and (b) *La race blonde* of Zaer. The former has a dun coat with black extremities and the latter a pale coat with the extremities slightly pigmented or without pigmentation at all.

It is clear from the illustrations and the text that the above two breeds are of the Brachyceros type.

With regard to Algeria no definite information is available.

Tunis.

According to a *Notice sur la Tunisie*[12], Tunisian cattle are small, but robust, and conform entirely to the Brachyceros type as described above.

Egypt.

According to the description of Flowers (1932), given *in toto* by Epstein and Curson (1934), the cattle of Egypt are of the Brachyceros type.

Sudan.

The *Annual Report of the Sudan Veterinary Department for* 1925 (p. 16) makes it clear that the cattle of the country may be grouped as follows :—(a) "The true Zebu type, having small or medium sized horns, a hump and a pendulous dewlap."

(b) A long horned, small humped and "leggy" beast, occurring in the Upper Nile (the Sanga type of Epstein); and

(c) An under-sized type, common along the Abyssinian and Eritrean frontiers. It is suggested that this beast results from crossing with "the small Abyssinian breed of cattle."

It would seem that (c) represents the Brachyceros type, members of which are indeed encountered not only as far south as Tanganyika, but have exerted an influence in other parts of Africa south of Eritrea.

Conclusions.

When the evidence not only in regard to the distribution, but also concerning the adaptability of cattle of the Brachyceros type is considered, there can be no doubt that the type has been established in Africa for many centuries. Having passed through the numerous vicissitudes associated with Africa, the beast has become highly resistant to several maladies, principally trypanosomiasis in West Africa.

As is inevitable with native stock, where breeding and feeding are neglected, the cattle of Brachyceros type have degenerated both in size

[12] *Notice sur la Tunisie. Direction generale de l'agriculture, du commerce et de la colonisation, Government Tunisien. 1914, P. 30.*

and milk production. It is only by selection according to European standards that an improvement can be effected.

One striking advantage is the resistance of West African Shorthorn cattle to trypanosomiasis. Could not use of this fact be made and suitable cattle be introduced into Glossina areas in Central and Southern Africa?

Academically the cattle are of great interest to the student of animal husbandry, but if the knowledge outlined above were applied, much good of a practical nature should result.

ACKNOWLEDGEMENT.

The writing of this paper has only been made possible through the co-operation of the Directors of Veterinary Services of South Africa (Dr. P. J. du Toit), Tanganyika (H. E. Hornby, Esq., O.B.E.), Nigeria (Capt. W. W. Henderson), and Gold Coast (J. L. Stewart, Esq., M.C.). I particularly appreciate the use of Mr. Stewart's unpublished notes and letters which were made available by Mr. Hornby.

It may be added that there is very little literature on the subject in South African libraries.

LITERATURE.[13]

BRANDT, F. R. (1925). Cattle Breeding in Nigeria. *Proceedings of the Scottish Cattle Breeding Conference* 1924. Edited by A. F. Finlay. Oliver and Boyd, Edinburgh.

DA COSTA, A. M. (1931). *L'elevage et les service veterinaires dans les domaines portugais d'outre-mer.*
Extract published 1933 from "Les Colonies Partugaises" available at the Paris Colonial Exhibition of 1931.

DU TOIT, P. J. (127). *Report on Livestock Problems in Nigeria.*

EPSTEIN, H., and CURSON, H. H. (1934). Anatomical Studies, No. **50:** A Comparison of Egyptian, Longhorn, West African Shorthorn and Afrikander Cattle, particularly in regard to the skull. *Onderstepoort Jl. Vet. Sc. and Animal Industry.*

FLOWER, S. S. (1932). The Recent mammals of Egypt. *Proc. Zool. Soc. London,* July 1932: 369-450.

JOHNSTON, H. (1906). *Liberia,* Vol. II.

SIMPSON, J. J. (1912). Entomological Research in British West Africa; III. Southern Nigeria. *Bull. Entom. Res. iii*: 167.

STEWART, J. L. (unpublished). The Origin of Domestic Cattle.

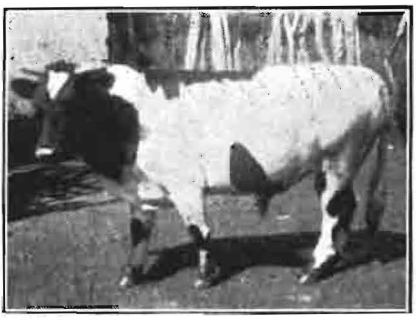
ADDENDUM.

A copy of the above paper was submitted to Mr. Stewart whose comments[14] are not only incorporated in the text, but also subjoined as follows :—

(13) Additional to references mentioned in the text.

(14) His letter 404/96/1930 of 10/3/34, addressed to Dr. P. J. du Toit.

In the Northern Territories of the Gold Coast, where all the cattle are West African Shorthorns, the average weight of a bullock is 5 cwt. and they go up to 7½ cwt. live weight. Good bullocks of the Fouta (N'Dama) breed weigh more than that and are sold in Accra for £8 per head average, which is much the same price got by very big Nigerian bullocks (zebu) and more than that got by the zebus which have come overland from French Soudan. I do not mean to infer that the breed does not require improvement, but I wish to emphasize that it cannot be classed as "quite unimproved." One great snag is that most of the owners are fetish followers and that in the periodical sacrifices necessary in that cult, it is incumbent on the owner to kill an entire bull for certain rites and at that his best bull. This accounts for the paucity of good bulls. We are combating this by the institution of Native Administration farms throughout the country, so that in time every village will have a communally owned bull which it will hence be impossible to kill for fetish. Many owners have regretted this custom to me, but state that it is inevitable and most of them welcome the Native Administration farm idea as being a satisfactory solution of the difficulty. It will be possible to improve the West African Shorthorn cattle, the property of the peasant farmers, in a way which it will be quite impossible to do with the nomadic zebu herds. The owners of the latter, the Fulani, being pastoralists, farm no land and hence the question of fodder crops or storage of food is out of the question. It will be a comparatively easy matter for the owners of the West African Shorthorn cattle to provide dry season fodder for their animals, and even now some of them preserve hay of some sort for this purpose.



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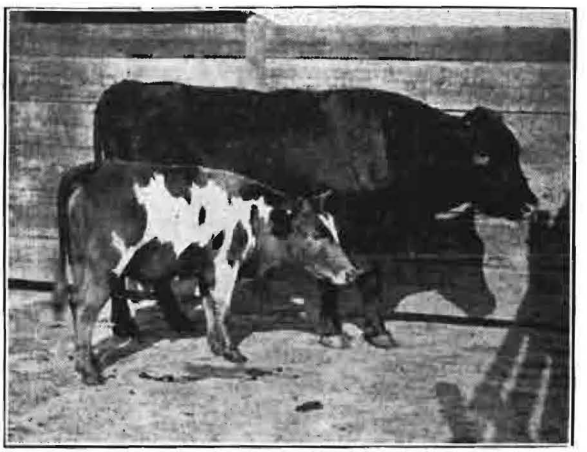

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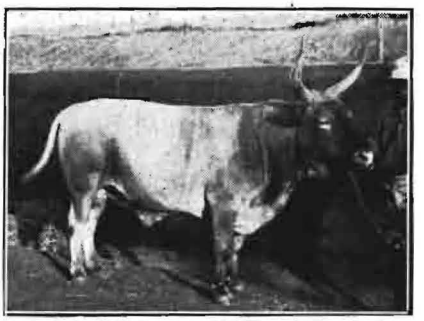

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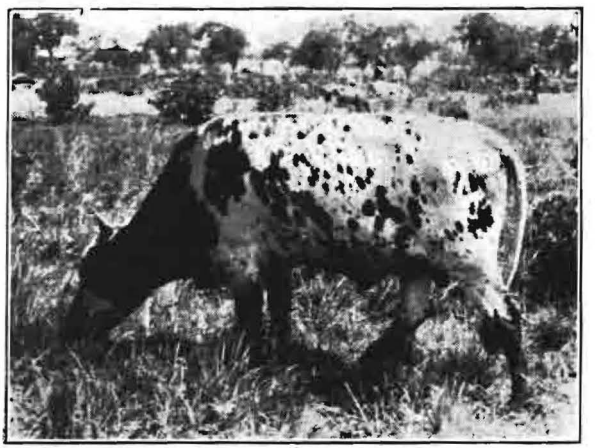

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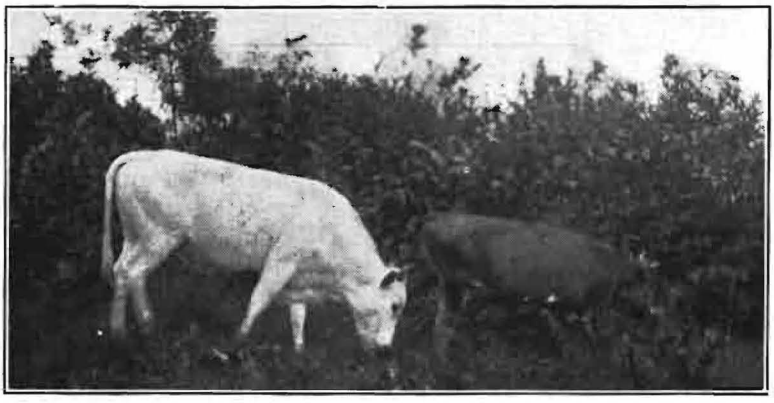

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Explanation of Figures.

Fig. 13.—West African Shorthorn bull (Photo by J. L. Stewart, M.R.C.V.S., P.V.O., Gold Coast).

Fig. 14.—West African Shorthorn bull, age 3½ years, weight 350 lbs. (Photo by W. W. Henderson, M.R.C.V.S., C.V.O., Nigeria—See his *Annual Report*, 1928). Alongside is a pure bred Lincoln bull for comparison.

Fig. 15.—A Fouta (N'Dama or Malinke) bull (Photo by J. L. Stewart, M.R.C.V.S., P.V.O., Gold Coast).

Fig. 16.—West African Shorthorn bull at Sunyani in the Ashanti forest (Photo by J. L. Stewart, M.R.C.V.S., P.V.O., Gold Coast).

Fig. 17.—West African Shorthorn cow (Photo by J. L. Stewart, M.R.C.V.S., P.V.O., Gold Coast).

Fig. 18.—West African Shorthorn cow (Photo by Dr. P. J. du Toit, D.V.S., Union of South Africa).

For Mounted skeleton of West African Shorthorn bull (A.82) presented by Capt. W. W. Henderson, M.R.C.V.S., C.V.O., Nigeria, to the Onderstepoort Museum (Photo by T. Meyer) see Fig. 8, page 190.

OBITUARY.

Sir Francis Duck (1845—1934).

It is with great regret that we record the death in May of Sir Francis Duck, the hero of so many South African campaigns.

As an excellent biographical notice appears in Smith's *History of the R.A.V.C.*, pp. 197-199, all that we need emphasise is his service in South Africa.

Francis Duck, the son of Mr. John Duck, formerly of Catterick, Yorkshire, was born on 17th December 1845 and educated at Stonyhurst, qualifying at the London College on 22nd April, 1867. He entered the army the following July and was at once gazetted to the Royal Artillery, with which branch he served until departmentalisation of the A.V.S. in 1878.

Before taking part in the 9th Kaffir War (1877-78) he had already seen service in Abyssinia (1867-68) and India. During the Kaffir War he was attached to the Frontier Light Horse, with which unit he proceeded in 1878 to Sekukuniland to take part in the second campaign against Sekukuni. In the following year he was in Zululand, still with the F.L.H., but in veterinary charge of all the mounted corps. For his services in the campaign, or rather series of campaigns, he was

mentioned in Col. Buller's Despatch (*London Gazette* 5.7.79) for his skill and unremitting attention and for his gallantry in action. The last phrase refers to an incident during the disastrous retreat from Hlobane Mountain (28.3.79) when "taking a dead man's rifle, he volunteered his services with the rearguard and rendered excellent service at a most critical moment." He was recommended for the V.C., "but his name was struck out by the supreme Commander on the ground that he had no right to be there!"

After the Zulu War he returned on leave to England and was not back in Natal for the first Anglo-Boer War (1880-81). Like other veterinary officers he reached the front after armistice had been arranged (6.3.81). He was Senior Veterinary Officer, A.V.D., South Africa, from 1882 to 1885, during which period he acted on more than one occasion as *locum tenens* for Mr. Samuel Wiltshire, Colonial Veterinary Surgeon, Natal.

In 1884 he organised the veterinary side of and took part in the Bechuanaland Campaign, writing later a most excellent report of the operations. For his services he was in 1890 promoted to Inspecting Veterinary Surgeon (now Lieut. Col.) and in 1894 he proceeded to India as P.V.O. In 1897 he returned to England to take up the appointment of Director General A.V.D., from which post he retired in 1902.

On taking up his domicile in South Africa he resided first in the Western Province (Somerset West) and then later in Southern Rhodesia (Arcturus), where he died.

As a mark of appreciation for his professional services he, with Sir Frederick Smith, was elected an honorary associate of the S.A.V.M.A. in July 1928, being the first veterinarian to be accorded this distinction.

The accompanying photograph is taken from *Smith's History of the R.A.V.C.* (p. 197) and appeared in the *Veterinary Journal* of 1934.

BOOK REVIEW.

Since the fourth edition of the translation of Ostertag's well known *Handbuch der Fleischbeschau*, the English version has been out of print for some years. Meanwhile the author has revised the German text so radically as to justify a change of title, and the appearance of an English translation[1] of this work is the most welcome event in

[1] ***Ostertag's Textbook of Meat Inspection*, Fifth English Edition, edited by T. Dunlop Young, O.B.E., M.R.C.V.S., D.V.S.M., F.R.S.I.; translated by C. F. Marshall, M.Sc., M.D., F.R.C.S., pp. 750, illustr. 610, plates 8. London: Baillière, Tindall and Cox, 1934: 45/-.**

standard veterinary literature for some time past. The book is planned on the same lines as the older "Handbook," but is described as being more concise.

Criticism of a work on meat inspection from the pen of Ostertag would be almost an impertinence. On perusal, one realises more than ever how Germany leads the world in this sphere and into what an extraordinarily accurate science meat inspection has grown in that country.

The section on the pathology of tuberculosis has been brought up to date on the lines of the modern conceptions of the pathogenesis of this disease, and its value is enhanced by the inclusion in the chapter on normal anatomy of a detailed description of the lymphnodes, lymphatics, and drainage areas in accordance with the results of the accurate researches of Baum. The English translation does not include the historical introduction and the chapter on the German regulations, while the chapter on abattoirs and methods of slaughter appears to have been re-written (by the editor?) so as to give greater prominence to the position prevailing in Great Britain and the colonies, a short chapter on poultry diseases has been introduced, and the appendices contain abstracts from the British legislation. It will be recognised therefore that the book is very much more than a substitute for those unable to read the original German text : it has been modified to meet the needs of English speaking veterinarians and meat inspectors.

The errors which the editor, in his preface, anticipates as being "almost certain to be observed" by those reading the work were found to occur in numbers fully justifying his apprehension, and they concern also technical terms, which in addition to other words suffer often from so many mis-spellings and wrong usages that space would not permit of a complete list being given here. Some of the more offensive examples are : "median" for "middle" (p. 57); "catalysators" for "catalysts" (p. 91); "bronchcoles" for "bronchioles," "induration" for "consolidation," "red" instead of "yellow hepatisation (p. 163); "haemangroma" for "haemangioma" (p. 167); "senile" for sessile (p. 176); "E. arloingii" for E. arloingi (p. 217); "B. bigemina" for "B. bigeminum" (p. 218); "milk tumour" for splenic tumor (apparently a corrupted translation of *Milztumor*!) (p. 219); "pseudo-coast fever"—(nearly all our textbooks are guilty of almost equally bad misusage of hyphens) (p. 219); "60m." for "6m." (length of *Monezia expansa*) (p. 224); *S.bovis* in the venis of the "hindquarters" (p. 236); "gigantorrhyncus in the small intestine of *sheep*" (instead of *pig*) (p. 238, fig. 48); "C. cellulosae" for "C. tenuicollis" (p. 264); E. polymorphous" for "E. polymorphus" (p. 283); "not valueless" instead of "not harmless" (referring to echinococci removed from infested organs) (p. 290); "oval" for "oral infection" (glanders) (p. 319); pallor of "eyelids" instead of "conjunctivae" in pernicious anaemia, a

red count of "half a million in 1 cc." (p. 323); "septa between the hepatic *cells*" for "lobules" (p. 324); "provisionally fit" for "theoretically fit" (referring to the flesh of animals infected with B. melitensis) (p. 290); "a condition of *hypertrophy* of the liver...due...to cell infiltration" (p. 583).

The translation, too, might well be taken in hand in a future edition with a view to avoiding those ponderous and too literal translations from the German which so often necessitate the reading of a passage twice (sometimes once forwards and once backwards) before its meaning becomes clear.

The work of the publishers, as is almost superfluous to mention of a product of the house of Bailliére, Tindall and Cox, is faultless. Like its predecessors, this translation of Ostertag is inevitably destined to be the standard work on meat inspection in all English-speaking countries.

C.J.

Recent Promotions in the Service.

We offer hearty congratulations to Messrs. Snyman, Neser, and Canham, who have recently been appointed Senior Veterinary Officers for the Orange Free State, South-West Africa, and the Transvaal respectively. To their predecessors, Mr. Spreull, Mr. McNae, and Mr. May we extend our best wishes for the future. We trust that all three stalwarts will remain in South Africa and here enjoy their well-earned pensions.

Mr. P. S. Snyman is a member of the first batch of B.V.Sc. veterinarians, who graduated in December, 1924. He immediately joined the Service, becoming G.V.O. for Nongoma. Later, he undertook meat inspection duties at Durban, but again returned to the field as G.V.O. Greytown. In 1930 he was transferred to Onderstepoort and in addition to his research work lectured on Hygiene.

Mr. M. M. Neser qualified at the Dublin Veterinary College in 1923. As all of his service has been spent in East Coast Fever areas (Umtata, Louis Trichardt, Piet Retief, and Dundee), the change to Windhoek should be most welcome.

Mr. A. S. Canham qualified at the Royal Veterinary College, London, in 1920 and joined the Service shortly afterwards. He has been stationed at Potchefstroom School of Agriculture, Bloemfontein, Allerton, and Onderstepoort, where in addition to performing research work he lectured on stable management.

There are at the moment several professional matters requiring consideration in the Service. We feel sure that the above gentlemen will make every effort to contribute towards a satisfactory solution of these small but vital points.

Regulations under Veterinary Act, No. 16 of 1933.

The following regulations drafted by the Veterinary Board appeared in the *Government Gazette* of 6th July, 1934 :—

It is hereby notified for general information that the following acts or omissions by a registered veterinarian shall constitute conduct of which the Veterinary Board may take cognisance under section *fourteen* of Act No. 16 of 1933.

1. ADVERTISEMENTS.

(1) Advertising in the lay press or arranging or inspiring reports, interviews, articles or notices of any description referring to himself professionally in a manner calculated to attract clients or cases.

(2) Issuing to the public or permitting to appear in a public place cards, handbills or pamphlets or any other communications in connection with his practice, except to bona fide clients, intimating change of address, dissolution of partnership and the like, in which case the communications must bear the name of the client to whom they are addressed and must be enclosed in a sealed envelope; provided that no printed matter other than the address of the veterinarian should appear on the envelope.

(3) Publishing or allowing to be published in the telephone or other lay directory or other similar publication any information other than his name and that of his active partner or partners, if any, professional qualifications and speciality, if any, and address, or publishing these in any other but the ordinary type of such publications. In the case of death or retiral of a partner his name shall not be retained either separately or together with others for a period exceeding twelve months after such death or retiral. In the case of removal the name and new address of the veterinarian may remain in reasonable evidence for a period not exceeding six months.

(4) Permitting his name to be used in a professional capacity in connection with trade advertisements either in testimonials or otherwise.

(5) Permitting publication in the lay press of testimonials or laudatory notices or issuing handbills or posters to the lay public in support of his candidature for a public professional appointment.

(6) Permitting the appearance in the lay press of his opinions on veterinary subjects with his name appended thereto; provided that this rule shall not apply to whole-time public veterinary officials acting in their official capacities or to officers of a veterinary association or society acting in an official capacity on the instructions of such association or society, or to veterinarians not in private practice, or to any communication dealing solely with questions purely of academic interest, public and animal health, veterinary-political matters and the like, wherein the co-operation of the public is necessarily sought in order to give practical effect to principles already generally accepted by the profession.

2. BUSINESS ADVERTISEMENTS.

(1) Permitting his name to be used in connection with advertisements of veterinary instruments, appliances, dressings, drugs, beverages or dietary preparations in the lay press.

(2) Permitting his name to be used as part of the title of a veterinary practice carried on or managed by any lay person or company.

(3) Permitting the publication of his name in connection with advertisements on behalf of kennel clubs or similar commercial organizations.

3. NAME-PLATES.

(1) Using any of the following means to indicate his place of residence or consulting rooms:—

(a) A name-plate exceeding in size 14 by 8 inches or otherwise not complying with the requirements hereinafter laid down.

(b) A street signboard.

(c) A name-plate or lettering on balconies or windows.

(d) A name-plate on an outside wall or pillar forming part of a building not at a bona fide entrance to that part of the building in which his consulting room is situated without the special permission of the Veterinary Board.

NOTE.—

(i) Plain brass plates such as are in general use by the medical profession must be used. A name-plate shall not contain more than the veterinarian's name, title, profession, qualifications or degree, his speciality, if any, and his hours of consultation. Veterinarians registered under section *twelve* of Act No. 16 of 1933 must use the designation *Registered Veterinary Surgeon*, *Registered Veterinarian* or *Veterinary Surgeon* (which can be abbreviated to R.V.S., R.V., or V.S. respectively) but no other.

(ii) In the case of veterinarians succeeding to a practice or in the case of death or retiral of a partner it is not permissible to use on the premises or elsewhere the name or name-plate or plates of the predecessor, deceased, or retired partner for a period exceeding twelve months from the date of succession to the practice. During this period of twelve months succession to the practice shall be indicated by the words "Successor to."

(iii) In the case of removal, the name and new address of the veterinarian may remain in reasonable evidence for a period not exceeding twelve months.

(iv) Professional name-plates shall not be allowed at a veterinarian's residence or any other place unless he bona fide practices at such residence or place.

4. LETTER HEADS AND ACCOUNT FORMS.

(1) The printing on letter heads and account forms of any information other than—

(a) veterinarian's name;

(b) profession and qualifications in abbreviated form;

(c) addresses and telephone numbers;

(d) hours of consultation.

NOTE.—In addition to the designation R.V.S., R.V. or V.S. laid down in note (i) of paragraph 3, only academic and professional qualifications may be used in an abbreviated form, e.g. B.A., M.R.C.V.S., etc.

5. ENVELOPES.

(1) The printing of envelopes of any information other than a return address (without the inclusion of the veterinarian's name) in case of non-delivery.

6. CANVASSING AND TOUTING.

(1) Canvassing or touting for clients or cases personally or through agents or in any other manner.

14. SUPERSESSION.

(1) Superseding another veterinarian who is in charge of a case which he has seen with or on behalf of such veterinarian except with the consent of the veterinarian originally in charge of the case, unless that consent is withheld unreasonably or unless no other veterinary assistance is available.

(2) Taking over the case of another veterinarian unless satisfied that the owner of the patient has notified such veterinarian that he no longer requires his services.

15. PROFESSIONAL REPUTATION OF COLLEAGUES.

(1) Attempting to undermine or injure the professional standing of another veterinarian by unfairly or unnecessarily criticising his professional word.

16. CERTIFICATES.

(1) Granting a certificate in his professional capacity unless he is satisfied that the facts are fully and correctly stated therein, or has qualified the certificate by the use of the words "as I am informed."

17. SCHEDULE OF FEES.

(1) Issuing or being party to the issuing, except to registered veterinarians, of a schedule of professional fees or of a tariff of discounts allowed on fees.

GENERAL NOTE.

The Veterinary Board wishes it to be understood clearly (1) that these do not constitute and are not intended to constitute a complete list of the offences which may be punished by reprimand, suspension or erasure from the register, as provided for by section *fifteen* of the Act, and (2) that by issuing this notice the Veterinary Board is not precluded from considering and dealing with any other form of professional misconduct which may be brought before it. Circumstances may arise from time to time in relation to which there may occur questions of professional conduct in respect of which no warning notice has been issued. In such instances as in all others the Veterinary Board has to consider and decide upon the facts brought before it.

7. LIST OF CHARGES.

(1) Publishing or allowing to be published or exhibited in any public place his scale of professional charges, whether fees alone are mentioned or cheapness or other advantages indicated.

8. SHOW CASES.

(1) Exhibiting to public view in show cases or otherwise articles or appliances including models, diagrams and charts relating to his profession.

9. FEES AND COMMISSION.

(1) Accepting commission from chemists and druggists, makers or dealers in veterinary appliances and materials or similar persons or concerns.

(2) Paying commission to any person for recommending clients.

(3) Receiving commission in return for recommending services or wares to clients.

(4) Sharing fees (Dichotomy) with any person who has not taken a commensurate part in the service for which the fees are charged.

10. COVERING.

(1) Employing as an assistant or locum tenens any person not registered, or acting in collusion or collaboration with any person not registered, or entering into partnership with any such person, or employing such person as a paid anaesthetist, or as a paid assistant at an operation.

(2) Consulting with unregistered persons or in any way assisting or supporting them in their illegitimate practice, except bona fide veterinary students acting under the direct supervision of their teachers or tutors. In the event of a veterinarian being called in in a grave emergency to aid an unregistered practitioner he should immediately report the case to the Veterinary Board.

11. CLUBS, SOCIETIES, ETC.

(1) Having a financial interest, whether by way of fixed salary or otherwise, in kennel or racing clubs or similar organizations, or associations which advertise for members or clients in the lay press, or by circular, or card, or in any other way.

12. TENDERING.

(1) Tendering for full-time, part-time or any other type of appointment.

13. CONSULTATION.

(1) Withholding on the part of the veterinarian in attendance upon a case to give the opinion of the consulting veterinarian (whether favourable to his own or otherwise) to the owner of the patient.

(2) Revisiting a patient by a consulting veterinarian without a special invitation by the attending veterinarian or agreement with him.

NOTE.—The opinion of the consulting veterinarian must be given to the owner of the patient in the presence of all three, viz., the attending veterinarian, the consulting veterinarian and the owner, but in the absence of the owner the consulting veterinarian may, after giving his opinion to the attending veterinarian, transmit it in writing to the owner.

The 27th Annual General Meeting of the S.A.V.M.A.

The 27th general and scientific meeting of the Association was held at Onderstepoort on the sixth and seventh of September and as usual was greatly appreciated by most of the visiting members. Much of the success attending this function is due to the efforts of the Acting Director of Veterinary Services in permitting as many district veterinarians to attend as could be spared, and to his courtesy in allowing the deliberations to take place in the spacious hall of the new Empire Marketing Board Library.

Members of the Onderstepoort Staff naturally contributed in no small measure in making the visit of their colleagues as interesting, profitable and amenable as possible.

The well attended dinner at Polley's in the company of the Association's guests, Dr. H. Reitz, Dr. C. P. Bresler and Dr. Hahn, was most enjoyable and again serves to impress on us the necessity for providing some form of social function at these annual gatherings.

It is greatly to be regretted that so few private veterinarians make it convenient to attend these meetings, especially those who are not hampered by too great distances.

No one will deny that most of the advantages, real or potential, which can be derived from the Association's scientific papers and demonstrations, and personal contact with colleagues, would benefit the private practitioner perhaps more than his state employed colleague who is not so isolated in his work.

Every endeavour is made to include in the programme items of interest to all sections, but with the lack of support from independent and private sources it is not surprising to find an undoubted departmental bias pervading the proceedings of this Association.

At the conclusion of the brief business meeting (see minutes) the vice-president called upon Dr. de Kock, acting D.V.S., and host, to take the chair during the subsequent scientific proceedings.

Dr. de Kock in extending a hearty welcome to all present also gave a resumé of the veterinary activities in this country in the following terms :—

It is a great pleasure to the Staff of Onderstepoort to welcome you to this Institute, where you will be afforded an opportunity of carrying on your deliberations and scientific discussions. The policy is to bring about far more active, intimate and friendly feeling and co-operation not only between members of the Onderstepoort and Field Staffs, but also between Government officials and all veterinarians who are asso-

ciated with municipal administration or private practice. It is only by close and personal contact that the profession will be placed in a position to indicate to the State and the public the value of its knowledge to the stock industry in this country.

Co-operation between the various departments of the profession could be increased by more frequent collaboration between district and research government veterinary officers; by consideration of a possible system of interchange between field and research officers, or the institution of post-graduate courses; or by a revision of the type of work done by the field officers so that more time could be given to the practice of veterinary science and animal husbandry. Field officers are frequently disappointed in that views and suggestions presented to the heads of the division are not immediately acted upon. I can assure you that we do everything in our power to place all sound arguments at the disposal of the departmental heads. If we are overruled, for probably very good reasons, it is our bounden duty to see that whatever the policy laid down, it is carried out to the best of our ability. It should not be forgotten that the Government and its heads of Departments must consider financial regulations, the financial position of the country, and interdepartmental policy. Public opinion is inclined to judge the veterinary profession according to the criticisms levelled against it as an outcome of its control of stock diseases. No profession is more severely criticised and *ipso facto* more unpopular than the veterinary profession, because our measures dealing with the control of stock diseases demand stringent and often harsh restrictions, based on scientific considerations. This type of control, for economic and for other reasons, does not always consist of curative measures, so that immediate and direct benefits to show up the value of our profession do not at once appear. The indirect and tremendous value of our control and the great saving to the State and the taxpayer are too often masked and neither realised nor appreciated by the public.

Our officers have to fight an uphill battle and are frequently subjected to much unpleasantness and obstruction in their duties. This is frequently a result of ignorance, on the part of the farmers, of the real value of regulations imposed on them with a view to controlling infectious diseases. In this direction it is therefore essential that more propaganda and extension work be undertaken by the veterinary profession to bring the importance, the necessity and the value of our work to the notice of the public. This naturally demands more veterinary staff, of which there is a tremendous shortage at the present moment. To-day it is only possible to deal with pressing needs and many important aspects of veterinary science and animal husbandry which loom prominent in the foreground cannot be given their rightful consideration. No effort, however, will be spared to rectify these

matters in order that an economically sound animal industry can be established in the Union of South Africa.

Our thanks and appreciation are tendered to those officers on the field staff who have to face these difficulties for the patience, endurance, tact, and loyal support which they give to the State.

Foot and Mouth Disease.

There has been rather a serious setback in the form of outbreaks of foot and mouth disease in the neighbouring territories; these having occurred in the Bechuanaland Protectorate, Southern and Northern Rhodesia. In the case of Southern Rhodesia, the outbreak is considered of a very serious nature in view of the fact that its origin remains a complete mystery, after Southern Rhodesia had been declared free from the disease for a period of almost two years. An opportunity was afforded to the Acting Director of Veterinary Services to visit the centre of infection in Southern Rhodesia, where all possible sources of infection were very fully considered: e.g. the possibility of a virus carrier in ruminants and game, of the virus remaining viable for long periods in animal or vegetable products, or on the veld; the question of immunity in regard to duration and type of virus; the possible introduction of fresh infection from outside the Southern Rhodesia border. In view of this lack of definite information it is obvious that control of the disease becomes decidedly difficult and a burden to the State, because it involves maintaining extensive cordons all along our borders, close control by the veterinary staff and restricted movement of animals and animal products. It becomes extremely difficult to introduce fool-proof restrictions to obviate the possibility of the disease being introduced into the Union by means of animal and vegetable products from the infected territories. It should be realised that although the conditions laid down for the control of such products may seem unwarranted and extremely harsh, this is mainly due to the fact that no explanation has been found for these mysterious outbreaks and accordingly every precaution must be taken by this Department to obviate the disease being introduced into the Union.

Swine Fever.

As this problem forms the subject of one of the papers on the agenda, no mention of it is necessary at this stage.

Rabies.

It is gratifying to note that so far only two cases of rabies have been diagnosed in wild carnivora during the current year. Most probably a heavy mortality of meercats was caused by the excessive rains of last season. A new set of regulations has been drafted which will give the Department better control of the disease. It is felt that more

information should be obtained about the methods of destruction, migration, habits, life history, etc., of the wild carriers, before commencing operations in a haphazard fashion at tremendous cost to the State. This matter is receiving the attention of the Department.

Dourine.

The campaign against dourine is causing much concern and has given rise to deep discontent and ill-feeling amongst the farming community. The opposition raised by the farmers is mainly directed against the destruction of those equines which react to the test but appear clinically healthy. It is difficult for owners to understand how such an animal can remain a source of danger, and why curative measures cannot be carried out. In spite of all these difficulties I feel that we should not relax our efforts in carrying out our present campaign and that endeavour should be made to confine the disease to its present limits and gradually to eradicate it. By means of propaganda of the right sort on the part of our staff I am sure more progress will be made, especially if farmers understand and realise the value and importance of the regulations enforced.

East Coast Fever.

The position in regard to East Coast Fever may seem to be serious according to the large number of new outbreaks, but when the facts are carefully considered it will be realised that progress has undoubtedly been made and that by more intensive research work dealing with the value and importance of the *plasma body* and by not relaxing our intensive methods of inspection and control of animals and smears, headway in the eradication of this disease must be made.

Verminosis.

Undoubtedly the greatest menace to animal industry, especially to sheep, during the past year, has been the effects produced by parasitic diseases. Due to soil erosion and overstocking (with the subsequent depletion of pastures of most of our nutritious grasses), the resistance of the animal has been markedly affected. In addition the extensive rains of last season created most unusual and ideal facilities for the propagation of parasites. In view of the great economic issue of this problem it was deemed essential that it be brought to the notice of our professional officers for full discussion. Suffice it to say that this problem has brought home to us the fact that the veterinarian must be afforded better opportunities and more time to utilise his knowledge of animal health, veld hygiene and veterinary science to bring about better understanding and control of this condition, which is threatening animal industry to-day.

Nagana.

The results of extensive and continuous trapping for the past three

years in the Eastern portion of the Umfolosi Game Reserve indicate that the fly density has been reduced to a fraction of a fly per trap per day, and Nagana has at the same time been reduced. More extensive trapping operations have been launched in the western portion of the Game Reserve to attack the fly density there. It is hoped that this extensive onslaught on the fly in its natural environment will lead to the extermination of Nagana. The valuable effect of efficient trapping on the surrounding area of the eastern portion of the Umfolosi Game Reserve is indicated in the following report :—

"Mr. Curry's farm in the Ntambanana Settlement is only about 12 miles from the Eastern Portion of the Game Reserve and is connected with it by unbroken fly ways or bush leaders. Mr. Curry has been running a herd of between 300 and 400 head of cattle on his farm for the past three years or more. Prior to fly trapping Mr. Curry has never been without a number of infected animals and inoculation with antimosan was a daily routine." Similar reports came from native cattle owners in the Native Reserve No. 5. On the other hand Ntambanana settlers, whose farms are situated on the western boundary of the settlement and midway between the western portion of the Umfolosi Game Reserve (where the fly density is still comparatively high) and the Nkwaleni Irrigation Settlement, are continually complaining of Nagana infection amongst their stock.

Other Stock Diseases.

The Division, with its available staff, has had to concentrate on those diseases which are of the greatest economic importance to the State, but it has not overlooked the importance of the following conditions which have caused in many instances a setback to the stock industry of the Union : anthrax, paratyphoid, contagious abortion, sweating sickness, and tuberculosis, as well as the numerous plants poisonous to stock and the problem of mineral and other pasture deficiencies. Active research work on many of these continues to shed new light on the aetiology, pathogenesis and preventive measures applicable.

Municipal Veterinary Services.

Not only has a more friendly spirit and feeling been brought about between the medical and veterinary professions in the Union, but the recent far sighted decision of the medical profession to invite veterinarians to become active members of its annual scientific meetings, for the purpose of considering and discussing problems of common interest, is much appreciated and bound to lead to closer co-operation. In addition it is gratifying to learn that the Director of Veterinary Services can in future attend the deliberations of the Public Health Council.

Municipalities, mainly through their Health Officers, are gradually realising the value of veterinary services, particularly abattoir work, where the control of certain stock diseases is conditional on proper veterinary ante-mortem and post-mortem inspection. Private practitioners must bear with the policy of the Department in prohibiting the haphazard method of tuberculin testing. Tuberculosis as a scheduled infectious disease must be controlled by the State, but such control can be exercised through those local authorities who are prepared to make use of full time or part time veterinarians, fully versed in municipal veterinary science. It is gratifying to note that the Department is at the present moment contemplating a scheme for the eradication of tuberculosis in the Union, but it is realised that the main issue at stake is to see that proper provision is made for adequate compensation.

It will therefore be realised that there is, undoubtedly, in municipal veterinary science a great future for those veterinarians who have become fully versed with the whole problem of milk supply, especially in its relation to tuberculosis and the question of meat inspection.

Tribute must be paid to the services and pioneer work for the State performed by those veterinarians who have left the Department during the year—Messrs. J. Spreull, G. May, G. T. Henderson, F. J. Dunning, M. M. Neser, N. F. Viljoen.

We have just received an advance copy of "The Bloodless Phlebotomist" Vol. VIII No. 2, which is being mailed to every physician and veterinarian in South Africa.

This little journal published by the Denver Chemical Manufacturing Company of New York is replete with interesting articles written by physicians who are located in many different countries, and while the purpose of the publication is to acquaint its medical readers with Antiphlogistine, the physicians will find a number of items and illustrations which will excite their curiosity and interest —altogether, the little journal is well worth reading and we note that 1,347,000 copies are printed in nine languages and distributed to every doctor in the world with a known address, excepting in the countries of Russia, Latvia and Bulgaria.

If you do not receive a copy write to the Denver Chemical Manufacturing Company, New York, who will place your name on their list. The journal will be supplied you free of all charges.

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The Chemical Investigation of Poisonous Plants.

By CLAUDE RIMINGTON, M.A., Ph. D., B. Sc., A.I.C., Empire Marketing Board Research Fellow, Onderstepoort.

I wish to express my appreciation of the privilege accorded me by the invitation of your Council to deliver this address upon the work which I am doing at Onderstepoort in connection with the chemical investigation of poisonous plants.

I am beset at the outset with the difficulty that the subject is a wide one and moreover, although my title indicates general methods of chemical investigation, it is to be feared that no such thing as a general method, in the true sense, exists. Each case presents an individual problem and must be approached as such. However, my intention is to discuss the classes of substances amongst which the toxic constituents of plants are generally to be found, to indicate the lines of approach one would adopt in investigating any particular case, and lastly to describe the results obtained with some South African plants in my own work, selecting these in such a way that they illustrate the points already discussed.

Dr. Steyn (1933), in his paper delivered before this Association at the last annual general meeting, discussed the recognition of plant poisoning in the field, the question of differential diagnosis and of treatment.

Poisonous constituents of plants usually fall into one or other of the following classes :

1. Alkaloids.
2. Glucosides (Simple glucosides).
   (Cyanogenetic glucosides).
   (Cardiac glucosides).
   (Saponins).
3. Bitter principles.
4. Organic acids : resins, oils, substances of ill-defined nature.

1. Alkaloids.

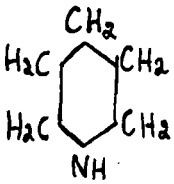
To take each group in turn : Alkaloids are nitrogen-containing organic substances more or less strongly basic in character, a property which is exploited in methods of their chemical isolation. They may be regarded, in fact, as derivatives of ammonia, although the nitrogen atom is usually a part of a ring system and is therefore a primary,

secondary or tertiary amine according to whether 1, 2 or all 3 of the hydrogen atoms of the ammonia molecule are replaced by these groups.

The chief ring-types met with in alkaloids are the following :

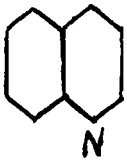
(a) Simple amines $R—NH_2$ e.g. Ephedrin $C_6H_5.CHOH.\overset{CH_3}{\overset{|}{C}}H.NH.\overset{CH_3}{\overset{|}{}}$

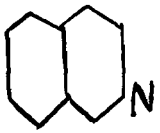
(b) Pyridine  e.g. Arecoline, Piperine, Trigonelline.

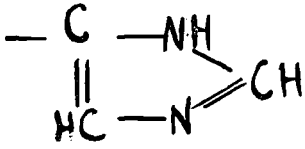
(c) Piperidin  e.g. Piperine, Coniin, Alkaloid of *Psilocaulon absimile*.

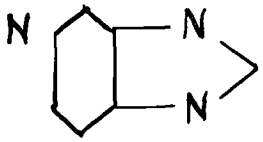
(d) Pyrrol or Pyrrolidine  e.g. Hygrine, Stachydrine (a betaine), Nicotin (b and d together), Anabasine (c and d together).

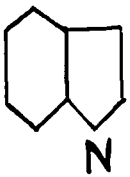
(e) Tropane  e.g. Atropine, Lupinine, Cocaine, ? Senecifolin.

(f) Quinolin  e.g. Quinine, Strychnine, Brucine.

(g) Isoquinoline  e.g. Morphine, Codeine, Papaverine.

(h) Imidazol  e.g. Pilocarpine.

(i) Purine  e.g. Caffeine, Theobromine.

(j) Indole  e.g. Hordeine, ? Ergot alkaloids.

The alkaloids usually occur in plants in combination with organic acids as salts.

Their isolation is facilitated by the fact that the simple salts are usually insoluble or sparingly soluble in organic solvents like ether, chloroform, benzene, etc., whilst the free bases dissolve easily in these liquids but are sparingly soluble in water.

One can extract a plant with alcohol containing tartaric or acetic acid and so obtain the alkaloidal tartrate or acetate in solution and then, having removed the alcohol and dissolved the salt in water, alkali is added and the sparingly soluble free bases shaken out into ether or chloroform, shaking the ether solution with aqueous acid transfers the alkaloid, in its salt form, into the aqueous phase and so the process may be repeated until accompanying foreign material is elminated. By using acids and alkalis of differing strengths alkaloids of greater or lesser basicity may be separated from one another by means of this process. Some alkaloids are unstable in alkaline solution, others again are too feebly basic to form salts, and for their isolation special methods have to be elaborated.

2. Glucosides.

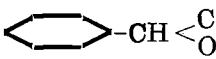
These substances are combinations of a sugar portion with another substance termed the "aglycone" which may or may not contain nitrogen. The carbohydrate is often glucose but may consist of a variety of sugars. Nearly all the colouring matters of plants and flowers are glucosides.

The simple glucosides are rarely if ever poisonous. They include such substances as

Arbutin = Hydroquinone + Glucose.
Salicin = Hydroxy-benzalalcohol + Glucose.
Daphnin = 3 :4 Dihydroxycumarin + Glucose.

In the cyanogenetic glucosides, the aglycone, the portion to which the sugar is attached, is always, so far as is known, the cyanhydrin of

an aldehyde or a ketone. Thus linamarin is the glucose ether of acetone cyanhydrin $CH_3 > C < \begin{matrix} CH_3 \\ O\text{—Glucose} \end{matrix}^{CN}$, whilst sambunigrin is the glucoside of benzaldehyde cyanhydrin



They are accompanied in plants in almost every case by enzymes which bring about their decomposition into the aldehyde or ketone, the sugar portion and hydrogen cyanide. It is the latter substances, of course, which causes the death of the animal.

In the group of cardiac glucosides are to be found certain complex substances usually containing a variety of sugars attached to a sterol-like material. They exert a profound and specialised action upon the heart. Strophanthin and Digitoxin may be mentioned as typical examples. The glucosides of *Urginea burkeii* and of *Nerium oleander* would appear to belong to this class.

The saponins are again highly complex associations of sugars (usually hexoses and pentoses together) with a "sapogenin." They are distinguished, physically, by their property of lowering surface tension and of haemolysing red blood cells. They are very widely distributed in nature but as they are only poorly absorbed from the alimentary canal they only rarely cause fatal poisoning.

Glucosides are of comparatively common occurrence in plants but their isolation is frequently a matter of difficulty. In the first place they are rapidly decomposed by the enzymes of the plant—cyanogenetic glucosides, for example, with liberation of hydrogen cyanide—and therefore a first essential is to prevent all enzyme action. This is usually done by plunging the fresh material into boiling water or alcohol, whereby all enzymes are inactivated and the material protected from further destruction. Suitable isolation technique can then be applied.

The majority of glucosides are soluble in water but only very sparingly soluble in alcohol or ethyl acetate and not at all in any other solvent. It is often extremely difficult therefore to separate them from accompanying material.

3. Bitter Principles.

Under the name bitter principles are grouped together a number of substances which contain carbon, hydrogen and oxygen only, are not glucosidal and which, as a general rule, possess a more or less bitter taste. They are usually insoluble or sparingly soluble in water but dissolve slowly in alkalis since they are lactones, that is to say internal anhydrides of hydroxy acids. The lactone grouping is opened by the alkali forming the sodium salt of an hydroxy acid thus

$$R < \begin{matrix} CO \\ | \\ O \end{matrix} + NaOH \longrightarrow R < \begin{matrix} COONa \\ | \\ OH \end{matrix}$$

With the opening of the lactone ring, their bitter taste and toxic properties usually disappear.

Many bitter principles are harmless to warm-blooded animals when taken by mouth although extremely toxic when injected, but many are extremely poisonous to fish and plants containing them are used by native peoples as fish poisons (e.g. *Tephrosia*).

Bitter principles are usually isolated by means of organic solvents and a laborious series of purifications.

4. Organic Acids.

In the fourth class of toxic principles may be grouped poisonous acids such as oxalic acid, frequently present in large amounts in succulent plants, and also such other constituents as poisonous resins, terpenes, volatile oils, etc. The chemistry of these substances is somewhat imperfectly explored and presents considerable difficulties.

Having enumerated the classes of toxic principles of most frequent occurrence let us now assume that investigation has to be made of a plant proved by laboratory experiments to be poisonous to animals when fed by mouth or drenched. The procedure would be somewhat as follows :—

1. The plant is dried and ground to powder and the M.L.D. (minimal lethal dose) ascertained by drenching this powder to suitable test animals.

There are at the outset certain difficulties. The toxicity may disappear on drying and this may be due to enzymic processes having destroyed the toxic principle or possibly to slow oxidative changes having taken place. A suitable animal must be used. Rabbits are convenient test animals in many cases but are quite unsuitable at times (e.g. liver poisons : *Geigeria*).

2. Assuming that the full toxicity of the plant is retained after drying, extracts are next made by means of

(a) cold water
(b) boiling water
(c) hot alcohol
(d) hot ether
(e) hot chloroform
(f) hot petroleum ether,

the solvent is removed in each case and the residue suspended in water and drenched to an aimal. It is convenient to take for each extraction a quantity $1\frac{1}{2}$ to 2 times greater than the M.L.D. and information is

thus obtained at once concerning the solubilities and stability of the toxic principle.

A substance passing into the hot water and hot alcohol extracts but not in the cold water extract suggests a glucoside, decomposed in contact with cold water by some enzyme also present in the plant. Further tests for glucosides can then be carried out, such as extraction with boiling ethyl acetate, a method I have developed with excellent results in certain cases. Sometimes, however, it fails completely as an isolation procedure.

Solubility in alcohol, ether and chloroform suggests an alkaloid, or resin; solubility in alcohol and chloroform only, a bitter principle.

There is a confirmatory test for alkaloids which is of great value. The plant powder is extracted with a mixture of alcohol and ether made alkaline by ammonia in order to liberate any alkaloids from their salts which might be present in the plant. On evaporation of the solvents and extraction of the residue with hot dilute sulphuric acid, an aqueous solution of the alkaloid sulphate is obtained. Should this give precipitates with the usual "alkaloid reagents" such as iodine, tannic acid, picric acid, etc., an alkaloid is probably present although some bitter principles simulate their behaviour very closely. Isolation is then attempted by means of the shaking-out process already described.

Organic acids are usually present in the watery extracts and may be separated together with tannins, colouring matters, etc., by precipitation with lead acetate. Suitable fractionation is then applied.

In all cases when working systematically through a particular extract, portions representing what would be the M.L.D. or something greater are drenched to test animals in order to control the progress of the isolation and make certain that not more than one toxic principle is present in the extract.

It is unfortunately not possible to give more definite indications of the way a poisonous plant is examined but I hope from the following examples of South African plants which I have examined at Onderstepoort, to amplify and illustrate the somewhat sketchy information given above.

Cyanogenetic Glucosides. The "Bietous" (*Dimorphotheca* species).

It is perhaps of interest to mention that among South African poisonous plants, alkaloids are less frequently encountered than is usually the case in Europe, cyanogenetic glucosides are, on the other hand, fairly common. The quantities of toxic principle that these plants contain is also amazingly high—often a hundred times greater than one would expect to find in a similar poisonous plant in Europe. Climatic factors may perhaps play some part in this peculiar phenomenon.

The *Dimorphothecas* or "Bietous" are members of the family Compositae and frequently cause death from prussic acid poisoning. Samples I have examined have contained the following quantities of HCN. :

Dimorphotheca spectabilis,

1.7 gm. HCN/100 gm. dry weight in fresh plant.

,, *zeyheri* 1.1 gm. do. do.

,, *cuneata* 0.3 gm. do. do.

,, *fruticosa* 1.4 gm. do. do.

figures which indicate that the plant may contain roughly as much as 17% of glucoside in some cases!

The isolation was achieved by dropping the plants into boiling water, removing tannins, etc., with basic lead acetate, extracting the concentrated filtrate with alcohol, purifying this extract by addition of ether and finally extracting and crystallising the glucoside repeatedly from boiling ethyl acetate, (see Rimington 1932).

The active principle proved to be the same in all cases, a cyanogenetic glucoside named linamarin, first discovered in flax seedlings. Its constitution was proved by decomposing it and identifying the constituents, acetone, glucose and hydrogen cyanide; chemically, it is the glucose ether of acetone-cyanhydrin. The following figure represents its structure and decomposition products:

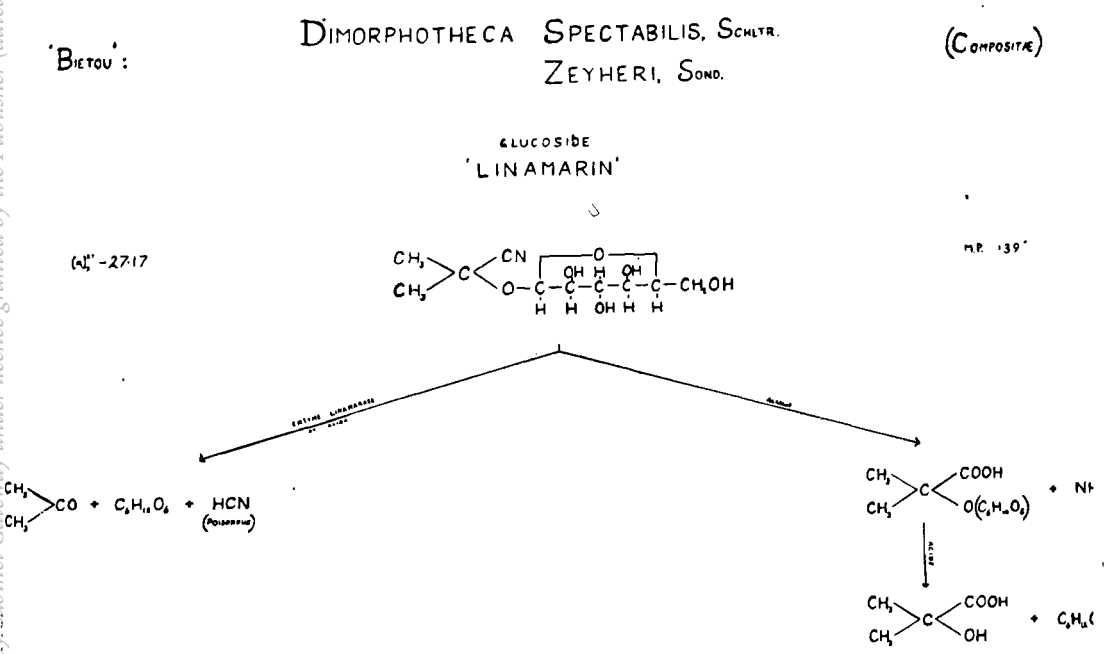
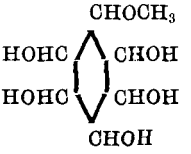


Fig. 1.

Direct extraction of the glucosides by boiling ethyl acetate was possible in all cases except *D. cuneata*, the leaves of which contain a large proportion of a sticky viscous material, which interferes with crystallisation.

Recently, Dr. Steyn and I (1934) have found that many of the South African species of *Acacia* contain considerable quantities of a cyanogenetic glucoside which has not hitherto been described. *A. stolonifera* and *A. lasiopetala* have been examined and the same glucoside isolated from each.

It is not possible to extract the glucoside directly by ethyl acetate; in fact the isolation is an extremely laborious process following in general the lines used in the case of Bietous. The final ethyl acetate solutions always contained a large quantity of some other non-glucosidal material, so closely resembling the glucoside "Acacipetalin" that separation was practically impossible without tremendous losses of material. Some of the accompanying substance was obtained pure and when analysed proved to be a material "pinit," inositol-monomethyl ether, which occurs in Douglas fir, senna leaves and one or two other plants. Its formula is :



Once its identity was known, advantage could be taken of certain chemical peculiarities it possesses, and the greater part removed. Yields of glucoside up to 20% of the theoretical possible were then obtained. The cyanogenetic glucoside present in these *Acacias* is found to have the formula $C_{11}H_{17}O_6N$. As very little material could be spared, its constitution had to be worked out by the use of micro-methods. The steps are possibly worth recording for illustrative purposes.

The aqueous solution of the glucoside was incubated with a few milligrams of the enzyme emulsin. Hydrogen cyanide was liberated. The mixture was transferred to a polarimeter tube and the optical rotation measured. This agreed with the value expected, assuming the sugar in the quantity of glucoside taken to have been glucose. The solution was now placed in a small distilling flask and the bulk of the liquid distilled over after the addition of a few crystals of silver nitrate to retain any remaining hydrogen cyanide as the insoluble silver cyanide. To the distillate, which contained the volatile aldehyde or ketone, a requisite amount of 2 :4 dinitrophenylhydrazine was added under the proper conditions for the precipitation of the dinitrophenylhydrazone of the aldehyde or ketone. The orange yellow precipitate was washed, crystallised from dilute alcohol and analysed.

As a final confirmation of the presence of glucose the residue in the distilling flask was filtered and from it glucosazone prepared by the usual means. Methods similar to those outlined above could be applied to the examination of any cyanogenetic glucoside.

It is of interest before passing on from the subject of the *Acacias* to mention that one other record exists (Finnemore and Cox, 1930) of the occurrence of cyanogenetic glucosides in *Acacia* species, but these were Australian species and the glucoside isolated proved to be sambunigrin, a well-known glucoside of quite different composition. Now the Australian *Acacias* belong to a division in the genus in which the leaves are flat and blade-like, whereas all the South African *Acacias*, with one exception, belong to the division with dissected frond-like leaves. This one exception, the Port Jackson Willow (*A. saligna*), was actually imported from Australia, and we have made arrangements to obtain material and intend to see whether it contains the glucoside typical of the Australian or of the South African trees—assuming that it contains any cyanogenetic glucoside at all.

I will now pass on to consider the plant *Psilocaulon absimile*, an example of a plant containing two toxic principles, an alkaloid and an organic acid. *Psilocaulon absimile*, the "asbos" or "loog-as," is a typical succulent plant of the Aizoacea, and is widespread over the Karroid areas of this country. It has caused stock poisoning in the Willowmore district. When examining the plant in the systematic manner outlined, Dr. Steyn and I (1933) found that the aqueous extract was toxic. However, after separating off the organic acids, tannins, etc., by basic lead acetate and testing the fraction precipitated and the filtrate, we found *both* were still capable of killing test animals but with differing symptoms. A thorough examination was made of the organic acids and 8.6% of oxalic acid found, sufficient to account for the toxic symptoms of this fraction. The other poisonous principle proved to be an alkaloid which could be isolated directly from the plant as the hydrochloride by extraction with chloroform. The chloroform was evaporated off and the residue treated with water, this again evaporated and the alkaloid salt taken back into chloroform and precipitated in the crystalline condition by the addition of petroleum ether. Much difficulty was experienced on account of a dark, hygroscopic impurity which adhered to the material but this, it was eventually found, could be removed by treatment with pyridine. When trying to prepare the free alkaloid by addition of alkali to the hydrochloride it was noticed that a strong ammoniacal odour developed. This provided the clue to the fact that the free alkaloid is a volatile ammonia-like, liquid base which could be purified by steam distillation. Once pure and capable of being converted into well-characterised derivatives such as the picrate, gold salt, platinichloride and picrolonate, it was definitely identified as the substance *piperidine*.

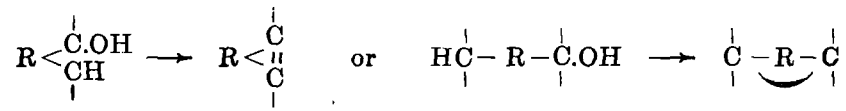
It is of considerable interest that this conclusion was reached since, although piperidine is a constituent of coniine, piperine and other well-known alkaloids, piperidine itself has not previously been found in any plant. Moreover, it is the first alkaloid to be found with certainty in any member of the family Aizoaceae, (see Rimington 1934).

As an illustration of the isolation of bitter principles, I have chosen the plants *Cucumis myriocarpus* and *C. leptodermis*. Quin (1928) had previously found that the juicy pulp of the ripe fruits contained an amorphous bitter material, free from nitrogen and not glucosidal in character, which caused death of animals when injected intravenously or when fed in larger amounts per os.

The method used was as follows (see Rimington 1934). The ripe fruits were squeezed in a press and the juice collected. This was treated with basic lead acetate, filtered and excess of lead removed by sodium carbonate. The pale yellow liquid was now shaken with chloroform, which extracted the bitter principles. After drying, the chloroform solution was poured into $3\frac{1}{2}$ volumes of ice-cold petroleum ether when the toxin "cucumin" was precipitated as a white amorphous powder. In the case of *C. leptodermis* fruits, the filtrate from this precipitate, when left in the ice-chest, deposited a second bitter principle in crystalline form. It was named leptodermin. Analysis of these substances establishes their formulae as :

Cucumin ... ... $C_{27}H_{40}O_9$
Leptodermin ... ... $C_{27}H_{38}O_8$

It will be seen that they differ by H_2O, the elements of water, suggesting that they contain structures related in some way as follows :



In many respects they are closely similar in chemical properties.

In order to gain some insight into the constitution of these bitter principles, certain reactions were carried out as follows :

When dissolved in alcohol they give neutral solutions, therefore no free acid groups are present.

When boiled with alcoholic potassium hydroxide they each neutralise three equivalents of alkali. Therefore three acid groups are formed, possibly by opening up of lactone rings.

They each form compounds with 2 :4 dinitrophenyhydrazine. Therefore each contains a $>$ CO group.

By the action of acetic anhydride, drastic decomposition takes place but when boiled with phenylisocyanate, three equivalents of this sub-

stance are taken up. Therefore there are three (OH) groups in the molecule. These may possibly be the same as the three groups combining with alkali.

Finally, when fused with alkali a complex mixture of phenolic acids is formed.

Whilst these details are only preliminary, they clearly reconcile the two substances to the bitter-principle class.

Of more interest perhaps is the peculiar physiological action exerted by Cucumin and Leptodermin. They are both very toxic to rabbits when injected intravenously, the M.L.D. being about 1 mgm/kilo, but it takes over 25 mgm/kilo to cause reath when given by the mouth, probably on account of the rapid detoxication of these substances in the presence of alkali in the digestive tract. To fish, they are extremely poisonous and these animals were used to compare the relative toxicities of cucumin and leptodermin and some of their derivatives. The tests were carried out as follows :

A solution of the material in water was made with a strength of about 0.1%. From this by dilution were prepared lower concentrations down to 0.005%.

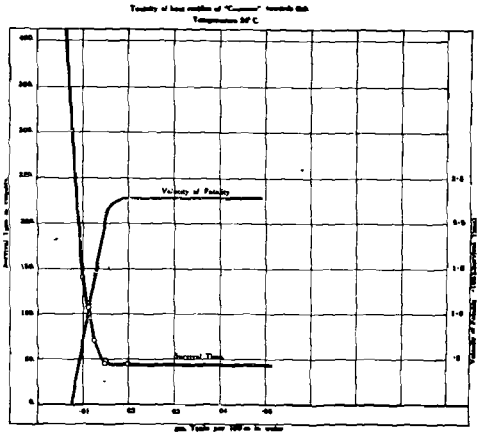


Fig. 2.

A small species of carp was obtained and two fish placed in the most concentrated solution and their survival time measured accurately in minutes. Proceeding in this way observations were made with each solution and the survival times plotted against concentration (see Figs. 2 and 3). It will be noticed that survival time remained fairly constant until about 0.03% concentration was reached, after which it rapidly increased and at slightly under 0.01% survival time was indefinite, that is to say such solutions were no longer toxic. Considering the variability of biological material the observations agree remarkably well.

It is more convenient for purposes of relating toxicity to plot the function 1/survival time or "velocity of fatality" against concentration,

when curves are obtained which are approximately linear when they cut the abscissa. This concentration is that of limiting toxicity. Cucumin and Leptodermin give practically identical figures.

I will now refer very briefly to one of the most familiar of all toxic plants; the Gifblaar, "*Dichapetalum cymosum.*" Work is still in progress upon this plant but some interesting incidental discoveries have been made.

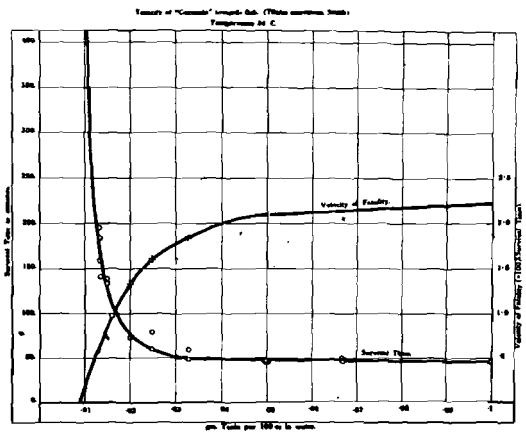


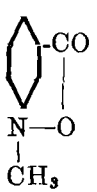
Fig. 3.

The toxic substance is soluble in no other solvent than water and so far no reagent has been found which will precipitate it. It appears to be neither glucosidal, alkaloidal, nor acidic in character.

In endeavouring to eliminate accompanying material from its solutions, the following substances have been isolated from the plant:

1. A tannin giving the reactions of a catechol tannin.
2. A yellow colouring matter, present in large quantity, which is a glucoside. On hydrolysis it yields the sugar rhamnose, a methyl pentose, and it is therefore a methyl pentoside.
3. A complex carbohydrate of the gum arabic type.
4. Some choline, a base feebly toxic to cold-blooded animals.
5. A fair quantity of an alkaloid, trigonelline.

This was obtained as its gold salt. It is a methylbetaine of nicotinic acid, having the formula:



These materials are relatively non-toxic and the final isolation of the active principle still remains to be accomplished. The task is rendered difficult by its chemical non-reactivity and by its limited solubilities.

My next example is one included to illustrate a case where none of the usual routine methods of approach is of any material help. I refer to the plant *Tribulus* causing the disease of Geeldikkop.

The plant is only poisonous at certain times or under certain conditions and cannot be used to reproduce the disease at the Laboratory. Work has either to be done in the field or from varying angles of experimental approach.

The disease, which has been extensively investigated by Sir Arnold Theiler and by Dr. Quin, is characterised by two main phenomena, a generalised icterus and a state of photosensitivity leading to oedematous swellings and subsequent necrosis of exposed parts of the body.

Certain plants and dyestuffs are known to cause photosensitivity but in none of these cases is icterus ever produced, neither can any such photosensitising pigment be found in *Tribulus* plants even when in the toxic state.

To complicate matters, it is also known that the drenching of *Tribulus* juice or of dried ground *Tribulus* in water leads to the death of sheep but with a totally different set of symptoms and post mortem appearances.

The principal finding in this latter case is a marked methaemoglobinaemia. No icterus is present and no photosensitivity.

Dr. Quin and I commenced by investigating this phase of the problem. We found (Rimington and Quin 1933) that the factor causing methaemoglobinaemia was the presence of inorganic nitrite in the plant extracts. This nitrite was not, however, present as such in the plant but was formed by a reducing enzyme system which acted upon nitrates, found in the plant, and converted them into nitrites.

This peculiar phenomenon appears to have no relation to the disease geeldikkop as seen in the field.

The next problem was to account for the photosensitivity and icterus of the typical disease. Dr. Quin had made the observation that by producing an experimental biliary obstruction in sheep at the Laboratory by ligating the common bile duct and exposing such animals to sunlight for several days, a state of photosensitivity usually made its appearance some 4 to 12 days after the operation. It seemed to us that useful suggestions might be obtained by determining what substance it was present in the blood of these sheep that rendered them sensitive to light.

Sera of such animals were examined and in each case it was possible to detect small quantities of a pigment with a characteristic absorption spectrum in the sensitive animals but not in the controls.

Even the bile itself, when similarly examined, was found to contain the same pigment and in order to acquire sufficient material from which to attempt its isolation we introduced permanent biliary fistulae into a number of animals, collecting the bile they secreted in bottles, strapped to the animals' leg.

It was then noticed that the quantity of this particular pigment present in the bile appeared to increase after the operation becoming even 10 or 25 times as great as formerly. This was traced to the fact that after the operation the animals had been liberally supplied with fresh green feed. This, taken in conjunction with the fact that sheep with ligated bile ducts only became photosensitive some 10 days or so after the operation still further supported the hypothesis that the porphyrin-like pigment we were examining was in reality the agent causing light sensitivity.

From about 60 litres of bile, approximately 0.3 gm. of the pure crystalline pigment was eventually obtained. This was converted into its methyl ester and both it and the ester analysed, from which it was seen that the pigment was none other than *phylloerythrin*—a derivative of chlorophyll.

When 40 mgm. was injected intravenously into a sheep, the animal became markedly photosensitive, flinching, crouching and exhibiting all the symtoms of such a condition including the swollen head and ears some 24 hours later. A sample of phylloerythrin prepared by chemical means from chlorophyll acted similarly.

It was thus clear that the photosensitising factor in these cases of biliary obstruction was a pigment derived from the chlorophyll of the green food and normally present in the animals' bile. The feeding of rations devoid of chlorophyll abundantly demonstrated the relation between phylloerythrin excretion and chlorophyll in the diet. About this time, severe outbreaks of geel-dikkop occurred in certain parts of the Karroo. Dr. Quin and I went down, collected bile and serum from affected animals, and returning to the laboratory examined the samples chemically. We found that the same pigment was present and, therefore, responsible for the photosensitisation as in our experimental obstruction cases.

The genesis of the one symptom of geel-dikkop was therefore elucidated. Photosensitivity in dikkop is due to the presence of phylloerythrin in the bile of such animals and can be regarded as an incidental symptom or complication. The primary lesion is the physiolo-

gical inability of the liver to excrete the bile it forms in the normal manner, see Rimington and Quin (1934).

It was important, however, to ascertain how and where in the animal body the transformation of chlorophyll into phylloerythrin took place. It did not occur in the plant nor as a result of the action of plant enzymes since all experiments designed to test this point proved negative.

A comparison of the chemical structures of chlorophyll and phylloerythrin show that all that is necessary to transform the one into the other is the removal of magnesium followed by the splitting off of phytol, methyl alcohol and a carboxyl group. These reactions are such as have familiar counterparts in biochemical processes.

Dr. Quin, Mr. Roets and I (in preparation for press) made a study of the distribution of phylloerythrin in the various parts of the alimentary canal of animals belonging to the main zoological types. They were slaughtered, samples removed from the various levels of the gut and phylloerythrin determined in each, the quantity found being related to the dry weight of the sample. At the same time microscopical examinations were made and the presence of infusoria, bacteria, or spirochaetes recorded.

The results may be summarised briefly as follows. The curves reproduce typical results in sheep :—

1. *Ruminants.* In sheep much phylloerythrin is present in the rumen. Further formation may possibly occur in the caecum and colon.

2. *Herbivora.* In horses, phylloerythrin is first encountered in the caecum.

Guinea pigs and rabbits contain phylloerythrin in the stomach contents.

3. *Omnivora.* In rats, it is found only in the caecum and colon. The pig and dog excrete no phylloerythrin after chlorophyll feeding.

4. *Avians.* Fowls, under similar circumstances, excrete traces of phylloerythrin.

In all cases where phylloerythrin formation occurred, microorganisms were also present. Thus in the ruminal contents of sheep, multitudes of large infusoria could be seen, laden with chlorophyll particles. Some of these infusoria were separated from the ingesta and their bodies, upon extraction, yielded phylloerythrin. It seems safe to conclude that the conversion of chlorophyll in the food into phylloerythrin is brought about by the symbionts in the digestive tract of animals.

Returning to the main problem of geel-dikkop, investigation now resolved itself into a search for the toxic material presumably present in the plant which was capable of causing the hepatic insufficiency and therefore leading to icterus.

In this we were helped by the observation of Quin (1933) that another plant, *Lippia rehmani*, found locally, is capable of causing, when fed, a symptom complex practically indistinguishable from Tribulosis.

From the plant we separated a resinous fraction capable of causing severe icterus when dosed to sheep and by chemical fractionation of this resin eventually succeeded in isolating a crystalline material which we strongly suspect is the responsible active principle (unpublished results).

The substance appears to be related to the resinic acids and has most probably the formula $C_{24}H_{38}O_4$ or something very similar. At this stage the chemical investigation awaits the isolation of further quantities of material. Whilst being careful to make the reservation that there is as yet no proof that the action of *Lippia* and *Tribulus* are similar, it is however significant that the conditions brought about by the two plants are indistinguishable. One may summarise our conception of geel-dikkop as follows :—

The disease exhibits a symptom complex comprising chiefly—

(1) a generalised icterus, and
(2) photosensitisation.

The action of the plant would appear to be either directly or indirectly upon the liver causing a failure on the part of this organ to excrete the bile it forms.

Chlorophyll taken in with the green food is transformed in part into phylloerythrin most probably by the symbiotic microorganisms of the rumen and lower gut. This pigment is normally absorbed to some degree and eliminated in the bile. Should the elimination of bile be stopped, phylloerythrin, together with the other constituents of the bile, finds its way into the general circulation and there exerts its photosensitising action, causing inflammation of any exposed, highly vascularised surface of skin. Treatment of the symptoms of photosensitisation is, therefore, merely palliative. The essential action of the plant poison is to inhibit the function of the liver in so far as excretion of bile by this organ is concerned.

I would like to make a very brief reference to the Vermeersiektebossie, species of *Geigeria*, which as you know, constitutes a very serious menace to stock in certain parts of Griqualand West. Investigations are in progress with this plant and some interesting results

have already been obtained. The difficulty lies, however, in the fact that the toxic principle appears to be unstable and fresh, toxic plants lose their toxicity rapidly after collection or when dried. Moreover, this is a case when small laboratory animals are not suitable for test purposes; sheep have to be employed and a quantity of plant, or extract prepared from about 3 to 4 kilos of dry material, drenched for each dose. The work is, therefore, necessarily slow and laborious.

It has been possible to isolate a crystalline bitter principle from *Geigeria aspera* which it is thought may possibly prove to be the toxic principle. This substance is only present to the extent of 0.05 to 0.1% of the dry plant. It has the formula $C_{15}H_{22}O_5$ and contains one lactone group and a ketonic group. Hydroxyl and methoxyl groups are, however, absent. Chemical examination to date suggests that it may be built up of hexamethylene or pentamethylene ring systems. Should this prove to be the case, it brings the substance into line with the pyrethrins, insecticidal oils obtained from another member of the compositae, *Chrysanthemum cinerariaefolium.*

In conclusion, one may summarise the findings recounted as fol lows :—

"Bietous," *Dimorphotheca species*, contain the cyanogenetic glucoside linamarin. *Acacia lasiopetala*, *A.stolonifera* contain a hitherto undescribed cyanogenetic glucoside to which the name "Acacipetalin" has been given. It is $C_{11}H_{17}NO_6$.

Psilocaulon absimile contains large quantities of oxalic acid (8.6%) and also a toxic alkaloid, piperidine (about 4%).

Cucumis africanus, *C.myriocarpus* and *C.leptodermis* all contain the same bitter principle "Cucumin" $C_{27}H_{40}O_9$. *C. leptodermis* contains, in addition, a closely similar bitter principle "leptodermin" $C_{27}H_{38}O_8$.

Dichapetalum cymosum contains a water-soluble toxic substance. The bases choline and trigonelline have also been isolated and a glucosidal colouring matter.

Tribulus sp. contain inorganic nitrate and a reducing enzyme system converting nitrate to nitrite. The toxic principle causing icterus has not yet been isolated although a crystalline material related to the resinic acids has been isolated from *Lippia rehmani*, a plant causing a symptom complex similar to that seen in geel-dikkop. The photosensitivity seen in geel-dikkop is caused by phylloerythrin present in the bile of sheep on green feed and formed from chlorophyll, almost certainly by the action of microorganisms present in the rumen and other parts of the alimentary canal. *Geigeria* or Vermeersiektebossie contains a crystalline bitter principle which, it is thought, is possibly the toxic substance responsible for the disease.

In the present paper, I have dealt exclusively with poisonous plants which have been examined by myself and colleagues at Onderstepoort. Considerations of time and space forbid a more extensive survey of the subject but in conclusion reference should be made to the very important contributions made by Dr. H. H. Green, Dr. Kammerman, Professor Rindl and others whose work upon the chemistry of South African poison plants is well known and fully merits the appreciation with which it has been widely received.

References.

FINNEMORE, H., and COX, C. B. (1930). Cyanogenetic glucosides in Australian plants. *Jl. Proc. Roy. Soc. N.S. Wales.* 1930. Vol. 62, p. 369.

QUIN, J. (1928). The toxicity of *Cucumis myriocarpus* Naud. *S.A. Jnl. Science.* Vol. 25, p. 242.

QUIN, J. (1934). Studies on the photosensitisation of animals in South Africa and The Toxicity of *Lippia rehmani*, Pears and *L. pretoriensis*, Pears. *Onderstepoort Jnl.* Vol. 1, No. 2, p. 501.

QUIN, J. (1934). Studies on the photosensitisation of animals in South Africa VI. The effect of surgical obstruction of the normal bile flow. *Onderstepoort Jnl.* Vol. 1, No. 2, p. 505.

RIMINGTON, C. (1932). Isolation and chemical examination of the poisonous principle of *Dimorphotheca spectabilis* Schltr. and *Dimorphotheca zeyheri* Sand. *18th Report of the Dir. of Vet. Services and Animal Ind.* p. 955.

RIMINGTON, C. (1934). Isolation of the toxic principles of *Cucumis africanus* a.c.f. *C. myriocarpus* Naud emend Schweikert and of *C. leptodermis* Schweikert sp. nov. Their characterisation as trilactones belonging to the Bitter Principle class. *Onderstepoort Jnl.* Vol. 3, No. 2.

RIMINGTON, C. (1934). *Psilocaulon absimile* N.E. Br. as a stock poison II. Isolation of the toxic alkaloidal constituent and its identification as piperidine hydrochloride. *Onderstepoort Jnl* (in press).

RIMINGTON, C., and QUIN, J. (1933). Studies on the Photosensitisation of animals in South Africa, II. The presence of a lethal factor in certain members of the plant genus *Tribulus*. *Onderstepoort Jnl.* Vol. 1, No. 2, p. 469.

RIMINGTON, C., and QUIN, J. (1934). Studies on the Photosensitisation of animals in South Africa, VII. The nature of the photosensitising agent in Geeldikkop. *Onderstepoort Jnl.* Vol. 3, p. 137.

RIMINGTON, C., and STEYN, D. G. (1933). *Psilocaulon absimile* N.E. Br. as a stock poison. I. Determination of oxalic, malic, tartaric acids, etc. *Onderstepoort Jnl.* Vol. 1, No. 2, p. 439.

STEYN, D. G. (1933). The Diagnosis, treatment and prevention of vegetable poisoning. *Jnl. S.A. Vet. Med. Ass.* Vol. 4, No. 4, p. 193.

STEYN, D. G., and RIMINGTON, C. (1934). The occurrence of cyanogenetic glucosides in South African species of Acacia I. *Onderstepoort Jnl.* (in press).

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V (4) 1934.

The Control of Cannibalism in Chicks by the use of Ruby-Red Glass in Brooder Houses.

By E VAN MANEN, B.Sc. Agric. (S.A.), M.Sc. Agric. (Cornell), Onderstepoort.

What is Cannibalism?

By the term cannibalism is meant any condition which is associated with the partial disfigurement or total destruction of chicks or adult fowls by others of the same kind. Toe pecking and feather picking are vices frequently encountered in the brooder house, while feather picking, which ultimately leads to vent pecking, or as it is commonly called "eating out behind," is more often experienced in the rearing and laying houses.

How is it Caused?

Fowls are not naturally inclined towards cannibalism. It is a vice which is acquired through some form of mismanagement and which becomes intensified by neglect.

In the brooder houses cannibalism is invariably caused when chicks are overcrowded. Overcrowding leads to overheating followed by a nervous reaction resulting in either toe pecking or feather pulling. Once blood is drawn the vice becomes general, and may continue until several chicks have either been badly hurt or totally destroyed.

The absence of sufficient hopper space at feeding time is another common cause of cannibalism. The chicks crowd at the limited space allowed for feeding, and in their desire to get at the food they peck at each other. Intense scrambling ensues and sooner or later blood is drawn as the result of such scrambling.

Crowding around the hoppers is often seen when some hoppers are more favourably placed than others. Sunny spots are selected and chicks will forsake ample room at other hoppers to fight for a place at such a spot. Uniformity in the construction of the hoppers adds to their efficiency in this respect.

Cannibalism also occurs when the brooder house itself is kept at too high a temperature, and lack of ventilation under such conditions adds to the trouble.

When chicks are accidentally hurt the presence of blood on the affected parts frequently leads to cannibalism. The chicks are attracted by the colour of blood rather than by anything else, and will peck at

the affected part merely as the result of curiosity. The taste of blood then leads to further pecking and the trouble soon spreads.

In the laying houses cannibalism may be started by the sight of blood on a feather quill, or by the sight of blood on the vent of a fowl caused during laying, especially when difficulty is experienced in passing the egg. The vent of such a hen may be temporarily extended with blood showing, and other hens are attracted to it almost immediately. Once pecking starts it will continue until the whole vent is pecked out and the bird succumbs through loss of blood. After this other victims are soon singled out and before long the entire flock becomes affected.

How can it be Controlled?

The control of cannibalism lies in management, and the careful poultryman will not be bothered by it to any marked degree.

The first essential in correct brooding is to give just the required amount of heat during the early brooding period. Experience has shown that the correct temperature under the hovers during the first few days of brooding should not be more than 90 to 95°F, and that the temperature should thereafter be reduced by 5° every six or seven days.

The question of ventilation should also receive serious consideration as growing chicks require an abundance of fresh air especially under the hovers at night. The air of the brooder house away from the hovers need only be moderately warm, as the chicks themselves are generating heat while running about the floor.

Chicks should never be crowded either under the hovers at night or at the hoppers during the day. Units of from one to two hundred chicks give the best results during the first week. Thinning out should be practised until the chicks are ready to leave the brooders. Grouping according to size rather than according to age should be practised throughout the season.

The food hoppers should be spaced around the floor in such a way that no particular hopper is more favourably placed than the others, and sufficient feeding space should be provided so that at least 75 per cent. of the chicks can feed at the same time.

With intensive brooding the use of sun-parlours should be encouraged. By using the sun-parlour the chicks are allowed more freedom, and are given the full benefit of the direct rays of the sun.

The attendant should at all times be on the alert so that he can remove any chicks which may have been accidentally hurt, or which show signs of having been pecked.

The Use of Ruby-Red Light in Brooding.

For battery brooding especially, the most efficient control of cannibalism exists in the use of ruby-red window glass for lighting purposes. All the light which reaches the chicks should pass through ruby-red glass. In this way the red light which reaches the chicks prevents them from distinguishing blood on any part of their bodies. Should a chick be accidentally hurt on a toe or feather quill, such a hurt will pass unnoticed by other chicks, even though blood is present on the affected part. In ordinary white light such a condition would easily lead to toe pecking or feather picking.

The soft red light inside the battery room also serves to keep the chicks subdued, and the absence of lighted spots at the hoppers prevents crowding. For practical purposes it is necessary to allow the chicks direct sunlight (through the open windows) only from one to two hours daily during the early morning. After they have been allowed direct sunlight the windows must be closed for the remaining part of the day so that no white light can penetrate the interior. Ventilation, however, must be provided, and this is easily accomplished by leaving a space of from 12 to 15 inches open over the windows, and constructing a false ceiling at least 6 feet wide from the bottom of this space to run inwards and parallel to the roof. The brooders can then be placed underneath the false ceiling about two feet away from the windows.

The height of the front wall of the battery brooder room will depend upon the height of the batteries to be installed. The room itself need not be deeper than 10 to 12 feet, and the length of the room will depend on the number of batteries in use. The windows should be so constructed that they are pivoted centrally, and will open inwards to admit the maximum amount of light to all parts of the batteries.

For the best results the main windows should face east, so that use can be made of the early morning sun. It will also be found convenient to have at least one window on the north side. The more red light the windows can admit, the better will be the result. Also by painting the false ceiling and inside walls red, better results are obtained than by leaving these the customary white.

The red light system can be adapted to any type of brooder house which employs windows for front lighting. The windows should be so placed that the sun's rays will fall over the entire depth of the house if possible. The extra cost of adapting this system will be worth while, in that better and stronger chicks can be reared without the evils generally associated with brooding.

A temporary substitute for ruby-red glass can be found in painting ordinary window glass with a preparation of eosin, shellac and alcohol. The shellac is first dissolved in the alcohol to obtain a thin paste and

the eosin is then added until the required colour is obtained. The desired colour resembles pillar-box red very closely. The resulting mixture should then be applied to the inside of the glass with a soft, broad, flat brush. The windows must be shaded while the paint is applied so that an even surface will be obtained. One coat of paint will be sufficient as the brooder house is used only for a short period of the year. Should any fading occur the desired colour may be restored by an additional coat later in the season.

Closely fitting red blinds made of some translucent material may also be used instead of ruby-red glass.

The Research Poultry Plant, of the Division of Veterinary Services at Onderstepoort near Pretoria, has been making use of red light for battery brooding for the past two seasons, and has found this system very effective in preventing cannibalism.

The following summary gives the brooding results on 503 day-old white Leghorn chicks for the 1933 season. The chicks were allowed direct sunlight for a period of from one to two hours daily between 7 and 9 a.m. For the remaining part of the day the windows were closed to admit red light only. After six weeks the chicks were removed to the floor pens of an intensive brooder house.

SUMMARY OF BROODING RESULTS FOR 1933.

Number of chicks placed in Battery Brooder 503

Number of chicks per tray—approximately 100

Date of commencement of brooding—16th September 1933.

First three weeks in Electric Battery Brooder.		Second three weeks in Cold Battery Brooder.		Six weeks to three months in Brooder House.	
Red Light Mortality.		Red Light Mortality.		White Light Mortality.	
Accidental	Other Causes	Accidental	Other Causes	Accidental	Other Causes
3	7	1	3	4	1
Totals ... 10		4		5	

Grand Total 19

Per cent. mortality up to 3 months 3.8

Cannibalism	(1)Cannibalism	(2)Cannibalism
0	3	3

Total 6
Per cent. of chicks affected 1.2

NOTE.—1. Toe pecking occurred during the opening of the windows to admit direct sunlight.

2. Signs of feather picking were seen on three chicks.

It is interesting to note that toe pecking occurred only after the third week. Owing to a shortage of houses during building operations, the inability to dispose of young cockerels, and the acquisition of only one cold battery brooder, the chicks were rather crowded after the third week. Toe pecking occurred only after the chicks were placed in the cold battery brooder, and was first observed when the windows were opened to admit direct sunlight. This vice was immediately checked by the removal of the affected chicks, and the exclusion of the white light. Of the total number of chicks placed in the battery brooders only 0.6 per cent. showed signs of having been pecked.

SUMMARY OF BROODING RESULTS FOR 1934.

First three weeks in Electric Battery Brooder.		Second three weeks in Cold Battery Brooder.		Six weeks to three months in Brooder House.	
Red Light Mortality.		Red Light Mortality.		White Light Mortality.	
Accidental	Other Causes	Accidental	Other Causes	Accidental	Other Causes
0	23	1	0	1	0
Totals ... 23		1		1	

Grand Total 25
Per cent. mortality up to 2 months (to date) 3.4

Cannibalism	(1)Cannibalism	(2)Cannibalism
0	4	12

Total 16
Per cent. of chicks affected 2.1

Total number of chicks placed in brooders	742
Number of chicks per tray — approximately	100
Date of commencement of brooding—23 August 1934.	

NOTE.—1. Wing pecking started when the chick leg bands were changed to the wings.

2. Wing pecking continued in the brooder house, the wing bands being the cause of the trouble.

Most of the mortality during 1934 was due to the fact that a certain number of pullets were included in the breeding pens for experimental purposes. These pullet chicks were decidedly smaller and weaker than the hen chicks and they were generally the ones that died during the first week.

After the first week of brooding there was practically no further mortality except that two chicks were killed accidentally. Four chicks suffered slight wing pecking during sunning operations in the cold battery brooder, the cause of the trouble being the presence of wing bands. The irritation caused by the wing bands caused the chicks to peck at them and to set a bad example to the rest. When these chicks were removed to a small cage no further trouble was experienced. The affected chicks were again replaced after a few days.

The twelve chicks that were wing-pecked in the brooder house were also placed in a small brooder inside the ruby-red battery room, and kept under observation for a few days. No further pecking was experienced and the affected chicks were taken back to the brooder house as soon as it was safe to do so.

No cases of toe pecking were recorded during the past brooding season. Four chicks, however, had their toes accidentally hurt on the wire floors of the sun parlours. They were left to recover in the battery brooder room without fear of the trouble being continued.

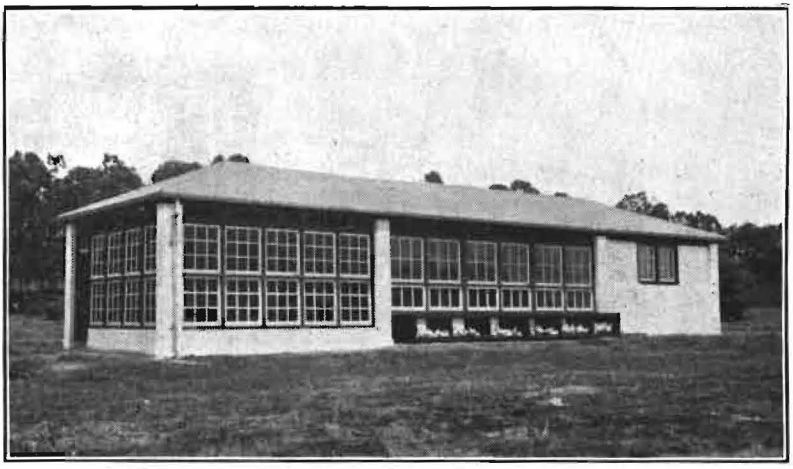

Fig. 4.—Portion of Research Poultry Plant, Onderstepoort, showing battery brooder room, sun-parlour brooder house, and incubator room.

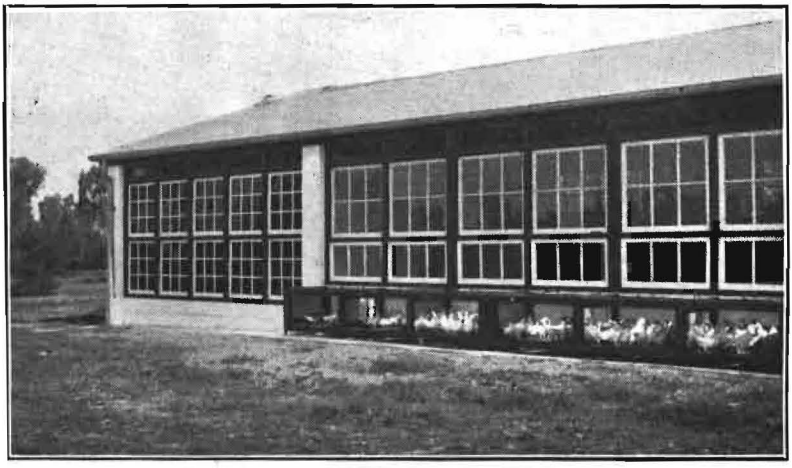

Fig. 5.—Ruby-red glass battery brooder room (left), with Vita-glass six-pen brooder house and sun-parlours (right).

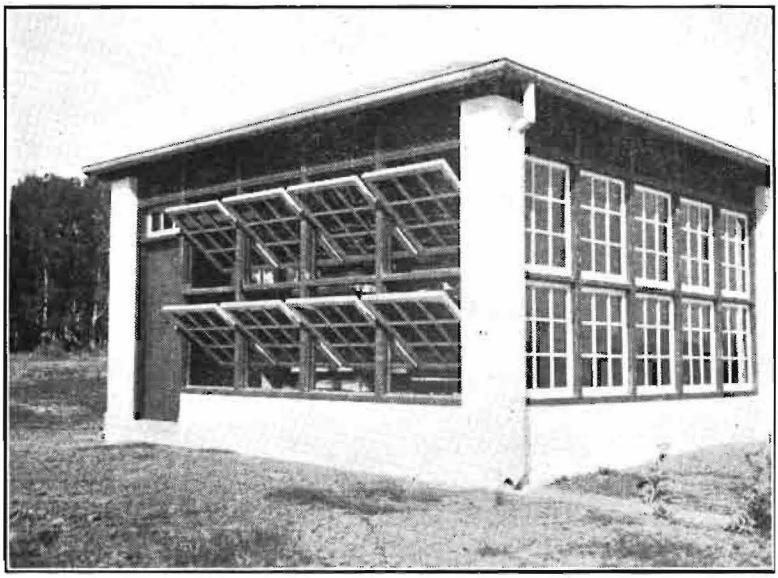

Fig. 6.—Battery brooder room with ruby-red glass windows on East and North sides. East windows open to allow sunning of the chicks for an hour early in the morning.—Windows otherwise closed to control cannibalism.

Fig. 7.—Battery brooders in position near East windows during sunning operations Electric model for baby chicks in right foreground.

Two Anaesthetics Recently Used with Success.

By J. H. SCHOEMAN, B.V.Sc., Umtata.

Novutox.

This is a local anaesthetic put up in two and three per cent. solutions in glass stoppered bottles containing two fluid ounces each.

In veterinary practice, novutox has been used in horses and dogs at Umtata with great success. One of the main advantages of the preparation is that it remains sterile, even when the container is left open for long periods. The dose varies with the size of the patient and the nature of the operation. In dogs the writer has used up to 5 cc. and in horses up to 15 cc. The solution is injected subcutaneously or intramuscularly at and around the site of operation.

Evipan Sodium.

A general anaesthetic producing complete anaesthesia for a short period, this drug is extensively employed in human medical and dental practice and has been adopted at Umtata in canine surgery with very encouraging results.

It is administered intravenously at a slow rate—approximately 5 cc. per minute. Anaesthesia sets in immediately with no intervening stage of excitement and lasts for 10 to 30 minutes, after which the full dose can be repeated without harmful effects. This, combined with the fact that previous starvation is not essential, makes it an invaluable addition to the veterinary dispensary for the use in minor surgical operations and cases of emergency.

The dosage has not yet been worked out accurately, but judging from the cases recorded so far the dose should vary, both with the weight and the age of the patient. The following three cases are quoted to illustrate this point :—

(1) 14 cc. produced complete anaesthesia for 10 minutes in a dog 3 years old, weighing 86 pounds.

(2) 4 cc. produced complete anaesthesia for 20 minutes in a dog 2 years old, weighing 26 pounds.

(3) 1 cc. produced complete anaesthesia for 30 minutes in a dog 6 weeks old, weighing 8 pounds.

The three patients were unstarved and in case (1) A.C.E. mixture inhalation was employed to prolong anaesthesia, as more Evipan Sodium was not available.

I am grateful to Dr. J. Bester and Mr. G. Lund (dental surgeon), for supplying me with information and samples of Evipan and Novutox respectively.

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Regulations Under the Veterinary Act, No. 16 of 1933.

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

These regulations were published in the Government Gazette on the 6th July, 1934, and are designed to deal exclusively with matters of professional discipline and etiquette arising out of section 14 of the Act. This section, it will be remembered, reads as follows :—

> **14.** The Veterinary Board shall have power to enquire, with the approval of the Minister, into any complaint, charge or allegation of improper conduct or disgraceful conduct against any person registered as a veterinarian under this Act and on conviction to impose the penalties prescribed by sub-section (1) of section 15: Provided that if any such complaint, charge or allegation forms, or is likely to form the subject of criminal proceedings in a court of law, the Veterinary Board may postpone its enquiry until such proceedings have been determined.

The Regulations are characterised by great attention to detail and will within their limits undoubtedly serve to impress the necessity for adhering to the only legitimate method of gaining a reputation, namely by becoming a more and more proficient and skilful veterinary surgeon. The first portion of the Regulations is devoted to *Advertisements* and it may be as well to quote *Bullock's* apt reason why advertising is regarded so coldly amongst professional men : "Advertising is prohibited because it would enable the unscrupulous, or wealthy, member to gain for himself credit, or to increase his clientele, to the detriment not only of his more scrupulous or less wealthy brother, but also of the public. The interests of members of the public require that they should be able to choose freely from among practitioners that one who is, in their opinion, the best for their needs, having regard to his known skill and reputation, and not his cleverness in keeping his name before the public." (*Bullock* : *Handbook for Veterinary Surgeons*, *p.* 34). *Bullock* also points out that in addition there is such a malpractice as Indirect Advertising and emphasises that a member should be on his guard against it, i.e., should see that other persons do not advertise for him. There are ways of getting advertised, he says, without appearing to be responsible for the notices, and there are members who stoop to this form of disgraceful conduct, alleging that they cannot help what others do on their behalf. If such conduct does not result in the removal of the member's name from the Register, it usually results in his being rightly ostracised by his professional brethren, the recognised channels, he submits, by which a member may bring to the notice of the profession results obtained, or experience gained, in his practice, being professional journals and

the various veterinary societies. The lay press should never be used for such purposes. It is interesting to note that in the exercise of its powers the Council of the Royal College of Veterinary Surgeons to remove the name of a member from the Register under section 6 of the Veterinary Surgeons Act 1881, (p. 143) or of an "existing practitioner" under section 3 of the Act of 1921 the Council follows by-laws. What constitutes "conduct disgraceful in a professional respect" within the meaning of the Act has not yet been defined by the Council but certain Acts are declared (By-law 53) to be such as to bring the doer within the section, as e.g. "Touting or canvassing for practice, whether by himself or by others." In England the Medical Council has adopted a system of issuing warning notices. For the purpose of bringing to the knowledge of medical practitioners the nature of the acts or conduct which will be regarded as "infamous" the Council issues a warning notice. This is in the form of a summary of the resolutions and decisions of the Council upon the forms of professional misconduct which have from time to time been brought before them and which render a medical practitioner liable to have his name erased from the Medical Register, and section 7 reads: "Advertising, whether directly or indirectly, for the purpose of obtaining patients or promoting his own professional advantage; or for any such purpose, procuring or sanctioning or acquiescing in the publication of notices, commending or directing attention to the practioner's professional skill, knowledge, services or qualifications or depreciating those of others; or being associated with or employed by those who procure or sanction such advertising or publication," while section 8 is as follows: "Canvassing, or employing any agent or canvasser for the purpose of obtaining patients, or sanctioning or being associated with or employed by those who sanction such employment."

As has been pointed out before, it is impossible to set out a complete list of offences, and no list purports to be more than a general specimen. From time to time the duly appointed authority will declare what conduct falls within the term "infamous," or in South Africa "disgraceful" or "improper" conduct. As has also been indicated before, the Courts are not astute to interfere with the finding of a Council or Board or other body in disciplinary matters. In England, if it is shown that a medical man, in the pursuit of his profession, has done something with regard to which it would be reasonably regarded as disgraceful or dishonourable by his professional brethren of good repute and competency, then it is open to the General Medical Council to say that he has been "guilty of infamous conduct in a professional respect" within Medical Act 1858, (C.90), s. 29. Moreover if the Council, acting *bona fide* and after due enquiry, have adjudged a medical practitioner to have been guilty of infamous conduct in a professional respect, the Court has no jurisdiction to review

their decision by granting a mandamus to restore an erasure. The only thing which the Courts can investigate when proceedings of the General Medical Council on an injunction to restrain erasure are brought is whether the domestic forum has acted honestly within its jurisdiction. (*Bowen, L. J.*, in *Leeson v. General Council of Medical Education and Registration* (1889) 43, *Ch. D.* 366). Indeed it has been held that the functions exercised by the General Council under the Dentists Act 1878 (C. 33) ss. 11, 13 respectively being discretionary, not merely ministerial, whether they acted under section 13 or under section 11, sub-section 5, only, they were not liable to an action for the erroneous exercise of their discretion in the absence of *mala fides*. (*Partridge v. General Council of Medical Education and Registration of United Kingdom* (1890), 25 *Q.B.D.* 90). This is of course distinct from an application for a mandamus to restore a name where the Council had acted erroneously.

The second portion of the Regulations framed under Act No. 16 of 1933 refers to *Business Advertisements*. This deals with the persistent attempts to induce members to give their approval to patent medicines, etc., etc. *Bullock* points out that there are two good reasons why such requests should not be acceded to : (i) The member who gives a report or testimonial will find his name, qualification and address printed in leaflets or circulars used to advertise the remedy, and he may consequently be charged with indirect advertising. (ii) He is lending his professional aid to a commercial enterprise, the purpose of which is not primarily the good of the public but the good of the advertising firm. Patent medicine vendors spend enormous sums in advertising alleged remedies for which extravagant claims are frequently made. It is a prostitution of one's professional education to make it the means, not of serving the community, but of assisting commercial concerns such as these to increase their business. Our regulations indeed refer to "kennels or similar commercial organisations."

The Regulations are extremely exhaustive and, if one may say so, taken over from other sources which in themselves represent the fruit of many years. It is therefore not advisable merely to relate the offences seriatim. A few remarks about some aspects of the Regulations may fittingly conclude this article. On the question of name plates, always a difficult one, the rule laid down by the Dental Board seems very appropriate :—

"The Board views with disapproval the use or exhibition of any sign, other than a sign which in its character, position, size and wording is merely such as may reasonably be required to indicate to persons seeking them the exact location of, and entrance to, the premises at which the practice is carried on." And *Bullock's* general observations

are indeed trenchant: "The use of large signs is much to be deprecated and the painting of name and qualification on the side of a house has, on more than one occasion, been held to be a breach of the by-laws. Members should keep in mind the fact that any unnecessary display tends to lower their status as professional men and to bring them into the class of tradesmen. It is the sign of the quack to advertise himself and his nostrums; the man of true professional feeling, content with a modest nameplate, receives a greater amount of respect than the man who describes himself and his premises in staring capitals." South Africa, take notice, not merely of overt advertising but of more insidious commercialisation! Another point which we may here refer to is that of assuming the title of "specialist." This savours of both extravagance and advertising. Fees again differ as those do of medical practitioners with the locality and veterinarians should always seek information as to the prevailing charges. In the matter of public appointments it is suggested that unless a definite salary is stated members should not apply and should in any case see that their own minimum is observed. No member should "tender" uninvited services for an appointment. Such appointments are sometimes advertised but are in conflict with the dignity of the profession and the interests of the public. Nor should any appointment requiring applicants to "state salary required" be applied for until the secretary of the Association has pointed out the error and the matter been adjusted accordingly. I think that on the whole the Regulations are full and clear and should provide a sufficiently clear guide. The spirit of these regulations will appeal to the healthy outlook which characterises the average veterinarian. In conclusion therefore one knows that our veterinarians will not cavil at my quoting *Bullock* again when he says: "The statutory recognition given to the profession was not intended for the protection of the registered veterinary surgeon, but rather for the protection of the public by enabling them to distinguish between qualified and unqualified practitioners." The circumstances under which these words were written may not be identical with those governing the birth of our Veterinary Act, but the sentiments are sound and need little apology anywhere.

Our Professional Status: A Few Constructive Suggestions.

By N. F. VILJOEN, M.R.C.V.S., Bloemfontein.

Since our profession has at last received legal recognition in South Africa, and we, as members S.A.V.M.A. and members of the veterinary profession generally, have from time to time been invited to give suggestions which might lead to the further advance of the profession, it has occurred to me that what we lack most is professional status, and to a certain extent etiquette. I am inclined to think that rectification of our lack of status rests with ourselves, not as individuals, but as a profession, through the medium of the S.A.V.M.A. and the newly appointed Veterinary Board.

I now propose to lay a few suggestions before my professional colleagues, and if they could become the subject of a discussion in the "Journal," I should be very glad. We are not all privileged to attend the General Meetings of the S.A.V.M.A. regularly, and the "Journal" is, therefore, our only means of exchanging views.

It is, of course, a great pity that the identity of our profession is mainly absorbed in the Department of Agriculture, within which the bulk of its members are employed. The result is that departmental discipline to a certain extent precludes junior members of the profession from putting forward just claims and suggestions.

As regards the private practitioner, the main difference between the veterinarian in Britain and his colleague in South Africa, lies in their respective experience with the public. The British stock owner has been taught from the beginning that the professional services of the veterinarian deserve the same payment as those of the doctor and dentist, whereas it is a sore point with most private practitioners that the South African farmer is hopelessly spoonfed. In what respect is this spoonfeeding more obvious than in our professional practice? In no districts, except in the larger urban areas, can the unfortunate private practitioner make a living, simply because his professional knowledge is not considered worth a fee. The rural areas are served by the Government Veterinary Officers, who, poor fellows, are at the beck and call of, sometimes, a most inconsiderate public. How many G.V.O.'s have not spent hours in the middle of the night calving cows, or been called on a Sunday morning to remove a putrid placenta, all for nothing? I do not advocate that State Veterinarians should be permitted to charge fees on their own account, and so indulge in private practice, but what I certainly do consider should be done, is that a definite scale of fees should be drawn up by the Department for veterinary services by their Officers to the public, which fees should be paid in to Revenue. The

veterinary officer would then at least have the satisfaction of knowing that the public was paying for his services. The existing understanding that in areas where private veterinarians practise, the State Veterinarians should not be allowed to interfere, should stand. I do not know whether instructions to this effect have ever been given in writing to State Veterinary Officers, and I fancy that a sort of "gentlemen's agreement" exists, but the S.A.V.M.A. as the organisation of the profession can surely request the Department to instruct its officers accordingly, so that the private practitioner could be definitely reassured. I do not imply that the Government Veterinary Officers have deliberately taken work from the practitioners, but, nevertheless, the position to-day is that the town stock owner must pay for professional services, whereas the rural owner gets advice free. It is a most anomalous and unjust state of affairs, and if a scale of fees were compulsorily charged by veterinary officers, the anomaly would be adjusted, and Revenue would benefit thereby. The issue to the public by the Department of pamphlets on matters of a professional nature is also unjust to the practitioner, and if we were properly organised professionally, that practice would not be tolerated. It is similar to and as objectionable as the practice of some veterinarians who give the public professional information in answer to queries in the press.

The veterinary officers who have from time to time been stationed at the various Schools of Agriculture can state what manner of queries they are sometimes called upon to answer, and what professional secrets they are asked to give, gratis, to the public. At the Potchefstroom School of Agriculture, I was asked questions ranging from castration technique and castration of cryptorchids to the treatment of milk fever, by correspondents from the Rand, and, needless to say, on each occasion my reply was that they should call in one or other of the private practitioners in their area.

Then as regards the disguised form of advertising which goes on in this country? How many times have we not seen announcements in the press of the marvellous surgical feats of veterinarian "So-and-So"? Surely the newly established Veterinary Board is aware of this and in a position to put a stop to this unprofessional practice. In order to overcome some of the difficulties, and to create uniformity, and to make the rural stock owner appreciate the services of his District Veterinary Officer, as his urban fellow owner has to do, I would suggest that the S.A.V.M.A. request the Department to charge definite professional fees, and that a similarity between the Government fees and those of the private practitioner should be arrived at. Without dictating to our practitioner colleagues, as to what their fees should be, the S.A.V.M.A. could circularise all practitioners in the country, whether members of the S.A.V.M.A. or not, to ascertain what scales of fees and mileage

rates they charge, and a definite scale could then be suggested for all veterinarians, government or private, so that an end could be put to the objectionable and unprofessional practice of undercutting.

BOOK REVIEW.

Progress in the closely allied subjects of Veterinary Helminthology and Entomology has been very rapid and extensive in recent years with the result that an enormous amount of information is scattered in the literature, out of reach of the busy average person, otherwise interested in this subject. The book under review,[1] which is primarily of a practical nature, is intended for the use of students of veterinary science and as a concise guide to the veterinary practitioner, who is frequently handicapped, so far as exact diagnoses are concerned, by the inaccessibility of suitable literature. Within the space of 400 pages the author covers an extremely wide field which includes all the more important internal and external parasites likely to be encountered in domestic animals, birds and fur-bearing wild animals.

The work begins with a general discussion on parasitism in its wider sense, *inter alia* types of parasitic relations, pathogenicity, host and organ specificity, resistance and immunity, etc., followed by a brief historical review of the subject. The next section is devoted to the collection, handling and examination of parasites, wherein methods of laboratory technique as well as those applicable in the field are briefly dealt with. Clinical diagnostic methods as well as the various serological tests and allergic reactions applicable to parasitic infestations are also discussed. The phyla of the helminth parasites, plathelminths and nemathelminths, are treated systematically and the phylum Annelida is added for the sake of completeness as helminth parasites in the broad sense of the term. Only sufficient detail is given to enable the veterinarian to arrive at a diagnosis in most cases, where host and position of the parasite are known. Pathogenesis and pathogenic effects are discussed throughout and together with methods of prophylaxis and treatment where these are known.

The latter third of the book deals with the arthropod parasites of veterinary importance and their methods of prevention and control, particular stress being laid on the commoner and more important forms and those parasites which act as vectors of disease.

It is manifestly impossible for the author to go into any great detail in the space he has allowed himself in connection with the

(1) 1934. Veterinary Helminthology and Entomology by H. O. Mönnig. pp. 404 + xvi. Baillère, Tindall & Cox, London. £1.10.—postage 1/3.

descriptions of the various parasites and the diseases produced or transmitted by them, with the result that the value of the book to the research worker is lessened. However, the book is primarily intended for the student and practising veterinarian and in this respect fully justifies the hope expressed for it by the author. For the sake of compactness the author has elected to use a simple style in which short sentences preclude the possibility of any ambiguity; but this is offset by the clarity of type and the excellent arrangement and reproduction of the numerous original illustrations which help to make this volume a very valuable addition to the libraries of all interested in this most important subject. R. du T.

THE ASSOCIATION.

Minutes of Special Council Meeting S.A.V.M.A. held at Onderstepoort on 29.6.1934.

Present: Messrs. H. H. Curson, P. J. J. Fourie, A. D. Thomas, C. Jackson, M. H. V. Brown, and Dr. G. de Kock (by invitation).

It was agreed that the Acting Director of Veterinary Services be asked to approach the Secretary for Agriculture with a view to obtaining permission for as many Government Veterinary Officers as possible to attend the Annual Scientific Meeting of the S.A.V.M.A. provisionally arranged for the second week in September 1934.

Dr. de Kock also mentioned that the Medical Association had extended an invitation to all members S.A.V.M.A. to become full members of the Medical Congress to be held in Pretoria during the first week in October 1934 on payment of £1.1.0. Council instructed the hon. sec.-treasurer to circularise members of the Association accordingly.

Minutes of Council Meeting S.A.V.M.A. held at Polley's Hotel, Pretoria, 10.8.1934, at 8 p.m.

Present: Mr. F. J. Carless (in the chair), Messrs. P. J. Fourie (Hon. Sec.-Treas.); H. H. Curson, A. D. Thomas, G. Martinaglia, C. Jackson, A. C. Kirkpatrick, A. M. Diesel, M. H. V. Brown, and Drs. G. de Kock and J. I. Quin (by invitation).

1. The minutes of Council Meetings held on 13.2.1934 and 29.3.1934, and of the General Meeting held on 29.3.34, were taken as read and were approved.

2. Matters arising from these minutes: None.

3. Reports of Committees:

a. Dr. Quin read the report of the Status Committee Meeting held on 25.5.34 as follows:—

1. The following members of the Status Committee attended the meeting: Messrs. McNae, Kirkpatrick, van Heerden, Fourie (Sec. S.A.V.M.A.), and Quin (convenor of meeting). Mr. Alexander, the other member appointed by Council, expressed his inability to serve on the Status Committee and did not attend.

2. The object of the meeting was to consider the replies received from members of the S.A.V.M.A. to a circular sent out by the Secretary in December, 1933, re the possibilities of part-time appointments for veterinarians.

3. The committee noted with regret the very poor response to the circular: only 8 members of the profession replying to it. It was felt that without the active support and sympathy of the profession behind it, great difficulty was experienced in attempting to raise the status of the profession and to find employment for more veterinarians outside the Government service.

4. A full discussion took place on the various points raised in the replies received. In a few instances it was stated in the replies that part-time municipal work and private practice could be undertaken in some areas for which certain annual incomes could be expected, either payable directly into Government revenue or to be retained by the veterinary officer. The difficulties arising from the various schemes with regard to such matters as transfer of officers, pensions, etc., were brought up and fully discussed.

5. After careful consideration of the whole problem the Status Committee wishes to place the following recommendations before Council for further discussion:—

(a) In order to test out the practicability of a part-time Government employment combined with part-time private practice for veterinarians, two or three areas in the Union (e.g. Middelburg-Graaff Reinet as one and Bedford as another) be selected, where an experiment lasting two or three years be conducted along these lines: A Government Vety. Officer stationed in each of these areas and drawing his full salary from the Agric. Dept. is allowed, in addition to his purely official duty, to carry on private practice and municipal work as far as possible in each area. For private work done, fees would be charged while municipalities would be requested to guarantee a certain sum annually for all veterinary work done for them. All fees earned by the veterinary officer, private as well as municipal to be paid into general revenue. The object of this scheme would be to ascertain to what extent private and municipal work would be possible in a few of the best rural areas and also what remuneration could be expected from these sources, should such veterinary officers and the agricultural department after the 2-3 years of the experiment agree to an annual retaining fee to be paid to the officers while the balance of their income is to be derived from whatever private and municipal work yields to them. It was felt that some scheme such as this would induce a certain number of enterprising veterinary officers to develop private and municipal work and incidentally give better service than in the past. Moreover it would tend to teach stock-owners and municipalities to appreciate and pay for veter-

inary services. Such services would now be rendered with greater interest and keenness by veterinarians and not be looked upon as a troublesome routine duty as before.

(b) Well planned propaganda should be conducted in certain of the larger towns and cities of the Union, e.g. Pretoria, Maritzburg, East London and Port Elizabeth for the employment of full-time municipal veterinarians. This is to be done after consultation with the public health department through the secretary for agriculture. Furthermore by winning the goodwill and cooperation of the health authorities and medical profession who thus far have held full control over municipal hygiene, abattoirs, etc., the veterinary profession would take its proper and legitimate share in such important matters. The committee also took note of the fact that municipalities were subsidised by the Public Health Department in respect of public health services—a point which it is suggested Council might give its attention to.

(c) It was suggested that several other towns in the Union be considered with a view to ascertaining the possibilities for part-time veterinary employment. The following list of towns to be considered:—

Natal—Vryheid, Ladysmith, Estcourt, Dundee, Newcastle.

Transvaal—Potchefstroom, Germiston, Krugersdorp, Benoni, Pietersburg, Standerton-Volksrust, Vereeniging-Heidelberg, Ermelo-Carolina, Middelburg-Witbank.

O.F.S.—Kroonstad, Bethlehem, Harrismith.

Cape—Kimberley, Middelburg-Graaff-Reinet (already considered), Bedford (already considered).

(Sgd.) J. I. QUIN.

Mr. Alexander's resignation from the Status Committee was noted with regret and the report was accepted.

Discussing the report, Dr. Fourie stated that Mr. R. Clark, Government Veterinary Officer stationed at Ermelo, had induced the Ermelo Municipality to offer £200—£300 per annum for his services as Municipal Veterinarian. He was willing to perform the work for one or two years, the emoluments offered to be paid into Government Revenue. This represented a definite start in the scheme recommended by the Status Committee and Dr. Fourie considered that if the Department was agreeable it should be proceeded with. The Ermelo Municipality had communicated with the Department, but as far as he knew the matter had not yet been dealt with by the latter authority.

Dr. Thomas disagreed with the principle that the veterinarian should receive no extra emoluments for the work performed for the Municipalities, etc. If such were the case there would be little or no incentive for the veterinarian to widen and enlarge the scope of the work. This applied especially to private practice where the amount collected depended entirely on the initiative and energy put into the work by the Veterinary Sur-

geon. Why should the veterinarian spend time and energy on collecting fees for private work, when the proceeds would be paid into Treasury?

The Speaker then proposed that in place of the plan recommended by the Status Committee the following scheme be put before the department, viz., that one or two areas be selected in which new posts as part time Government Veterinary Officers (i.e. dealing with scheduled diseases only) at say £400 p.a. be advertised. The veterinarian appointed would then be free to pursue Municipal and private work and the proceeds would, of course, be his own.

Mr. Diesel seconded this proposal.

Mr. Jackson held that the Status Committee recommendations should go forward unchanged.

Dr. Quin then suggested that both schemes be adopted and go forward for consideration by the Department, i.e. that recommended by the Status Committee and Dr. Thomas's proposal. This was agreed to.

b. Finance Committee: Dr. Fourie (as convenor) reported that during the year the Finance Committee had resolved to place all the Association's funds (apart from the current account) in Union Loan Certificates on account of the safety of the investment and only slightly smaller rate of interest. This had been done and the total reserve fund of £1,140 was invested in Union Loan Certificates.

The action of the Finance Committee was approved.

e. Temporary Committee *re* Private Practice.
Dr. Fourie stated that all association members who were private practitioners had been circularised and asked to give instances and evidence where Government officials had encroached upon their work.

Only a few replies had been received and the Committee was not yet in a position to report.

4. Constitution of Association of Private Practitioners.

Dr. Fourie read a letter from the Secretary of the newly formed Association of Private Practitioners explaining the objects of the Association—in brief to safeguard and protect the interests of and to foster a spirit of co-operation and unity amongst private practitioners of all professions—and inviting the S.A.V.M.A. to elect a member to act on the executive of the Association. It was recommended that a member be elected at the General Meeting.

5. Spring General Meeting S.A.V.M.A. 1934.

Dr. Fourie said that the date had been fixed for the 6th and 7th September 1934 and that all members had been informed, including S.W.A. veterinarians.

Dr. de Kock mentioned that a considerable amount of difficulty had been encountered in obtaining the sanction of the Department for the attendance of Government Field Veterinarians at the meeting. Thus several papers of special interest to the Field Veterinarians had been arranged in order that the benefit of such a meeting to the Field Staff especially would be obvious to all.

Dr. Fourie said that in view of the courteous offer of the Medical Profession in permitting veterinarians to take part in the medical congress in October 1934, he thought that the S.A.V.M.A. should reciprocate in some way.

Mr. Jackson pointed out that in the past the S.A.V.M.A. congresses had consisted of scientific meetings only and that no social functions had been incorporated. The meeting agreed that there was a lack of social amenities at the meetings and it was suggested and approved that a dinner be held on the evening of the 6th September, attending members to contribute towards the costs; the details and arrangements to be left to a small sub-committee consisting of Drs. P. J. J. Fourie and Thomas.

Dr. Fourie further suggested that the presentation to Dr. H. Reitz take place at the dinner as this was a suitable occasion and it was agreed that Dr. Reitz be invited for this purpose.

6. S.A. Medical Congress, 1—6 October 1934.

Dr. Fourie read a letter from the Director of Veterinary Services stating that the Northern Transvaal branch of the S.A. Medical Association had agreed to allow members of the S.A.V.M.A. to become full members of the Medical Congress in Pretoria on payment of £1.1.0 each. This, the speaker mentioned, was a great step forward towards fuller co-operation between the Veterinary and the Medical professions and that it was mainly attributable to Dr. de Kock's efforts in this connection. Members S.A.V.M.A. had already been circularised and informed of this.

Dr. Thomas proposed a formal vote of thanks to Dr. de Kock for his initiative in this matter. Seconded by Dr. Curson and passed unanimously.

Dr. Fourie suggested that members of the Medical Association be invited to our meeting and it was agreed that a copy of the agenda with an open invitation to the meeting be sent to the Secretary of the

Medical Association (Northern Transvaal Branch), and that in addition the Chairman and Secretary be invited to the S.A.V.M.A. dinner.

In this connection also Drs. Fourie and Curson were delegated to draw up a resolution *re* reciprocity with the Medical Profession to go before the general meeting.

7. Trustees for the Benevolent Fund.

Dr. Fourie stated that, as 5/- of every £2.2.0 subscription was now to be used to establish a benevolent fund, it was desirable to appoint trustees to control and administer the fund. After some discussion the matter was allowed to stand over until a subsequent meeting, as it was felt that it was not yet necessary to open a separate account for the fund.

8. General.

a. Dr. Curson drew the attention of the meeting to the fact that Dr. K. Schulz, Government Veterinary Officer stationed at Kimberley, had recently sustained grave injuries in the execution of his duties, and asked if the Government would consider reimbursing him for the considerable expense incurred. It was agreed that the following resolution be put before the General Meeting :—

"The attention of the South African Veterinary Medical Association having been drawn to the grave accident sustained by Dr. K. Schulz in the execution of his duties, it trusts that the Department will behave generously towards him in consideration of the pain and disability he has suffered."

b. Mr. Jackson said that he had repeatedly felt in need of legal advice on certain matters of Association business, especially in connection with articles for the Journal. The need of extreme caution was frequently necessary in publishing articles or correspondence of possibly controversial nature, and in many instances it would be wise to have legal advice.

Dr. Thomas supported Mr. Jackson and mentioned that Mr. C. P. Bresler, of Pretoria, would be the most suitable legal practitioner to consult, as he had already done valuable work for the Association especially in connection with the Veterinarian's legal position.

It was agreed that should the need arise Mr. Bresler be consulted.

c. Mr. Jackson pointed out that during the last year or two a large amount of valuable material had accumulated in the S.A.V.M.A. Library and that most of this was inaccessible and badly housed on account of being unbound, and asked for a grant of £10 to be used for binding.

Mr. Kirkpatrick proposed, and it was agreed, that this be allowed.

d. Dr. Martinaglia pointed out that the newly published regulations of the Veterinary Board stated that unqualified but registered practitioners were allowed to make use of, amongst others, the letters "V.S." after their names. He mentioned that the Canadian University of Toronto, amongst others, utilised these letters to designate a *degree* in veterinary science and that, apart from the obvious objection of allowing an unqualified man to use letters signifying a degree, the Universities concerned might raise a serious objection.
It was agreed to bring this matter to the notice of the Veterinary Board.

e. Mr. Kirkpatrick drew the attention of the meeting to the finding of the court at Bloemfontein, where a veterinarian had been found guilty of a criminal charge, and asked if any steps be taken in this connection. The matter was allowed to stand over for consideration at a subsequent meeting.

The meeting adjourned at 11.30 p.m.

Minutes of Council Meeting held at Onderstepoort, 5.9.1934, at 5 p.m.

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1. Only certain matters arising out of previous Council minutes were considered :

Mr. Clayton. The Secretary was instructed to get full details of this case so that at the next Council Meeting the matter of membership of the Association could be considered.

2. Badge—Dr. Hartig. This enamelled brass badge of the S.A.V.M.A. coat-of-arms, prepared under Dr. Hartig's direction, has been displayed to members of the Association, but is found too large for the purpose for which it was intended. It was decided to acquire this badge for the sum of two guineas, and to thank Dr. Hartig for the interest he had shown in the matter.

3. Letter from the Chairman of the Veterinary Board *re* complaint differentiation of unqualified registered practitioners. The Secretary was instructed to reply suitably.

4. General.

(a) Necessity for clerical assistance. This question was raised by Dr. Thomas, but as it was not constitutional for the Council to take immediate steps before the increased expenditure was

authorised by the Finance Committee, the Secretary was instructed to refer this to the Finance Committee for consideration and report to Council.

(b) Letter from Mr. N. F. Viljoen *re* private practice. The letter was referred back to the Editorial Committee for action.

The meeting closed at 7 p.m.

Minutes of 27th General Meeting S.A.V.M.A. held at Onderstepoort, 6th and 7th September, 1934.

Members present: Messrs. de Kock, Curson, Fourie, Keppel, Robinson, van Heerden, Green, Brummer, Nicol, Adelaar, Steyn, Rossiter, Thomas, Simson, Howie, Frean, R. du Toit, Cooper, Lund, Maré, Canham, Thorburn, Blomefield, Zwarenstein, Clark, Wright, Jackson, Quinlan, Alexander, Scheuber, Starke, E. M. Robinson, Kirkpatrick, Martinaglia, van der Vyver, Mason, Neitz, Marais, Mönnig.

Apologies for absence: Messrs. Carless and Amos.

The President, Mr. Carless, in a written apology for his non-attendance, explained that he had to attend a shipping board meeting at East London, and it was impossible for him to be present. In the absence of the President, Dr. Curson, the Vice-President took the chair.

The Chairman, in declaring the meeting open, welcomed all the members and expressed his regret at the unavoidable absence of the President.

(1) Minutes of the 26th General Meeting were taken as read and approved.

(2) Matters arising out of these minutes:

(a) In referring to representation on the Public Health Council, the Chairman remarked that further nominations had just been made and that a veterinarian was not included amongst these. Dr. de Kock pointed out that amendment of the Act was under contemplation and that there was still every likelihood that such an amendment would be passed, as a result of which a seat on the Public Health Council would be specifically reserved for a veterinarian.

(3) Medical Congress—Resolution which was carried reads: This meeting appreciates the action of the Federal Council of the Medical Association of South Africa in allowing members of the South African Veterinary Medical Association to become full members of their Congress and resolves that members of the Medical Association of South

Africa be invited to attend the 1935 (Spring) scientific meeting of the South African Veterinary Medical Association to be held at Onderstepoort.

(4) Dr. Schulz : Drs. de Kock, Curson and Fourie were asked to draw up a letter to the Director of Veterinary Services in connection with Dr. Schulz's accident.

General.

(a) Mr. Howie reported that the Port Elizabeth Municipality had graded the Superintendent of the Municipal Abattoirs at a salary of £500—equal to that of a Sanitary Inspector. Mr. Howie was asked to forward further details to the Secretary of the Status Committee.

(b) Mr. Howie also referred to the unsatisfactory state of the S. and T. allowances. Mr. van Heerden explained that these allowances were those paid to district travelling officers and that the only officers classified as such were the District Foresters and the Government Veterinary Officers. The matter was now before the Public Service Commission and he had hopes that they might be persuaded to recommend the removal of the Government Veterinary Officers from the district travelling officers class. If that could be done, the S. and T. question would be solved immediately.

(c) Mr. Zwarenstein complained that he was not notified of the post advertised by the Pretoria Municipality. The Secretary explained that the Town Clerk had told him that the post was advertised in the papers of all the provinces of the Union and in the circumstances he only notified members in South West Africa and one member in Northern Rhodesia.

In closing the business meeting of the Association the Vice-President asked the Acting Director of Veterinary Services to take the chair for the scientific discussions that were to follow. The subjects discussed were :

6.9.1934.

(1) 11-1 p.m. Anthrax. Mr. Nicol and Dr. Robinson.

(2) 2-3 p.m. Regulations—Their application. Mr. van Heerden.

(3) 3-5 p.m. A general discussion of the animal parasites of the domesticated animals with demonstrations. Dr. Mönnig and Major Keppel.

7.9.1934.

(4) 9-10 a.m. Arsenical poisoning of the domesticated animals. Dr. G. Steyn.

(5) 10-10.45 a.m. Demonstration of field outfit for the diagnosis of arsenical and hydrocyanic acid poisoning. Dr. Steyn and Mr. van der Vyver.

(6) 11.30-1 p.m. Swine Fever. General discussion and demonstration. Drs. de Kock, Robinson and Thomas.

(7) 2-3.30 p.m. General methods of chemical examination of poisonous plants. Dr. Claude Rimington.

At the conclusion of the scientific discussions the following resolutions were carried unanimously :—

(1) This meeting of the S.A.V.M.A. expresses its concern at the widespread prevalence of Anthrax within the Union and is of opinion that energetic measures should be taken for the suppression of the disease. The meeting is further of opinion that consideration should be given to the discontinuance of the issue of Anthrax Vaccine free of charge to stock owners.

(2) That from a point of view of dealing expeditiously with possible cases of arsenical poisoning arising out of the forthcoming locust campaign, the Department supplies each Government Veterinary Officer with a poison testing outfit and the necessary sample jars and containers for submitting samples for chemical analysis.

(3) In view of the fact that very serious losses are being sustained in stock as a result of verminosis, this meeting of the S.A.V.M.A. feels that an intensive campaign be inaugurated against parasites, and further that facilities be provided for field experiments as a demonstration to farmers of the beneficial results of proper care, feeding, prophylaxis and treatment, coupled with a rational system of fencing and pastoral rotation. These experiments will at the same time determine whether the present recommendations of the Department can be carried out economically under field conditions.

At the request of the Chairman, the following votes of thanks were passed :—

(1) To the Minister and Secretary for Agriculture for allowing so many officers to attend.

(2) To the ladies of the Onderstepoort staff for providing lunches.

(3) To the Secretary for the excellence of the arrangements for the meeting and to the Secretary and Dr. Thomas for organising the dinner, which was a great success.

(4) Major Keppel proposed a vote of thanks to the Chairman.

Comparative Medicine Section Incorporated at the Annual Scientific Meeting and Medical Congress of the South African Medical Association held in Pretoria 1st to 6th October, 1934.

RESUME OF PROCEEDINGS.

In September 1933 Drs. du Toit and de Kock were asked to read papers at the Annual Scientific Meeting and Medical Congress of the S.A.M.A. held in Cape Town. The papers created such a favourable impression on the large number of attending members that the Federal Council of the S.A.M.A. was approached in order to see whether it would not be possible to form a section of Comparative Medicine at annual meetings of Congress and in that way establish more intimate and closer contact between the medical and veterinary professions. The Federal Council being in sympathy with this proposal such a Section was duly formed and this year veterinarians were invited to become full members of Congress on the payment of a nominal fee. A number of veterinarians availed themselves of this opportunity, namely Drs. de Kock, Robinson, Fourie, Quinlan, Quin, Steyn and Curson, Messrs. Alexander and Mason.

The organizing Committee in Pretoria on which Dr. de Kock served as a member arranged a programme in the following sections of which veterinarians were asked to co-operate, viz. :

(1) A symposium on anaemia.

(2) Papers in the Section of Comparative Medicine.

(3) Papers in the Section of Public Health.

Members of the S.A.V.M.A. participated as follows :—

(1) Plenary session—After Drs. J. Buchanan and R. L. Girdwood, both of Johannesburg, discussed Anaemia from the medical aspect, Drs. de Kock, Fourie and Quin referred to Anaemia in domestic animals under South African conditions. This paper, to which Drs. de Kock, Quin, Fourie, Mönnig, Graf and Kellerman contributed, will be published in full in the S.A.M.A. Journal. Various significant observations on anaemia were referred to, especially in connection with the functions of the spleen, chemical changes, technique, and a brief survey was given of the different forms of this disease in domesticated animals, viz. : (a) Anaemias associated with changes in the erythroblastic tissue. This dealt mainly with the question of Leucosis of fowls. (b) Anaemias associated with injury to red cells, e.g. in the case of infectious anaemia of equines, anaplasmosis and piroplasmosis; the effect of copper and its relation to Enzootic Icterus in sheep; (c) Verminous anaemias; and (d) Nutritional anaemias.

(2) Section of Comparative Medicine. This section was inaugurated at the Pretoria Congress in October 1934, with Dr. D. Marais of Cape Town as President, and Drs. A. Pyper (Pretoria) and G. de Kock (Onderstepoort) as secretaries. As a result of their experience at this congress, the president and the secretaries are of opinion that the section should be maintained as an independent section at following congresses, but that the papers of the section should be read at joint meetings with those sections of congress for which they are most suitable.

An exhibit of pathological material, from both Onderstepoort and Dr. Pyper's laboratory, was put up by the Staff of Onderstepoort. Its success was evident, and it impressed many members with the desirability of continuing the co-operation between veterinarians and medical men.

Sectional Meetings. Tuesday, October 2nd. Dr. Marais in the chair.

Dr. Steyn of Onderstepoort gave a demonstration on poisonous plants, connected with bread poisoning in human beings (see Onderstepoort Journal of Veterinary Science and Animal Industry, i (1), 1933), including several kinds of *Senecio*, *Vicia sativa*, *Lolium temulentum*, *Rumex acetosella*, and Wild Mustard. He mentioned the accidents that had occurred from eating certain kinds of vegetable marrows, *cucumis spp.* and went on to describe and show plants that caused poisoning through food in other ways, such as *Datura stramonium*, *Datura tatula*, species of Solanum, of Lathyrus and many others. In the discussion Dr. Cawston enquired concerning the use of certain leaves by natives as antiseptics for wounds. Dr. de Kock also spoke on the pathology of the liver in Senecio poisoning. Dr. Marais brought up the question of dagga-smoking.

Wednesday, October 3rd. Dr. Marais in the chair.

Dr. Quin of Onderstepoort spoke on photosensitization in Geeldikkop, and described Dr. Rimington's and his work on this condition. Whilst *Tribulus* certainly had a good deal to do with the causation of the condition, and the work so far had shown that the photosensitization was capable of explanation, the accompanying icterus still remained somewhat obscure. In the discussion Dr. Brown mentioned the effect of seasons and early rains, and Dr. Labuschagne asked about the pathology of the liver.

(3) Section of Public Health

In this section two very important papers of interest both to veterinarians and medical men were read :—

Wednesday, October 3rd. Joint meeting with Section of Public Health.

Dr. de Villiers in the chair.

Dr. Pyper gave some lantern slide illustrations and spoke on Typhus-like Diseases of South Africa, showing how he had succeeded in establishing three kinds : lice-typhus, flea-typhus (both in rats and in man), and tick-bite fever, which were all three different from known forms. In the discussion Sir Edward Thornton saw no necessity for notification of tick-bite fever, Prof. Campbell spoke of a fatal case of tick-bite fever seen by Dr. Elliott, Dr. Annecke referred to the prevalence of tick-bite fever in the low veld, where real typhus had also recently broken out. Dr. Cluver read a letter from Dr. Rhodes, in which the latter reported certain experiments on rats undertaken by him quite recently which had confirmed Dr. Pyper's earlier findings.

Friday, October 5th. Dr. de Villiers in the Chair.

Continuation of the discussion on Typhus-like Diseases. In further discussion which took place Dr. de Kock spoke of the fruitful relations between veterinary and medical workers on virus diseases, Dr. Laidler raised the question of the connection between dogs and ticks and Dr. Nelson the question of body and head lice.

Dr. J. Quinlan also presented his paper on Recent Observation on Sex Physiology in Sheep at the conjoint meeting of the Sections of Gynecology and Comparative Medicine. Many aspects of the paper were illustrated by lantern slides. A good deal of discussion followed on what was regarded as a paper of great importance, not only to veterinarians but also to medical men. In the discussion, Dr. Quin wished to have further information about the grafts and whether there was an indication of proliferation of testicular or interstitial tissue. Dr. Quinlan was satisfied that in all the grafts examined there was no proliferation and that the transitory stimulus in old animals was probably due to the presence of hormones included in the grafts. Dr. te Groen wanted further information as regards the site of fertilization, which Dr. Quinlan very fully explained. Dr. Pyper was anxious to have more information about fluids suitable for the preservation of sperms for diagnostic purposes in the laboratory and whether it was essential that such preparations be kept at a certain temperature. Dr. Quinlan explained that there was a good deal of variation as between the sperms of different domestic animals with regard to the ingredients of fluids and their pH., which in the sheep was in the vicinity of 7.6. Sperms kept at body temperature soon degenerated, and he was of the opinion that 12°C. was an ideal temperature for keeping sperms of sheep alive for any period of time. Dr. Simpson Wells wished to ascertain whether the seminal fluid had any physiological action in connection with artificial insemination. Dr. Quinlan was of opinion that this was not the case.

At a joint meeting of the sections of Comparative Medicine and Public Health on 3rd October, Dr. E. M. Robinson read a paper en-

titled "Recent views on the Brucella group." After a few introductory remarks on the history of the Brucelloses the most recent work on the biology and classification of the main types of the group was reviewed. Of methods available for classification the most valuable were : (1) sensitivity to carbon dioxide, (2) formation of hydrogen sulphide, (3) sensitivity to dyes, (4) thermo-agglutination, and (5) serological methods. The thermo-agglutination test was of great value in differentiating rough and smooth strains of Brucella types and both para-melitensis and para-abortus could be considered as merely "rough" variations of their respective types. Mention was made of the peculiar rash, apparently an allergic reaction, developed by veterinarians handling cows with contagious abortion. The brucella infections of the domesticated animals apart from cattle and goats were discussed. The peculiar conditions seen in the horse associated with poll evil and fistulous withers were described and the possible importance of the infection in sheep, dogs and poultry. The condition of brucellosis in the pig appeared to be an infection similar to undulant fever in which abortion might occur in the pregnant sow. The various serological and allergic diagnostic methods were discussed as well as the part played by the brucella infections in animals from the public health point of view. Apart from infection of milk and its products, animals were not considered to be an important source of infection for human beings. Finally the treatment of brucella infections was briefly discussed.

In the discussion Dr. Campbell of Cape Town gave his experience of brucella infections of man in the Western Province. Dr. Pyper mentioned the extremely low incidence of brucellosis in the Transvaal according to general experience.

At a meeting of the Public Health Section, Dr. E. Grasset read a paper on "Bacterial endotoxoids" (endoanatoxines). By alternate freezing and thawing of bacterial cultures such as those of *B. typhosus* he was able to produce soluble highly toxic autolysates. These contained practically all the antigen substances of the bacteria but owing to their toxicity could not be used in that form for immunizing purposes. By the addition of one to six parts per 1000 of formalin, these toxic autolysates could be detoxicated in about four to six weeks, without losing their antigenic properties. It was found that these endotoxoids produced a much higher degree of immunity than did ordinary bacterial suspension vaccines. The value of sera produced by immunizing animals with the endotoxoid could be estimated by flocculation tests. Dr. Grasset went on to discuss the application of endotoxoids in the immunization against human typhoid fever and mentioned the excellent results obtained in the immunization of mine natives in Johannesburg. The method was applicable to paratyphoid infections and an extremely potent toxin could be prepared from

S.aertrycke. Finally the value of endotoxoids made from the gonococcus and staphylococci was discussed and good results were claimed from their use in treatment.

OBITUARY.

JOHN MILLER TATE was born in 1862 and qualified at the Royal Veterinary College, London, in July 1899. While serving as assistant to Chas. Allen, Esq., F.R.C.V.S., Dublin, the 2nd Boer War broke out and Tate received an appointment as C.V.S. in the A.V.D. After some training at Aldershot he proceeded to South Africa

in the S.S. "Manchester Corporation" in (veterinary) charge of T. and Q. batteries R.H.A. On arrival at Durban, he was posted to the Base Veterinary Hospital, Maritzburg, and after the Relief of Ladysmith he joined the 1st Royal Dragoons at that town as V.O. In 1901 he left the A.V.D. for the S.A.C. with which corps he served from 28/1/01-1/7/08 *i.e.* until its disbandment. He then received an ap-

pointment in the Transvaal C.V.D. remaining in this position until 14/11/14 when he was gazetted V.O. to the S.A.P. with the rank of Captain. In 1919 he was promoted Major and on 31/10/25 retired on pension. During his police service he compiled a manual "Notes on Health, Management and Care of Horses" on the lines of the booklet previously issued by Major Collyer for use by the N.P. Tate held both the Queen's and King's S.A. War medals.

Always interested in matters concerning the profession he was a foundation member of both the T.V.M.A. and S.A.V.M.A., and on several occasions served on the Council of each of these bodies.

Since his retirement he lived at Plumstead. His death took place on 26/12/33.

H. H. C.

CORRESPONDENCE.

The Honorary Secretary,
South African Veterinary Medical Association,
P.O. Onderstepoort,
Pretoria.

Dear Sir,

The Annual Conference of this Association will take place at the Veterinary Research Institute, Parkville, Melbourne, on January 16th to 23rd, 1935, during the Centenary Celebrations of this city.

The President and members of this Association extend to all members of your Association who may be visiting Australia at that time a cordial invitation to attend the conference and assure them of a very warm welcome.

(Sgd.) D. MURNANE, B.V.Sc.,
Assistant Honorary Secretary.
Australian Veterinary Association.

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