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JOURNAL



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The Indian Veterinary Journal.

(The Journal of The All-India Veterinary Association).



Editor :

P. SRINIVASA RAO, G.M.V.C.,

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NOTICE

The Indian Veterinary Journal

A quarterly record of Veterinary Medicine and Surgery
devoted to the cause of the Veterinary Profession.

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EDITOR:

P. SRINIVASA RAO, G.M.V.C.,

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(The Journal of the All-India Veterinary Association)

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CONTENTS

I. EDITORIALS.	PAGE
VETERINARY SCIENCE AND THE INDIAN UNIVERSITIES ...	219
MILK PROBLEM IN INDIA ...	225
THE SLAUGHTER ...	229
II. NOTES ...	230
III. ORIGINAL ARTICLE.	
THE PREPARATION OF AN IMPROVED PATTERN OF COTTON-WOOL SWAB.—By D. C. Matheson F.R.C.V.S., D.V.S.M. (vict), Edinburgh. ...	231
IV. GENERAL ARTICLES.	
INTRODUCTION OF SILO-PITS IN RURAL CO-OPERATIVE SOCIETIES.—By Rai Sahib P. N. Das, G.B.V.C., Cuttack ...	235
TRYPTOPHANE AND ITS PRODUCTS.—By G. A. Ajwani, M. Sc., D.V.M., G. B.V.C., D.V.H. Shikarpur ...	243
NATURAL DIARRHOEA IN ELEPHANTS.—By A. B. Bopayyah, G.M.V.C. Coorg ...	259
NOTES ON DEVELOPMENT OF MEDICAL ART.—By T. N. Kulkarni, Nargund ...	264
V. TRANSLATION.	
ASVAVAIDYAKAM.—By Nripendra Nath Majumdar, Bengal Veterinary Service ...	271
VI. CLINICAL ARTICLES.	
FURTHER INVESTIGATIONS ON STREPTOTRICHOSIS OR ACTINOMYCOSIS BOVIS IN INDIA.—By Rai Sahib Debakar Dey—Bengal ...	277
ECHINOCOCCOSIS HEPATIS IN A BULLOCK.—By M. V. Pilley, G.B.V.C. Penang ...	279

CONTENTS		PAGE
GASTRIC TYMPANY IN A HORSE.—By M. U. Gopal, L.V.P.		
Dhrrangadra	...	280
A CASE OF STIFF-SICKNESS.—By M. U. Gopal, L. V. P.		
Dhrrangadra	...	282
A CASE OF MENINGITIS IN A DOG.—By R. Swaminathan, B.A., G.M.V.C., Ootacamund		
	...	283
A CASE OF RABIES IN A CALF.—By R. Swaminathan, B.A., G.M.V.C., Ootacamund		
	...	284
EXTRA-OCULAR FILARIASIS IN DOGS.—By R. Swaminathan, B.A., G.M.V.C., Ootacamund		
	...	285
BOTULISM.—By R. S. Narayanan, G.M.V.C. Alor State		
	...	286
VII. NOTANDA.	...	288
VIII. EXTRACTS.		
ATYPICAL AND CHRONIC FORMS OF CANINE PIROPLASMOSIS	...	293
TREATMENT OF BOVINE COCCIDIOSIS.—	...	293
CONTAGIOUS ABORTION AND ITS RELATION TO UNDULANT FEVER IN MAN		
	...	294
EXPERIMENTAL STUDIES ON OSTEOMALASIA IN THE HORSES	...	294
ANAPLASMA MARGINALE IN CATTLE	...	295
ASCITES IN THE DOG.—By A. A. Feist, St. Paul, Minn	...	297
HANDLING BANG. ABORTION DISEASE, A PROGRAMME FOR THE VETERINARY PRACTITIONER.—By R.R. Birch & H.L. Gilman...	...	298
RELATION OF THE BULL TO THE SPREAD OF BANG. ABORTION DISEASE.—By Herbert L. Gilman, Cornell University	...	300
IX. CORRESPONDENCE	...	302
X. ASSOCIATION NEWS.		
PROCEEDINGS OF G. B. MEETING, A.I.V.A. MADRAS BRANCH	...	304
REPORT OF THE MANAGING COMMITTEE OF A.I.V.A MADRAS	...	310
XI. DEPARTMENTAL NEWS.		
MADRAS	...	313

THE Indian Veterinary Journal

Vol. V] JANUARY, 1929 [No. 3

Editorials

VETERINARY SCIENCE AND THE INDIAN UNIVERSITIES

IN our last issue, we briefly referred to some of the salient points in the report of the Royal Commission on Agriculture in India regarding "Diseases of live-stock and their control." We have therein expressed our views on the recommendations of the Royal Commission regarding the Veterinary Education in India. We now propose to return to this subject in view of the fact that the nature of Veterinary Education given to the youths of the country will play a large part in determining the future of the Veterinary Science and control of the diseases of live-stock in the country.

The report of the Commission says "for the provincial services, that is, for the district veterinary surgeons, the courses which should be settled by a conference between the university and veterinary authorities concerned, should extend over a period of five years from Matriculation and should end in a degree" and further the report advocates a two year course for the Assistant Veterinary Surgeons. In the last issue of this Journal, we have shown that it is detrimental to have two distinct courses of studies in Veterinary Science, i. e. one of two years for the lower grade men who have to do the actual work of diagnosing the several diseases of the numerous dumb animals and treating them and the other of five years for men required for higher service who do the work of supervising the work of the former

guiding them during their visits, and by means of communications through post and other means. It needs no elaborate arguments to prove the necessity that the men who have to deal actually with the sick animals should have a high standard of education and it is no use letting loose half baked Veterinary Surgeons in the country parts to popularise the veterinary treatment and treat the diseases of the animals. This cheap method will in the long run do more harm than good to the country and instead of popularising the veterinary treatment will produce the opposite effect. Even the present three year course of studies in the Veterinary Colleges of Bombay, Bengal and Madras has been found to be insufficient to manufacture a well qualified Veterinary Surgeon and a four year course has already been introduced in the Punjab Veterinary College at Lahore. The need for the revision of the present courses of studies was recognised so far back as 1922, by a meeting of the Principals of all the Veterinary Colleges in India convened under the orders of the Agricultural Adviser to the Government of India. That meeting recommended that the courses should be extended in all the Indian Veterinary Colleges to four years in English and that a high standard of general education qualification be demanded of the recruits to the Colleges. They further outlined a sufficiently comprehensive and advanced course of studies and method of examination to justify recognition by the local universities as an approved degree course in Veterinary Science for conferring a special degree in that Science, i. e. B. Sc. (Vet) on students who graduate in this course. A second meeting of the Veterinary Officers in India in 1923 further discussed this scheme and approved of the same. The President of this second meeting Col. G. K. Walker C. I. E., O.B.E., F.R.C.V.S., the then Principal of the Punjab Veterinary College wrote in the course of the proceedings published under the authority of the Government of India as follows in this scheme. "The discussion on this point has recalled the fact that we are practically unanimous in approving wholeheartedly the course of instruction prepared by the Principal in Bombay. I ask for a formal resolution to that effect. There is no doubt that it represents a genuine attempt to educate Indians upto the highest standard in Veterinary Science. Personally my only fear is that four years may

prove to be rather too short a time for students admitted to Colleges after passing the Matriculation standard of examination to grasp the work. My experience in the Punjab is that the Matriculation is not very satisfactory. We should aim at obtaining students with Intermediate qualification in science and the Punjab prospectus provides for them." He further says "the scope of the Veterinary study has developed so much that three years' study for men of inferior primary education is quite insufficient. Why then pretend to give a qualification that cannot be substantiated with practical outcome?" Mr. J. T. Edwards B. Sc. M.R.C.V.S., Director of the Imperial Institute of Veterinary Research, Muktesar, and a great authority in Veterinary Science also strongly maintained "that the Bombay programme represented the minimum required for the inculcation of an intelligent conception of Veterinary Science as the Science stood at the present day. He pointed to the advances made in our knowledge during recent years since the time when shorter courses of study were adequate.

The officers who had gathered in the meetings mentioned above and who arrived at those momentous conclusions at the end of their deliberation were all men grown grey in the service of Civil Veterinary Departments in India with plenty of knowledge of the Indian conditions and needs. Some of the Indian Veterinary Colleges have introduced a six months course of Post Graduate studies to supplement the existing three years course. The Report of the Royal Commission recognises that the *effective* treatment of animals depends upon the Veterinary Assistant Surgeons and yet it prescribes a short course of two years to these men.

In the light of these recorded and authoritative proceedings, we fail to understand how the report of the Agricultural Commission recommended a much shorter course than the present three years one, for the men who have to do the actual duties of a Veterinary Surgeon in the country. We find in the report that the Commission had in view only cattle and as such its report advocates the training being given to the two year course men mainly in the anatomy; physiology and diseases of the ox and says that the fully qualified men, i. e. those of five years course may be required to treat

the diseases of any domestic animals and their courses of studies should be fixed with this object in view. The Report is of the opinion that the animals other than cattle may be left out of account in the case of Veterinary Institutions in the mofussil parts. A perusal of the patients admission register in the Veterinary Institutions in the mofussil parts, will reveal the fact that those institutions though even now in their infant stage are attending to the treatment of a large number of animals other than the ox, i. e. the sheep, goats, ponies, dogs, birds (poultry) etc. Even though the prices of these animals are low, yet the economic value of these animals is great to their owners in an economically poor country like India. It is true that owing to the ignorance of the owners, long distances and other causes, many of these animals do not at present come to the Veterinary Assistant Surgeon for treatment and many of them succumb to the diseases. But an ideal state should not allow the continuance of such a condition. In its anxiety to secure as many men as possible to meet the minimum needs of the country to treat only the cattle, the Commission recommended this shorter course. In this connection, we have already said that if more men are wanted for field work, the better course will be to improve the prospects of the profession and attract more men and make provision for training a greater number of students at each of the Veterinary Colleges and in this way within a few years time the required number will be available. We reiterate our previous remarks that we do not believe in concentrating knowledge only in a few of the superior service and letting loose in the country the two year course men but the knowledge should be wide-spread to be of benefit to the country at large. Therefore, nothing short of a four year course after the University Intermediate Examination in Science, will suffice for training a Veterinary Surgeon who can be of real service to the country and out of this class those that have undergone further course in laboratory work and show merit, ability, capacity and character may be promoted or appointed to the higher service.

In this connection there is a heavy responsibility on the part of the Indian Universities especially those of Madras, Bombay, Bengal and the Punjab. There are well equipped Veterinary Colleges in all these places and Patna will get

an up-to-date Veterinary College in the course of this year. It was the fond hope of the founder Principal of the oldest Veterinary College in India—J. H. Steel of the Bombay Veterinary College—to have that College affiliated to the University of Bombay. But for his untimely and premature death, this would have been an accomplished fact long ago. The course of studies he had instituted in that College at that time and the men who came out qualified from that Institution compared favourably with those of the Royal College of Veterinary Surgeons in England at that time. But unfortunately after his untimely demise the course of studies was lowered from time to time. The Universities in India probably following the tradition of the ancient Universities of England never thought of instituting a faculty in Veterinary Science. This is a grave charge against these Universities that they never paid attention to the cause of Veterinary education which is of great economic value in an agricultural country like India. Recently some of these Universities have instituted a faculty in Agriculture, Economics, Commerce, Music etc. The Veterinary Surgeon “labours in the interests of the whole population.” The Agricultural Commission itself says “In stopping the onrush of a disease, he (Veterinary Surgeon) is as much a public servant as the engineer who, by the construction of embankments, preserves a district from floods; in eliminating and destroying the sources of infection of anthrax or rabies, he protects human life just as does the medical officer who seeks to detect and destroy the sources of infection of cholera or plague. It is, indeed, recognition of the fact that the Veterinary officer is capable of protecting the interests of the whole community and not merely those of the owner of live-stock that has led, in recent years, to the employment of State Veterinary Surgeons, remunerated from public funds, in most civilised countries.” But neither the Medical men representing the faculty of Medicine nor the Agricultural Graduates representing the faculty of Agriculture nor the Professors of Economics in the Universities have seen it fit to take steps to institute a faculty in Veterinary Science. Excepting a few Veterinary Officers such as Steel, Walker and a few others, no Veterinary Officer in India has made a persistent effort for the affiliation of the Indian Veterinary Colleges to the Universities. Veterinary Officers

who are mostly only members or fellows of the Royal College of Veterinary Surgeons in England but not University degree holders in Veterinary Science have not thought it necessary to take vigorous steps towards the institution of a faculty in Veterinary Science in the Indian Universities. Even in England where the standard of Veterinary Education is fairly high, the eminent Veterinary Surgeons are not at all satisfied with the present state of the Veterinary Science in that country. To illustrate this let us quote the editorial comments on a well written article under the caption "Plea For Better Veterinary Education in India" by Mr. C. J. Fernandez G. B. V. C. Veterinary Surgeon, Baroda State Army Service, in the *Veterinary Journal* (London, March, 1928) edited by Principal Fred. Hobday C. M. G. F. R. C. V. S., F. R. S. E. Principal, Royal Veterinary College, London and Hon. Veterinary Surgeon to H. M. The King "That Great Britain is not alone in its endeavours to secure financial and other help for Veterinary Education is shown by a well-written article which appears as the first of our General Articles from the pen of an Indian colleague, who draws attention to the need for advancement in this branch of Science in his country. Curiously enough he has termed it by the same name which has been applied to it on numerous occasions by various writers in this country i. e. the cindrella of the Government Departments. Unfortunately this name is too truly applied and it is time that we woke up to the fact that we are as essential to the well-being of the country as human medicine, law, engineering, divinity and any other branch which is considered an essential to the formation of a complete University. Abroad, our continental neighbours have long recognised this, and the Veterinary School, instead of trying vainly to stand alone, has been linked up with the other learned sciences to become the Veterinary Faculty of a University. We cannot afford to ignore the advantages which accrue to such combination, and the time is not far distant when every British Veterinary School will become Veterinary Faculty likewise. The advantages to the student and the graduate are too plainly obvious to need discussion." Our only excuse to quote the above comments at length is that we cannot better describe the dissatisfaction of the British Veterinary Surgeon at the state of the Veterinary

Education in his country where it is sufficiently high and what he thinks necessary to be the steps to further improve its condition. These remarks apply with greater force to the state of Veterinary education in this country which is mainly agricultural.

Now that the Veterinary and Education departments are under the portfolio of the popular ministers in all the British provinces, the Universities of Bombay, Bengal, the Punjab and Madras have well equipped Veterinary Colleges in their headquarters and the University of Patna will soon have an equally well equipped Veterinary College at its headquarters and most of these Universities have as the fellows of their Senate, Members representing district and other local boards, we appeal to all these to take immediate steps for the affiliation of these Veterinary Colleges to the respective Universities instituting a faculty in Veterinary Science. Some time last year, we addressed a communication on this Subject to the Veterinary Advisory Committee of the Madras Legislative Council through an esteemed Member of that body strongly pleading for the affiliation of the Madras Veterinary College to the Madras University but we have not heard if that august body ever met and discussed these proposals. However, in the interests of both rural and urban economy and in the interests of the great and vital industry of Agriculture in this country, we urge this subject on the attention of the Senators of the Universities, the Honourable Ministers in charge of Education and Veterinary Departments and above all the officers of the Indian Veterinary Service to move immediately in the matter of giving the highest Veterinary Education to the youths in India, instituting a Faculty in Veterinary Science in each of the five Universities of Bombay, Bengal, the Punjab, Madras and Patna.

THE MILK PROBLEM IN INDIA

Of the various problems affecting the welfare of the people of this country, the most important and the most vital problem is the Milk Problem. Whether it be for the feeding of a growing infant, or whether it be for the nursing of an

invalid, or again, whether it be for the preparation of butter and ghee, or 'Dhoodpeda' and 'Basundhi', milk forms a very necessary article of dietary. It is a food which, when fresh and clean, is rich in vitaminous constituents and is a perfect food for an infant. Of course, the ideal food for a baby is its own mother's milk, or from another of the same species; but, in the majority of cases, for some reasons or other, this is not available. The next best food is the cow's milk which, in its constituents, is very nearly equal to human milk, and which, with the addition of a small quantity of water and sugar can be made to closely approximate it. In the present day, the number of children fed artificially on either cow's milk or other prepared foods is steadily on the increase and, in some quarters, it is even considered 'old fashioned' to breast feed an infant. Consequently, the demand for cow's milk is exceedingly great and far exceeds the supply; in fact, the milk which is a necessity for the rich and the poor, has become an article of luxury available only to the former. Further, even the little milk that is available is far from being pure and is generally adulterated and contaminated. The housing and tending of milch cattle, the milking of cows and the distribution of milk are, as is well-known, carried on in a most unsatisfactory and primitive manner, favouring an easy and ready contamination of milk at every stage. Intestinal disorders, especially in children, can, in the majority of cases, be traced to bad milk, while regular epidemics of typhoid and cholera have been due to infected milk. There are various other diseases, such as sore-throat, diphtheria, tuberculosis and many other diseases, which are induced by the ingestion of impure milk. In the important cities like Bombay, Calcutta and Madras, the infantile mortality from causes of dietetic origin, is very considerable; and as the general diet for growing children is only milk, the high death rate must be put down to unwholesome milk. Thus, a problem about the supply of milk has arisen in a primarily agricultural country like ours, where there ought not to be such a problem at all; and this is more acute in towns and cities than in villages.

Now, what is the cause of all these? We can write volumes on this subject, but, to put it briefly, the apathy of

the people and the indifference of the Government with regard to our cattle and the consequent degeneration of our once famed live-stock, the absence of any scientific breeding of cattle in the country, the non-existence of any dairying concerns to suit the modern requirements, and the craze for the town life resulting in an extra-ordinary crowding of people in towns and the practical desertion of villages—all these have contributed together to this state of affairs.

Taking these seriatim, there have been, and are still, many breeds of some really fine cattle in this country. The Scindi and Montgomery in the North, and the Ongole and Kangayam in the South, are famed far beyond the shores of India. Breeds of these types were built up by the pioneer cattle breeders of the country, after years of toil, to suit the requirements of particular localities; and, judged by the then standard, they have done admirably well. But now, times have changed; and the requirements of the present day are far different from those of olden days. Although, the demand is still for the same dual-purpose animal, the immediate needs of the country are for a breed of cows with outstanding capacity for high milk-yield. Unfortunately, 'the big Zamindars with large acres of land and plenty of capital' have practically ceased to take any live interest in the cattle of the country and consequently, cattle breeding and improvement of live-stock has become neglected; or, if carried on, is done in a haphazard and unscientific manner without an understanding of the present-day requirements. The cattle breeding centres run by the Government are few and far between and are scarcely enough to meet the situation. To crown all, some of the finest cattle in the country have been, during recent years, indiscriminately exported to foreign lands, leaving the meagre stock well nigh depleted. Improvement of cattle is, therefore, one of the main economic aspects of the Milk Problem which should be the primary duty of the Government to study deeply and solve early.

With the improvement of the cattle to suit our present-day needs we should naturally expect an increase in the availability of milk. It should here be remembered that the yield of milk is generally affected by the general upkeep of the animal and also by the food it gets. The stabling of

cows is, indeed, a problem in big cities and towns where the habitation for even human beings is precious little; but, still, as the consumption of good, pure milk is necessary for the well-being of human lives, it is in the interests of man and beast to find a decent habitation for the cows. This becomes all the more necessary when it is realised that the contamination of milk commences from the moment it leaves the udder and that the cleaner the surroundings, the purer the milk. The housing and feeding of cow is, therefore, another aspect of the economic side of the milk-problem. This point is easy of solution, if only our municipalities and corporations will realise the importance of it. Construction of ideal cow-sheds in important portions of the city with facilities for water supply, and the compulsory housing of all milch cows in those sheds is a thing which with a little of tact and persuasion on the part of the authorities, is easily achieved.

The production of an increased quantity of milk in sanitary surroundings being thus assured, the next item which should engage our attention is the "distribution of milk." This item is the most important in the solution of the milk problem in India, because, it is during this process that the maximum amount of contamination and adulteration takes place. As is well known, the milk is being hawked about in the crowded streets of the towns in open, dirty vessels and handled in the most unconcerned fashion with the unclean hands of the milkman. The first and foremost thing to do, therefore, is to educate the people in the elementary principles of sanitary dairying. 'Education is one of the principal spokes in the wheel of milk waggon' and it is necessary if we desire the intelligent and hearty co-operation of the people in all our attempts for the solution of the milk problem. It is here that the co-operative movement can do a lot of useful work. "Co-operative Dairying Concerns" for the production and distribution of milk have gone a long way in the solution of the milk problem in other countries and we dare say the same thing will hold good here also. Municipalisation of Dairies is another step in the solution of the problem, and, in our opinion, this is the only method in which the Municipalities can practically demonstrate their real solicitude for the welfare of the people.

THE SLAUGHTER

The worst has happened. Out of the nine officers who had undergone the Post-Graduate Course at the Madras Veterinary College from July to December 1928, three have failed in the examination held at the end of the Course! We publish in detail the results of the examination in this issue elsewhere. This percentage of failure beats all previous record. We most heartily congratulate the Board of Examiners on their achievement!

It so happens that all the three unfortunate officers are gentlemen who had come from the Malay States at considerable personal inconvenience, spending their money, time and energy and had paid for their course. Impatient critics will at once jump at us in righteous wrath and stagger us with the contemptuous question "Do all the above factors entitle a person for a pass?" We admit they do not. But may we ask in return whether those elderly officers drawing a salary of Rs. 450 to Rs. 600 had come all the way to India crossing the sea, and stayed here for six months, *had not realised their responsibilities*, spent their time for nothing, only to fail in the end! Are they boys to indulge in such inglorious and costly past-time? Will anybody come forward and say that they were? No, the fact is otherwise. We know they worked hard—Poor men! Some of them had lost their health terribly. They knew well what they had been taught during these six months. But, perhaps age was against them. They could not *memorise* things and repeat like a parrot.

Thus candidates fail not because they do not know the subjects taught to the extent required for practical purposes, but because of their physical inability to get by rote some of the fine-spun theories. All these three officers have failed for want of 2, 3 or 5 marks! Their six months' hard toil was not taken into account by the Board of examiners.

Again we ask the Professors who were taking the classes whether these three officers were worse than some who are alleged to have passed at the examination? We don't mean any offence nor intend casting any slur on those who have passed. Our duty is to be impartial and bring out in prominence all phases of the subject we discuss. So

there is such a thing as "Chance" in an examination. Then, why submit these respectable elderly officers to the shame, grief and perhaps marring of prospects by such *chances* of an examination! It is cruel to run the farce of an examination at the end of the course. If they only remove it, we are sure the course could be made more practical, the candidates themselves will pick up much that is really useful for every-day practice and not fill their brains with terms and technicalities which they forget even before they reach their respective stations.

But official "Prestige" is a difficult Goddess to please. She must have her annual slaughter and sacrifices. She must hold the poor trembling subordinates ever in terror. Else, she may not be respected, worshipped with incense and dreaded. O Tempora! O Mores!

There is only one cure for this cruel sport of man-slaughter at the Madras Veterinary College every year and that is, the Examination must go. Would to God that the eyes of the Government are opened to the justice of our plea!

Notes

We had the pleasure of witnessing a "Lantern lecture" on "Anthrax and how it is communicated to man." by Professor V. Krishnamurthi Iyyar of the Madras Veterinary College on 18th October 1928. To say that it was a highly interesting and instructive lecture, is merely doing barest justice to the learned professor. The slides, nearly four-hundred in number, have all been the out-come of the labours of the professor. They are all highly original and do great credit to his powers of observation and expression. The slides when screened in the villages are bound to be of high educative value.

We are glad that after all the authorities have paid attention to this subject of propaganda with the help of lantern slides which was advocated all these years by us in these columns and suggested by the All India Veterinary Association, Madras Branch, in its resolutions.

Our thanks are due to the ex-minister Mr. A. Ranganatha Mudaliar for his having taken initiative in this matter during the short tenure of his office as Development Minister, Madras. We hope that this is only a forerunner of many such useful exhibitions.

We are sure the profession would have noted with pleasure that Professor V. Krishnamurthi Iyyar, G. M. V. C., I. V. S. of the Madras Veterinary College had the unique honour of being nominated a Member of the University Commission which visited the Agricultural College, Coimbatore, to report on its working and suggest means and methods of its expansion. This is the first time a Veterinarian has been recognised of his worth by a University and we offer our heartiest congratulations to the Professor.

That he would have acquitted himself with credit, justifying the rare choice, we have the least doubt. We only hope that more honours are in store for him.

The resignation of Dr. Edwards is still a mystery. We hope better counsel will prevail with the Government of India and a wise decision arrived at.

Original Article

THE PREPARATION OF AN IMPROVED PATTERN OF COTTON-WOOL SWAB

BY

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Cotton wool swabs have a recognized value in the collection of material from the body for laboratory examination, thus, for example, in the collection of blood from a case of suspected Anthrax; or of pus or other material required for the preparation of autogenous vaccines: of nasal discharge in cases of suspected tuberculosis; or of discharge in these

cases of mastitis where the milk secretion is suppressed and only a small quantity of material can be obtained on manipulation. Other examples will readily suggest themselves.

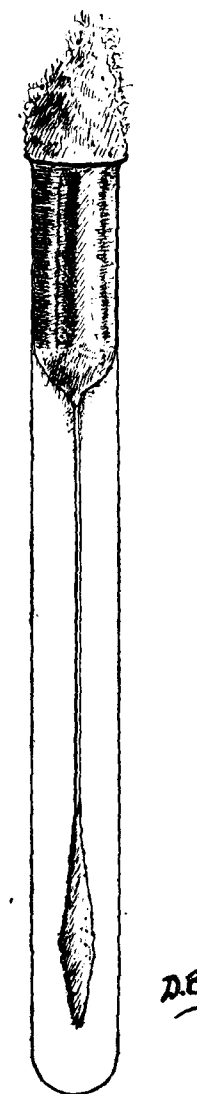
A suitable swab for these purposes may be made as follows:—A stout glass test-tube is selected; an ordinary culture tube about 15·2cm. long by 1·5cm. in diameter is convenient. A tube of the size indicated has two advantages: it enables us to use a wire of such length that we can inoculate a tube of medium directly from it, moreover the tube is sufficiently wide to facilitate the withdrawal and re-introduction of the swab without touching the upper end of the tube which may be highly undesirable.

Poor quality glass tubes with thin walls should be avoided; they break easily and may not bear the heat necessary for sterilisation. The blue-lined or green-lined are the best.

Next a piece of wire is obtained of such a thickness that when a 15·2cm. length is taken and a small cork stuck lightly on one end the wire will not oscillate when held gently at the other end between the thumb and finger; moreover it should support the weight of the cork without bending but the wire should not be so stout as to tempt us to use it occasionally as a probe. Wire, such as is sold upon reels or cards to be used in fastening up flowers etc., is too thin. It will oscillate vexatiously during manipulation and will bend permanently under pressure.

The piece of wire 15·2cm. in length is taken and a notch is made with a file 4cm. from one end. From this mark a row of notches is cut towards the short end of the wire. These notches should be about 3mm. apart, and after each is cut, the wire should be turned a little so as to give the row of notches a spiral direction around it. A similar row of notches is to be cut at the other end of the wire but need only extend 2·5cm. from that end. The wire is most conveniently held on the bench with forceps while the notches are being cut: they need not be deep.

A strip of absorbent cotton wool measuring 10cm. long by 5cm. wide is next to be taken. The thickness of this strip should be such, that when it is held between the eye



An Improved Pattern of Cotton Wool Swab

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and the light, one's finger can just be detected as a dark object when moved between the light and the wool. The strip of wool is now to be laid across the fingers of the left hand, which is held palm upwards; one long side of the strip is placed towards the thumb while the other is towards the tips of the fingers.

The 4cm. notched end of the wire is now to be placed on the edge of the wool nearest to the body and the left hand end of the wire should reach to within a few millimeters of the edge of the cotton wool nearest the left thumb. The wire should now be rotated lightly: it will gather up the wool and as soon as it does so the thumb and finger of the left are brought together to assist to mould the wool round the wire. As the moulding proceeds the wool will emerge in an upward direction between the thumb and the first finger and the final twisting of the wool will be along the wire towards the exposed end. The plug is now to be pushed into the tube to see if it be of the right size. It should fit firmly enough to allow us to lift the tube by it but it should be capable of being removed easily when grasped between the thumb and the fingers of the right hand and drawn out. During insertion or removal the plug should be rotated slightly. If it be too small a thin strip of wool can be twisted on by rotating the wire as before. If the plug be too thick a thin strip must be removed. The plug should fit so that the end of the wire, destined to hold the swab, will reach to within 1.3cm. of the bottom of the tube.

A piece of absorbent cotton wool 2.5cm. square and of such a thickness, that, when spread flat and held up between the eye and the light, we can just see the wire through it when the former is placed between the wool and the light, is now to be taken and laid on the first and second fingers of the left hand, the palm of which is held upwards. The wire with the plug already fixed at one end is grasped about the middle between the thumb and first finger of the right hand (Do not touch the wool plug during this manipulation) and the free notched end is laid on the edge of the cotton wool and the wire is rotated. It will gather up the wool and then the thumb and the first and second fingers of the left hand close on the wool and assist to mould it into shape. Notice as the moulding proceeds the now somewhat spindle shaped

synthetic substances directly obtained from the grass and the vegetable products respectively and they have achieved some degree of success in this direction. But these artificial products are neither within the easy reach of an ordinary cultivator nor have they any substantial food value like natural milk and ghee. In fact they have not yet passed the laboratory stage and their utility in the field of daily necessities of man is still doubtful. Whatever attempt is made to relieve the cattle from the working lines all are surely doomed to failure in the practical field of agriculture under the present condition of the country and the ryots in particular.

Much interesting literature has been written on the subject of animal husbandry and they found prominent place, in the ages gone by in the Hindu Mythology, which proved beyond doubt that cattle occupy the foremost position in the requirements of a man from birth to death. They are so useful in contributing to the existence and comfort of man that the people venerate them as the object of worship. I, therefore, believe that the cattle question which is intimately connected with the preservation of life and health of human beings is more important than the agriculture itself.

Present condition of cattle in Orissa and Chotanagpur :— It is an admitted fact that the breed of local cattle has considerably deteriorated in recent years. They are, as a whole, the poorest and weedy lot in the province except in some selected areas where they are better looked after. Mr. G. Milne, who studied the condition of local cattle in the year 1915, says that cattle of this part of the province keep one dead level of inferiority. They are half starved in the dry months and remain underfed during the rest of the year. In short they live in famine condition during the major portion of their life-time. They are mostly a lot of small, weak and emaciated creatures and possess a very low degree of vitality. Their number is too numerous in comparison with the amount of fodder, space and the care they receive and the work they perform in the field of agriculture. The result being that a large number of them pay the debt of nature every year to starvation and other causes and many find their way to public abattoirs. In my opinion more than 50% of them are

useless for any purpose except yielding a small quantity of manure and therefore they can easily be eliminated without any appreciable loss to the economic condition of the ryots.

Even after death their hides are considered to be of inferior quality. An expert tanner of Cuttack told me the other day that the local hides are quite useless from the tanning point of view and their position is extremely low in the tanning industry. It is a well-known fact that the cows here are very poor milkers, only one and half seers milk per day is estimated as the average quantity obtained, but the condition is perhaps a little better in the Chotanagpur district.

Value of fodder :— Under the foregoing paras I have tried to explain the utility of cattle and their present deplorable condition in this part of the province. The causes of this unsatisfactory condition are manifold but I believe the want of proper and sufficient fodder is the foremost of all. It has been stated that the cow is simply a machine for turning food into milk and the bullock is a living power house for the production of animal power from the assimilated food. Proper and sufficient fodder is, therefore, essential for the health, growth and the production of power for the working animals and for the maintenance of health for the non-working ones. It has been noticed that these wretched cattle when they get sufficient pasturage and good fodder during the rains improve their condition considerably and yield more animal power and milk. The out-turn of milk can easily be improved to some extent in any country cow of very poor milk strain, by good feeding and housing.

Condition of fodder supply :— All large herds of cattle whether of superior or inferior kinds which are usually kept in the open or in partially closed pens at night are generally maintained on pastures alone irrespective of weather conditions. Their number in some places is too great to be housed at night. Such cattle vary in condition with the seasons, being half-starved in the dry weather and fairly well fed in the rainy and cold months. During the dry weather grazing being scarce, they mainly depend, on the surplus paddy-straw, nearly half of the entire production of which goes for the thatching of the houses of people as the proper thatching grass is not available. The main foodstuff (paddy straw) not

only has a poor feeding value but is also miserably insufficient for the whole lot of starving cattle. The condition of pasture land is equally deplorable as generally the useless piece of land in a village and the sandy and rocky soils in the neighbourhood, on which no food crop can grow, are set apart for this purpose. In the jungle areas, however, their condition is somewhat better. On account of this peculiar condition of the soil the so-called grazing lands generally assume the appearance of a veritable desert in the summer season i. e. from the beginning of February to the middle of June and the cattle simply silently suffer when they hardly find a single blade of grass, to pick up, in the whole day of their roaming. This condition of fodder scarcity, however, continues till the burst of the monsoon and the appearance of new grass and leaves.

The system of stall feeding is practically unknown to the ryots of this part of the Province but in some cases it is in vogue, to certain extent, to the feeding of working bullocks and milch cows in towns and in some selected areas. Fodder crops are never grown solely for the purpose of feeding cattle and very little effort is made to import fodder from outside in the days of scarcity. The bhusa of any description which has a very high feeding value for cows are practically unknown to average ryots which is due to the fact that the *ragi* crops are scarcely grown except Biri and Kulthi in Orissa and less extensively in Chotanagpur areas. It is considered to be a luxury to allow grains to the animals other than the working cattle and its relative value is much discouraging on account of cost. Like the foundation of a house the problem of fodder supply is of paramount importance in the whole question of stock rearing and breeding and the solution of the problem has to be tackled in right earnest.

Remedy.—The question may now arise as to how this difficult problem of supplying fodder to the starving lot of cattle can be solved in the face of so many difficulties as stated above. Besides, the ryots are so apathetic and ignorant that it is practically impossible to introduce any new method of improvement for their neglected herd especially when this involves the question of finance. Under these conditions and the prevailing practice of feeding and rearing the live-stock to which the ryots are accustomed from time immemorial,

it is not an easy job to improve the matter unless some feasible and most acceptable method of improvement is devised. To my mind there are only two points which require to be tackled as a preliminary step for the betterment of the condition, i.e., (1) the reduction of herd to minimum and (2) sufficient supply of fodder by means of ensilage. These objects can easily be accomplished through the agencies of the Village Co-operative Societies where such Societies exist whose members hold very important positions in the rural areas and who are considered to be the backbone in the village organization. The help of local zamindars should also be sought for whenever possible. By reduction of herd I mean the gradual reduction of all useless and surplus cattle which consume so much of the fodder that could conveniently go to the deserving and the working animals of the ryots. The indiscriminate breeding of undesirable stock should be checked rigorously and all possible methods of reducing the herd should be taken up in right earnest.

Ensilage operation.—I now come to the most important question of fodder supply particularly the ensilage operation which forms the subject matter of this paper. Ensiling is a process of storing fodder in the green state tightly packed in some form of receptacle such as a silo or pit. This is indisputably the cheapest and easiest form of fodder conservation. During rains the large grazing tracts produce a plentiful supply of grass for grazing and there remain also a considerable surplus unused; this combined with the quantity which grows in jungle areas, which are either burnt or wasted away, will afford sufficient food for thousands of our starving cattle, if stored in time, in the form of ensilage. But unfortunately this method is practically unknown to the ryots and the country in general. As far as my information goes, the ensilage operation is not commonly known to any part of the province except in a few Government farms as well as in some indigo and other concerns under private management. In the year 1913, however, Rev. Father Hoffmann of the R. C. Mission started the operation, in a small scale, as an experimental measure with the object of introducing it to other Mission stations in the rural areas. But the work was not continued after his departure from India. These silo-pits were mostly of masonry work and consequently they were

costly affairs. Although the ensilage operation and its utility are still a mystery to the ryots yet I am inclined to believe that if properly conducted by competent agencies it will provide the cheapest and the best cattle fodder which a cultivator can easily afford to produce for his own requirements.

Pit Silos in the rural areas.—In the year 1925 the Cattle Committee headed by Dr. Clouston, Agricultural Adviser to the Government of India, visited Chaibassa during the rains and along with other things they discussed the question of removing the local scarcity of fodder in the hot weather. It is said that one of the members of the Committee, Mr. D. Quinlan, the then Director, Civil Veterinary Department of Bihar and Orissa, suggested to try cheap ensilage operation in the rural areas under the supervision of the local veterinary assistant surgeons. Mr. J. E. Scott, I. C. S., O. B. E., the then Deputy Commissioner of Chaibassa who took a keen interest in the matter at once issued necessary instructions to the Mankys and Mundas of all important villages of Kolhan, Porat and Dhalbhoom areas to start the pit-silos under the supervision of the local veterinary doctors. These officers were given preliminary instructions regarding the proper execution of the scheme. The operation was started in the month of September in the rural areas of the district under the supervision of the three touring veterinary assistant surgeons in addition to their own duties. The "*modus operandi*" which was adopted by the assistants is given below:—

At the outset suitable sites were selected on high or well drained moorum soil at the different parts of the district by the assistants themselves and necessary instructions were given to the headman of the village for digging the pits and the collection of materials for filling them up. The pits were circular in shape measuring 10 to 15 ft. in diameter and about 6 to 10 ft. in depth. Altogether 25 pits were excavated the position of which is shown in a separate skeleton map drawn for reference. The inside of the pits were mostly smoothed with a plaster of clay and cow-dung and were filled up with ordinary field or wild grass-chopped or un-chopped under the direct supervision of a veterinary officer. All the work in

this connection was done by the villagers themselves and on cost of labour or material was incurred. About 3 feet of fodder was put in at a time and 2 to 4 lbs. of common salt was sprinkled over each layer of one foot and the whole stuff was tightly pressed by trampling in order to exclude air as far as possible. The pits were then raised about 3 ft. higher than the ground level and sloped down in the form of a cone for the proper discharge of rain water. In some cases they were only filled up to the ground level or even less either for want of fodder or due to lack of interest shown by the ryots concerned.

The whole pit was covered with a thin layer of straw or leaves or trees, as available nearby, in order to prevent wastage of silage that may come into contact with the mud covering and then plastered with a layer of mud paste consisting of mud, cow-dung and powdered charcoal. These pits, when completed, looked like miniature hillocks standing on a plain ground. They were fenced by split bamboos and poles or the branches of trees but in some places no fencing was provided. Proper attention was paid to the drainage of rain water and only in a few cases temporary sheds were erected over the pits but most of them were kept exposed. The pits were kept undisturbed until cracks and holes were noticed on the top portion by settling down of the contents and they were immediately attended to. In some cases, however, they sunk below the ground level or even more and the depression was filled up by the fresh earth and foliage. In neglected cases the contents were partially or completely decomposed and became totally unfit for feeding the cattle. But in the majority of cases the operation was quite successful and the villagers highly appreciated the value of the new product. The contents of the pits were opened in the month of May and distributed to the persons responsible for filling up of the pits. The Circle Inspector of the Veterinary Department was occasionally deputed to help the veterinary assistant surgeons in the operation and for general supervision. The writer of this paper examined most of the pits, at different stages of the operation, as far as possible, and gave necessary instructions wherever found necessary and watched the progress of the work.

In the year 1926-27 as many as 23 pits were filled in the same field of operation and during the last year 1927-28 nearly 43 were completed in the Singhbhum district. The operation was also extended last year to the Bargarh sub-division of the Sambalpur district and as many as nine pits were filled up under the direct supervision of an officer deputed by this department. I am indebted to Mr. Sanku Bala Charan Das, the Sub-Divisional officer of Bargarh who took the initiative and personal interest to start the work in the Sub-division. The same "modus operandi" was adopted in all cases as was done in the first year of the operation. From the samples of silage and the demonstration reports received from the officers in charge of the silo-pits opened this year it has been proved that the operation, on the whole, was quite successful and the officials as well as the villagers appreciated its value. 3 samples of silage, in glass bottles, are placed on the table for inspection. From the extract of a resolution of the general meeting of District Board of Singhbhum held on the 13th September, 1926, it appears that the local bodies also took lively interest in the matter and all credit is due to them for the success of the operation, the resolution of the Board runs thus—"Resolved that the veterinary assistant surgeons should try to get as many silo-pits as possible in and around the same village as last year." The matter was also mentioned in the annual report of the Civil Veterinary Department, Bihar and Orissa, for the year 1925-26.

From the facts stated above as well as from the practical experience thus gained I have no hesitation in saying that the pit-silos can be raised without any cost, in the rural areas where grass is available. The silage can be made from all sorts of grass, herbs or any fodder plants which the cattle do not refuse to eat. In places where grass is not available fodder crops like jowar, maize etc., have to be grown for this purpose. The time of filling should be just at the close of the rains or later according to the availability of the silage making stuff and the fitness of the soil for digging the pits. The Katcha pits which should be dug up and filled up by contributing labour by the villagers themselves, should only be tried. Hired labour or the contractors should only be engaged where the work cannot be done by the villagers

themselves or by an individual person desirous of having the benefit of silage. Much attention should be paid to the proper filling and covering of the pits where the keynote of the success lies. Faulty fillings and defective covering of the pits may lead to failure. I believe if the villagers are properly trained to build up the silo-pits where the demand of fodder is keenly felt, specially in dry season, they will take a keen interest in the method and the whole problem of scarcity of fodder will thus be automatically solved in course of time. Before concluding this paper I may again point out that for the solution of hot weather fodder problem in this part of the province the introduction of ensilage operation in rural areas should be extensively tried through the members of the village Co-operative Societies, where such Society exists, on the lines indicated above or according to the instructions issued by the Agricultural Department of Bihar and Orissa on the subject. The members of the village Co-operative Societies should be requested to open as many pits as possible in their respective jurisdictions either alone or by two or more members combined together. The Government should also be approached for broadcasting the introduction of silopits as well as for rendering financial help, to the parties desirous of starting pits, whenever necessary.

TRYPTOPHANE ($C_8H_9NCH_2CH(NH_2)COOH$) AND ITS PRODUCTS*

BY

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This paper is the result of my study on tryptophane in connection with my research in the "Morgan Group of Parathyphoids" at the Iowa State College, in 1924.

Tryptophane is always formed when the tryptic digestion of the albumins has extended beyond the formation of albumoses. As its presence among the various digestive products is easily recognised, it is thus possible to ascertain whether the destruction of the albuminous molecule has extended to the formation of amino-acids without testing

* Received for publication on 29-10-28.

Glyoxylic acid reaction (Hopkins-Cole reaction).—To about 2 c.c. of glyoxylic acid reagent (No. 38) add 2 c.c. of the 2 per cent protein solutions or of the protein solutions to be tested, mix and pour concentrated H_2SO_4 down the side of the tube. A purple violet ring at the plane of contact is a positive reaction. Repeat, mixing the contents of the tube. This reaction does not always come immediately, so if negative allow it to stand 15 minutes. If still negative, repeat, mixing a little of the solid protein matter dissolved in glyoxylic acid and sulphuric. The glyoxylic and reagent is made in the following way :—

In a 500-c.c. flask place 10 grams powdered magnesium, cover with distilled water and slowly add 250 c.c. of saturated oxalic acid solution, cooling from time to time under the tap. Filter off the magnesium oxalate, acidify slightly with acetic acid, dilute to one liter and keep in a stoppered bottle, with a little chloroform added. The solution contains oxalic acid and glyoxalic, $\text{CHO} \cdot \text{COOH}$. Cole states that this reaction is interfered with by the presence of chlorides in excess, and in the presence of chlorates, nitrates and nitrites. It is also important to use pure sulphuric acid.

Aldehyde reaction :—E. Komun and Eberhard Böhringer give the following data :—

5 c. c. of tryptophane solution or a protein solution is treated with 5 c. c. of 15% HCl , concentrated, 6 c. c. of 0.1% HCHO per 500 c. c. 10 c. c. of concentrated H_2SO_4 added and mixture shaken until no bubbles of HCl appear. A blue colour develops. 1:75,000 gives satisfactory result. For quantitative work the protein is weighed in a colorimeter cup, treated as described and colour compared with that of the standard. Accuracy 2-4%. H_2O_2 and H interfere. Colour does not fade within 24 hours.

THE ISOLATION AND ESTIMATION OF TRYPTOPHANE

Tryptophane is not obtained in any large amount by the hydrolysis of proteins by acids and is best prepared by the action of trypsin. According to Hopkins and Cole, the protein is digested in alkaline solution by trypsin, until the solution gives maximum colouration when tested with bromine water; the solution is then acidified, boiled and filtered.

The clear solution (better after concentrating in vacuo and filtering off tyrosin, which crystallises out) is acidified with sulphuric acid until it contains 5%; and then mercuric sulphate dissolved in 5% sulphuric acid is added as long as a precipitate, which contains tryptophane, cytine and tyrosine, are formed. The precipitate is freed from tyrosine by washing with 5% sulphuric acid in which the tyrosine compound is soluble, that is, until the washing no longer reacts with Millon's reagent. It is then decomposed by sulphuretted hydrogen and the solution containing cytine and tryptophane is again acidified with sulphuric acid to 5% and fractionally precipitated with the mercuric sulphate reagent. The cytine is thrown down first, and filtered off, and then the tryptophane is precipitated. The precipitate is again decomposed by hydrogen sulphide, and the solution, freed from sulphuric acid to 5% and fractionally precipitated with mercuric sulphate reagent. The cytine is thrown first, and filtered off, and then the tryptophane is precipitated. The precipitate is again decomposed by hydrogen sulphide, and the solution again freed from sulphuric acid, is evaporated down, alcohol being continually added to hasten the evaporation and prevent decomposition of the tryptophane, which is estimated by weighing (A.H.A. Plimmer).

Thomas Pierre for estimation of tryptophane employs the colour test with P-dimethylamino benzaldehyde in fully digested protein. By this method 1.7 to 1.8% of tryptophane was found, in caseinogen, an amount which is in agreement with the result of Hopkins and Cole.

O. Fürth and Lieben have employed colorimetric method for estimation of tryptophane. The relative amounts of free and combined tryptophane were followed up by Voisenet's method during hydrolysis of protein precipitated by phosphotungstic acid and in the residue. In the case of hydrolysis of fibrin by tryptic digestion, only 2/3 rd. of the total tryptophane was obtained in the free form.

Reagents were = Phospho-tungstic acid 10%
Formaldehyde, HCl , NaHO .

They state that the suitable way of carrying out the estimation is as follows :—To 2 c. c. of the solution a drop of 2% formaldehyde solution and about 15 c. c. of very con-

centrated HCl are added, after 10 minutes, 10-12 drops of .05% NaH_2O_4 are also added and the mixture made up to 20 c.c. with concentrated HCl. After a short time the violet colouration which is produced is compared with a standard tryptophane solution (O. 1%). An error of 10-20% was observed. The estimation can also be carried out on insoluble and the coagulated protein without hydrolysis. The tryptophane content of a great number of proteins has been determined.

Fürth and Nobel have confirmed that Voisenet's protein colour reaction is specific for the tryptophane content of protein. Their reaction has been found suitable for the estimation of tryptophane in the free or in the combined state without decomposing the protein molecule. The globulins seem to have a higher tryptophane content than the albumin.

Reagents were	{ 2% formaldehyde, conc. HCl }	Error is
	{ .05% NaNO_2 }	10-20%

THE ACTION OF MICROORGANISMS ON TRYPTOPHANE

The action of bacteria on tryptophane explains the formation of indol and skatol in the digestive tract of higher animals. It has long since been known through the work of Kuhne and Nencki that indol and skatol are formed by putrefaction of albumins. If one allows tryptophane little acted upon by pancreas or better with a little gelatine and in presence of mineral salts, to be digested there is obtained besides skatol and indol also skatol carbonic acid as well as skatol acetic acid.

B. coli gives under aerobic conditions chiefly skatol carbonic acid and indol. In an anaerobic culture or of *B. coli* one finds specially skatol acetic acid. Under the influence of anaerobic bacteria tryptophane first loses its NH_2 , just the same as tyrosin under similar conditions. Tryptophane produces indol propionic acid and tyrosine produces oxyphenyl propionic acid.

Under anaerobic conditions the splitting is carried to indol acetic acid. Under the influence of aerobic bacteria one gets phenyl acetic acid from phenyl amino propionic acid, first phenyl propionic then phenyl acetic acid. Anaerobic bacteria produce only phenyl propionic acid.

The production of skatol from tryptophane by putrefactive bacteria is very limited according to Hopkins and Cole, yet the fermentation fungus of plant and animal tissue, form considerable quantities of skatol.

Two theories or hypotheses have been advanced:—(1) Tryptophane is perhaps not stored in all protein molecules (2). The bacterial decomposition of tryptophane depends on the kind of bacteria which attack the indol amino propionic acid. What we know of the action of different bacteria on some sugars, viz., glucose, for example, permits us to hold that the second of the hypotheses is probable. Likely another kind of bacteria as that of *B. coli* can form more skatol. It has been shown that aseptic digestion can produce no indol. One obtains only tryptophane and HCN in urine.

DECOMPOSITION OF TRYPTOPHANE BY PROTEUS BACTERIA

In presence of glycerol and Henderson's phosphate mixture (Ergellu d.physiol. 8 : 254, 1909) as buffer there is formed chiefly hydroxy acids, while without buffer, specially when milk sugar is added (i. e.) under the unformable condition for formation of OH acid from the amino acid due to the accumulation of Hions, there is formed chiefly the corresponding amine. In the bacterial culture it is very difficult to separate the resinous mass and to crystallise the compound (OH acid) with use of basic copper acetate solution it is easy to precipitate the oxy acid almost quantitatively and to isolate the pure substance. The proteus bacterium is ordinarily active in producing oxy acids while the Bact. subtilis produces oxy acids very sparingly.

KCl.	1	gram.
Amm. Chloride	1	"
Mag. Sulph.	0.1	"
Glycerol	25	"
Henderson's Phosphate mixt.	170	c. c.
Water		to make a liter.

To this medium was yet added about 0.5 grams freshly precipitated moist uranyl phosphate.

800 c.c. of media placed in 4 flasks, sterilised and inoculated with proteus (24 hours growth) from agar culture. The flasks kept at 37°C. until disappearance of tryptophane

reaction (44 days). The reaction remained weakly alkaline to litmus. Contents of flask united and distilled under high vacuum. The alcoholic extract now distilled under reduced pressure. The resulting residue now dissolved in H_2O and after acidifying with H_2PO_4 extracted with ether. After vapourising the dry ether in vacuum desiccator this aqueous mass is treated with warm water and filtered. Filtrate cleared with charcoal then precipitated with copper acetate solution (basic). The precipitate in warm suspension treated with H_2S , copper, H_2S free solution again extracted with ether. The extract is evaporated to small volume, then mixed with alcohol and distilled under high vacuum. The residue can contain producing bacteria (*B. coli* and others) decompose tryptophane but also those that do not produce indol (*B. typhosus*, and others). The consumption of tryptophane is decreased markedly if other protein cleavage products are supplied, as is the case with peptone culture media. Many bacteria produce more tryptophane through peptolysis than they can destroy, others have such small peptolytic action that tryptophane is all decomposed as quickly as it is formed. Several bacteria can destroy free indol but cannot produce it.

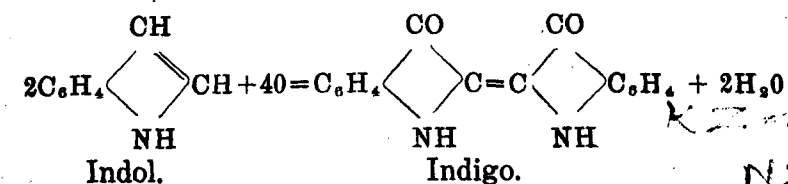
SYNTHESIS OF TRYPTOPHANE BY BACTERIA AND NATURE OF INDOL FORMATION.

Logie states that certain gram negative bacilli specially *B. coli* and *B. friedlander* could synthesize tryptophane in protein free media. This synthesis of a ring compound supports the view of the vegetable nature of bacteria. The addition of glucose to a living culture causes the rapid disappearance of the indol already formed. This points to the possibility that indol "formation" is a consequence of diminished use of indol, rather than a special formation by the organism. The splitting off of indol seems to be a reversible chemical reaction dependent on the chemical balance between indol, tryptophane and other substances. The difference between *B. coli* and *B. typhosus* with respect to indol formation and reabsorption is probably due to the fact that *B. coli* possesses an enzyme which enables it to split off and utilise the open chain (aloinin) portion of the tryptophane

molecule. When the amount of tryptophane added to the medium is insufficient to prevent the formation of free indol, the indol appears late and after the glucose is fermented. Acid formation cannot be the cause of inhibition of indol formation by glucose.

INDOL. (C_8H_7N).

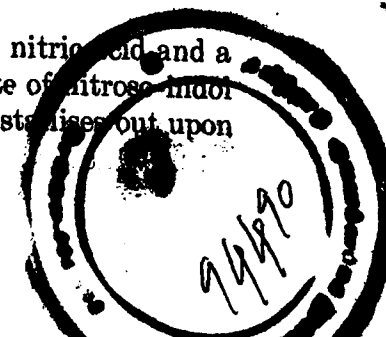
Indol is a derivative of the tryptophane complex, viz., of skatol-amino-acetic acid. Structurally it is closely related to indigo, and according to Nencki, this transformation can be effected through the action of ozone. It is represented by the equation:—



Conversely, indigo can be transformed into indol on reduction. From the albumins the substance can also be obtained on fusion with potassium hydroxide. The greater portion of indol that is formed in the large intestine is no doubt eliminated in the faeces. A certain amount, however, is absorbed and after oxidation to indoxyl appears in the urine in combination with sulphuric acid as so called indicans. If larger quantities are formed, a variable fraction is further eliminated in the urine as an indoxyl compound of glucuronic acid. Indol crystallises in small platelets which melt at $52^\circ C$. and are soluble in hot water, ether, alcohol and benzol. Its odour is feculent, it is quite volatile, and when boiled with water passes over into the distillate. With picric acid a beautifully red crystalline compound is formed which is readily decomposed on boiling with dilute ammonia; the liberated indol is then found in the distillate. When distilled in the presence of sodium hydrate, on the other hand, the indol is decomposed.

TESTS

When treated in aqueous solution with nitric acid and a trace of nitrite a red precipitate of the nitrate of nitroso-indol is formed. This is soluble in alcohol and crystallises out upon the addition of ether.



If a small piece of pine wood is moistened with strong hydrochloric acid and then passed in the watery solution of indol, it gradually assumes a cherry red colour.

An aqueous solution of indol, is treated with a small amount of a solution of sodium nitroprusside until a brownish yellow colour develops. If now a dilute solution of sodium hydrate is added drop by drop, the colour changes to violet. Upon further dilution of a little dilute hydrochloric acid this becomes a deep blue, while an excess of the acid destroys the blue colour. On shaking a small quantity of an aqueous solution of indol with a few drops of a 2% dimethyl-P-amino-benzaldehyde in equal parts of water and concentrated hydrochloric acid a cherry red colour develops either at once or upon the application of heat.

Indol gives red colouration with oxalic acid. The test for indol is carried out by hanging a piece of filter paper which has been dipped in saturated oxalic acid, dried and sterilised, just above the culture media. G. Morrelli states that for the detection of indol in culture media indol gives a red colouration with oxalic acid. The test for indol is carried out by hanging a piece of filter paper which has been dipped in saturated oxalic acid, dried and sterilised just above the culture media.

DETECTION AND ESTIMATION OF BACTERIAL INDOL

F. C. Lewis in his article stated that the Ehrlich test as ordinarily applied gives variable results, which depend on quantity of indol present and on quantity of reagents used. Therefore he suggests the following method:—To 5 c.c. of culture add 5 c.c. of the aldehyde reagent and 1 c.c. of 1% $K_2S_2O_8$. Let it stand 30 minutes, warm slightly and extract with 5 c.c. $CHCl_3$. Do not wait longer than 30 minutes. For quantitative determination extract culture with $CHCl_3$ and treat extract by above method. Compare colour with standard made in some way.

Seidelin suggests the following standards for indol estimation: Dissolve 5 cent. grams pure indol in a few c.c. of (a) absolute alcohol. Add distilled water to 500 c.c. giving 1:10,000 dilution. Of this solution add 1 c.c. to 99 c.c. H_2O .

(b) solution is now 1: 1,000,000

(b) is 1 on scale (a) is 100 on scale.

Place 10 c.c. of each solution in series of test-tubes. To each add 5 c.c. Ehrlich's solution.

Paradimethyl amino-benzaldehyde	4 c. c.
Alcohol 96%	380. c. c.
HCl (Conc.)	80. c. c.

To each test-tube add 5 c.c. 1% K_2SO_4 . When red has become most intense, add 5 c.c. chloroform, mix. Colouring material separated by $CHCl_3$ is pptd off. Burette separate coloured chloroform. Place in tubes and fill with sterile NaCl solution, close and paraffin the tubes.

Test.—Do as above and compare with standards. Traces of indol produced by bacterial action react readily with the P-cresol-tyrosinase reagent producing a blue dye soluble in ether. Alkalies change the colour to yellow and acid to green. Skatol does not react with this reagent. By means of this reagent it is possible to differentiate indol and non-indol producing bacteria and to determine the extent of proteolysis.

E. Pringshiem has given a qualitative test for indol: He uses a modified Ehrlich-Bohn reagent for the detection of the production of indol.

Paradimethyl amino benzaldehyde	5 parts.
Methyl alcohol	50 "
Concent. HCl	40 "

For the reaction add 5 drops of the above mixture and 10 drops of saturated solution of pot. per sulphate. Red or red urine colour results if indol is present.

Ehrlich's method in bacterial culture:—The culture which should contain 8-10 c. c. of peptone water, is treated with 1 c. c. of Ehrlich's reagent and 2 drops of 40 p. c. CH_3O solution. On shaking a reddish violet colour appears and by

addition of alcohol the solution may be made suitable for colorimetric examination.

Nitroso-indol test:—The red colour obtained when a peptone culture of certain bacteria is treated with a drop of mineral acid is due to presence of nitrate in the peptone, and there is no need to add nitrite before colour can be obtained. If the peptone medium is inoculated previously with a denitrifying organism, the nitrate is reduced to nitrite and then to NH_3 and then N and the medium no longer yields a nitroso indol reaction, when used for the culture of the organism mentioned (*Cholera vibrio*, etc.). Conversely the peptone media free from nitrate and nitrite are described and may be used for the detection of traces of nitrate; the substance to be tested is added to the medium which is then inoculated with an organism capable of giving a nitroso-indol reaction.

PRODUCTION OF INDOL BY BACTERIA

Production of indol by certain bacteria artificially in the laboratory on inoculation of tryptophane broth has been recognised for the differentiation of bacteria by all the bacteriologists. Kligler in his article concludes that the indol reaction is sufficiently constant to be of diagnostic value and that the Ehrlich test is constant and more reliable than the Salkowsky test. The test should be made on the 4th or 6th day and the tubes shaken with CHCl_3 as a confirmatory test. With the Ehrlich test *B. coli* is generally positive, *B. aerogenes* and *B. proteus* variable and *B. cloacæ* and *B. paratyphi* always negative. The blue colour sometimes observed in connection with Ehrlich test is independent of indol and due to some substance present in peptone. Species of colon-typhoid group are the ones differentiated on indol production. The following organisms have been, however, known to produce indol:—(after Norton and Sawyer).

Bact. aerogenes.

„ *coli*

„ *dysenteriae*

Clostridium sporogenes.

Clostridium tetani.

Corynebact. diphtheria.

Hemophilus influenza.

Pasteurella aviseptica.

Proteus group of bacteria.

Pseudomonas pyocyanea.

Vibrio cholerae

„ *finkleri*

„ *metschnikovi*.

DETECTION OF INDOL IN THE LABORATORY.

Dunham's or peptone solution is inoculated with the organism to be tested and incubated for three to four days. There are two methods of testing:—

SALKOWFSKY TEST

1. Add $\frac{1}{2}$ c. c. of 10% H_2SO_4 , mix, then add 1 c. c. of 0.1% sodium nitrite so as to form a layer on the surface. Red ring will be formed between the upper layer and lower solution in two to twenty minutes in case of indol. As H_2SO_4 decomposes the nitrite nitrous acid is freed and this unites with indol to form nitroindol which is a bright red compound.

EHRlich TEST

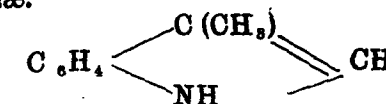
2. 3 c. c. of each of the following are added to the culture:—

a. Paradimethyl-amino benzaldehyde.

b. Pot. persulphate (saturated solution) after mixing red colour will be shown if indol present. (Levine).

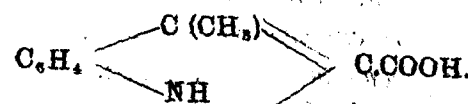
SKATOL ($\text{C}_8\text{H}_7\text{N}\cdot\text{CH}_3$).

Skatol, like indol is a direct derivative of tryptophane and is likewise formed during the process of albuminous putrefaction. It is methylated indol, and may be represented by the formulæ.



By combining with carbon dioxide it gives rise to the formation of skatol-carbonic acid, which is also formed in the

content of large intestine and belongs to the ortho-series. Its formula is



Like indol, skatol is also formed on fusing albumins with caustic soda, and can be obtained from indigo on reduction with tin and hydrochloric acid.

When passed through red hot tube it yields indol. On absorption it is oxidized to skatoxyl and is eliminated in the urine in combination with sulphuric acid and glucuronic acid, as in the case of indol. Skatol-carbonic acid, on the other hand, appears in the urine as such.

Another derivative of skatol is Baum's skatosin, $\text{C}_{10}\text{H}_{16}\text{N}_2\text{O}_2$. Skatol crystallises in the fine platelets which melt at 95°C . and are soluble in ether, alcohol and benzol, in hot water it is soluble with greater difficulty than indol. Its odour is exceedingly offensive. Like indol it is volatile, and combines with picric acid to form a red crystalline compound. On distilling this in ammoniacal solution or in the presence of sodium hydrate the skatol passes over as such, while indol in the latter instance is decomposed. On distilling a mixture of indol and skatol in aqueous solution the skatol passes over first and it is thus possible to separate the two substances from each other.

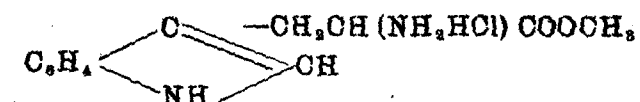
TESTS

From its aqueous solutions skatol is precipitated by yellow nitric acid as a white substance—skatol nitrate. If a small piece of pine wood is moistened with an alcoholic acid, it assumes a red colour. If, on the other hand, the test is conducted as with indol no reaction is obtained. With nitric acid of a specific gravity of 1.2 skatol gives a marked xanthoproteic reaction on boiling—i.e., a yellow colour which changes to orange when ammonia is added in excess. The substance does not give the reaction with sodium nitroprusside.

OTHER DERIVATIONS ON TRYPTOPHANE

The copper salt of tryptophane $\text{Cu}(\text{C}_{11}\text{H}_{11}\text{O}_2\text{N}_2)_2$ is a pale blue non-crystalline substance, difficultly soluble in common solvents and in cold mineral acids.

The hydrochloride of the methyl ester of tryptophane



, crystallises from a mixture of CH_3OH and ethyl acetate. It dissolves readily in H_2O .

The hydrochloride of d-tryptophane $\text{CaNH}_2\text{CH}(\text{NH}_2\text{HCl})\text{COOCH}_3$ is soluble in hot water. It gives all the reactions described by Fischer for the chlorides of amino acids.

BIBLIOGRAPHY

1. Abderhoden, E. & Martin Kemp, 1907. Tryptophane and some derivatives. *Zeit. Physiological Chem.* 52, 207-218.
2. Bayne, Jones, S. and Zinunger Pauline. The inability of *Staphylococcus* to form Indol from protein, peptone and tryptophane. *Abstracts of Bact.* 5, 438, 2090.
3. Buchaman, R. E. 1921. Indol production. *Veterinary Bacteriology*, 118.
4. Cole, Sydney W., 1903. Lieberman's colour reactions with proteins (tryptophane). *J. Physiol* 30, 311-18.
5. Cohen. *Organic chemistry*, 399-406
6. Daskin, H.D. 1907. The glyoxylic acid reaction with tryptophane indol and skatol. *J. Biol. Chem.* 2, 389-96.
7. Fallin, O. and Looney, J.M., 1922. Colorimetric methods for separate determination of tyrosine, tryptophane, and cytine in proteins. *J. Biol. Chem.* 51, 421-34.
8. Fearon, W.A., 1920. Colour test for tryptophane of urine, *Dublin J. Med. Sc.* 1, 28.
9. Furth and Nobel, 1920. Colorimetric investigation of tryptophane. *Biochem. Zeit.* 109, 103-23.
10. Furth O. and Lieben, F., 1920. Colorimetric investigation. II. Systematic investigation of the colorimetric estimation of tryptophane based on voisinet's reaction. *Biochem. Zeit.* 109, 124-32.

11. Furth, O. and Lieben, F., 1920. Colorimetric estimation of tryptophane. III. The cleavage of tryptophane during the hydrolysis of proteins. *Bio Chem. Zeit.* 109, 153-64.
12. Groenievege, J., 1919. *Med. Geneesk. Lab. Weltevreden*, III A., 177-83.
13. Hawk, Practical physiol. Chem. 5th edition, 65, 67, 77, 98 and 139.
14. Hopkins and Cole, 1901, Protein chemistry a hitherto undetermined product of tryptic digestion, *J. Physiol.* 27, 418-28.
15. Hopkins and Cole, 1903. Constitution of tryptophane and action of bacteria upon it. *J. Physiol.* 29, 451-66.
16. Herzfeld, E. and Kligler R., 1915. *Cent. Bact. Parasiterk* I, 76, 1, 12.
17. Homer. Colour tests. *J. Biol. Chem.* 22, 379.
18. Horper, F. Zoller, 1920. Quantitative estimation of indol in biological media. *J. Biol. Chem.* 41, 25-36.
19. Kligler I. J., 1914. Production of indol by bacteria of the colour-tryptophane group. *J. Infect. diseases* 14, 81-86.
20. Levine, max., 1921. Bacteria fermenting lactose and their significance in water analysis. *Bull.* 62, Iowa State College of Agriculture and mechanic Arts.
21. Levine, max., 1921. Indol production by bacteria. An introduction to Laboratory Technique in Bacteriology, 37.
22. Lellene and Ravillis. Quantitative determination in protein cleavage products. *J. Biol. Chem.* 2, 481-84.
23. Logie, W. J., 1920. Synthesis of tryptophane by certain bacteria and the nature of formation. *J. Path and Bact.* 23, 224-29.
24. Lewis, F. C., 1915. Detection and estimation of bacterial indol and observation on intercurrent phenomena. *J. Path and Bact* 19, 429-42.
25. Mathews. *Physiological Chemistry*, 3rd edition, 118, 1:8, 129, 323, 148, 149, 717, 441, 400 and 750.
26. Mandel. A text book of physiological Chemistry by Hammarsten, 81, 84, 99, 131, 150, 151, 106, 107 and 153.
27. Morrelli, G., 1909. Detection of indol in culture media. *Zeit. Bact.* 5, 413-15.
28. Mayeda, M., 1907. Tryptophane and phenylalanine detection. *Z. Physiol. Chem.* 51, 261-63.
29. Malone and Rose, 1921. Detection of indol in bacterial culture. *Indian J. Med. Res.* 8, 490-504.
30. Nowiki, W. 1917. Indol reaction, modification of Ehrlich method in Bact. culture. *J. Chem. Soc.* 114, II, 140.

31. Norton and Sawyer, 1921. Indol positive organisms, *J. Bact.* 6, 476.
32. Crossinini, E., 1910. Detection of Indol in bacterial cultures by the Ehrlich Method. *Arch. Hyg.* 72, 161-74.
33. Porcher, C., 1909-10. Action of microbes on tryptophane, *Biochem. Zeit.* 9, 735-37.
34. Porcher, C., 1909-10. Colour reactions of tryptophane. *Biochem. Zeit.* 9, 732-33.
35. Pierre, Thomas. Estimation of tryptophane in protein. *Asn. Inst. pasteur* 34, 701-08.
36. Paul, R. Cannon, 1926. Rapid and simple test for indol. *J. Bact.* I.
37. Rivas, D. 1908. An improved rapid test for indol in broth culture and for the presence of indol in meat sugar-free broth *J. Infect. diseases* 4, 611.
38. Seidelin 1911. Indol estimation. *J. Hyg.* XI.
39. Sasaki, T. and Otsuka, 1921. Decomposition of tryptophane by proteins. *Bact. Biochem. Zeit.* 121, 167-70.
40. Seidelin and Lewis, 1911. Indol production. *J. Hyg.* 11, 118-21.

NATURAL DIARRHOEA IN ELEPHANTS

BY

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As diarrhoea in elephants is of considerable interest to the profession and of some consequence to the animal and to the owner, I put the following observations before the readers of this esteemed Journal.

The heading "Natural Diarrhoea" is selected as it is natural with the elephants to purge at intervals and as it is more physiological and desirable than pathological.

This diarrhoea, as in other forms, is characterised by increased frequency of softer and watery evacuations of the contents of the alimentary canal.

It occurs throughout the year, in all seasons and wherever the elephants are found, whether in captivity or in the natural wild state and whether stable fed or left to graze at

large. It is seen in healthy and sickly ones of all ages and sexes.

The question why it should occur is satisfactorily answered only if the causes and consequences are unreservedly dealt with. The immediate cause is, elephants eating selected earth and the consequence is the resultant temporary weakness of the digestive and the general system involving loss of a week's work. It is still questionable, why an elephant should eat earth and purge instinctively and for what purpose. The apparent symptoms that precede and follow diarrhoea in the animal reveal why and when an elephant eats earth. The animal suddenly appears slightly dull and indisposed. It is followed by mild flatulency of the alimentary system. He is not inclined to eat his ration or fodder as usual. He then searches for and eats the barks of Jala (*Shorea Robusta*), Maddi (*Terminalia Tomentosa*) and Seege creeper (*Acacia Concinna*). He is in this state from about 6 to 12 hours. He then goes about and eats this selected earth up to, I think about 10 lbs or more. Some eat these barks after eating earth also. He begins to purge after 8 to 15 hours purging for about a day or two. Considering the number of parasites that infest an elephant's digestive system this healthy habit of the elephant to rid itself of the contents of the alimentary canal is best utilised by the Veterinary Surgeon in aiding more. The purgative taken is sufficient requiring no adjuvant or corrective. Jala and Maddi barks are astringents and vermicides and Seege is a vermicide. Elephants in captivity are domesticated and require some stronger vermifuges or vermicides. These are best given when the elephant eats its natural vermicide and before it takes its purgative, so that the vermicide will have sufficient time to act. My revered teacher Mr. F. H. Mascarenhas, G.B.V.C., administered santonine when the animal started purging. I think it is advisable to do it earlier as in some animals purgation stops in about 6 to 10 hours. If instructions are given, the mahouts will ask for the worm powder when they see the animal eating these barks and in flatulency. Questioning deeper still, one would ask why elephants alone should have this advantage over other animals in creation. The simple answer that it is natural is insufficient. We do find some solution in the mode of their natural living.

They love grass but more still the roots of some variety of grasses. Again when they twist and pull up grass with their trunks they are pulled out with root and all. This they dash on their limbs and body and eat away along with the remaining earth, dirt, eggs of parasites and dried leaves etc. Sometimes they do not throw away the roots. The quantity of these indigestible materials they consume daily is considerably much. Some of the tree fodder they naturally eat is very coarse. The stomach is comparatively small. I had in the first post mortem examination I held, to search for the stomach. The liver is not comparatively big. To make good these discrepancies, and to remove the evil effects of the earth, dirt, eggs etc. consumed daily, provision is probably made that when the cumulative effects of these continuous overtaxation reach a definite pitch, the intestines become less active and cause flatulence tempting the animal to self doctor and purge to be alright again.

The presence of bots (sometimes few and at times considerable), round worms, flukes etc. always in the digestive system of elephants has led some to believe that worms cause irritation and elephants eat earth and purge. No author appears to have noted the conditions of the animal preceding diarrhoea which I think is a chief factor to be considered. Mr. F. Ware, F.R.C.V.S. then Superintendent, C.V.D. Madras, instructed me in 1914, to find out whether worms cause this diarrhoea or come out as a consequence. My observation is that they are thrown out as a consequence, 90 per cent being killed. I have seen often in severe cases of this diarrhoea no worms being passed. I do not think that worms can be the cause of this mild flatulency at regular and irregular intervals, in all seasons and in all elephants chiefly of India and Burma kept under various conditions.

In the post mortem examinations of carcasses of elephants destroyed, dead and shot for sport one will invariably find number of patches of congestion, inflammation and even ulceration of the walls of the stomach and intestines revealing that coarse and adulterated fodder, though consumed instinctively does interfere with the digestive canal. The number of worms found in all cannot be made responsible.

This state of the alimentary canal suggests that frequent administration of oleaginous preparations much advocated by the indigenous treatment is useful and indicated.

A complete change of environments such as locality, climatic conditions, grass and tree-fodder checks this diarrhoea for a considerable time. I have noticed that animals that usually purge once in three or four months have no attack of diarrhoea for over 8 months under the new environments. It did more harm than good. I cannot say whether the selected earth could not be had there.

PATHOLOGY IN PHYSIOLOGICAL DIARRHOEA

An interval of three to four months between these attacks, is, I think, desirable. But if the interval is short the elephant gets thinner and weaker requiring interference. In such cases a complete change of rations is indicated. In persistent cases Liquor Arsenicalis, vegetable bitters and Ferri sulphas answer well. If however the elephant fails to improve by the above treatment in about six months the following masala is worth its cost:—

Ghee	... 8 oz.
Beaten rice	... 3 lbs.
Jaggery	... 10 oz.
Cocoanuts	... 2 (Kernels only.)
Omum seeds	... 2 oz.
Onions	... 4 oz.

Crush and mix all together and give daily once for one month. Bathing, working and grain feeding them during this period is very harmful.

[Ed. *Shorea Robusta* of the genus *Dipterocarpeae* (*Sans*—Sala; *Asvakarma*. *Eng*.—the Sal tree. *Hind*—Sakhu. *Ben*—Sal (the resin) Ral; Dhuna. *Bomb & Mah*—Sal. *Tel*.—Jalari-chettu. *Tam*.—Taloora. *Can*.—Bile-bovu, Bile-bhogimara. *Mal*.—Karimaruthu), is common in the Sub-Himalayan regions and the forests of Western Bengal. The bark contains tannic principles and yields on boiling with water, an extract similar to Catechu, which is an astringent. The

resin which exudes from incisions made in the bark is a mild astringent, aphrodisiac and stimulant: it unites with fixed oil to form *plasters* and *ointments*, applied to chilblains, ulcers etc. A *paste* of it mixed with brandy and white of an egg is a very useful and soothing application for the relief of lumbago and other rheumatic pains. A paste of it put over the top of the head is said to be a cure for elongated uvula. With sugar it is used in dysentery, bleeding piles etc. Also used for weak digestion, gonorrhoea and as an aphrodisiac. The resin is burnt as an incense in households during the worship of Gods among Hindus and in sick rooms for its fragrant smoke.

Terminalia Tomentosa or *T. Crenulate*; *T. Glabra*; *T. Alata* or *Pentaptera Tomentosa*. (*Sans*—Asana. *Hind*—Asan. *Ben*—Piasal. *Bomb & Mah*.—Ain. *Tam*.—Karuppomara. *Tel*.—Maddi. *Can*.—Karimatti; Bonapu; Aini. *Mal*.—Thambaon.) is met with in the Deccan, united Provinces, Nepal and Sikkim. It contains much calcareous matter, yielding an ash which is used by the chewers of betelnut. It yields a gum used as a cosmetic and incense. The astringent bark is used internally as *decoction* (1 to 10) in atonic diarrhoea in 2 ounce doses and externally for indolent ulcers. The bark of this is found to contain:—insoluble matter 64.0, extractive matter (non-tannin) 4.4, tannin 20.2, ash 6.7 P. C.

Acacia Concinna or *A. Rugata*. *N. O. Leguminosae* (*Sans*—Saptata. *Hind*—Kochi. *Duk*—Siki. *Ben*—Banritha. *Tel*—Cheekaya; Gogu. *Tam*.—Sheegakay. *Can*.—Sheegae. *Mal*.—Sheeyakayi. *Kon*.—Shikayi. *Guz & Mah*.—Reetah). *Habitat*. In the tropical jungles throughout India.

Parts used. Pods and leaves.

Constituents. Pods freed from seeds contain Saponin 11.2 per cent, Malic acid 12.75 per cent, Resin 1 per cent, Glucose 13.9 per cent, Gum and colouring matter 21.5 per cent. Crude fibre 22 and Ash 3.75 per cent.

Action. Externally detergent and astringent. Internally aperient, expectorant and emetic.

Preparations. Decoction, infusion, ointment and paste.

Uses.—Decoction of pods and leaves is useful aperient in bilious affections. The decoction of the pods (one in forty

parts of water) is used as hairwash, it is said to promote growth of hair and remove dandruff. It also prevents flatulence, as it acts as a mild laxative. The pods ground up and formed into an ointment make a good application in skin diseases.

NOTES ON THE DEVELOPMENT OF MEDICAL ART

BY

T. N. KULKARNI

Veterinary Assistant Surgeon, Nargund.

PART III

(Continued from page 210, Vol. IV, No. 3.)

ZOROSTRIANS

The ancient Parsees were well advanced in art and science. In 632-651, the Mohomadans and Arabs were making rapid progress. They conquered Persia and as usual they began to spread Mohomadanism by the sword. The Zorostrians had no alternative but to accept the Kuran or death by sword. Many left Persia. India spread its helping hand and they settled here as Parsees. The progress on all directions were much hindered and much of the written work was stolen, burnt or missed.

Thrita was the first person skilled in medicine. It was a practice that a person intending to practise the healing art, should make trial on the idolators and if proved unsuccessful three times, is incapable for ever to practise. Baizonycle was another physician and Sanskrit scholar. He visited India to learn medical drugs. He translated a few of the works.

The Parsee medical work entitled Husparum written by Zoroaster the founder of Parsee religion (600 B.C.) is lost now. The Parsees thought well that prevention was of greater importance than cure. They were more particular about zymotic diseases. Zorostrian method of disposing the dead by exposing the corpse on an elevated land to the vultures is next best to cremation.

ROME

Romans under Julius Cæsar conquered Alexandra (Greek) in B.C. 48. A Roman Lucullus who received the

knowledge of philosophy in Greece, opened a library which became a resort of learned men. Rome was without physician throughout the republic. In B. C. 219, a physician named Archagathus settled in Rome and practised medicine and surgery. Asclepiades was the next succesful practitioner in Rome. Themison was another well-known physician about the first century A.D. He is said to have been the first person to bring into public notice the use of leeches. He was the author of several works. Celsus was another eminent writer on medicine. His descriptions of all branches of medicine though short were accurate. Few of the ancient practitioners were Dioscorides, Galan, expert in Physiology and Anatomy. Alexander and Trallianus lived in the seventh century and were skilled in treating the diseases of women.

With the death of Paulus the schools of medicine began to decline.

ARABS

About the downfall of Roman empire 337 A.D., the Arabs began to show progress. Of all these sciences and arts the Arabs have done greatest service to the medical art. The practitioner had to undergo a course and get a certificate. They were the first to publish the authorised Pharmacopia. Their knowledge of Chemistry and Botany was advanced. Ibn Phara and Albironi distinguished themselves as Botanists. The first and most distinguished chemist was Geber who lived in the eighth century. Modern writers assert that he derived his knowledge of Chemistry from the works of the ancient Hindoos.

Rhazes or Al-rasi was a very distinguished physician who became Professor in the College of Bagdad in the tenth century. Averrdes was another physician and author of some works. He suffered too much in the tenth century. Al-beithar lived in the 13th century, travelled the greater part of Europe, Africa, Arabia and India. He wrote three books, first on medical plants, second on metals and minerals, and third on animals.

The introduction of Christianity did not at all contribute to the improvement of the healing art. The Monks and the Clergies chiefly engrossed the practice of physic and had recourse to prayers, holywater and other superstitious practices,

"The relics belonging to saints" says Pettigrew in his work on medical superstitions "have been esteemed of equal efficacy in removing diseases—the belt of St. Guthlac and the felt of St. Thomas of Lancaster were sovereign remedies for the headache, while the penknife and boots of Thomas Bucket and a piece of his shirt were found most admirably to aid parturition. Belief in the efficacy of the Royal touch in curing scrofula is another specimen of folly. Louis IV is said to have touched 1600 persons affected with scrofula in 1686.

The first school of medicine was founded at Salerno in Europe in the 13th century. Shortly other schools sprang up. Fredric granted permission to dissect a dead body. Mondani, a Professor, in the University got the advantage of it in 1350 and published the anatomical plates of human body. In 14th century Pope Sixtus IV, authorised the dissection of human subjects in all Universities. This circumstance diffused a general taste for the study of Anatomy. Roger Bacon was a famous physician in 13th century. He was well-versed in Chemistry, Medicine, Mechanics, Optics and Astronomy. Franciscan Monk accused him of magic and excommunicated by the Pope and imprisoned for ten years. Arnoldus Devillanova of Bariclona accidentally discovered many chemical processes and compounds. He was the first to find out spirits of wine to be a solvent for active vegetable principles. This discovery lead to the introduction of tinctures in general use. Thomas Linacre was a celebrated physician and a native of Canterbury. He was a physician to Henry VII. He took a conspicuous part in founding the Royal College of physicians of London. Dr. George Ernest became M. D. in 1683. He applied himself to the study of Chemistry and began to entertain doubts about the correctness of the prevailing theories. Fredrick was another M. D. who had striking dissimilarity in medical opinion from Dr. George. Harman was another practitioner who based his system upon the combined opinions of others. Van Swieten wrote several books on varied subjects. He was a distinguished physiologist. He is called "the Father of Physiology." Jenner was another physician who has acquired fame by his discovery of vaccination in 1796. Since 1800 the progress of medical sciences is very fast. The progress is in the same line, but has taken different direction.

20th century is a century of injections. Now let us turn to different modes of applying medicines.

The term *Allopathy* comes from *Allois-pathos* meaning dissimilar affection. This is divided into (1) Heteropathy and (2) Antipathy.

(1) Heteropathic or revulsive method is that in which one disease is substituted for another, for example, counter irritants to relieve congestion, of the internal membrane.

(2) Antipathy is that in which a medicine produces symptoms directly antagonistic to those of the disease in question. This is rather palliative and not curative. Thus cathartics are given to remove constipation but when their operation is over the systems return again and again to be combated at the cost of the patient. The administration of anæsthetics for operation is a good instance of occasional success of antipathy.

PART IV

Homœopathy

The founder of Homœopathy is Hahnemann. The term Homœopathy is derived from *homois-pathos* meaning similar affection viz:—Medicines which tend to produce particular symptoms in health will also cure a disease presenting those symptoms when given in small doses. For example, cinchona bark when taken largely in health produces ague.

Hahnemann was born about 1755. He excelled as a Greek, Latin, French and English scholar. About 1770, he went to Germany. He pursued his medical studies there but for his livelihood he translated foreign works. He went to Leipsic, Vienna and lastly to Erlangen where he took the degree of Doctor of Medicine in 1779. Shortly he was dissatisfied with the ordinary method of treating and began to discover another method. When translating the *Materia Medica* of Collen from English into German he was perplexed with the efforts made by the author to explain the action of cinchona bark in curing ague. He resolved to try it upon himself. He took the drug for several days when symptoms of ague manifested themselves. He tried it again on himself and on his friends with the uniform result. He thought that this is the common property to medical remedies of all kinds.

He made a series of experiments on healthy persons with other drugs such as sulphur, belladonna, mercury etc., in order to ascertain their effects. This being done he administered them to the sick. After six years he made known the result of his researches viz:—Diseases are to be cured by the use of those medicines which when given in large doses to healthy persons produce symptoms similar to those of the diseases themselves. To this law of therapeutics Hahnemann gave the name of Homœopathy. 'Refute' says Hahnemann 'these truths if you can, by pointing out a still more efficacious, sure, and agreeable mode of treatment than mine and do not combat them with mere words of which we had already too many. But should experience show that mine is the best, then make use of it for the benefit of suffering humanity and give God the glory'.

His therapeutic law is '*similia similibus curantur*'. There is black sheep in every flock. His discoveries were considered so extraordinary that he was persecuted and was driven from place to place from 1792 to 1810, when he was settled with Duke of Ferdinand. From 1810 to 1830, he published several volumes:—'The Organ of Rational Medicine' 'Pure Materia Medica' and 'Chronic Diseases'. He died in 1830. Now there are thousands of educated men practising this method in every country.

Hydropathy

• Hydropathy or Healing art by means of water is invented by Lous Kuhne a German in 1860 and he regularly opened an establishment on October 10th 1883. He gives a new name to his theory namely:—'New Science of Healing without drugs and without operation.'

Of Allopathy he says that on account of too much dosing of drugs the whole system is poisoned and therefore thoroughly healthy persons are now hardly to be found but on the contrary chronic diseases are multiplying with fearful rapidity. To the Surgeons who boast of surgery he says that this new art of healing will render surgery almost wholly superfluous.

Of Homœopathy he says that it is a brave ally in the crusade against the fatal faith in medicine. He further

observes that it does not formulate fixed diet and the minute doses of medicine are not altogether harmless.

His guiding principles are (1) to start from observation (2) to draw inferences from them and (3) to prove the correctness of the inferences by experiments.

He defines disease as the presence of foreign matter in the system.

There are two ways through which matter can be introduced into the system—one by nose to lungs and another by mouth into the stomach. Lung diet is not so dangerous as stomach diet, as the former admits of no luxurious outlay. It is therefore the digestive system which is forced by the unnatural demands put upon them. All excess in food acts as poison for the body. The system tries to throw away this poison called foreign matter. The lungs expel it directly whereas the stomach takes a round about way. Once the foreign matter is accumulated it increases rapidly and is deposited in the neighbourhood of the secretory organs. Now the disease begins. These deposits can be seen more distinctly in the upper part of the body especially in the neck. This foreign matter consists of insoluble and decomposable substances. When disintegration and decomposition takes place fermentation occurs and warmth is always generated. The degree of warmth—heat or temperature is regulated by degree of fermentation. As fermentation develops the bacilli multiply in the system. He therefore says that it is idle to speak of infection through bacilli without the presence of foreign matter. His inference, therefore, is 'There is only one cause of disease and there is only one disease which shows itself under different forms.' Infection is not possible in persons whose bodies are free from foreign matter. His observation on Allopathy is that each new medicine enervates the vital powers and in course of time the system no longer reacts and therefore stronger remedies are required until the disease is declared incurable and finally the destruction of life is the result.

Remedial agents of Mr. Khune

1. Steam bath. 2. Sun-bath. 3. Friction Hir-bath.
4. Friction Sitz-bath. 5. Mud-bath.

Diet

Writing on the subject of diet Mr. Khune says:—Man disregards altogether as a rule the facts laid down by nature. In nature we find everywhere a certain period of fasting. We see how snakes fast often, deer and hares get food very sparingly for a long period in a year and yet overcome all fatigue of all seasons. The place where we consume our food has a great bearing to its digestibility. That which we eat in the open air is always more easily digested than that consumed in the house because in chewing the food is mixed with fresh air which acts upon the digestibility of food.

Those foods which taste good in their natural state and tempt us to eat are always easy of digestion and supply us with the greatest vitality. Foods which we change by cooking, spicing, pickling etc. are far inferior to foods in their natural condition. Continued use of fluid nutriment tends to dilatation of the stomach and disturbs the digestion.

Those foods which in their natural form create disgust and nausea are always injurious to health however good they may taste when in the cooked condition. Flesh, meat beef etc., all come under this class of food.

I have seen many persons who have undergone this method. In about 50% cases complete success and rest failed because for discontinuing the process for some reason. The effect of half tried process was so much that there was complete change in their health. During this treatment diet should be restricted to only raw fruits and milk.

Water is used as a medical agent in all its stages i.e. Ice, Water and Vapour. Ice is used in heatstroke and high fever. Water as hot and cold baths. Turkish and medicated baths come under this heading.

Translation

ASVAVAIIDYAKAM

BY

SRI MAHA SAMANTA JAYADATTA

Translated into English by Nripendra Nath Majumdar.

(Bengal Veterinary Service.)

Continued from Page 241, Vol. IV No. 3.

CHAPTER VII

VAHANBIDHANE—RULES FOR BREAKING OF HORSES

Vipraditadvahanvivaranam,¹—On classes of horses, Brahmin &c. and their breaking.

Sl. 1. Now I am going to tell you the substance of all the rules as have been fixed by Brahma², to be observed when training or—breaking horses.

Sl. 2. Specially shall I describe all about the merits and demerits of trainers of horses.

Sl. 3. One should ascertain the caste (of a horse) by its nature or quality and then apply (one of) the three, encouraging words, conciliatory or caressing words or the whip.

Sl. 4. Horses that are of a mild nature and nervous temperament and are somewhat greedy are called Brahmins. Those that are valiant and (when infuriated) retain their passion for a long time, are known as Kshatriyas.

Sl. 5. Those with harsh coat, dirty appearance and wicked and vicious in nature are known as Vaisya. Those that are ugly, devoid of any symmetry and of a furious nature are known as Sudra.

Sl. 6. (A trainer should) guide his horses by using encouraging words to Brahmins, conciliatory or caressing words to Kshatriyas, by the sound³ or swish of the whip, or the whip itself to Vaisyas and by the application of the whip to Sudras.

1. Vipra—Brahmin; the Hindus were divided into four castes or classes. The horses too are similarly divided into four castes or classes.

2. Brahma—the Creator; a god of the Hindu triad.

3. Sounds—include the sound of the whip as well as sounds uttered by the mouth by horseman.

Sl. 7. Ride or drive a Brahmin (horse) at dawn, a Kshatriya at about three hours after sunrise, a Vaisya at the approach of evening and a Sudra in the night.

Satvaśaktitadvāhanvivaraṇam.—On nature and strength of horses and their training

Sl. 8. The nature of a horse had been described to be of three kinds:—Good, Medium and Indifferent. The intelligent should train the Good (horses) by using coaxing words, the Medium by encouraging words and the Indifferent, by the whip or its sound (i.e., the swishing sound produced by the whip.)

Sl. 9. The natural appearance or lustre of a Good horse is like that of oil when poured over milk.

Sl. 10 & 11. Strength is of two kinds,—one arising from bulk and the other from thinness. The former (should be trained) by reducing their bulk while the latter by adding to it. Break a horse after ascertaining its nature.

*Rangabhūmivivaraṇam*².—Description of training Ring.

Sl. 11 & 12. Impervious, hard, rocky, swampy, or grounds with weeds and coarse wild grasses should be avoided in selecting a training theatre.

Sl. 12. Make the training theatre which should be flat, even, spacious, covered with sand or with a sandy soil and pleasing to the eye, in a place which should be rather solitary and away from or at the end of a town or city.

1. Horses that appear thin but possess great strength are said to be of the class having "strength without bulk" and those with a stout frame are said to have "strength arising from bulk."

2. Megasthenes gives a very quaint but corroborative description of a training ring which were then in use when he visited India. It is as follows:—
"When it is said that an Indian by springing forward in front of a horse can check his speed and hold him back, this is not true of all Indians, but only of such as have been trained from boyhood to manage horses; for it is a practice with them to control their horses with bit and bridle, and to make them move at a measured pace and in a straight course. They neither, however, gall their tongue by the use of spiked muzzles, nor torture the roof of their mouth. The professional trainers break them in by forcing them to gallop round and round in a ring, specially when they see them refractory. Such as undertake this work require to have a strong hand as well as a thorough knowledge of horses. The greatest proficients test their skill by driving a chariot round and round in a ring; and in truth it would be no trifling feat to control with ease a team of four high-mettled steeds when whirling round in a circle." Megasthenes *Indika*. *Fragm.* xxxv. (McCrindle.)

Dosa Guna Tarana Vivaraṇam.—Merits and demerits (of a rider) and of striking a horse.

Sl. 13. (One who is) corpulent, (who has) an irritable temper, (who is) wanting in common sense, (whose) mind is easily perturbed, whose seat (on the saddle) is not firm, or one who strikes (the horse) on improper places, will never be able to train a horse.

Sl. 14. One who moves on his seat, or holds his arms high and strikes in that position, he should not ride a horse.

Sl. 15. But one with the following six qualities, viz., whose seat is firm, who is possessed of the knowledge of horses, whose hold on the reins is firm, who is active, not easily perturbed, cool and steady, will make a good rider or trainer.

Sl. 16. A horse will never obey him who cannot anticipate its intentions, however he may strike it with the whip.

Sl. 17. Strike a horse for the following six defects:—When it neighs (unnecessarily or seeing a mare), or slips, or is frightened, or when it goes astray, or when it is enraged, or bewildered.

Sl. 18. Strike on the head when a horse neighs, on the knees when it slips, on the breast when it is enraged, on the belly or abdomen when it is bewildered.

Sl. 19. Strike on the hind quarters when a horse is frightened, on the face when it goes astray. Strike on these parts only according to the nature of the offence.

Sl. 20. A horse when struck on improper places will never be trained properly and will not be cured of the vices during its lifetime.

Sl. 21. Those (horses) who have never been struck, strike once only on the root of the tail when they are enraged and on both the knees when they are bewildered.

Sl. 22. A horse, when struck on improper places acquires many vices which last as long as it lives.

Sl. 23. A horse, even with all possible capabilities, becomes useless if not worked properly while if worked too hard it becomes weak and diseased.

Sl. 24. Now shall I describe the five (kinds of) gaits¹ or paces as told by the sages. The first is known as "Vikrama" and the second "Pulaka."

Sl. 25. The third is called "Pūrnakanthi," the fourth is "Tvarita" and the fifth is "Dhara"; that which is the sixth is called "Niralamba" and has only been heard of but has never been seen.

Sl. 26. Vikramā² is that in which a horse lifts all its four legs together as in jumping; this sort of gait when accompanied with the face raised becomes Pūrnakanthi.

Sl. 27. The gait a horse adopts when going at its free will is Tvarita and the fifth is adopted when urged by whipping. That which is the sixth (Niralamba)³ is only to be found in heaven.

Sl. 28.⁴ As many pores as there are on the skin of a horse and its rider, so many years a man will live in heaven when killed on a horse. (i.e., while fighting).

Sl. 29. A man killed on a mare will not inhabit the same heaven as one killed on a horse.

Sl. 30, 31 & 32. Now shall I describe the reins⁵ as stated by the sages:—Pūspadanti, Gokarni, Tulolula, Tulodhrta,

1. The description of the gaits as given by Jayadatta is incomplete inasmuch as he does not describe the second kind "Pulaka" at all, while the others are described in a way from which little can be made out. Sukracharya in his Nitisara—Book IV—Chap. VII, Sl. 144-149 gives a better description. The following is a somewhat free translation:—Sl. 144. The gaits are of six kinds:—Dhara, Askandita, Rectia, Pluta, Dhauritaka, and Valgita and they are differentiated as follows. Sl. 145. A very very fast gait urged by severe spurring and in which the horse appears to run wildly like a mad animal, is called Dhara. (This is possibly Full Gallop). Sl. 146. Those who know the gaits of horses have described that fast gait in which a horse contracts the fore feet and moves in bounds, as Askandita. (This is Gallop. 5th gait—Hemachandra.) Sl. 147. That in which the motion is continuous, but the bounds are smaller is Rectia (Canter) and that gait like a deer in which the leaping motion is very slight is called Pluta (Amble). Sl. 148. That gait in which the legs are not very much contracted but displays good action and is fast, is known as Dhauritaka (Trot and is best suited for driving in carriages). Sl. 149. That in which a horse moves half the body at a time with a swinging gait, with contracted legs and with neck raised like a peacock, is called Valgitam (Fast walk). (This is possibly the fancy gait so much indulged in by up-country dealers.)

These are the accepted terms in the dictionaries.

2. Vikrama is Gallop; Pulaka is Trot; Pūrnakanthi is Canter; Tvarita is Fast walk; Dhara is Amble.

3. Niralamba literally means, without having any ground to stand upon.

4. Sl. 28 & 29 seem to be interpolations as they do not appear in some texts.

5. The names of the different kinds of reins are given without any description which renders it unintelligible.

Nagpiṭi, Pūspadhari, Durmuṣṭi, Rajastani, Dvihadhi, Ekahasti, Subhagā and Sobhanā. These are the twelve kinds of reins described by the sages.

Sl. 32, 33 & 34. On mounting a horse a good rider should fix his mind on the point between the ears of a horse and should first make it walk slowly and then urge it to Pulaka. (Trot) A good rider should not sit on his seat in a crooked fashion, nor with his face turned upwards, nor in a curved manner like a humpback, nor very prone with his face downwards and not with a rigid, motionless body. The seat as well as the thighs and sides should be firm with the lower part of the spine straight and raised.

Sl. 35. The seat on a Deccan horse must always be firm. The above qualities make a good rider, all others are dangerous.

Sl. 36. The well versed in the Sastras have indicated that a horse should not be exercised for training during the three seasons¹—summer, rainy and autumn. From the dewy season, i. e., from the middle of October, training should be commenced.

Sl. 37 & 38. The training of a (fresh) horse is to be commenced on such auspicious days as the first, fifth or thirteenth day of the moon during the light half of a month, on Sundays or Mondays, on the particular auspicious astrological conjunction known as Dhṛti and Siddhi,² on the lunar mansions of Mūlā,³ Rohini, Hastā, Pūṣya, and the three Uttarās.

Sl. 39 & 40. After placing the image of the god Raivanta⁴ in the training ring⁵ and after bathing in the morning and

1. The Hindus divide their year into six seasons, each comprising of two months. The year commences with summer which starts sometime during middle of April; the rainy season from middle of June; the autumn from middle of August; the dewy season from middle of October; the winter from middle of December and the spring from the middle February.

2. The astrological conjunction of planets are called Yoga. When the first, sixth and eleventh day of the moon falls on a Friday it is known as Siddhi-yoga.

3. Nakṣatras are lunar mansions. They are 27 in number of which Mūla is the nineteenth mansion, Rohini is the 4th, Hastā the 13th, Pūṣya the 8th and the three Uttarās, namely Uttarāṣṭrī, Uttarāṣā and Uttarābhadrā are the 12th, 21st and 26th asterisms respectively.

4. Raivanta is the offspring of the Sun and is said to be the guardian deity of horses.

5. Training Ring—See notes under Sl. 11 & 12.

being clad in clean or red clothes and wearing garlands of red flowers and then offering worship to the said god Raivanta with flowers, incense, light, sweets made of rice, milk and sugar and the "five sounds" i. e., cow, goat, sheep, elephant and horse, (training of a horse should be commenced).

Sl. 41. (This consists of the "Mantra" or incantation being a hymn in praise and a prayer to the deity Raivanta.) "Om namo Raivantaya asvahrdayaya hrim klim om namo atisvetaya soumyarupaya imam mama asvam sadhaya sadhaya bandhaya bandhaya vasyam kuru kuru mahaviryaya Raivantaya Namah."

Sl. 42. The wise should cant the above twenty-one times in the right ear of the horse and then saddle or harness it.

Sl. 43 & 44. Then (the horse) should be ridden for a distance of a "kros" (about two miles) and the different gaits, Vikramā, Pulaka, Purnakanṭhi and Tvarita, should be taught gradually. Holding the reins by both the hands, right and left, should be practised and the horse should also be gradually taught to take the bit.

Sl. 45. The wise should make the bit, which should be neither too thick nor too thin, neither immovable nor rough, of a length of seven fingers.³

(To be continued).

1. Panchasabdah literally means-five Sounds, but for purposes of offering in worship, they denote the five animals-cow, goat, sheep elephant and horse.

2. The 'mantra' when freely translated purports as follows:—"Salutation to thee O Raivanta of the very white and pleasing appearance. Do thou subdue and control this my horse. Salutation to Raivanta of great prowess." The terms Om, Hrim and Klim are mystic syllables and cannot be properly translated. Om is the result of combination of three letters A, U and M representing Visnu, Mahesvara and Brahma respectively of the Hindu triad. Hrim—Similarly the H in this word stands for Nakulisa, a Bhairaba of Mahadeva, R represents fire, I the left eye of Mahadeva and the M for the crescent on the forehead of Mahadeva.

3. Fingers i. e., fingers breadth.

Clinical Articles

FURTHER INVESTIGATIONS ON STREPTOTRICHOSIS OR ACTINOMYCOSIS BOVIS IN INDIA

BY
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I have now come to the end of my findings on Actinomycosis or Streptotrichosis, (Raymond and Holmes) Dum Dum Sore or Calcutta Sore.

Actinomycosis (wooden tongue, lumpy jaw) is the actinomycosis, commonly found in cattle. It is the same as the 'Streptotrichosis' of (Raymond and Holmes) which is the Actinomycosis of the lymphatic vessels and glands, formerly known as 'Wens' or 'Clyers,' 'Dum Dum Sore' or 'Calcutta Sore' is the actinomycosis of the skin.

The causal organism of the disease is a vegetable parasite of the Streptothrix variety, commonly known as 'Ray-fungus' owing to its star-like processes.

The vegetating 'Ray fungus' when it finds its way through a penetrating cora, like 'Barley' or grasses like 'Spear-grass' into the sub-mucosa of the tongue or gums, appears as 'Wooden Tongue' or 'Lumpy jaw' and in the horse as 'Scirrhus cord' when castration operation has been done too low and the freshly-devised Spermatoc cord gets contaminated with grass having a growing 'Streptothrix actinomyces' in the straw or haybed etc. The sub-maxillary lymphatic gland of the horse is another seat of this disease. When this happens, it may be confused in young horses with 'Strangles' and with older horses with 'Glanders.'

It is a common disease in most parts of Europe and in my recent visit in that great country, I found cases in London and Edinburgh, with my Professor of Bacteriology and I had the opportunity of doing sections and cultures and stains of actinomycotic growths very extensively. Since 1901 A. D. there had been not more than 3 cases in the Bengal Veterinary College.

I have a case of 'Lumpy jaw' in my Bovine Clinique now, a well bred breeding-bull, the property of a multi-millionaire Marwari gentleman, Hukum Chand Sarup Chand of Burra Bazar, Calcutta,

This case was at first suspected for necrosis of the jaw or a caried molar tooth, but on thorough examination no caried molar could be detected.

The cold jaw-tumour had been treated with Ung Hydrag. Biniodidii (1-12) with the hope of absorption or suppuration. After 3 applications of this antiseptic irritant, the abscess suppurated with many points and the pus was examined but no sulphur-yellow granules could be found in the pus. 'Staphylo' and 'Strepto' grew abundantly upon 'plates' and 'Tubes cultures' done at the 'Bengal Health Association Laboratory,' by my enthusiastic friend Dr. Nerud Bhattacharya, Dean of this famous Laboratory at my special request.

After some time, the specific streptothrix organisms could be distinguished.

The progress of the disease could be checked by the repeated applications of Ung. Hydrag. Biniodidii and administration of Pot. Iodide 1 dr Spt Ammon. aromat 1 oz with aqua 1 pint once daily. The case is on the fair road towards recovery.

Conclusion :—

(a) 'The Dum Dum Sore'

or

'The Calcutta Sore'

is the Actinomyces of the skin.

(b) 'The Streptotrichosis' of Raymond and Holmes is the Actinomyces of the Lymphatic vessels and glands.

(c) Actinomyces of the jaw and tongue (Lumpy jaw and Wooden Tongue) is the Actinomyces proper in cattle.

All these cases or forms are amenable to treatment, Pot. Iodide or Pulv. Biniodide of mercury on the accessible parts of the body, surgical interference, in bad cases, and internal administration of Pot. Iodide with Spt. aromat. and water.

ECHINOCOCCOSIS HEPATIS IN A BULLOCK

BY

M. V. PILLAI, G. B. V. C.

Penang

The subject was a white Indian bullock in an excellent condition belonging to the District Hospital, Penang.

The animal was first admitted into the Infirmary for severe constipation on 2-5-28. As usual a purgative containing Mag. Sulph, Treacle and Ginger was administered, which was then followed by a course of nerve tonics. In two or three days the animal was alright and discharged from the Infirmary. Two months later i. e. on 8-7-28, the same animal was again brought for treatment with a letter from the District Medical Officer. This time the history, as written by the D.M.O., was that the animal was getting thinner and thinner day by day.

The animal was kept under observation and the symptoms presented during this period were so peculiar and puzzling that nothing could be definitely diagnosed. Temperature was never beyond 102. 5° F. Extreme Constipation and disturbance in digestion were well marked during the period. The dung was so round, dry and hard that the pellets could be broken with difficulty. The appetite was fairly good in the beginning, but towards the latter part, the animal completely refused food and water. Rumination suspended. The animal could scarcely move on account of progressive emaciation. Pressure and percussion on the chest produced a dull sound, but did not cause much pain. An intermittent dry and painful cough developed afterwards and this led me eventually to suspect it to be some trouble connected with the lungs.

Treatment consisted at first in giving a purgative as before. The action of the purgative was not satisfactory. Stimulants were tried to keep up the strength. Hand feeding was also adopted. The nature of the case was then reported to the D. M. O. who officially advised us to have the animal destroyed or to give it to a butcher. We preferred the latter and the animal was sent to the Abattoirs for slaughter.

The post-mortem symptoms seen at the Abattoirs were as below:—

The liver contained a number of cysts of different sizes and considerably modified in volume and shape. The weight of the liver was 30 lbs. The tissue of the liver was discoloured and the wall of the cysts thickened. The contents of some cysts were fluid and some calcareous. The whole of the lungs were covered with small cysts containing fluid. Small caseous nodules, which look like caseous tubercles were also present in the lungs. The weight was not much altered. The surface was very uneven. The parenchyma, near the cysts, looked compressed and completely devoid of air. The right kidney was also affected with small cysts.

The severe constipation that the animal had was the result of the defective function of the liver.

GASTRIC TYMPANY IN A HORSE

BY

M. U. GOPAL, L. V. P.

Veterinary Surgeon, Dhrangadra (Kathiawar).

Subject:—A chestnut C. B. gelding in excellent condition, about 16 years old, belonging to H. H. The Maharaja of Dhrangadra.

History:—The past history of the case was almost negative, because the attendant could not tell anything except that there was some change in the corn that the horse was supplied with and that the quantity of the corn ration was also increased even though no work was taken out of the animal.

Symptoms:—The animal was brought to the hospital at 8 A. M. on the 14th September, 1928, in an extremely painful condition. The abdominal pain was so much marked that the horse could not move without great difficulty. While moving about the animal tried to lower his hind quarters and sit on haunches. The breathing was laboured and the expression of the face was anxious. The animal was constantly looking towards the flank and was pawing the ground with the fore-feet. Also the animal was making attempts to lie down but no sooner he was on the ground than he at once got up after rolling his body for a moment. The temperature of the case at 8 A. M. was 100.2°F. and mucous membranes were

slightly congested. On rectal exploration, the rectum was found to be empty and the wall of the bowel was sticking to the arm.

Treatment:—The animal was at once put into a loose box with sufficient amount of bedding and was given the following:—

- (1) R_x
- | | |
|---------------|---------|
| Ol. Terebinth | 2 oz. |
| Ol. Lini | 1 pint. |

M. Ft. haust, given at once.

(2) Soap water enema

At 10 A. M. the animal began to show very slight improvement, symptoms of abdominal pain were somewhat diminished and he kept standing for a considerable time without showing any symptoms, but still he passed no dung or urine.

At 10 A. M. he was given soap water enema followed by walking exercise.

At 11 A. M. the animal again began to show the same sort of colicky pain as before. This time I prescribed the electuary containing calomel 1 dr. and Ext. Belladonna 1 dr. but this did not bring any relief to the animal. Symptoms of colicky pain began to aggravate and the horse began to throw himself violently on the ground, rolling and getting up. Soon after the animal got rigors and shivering fits with profuse perspiration. Mucous membranes were highly congested and temperature at 12 A. M. was 103° F. Also the animal was making attempts to vomit but nothing came out through the nostrils. At 12 A. M. the animal was given per rectum 3 oz. of chloral hydrate. The same sort of symptoms continued and the horse kept standing from 11 A. M. to 1 P. M. pawing the ground, shivering violently, sweating profusely and showing anxious expression of the countenance. Temperature at 1 P. M. was 105.8° F. After a very short time the animal fell on the ground, respirations became deep and blowing, surface of the body began to become cold, pulse was running down and internal temperature began to decline till it was subnormal. The animal breathed his last at 2-30 P. M.

The definite diagnosis of gastric tympany was made only on post-mortem examination which was carried out at 4 P. M.

On opening the abdominal wall and giving incision into the parietal layer of the the peritonium gas collected into the peritoneal cavity after rupture of the stomach began to come out with great force. The rupture of the stomach had taken place in the region of the greater curvature near the pyloric end and the ingesta were collected into the peritoneal cavity setting up peritonitis.

Differential diagnosis:—The condition was likely to be confused with impaction of the stomach but the quantity of ingesta coming out of the ruptured stomach was too little to confirm and the evolving of gas in a huge quantity was in favour of the gastric tympany.

A CASE OF STIFF-SICKNESS

BY

M. U. GOPAL, L. V. P.,

Veterinary Surgeon, Dhrangadra (Kathiawar).

Subject:—Red cow belonging to Bhai Shanker Garden, Superintendent, Dhrangadra.

History:—The cow, suddenly got ill on the 4th July 1928, stopped feeding, milk yield was diminished and various parts of the body specially the limbs and the neck became stiff giving rise to difficulty in moving about.

I was called upon to attend to the case on the 5th July 1928, at 8 A. M. On my arrival at that place I found the cow standing in a characteristic manner. She was quite dull and depressed, her head was protruded and muscles of the neck were found altogether stiff causing extension of the neck in the same manner as in dyspnoea, there was also marked stiffness in the fore-limbs. Moreover there was an cedematous swelling in the inter-maxillary space extending up to the region of the throat but there was neither any appreciable difficulty in breathing nor any abnormality in the mouth. Rumination was suspended. Temperature of the case was 104.2° F., pulse frequent and bounding, mucous membranes were injected, respirations about 25 per minute. Faeces were hard and mucus coated.

I being quite a fresh graduate at that time with a very little practical experience, it was undoubtedly difficult for me

to come to a definite conclusion on the spot from the above mentioned symptoms. What I, therefore, did was to administer a dose of Saline and then I intended to continue my observation. Again I went to see the case the same day at 6 P. M., when I found the cow standing in the same manner as before and the stiffness became so much marked that the animal was unable to move even a few steps. At this time I did not advise anything except massaging the neck and the limbs.

Next day morning when I went to have a look at the case, I found her moving about slowly in the stall and I was informed by the owner that she also showed some inclination towards food, and she was reported to pick up some fodder from her manger. The temperature of the cow at that time was 103.4°. Faeces were soft. This sudden improvement in stiffness and other general symptoms made me suspect the case to be that of Dengue or stiff-sickness. For this reason, I did not prescribe anything and simply advised the owner to supply the cow with some soft and laxative diet like linseed gruel or bran mash. That day evening I noted that the cow was making rapid improvement. On the 7th July, the animal was found to have been completely recovered, stiffness of the neck and the limbs totally disappeared and swelling in the inter-maxillary space was no longer seen. The temperature of the cow became quite normal and now she was eating, ruminating and passing the dung quite normally.

Thus the symptoms of the disease lasted for three days and the diagnosis of the three-day sickness or stiff-sickness was confirmed.

I. A CASE OF MENINGITIS IN A DOG.

BY

R. SWAMINATHAN, B.A., G.M.V.C.

*Veterinary Assistant Surgeon, Veterinary Hospital,
Ootacamund, Madras.*

A fox-hound dog, belonging to the Ootacamund Hunt, aged about 4 years, and regularly hunted during the season, was noticed to be off colour on 27-8-26. It was immediately isolated and sent to the hospital on 28-8-26. On admission, the following symptoms were noticed:—A stupid vacant look, a certain amount of incoordination, temp: 103.4° F. and

completely off feed. No previous history was available. Without venturing a definite diagnosis, the dog was kept under observation and given a dose of opening medicine. The next day the dog was decidedly worse. It was walking with a swaying movement of the hind limbs, the jaw was dropped with the tongue hanging out and its temperature was 104°F. It lapped milk and water from a plate but was unable to swallow anything. The case was suspected to be one of Dumb Rabies and no treatment was adopted. The symptoms continued the same and the dog on the 30th morning, i.e., on the 4th day from the commencement of illness.

The carcase was taken to the Pasteur Institute, Coonoor, for examination of the brain, and the following is from the report of the Director of the Institute:—

"On removing the skull, we found a localised patch of inflammation of the membranes of the brain in the left parietal region, with a considerable amount of pus between the membranes and the brain. This condition, technically known as Purulent Meningitis, could not be due to Rabies, but might produce symptoms closely resembling Rabies.....The examination of the brain for Rabies "bodies" was negative..... An animal inoculated with a piece of the brain of the dog, remained well even after three months".

Remarks:—The necessity for examination of the brain in all suspected cases of Dumb Rabies becomes obvious and it cannot be too strongly insisted upon.

A CASE OF RABIES IN A CALF.

BY

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A country bred cow-calf, aged 6 months was brought to the hospital on 2-12-24 with the following symptoms:—

Off feed and rumination, abdomen tucked up, a frightened expression, crying out every few minutes, lying down

with a thumb on the approach of any person, remaining comatose in that posture for a time and then getting up hurriedly with a start, champing of the jaws and a slight dribbling of saliva, pulse very hurried, temperature 102.4 F. bowels costive and urine scanty.

The animal had been ill only for a day and the first thing that drew the attention of the owner was the frequent crying of the animal for no apparent reason. As I had experienced such cases before, I diagnosed this as one of Rabies. Enquiring into the previous history of the animal, I was told that a Rabid dog which was roaming about the place nearly a month previous, had bitten this calf-site not definitely known-but no notice was taken of it owing to the ignorance of the owner. This only confirmed my diagnosis and, as treatment was out of question, the animal was left in a closed yard. The symptoms remained practically the same and the animal died on 4-12-24.

The brain was removed and sent to the Director of the Pasteur Institute, Coonoor, who reported that the result of the examination was positive for Rabies.

EXTRA-OCULAR FILARIASIS IN DOGS

BY

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The occurrence of Extra-Ocular Filariasis in Dogs is a very rare one, and, to my knowledge, no case has been recorded about its incidence in Southern India. The following cases are therefore worth recording:—

CASE NO. I.

A cross-bred Spaniel dog, aged about 18 months, belonging to a Conservator of Forests, was brought to the hospital on 28-1-25, for treatment of ulcer of the cornea of the right eye. The animal was placed on the table with a view to close examination, when a number of filarial worms were noticed freely moving about under the Membrana Nictitans. Evidently these were the causal agents of the

characterised by paresis, principally of the locomotor system. The animal lies down seemingly paralysed without other indication of acute sickness.

2. The disease though sudden in appearance, is subacute as evident from the duration of the disease.

3. The disease appears to be limited to animals running on rank and swampy pasture and to regions subjected to tides—possibly due to dead and putrifying animal matter being usually deposited by the tide.

4. Post mortem changes are not characteristic. No microscopic changes except slight cachexia and atrophy of fatty tissue. Meat had no undesirable taste or effect.

Are these atypical cases of botulism?

Notanda

(R.S.N.)

1. Rinderpest in Malaya exists in the form of two strains—one virulent to buffaloes and wild pig; and, one virulent to buffaloes and oxen.

(R. MacGregor, M. R. C. V. S.)

2. The adrenal cortex is an important part of the immunity mechanism of the body. It is active in increasing body resistance to bacterial products and to chemical toxins as well.

(Jl. of Organotherapy.)

3. The virus of rabies may occur in the saliva from 6 to 8 days before symptoms are manifested.

(Vety. Medicine.)

4. Johnes' bacillus approaches almost perfect parasitism. That is, it produces a chronic malady but permits its host to survive for many years and the bacillus itself is difficult to adopt to an artificial medium.

(A. T. Kinsley.)

5. Eye lotions:—

- (1) In persistent lachrymation—Formalin 4 drams; Tr. Opii. 1½ drams; and, Aqua 1 pint. Use once daily while lachrymation persists.

- (2) Should ulceration occur, the solution used should be 2 per cent solution of hyposulphite of Soda, to which Tr. Opium has been added in the proportion of 10 minims per ounce.

- (3) To clear up opacities, a mixture containing equal parts of 1 per cent atropine sulphate and 4 per cent alum is used.

(Canhan. A. S.)

6. Protein therapy in a simple form gives relief in persistent diarrhoea in cows. A foreign protein in the form of egg albumen (or a single dose of one or two ounces of normal horse serum) injected subcutaneously usually checks diarrhoea. The raw white of a few eggs can be easily drawn into a syringe and injected in one dose.

(E. McSwinnney, M.R.C.V.S.)

[One of the Veterinary surgeons in Madras C.V.D. has tried this method in a cow with success. Ed.].

7. Sporotrichosis*:

Sporotrichosis is a chronic disease of men and equines frequently confused with epizootic lymphangitis and cutaneous glanders. The causative agent is a fungus cylindrical in shape, segmented, more or less branching thread-like growth which carries a club shaped enlargement on one end and vacuoles in the inside together with gram positive spore-like granules. The examination may be facilitated by clearing the pus with 4 per cent NaOH or by staining with any of the basic stains such as methylene blue, gentian violet or fuchsin.

Organism best grows in 4 per cent glucose agar at room temperature, growth appearing from 4 to 6 days, as minute gray flecks which are soon surrounded by a delicate fringe.

Symptoms:—Usually sporadic in occurrence. Manifested by the development of, first dense and later suppurating nodules. Mostly confined to hind legs (90 per cent right hind). Nodules are first noted as thickened areas on the skin and do not cause any discomfort to the animal. They

* (By Capt. F. C. Sager of U. S. Army. Extracted from Vety. Record.)

gradually soften in the centre and later rupture, exuding a small quantity of creamy pus. The margin of the ulcer although somewhat elevated does not appear to be appreciably thickened.

Treatment:—Potassium Iodide in 2 dram doses twice daily in the grain ration.

8. *Dr. M. B. Soparkar on Tuberculosis among domestic animals in India*:—I have found tuberculosis in 14 to 16 per cent of cattle examined at Ferozepur and Lahore in Punjab. Two years ago I found three cases of tuberculosis among the cattle at Bandra. 4 per cent of the pigs slaughtered in the Arthur Road pig slaughter-house were of tuberculosis, and further investigation showed that most of them were infected with human tubercle bacilli. I have also found in the course of my investigation in the Punjab that nearly 1 per cent of the buffaloes examined were found tuberculous. As regards the assertion that sheep and goats do not get the disease, this would require some modification. Sheep have been found affected with tuberculosis, though the disease is rare among them.

9. In abdominal tuberculosis diarrhoea is usually intermittent, whereas, in Johne's disease the diarrhoea is copious and prolonged.

(J. W. Brittlebank.)

10. The cough of husk is frequently in the later stages, very like the tuberculous cough, except that it is as a rule more paroxysmal than is the tuberculous cough.

(J. W. Brittlebank.)

11. Cancer of the liver is not uncommon in cats addicted to eating cockroaches. The condition is almost invariably accompanied by ascites and cirrhosis.

(J. F. D. Dutt.)

12. Whole grain feeding favours egg production and less mortality. Hens on free range, gained in weight while those confined, lost weight. More eggs are laid by those on free range but they consumed more grain feed.

(26th Annual Report, Bureau of Agriculture. Phillipines.)

13. *Nodular Vaginitis*:—Douching with a 0.4% formaldehyde (a 1% solution of the 40% Formalin) followed

immediately by cleaning with physiological salt solution has given good results.

(Fohner Nielsen).

14. Parasites differ fundamentally from the bacteria in that they cannot multiply inside its host. Some parts at least of their life cycle must be passed outside, hence, control of the manure disposal could control parasitic diseases.

(W. M. Cameron.)

15. Klauder and Brown of the Research Institute of Cutaneous Diseases, have shown that a relation exists between the irritability of the skin and the quantity of Calcium it contains. The greater the amount of calcium the lesser its degree of irritability, while the reverse obtains in the case of Potassium.

16. *Microfilaria immitis* of the dog shows a daily periodicity minimum in the mornings and maximum in the evenings. They are numerous in the venous than in the arterial system. The worms are also found in lymph spaces in the skin and in lymphatic glands.

(Extracted from Trop. Vet. Bull.)

17. Tuberculosis of swine is caused by infection from avian as well as from bovine sources. Human tuberculosis by infection with the avian type of bacillus is also occasionally recorded. Tuberculosis of horses, dogs, cats, sheep, foxes and other animals may be caused by bacilli which in some cases do and others do not fit in with human, bovine and avian types.

(E. A. Watson.)

(In elephants, human type.....R.S.N.)

18. *Hints on tropical technique*:—

(a) Glassware may be cleaned by placing for an hour in a solution containing caustic potash, 1 part; water, 1 part; methylated spirit 8 parts.

(b) Store cover glasses in 60% alcohol; rubber tubing in glycerine.

(c) Flood films are packed for despatch by post with pieces of cardboard between the slides to prevent rubbing. The slides then rolled in paper. The package, after it has

been sealed up, dropped into melted paraffin until it has permeated. This prevents the growth of fungi and the smears will keep indefinitely.

(*Marshall & Macdonald*).

19. Vomition in nephritis has no relation to the ingestion of food, whereas vomition in gastritis always follows the taking in of food or water.

(*Prof. Wooldridge*).

20. Eggs from hens that have been fully exposed to sunlight are rich in vitamin A and are of value as an anti-rachitic food. This vitamin has been found to be retained in eggs that were in storage for nine years.—*Science*.

Veterinary Medicine, July 1928.

21. Cattle breeders are beginning to appreciate the danger in buying non-reacting cattle from herds in which tuberculosis infection exists, as some non-reactors purchased from infected herds may at a later date become reactors and cause endless trouble and expense.

V. M. July, 1928.

22. The blood serum of cows that have acquired infectious abortion may react strongly to the agglutination test for at least a year after the disappearance of the infection from the udder, as indicated by guinea pig inoculation tests.—*Buck & Creech*.

V. M. July, 1928.

23. Once animals are under fence our parasite cycle begins; increased land values call for more and better stock per acre; more stock per acre means more manure per acre; more manure per acre means more parasite material per acre; more parasite material means greater certainty of infection and greater infection per animal means more worm material for any given amount of manure; and this means more infection per acre; and so on.—*M. C. Hall*.

V. M. July, 1928.

24. As far as practice is concerned books a year old, nowadays, are already out of date. The scientific books is but a record of events previously exposed in journals.

The North American Veterinarian, June, 1928.

Atypical & Chronic Forms of Canine Piroplasmosis 293

25. Vitamin C is often referred to as the sunlight vitamin, the vitamin of the leafy, summer-grown vegetables. It was, however, recently discovered in milk.

N. A. V. June, 1928.

26. Washing with any of the chlorine generating solutions now employed widely in wound treatment and disinfection, is useful in removing mercurochrome stains from the skin or instruments.

N. A. V. June, 1928.

Extracts

ATYPICAL AND CHRONIC FORMS OF CANINE PIROPLASMOSIS.

The authors hold that in the past errors of diagnosis have been made as a result of insufficient examination of blood smears. NOCARD pointed out in 1902 that a negative result of the examination of the blood on two or three days is not sufficient to warrant a negative diagnosis.

They have been struck with the variations in the symptoms present, and they are certain that the majority of the diseases would not have been definitely diagnosed but for careful and persistent examination of the blood in all cases showing anæmia and discoloration of the urine.

The abnormal symptoms which may mask the classical symptoms of the disease involve the respiratory, digestive, nervous, or muscular systems.

Apart from these acute atypical cases, there are chronic cases in which diagnosis is extremely difficult, but a symptom which is rarely absent is the white porcelain appearance of the mucous membranes. Bile staining is exceptional.

The examination of the urine is of great importance. Bile Pigments may be detected, and rarely hæmoglobin. Bile salts are almost invariably absent. Corneal opacity may be found.

It is suggested that some of these abnormal cases of the disease are really due to a combination of bacterial and protozoal infections, but the authors state that they have not found any evidence that this is so.

Tr. Vet. Bull. March 1928.

THE TREATMENT OF BOVINE COCCIDIOSIS BY ICHTHARGAN.

Infected animals are treated with 1 gramme dissolved in 1 litre of water (not in salt solution) twice daily. The author claims that he has treated several dozen animals with such success in every instance. Two or three days suffice to effect a cure.

One case is specifically referred to and in this instance 3 species of coccidium were recognisable in the faeces—*E. Zurni*, *E. Smithi* and a third of large size.

Tr. Vet. Bull. March 1928.

CONTAGIOUS ABORTION AND ITS RELATION TO UNDULANT FEVER IN MAN.

This article is a review of the relations of *B. abortus* and *M. melitensis* and thus consists chiefly of a summary of views put forward in the last few years. The author regards milk as a very important vehicle of infection with *B. abortus* and states that the majority of cases of undulant fever in man where no caprine source can be found may be due to the contaminated milk of cows and, in a later section, that undulant fever is an enzootic which may affect animals and man; thirdly, that there is no valid method at present known of distinguishing the two organisms; the bacillus isolated by haemoculture from man or goats being designated *B. melitensis* while, if isolated from the cow or other animal, it is called *B. abortus*.

From 90 cases whose sera agglutinated in a titre of over 1:200, the highest being 1:10,000, he found:—

Sera agglutinating in equal titre <i>B. melitensis</i> and <i>B. abortus</i> .	... 41 or 45.5 per cent.
Sera agglutinating <i>B. melitensis</i> in higher dilution	... 11 or 12.2 per cent.
Sera agglutinating <i>B. abortus</i> in higher dilution	... 16 or 17.7 per cent.
Sera agglutinating <i>B. melitensis</i> only	... 11 or 12.2 per cent.
Sera agglutinating <i>B. abortus</i> only	... 11 or 12.2 per cent.

He also examined the sera of 256 cows killed at the slaughter-house of Barcelona and found 35.15 per cent. which agglutinated "la brucella" (*B. melitensis*) in a dilution of over 1:200, a close approximation to the figures of STUART (Trans. Roy. Soc. Trop. Med. & Hyg. June, 1925), where 31.2 per cent. of 542 sera examined agglutinated the *B. abortus*.

Tr. Vet. Bull. March 1928.

EXPERIMENTAL STUDIES ON OSTEOMALACIA IN THE HORSES. FIRST REPORT. ETIOLOGICAL SIGNIFICANCE OF CALCIUM DEFICIENCY IN THE DIET.

PART I.

Two horses were fed upon barley, which the author finds to be very deficient in calcium, and after about 5 months symptoms of osteomalacia developed.

The symptoms were *licking*, gastro-intestinal catarrh, and loss of appetite. There was gradual loss of condition, and the bones, particularly those of the face, became slightly swollen. There was evidence of pain

in the bones. Neutrophil polynuclear leucocytes increased in numbers, and there appeared at first an increase in the basophil leucocytes. The amount of urine was increased in both animals, and it had an acid reaction. As the animals lost condition the amount of phosphorus pentoxide present in the urine increased.

On post-mortem examination complicated phenomena of resolution, absorption, new formation, and proliferation of bone tissue were observed in the spongy calcareous trabeculae of the ribs.

Tr. Vet. Bull. March 1928.

ANAPLASMA MARGINALE IN CATTLE.*

Theiler, in his extensive work on Anaplasma in South Africa, states that *Anaplasma marginale* is transmitted only in blood containing corpuscles, as the organisms, have lost their body plasma, for which reason they have derived their generic name, and have to exist in the cell protoplasm, making them a strictly intracellular organism. He failed to produce the disease by injecting filtered blood, proving that there was not a stage in the development of the organism which was filterable.

He also showed that the incubation period, after the injection of blood containing anaplasma, depends upon two conditions: if the amount of blood is large, the incubation period is shortened and if the strain has been passed through several animals by injection, the same result obtains. He found this period to average between sixteen and forty days, usually in the neighbourhood of from twenty-three to twenty-five days.

He distinguished two varieties of anaplasma, dependent upon their location in the red blood cells, the severity of the disease, and the inability of one to confer complete immunity upon the other. *Anaplasma marginale* is located upon or near the periphery of the cell, and the other *A. marginale* (variety Centrale) is somewhat smaller and is located near to or in the centre of the corpuscle. It has not been noticed that *A. centrale* causes death, either by direct inoculation of blood or by tick infection, while animals affected with *A. marginale* frequently succumb. An animal recovering from *A. centrale* infection, when inoculated with the *marginale* variety, develops the disease, but in a much milder form than would be otherwise encountered, which proves that although there is not a complete immunity there is some protection provided.

The incubation period for this disease after tick infection is rather long and has a wide range, varying from a few days under two months to a few days over three months.

Animals that were immune to *Babesia bigemina* could be infected with anaplasmosis either by means of ticks or by blood inoculation which proves that *B. bigemina* affords no immunity against anaplasmosis.

In further experiments, Theiler proved that animals recovering from anaplasma infection were not immune to *B. bigemina*, either by means of tick or by blood inoculation. He suggested that in inoculating with *B. bigemina* for the purpose of immunization, it is just as well to inoculate with anaplasma at the same time. The incubation period of *B. bigemina*

* The Cornell Veterinarian, January 1928.

is so much shorter, the animal will have ample time to recover before the anaplasma reaction takes place.

Theiler proved that two varieties of tick can transmit the disease: *Boophilus decoloratus* the blue tick which also transmits *Babesia bigemina* and the black-pitted tick, *Rhipicephalus simus*.

Frequently a double infection of *Anaplasma marginale* and *A. centrale* is found in the same animal, this being especially true after tick infections.

In the course of transmission experiments it was found that beginning with the sixth day after the appearance of the marginal bodies, there was a rapid decrease in the number of red cells and hemoglobin percentage and an increase in the number of cells infected with anaplasma. As the disease progressed, the bodies became more abundant, many red cells containing two, three, four and even five. The marginal bodies were most abundant during the febrile period which extended from the twenty-sixth to the thirtieth day after the animal was injected or from the seventh to the eleventh day after their first appearance. On the twenty-third day after injection, or the sixth after the first appearance of the marginal bodies, it was noticed that the red cells were not so uniform in size. Anisocytosis was very pronounced when the fever was at its height. This condition continued with varying degrees of intensity until the fortieth day after injection, at which time the red cells were practically normal in appearance.

Polychromasia was first observed ten days after the appearance of the marginal bodies. On the following day, punctate basophilic cells were noticed, and on the thirteenth day, the first nucleated red cells. These blood changes made their appearance when the cow presented marked physical symptoms.

The crisis of the disease occurred on the thirty-second and thirty-third days after injection, which was fifteen and sixteen days after the appearance of the marginal bodies. At that time, the temperature had subsided to normal. The marginal bodies were not so numerous as they were during the febrile period but the cellular changes were pronounced. The animal was weak and emaciated and walked with a staggering gait; muscular tremors were especially noticeable in the shoulder and flank. She refused food and her sight seemed to be impaired. On making a recovery, the temperature was the first symptom to return to normal. It took this animal practically two months to regain her normal blood count and hemoglobin percentage. (It has been observed in the few dairy cows which have recovered from this disease, that they practically return to their normal milk production in between four and five weeks after they show signs of recovery). The eosinophilic leucocytes showed a curve which corresponds in many respects to the severity of the disease. During the crisis, and for a few days after, these cells were very scarce or entirely absent, but, as the animal showed signs of improvement, they gradually returned to their normal percentage.

The author finally arrives at the following conclusions:—

1. It has been definitely proved by microscopic findings, autopsy, and transmission experiments by blood injection that *Anaplasma marginale* (Theiler) is present in California.

2. The incubation period, i.e., the first appearance of the marginal bodies in the red blood cells after large injections of infected blood, is approximately eighteen days.

3. It is from six to eight days after the first appearance of the marginal bodies before the infected animal begins to show physical symptoms and a temperature reaction.

4. The marginal bodies are most abundant during the febrile period. In some instances, nearly 50 per cent of the red cells are infected.

5. Severe anemia, jaundice, constipation, marked muscular tremors and weakness, rapid, wiry pulse, sonorous respiration, impaired eyesight, inappetence, fever and rapid emaciation are the most pronounced symptoms in severe cases.

6. The mortality has been high among those animals that manifested physical symptoms.

7. Anaplasmosis is apparently more fatal among heavy producing milk cows than among dry dairy cows.

8. The exact mode of transmission of *Anaplasma marginale* among cattle in California is not definitely known, but the large horse fly, *Tabanus punctifer*, O. S., may be considered as a factor in some localities.

9. Blood from a recovered cow, which showed no detectable evidence of the disease, produced anaplasmosis when injected into a susceptible animal.

One of the handicaps in treating this disease, is the fact that animals are well advanced or, one might say, they have practically reached the crisis of the disease when they show physical symptoms. In one infected herd of 80 cows, blood smears were taken from the apparently healthy animals, 4 of which were found to be infected.

ASCITES IN THE DOG.*

BY

A. A. FEIST, ST. PAUL, MINN.

This report covers what I believe to be a new treatment, although not necessarily a cure for ascites, or dropsy, in the dog. We know that dropsical conditions are found in old animals quite frequently and are most often due to chronic indurative nephritis or cirrhosis of the liver. In most cases of disordered kidney function, the physician or veterinarian prescribes plenty of water to drink, for the purpose of flushing the kidneys.

Recently I had three cases of ascites. One case was a dog thirteen years old. The abdomen was distended with fluid, breathing was distressed and the dog drank about a gallon of water per day. I did not aspirate the fluid, but put the patient on a diet of vegetables, fish and milk. I prescribed a diuretic and a heart stimulant. The mucous membranes of the mouth were very anemic.

* Journal of the American Veterinary Medical Association, January 1928.

The patient was brought back ten days later, very much worse. The owner claimed the dog did nothing but drink water. An idea then flashed through my mind. If the kidneys were not functioning and could take care of only a certain amount of fluids, why not try to eliminate liquids from the diet? This is the point in which I am interested. I cut this dog down to two glasses of water per day and ordered him to be brought back in ten days. I also put him on an antacid tablet of bismuth and soda, to eliminate what I thought was a burning stomach. This particular animal has improved 100 per cent, is back to normal and feels like a new dog. I would like to have some of my fellow practitioners try this line of treatment and later report their observations and results.

Treatment.

1. *Diet*: Fish, milk (alternately with water) and vegetables, boiled. Water, one-half glass twice daily.

2. *Medication*: One tablet containing the following, daily:

Sodium bicarbonate	... 5 gr.
Magnesium carbonate	... 5 gr.
Bismuth subnitrate	... 5 gr.

For flushing the urinary tract we use a tablet containing urotropin, lithium carbonate, methylene blue, corn silk and couch grass, one tablet twice daily. The point I wish to stress is that when no organ like the kidney or liver is getting to an indurated stage, it is well to save the functioning power by cutting down on the liquids.

In the first stages stop all fluids and do not aspirate. Give from one-half to one ounce of water three times daily. My idea is to use the dropsical fluid though reabsorption, if such a thing is possible. So far I have observed, in three or four cases, that aspirating is not necessary when fluids are withheld.

HANDLING BANG ABORTION DISEASE; A PROGRAMME FOR THE VETERINARY PRACTITIONER.*

BY
R. R. BIRCH and H. L. GILMAN,

Veterinary College Experiment Station, Cornell University.

The authors have written a very comprehensive treatise at a great length and those interested greatly in the problem of the Bang abortion disease are directed to refer to the article in original. Here only a few salient points are brought out.

The authors have reviewed the literature existing on the subject in full.

In the control of this disease the authors suggest the herds to be tested by agglutination test. They are of opinion that the agglutination test now used in the detection of Bang abortion disease, when carefully conducted and interpreted, is exceedingly accurate, but not perfect. It

* The Cornell Veterinarian, April, 1928.

may be employed as often as is necessary, and one test does not interfere with the accuracy of subsequent ones. In the following manner they illustrate the relation of history of the individual or herd to the interpretation of the agglutination test.

1. Two heifers each 16 months old, one open, the other pregnant, react at 1:160. Each is thus definitely established as a carrier of *Bact. abortus*, but they are far apart regarding future probabilities. The open heifer kept away from spreaders, will probably recover and overcome her reaction, and she probably will not become an active spreader. The pregnant heifer handled in exactly the same manner will probably be a spreader, whether she aborts or calves, and she will probably become a chronic reactor.

2. An old cow, a regular breeder and pregnant, is and has been for years in a badly infected herd in which there have been many abortions. A heifer, also pregnant, is in the same herd. Both are high reactors to the agglutination test. The cow probably is a chronic reactor and tolerant of the infection, her chances for carrying her calf are good, and there is about one chance in six that she will be a spreader during parturition. The heifer is very likely to abort, and she is almost sure to be a spreader at the time of parturition.

3. Suppose the animals just described are found to be nonreactors to the agglutination test. The old cow, even though allowed to remain in the badly infected herd, probably never will become a reactor, because her history and the history of the herd tend strongly to establish her status as a true immune. The heifer, if she remains in the herd, is much more likely to become a reactor than she is to remain clean, because it is the exceptional pregnant females which will withstand natural exposure.

In view of the above facts it is suggested that it is important to differentiate between recent reactors "with breeding trouble in prospect, and chronic reactors which are much more likely to be satisfactory breeders, even though dangerous to susceptible associates."

The authors give in detail the procedure adopted in collaborating with Doctor George Derrick in the control of this disease.

With the help of the local veterinarian they make survey of a herd. They draw blood samples from animals over ten months old and perform agglutination test. With the "agglutination charts" they visit the herd and acquaint themselves with the management, equipment and history. They also look for the breeding bull and check it with the data. Thorough examination of all females, reactors and non-reactors, unsatisfactory breeders (with a view to eliminate any in either class that are hopelessly sterile), is due. Advice is given to the owner of keeping the spreaders and susceptible animals apart. If the owner is willing to the plan periodic testing of blood is done.

They suggest finally specific plans of procedure, under the following subheads:—

1. Sound herds. The status of the sound herd can be determined only by test. Once a clean herd is established the problem is to protect it.

"Clinical and experimental evidence does not give us very definite and clear cut facts regarding the relation of the male to the spread of the disease. Efforts to infect the bull artificially, either by natural or artificial channels, have not been uniformly successful. Likewise, it has been difficult to infect cows by vaginal injections with cultures of the organism. While the percentage of bulls positive to the agglutination test is rather high, there are a very few instances on record where it has been conclusively proved that the organism was eliminated with the semen. Perhaps when more work has been done on this problem, the number of reacting bulls eliminating the organism will be found to be much higher. The bull can and frequently does become infected with, and eliminate other types of infection, and there is no reason why he might not just as easily eliminate *Bact abortus*.

Most clinical evidence indicates that the bull is not a very great factor in the disease. However, instances where the bull was probably the only means of introducing the infection into a negative herd are by no means rare. Unquestionable proof, however, is lacking in most instances. Until we have more accurate data, it seems best to classify all reacting bulls as potential spreaders, unless proved otherwise. To leave a positive bull in a herd, while taking out the positive cows, is not a safe procedure. The use of herd bulls for service to cows in other herds is, in general, to be condemned, both with regard to Bang abortion disease, and other infections."

Correspondence

FROM

A. M. MUTHAPPA,

Veterinary Asst. Surgeon.

Ammatti

TO

J.T. EDWARDS ESQ., D. SC. (LONDON) M.R.C.V.S.

Director, Veterinary Research Institute

Mukteser.

SIR,

I beg to report that all the Scindi cows brought by A.B. Chengappa last year showed symptoms of anaphylaxis after an injection of anti-rinderpest serum. They were given 60 c.c. of rinderpest serum; and they showed anaphylactic shock within 15 minutes after the dose was administered. The affected cows showed intense cutaneous eruptions and oedema of the anus, vulva etc. Though the symptoms subsided within two hours, one of the cows aborted after two days.

I, therefore, beg to request you to be so good as to let me know as to what precautions I should take in future to prevent such recurrences. Reply is solicited.

I beg to remain,

Sir,

(Sd.) A. M. Muthappa.

13-10-28

N. B.—The cows were first inoculated in the month of May when they did not show any symptoms of anaphylaxis. When they were re-inoculated again in the month of September they showed all the above symptoms.

19-11-28

COPY OF THE LETTER FROM

J. T. EDWARDS ESQ., D. SC. (LONDON) M.R.C.V.S.

Director, Mukteser.

* * * * * Your letter of the 15th October last on the subject of the development of symptoms which you ascribe to anaphylactic shock in cattle, inoculated by you with anti-rinderpest serum. * * * * *

(1) The history of the condition as you relate it is highly interesting, for although symptoms of anaphylactic shock are well known to occur in animals after inoculation with serum in certain conditions, they are seldom reported to us in this country.

(2) Anti-rinderpest serum as now prepared in this laboratory is derived entirely from buffaloes, a species that is serologically heterologous as compared with ordinary cattle. One may therefore expect to find that when cattle are injected with a dose of serum, of buffalo origin and again injected at a later date with another dose of serum of the same origin, they may develop symptoms of anaphylactic shock. The first dose is the so called sensitising dose, and the second one the anaphylactising dose. We have observed this phenomenon to occur (in calves in Madras) when the first dose was an anti-anthrax serum (of buffalo origin) and the 2nd. an anti-rinderpest serum. It is not unlikely, therefore, that the cattle which developed anaphylactic symptoms under your

observation had been inoculated at some time previously with serum.

(3) I know of no practical means to avoid accidents of this kind. What is usually recommended is to 'disensitise' the animals when their previous history is known, by giving initially a minute quantity of serum, to be followed later in about one hour or so, when the symptoms have passed off, by a larger amount and again after another interval of an hour, by more, until the whole dose has been given.

There is no cure known and nothing, so far as I am aware can be given to alleviate the symptoms by artificial means.

(Sd.) J. T. EDWARDS.

Association News

All India Veterinary Association, Madras Branch.

Proceedings of the General Body meeting of the All India Veterinary Association, Madras Branch, held at the S.P.C.A. Hall, on 24th December, 1928.

Members present:—

Messrs.

L. S. Parameswara Iyer
P. S. Kuppuswamy Iyer
P. Srinivasa Rao
K. Ranganathan
P. N. Thillanayagam
K. Samirasimha Rao
V. P. Subbayya
V. Janakirama Iyer
M. S. Sastry
T. Vinayaka Mudaliar
T. Raghavan
G. R. Viswanathan
S. Ganapathy Iyer.
P. S. Narayanan.

Mr. P. Srinivasa Rao proposed and Mr. T. Raghavan seconded that Mr. L. S. Parameswara Iyer, be the chairman of the meeting as the President was absent owing to unavoidable circumstances. This was unanimously carried.

Mr. L. S. Parameswara Iyer taking the chair made a few introductory remarks thanking the members for electing him as the chairman of the meeting.

1. The minutes of the last meeting were then read and confirmed.

2. Read the annual report of the managing committee on the working of the Association for the year ending with the 31st October, 1928, together with the statement of Receipts and Expenditure.

After a few remarks from the members present regarding the present condition of the Association suggesting means for the revival of the activities during the current year, the report with the statement of the accounts was adopted unanimously.

3. The following resolutions were then unanimously passed, duly proposed and seconded.

(a) This meeting records its deep sense of sorrow at the untimely demise of P. Nataraja Pillai, one of its members and empowers the secretary to send a letter of condolence to the members of the bereaved family. Unanimously passed all members standing.

(b) Resolved to request the S. P. C. A. authorities in Madras to take early steps to do propaganda work in all the important towns of this presidency where there are Veterinary Institutions and to start its local branches in all those places.

(c) Resolved to request the members of the profession in the important towns to help the S. P. C. A. authorities in their propaganda work and in starting local branches of the Society.

(d) Considering the advantages of running an Association as a branch of the All India Veterinary Association.

ation) it is resolved to intensify efforts to revive the activities of the Association as of old.

In moving the above resolution, Mr. T. Vinayaka Modaliar spoke as follows:—

Mr. President and Friends,

From the informal discussion we have had just now, whether to continue running this Association or close it with as much solemnity as we can, I am glad to gather that you are all so unanimous that the Association should live. The warmth of your feeling is really touching. So I beg leave to move the above resolution and let us put every ounce of our effort in this, our final attempt, to revive the activities of our Association as of old.

Friends, we need a cut and dry programme for the year. A definite programme must be chalked out and it must be gone through at any cost. We must pitch upon an enthusiastic and earnest worker in each district, who would be our District Secretary as it were. He may help us in securing professional papers from his district, help us in the collection of annual subscriptions and arrange for the deputation of members from his district to our meetings in Madras. Again the Presidency may be divided into Circles. One chosen individual in each circle may be entrusted with necessary propaganda work.

With increasing vitality on the part of the Service Association, our work is becoming more and more professional. So I clearly see a day when the leaders of the profession in our presidency will join us heartily and help us. But we must fit ourselves betimes. Our lost ground must be regained.

Our annual gathering must be made very grand and attractive. Heads of department must be asked to preside. Members of Government must be requested to open our Conference. Our annual social dinner should be well advertised. It had its own social side which had tremendous influence on the esprit-de-corps of the profession. We must make individual appeals for professional papers. I am sure if we

make all these efforts the response will not be disappointing. With such intensive programme let us work for two more years, before we give it up as hopeless. But every member of the profession should help us. May God help us in our task.

(e) The resolution proposing the reduction of the membership fee from Rs. 3 a year to Rs. 2 was defeated by a large majority of votes.

4. Next item of the programme being the election of the office-bearers and the members of the managing committee for the current year, the following were elected unanimously.

President:—Mr. P. Srinivasa Rao, G. M. V.C., the Editor of the "Indian Veterinary Journal", Madras.

Secretary:—Mr. M. S. Sastry, Veterinary Assistant Surgeon, Ananthapur.

Joint Secretary and Treasurer:—Mr. V. Janakirama Iyer, Lecturer Veterinary College, Madras.

Members of the Managing Committee:—

Messrs. (1) T. Vinayaka Mudaliar, (2) P.M. Thillanayagam, (3) T. Raghavan, (4) K. Samirasimha Rao, (5) V. P. Subbaya, (6) L. S. Parameswara Iyer, (7) P. S. Kuppuswamy Iyer, (8) A. Ramalinga Mudaliar, (9) M. Ananta Narayana Rao, (10) R. Swaminathan, (11) T. R. Rajagopala Rao, (12) G. R. Viswanathan, (13) M. Noor Ahamad, (14) S. Seshadri Iyengar, (15) K. V. Raghavan, (16) L. Adinarayana Sarma.

A resolution recording the heartfelt thanks of the Association to the retiring office-bearers for the services rendered to the Association was duly passed.

The President of the meeting regretted the apathy of the members to present professional papers at such meetings. To make good this omission he said he would just say a few points of professional interest which came uppermost in his mind just then.

He said that Theiler in 1902 recorded in the blood of cattle a large Trypanosome which he considered to be the causative agent of gall-sickness of cattle in Africa. This, *Trypanosome*

theileri, was also identified later on by Laveron who gave a description of the parasite and said that he was able to note two species of the parasite one the commoner form called *T. theileri* and the other, the rarer form called *T. transvaliense*. In the latter the centrosome and the nucleus were more approximate and the parasite itself was broader and shorter. Theiler later on proved these two species to be one and the same.

In India at about the same time, large Tryps in cattle were recorded by Durrant and Holmes; Holmes; and Lingard. Those tryps were named *T. himalyanum*, *T. indicum*, *T. giganticum* and *T. muktesari*. These are now considered to be mere synonyms of *T. theileri*.

The first record of this Trypanosome, in Madras was made by Valladaris in 1909, who considered it also to be the cause of death in the cattle affected. But the latter statement remains to this day uncorroborated.

The President said that the following cases were recorded at the Madras Veterinary College since January 1928.

The first case was in a calf brought to the College hospital as a patient. Examination of blood smears revealed that it was a mixed infection of *Piroplasma bigeminum* and *T. theileri*. Only two trypanosomes could be seen after prolonged search. Smears from the following day from the same calf proved to be free from Tryps.

The next opportunity occurred during a systematic examination of blood smears from calves of the Rinderpest Virus producing camp at the Madras Veterinary College in April 1928. Three of the calves revealed *T. theileri*. The two forms described by Laveron were noticed.

No particular pathogenic symptoms could be attributed to the presence of these parasites, as the cases were complicated with Piroplasmosis and Rinderpest.

The quickest way of determining the presence of Tryps in blood is by examining a drop of live blood under a cover-glass. The lashing movements of the parasite fail not to attract our attention.

This Trypanosome is specific to cattle. The infected blood from a calf was injected into white-rats, guinea-pigs and dogs and they were found to be not susceptible to this

parasite. Two calves also were inoculated with the infected blood. In only one of these calves tryps appeared in very small numbers at the end of the seventh day and remained in blood for only three days. No special symptoms could be noticed in that calf.

Theiler was able to transmit this Trypanosome mechanically with *Hippobasca rufipes*. Nöeller of Germany thinks that *Tabanus glaucopus* can not only transmit this disease mechanically but also cyclically.

The next subject dealt upon by the President was :

Tenia Solium.

He said the adult parasite is found only in man and the cystic stage is commonly met with in the musculature of pigs. But the cystic stage had also been recorded in wild boars, sheep, stag, dog, cat, brownbear, monkey and man.

The president said that it was his intention merely to invite the attention of the profession to the possibility of finding the larval stage more commonly in other animals than in pigs. Between the years 1923 to 1928, the cystic stage had been recorded in five cases of dogs at the Madras Veterinary College. Due to the less extent of the eating of pork in India, it was believed that infection from *T. solium* was not prevalent to the same degree as in other countries. But the profession should not completely preclude from its mind the possibility perhaps more common than what is generally believed of finding the larval stage in other animals as well.

The President next passed on to :

Tenia Echinococcus.

He said that though the infection was with hydatid cysts, the larval form of *Echinococcus granulosus* commonly known as *Tenia echinococcus*, was common in cattle and sheep in India, one was struck with the rarity of the adult infection in dogs. But the adult worms were recorded in three cases of dogs during the last three years at the Madras Veterinary College.

With a hearty vote of thanks to the chair and light refreshments to the members present, the meeting terminated.

(Sd.) L. S. Parameswara Iyer,

Chairman.

APPENDIX (A).

THE REPORT OF THE MANAGING COMMITTEE OF THE
MADRAS BRANCH OF THE ALL INDIA VETERINARY
ASSOCIATION FOR THE YEAR ENDING

31st, October, 1928.

Membership.—There were 204 members on the rolls of the Association at the beginning of the year. 2 new members were admitted during the year. Thus the total number of the Association remained at the end of the year was 206, but it is with the deep regret that mention has to be made that since the close of the year under report Mr. P. Nataraja Pillai died in November 1928.

Meeting.—There was only one meeting held during the year i.e. the annual meeting of the Association, the details of which have already been published in the All India Veterinary Journal. There was an emergent meeting of the Managing Committee on 25th December 1927 with the President of the Association in the chair to arrange sending delegates to the All India Veterinary Conference held in December, 1927, at Bombay.

Owing to several adverse circumstances no meeting of the Association other than the annual one was held.

Arrangements had been made to open a divisional branch at Bellary in April, 1928, but owing to the sudden outbreak of plague in the district it was postponed sine-e-die.

Delegates to the All India Conference.—The Secretary Mr. M. S. Sastry and a student of the final year class Mr. Srikanthiah attended the Conference. In addition the Secretary and Mr. P. Srinivasa Rao, the Editor of the "Indian Veterinary Journal" attended the Mysore Veterinary Conference held at Bangalore on the 23rd and 24th of May, 1928.

The Indian Veterinary Journal.—The journal has been making a steady progress in its useful career under the able editorship of Mr. P. Srinivasa Rao and it is interesting to note that it has been appreciated in many influential quarters even in the far off America and England. We have to note again with regret that this presidency which used to lead all the other presidencies in supplying necessary quota of professional articles to the journal has almost completely ceased to do this useful work. This paucity is mainly due to the existence of the G.O. which prohibits the members of the C.V.D. from sending articles direct to the Editor for publication. It needs no argument to prove the value of such professional papers and clinical notes which appear in the professional journals to the benefit of the profession. The present state of affairs has caused much anxiety to all the well wishers of the profession. It is up to every member of

the profession to seriously think about this and take such steps as will remedy the present state of deplorable affairs.

Finance.—In spite of appeals, there are still heavy arrears from many members and it is hoped that this general meeting will devise some means of rectifying the present conditions.

The statement of receipts and expenditure is herewith appended.

Remarks.—This Association which was started on 23rd October, 1920, functioned quite successfully for the first 4 years, holding every year conferences and meetings wherein professional subjects of a very useful nature were read and discussed and demonstrations were held.

Social gatherings which were held on those occasions were greatly enjoyed. Further these meetings and conferences were the occasions when members from different parts of the country used to meet and exchange thoughts and notes providing the necessary scope for the creation of esprit-de-corps so necessary in a profession like ours. The Association published all the proceedings and the professional papers read and discussed for distribution amongst the members, besides those articles, it had the privilege of playing its humble part in the formation of the All India Veterinary Association with the aid of its delegates, to do the propaganda work in different parts of the country. It arranged for the successful holding of the third session of the All India Veterinary Conference in December, 1924, and it has been the proud privilege of this branch to supply one of its members for the editorship of the journal which owes its inception mainly to the efforts of the Association. Many of its suggestions embodied in the forms of resolutions did not fail to attract the attention of the authorities and a good deal was achieved in that direction. All these activities were carried on under numerous disadvantages and difficulties to the organisers with the hope that the day would soon come, when the elders and influential members of the profession would extend a helping hand in the continuance of this Association; but it is very unfortunate, all these hopes have been shattered and the indifference and the apathy in some cases continue to dominate still in the influential quarters with the painful result, that the once useful and active Association considered to be the strongest limb has been to-day in a moribund condition. With the increase in the number of members in the profession and the expansion of its activities, the necessity for a strong and healthy organisation to look after the welfare of its members, has increased and if urgent steps are not taken towards this object, the posterity will have every reason to pronounce a very

unfavourable verdict against the existing members in the profession. There are many serious problems affecting the welfare of the profession and the country which require immediate attention.

It is hoped that practical and well considered decisions will be arrived at as to the future of the working of the Association at least in this meeting.

MADRAS, } (Sd.) M. S. SASTRY,
24th December, 1928 } Secretary.

Signed by Messrs. L. S. Parameswara Iyer, P. Srinivasa Rao, T. Vinayaka Mudaliar, T. Raghavan, P. M. Thillanayakam, V. P. Subbayya and V. Janakiraman.

Statement of the accounts of the All India Veterinary Association, Madras Branch, for the year ending 31st October, 1928.

RECEIPT.		EXPENDITURE.	
	RS. AS. P.		RS. AS. P.
Balance on hand on 1-11-1927	398 0 4	Postage	1 5 0
By Subscriptions	89 0 0	Printing	19 3 9
Interest on S. B. deposit.	8 7 3	Boarding for the members and delegates	8 13 0
		Railway fare to Bombay and Mysore Conferences and Secretary's trip to Madras	69 14 0
		Conveyance charges	13 14 0
			113 1 9
Total	490 7 7	Balance on hand on 1st December, 1928.	377 5 10
			490 7 7

(Sd.) V. JANAKIRAMAN.

Joint Secretary and Treasurer.

Checked and found correct by Messrs. M. S. Sastry, T. Vinayaka Mudaliar, L. S. Parameswara Iyer, P. M. Thillanayagam, V. P. Subbayya, P. Srinivasa Rao and T. Raghavan.

Departmental News.

The following gentlemen have passed the Post-Graduate examination held in December 1928 at the Madras Veterinary College.

1. Messrs. N. Muniappa Pillai ... II Class.
2. " T. Vinayaka Mudaliar ... II Class.
3. " K. Samirasimha Rao ... II Class.
4. " H. Vishwanatha Sastri ... II Class.
5. " V. P. Subbayya ... III Class.
6. " R. Jayarama Rao ... III Class.

Mr. N. Muniappa Pillai was first in Parasitology. Mr. K. Samirasimha Rao was first in Pathology and Bacteriology, Mr. T. Vinayaka Mudaliar was first in Preventive Medicine and Clinical diagnostics.

Mr. Krishnaswamy Mudaliar has been posted to the Agricultural College, Coimbatore, in place of Dr. Richards who had gone on long leave preparatory to retirement.

Mr. A. Ramalinga Mudaliar is on furlough for one year.

Mr. G. A. Ajwani M. Sc., D.V.M., G.B.V.C., D.V.H. has been recruited to the Madras Provincial Service on probation for two years. He is to work at the Madras Veterinary College for two months.

Mr. Mitra M.R.C.V.S. has been recruited to the Madras Provincial Service on probation for two years and is posted to work with Mr. Sampath Iyengar Circle Officer, C. V. D. Coimbatore.

Mr. A. J. Wilson Circle Officer, C. V. D. Madras, was on leave for six weeks and Mr. Alagappa Pillai acted for him. Mr. A. J. Wilson has now rejoined duty.

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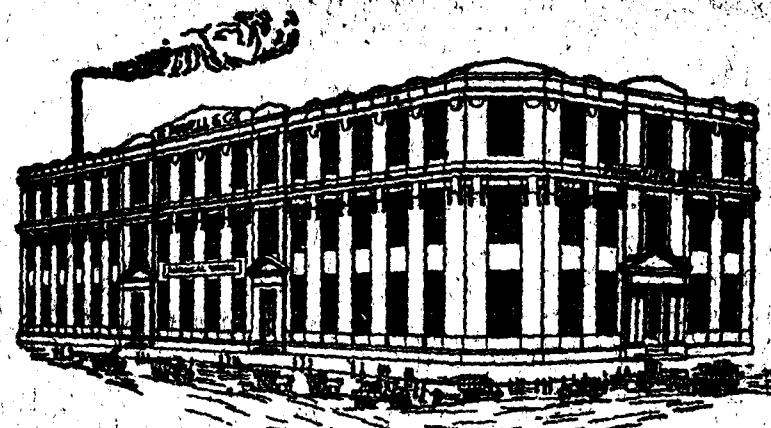
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