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(The Journal of the Indian Veterinary Association)

*A Monthly Record of
Veterinary Science*



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THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE INDIAN VETERINARY ASSOCIATION]

PUBLISHED MONTHLY



A Monthly Record of Veterinary Science
Devoted to the cause of the
Veterinary Profession



EDITOR

Rao Sahib T. VINAYAKA MUDALIAR, G.M.V.C.,

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Editorial

AGRICULTURAL UNIVERSITIES

What is there in a name? A rose smells as sweet if called by any other name. This seems to be the attitude of our American benefactors. To start with they wanted to establish "Rural Universities" in India. We exploded this myth in our Editorial on Rural Universities in the April 1960 issue of this Journal. We explained in full how widely the word 'Rural' differs in concept and in reality in India and in America and questioned the wisdom of putting up huge buildings in rural areas and calling them as Universities. We indicated it may not be possible for us to *maintain* them even, when once the foreign aid is withdrawn. We expressed our fear that they may soon be relegated to the limbo of 'show places' which this country already abounds in and only add further proof to the words of that great Persian Poet, Omar Khayyam

"They say the Lion and the Lizard keep
The Courts where Jamshyd gloried and drank deep"

Since then, we find the term 'Rural University' is given up and a new name 'Agricultural University' has taken its place! We pleaded from time to time that it is hardly necessary to disturb the existing pattern of education which has stood the test of time in this country and which suits the culture and the genius of the people of this ancient land. We pleaded again and again that the generous aid offered may be diverted to strengthen the existing Institutions with better men and materials. We asked in all humility, what is wrong with the existing Institutions which have earned a name all over the world and which have been turning out exceedingly good scientists well suited for our conditions. Perhaps with better facilities in the existing Colleges, the products of these Colleges may prove second to none in the world. All our pleadings seem to have fallen on deaf ears. The much advertised aid will only be forthcoming on terms stipulated by the Donors. It is but natural that the person who pays, calls the tune and we have to meekly submit and dance. Vigorous attempts seem to be in progress

to open more and more so called Agricultural Universities and to get the existing Veterinary Colleges affiliated to such Universities. We do not know if our time-honoured Universities will permit such an encroachment, reduction or even diversion of their absolute powers.

Some may think we are looking too much into the mouth of a gift horse. We do not object to the horse as such, but to the strings attached. Are we to keep on changing our pattern of education with various kinds of aids offered. If we Americanise our pattern to-day because of this highly tempting offer, are we going to do the same if Russia holds out better offer to-morrow? Should there not be a fundamental principle in matters of such vital nature? We have great admiration for the Americans and their liberty-loving institutions. We only ask for the same liberty in shaping our educational needs in our own land. Let there be no imposition even though, we concede, done in very good faith. A gift, a charity, an aid and all the rest of it should be absolutely free from parochial conditions. Otherwise the wind is taken off the sail and the grace of such a noble act is lost.

We have written times without number in these pages on all aspects of our Animal Husbandry Education. In fact, we feel bored to keep on repeating them. We are prepared to send all such literature to those in authority who ask for them. We have evolved through trial and error methods, a pattern of education and a model of field work in Animal Husbandry matters which have earned the applause of the rural population who are the people who count in such matters. The Animal Husbandry work is one indivisible whole from transmission of hereditary characters to proper nutrition, expert management, tackling of the innumerable breeding hazards and finally to prevention and control of various contagious and non-contagious diseases. The one man who is best suited for all these items of work, through proper training and equipment is the Veterinarian. This is not merely our opinion; it is the opinion of expert men who count in such matters. We have quoted them before and we do not want to repeat again. The Veterinarian has triumphed where others have failed. That is our experience here. Leave him alone to settle down to his work. Constant shifting of ground will only lead to building with one hand and pulling down with the other. We appeal to all concerned not to undo the labour of nearly 70 to 80 years in Veterinary Education in this country.

Mr. J. B. Polding, himself an eminent Veterinarian and Research worker, in his article on "Veterinary Education in North America" in

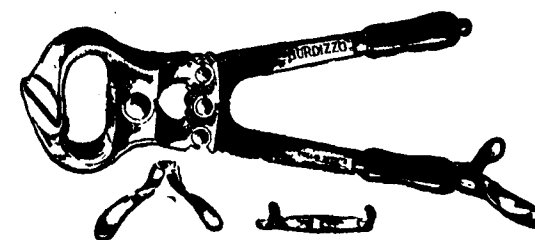
the *Veterinary Record* of London dated 7th and 14th April 1956 makes the following unvarnished statement for the benefit of those who care to stop and think. "Thus American aid in Veterinary field, however well meaning and however generous, may well have the unintentional effect of imposing on many areas, an American pattern entirely unsuited to the political and economic set up of the recipient country, and bias the further development of its Veterinary profession in a way which may ultimately be detrimental".

There is one other aspect as well which is going to undermine the very existence of our profession in India. It is the question of over-production of Veterinary Graduates and the consequent unemployment, in the not distant future. India is not America economically and she cannot feed all these men through private practice. The saturation point has long been reached in the matter of opening of more and more Veterinary Colleges. The ugly monster of unemployment has already made its appearance in more than one State. It is time the authorities stop and ponder over if they are doing the right thing in agreeing to sign on the dotted line, however tempting the offer might be.

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THE
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A New Year Resolve

The *Journal* is suffering from lack of a permanent abode. The management has asked the Government of Madras and the Corporation of Madras for free grant of a piece of land to put up a building. It is likely they may consider our request favourably. But we must be prepared with the necessary finance to start work immediately. It is the sacred duty of every Veterinarian in India to send in his contribution to the Reserve Fund immediately. Let us put our shoulders to the wheel and raise this monument which is bound to attract, in years to come, members of our profession both from within and without India. Let every one of us be worthy of this noble profession. Let it not be said that we as a profession have failed her, in her hour of need. Come then, come quick, with your contribution and let us house this national *Journal* of ours in an abode of its own, before the end of 1962. Let this be our New Year resolve. Let us take a pledge to achieve this object before the new year is out.

We intend publishing a consolidated list of all contributors as a supplement to the *I.V.J.* in suitable time or as a special number with photos of all those who pay Rs. 100/- and above. May God help us in our attempt!

G. Vinayaka Muru

President, Indian Veterinary Association
and
Editor, Indian Veterinary Journal.

MADRAS, }
10-11-61. }

General Articles

STUDIES ON A SINGLE DOSE EGG-ADAPTED LIVE CANINE
DISTEMPER VACCINE*

Using Gel Diffusion and Immuno-electrophoretic techniques

By

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and

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I. Introduction

Imported Canine Distemper vaccine is marketed as a proprietary preparation in this country. Many of these preparations require two doses for satisfactory prophylaxis. They are difficult to procure and very costly—Rs. 40/- to Rs. 60/-. Instances have been recorded where prophylactic failures and break-down of immunity have occurred after their use. Many of these cases are undoubtedly due to improper storage or length of time between manufacture and use resulting in deterioration of vaccine. In the case of dogs in this country, no systematic preventive measures have been taken even in the urban areas and the chances of natural infection with 'street virus' is consequently very great. With the chances that the indigenous virus strains have for normal passage through the natural host 'virulence' could be expected to be at the highest exaltation. It is therefore probable that the exogenous strains of virus used in imported vaccines have lower powers of inducing specific antigenic response in local dogs. Due to the extensive and unchecked scope for picking the natural infection, in this country, it is reasonable to expect almost 100% of bitches to secrete antibodies in the colostrum and thereby transmit passive immunity to the litters. York and Burch (1961) working with their tissue culture - modified live virus vaccine found the duration of the passive immunity was three months. They also found that this passive immunity interferes with subsequent prophylaxis. While the immune response in dogs without passive immunity was 96.5%, the corresponding figures in respect of those with passive immunity was as low as 83.4%. In their studies they supplemented field trials of the vaccine with normograph studies on serum antibody level.

Attempts were made by the senior author to isolate and propagate indigenous strains of virus from clinical cases of Distemper with the hope of eventually adapting the virus for vaccine preparation. An egg-

*Patent applied for.

adapted single dose vaccine has since been evolved. Cross immunity experiments using laboratory reared pups proved encouraging and the vaccine was issued for field use on pups over 12 weeks old, since March 1961.

For supplementary laboratory studies on Canine Distemper virus the experimental animal of choice is the ferret. This laboratory does not maintain ferrets and these animals are not easy to procure in this country. In order to prove the specificity and antigenic worth of the vaccine, resort was therefore had to the newer techniques of gel diffusion and gel electrophoresis. This article is a report on the results of these studies.

II. Literature

A. Gel diffusion:—Bechold (1905) was the earliest to study the precipitation reaction in gels. He used goat serum and its homologous antibody for his experiment. Sia and Chung (1932) used the 'simple diffusion technique' in which the immune serum was incorporated in appropriate concentration in the gel medium which was then plated. The plates were inoculated and the precipitation zones formed around the colonies were observed. Macgraith (1933), Kirkbride and Cohen (1934) and Petri and Steabben (1943) applied similar techniques for the study of Meningococcus and for identification of Gas gangrene Anaerobes. Oudin (1948, 1949) devised a method by which the antigen solution was layered over a thin bore tube containing the solid immune serum agar mixture. The antigen-antibody precipitate formed a sharp band which moved down the tube as more and more antigen diffused into the agar. Oudin demonstrated that only one band was formed with a single antigen-antibody system whereas multiple systems produced multiple bands. Ouchterlony (1949) studied precipitation in gels in various ways. He employed diffusible substances derived from either whole cultures or from toxin filtrates and devised the 'double diffusion technique'. In this method the antigen and antibody diffused towards each other and precipitation bands developed at the point of union. He used a lantern slide covered with an agar medium in which a transverse cut was made and filled with antibody - in this case, antibodies to Diphtheria toxin. The antigen, Diphtheria bacillus, was streaked perpendicular to the ditch and zones of precipitation occurred at or near the point where the culture reacted with the antitoxin. The reacting zones formed at acute angle to the streaks. Jenson and Francis (1953) used the above technique for studies on Influenza virus.

A modification of the above technique by Mansi (1957) was an improvement. In this method cups or holes forming a definite pattern were cut in the gel medium within a petri dish. One central hole and six peripheral holes equidistant with each other were made. The

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5/6

central cup was filled with antibody and peripheral cups with antigen. Both the antigen and antibody diffused in the gel to form 'Precipitin arcs' at the point of union. Mansi applied his technique to the study of Myxoma, Swine fever, Fibroma viruses of rabbits, Canine Distemper, Rhubarth disease and Lymphocytic Choriomeningitis. On the basis of these studies he observed in the case of Canine Distemper and Swine fever, the reactions were faint when infected tissue suspensions were used as antigens. He therefore recommended the employment of untreated pieces of tissues to be filled in the basin so that the tissue came in contact with the entire edge. This modification markedly increased the reaction and distinct precipitin lines were obtained. Many workers followed the technique of Mansi for studies on various other viral diseases. These include Wittman (1958) on Fowl Pox, Prass and Gromovsek (1958) on Rabies, Forsek (1958) and Grishenkova (1958) on Swine fever, White (1958) on Rinderpest, Brown and Crick (1959) on Foot and Mouth Disease and Krishnamurthi and Hanson (1961) on Duck Hepatitis.

B. Gel electrophoresis: Curtis and Graber (1955, a, b) studied the distribueion of antigen and antibodies in gel medium during electrophoresis. Graber (1959) discussed in detail, the technique of immuno-electrophoresis and presented a resume over the interpretation of the results employing these techniques. He used a glass plate 18 cm. long and of varying widths. The plate was covered with 1-1.2% agar gel. Electrophoresis was done in Barbitol buffer, pH 8.2, using 4-5 volts/cm. of the gel. Antigen was allowed first to diffuse out of the cups cut out of the agar. When the antigen diffusion was considered sufficient, electrophoresis was stopped and recommenced after the homologous antibody was placed in a linear trench cut out of the agar perpendicular to the direction of migration of electrophoresis. The precipitation band formed after a fixed time. The method is considered as highly sensitive. Because of differences in the rate of migration of different antigenic constituents during electrophoresis and because of specific and independent nature of the reactions each antigen-antibody system in a complex could be detected separately even in trace amounts. From a perusal of available literature immuno-electrophoretic studies on Canine Distemper virus do not appear to have been made so far.

III. Materials and Methods.

A. Gel Diffusion Technique:—(i) Preparation of Gel.

The following ingredients went into the composition of the gel.

Agar (Difco)	...	15 gms.
Sodium Chloride	...	16 gms.
10% Phenol saline	...	50 cc.
Methyl orange	...	0.03 gms.
Distilled water	...	upto 1 litre.

The agar was melted and the other ingredients mixed and filtered through filter paper pulp. A standard volume of 25 c.c. of the melted mixture was poured into each of several, clean, clear, petri dishes. The medium was allowed to cool until solidification and the plates were stored in refrigerator till use. Each plate was stamped with a pattern consisting of a central well surrounded by six other wells, to form a circle. The surrounding wells were made equidistant from each other and distance between the central well and the peripheral well was 4 mm. The wells were cut in the gel with the help of a metal cork borer 7 mm. in diameter. The medium was removed to form the wells by employing suction using a Pasteur pipette. The bottom of each well was then sealed with a drop of fresh melted medium and allowed to set.

(ii) *Preparation of Antigens*: Small pieces of Chorioallantoic membrane or alternatively suspensions of Chorioallantoic membrane in saline freshly harvested from eggs grown with (a) vaccine strain and (b) American strain (A.T.C.I. No. 45 EN 219 and 220 30% CAMS 1-2 ml 4-28-58) were used as required.

(iii) *Preparation of Antibody*:—All sera employed in these experiments were undiluted and unheated. The following types of sera were used.

1. Convalescent sera obtained after recovery from natural attacks of Distemper.
2. Sera obtained after 15 days from dogs protected with the Distemper Vaccine tested and
3. Normal dog sera free from Distemper from laboratory raised dogs.

(iv) *Readings*: The petri dishes covered with a bell jar were left at room temperature for 24 hours. In positive cases the arc produced by the antigen-antibody union clearly joined in a hexagonal form. In the case of negative reaction no arcs formed even after 72 hours.

Controls: Both positive and negative controls were used.

B. Immunoelectrophoresis

(i) *Electrophoretic apparatus*: A horizontal electrophoretic apparatus was used.

(ii) *Current source*: Direct current at a potential difference of 150 volts giving 30-40 (mA) was used.

(iii) *Buffer solution*: Buffer solution for electrophoresis was made of the following composition.

Sodium barbitol	... 10.3 gms.
Barbituric acid	... 1.83 gms.
Distilled water	... made upto 1 litre pH adjusted to 8.2

STUDIES ON A SINGLE DOSE EGG-ADAPTED LIVE CANINE DISTEMPER VACCINE

Using Gel diffusion and Immuno electrophoretic techniques.

By DR. U. K. MENON and C. V. NARAYANA RAO.

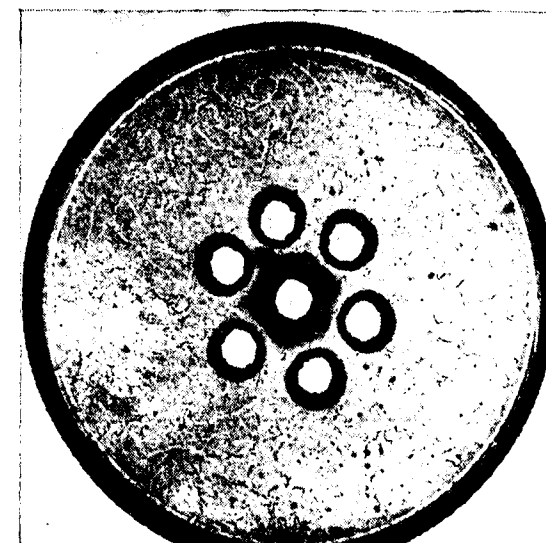


Fig. 1

I. Reaction of Serum - dog protected with vaccine.

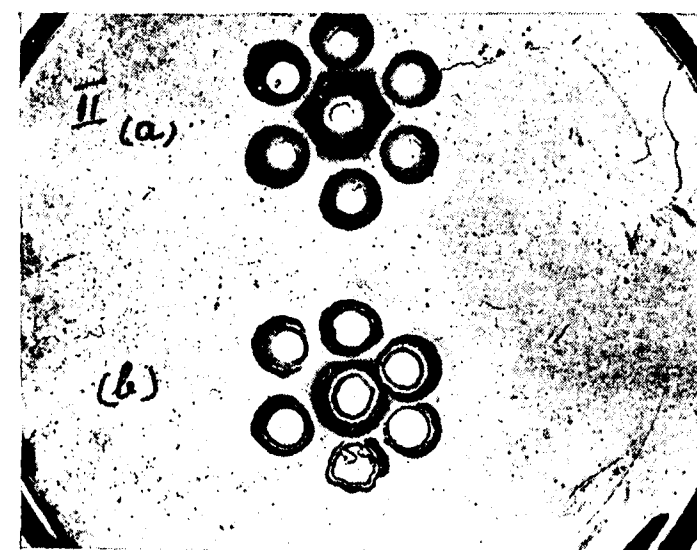


Fig. 2

II. (a) Reaction of Serum - convalescent dog.
(b) Negative control serum.

STUDIES ON A SINGLE DOSE EGG ADAPTED LIVE CANINE DISTEMPER VACCINE

Using Gel diffusion and Immuno electrophoretic techniques.
BY DR. U. K. MENON and C. V. NARAYANA RAO.

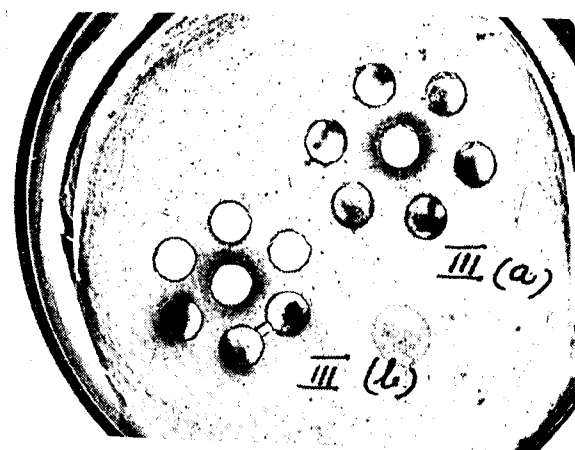


Fig. 3

III. (a) Negative control serum. (b) Negative control antigen.

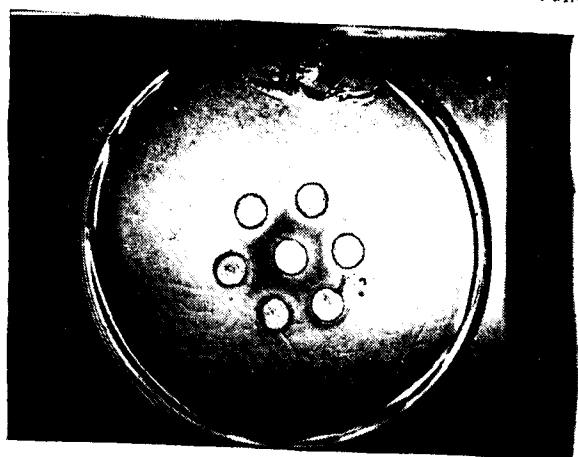


Fig. 4

IV. Reaction of serum - protected dog C virulent virus.



Fig. 5

V. Immuno electrophoresis - Distemper protected dog.

(iv) *Buffered Agar Gel*: The gel was prepared with 6.0 gms. of Difco agar mixed with 500 c.c. of Barbitol buffer, heated in a water bath till the agar was completely dissolved.

(v) *Preparation of gel plates*: The electrophoresis was performed on a layer of agar gel deposited on a glass plate 18 cm long and 13 cm broad cut out from photographic plates. The glass plates were placed in suitable trays. Two Whatman No. 1 filter paper strips each 4 cm wide and 24 cm long were placed at the ends of each of the glass plates so that the paper extended about 3 cm beyond the edge of the glass. The melted buffered agar solution was poured into the tray over the glass and filter paper strips. Sufficient agar solution was poured to form a gel deposit 4 mm thick. When the gel hardened the plates were carefully lifted after cutting the gel around the glass plate and filter paper. A light incision was made in the gel over the border of the plate covered by paper strips. The strips were bent to a 90° angle and melted agar was poured into the cut to fill the gap formed. Holes were cut in the gel so that they were opposite to each other. The holes were made with a cork borer, 7 mm. in diameter and the medium removed from the holes by suction with a pasteur pipette. The holes were sealed at the bottom with a drop of melted agar and these served as reservoirs for the antigen. The prepared glass plate with agar gel was placed in the electrophoretic apparatus filled with Barbitol buffer to the mark. The holes were filled with antigen suspension in normal saline-0.1 cc. derived from fresh harvests of chorioallantoic membrane. The current was switched on and the apparatus run for 3 hours after which the electrophoresis was stopped. An elongated trough 5 mm. wide and extending nearly to the end of the plate was made perpendicular to the axis of migration by cutting the gel with a blade and with the help of a flat foot rule. The trough was filled with 0.5 c.c. of immune serum. The distance between the wells of antigen and trough of immune serum was 8 mm. Electrophoresis was continued for another 4 hours. By this period precipitin arcs were developed. The gel was then washed in normal saline by setting the gel in a trough of normal saline for 3 days. Frequent changes of the saline were made during the period. The washing eliminated from the gel substances that had not participated in the immune reaction. For increasing the insolubility of the specific precipitate the gel was subjected to treatment with 2% acetic acid solution following the saline treatment. The excess acid was eliminated by repeated washing using distilled water.

(vi) *Readings*: The gel being transparent, the precipitin arcs were visible enough to be photographed. The clarity of the readings

were enhanced by staining. The stain was prepared of the following composition :

Amido black	... 1.0 gms.
Acetate buffer	... 900 c.c.
(Made up of equal volumes of M/10 acetic acid and sodium acetate)	
Pure Glycerol	... 100 c.c.

The staining solution was poured on the glass plate containing the agar gel and kept in contact for 4 hours. Decolourisation was effected using a washing solution of the following composition:

Acetic acid	... 20 c.c.
Pure Glycerol	... 150 c.c.
Distilled water	... 1000 c.c.

After sufficient washing the background was rendered colourless and precipitin arcs stood out against this background as black stained arcs.

IV. Results

A. Gel Diffusion:—It is clear that the Canine Distemper vaccine elicited specific precipitin arcs with protected as well as convalescent dogs' sera employed as antibody source. It failed to elicit any response in the case of known Distemper free serum. Crosstests using the American Virus (A. T. C. I. No. 45 EN 219 & 220) harvested from the chorioallantoic membrane elicited similar response as the vaccine strain thereby proving both the specificity and antigenic worth of the egg-adapted live virus vaccine. These results are illustrated in the accompanying photographs.

B. Gel electrophoresis:—The results of gel electrophoresis confirmed the inferences made on the gel diffusion experiments. No other precipitin arcs were discernable by gel electrophoresis, thereby proving the homologous character and specificity of the antigen-antibody reaction. The results of gel electrophoresis are illustrated in the accompanying photographs.

V. Summary

1. Canine Distemper Virus isolated and propagated from clinical cases of Distemper was successfully adapted to eggs and a single dose vaccine suitable for prophylaxis was evolved.

2. Initial cross immunity experiments using laboratory raised dogs *prima facie* indicated the value of the vaccine. On this basis it was issued for field trial from March, 1961 and so far the results were encouraging.

3. Further laboratory tests on the vaccine were handicapped due to the difficulty of procuring ferrets - laboratory animal of choice in work with Canine Distemper.

4. Resort was therefore had to the new technique of gel diffusion which was supplemented by gel electrophoresis in order to establish both the specificity and antigenic worth of the vaccine.

5. The results prove conclusively the efficacy and specificity of the vaccine.

Acknowledgments

We record our profound thanks to the Assistants in the Small Animal Clinic (I. P. & O. P.) who have sent us blood from clinical cases of Distemper for the isolation of the virus. We also record our thanks to Dr. S. G. Natarajan, G.M.V.C., B.V.Sc., the then Lecturer in Bacteriology and Dr. B. N. Rai, G.M.V.C., B.V.Sc., D.T.V.Sc., M.S., Reader in Bacteriology who have been preparing the vaccine from the adapted strains of the virus. To Sri. R. Uppili, we are indebted for the photographs and the staff of the Bacteriology Department in general for their help and co-operation. For the supply of large quantities of embryonated eggs used for the work, the authors have to thank the College poultry unit and Dr. R. D. Michael, G.M.V.C., B.V.Sc., Lecturer in Hygiene particularly. The senior author is highly indebted to Dr. F. D. Wilson, G.M.V.C., B.V.Sc., M.S., Professor of Surgery for the free supply of pups required for the experiments.

LITERATURE

1. Bechold, H. (1905) ... *Strukturbuilding in Gallerten*, Ztschr Phys. chemie, **52**, 185-199. (Cited by Oudin, J. *Methods in Medical Research*, **5**, 335.
2. Brown, F. and Crick, J. (1959)... Application of agar gel diffusion analysis to a study of antigenic structure of inactivated vaccines prepared from the virus of Foot and Mouth Disease. *J. Immunol.* **82**, 444
3. Curtis A. Williams and Graber, P. (1955) ... Immuno-electrophoretic studies on serum proteins. *J. Immunol.* **74**, 158, 897, 404.
4. Frass, A. and Gromovasek, P. ... (1958) Dijagnostika bjesnoce pomocu gel-difuzionog precipiti testa. (Diagnosis of Rabies by the gel diffusion precipitation test—*Vet Archiv*, **28**, 258-258.
5. Forsek, M. Z. (1958) ... Primjena gel difuzionog precipitintesta udokazivanju virusa svinjske kuge. (Demonstration of swine fever virus by the gel diffusion precipitation test).—*Vet. Glasn.* **12**, 867-871.
6. Graber, P. (1959) ... *Immuno-electrophoretic Analysis. Methods of biochemical analysis. VII.* 1-39. Edited by David Glick, Interscience Publishers, Inc., New York-London.

7. Grishenkova, A. S. (1958) ... Agar precipitation reaction for the laboratory diagnosis of swine fever. *Proc. Lenin Acad. agric. sci.*, **23**, 35-37.
8. Jenson, E. K. and Francis, T. (1953) ... Antigen-antibody precipitates in solid medium with Influenza virus. *J. Immunol.* **70**, 321-325.
9. Krishnamurthy, D. and Hanson, E. L. (1961) ... A modified micro gel diffusion method and its application in the study of the virus of Duck hepatitis. *Am. J. Vet. Res.* **27**, 274-278.
10. Kirkbride, M. D. and Cohen, S. R. (1934) ... Precipitation reaction of meningococcus strains with immune serum agar plates in relation to antigenic activity. *Am. J. Hyg.* **20**, 444-453.
11. Macgraith, B. G. (1933) ... Rough and smooth variants in stock cultures of Meningococci. *Brit. J. Exper. Path.* **14**, 227-235.
12. Mansi, W. (1957) ... The study of some viruses by the plate gel diffusion precipitin test. *J. comp. Path.* **67**, 293-303.
13. Oudin, J. (1948, 1949) ... *Methods in Medical Research*, **5**, 335 (1952). The Year Book Publishers, Inc. 200, East Illinois Street, Chicago.
14. Ouchterlony, C. (1949) ... An *in vitro* test of toxin producing capacity of *Corynebacterium diphtheriae*. *Lancet*, **I**, 346.
15. Petri and Steabben, D. (1943) ... Specific identification of the chief pathogenic Clostridia of gas gangrene. *Brit. Med. J.* **I**, 377-379.
16. Sia and Chung (1932) ... Use of anti-Pneumococcus serum agar for the identification of Pneumococcal types. *Proc. Soc. Exper. Biol. and Med.* **29**, 792-995.
17. White, G. (1958) ... A specific diffusible antigen of Rinderpest virus demonstrated by the agar double diffusion precipitation reaction, *Nature*, **181**, 1409.
18. Wittmann, G. (1953) ... Demonstration of precipitating antibodies in fowl pox by the agar diffusion technique. *Zool. Vet. Med.* **5**, 769.
19. York J. Charles and Burch, R. George (1961) ... Canine distemper immunisation, *J. Am. Vet. Med. Assoc.* **138**, 298-301.

A PRELIMINARY REPORT ON A DISEASE RESEMBLING MUCOSAL DISEASE COMPLEX IN BUFFALO CALVES IN MADRAS

BY

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Among cattle diseases in this country Rinderpest occupies a prominent place. But of late, many other viral diseases resembling Rinderpest have come to be recognised. Thus, from U. S. A. Olafson *et al* (1947), Pritchard (1954) and Ramsey and Chivers (1953) described respectively Viral Diarrhoea, New York, Viral Diarrhoea, Indiana, and Mucosal Disease. Reports from other countries are those of Childs (1946) from Canada, Dow (1956) and Huck (1957) from England, Heinning (1953) from Germany, Blood *et al* (1957) from Newzealand, McCormick *et al* (1957) from Australia and Pande and Krishnamurthy (1960) from U. P. India. From France, Tornut *et al* (1960) described three forms of Mucosal Disease Complex. It is pertinent that all the above reports excepting that from India are diseases affecting white cattle. The present report deals with a similar disease affecting buffalo calves.

Incidence

From the information available, the outbreak of the disease appeared seasonal, manifesting soon after rains. The cases noticed were mostly in the months of September, October and November. Though observations based on autopsy records made us suspect a low morbidity and high mortality rate, epizootological and clinical observations in affected herds led us believe on the other hand, a high morbidity with low mortality incidence in this disease. Roughly, it would be safe to say that morbidity among the affected would be about 30-40% and the mortality 5-10%. Intercurrent infections and other stress factors which lower the vitality of the animal might enhance the mortality rate considerably. Thus, it is important in dealing with a disease of this nature to observe all the animals in the herd inclusive of the apparently healthy ones in order to assess the true morbidity rate. None of the white calves and other ruminants kept under identical environmental conditions showed the disease.

Symptomatology

Typical clinical cases show an initial transient pyrexial reaction of 102-104°F, lasting for one to two days. Often this stage is overlooked. There is serous discharge from the nostrils which become

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mucoid later on. The animal is dull, depressed and does not feed well. While nibbling at grass or straw, it refuses concentrates and exhibits great thirst. The nasal mucosa becomes hyperaemic and in a few cases circular eroded or ulcerated areas are seen in the mucosa of the anterior nares. Profuse lacrymation may be seen. Opacity of the cornea and cloudiness of the aqueous humor are noticed in a few cases and the conjunctiva injected. The ocular lesions often disappear in about a week's time.

The mucous membrane of the lips is highly congested and occasionally cyanotic in early stages with slight salivation. Careful examination of the oral mucosa may reveal small whitish necrotic foci which later get eroded. These are usually shallow and elliptical, although a few punched out circular ulcers 1-2 m. m. in diameter are also discernable. Such erosive or ulcerative type of lesions are located in the dental pad, lower palate, cheeks, dorsal and lateral aspect of the tongue and hard palate. In some instances erosions heal up rapidly, leaving a whitish scar which could be detected on careful examination.

The dung is normal in the beginning but becomes slightly loose (porridge-like consistency) by about the second week. The faeces is non-foetid, mixed with lot of mucus and sometimes flecked with blood-clots. The animal shows tenesmus. Grunting with accelerated respiration and dry cough are occasionally seen. The animal becomes weak, dehydrated and is unable to get up and dies after 6 to 8 hours of prostration.

Haematological studies made on 21 animals at different stages of this disease did not reveal any consistent and diagnostic change.

Autopsy Findings

Gross findings based on the post-mortem examinations on 17 female and 25 male buffalo calves are briefly reviewed. All the calves excepting one were received from King Institute, Guindy. Most of the calves were emaciated. Small shallow ulcers and erosions in the lips, buccal mucosa, dental pad, hard palate, cheeks, dorsal and lateral aspect of the tongue were frequently seen. The defects noticed were either small, linear erosions, brownish in colour or circular punched out ulcers 2-4 m. m. in diameter. Some were larger measuring up to 1-2 cm. in diameter with granulating base. On the dental pad the elliptical erosions which appeared yellowish-brown were clearly discernable against the normal rose-pink background. The lesions in the cheeks were either near the commissures of the mouth or the base of the molars and appeared irregular in shape due to coalescence of two or more ulcers. The lower palate revealed circular shallow ulcers about 1 c. m. in diameter, while those in the hard palate were oval and larger

A Preliminary Report on a disease resembling Mucosal Disease Complex in buffalo calves in Madras

By K. P. CHANDRASEKHARAN and G. BALASUBRAMANIAM



Fig. 2
Tongue-lateral aspect showing irregular ulcers.



Fig. 1
Hard Palate showing oval ulcers (1 c.m. x 0.75 c.m.)





Fig. 5
Cornea to show opacity.

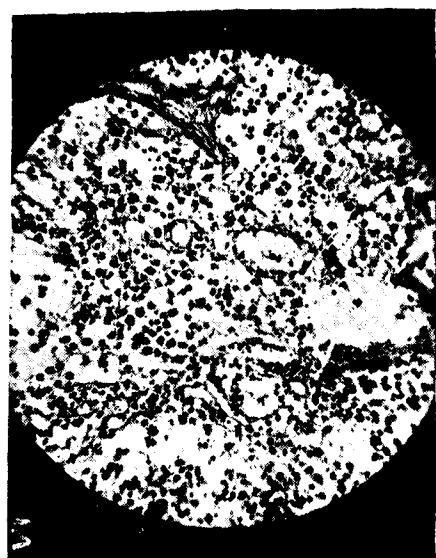


Fig. 6
Lymph node to show increased mononuclear reaction.

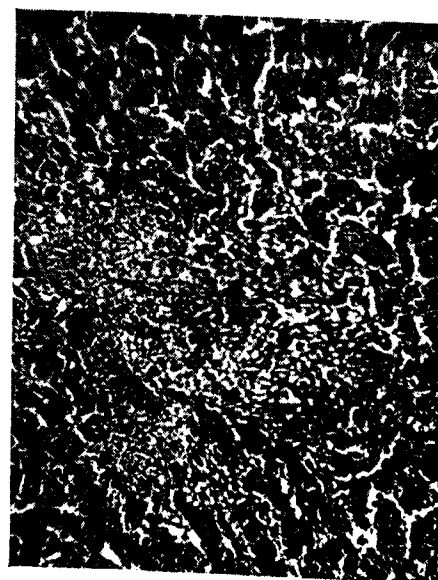


Fig. 7
Liver showing focal areas of necrosis.



Fig. 8
Oesophagus:—Note the coagulative necrosis of the mucosa and ulceration.

measuring up to 2 c. m. (Fig. 1). The lingual defects were also larger and had a pitted or irregular appearance with a brownish-red base. These lesions were seen either on the lateral (Fig. 2) or on the dorsal aspect of the root of the tongue but not on the ventral aspect or near the anterior region. Pharynx revealed small raised necrotic whitish areas and similar lesion was seen in the epiglottis in one case. Necrotic streaks with fibrinous deposits were found in the oesophagus in three instances.

The abomasal mucosa showed varying degrees of congestion and oedema. Small erosions (Fig. 3) to large patches of denuded epithelium were frequent. Petechiae, streaks of haemorrhage (Fig. 4) and adherent tenacious mucus were constant findings. While the mucous folds of the fundic region usually revealed only small erosions with raised borders, those in the pyloric area were more severe.

The intestinal lesions were mostly confined to jejunum and ileum, the deodenum being less often involved. The mucosa was oedematous and revealed petechiae and patches of haemorrhages. Adherent mucus was a constant finding. Only on a single occasion were a few scattered ulcers found in the jejunum. Fibrinous shreds in one instance were found in the small intestines. The mucosa of the jejunum and ileum in some cases was thickened and wrinkled both transversely and longitudinally to resemble the J. D. lesion. Also elongate or ovate raised areas with depressed centre were seen scattered in the posterior half of the deodenum and jejunum. It is an interesting observation that the large intestine did not show any lesion even in the very severe form of the disease. The intestinal contents were mixed with mucus and in a few cases tinged with blood.

The mesenteric lymph nodes were oedematous, juicy and occasionally even haemorrhagic; sometimes, even the supra-scapular and precrural lymph nodes were juicy and enlarged. Petechiae and haemorrhagic streak along the coronary grooves and endocardium of the heart were seen. Spleen was grossly normal. Liver in a few cases showed pin-point or diffuse whitish areas both on the surface and in the parenchyma. The lungs showed emphysematous patches. Congestion of the meninges was found in two instances. Corneal opacity (Fig. 5) was seen in two experimental calves which however, got cleared after a week. It is noteworthy that ulcers in the interdental spaces, thickening of the coronary band or evidence of laminitis, focal dermatitis and erosions in the pillars of rumen or folds of the omasum so frequently described by American and other workers were not found in any of the autopsies conducted here. Routine cultural examination of material (heart blood and spleen) taken from occasional cases did not reveal any significant bacteria.

Histopathology

The oral lesions revealed degenerative changes in the epithelial layer and inflammatory cellular reaction in the lamina propria. The epithelium showed coagulative type of necrosis. Microscopic changes in the oesophagus consisted of necrotic changes in the mucosa and cellular infiltrations around the erosions. In abomasum the changes were coagulative type of necrosis of the mucous membrane and atrophy of the glands, oedema, congestion and engorgement of the blood vessels in the sub-mucous layers. In the intestine catarrhal inflammation, sub-mucous oedema, capillary engorgement and thrombosis of vessels were frequent. The intestinal glands were dilated, filled with mucus, while some showed cystic dilatation and atrophy of the epithelium. In the wrinkled areas, marked cellular infiltrations of the mucus and sub-mucous layers were seen, the cells chiefly involved being round-cells and large mono-nuclears. The mesenteric lymph nodes revealed severe congestion in some, while in others marked accumulation of the large mono-nuclears and relative depletion of the lymphocytes were seen. (Fig. 6). The liver showed fatty changes and focal necrosis. (Fig. 7).

Transmission experiments

Transmission experiments were attempted using glycerinated splenic pulp material on 5 buffalo calves and 4 white cattle. While the buffalo calves showed reaction, the white cattle did not respond to the infective material. In a typical case in a buffalo calf, there was lacrymation, increased mucoid nasal discharge, congestion of the oral and nasal mucous membranes between the 4th to 7th day, diarrhoea on the 7th day, marked anorexia on the 8th day, weakness and prostration on the 13th day after infection. P. M. revealed erosions on the tongue, necrotic areas in the pharynx, fibrinous shreds in the oesophagus, (Fig. 8) haemorrhages on the folds of the abomasal mucosa with small raised ulcers and oedema, petechiae in jejunum, copious amount of mucus in jejunum and ileum, oedematous condition of the mesenteric lymphatic node and congestion of the meninges. Other buffalo calves that were destroyed after varying periods revealed erosions of the tongue, petechiae of the abomasal mucous membrane, small ulcers in the fundic region and adherent mucus, stray petechiae in the duodenum and jejunum and J. D. like lesions in the jejunum and early portions of the ileum, juicy and oedematous condition of the mesenteric nodes. In two calves unilateral corneal opacity and cloudiness of the anterior chamber were seen which, however, resolved after 7-10 days. Splenic materials from two cases sent to the Institute of Veterinary Preventive Medicine, Ranipet, were declared negative for Rinderpest,

Discussion

Olafson *et al* (1946) first recognised a viral diarrhoea in cattle as a separate entity. Subsequently, others have described similar conditions of viral origin under different nomenclature, which are now grouped under the collective name of Mucosal Disease Complex (M.D.C.) In all these conditions, erosions and/or ulcers of the oral mucosa and gastrointestinal lesions (resulting in diarrhoea) were prominent. In India, we are familiar with Rinderpest, which shows similar manifestations and it is likely that cases of M. D. C. might be mistaken for Rinderpest.

Now that Rinderpest has been eradicated from South India at least, we have to be more vigilant in recognising any disease that has even a remote resemblance to Rinderpest. The M. D. C. although immunologically distinct, as shown by Walker and Olafson (1947) and Derbishyre *et al* (1961) has a very close clinical and pathological resemblance to Rinderpest. However, these diseases are less severe in their manifestations. Gillispie *et al* (1961) have recently found immunological relationship between Viral Diarrhoea and Mucosal Disease by neutralisation tests. It therefore follows that close relationship exists between these different bovine enteric viral entities and great caution needs to be bestowed before describing any viral disease of bovines affecting the alimentary tract as a new disease.

It has been claimed by Maurer (1955) and others that lesions on the dorsal aspect of the tongue are not a feature in Rinderpest and Viral Diarrhoea. We feel, relative to Rinderpest, most of the Indian workers would disagree with this statement. Broadly analysing, but for the immunological differentiation, the lesions in Rinderpest, Viral Diarrhoea and Mucosal Disease are one of varying degrees of severity only. In Viral Diarrhoea the oral lesions are small, slightly more severe in Mucosal Disease and most in Rinderpest. Similarly, diarrhoea is of the shooting type in Rinderpest, slightly less severe in Viral Diarrhoea and is of porridge like consistency and intermittent in Mucosal Disease. In Rinderpest, definite and severe involvement of the lymphoid tissue is reported resulting in marked leucopenia. Also leucopaenia is reported in Viral Diarrhoea but in Mucosal Disease this is variable.

The other viral diseases grouped under M. D. C., like Malignant Catarrh, Infectious Bovine Rhinotracheitis and "X" disease (Hyperkeratosis) have some resemblance to M. D. C. The prominent upper respiratory affections, nervous involvement, lameness and relatively short duration will differentiate Malignant Catarrh. Similarly, marked upper respiratory tract involvement, short course, absence of diarrhoeic symptom usually will differentiate Infectious Bovine Rhinotracheitis,

"X" disease reveals characteristic proliferative lesions in the oral cavity and thickening of the skin. (These diseases have not been reported from India.)

The disease may be mistaken for Fascioliasis, Amphistomiasis, Coccidiosis, Winter diarrhoea and intestinal form of Haemorrhagic Septicaemia due to the diarrhoic syndrome. But the causative factor in all the above conditions could easily be established and also none of the above diseases manifest oral lesions.

Similarly the oral lesions may be confused with those in Foot and Mouth disease, Infectious Ulcerative Stomatitis, Bovine Papular Stomatitis and other stomatitidis, but the non-involvement of the gastro-intestinal tract in these diseases will stand out prominently for purpose of differentiation.

The disease described here very closely resembles the Mucopolypurulentitis described by Pande and Krishnamurthy (1960) in buffaloes. Both have the oral and alimentary lesions and both appear to be species specific. But the presence of ocular lesions and absence of lesions in the large intestines and the skin serve to differentiate these two. The above authors have described a "Mucosal Disease" in buffalo calves between 15 days to 2½ months, older calves being non-susceptible, while buffalo-calves above 3 months only are usually affected in Madras.

Summary

1. A disease in buffalo calves simulating the Mucosal Disease Complex is reported from Madras. Species specificity is suspected from a study of the spontaneous cases and limited transmission experiments conducted.
2. The symptomatology and autopsy findings are given and differential diagnosis discussed.
3. The absence of lesions in the large intestines is noteworthy.
4. Ocular lesions are occasionally seen.
5. Cutaneous lesions, lameness and interdigital ulcers are absent.
6. Transmission experiments were attempted in 5 buffalo and 4 white calves; while the buffalo calves reacted, the white calves did not respond to the infective material. Although a viral agent is suspected, more work needs to be done to confirm transmissibility of the disease and to conclusively prove the nature of the etiological agent.
7. Epizootology, symptomatology and distinct pathology of the disease would serve to distinguish this from other members of Mucosal Disease Complex, and Rinderpest.

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REFERENCES

1. Baker, J. A., York, C. J., ... *Am. J. Vet. Res.* **15**, 525.
Gillespie, J. H. and Mitchell, G. B. (1954)
2. Blood, et al. (1957) ... *Aust. Vet. J.* **33**, 75.
3. Childs, T., (1916) ... *Canad. J. Comp. Med. and Vet. Sci.* **10**, 316.
4. Coggins, Gillespie, Robson, ... *Cornell. Vet.* 539.
Thompson, Phillip, Wagner and Baker (1961)
5. Derbyshire, J. H., Brown, R. D., ... *Vet. rec.* **73**, 255.
Scott, G. R. and Huck, R. A. (1961)
6. Dow, C., Jarrett, W. F. H. and... *bid* **68**, 620.
McIntyre, W. J. H. (1956)
7. Gillespie, J. H., Coggins, L., ... *Cornell Vet.* **51** 155.
Thompson and Baker (1961)
8. Heinig, A., (1955) ... *Arch. Exp. Vet. Med.* **9**, 910
9. Huck, R. A. (1957) ... *Vet. rec.* **69**, 1207.
10. Huck, R. A., (1957) ... *J. Comp. Path. Ther.* **67**, 267.
11. Johnston, K. G. (1959) ... *Aust. Vet. J.* **35**, 101.
12. McCormick, R. E. and ... *Aust. Vet. J.* **35**, 432.
George T. D. (1969)
13. Miller, N. J. (1955) ... *J.A.V.M.A.* **126**, 468.
14. Olafson, P., MacCallum, A. D. ... *Cornell Vet.* **36**, 205.
and Fox, H., (1946)
15. Olafson, P., Rickard, G., (1947) ... *Ibid* **37**, 104.
16. Pande, P. G. and Krishna- ... Paper presented to the 10th Dis. Invest.
murthy, D., (1960) Officers Conf. Bhubaneswar, Orissa.
17. Piercy, S. E., (1952) ... *Brit. Vet. J.* **108**, 35.
18. Pritchard, W. R., Bunnell, D., ... *Ann. Rep. Purdus. Agric. exp. Station.*
Moses, H. E. and Doyle, L. P. (1954)
19. Pritchard, W. R., Taylor, D. R., ... *J.A.V.M.A.* **128**, 1.
Moses, H. E. and Doyle, L. P. (1956)
20. Ramsay, F. K., (1956) ... Dissertation. Iowa State College-Iowa.
21. Ramsay, F. K. and ... *North Am. Vet.* **34**, 629.
Chivers, W. H., (1953)
22. Rooney, J. R., (1957) ... *Am. J. Vet. Res.* **18**, 213.
23. Tournet, J., Locaze, P., ... *Rev. Med. Vet.* **112**, 81.
Bidon, P., Laporte, J., (1961)
24. Walker, R., and Olafson, P. ... *Cornell. Vet.* **37**, 107.
(1947)

**CRITICAL ASSESSMENT OF THE ETIOLOGY OF ENZOOTIC
BOVINE PARAPLEGIA IN MYSORE STATE WITH
PARTICULAR REFERENCE TO CEREBROSPINAL
NEMATODIASIS***

BY

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Introduction

Several species of nematodes have been recorded sporadically in nervous system and its associated structures in apparently normal animals (Sprent 17). Some species of nematodes have been reported in cerebrospinal system producing symptoms of paraplegia and paralysis in animals (Innes², Innes, Shoho and Pillai³, Kennedy and Whitlock⁹). *Setaria* species are the normal inhabitants of the peritoneal cavity of cattle and their immature forms and larvae are known to wander in the cerebrospinal system causing mechanical injuries to the brain and spinal cord. This condition has been described as Cerebrospinal Nematodiasis. After the publication of Japanese work on the incidence of Cerebrospinal Nematodiasis in horses, sheep and goats in Korea by a British worker (Innes, ², ⁴, ⁶) several research workers began to think of obscure nervous diseases in terms of Cerebrospinal Nematodiasis and since then paralytic diseases of unknown etiology in animals have attracted the attention of many workers all over the world to take up histopathological studies of nervous system in such cases.

In India, too, in view of the information already accumulated regarding Cerebrospinal Nematodiasis in animals, veterinary research workers began to think seriously of the problems of obscure diseases like cattle paralysis, lumbar paralysis in goats and sheep and Kumri in horses. In Mysore State an obscure disease in cattle known as Bovine Paraplegia and Paralysis is prevalent in some parts of Shimoga, North Kanara and South Kanara Districts for the past 30 years. Similarly diseases like Lumbar Paralysis in goats and sheep in Orissa, Uttar Pradesh and in other parts of India, are prevalent. In Ceylon paraplegia in goats is being reported since several years (Crawford ¹). In the new Mysore State after the integration of the districts of North Kanara and South Kanara from old Bombay and Madras State respectively, Bovine Paraplegia and Paralysis have become one of the major obscure diseases of cattle and every year a considerable number of cattle in the endemic area is lost on account of this disease. The Veterinary disease investigation officers of Ex-Bombay, Madras and Mysore States (Kulkarni¹⁰, Ramakrishnan¹⁴, Neelakanta Iyer¹⁸ and Mohiyuddeen¹¹) tried to know the etiology of this disease, but the exact causal agent could not be found definitely.

*Read at the I.C.A.R. Conference on Parasites and Parasitic Diseases held at Madras in September, 1961.

The systematic and detailed investigation carried out in Mysore State (Mohiyuddeen¹²) revealed that the so called bovine paraplegia or paralysis is not due to any specific bacterial or pathogenic protozoan infection like latent trypanosomiasis nor it is due to mineral deficiency like that of calcium, magnesium and inorganic phosphorus. The most interesting observation already recorded in Mysore State was the occurrence of nematode larvae and immature worms in the spinal cord of cattle dead of Paraplegia and Paralysis. The histological sections of brain and spinal cord besides revealing the transverse sections of the nematode had the lesions of patchy encephalomyelomalacia. This interesting finding was recorded in bovines for the first time. Subsequently Cerebrospinal Nematodiasis was reported in goats in Uttar Pradesh (Katiyar⁷, Katiyar and Varshney⁸).

Observation

During further investigation in Mysore State, one more case of Bovine Paraplegia revealed transverse sections of a nematode in the spinal cord on detailed histopathological studies. It was not possible to indentify the genus and the species of the nematode from the transverse section of the worm observed microscopically in the nervous tissue. Lesions of patchy encephalomyelomalacia were also observed. Still detailed histological study is being pursued. Besides, six healthy cattle were purchased from villages known to be endemic for the disease and kept under observation for more than a month. Then they were sacrificed to study the histopathology of brain and spinal cord: In four of these healthy animals adult *Setaria* worms were found in the peritoneal cavity.

Though the nematode larvae and immature worms were found in the brain and spinal cord of a few cases of Bovine Paraplegia, so far it has not been possible to state definitely that Cerebrospinal Nematodiasis is the cause of the obscure disease known as Bovine Paraplegia in Mysore State. The British and Japanese workers on Cerebrospinal Nematodiasis, agree that it is the result of mechanical injury caused by the migration of nematode larvae and immature forms in the cerebrospinal system. On critical study of the problem it is not easy to reconcile with the idea of cerebrospinal nematodiasis as the etiology of the disease, since nematodes in abnormal situations have been observed normally without producing any apparent symptoms (sprent¹⁷).

In Korea, the Japanese workers conducted extensive field trials with filaricidal drugs like caricide (a product of Lederle laboratories, U. S. A.) administering it orally to treat the affected animals and also as prophylactic measures in healthy animals and claimed considerable

amount of success (Shoho^{13, 16}). In Mysore State also caricide was tried on fifteen cases of typical Bovine Paraplegia in the endemic area and encouraging results were reported. It is easily explainable that any antifilarial drug destroys all the nematode larvae in the system but it is very difficult to understand and explain how the mechanical damage already caused to the brain and spinal cord by migration of these worms is repairable by the filaricidal drug particularly when it is definitely known that of all the tissues in the body, neurons of the nervous tissues have no power of regeneration.

Summary and Conclusions

1. Besides the presence of nematode larvae and immature worms in brain and spinal cord of two cases of Bovine Paraplegia (already published), in this note result of further study of another case of Bovine Paraplegia in which transverse sections of a nematode were observed in the spinal cord, has been reported.

2. The genus and the species of the nematode could not be identified in this case also from the cross section of the worm observed microscopically in the spinal cord.

3. The result of treatment of fifteen ailing animals with caricide drug indicating considerable improvement and gradual recovery has been recorded.

4. Of the six healthy cattle from villages known to be endemic for this disease purchased for histopathological studies of brain and spinal cord, in four animals adult *Setaria* worms were found in the peritoneal cavity.

In assessing Cerebrospinal Nematodiasis as the cause of Bovine Paraplegia and Cattle Paralysis in Mysore State and Lumbar paralysis in goats and sheep in other parts of India, it is highly desirable to eliminate all other probable etiological factors by systematic and intensive investigation, because Cerebrospinal Nematodiasis by itself may not be the actual cause of such obscure diseases. It is probable that the real etiological agent may be masked and Cerebrospinal Nematodiasis may, in association with it, aggravate the condition. Some workers (Innes and Shoho⁶) have speculated upon the possibility that the larvae of *Setaria* species may transmit the virus of Japanese B. encephalitis. It is interesting to note that in some parts of Shimoga district of Mysore State where Bovine Paraplegia is prevalent, a virus disease of man and monkey known as Kysanur forest disease is also prevalent. As sufficient work to rule out or establish the possibility of virus etiology in case of Bovine Paraplegia in Mysore State, has not been done so far, it is not proper to make speculations at this stage. Therefore, the incidence of Cerebrospinal Nematodiasis in animals in

India as a definite etiological factor should not be taken as certain by a few reports of the presence of nematodes in the nervous system of animals as already recorded (Mohiyuddeen,^{11, 12} Katiyar⁷, Katiyar and Varshney⁸).

It has been observed that certain research workers in India consider the so called paraplegia and paralytic symptoms in animals as one disease. Therefore it is felt desirable to emphasize that paraplegia and paralysis are symptoms of several specific and non-specific diseases involving nervous system. Paralysis like icterus is only a symptom and not a disease by itself and hence all conditions associated with paralytic symptoms cannot be regarded as a single disease entity. Under these circumstances the tendency among certain workers in India to consider all paralytic conditions in animal as one disease should be discouraged and unless most critical assessment of Cerebrospinal Nematodiasis is done at every stage of its report from any part of India, it is not possible to check erroneous conclusions regarding several obscure diseases characterised by paraplegia and paralysis in animals.

Acknowledgment

I am grateful to Dr. K. S. Shetty, Director of Animal Husbandry and Veterinary Services in Mysore, for his interest in this problem and for entrusting me with the supervision and technical guidance of this investigation. I am thankful to Dr. N. S. Krishna Rao, Professor of Parasitology of M. V. C. for identification of worms collected from the peritoneal cavity of healthy cattle. My thanks are due to Sri. G. A. Hardikar, Deputy Director, Serum Institute, Bangalore for affording facilities for the work at the laboratories of Mysore Serum Institute. I am also thankful to Dr. R. D. Nanjiah, Principal, Mysore Veterinary College, for his help in the publication of this critical note. Lastly I thank Sri. B. S. Srinivasa Murthy and Sri. B. M. Kuppaswami for their assistance and co-operation in this work.

REFERENCES

1. Crawford, M. (1939-42) ... Annual reprints, The Government Veterinary Surgeon, Ceylon.
2. Innes J. R. M. (1951) ... Necrotising Encephalomyelitis (encephalomyelomalacia) of unknown etiology in goats in Ceylon with similarities to Setariasis of sheep, horses and goats in Japan. *Brit. Vet. J.* **107**, 187-201.
3. Innes, J. R. M., Shoho, O. and Pillai, C. P. (1952) Epizootic Cerebrospinal Nematodiasis or Setariasis. Focal encephalomyelomalacia in animals in the orient caused by immature *Setaria digitata*; a disease which may occur in animals in other parts of the world. *Brit. Vet. J.* **108**, 71-88.

4. Innes, J. R. M. (1952) ... Cerebrospinal Nematodiasis — a nervous disease of animals caused by immature Nematodiasis (*Setaria digitata*) and its relationship to Kumri of horses in India. *Indian Vet. J.* 29, 81-86.
5. Innes, J. R. M. and Shoho, C. (1952) ... Nematodes, nervous disease and neurotropic virus infection. *Brit. Med. J.* 16, 366-368.
6. Innes, J. R. M. (1953) ... The possible occurrence of Cerebrospinal Nematodiasis in goats in India. *Brit. Vet. J.* 109, 451-455.
7. Katiyar, R. D. (1960) ... Lumbar paralysis among sheep and goats of Uttar Pradesh. *Indian Vet. J.* 37, 167-178.
8. Katiyar, R. D. and Varshney (1961) ... Lumbar paralysis in sheep and goats in Uttar Pradesh with special reference to its etiology, prophylaxis and therapy. *Indian Vet. J.* 38, 20-26.
9. Kennedy, Whitlock and Roberts (1952) ... Neurofilariosis — a paralytic disease of sheep, introduction, symptomatology and pathology. *Cornell. Vet.* 42, 118-24.
10. Kulkarni, H. V. (1952) ... An undiagnosed disease among cattle and buffaloes of North Kanara District. *Indian Vet. J.* 28, 417-423.
11. Mohiyuddeen, S. (1955) ... Cerebrospinal Nematodiasis among bovines in some Malnad tracts of Mysore State. *Current Science* 24, 340-341.
12. Mohiyuddeen, S. (1956) ... Enzootic bovine paraplegia in some Malnad tracts (hilly and heavy rainfall region) of Mysore State with particular reference to Cerebrospinal Nematodiasis as its probable cause. *Indian J. Vet. Science & Anim. Husband.* 26, 1-26.
13. Neelakanta Iyer, D. and Seetharaman, J. (1953) ... Bovine Paraplegia in South Kanara District, Madras State. *Indian Vet. J.* 30, 138, 142.
14. Ramakrishnan, M. and Ananthapadmanabhan, K. (1953) ... A preliminary note on investigation into Bovine Paralysis in South Kanara District, Madras State. *Indian Vet. J.* 29, 291-303.
15. Shoho, C. (1952) ... Further observation on epizootic Cerebrospinal Nematodiasis — chemo-therapeutic control of the disease by 1-Diethyl Carbomyl — 4-Methyl piperazine citrate; preliminary field trials. *Brit. Vet. J.* 108, 131-141.
16. Shoho, C. (1954) ... Prophylaxis and therapy in epizootic Cerebrospinal Nematodiasis of animals by 1-Diethyl carbomyl — 4-Methyl Piperazine dihydrogen citrate; Report of a second field trial. *Vet. Med.* 49, 459-462.
17. Sprent, J. F. A. (1955) ... On the invasion of the central nervous system by nematodes. *Parasitology*, 45, 31-39.

THE DIAGNOSIS OF CYSTICERCOSIS IN GOATS AND SHEEP BY HAEMAGGLUTINATION TEST*

BY

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In recent years, serological tests have been used with advantage for the diagnosis of several parasitic diseases including hydatidosis. In man, the Casoni intradermal and complement fixation tests have been widely used to detect hydatid cysts (Jolly, 1958; Magath, 1959; Knierim, 1959; Rakower, 1960; Benex and Lamy, 1960). Angelillo *et al* (1959) have described a conglutination reaction in human and animal Echinococcosis. An indirect haemagglutination test for hydatid disease of man has been described by Garabedian *et al* (1957), while Norman *et al* (1959) used the bentonite flocculation test for the same purpose. Of late, these tests have been used by several other workers (Kagan *et al*, 1960; Garabedian *et al*, 1960; Mandras and Addis, 1960) taking crude or concentrated hydatid fluid as well as its purified extracts as antigens. Addis and Mandras (1958) and Knierim and Niedmann (1961) found the haemagglutination test to be more sensitive and specific than complement fixation test.

The incidence of cysticercosis in goats and sheep is high in this country and elsewhere, but there is no reliable method of diagnosis during life. In man, *Cysticercus* epilepsy, resulting from brain involvement, has been reported to occur in army personnel especially those who had spent part of their life in India and diagnosis is based upon X-ray examination (Dixon and Lipscomb, 1961). The present study was undertaken to find out the diagnostic value of the haemagglutination test in cysticercosis of goats and sheep.

Materials and Methods

Blood from adult goats and sheep was collected from the slaughter house and sera were stored at 4°C. and tested within 7 days after collection. Usually no preservative was added, but attempts were made at all stages to deal with the serum samples under sterile conditions as far as practicable. After the carcasses were opened, their abdominal cavities were searched for *Cysticercus* cysts and the blood samples were marked positive or negative basing upon the presence or absence of cysts. In all, 89 goat and 67 sheep sera were screened.

For the collection of cystic fluid, whole cysts from goats and sheep were carefully removed and the fluid was collected aseptically in a sterile container and stored at 4° C.

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The tannic acid haemagglutination method of Boyden (1951) was employed using pooled unconcentrated goat cyst fluid as the antigen. The fluid was made isotonic by the addition of 0.1 ml. saturated saline to each ml. of the fluid. A final concentration of 0.5% sensitized sheep erythrocytes was used for the test proper. After decomplexation (56° C, 30 minutes) and absorption of isoagglutinins on classical lines, sera were titrated from 1:10 to 1:5, 120 in two-fold serial dilutions. Serum, erythrocyte and saline controls were set up with each sample and results were recorded when the controls did not show nonspecific or erroneous reactions. With 10 each of positive and negative serum samples cross-haemagglutination tests were performed with erythrocytes sensitized separately with cystic fluid of caprine and ovine origin.

For the purpose of comparison, some of the positive and negative serum samples were put to the precipitation test also. The test was performed by layering 0.5 ml. of the cyst fluid over an equal quantity of freshly separated serum and incubating the tubes at 37° C. for one hour and observations were made at intervals of 5, 10, 15, 30 and 60 minutes for the development of ring at the interface.

Results

Out of 81 goat serum samples, 49 were from animals which had one or more cysts (positive group) and the rest 32 had no visible cysts (negative group). In sheep, out of 67 samples, 41 were positive and 26 were negative. In all cases the cysts were identified as *Cysticercus tenuicollis*.

Individual evaluation of serological reactions shown by positive and negative samples have been summarized in Table I. It will be seen that 77 (85.5%) out of 90 animals with cysts showed haemagglutination titre of 1:80 and above, while 11 (12.2%) reacted at 1:40 and 2 (2.2%) at 1:20 dilution of their sera. On the other hand, animals of the negative group showed serum titres maximum upto 1:40, beyond which they failed to react; 53 (91.4%) out of 58 samples reacting maximum upto 1:10, and rest 5 (8.6%) either upto 1:20 or 1:40.

TABLE I

Results of Haemagglutination Test with Positive and Negative Serum Samples with Tanned Erythrocytes Sensitized with *Cysticercus Tenuicollis* Fluid of Caprine Origin.

	No of samples tested		Hæmagglutination end titre in total No. of serum samples									
	Goats	Sheep	10	20	40	80	160	320	640	1280	2560	5120
Positive group	49	41	—	2	11	35	32	7	1	1	1	—
Negative group	32	26	53	3	2	—	—	—	—	—	—	—

Cross-haemagglutination tests revealed that goat sera, when tested with erythrocytes sensitized with sheep cyst fluid antigen, reacted to higher titres (usually 2 steps more), both in positive and negative samples, whereas with sheep sera the titres were almost reproducible with no further increase as compared with erythrocytes sensitized with goat cystic fluid antigen.

Precipitation tests showed that a faint hazy ring developed at the interface after 15 minutes in all samples and by 30 minutes the reaction was intense. However, by about the same time the antigen fluid became turbid so that further reaction, if any, was masked. The test, on the whole, was found to be of no real value in clearly differentiating positive and negative samples.

Discussion

The haemagglutination test is a sensitive technique in the diagnosis of *Echinococcus* disease of man. Using concentrated cystic fluid as antigen, Garabedian *et al* (1957) showed that serum from patients with active disease had haemagglutination titres from 1:360 to 1:122,880. Kagan *et al* (1959) reported that titres below 1:200 were usually nonspecific. In our experience with cysticercosis in goats and sheep, negative animals reacted maximum upto 1:80 in the haemagglutination test, while positive animals showed titres upto 1:2,560. The higher titres shown by patients, both positive and negative for *Echinococcus*, might be attributed either to the concentrated antigen used for sensitization of erythrocytes or it might be that the *Echinococcus* cyst fluid is more antigenic than *Cysticercus* fluid. Further work may throw light on this point. In any case, the diagnostic value of the haemagglutination test has been reaffirmed, since titres of 1:80 and above have been encountered only in animals with *Cysticercus* cysts.

Boarderline reactions at 1:20 and 1:40 dilutions of serum have been observed in 14.4% positive and 8.6% negative animals. This is in accordance with the observation of Garabedian *et al* (1959) and Kagan *et al* (1960), who encountered 5.7% and 7% false positive reactions in human *Echinococcus*. Such reactions have been attributed to the presence of host protein in the cyst fluid antigen, other concomitant virus and parasitic infection and some illdefined pathological processes of uncertain aetiology. Higher titres shown by goat sera tested with erythrocytes sensitized with sheep cyst fluid might be due to the presence of tissue protein in the antigen and this is probably at minimum in goat cyst fluid. In our experience, it is perhaps more advantageous to use goat cystic fluid as antigen in the haemagglutination test.

Summary

Sera from 81 goats and 67 sheep were tested with Boyden's tannic acid haemagglutination test in order to ascertain the usefulness of this test in *Cysticercus tenuicollis* infection in these animals. Unconcentrated cyst fluid was used as the antigen. In 90 goats and sheep with cysticercosis, 77 (85.5%) showed haemagglutination titre of 1:80 and more, while 53 (91.4%) out of 58 negative animals reacted only at 1:10 dilution of their sera. Borderline serum titre of 1:20 and 1:40 were observed in 14.4% positive and 8.6% negative animals. For diagnostic purpose a titre of 1:80 and above might be regarded as positive. The precipitation test was found to be of little value for the diagnosis of cysticercosis.

To the knowledge of the authors, this is perhaps the first report recorded in the literature for the diagnosis of cysticercosis in goats and sheep by haemagglutination test.

REFERENCES

- Addis, S. and Mandras, A. (1958) ... *Ingiene Moderna*, **51**, 793. *Trop. Dis. Bull.*, **56**, 957.
- Angelillo, B. T., Corticelli, B. and Masia, G. F. (1959) ... *Ingiene Moderna*, **52**, 567. *Trop. Dis. Bull.*, **57**, 826.
- Benex, J. and Lamy, L. (1960) ... *C. R. Soc. Biol.*, **154**, 583.
- Boyden, S. V. (1951) ... *J. Exp. Med.*, **93**, 107.
- Dixon, H. B. F. and Lipscomb, F. M. (1961) ... *Spec. Rep. Ser. Med. Res. Coun. Lond.*, No. 299, *Lancet*, **1**, 1152.
- Garabadian, G. A., Mattosain, R. M. and Suidan, G. G. (1959) ... *Amer. J. Trop. Med.*, **8**, 67.
- Garabadian, G. A., Malakian, A. H. and Mattosain, R. M. (1960) ... *Ann. Trop. Med. Parasit.*, **54**, 233.
- Garabadian, G. A., Mattosain, R. M. and Djanian, A. Y. (1957) ... *J. Immunol.*, **78**, 269.
- Jolly, A. (1958) ... *Maroc. Med.*, **37**, 778. *Trop. Dis. Bull.*, **56**, 637.
- Kagan, I. G., Allain, D. S. and Norman, L. (1959) ... *Amer. J. Trop. Med.*, **8**, 57.
- Kagan, I. G., Norman, L., Dorothy, S. A. and Goodchild, C. G. (1960) ... *J. Immunol.*, **84**, 635.
- Knierim, F. (1959) ... *Bol. Chileno de Parasit.*, **14**, 75. *Trop. Dis. Bull.*, **57**, 390.
- Knierim, F. and Neidmann, G. (1961) ... *Bolchileno de Parasit.*, **16**, 6. *Trop. Dis. Bull.*, **58**, 710.
- Magath, T. B. (1959) ... *Amer. J. Clin. Path.*, **31**, 1.
- Mandras, A. and Addis, S. (1960) ... *Parasitologica*, **2**, 217. *Trop. Dis. Bull.*, **58**, 232.
- Norman, L., Sadun, E. H. and Allain, D. S. (1959) ... *Amer. J. Trop. Med.*, **8**, 46.
- Rakower, J. (1960) ... *Harefuah, Jerusalem*, **59**, 261. *Trop. Dis. Bull.*, **58**, 344.

SEASONAL VARIATION OF HAEMOGLOBIN CONTENT OF THE BLOOD IN DAIRY CATTLE OF THE ALLAHABAD AGRICULTURAL INSTITUTE

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The haemoglobin content of blood has been used as an index of nutritional status with respect to iron and copper. The application of this index is also of great importance in clinical diagnosis in the field of Veterinary medicine. Wide variations in haemoglobin values are reported for dairy cattle showing conflicting correlations between haemoglobin values and breeds, seasons and age (1, 4-7, 9-11).

The present study was undertaken to find out how far the haemoglobin index as given by different authors would be applicable to Red Sindhi and its crosses with Jersey, and also to note whether breed, sex, age of animals, and seasonal variation would have any influence on the haemoglobin value.

Experimental

Red Sindhi and various crosses of Red Sindhi with Jersey maintained by the Department of Animal Husbandry of Allahabad Agricultural Institute, Allahabad were used in this study.

For this study, the whole herd was divided into four major groups, cows, milch and dry, young stock and bulls. Each group was further divided breedwise into Red Sindhi and crosses of Red Sindhi with Jersey. The details of the numbers of animals under each group and for each quarter (3 months) are furnished in table I.

TABLE I

Distribution of Animals in Different Groups.

Quarters	Milch Cows		Dry Cows		Young Cows		Bulls		Total No. of animals tested
	R.S.	Xs.	R.S.	Xs.	R.S.	Xs.	R.S.	Xs.	
I July - Sept.	14	67	1	11	15	66	3	3	180
II Oct. - Dec.	17	52	5	7	13	61	2	3	160
III Jan. - March	17	52	5	6	8	41	2	3	134
IV Apr. - June	14	57	2	7	7	41	1	8	132
Total	62	228	13	31	43	209	8	12	606

The care and managerial practices were alike for each group throughout the period of study. The animals were fed entirely on home grown fodder. The different constituents of concentrate ration and the mineral supplements were however, purchased from outside. The animals under test were in good health with no perceptible deficiency symptoms and the routine seasonal vaccination against major infectious diseases were performed.

The method employed in determination of haemoglobin content of blood was by the use of Hellige Sahli Haemometer.

Approximately 5 ml. of blood samples were drawn at each time from the jugular vein using ammonium oxalate as an anticoagulant. The collection of blood was done during the afternoon hours between 2 and 3 p.m. In all 606 blood samples were tested for haemoglobin value during the period of study lasting one full year.

Results and Discussion

The mean haemoglobin value of the blood samples of 606 animals was found to be 9.48 gms. per 100 ml. with individual variations from 7 to 13.5 gms. per 100 ml. of blood.

The average values of haemoglobin per 100 ml. of the blood for milch cows, dry cows, young stock and bulls were 9.36, 10.18, 9.42 and 10.66 gms. respectively. The results of the above are given in table II.

TABLE II

Average Haemoglobin Content of the Blood of Cattle of Various Groups During Different Seasons.

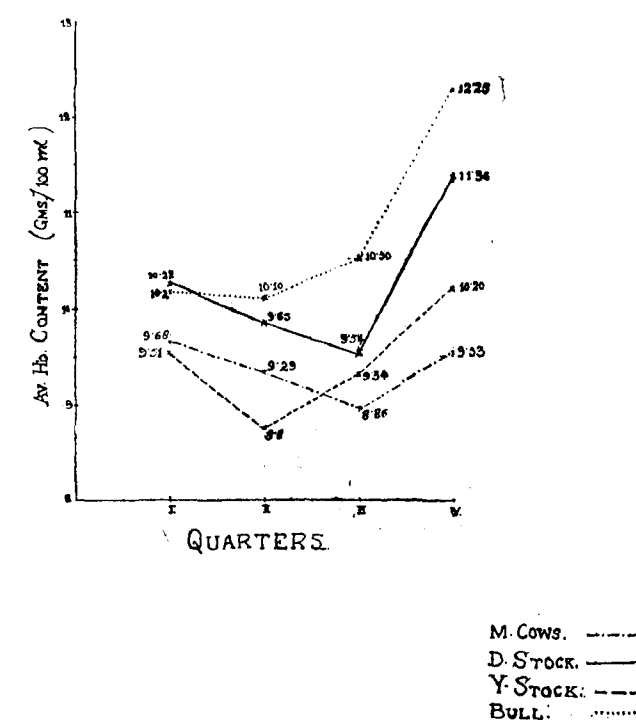
Period of testing	No. of samples	Milch cows	No. of samples	Dry cows	No. of samples	Young stock	No. of samples	Bulls	No. of samples	Herd Ave.
I July-Sept.	81	9.68 7-12.8*	12	10.22 7.5-12.5*	81	9.51 7-13*	6	10.20 9-12*	180	9.69 7-13*
II Oct.-Dec.	69	9.29 7.3-12*	12	9.85 8.5-12*	74	8.88 7-11.5*	5	10.10 9-13*	160	9.15 7-13*
III Jan.-March	69	8.86 7-11*	11	9.54 8-10.5*	49	9.34 7.8-11.7*	5	10.50 9.2-13.5*	184	9.15 7-13.5*
IV March-June	71	9.53 7.8-12.5*	9	11.36 9.8-12.4*	48	10.20 8.7-12.3*	4	12.25 11.5-13.5*	182	9.98 7.3-13.5*
Average for the year	290	9.36 7-12.8*	44	10.18 7.5-12.5*	252	9.42 7-12.3*	20	10.66 9-13.5*	606	9.48 7-13.5*

* Numbers indicate the range.

The data obtained on the haemoglobin values of all the animals at intervals of three months during the entire period of study, show a declining trend in haemoglobin values in the groups of young stock and bulls up to the second quarter (up to December) and an increasing trend during the third and fourth quarters (from January up to June).

Similarly the groups of cattle which were dry and those in milk showed declining trend up to the third quarter (up to March) followed suddenly by an increase during the fourth quarter (April to June).

Graph Showing the Av. Hb. Content of Blood of Cattle in A.H. Head



Graphical representation of the above trends shows clearly that the haemoglobin concentration in all the animals was higher during the summer than in winter. This observation is contrary to that reported by Pal *et al* (10) for Haryana cattle. However, the difference in haemoglobin value when subjected to statistical analysis, was found to be non-significant. This result is in conformity with that reported by Hemmersma (3).

In general there is apparently a higher haemoglobin value observed in the bulls as compared with the milch cows. A similar observation has been made by McCay (8).

Considerable variations in haemoglobin values were noticed even within the same breed of an individual group; however, it is of interest to note that an individual had either low or high values throughout, as shown in table III. This finding is in agreement with that of Byers *et al* (1).

TABLE III

No. & Breed-Sex	I	II	III	IV	Average
805 RS — O +	8.25	9.0	8.3	9.0	8.63
336 RS — O +	12.00	10.0	10.0	12.5	11.1
60 JxS — O +	7.25	8.5	7.0	7.8	7.63
92 JxS — O +	11.4	11.5	9.0	10.0	10.5
518 JxS — O ↑	8.7	.5	9.5	11.5	10.0
361 JxS — O ↑	12.0	13.0	13.5	13.0	12.8

The data obtained were subjected to the statistical analysis. The results are given in table IV.

TABLE IV

Analysis of Variance of Haemoglobin Content Due to Groups and Seasons.

	D.F.	S.Sq.	M.Sq.	F.	Remarks
1. Groups	3	54.829	18.276	.022	N.S.
2. Seasons	3	73.69	24.56	.029	N.S.
3. Group x seasons	9	42.30	4.70	.0056	N.S.
4. Breeds within group x season	16	7448.39	465.52	.560	N.S.
5. Individuals/breeds/year/ season	574	476377.41			

From the above table of analysis of variance it can be concluded that the variations in haemoglobin content in dairy cattle due to

groups, seasons, groups within season and breeds within groups, within season are non-significant.

Since the animals from which the samples of blood were taken were in sound health, it may not be out of place to mention here that the range of haemoglobin value for this heterogenous group of animals in normal health would be between 7 and 13.5 gms/100 ml. of blood.

Summary

1. The average blood haemoglobin content of the cattle herd was 9.48 gms/100 ml. of blood.

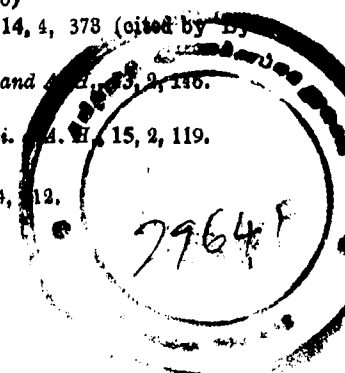
2. The graphical representation indicates that haemoglobin content of the blood of all groups of cattle is higher during summer than in winter thereby showing that climate has some influence on haemoglobin content.

3. In this study no statistically significant differences could be found in the haemoglobin value of cattle based on season, breeds and groups.

4. Animals with low or high haemoglobin value at the commencement of the experiment maintained low or high values throughout the experimental period.

REFERENCES CITED

- Byers, J. K., I. R. Jones & J. R. Haag (1952) ... *J. of Dairy Sci.*, 35, 8, 661.
- Dukes, H. H. (1947) ... *Physiology of Domestic Animals* Comstock Publishing Co., Ithaca, N. Y.
- Hammersma, P. J. (1937) ... *Onderstepoort J. of Vet. Sci. & Anim. Indust.* 8, 443 (cited by Pal, A. K. *et. al.* 10.)
- Kehar, N. D. & V. N. Murty (1945) ... *J. of Vet. Sci. & A. H.*, 15, 3, 183.
- Manresa, M. & P. Falcon (1939) ... *The Philippine Agri.*, 28, 187 (cited by Mauresa M. & S. C. Orig. 6).
- Manresa, M. & S. C. Orig (1941) ... *The Philippine Agri.*, 30, 5, 375.
- Manresa, M. & N. C. Reyes (1934) ... *The Philippine Agri.* 23, 588 (cited by Manresa M & S. C. Orig. 6)
- McCay, C. M. (1931) ... *J. of Dairy Sci.*, 14, 4, 378 (cited by Byers *et al.* 1)
- Mullick, D. N. & A. K. Pal (1942) ... *Ind. J. Vet. Sci. and A. H.*, 15, 2, 119.
- Pal, A. K., S. A. Momin & D. N. Mullick, (1945) ... *Ind. J. of Vet. Sci.* 15, 2, 119.
- Nayar, K. N. G., K. T. K. Nambiar & G. A. Sastry (1949) ... *Ind. Vet. J.*, 24, 4, 12.



STRINGHALT IN BOVINES

By

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Stringhalt is a condition commonly met in cattle and buffaloes of this country. The occurrence has been observed to have no regard for age, breed or sex of the animal. It is well known among the cattle owners by its colloquial names viz., 'SARAN', 'SANN', 'JHANKA-TANKA', 'JHANAK' and 'MANDIGUDI' etc. Though deaths are uncommon, the affection greatly hampers the working capacity of the animals.

Review of Literature

This malady has been treated by many workers (5, 6, 7, 8). Reports regarding the etiology are scanty (3, 6). The present communication is intended to advocate an improved and handy method for the treatment of stringhalt.

Materials and Method

During the course of study 51 cases of stringhalt were clinically diagnosed. Out of these 35 were bullocks, 13 were male buffaloes, 2 were female buffaloes and one was a cow.

The patient was cast and secured in the lateral recumbent position on the opposite side of the affected hind limb. The unaffected hind limb and the upper fore-limb were tied together. The affected hind limb was flexed towards the abdominal region by tying a rope around the pastern, the rope being pulled over the flank region. The area around the stifle joint was washed with soap and water, dried with sterilised towel and painted with 1% solution of Tincture Cetrimide. The 'V' shaped groove between the medial and the middle ligaments of the patella was felt by partial flexion and extension of the already flexed limb. The record needle No. 17 of 2' length was inserted in the middle of this groove to reach the joint capsule, and 7-15 ml. of Lugol's Iodine solution was injected in 46 cases; 10-20 ml. of Tincture Iodine Mitis was injected in 5 cases.

In some cases it was observed that the affected limb was difficult to flex after casting. In such cases patient was either given a good exercise or the Tendo-achilles was pinched. After this procedure the limb was flexed with a sudden jerk and a sound of 'CLICK'.

Immediately after this treatment, animal showed pronounced lameness which continued in most of the cases for about 2-3 days. After that the symptoms of stringhalt subsided, followed by slight lameness, for another 5-7 days. Consequently the progression of the limb became normal. Lameness did not subside within 10 days in 8 cases. Liniment Ammonia massage with hot fomentation was advised for such cases with satisfactory results. Complications with dislocation of hip-joint in two cases and gonitis in one case were encountered. It was required to give second injection in 3 cases only.

Discussion

The above method of treatment proved successful in 51 cases during our investigation with only 3 complications and 3 repeaters. This method requires a single injection of Lugol's Iodine Solution in contrast to the two at two different sites as advocated by others (5, 7, 8). Securing the foot by rope at pastern and flexing the hock joint by passing the rope over the flank has got the advantage that the stifle joint can be flexed as required to locate the 'V' shaped groove between medial and middle patellar ligaments.

Lugol's Iodine Solution in the dose of 7 ml. proved to be more satisfactory as compared to Tincture Iodine Mitis in doses of 10-15 ml. The complications could have been avoided if a little more care could have been exercised. The case of gonitis was rather due to secondary infection which had gained entrance into the joint capsule during the injection.

The etiology of this condition is obscure and the reports are inconclusive (7, 8.) Rao and Shankaram did not specify the exact cause but pointed out that it affects mostly the working animals. Choudari and Parameswaran (1, 5) mentioned it to be of nervous origin. Venkataraman (9) corroborated the findings of Pillai (6) that the affection usually occurs probably due to undue strain brought about in young bulls or bullocks when put to hard work for the first time. However Gountia (3) did not agree with the above authors and has seen luxation in two cows without putting them to work. He further pointed out that cases of luxation of patella appear to be hereditary. In horses the etiology of similar condition has been referred to by Henary *et al* (1946) who state that the condition appears as a result of loss in tone of the muscles binding the stifle joint. Michell (4) examined peripheral nerves of the hind limb of a hunter and observed that before the onset of the clinical picture of stringhalt, there had been a precarious state of balance between the antagonistic group of muscles situated anteriorly and posteriorly to the femur due to the depreciation of their nerve supply.

From the available literature and the present findings it is concluded that this condition is associated with the damage of nerves supplying the muscles of thigh, specially those attached to the patella.

This affection appears to be exaggerated in winter. Heredity, as the basis of etiology, cannot be supported since on tracing the pedigree of some of the treated cases nothing conclusive could be detected. Individual susceptibility, body confirmation and environmental influences should be looked into to prevent this complication.

Summary

Treatment of 51 cases of stringhalt in bovines with improved method of injection of Lugol's Iodine at Femero-patellar articulation has been reported and the etiology of the condition has also been discussed in the light of present work.

Acknowledgments

We express our sincere thanks to Major C. V. G. Choudary Principal, Veterinary College, Mathura for constant guidance and facilities provided and to the Ambulatory Clinic staff for kind cooperation.

REFERENCES

1. Chaudari, G. N. R. (1931) ... *Ind. Vet. J.*, 8, 44.
2. Dollar's Vety. Surgery ...
3. Gountia, A. (1948) ... *Ind. Vet. J.*, 24, 312.
4. Michell, W. M. (1949) ... *Vety. Record*, 61, 352.
5. Parameswaran, C. (1929) ... *Ind. Vet. J.*, 6, 131.
6. Pillai, M. R. (1944) ... *Ibid.*, 21, 48.
7. Rao, K. S. P. (1925) ... *Ibid.*, 2, 45.
8. Shankaram, K. S. B. (1927) ... *Ibid.*, 3, 208.
9. Venkata Raman, K. (1947) ... *Ibid.*, 23, 392.

STUDIES ON CALCIUM, PHOSPHORUS AND MAGNESIUM CONTENT IN THE BLOOD OF DOMESTIC ANIMALS OF MADRAS STATE

By

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Analysis of blood for the mineral constituents forms an important part in physiological, nutritional and clinical studies. The normal blood calcium, magnesium and phosphorus levels though fairly constant are found to vary under different conditions of environment, nutrition and

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disease. Mullick and Pal (1943), Pal *et al* (1945), Kehar and Murthy (1951), Murthy and Kehar (1952) and Mehrotra and Mullick (1959) have reported the mineral constituents of blood of animals of distinct breeds or tracts. Literature is not available on the normal levels in the nondescript cattle which forms a major part of livestock in Madras State.

The present study was undertaken in an attempt to find out the normal levels of the mineral constituents of blood of nondescript livestock in Madras State under varying conditions.

Materials and Methods

In an effort to have a widely varying conditions of management, feeding and climate, random selection of animals of local milkmen and farms was made. Animals brought to the Corporation of Madras abattoir from different parts of the state were also selected.

Blood from these animals was collected from the jugular vein in a clean and dry test tube. Serum was allowed to separate at 5°C overnight. It was further centrifuged at 1500 R.P.M. for 10 minutes and clear serum was obtained.

The calcium content was estimated by Clark-Collip modification of the Kramer-Tisdall method, magnesium by the modified method of Derris and phosphorus by the method of Fiske and Subba Row (Hawk *et al*, 1954).

The results were analysed statistically by the method of Snedecor (1956).

Results and Discussion

The various values reported by previous workers is shown in Table I.

Table II shows the results of the present study.

The calcium levels in the she-buffaloes and cows of the two age groups differ significantly ($P \leq 0.01$). The values reported by other workers are generally higher than the values of the present study. Mullick and Pal (1943) have worked with Haryana cattle whereas Murthy and Kehar (1952) studied the constituents of Kumaoni bullocks. Possibly there may be a sex variation in the levels of the blood constituents (Ca, Mg and P). Difference due to sex was not analysed in this study as the disparity in the number of variates was large.

There is no variation in the means of phosphorus levels of she-buffaloes and cows of the two age groups ($P \leq 0.05$). The values for phosphorus levels in blood serum of cows are in fair agreement with the

TABLE I
Statement showing the values of Calcium, Phosphorus and Magnesium in blood as reported by previous workers.

SPECIES	No. of samples analysed	Ca				P				Mg				AUTHOR			
		Range mg%	Mean mg%	SD	SE	CV	Range mg%	Mean mg%	SD	SE	CV	Range mg%	Mean mg%		SD	SE	CV
Male Buff. Bullocks	25	9.14—11.10	10.0	0.09	—	—	5.16—7.84	6.95	0.05	—	—	2.14—3.45	2.76	0.10	—	—	Kehar & Murthy, 1951
Hariana Bullocks Young	—	—	13.0	—	—	—	—	5.92	—	—	—	—	2.46	—	—	—	Mullick & Pal, 1943
Hariana Bullocks Adult	—	—	11.2	—	—	—	—	4.26	—	—	—	—	2.41	—	—	—	
Kumaoni Bullocks	—	9.4—11.4	10.5	0.10	—	—	4.8—8.3	6.80	0.20	—	—	1.71—3.19	2.85	0.11	—	—	Murthy and Kehar, 1952
Cows	12	10.10—11.5	10.8	0.4579	—	4.2	4.31—4.81	4.51	0.4728	—	10.5	2.57—2.92	2.69	0.1839	—	6.8	Pal <i>et al</i> , 1945
Sheep	—	11.75—12.33	12.11	0.69	—	—	5.64—5.69	5.67	0.31	—	—	2.49—2.58	2.55	0.13	—	—	Mehrotra and Mullick, 1959

TABLE II
Statement showing the values of Calcium, Phosphorus and Magnesium
in blood in the present study.

SPECIES	No. of samples analysed	Ca				P				Mg						
		Range mg %	Mean mg%	SD	SE	CV	Range mg %	Mean mg %	SD	SE	CV	Range mg %	Mean mg %	SD	SE	CV
Buffaloes 6 years and below (Female)	51	5.0—13.2	10.9	1.95	0.285	17.9	3.31—12.06	6.8	1.70	0.207	27.9	1.60—4.90	3.22	0.71	0.11	22.08
" Above 6 years	43	6.0—13.3	9.1	1.48	0.325	16.26	2.96—8.69	6.19	1.63	0.24	26.3	1.89—5.55	2.78	0.63	0.10	22.52
" Male	17	5.0—18.8	9.9	3.10	0.751	31.30	3.25—16.6	7.04	2.91	0.71	41.3	1.80—9.80	3.39	1.83	0.12	53.68
Cows 6 years and below	31	5.8—14.4	10.39	2.02	0.367	19.44	4.82—10.24	6.89	1.76	0.30	27.60	1.65—4.46	2.60	0.675	0.13	26.70
Cows above 6 years	18	6.0—11.6	8.87	1.40	0.349	15.78	4.65—14.28	6.23	2.70	0.63	43.30	1.44—4.03	2.58	1.04	0.24	56.60
Bullocks	22	6.3—13.7	9.60	2.02	0.444	21.03	3.05—12.12	5.86	1.32	0.93	22.60	1.56—4.23	2.58	0.62	0.13	24.01
Sheep	75	6.6—20.8	11.48	2.36	0.28	20.05	4.49—15.3	7.89	1.27	0.14	17.10	1.37—4.71	2.69	0.56	0.060	20.08
Goats	21	6.0—15.7	12.17	2.16	0.472	17.70	5.33—11.42	7.41	1.59	0.84	21.50	1.92—4.90	3.29	1.03	0.22	31.30
Hens	14	14.1—30.2	17.67	8.31	0.92	18.7	5.19—19.6	9.62	2.30	0.65	24.80	2.06—4.31	3.25	0.203	0.184	6.21
Cocks	11	6.5—13.9	10.40	2.076	0.626	19.9	3.42—16.0	8.56	3.40	0.97	39.70	2.10—4.54	2.90	0.242	0.25	8.30

levels reported by other workers, although Pal *et al* (1945) have reported a lower level of 4.5 mg%. They have not indicated the age or the breed of the cows. The means of the magnesium levels of the buffaloes of the two age groups differ significantly ($P < 0.01$).

In the case of cows there is no statistical difference in the values. Murthy and Kehar (1952) alone have reported the magnesium level of Kumaoni bullocks to be 2.35 mg%. This is in close agreement with the values of the present study although the levels in the she-buffaloes appear to be slightly higher.

It would be obvious from Table II that there is a large variation in the values of the various blood constituents in all the animals as seen from the large C. V. and wide range. This variation is due to the widely differing levels of feeding, management etc.

Summary

The blood of some species of domestic animals was analysed for calcium, phosphorus and magnesium content and the values obtained were subjected to statistical analysis.

Normal values were established.

REFERENCES

1. Hawk, P. B. Oser, B. L. and Summerson, W. H. (1954) ... Practical Physiological Chemistry. 13th ed. The Blackiston Co., New York.
2. Kehar, N. D. and Murthy, V. N. (1951) ... Physiological studies on the blood of domestic animals. II. Male Buffaloes. *Indian J. Vet. Sci.*, **21**, 13.
3. Mehrotra, P. N. and Mullick, D. N. (1959) ... Studies on physiological reaction of sheep. *Ibid.* **29**, 62.
4. Mullick, D. N. and Pal, A. K. (1943) ... Studies on the composition of the blood of farm animals in India. I. A study of some hematological and chemical constituents in the blood of normal cattle. *Ibid.* **13**, 146.
5. Murthy, V. N. and Kehar, N. D. (1952) ... Physiological studies on the blood of domestical animals. III. The normal blood picture of Kumaoni bullocks. *Ibid.* **22**, 251.
6. Pal, A. K., Momin, S. A. and Mullick, D. N. (1945) ... Studies on the composition of the blood of farm animals in India. II. Seasonal variations in the blood of dairy cattle. *Ibid.* **15**, 119.
7. Snedecor, G. W. (1956) ... Statistical Methods. Collegiate Press Inc., Ames, Iowa.

Clinical Articles

SQUAMOUS-CELL CARCINOMA IN A GRADE GERMAN SHEPHERD

By

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Mulligan (1949) described 17 squamous-cell carcinoma among 283 cutaneous neoplasms of dogs and noted that the Scotch Terrier and the Pekingese are the ones most commonly affected. He observed that the favoured sites are the extremities (especially the feet), the hard palate, the head externally and the abdomen. This is in contrast to the findings of Neilsen and Cole (1960), that in the dog, indication of breed predilection to squamous carcinoma is absent and the sites are scattered throughout the skin of the entire body. Thrasher (1961), on the other hand found this type of neoplasm affecting the skin of a Cocker Spaniel and the lung with a bronchogenic location in a Doberman Pincher.

Reports of squamous-cell carcinoma among dogs in the Philippines are wanting, hence, the purpose of this article.

Case Report

On July 12, 1961, a 9-year old female German Shepherd dog was presented to the small animal clinic, College Hospital, College of Veterinary Medicine, University of Philippines, Diliman, Rizal. A large solitary tumour was seen protruding from the left dorso-lateral portion of the neck of the animal.

The growth had a cauliflower-like appearance and gave off an offensive odour. The surface showed fungoid ulcerations and the crevices were filled up with filthy debris. The tumour was closely attached to the integument by a short pedicle.

History

About 3 years ago, the dog was bitten on the left side of the neck while being mated. The bite did not heal and a year after, a growing mass was observed from the indolent wound. The neoplastic growth gradually progressed until it had assumed an alarming size which prompted the owner to have it removed.

Surgery

The dog upon clinical examination, was pronounced to be in good condition; the appetite and temperature were normal. The regional lymph nodes revealed no clinical change.

Extirpation of the neoplastic growth was immediately recommended with the hope that metastasis had not occurred.

The operative area was cleaned and disinfected with ethyl alcohol. A basal dose of a general anaesthetic was then administered intravenously and the surgical site infiltrated with a local anaesthetic. After the area was draped, an elliptical incision was made around and approximately one half inch from the base. The tumour was carefully dissected out; large vessels that were encountered were ligated with chromic catgut. The wound was dusted with sulfanilamide powder and was closed with interrupted sutures. Before the dog aroused, an antibiotic was given intramuscularly.

The excised tumor weighed 160 grams with a diameter of 10.5 centimeters (Fig. 1). It was not encapsulated.

Five months later, the dog was found in good health and no signs related to the tumour or operation were noticed.

Histopathological Findings

Biopsy was performed from the swelling. Histological examination revealed masses of squamous epithelial cells arranged into nest-like whorls separated by a fibrous stroma (Fig. 2). The centre of these masses were composed of keratinized cells with acidophilic staining. These concentric arrangements are customarily designated as the pearly bodies or epithelial pearls (Runnells, 1954). The margins were hyperplastic from which strands of squamous epithelial cells were given off irregularly (Fig. 3). The epithelial cells were polyhedral and had round nuclei with bizarre mitotic figures.

Discussion

Carcinogenic agents such as pitch, soot and arsenicals are known to favour the occurrence of squamous-cell carcinoma. The same is true to physical agents like exposure to x-rays, radioactive substance or ultraviolet light. Another predisposing factor that is quite common is chronic irritation which leads to ulcers and fistulas. The appearance of squamous-cell carcinoma in this particular subject must have been principally due to the irritation of the bite, either by constantly pawing the growth or by rubbing it against objects.

Some characteristic features of malignancy, such as recurrence and metastasis were not evident. This would strongly suggest that the tumour had not penetrated the lymphatics and blood vessels and that no tumour cells were left out after the operation. Squamous papilloma was ruled out on the basis of gross appearance, local invasion and microscopic findings.

Squamous-cell Carcinoma in a Grade German Shepherd

By
CRISTOBAL L. MIRANDA



Fig. 1

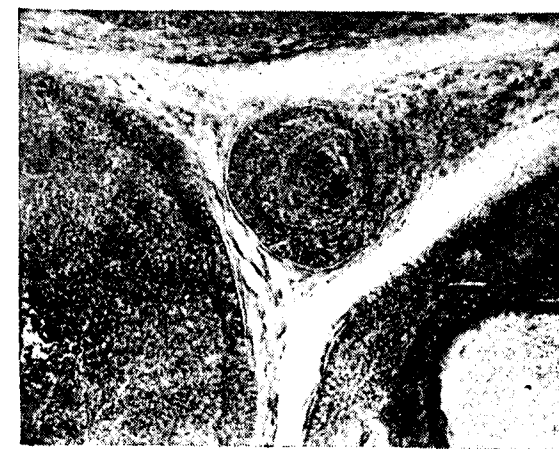


Fig. 2



Fig. 3

Ejection of a foetal mummy from a Murrah Buffaloe-cow

By

A. S. P. RAO AND P. NARASIMA RAO



Fig. 1

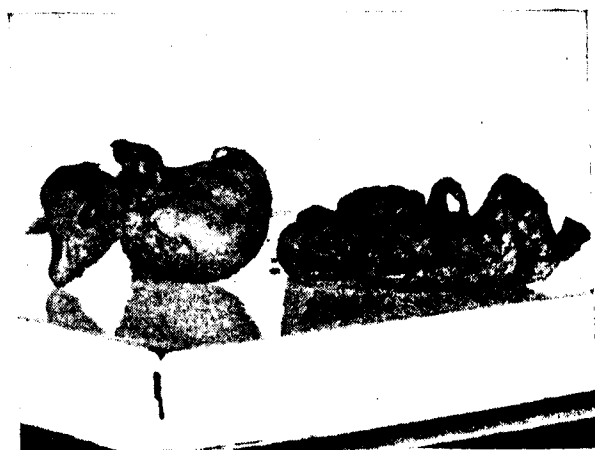


Fig. 2

Summary

A case of squamous-cell carcinoma with its successful extirpation in a grade German Shepherd dog is herein reported.

Acknowledgments

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REFERENCES

1. Mulligan, R. M. (1949) ... Neoplasms of the Dog. Williams and Wilkins Co., Baltimore, Md.
2. Njelson, S. W. and Cole, C. R. (1960) ... *Am. J. Vet. Res.* 21, 931-948.
3. Runnells, R. A. (1954) ... Animal Pathology. Fifth Edition. The Iowa State College Press, Ames, Iowa.
4. Thrasher, J. P. (1961) ... *J. Am. Vet. Med. Assoc.* 138, 27-30

EJECTION OF A FOETAL MUMMY FORM A MURRAH BUFFALO-COW

By

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Intra-uterine death of the foetus with progressive resorption of its soft tissues, resulting in the so-called "mummified foetus" occurs in all species of animals. For mummification to occur it is necessary that uterus does not become invaded by putrefactive organisms and this is usually dependent on the closure of the cervical canal by means of a mucus plug.

The occurrence of mummified foetus and its ejection through hormonal influence have been reported amongst others, by Anderson and Bugg (1942), Powell (1942) Stuart (1942) and Weighton (1943).

History

During the course of investigations on bovine infertility conducted at the Government Dairy Farm, Visakhapatnam, the following interesting case was detected.

Murrah buffalo-cow No. 832, aged about 6½ years had given birth to a bull calf on 26-12-1957. Subsequently she was served on four

occasions i.e., on 1-2-1958, 22-7-1958, 5-8-1958 and 16-8-1958. After the last service, the animal did not come on heat. It was therefore considered that the animal was holding but she did not show the usual progressive signs of pregnancy. Hence the buffalo-cow was subjected to detailed clinical examination.

Clinical Examination

An examination of the reproductive tract was conducted per rectum. The left ovary contained a corpus luteum which was deeply embedded. There was a distinct disparity in the size of the cornua, the left being larger. The uterus was drawn down over the brim of the pelvis. The left cornua contained a hard lump of the size of a big orange. On palpation there was neither the usual fluctuations of a gravid uterus nor could the double membranes and cotyledons be felt. The fremitus in uterine artery, which is characteristic of pregnancy, was also not felt. The lump was closely enveloped by the uterine wall. Vaginal examination revealed a constricted cervix with a thick duffy mucus plug. A diagnosis of foetal mummification was made.

Treatment

As the corpus luteum was deeply embedded in the left ovary, enucleation was not attempted. 4 c.c. of Stilboestrol in oil (1 c.c. containing 10 mgm.) was injected intra-muscularly. The injection was repeated on the second day. On the third day i.e., 48 hours after the first injection the os-uterus was well dilated and the mummified foetus had come down as far as the cervical canal. With slight manual traction the foetus was removed.

Appearance of the ejected Foetus

The entire foetus was shrivelled up. The membranes were dark brown, thick, parchment-like and was found closely wrapping the foetus. When the foetal membranes were separated no exudate was seen between the membranes and the foetus. The crown-rump length of the foetus was 18 cm. and the foetus was aged about 14 weeks. On detailed examination of the foetus it was found that the umbilical cord passed round the neck of the foetus. (Figure I). Also, the head of the foetus was twisted and was directed towards the dorsal aspect of the body (Figure II).

Discussion

Several views have been expressed regarding the causation of foetal mummification. Williams (1943) stated that the separation of the maternal and foetal placentas, which is the essential cause for haematic mummification, is due to interplacental haemorrhage. The cause for haematic mummification is believed by Roberts (1956) to be

due to a recessive lethal character. He is of opinion that neither torsion of the uterus, Brucellosis, pregnancy examinations per rectum, nor trauma cause haematic mummification. Benesch and Wright (1957) observed two cases in which it was found that amniotic part of the umbilical cord crossed over the foetal neck resulting in the strangulation of the foetus. David and Roberts (1961) stated that the osmotic pressure plays an important role in foetal mummification.

Haematic mummification is more common in cattle and is not seen in other species. In the case reported here, the amniotic part of the umbilical cord was found passing around the neck of the foetus and the head was also twisted. It is considered that the death of the foetus is due to the resultant strangulation as has been observed by Benesch and Wright (1957), which is rather rare in cattle and buffaloes.

Summary

1. A case of foetal mummy in a Murrah buffalo-cow is reported.
2. The foetal death was due to strangulation by the umbilical cord.
3. The foetal mummy was expelled by Stilboestrol injections.

Acknowledgments

Our thanks are due to Sri P. S. Rajulu, G.M.V.C., B.V.Sc., P.G., M.S., Principal, Andhra Veterinary College, Tirupati for his guidance and encouragement and to Sri D. Sanjeeva Reddi, G.M.V.C., B.V.Sc., P.G. (A.H.), Superintendent, Government Dairy Farm, Visakhapatnam for providing facilities to carry out this investigation.

REFERENCES

1. Anderson, L. J. and Bugg, R. R. (1942) ... *Vet. Rec.*, **54**, 249.
2. Brownlee, A. (1942) ... *Ibid*, **54**, 103.
3. Powell, C. R. A. (1942) ... *Ibid*, **54**, 157.
4. Stuart, K. (1942) ... *Ibid*, **54**, 106.
5. Weighton, C. (1943) ... *Vet. J.*, **99**, 125.
6. Williams, W. L. (1943) ... "Diseases of the Genital Organs of Domestic Animals" Massachusetts, Ethel Williams.
7. Roberts, S. J. (1956) ... "Veterinary Obstetrics and Genital Diseases" Edward Brothers, Michigan.
8. Benesch, F. and Wright, J. G. (1957) "Veterinary Obstetrics" Bailliere, Tindall and Cox, London.
9. Davidson, J. D. and Roberts, S. J. (1961) ... *Cornell Vet.*, **51**, 34.

Abstracts

The Influence of Thiabendazole, a new Anthelmintic on Weight gain in Lambs.—By Ross, D. B. (1961) *Vet. Rec.*, 73, 1455.

Thiabendazole 2-(4'-thiazolyl) benzimidazole (Merck Sharp & Dohme Ltd.) recently reported as a broad spectrum anthelmintic against gastro-intestinal nematodes of sheep and cattle was tried on 25 lambs in a farm where this parasitological problem was known to exist. The dose rate of the drug used was 60 mg/kg. body weight. Phenothiazine and an organic phosphate were also used on different groups of lambs. The live weight gains of the different groups were noted for 4 months after treatment. It was found that the greatest weight gain was shown by the thiabendazole group. The usefulness of the drug against immature gastro-intestinal parasites and its palatability and non-toxicity are also indicated.

V. S. A.

Treatment of Equine Summer Sores with a Systemic Insecticide.—By WHEAT, J. D. (1961). *Vet. Med.*, 56, 477-478.

Summer sore is caused by the deposition of larvae of *Hebronema* sp. in open wounds in equines. The author has treated 60 horses suffering from this affection during the past three years with an organic phosphorus insecticide. The drug was Ronnel (Ectoral, Pitman-Moore) which was administered as an aqueous suspension by stomach tube and the dose rate was 45 gm/1000 lbs. body weight. Definite improvement occurred within 1-2 weeks in all cases and complete recovery resulted in several weeks.

V. S. A.

Preliminary Report on the Anthelmintic properties of D. N. P. (Disopphenol) on Hookworms (*Ancylostoma caninum* and *uncinaria stenocephala*) of dogs.—By KOUTZ, F. R. and GROVES, H. F. (1961). *The Speculum*, 14 (2), 35-37.

Trials on 12 dogs formed the basis of this report. The examination of faeces of these dogs revealed infection with *Ancylostoma*, *Uncinaria*, *Trichuris*, *Physaloptera*, *Toxocara*, *Dipylidium* and *Taenia*. D.N.P. of American Cyanamid Company containing 35 mg. of Disopphenol per c.c. was administered subcutaneously and the dose rate was 0.1 c.c. per pound body weight. The experimental subjects were not fasted and food and water were available at all times. The drug removed all *A. caninum* from 9 out of 12 dogs. Its efficiency against *U. stenocephala* is comparatively less and against the other helminths the least. The procedure adopted for testing the anthelmintics including necropsy confirmation is detailed.

V. S. A.

Effect of Antibiotics and various other Feed Additives on Growth of Young Dairy Calves.—By J. M. WING and C. J. WILCOX. *Jour. of Animal Science*, Vol. 20, No. 2., May, 1961.

164 calves of the Holstein Guernsey and Jersey breeds were used to study various additives in five experiments as follows:—Streptomycin alone and combined with para amino salicylic acid (PAS) or isoniazid; Oleandomycin alone and with PAS or isoniazid; 8-hydroxy quinoline alone and with copper citrate or PAS, and copper citrate alone; and guanine and methionine alone and in combination. Growth and health were favourable in all animals. Control calves gained an average of 132% of the expected gains in body weight as compared with the Ragsdale standard. Under the favourable environmental conditions of the experiment, the feed additives studied would seem to have little merit.

A. MUKERJI.

Pulmonary Emphysema in Cattle.—By J. E. MOULTON, J. B. HARROLD and M. A. HORNING. *Jour. of Amer. Vet. Med. Assoc.*, Vol. 139, Sept. 1961.

Acute bovine pulmonary emphysema has been reported in the United States, Canada, Great Britain, France and the Netherlands. Recently an epizootic of acute pulmonary emphysema occurred among Colifornia range cattle. Morbidity was as high as 10% and mortality 5%. Onset of disease was sudden, and in some cattle it terminated fatally in as little as two days. Adult cattle were primarily involved. Although a specific allergen was not determined, the nature of the disease suggested that allergy was involved.

A. MUKERJI.

Experimental Treatment of Ovine Vibriosis.—By J. F. RYFF and HAROLD BREEN. *Jour. of Amer. Vet. Med. Assoc.*, Vol. 139, Sept. 1961.

Several reports on the experimental use of antibiotics in Vibriosis of sheep have appeared in the Veterinary literature. The present authors gave some trials with various antibiotics in ovine Vibriosis and recorded their observations as follows; over a four-year period in selected flocks of sheep in which a definite diagnosis of *Vibrio foetus* abortion had been made, Streptomycin, Oxytetracycline, and a repository Streptomycin were given by intramuscular injections, and Sulfabromomethazine and Oxytetracycline were given orally. Except for consistently good results with the repository Streptomycin, results were variable. However, during an epizootic some over-all benefit was secured from therapy with any of these agents.

A. MUKERJI.

Effect of three Shipping Fever Bacterins on Brucella Titres in Cattle.—

By N. B. KING. *Jour. of Amer. Vet. Med. Assoc.*, Vol. 139, September, 1961.

Cattle in herds presumed free of Brucellosis occasionally have been reported as developing "suspect" or "reactor" titres for Brucellosis after being given injections of certain biological products. Since shipping fever bacterins are commonly administered to cattle prior to interstate or international shipment three of these were studied. Results of these studies are reported here. A total of 120 dairy cattle were used to study the influence of three shipping fever bacterins on *Brucella abortus* agglutinin titres. When the response was defined in terms of a rise in mean titres or as a full dilution titre rise, the data indicated that the bacterins increased the response. However, the increases were not statistically significant. When the response was defined as change in classification from negative to "suspect", the bacterin treatments had little or no effect.

A. MUKERJI.

A study of the efficacy of therapeutic Brucellosis vaccine prepared in yeast autolysate medium.—

By ZAITEVA, A. I. (1961). *J. Microbiol., Epidemiol & Immunobiol.* Vol. 32 (1), page 129.

Brucellosis vaccine prepared on glucose-glycerol liver medium and on yeast medium were hardly different from each other with regard to their therapeutic effect as well as with regard to their antigenicity.

2. Yeast medium, compared with glucose glycerol liver medium, has a number of advantages, as it is more economical and of standard character, simple to prepare and does not contain animal protein.

3. When stored for six months at 8 — 10°C experimental vaccine prepared from a bacterial suspension cultivated on yeast medium preserved its original properties.

4. It is a fact deserving attention that the strains *Brucella suis* No. 4 and 18 and *Brucella abortus* No. 6 used by us for the preparation of experimental vaccines which are of low virulence possessed marked immunogenic properties no less effective than the properties of the virulent strains of *Br. melitensis* No. 20 and *Br. abortus* No. 494.

(Authors' summary; English translation by F. S. Freinsinger.)

The quantitative determination of live spores in STI Anthrax Vaccine.—

By N. A. PANIKOV (1961). *J. Microbiol., Epidemiol & Immunobiol.* Vol. 32 (1), page 125.

Bile added to a suspension of STI vaccine strain exerted a disaggregating effect which enables one to determine more precisely the number of viable spores in the original culture.

Before the bacteriological investigation of live STI vaccine 1% aqueous solution of crude bovine bile should be used to dilute the culture instead of distilled water. (Author's summary).

News and Views

Mrs. Jacqueline Kennedy, wife of the U. S. A. President is now in our country. We heartily join the stupendous welcome that is extended to her in the best traditions of our country.

* * *

Freedom from Hunger:—This is a new slogan we have been hearing in recent months. A News item reads:—Three Indian Veterinarians are among the ten senior Veterinarians, from Asia, Near East, and Latin America, who will be trained by the Swedish Government, under the Freedom from Hunger Campaign of the F.A.O. The idea is to equip them to control animal diseases and thus improve the production of food from animals in their respective countries. The nine-month training course is being held at Stockholm from March to December 1962.

* * *

Radio-active Fall-out:—A Japanese Scientist has claimed that out of 3000 Japanese who died of leukemia annually, nearly ten percent or 300 people died of radio-active fall-out caused by nuclear tests. That is the precious gift of the so-called civilisation of the West!

* * *

"Bio-Current":—The Soviet Scientists have developed a "bio-electrostimulator" which transmits bio-currents from a healthy person to a paralysed patient. The "Donors" bio-currents are recorded as electrical impulses on magnetic tape, which is used for subsequent treatment. It has been established that the usual nervous impulses are largely restored under the action of bio-currents. They also believe that this new method will help to regulate heart-beats and breathing rates.

* * *

The General Election in India:—The election fever has subsided. Things are returning to normal. Some of the American newspapers described the Indian General Election, "as the largest free election

ever held any where". It is something to be proud of that such an election has passed off without serious disturbances.

* * *

An Equine Foster Mother and her adopted foal:—A motherless foal and a foalless mare were brought together in time to bring about an uneventful adoption; says a press message from London. The Stud Director of the foal made an appeal over T.V. and it was duly answered and the mare arrived. The skin of the dead foal was put on the motherless foal for sometime and the mare and foal soon settled down as mother and child. This is an every day procedure with Madras Milkmen and they even pass on the dummy calves stuffed with straw as live ones. Perhaps it is a little more unusual in equines.

* * *

Poultry Development:—The Government have decided to encourage foreign collaboration in the following fields:—(1) Commercial hatcheries and breeding farms; (2) Poultry feed manufacturing plants; (3) Manufacture of Poultry equipment such as incubators, feeders, waterers, etc; (4) Broiler industry and (5) Poultry processing plants.

* * *

A Rejected Article:—Mr. Adlai Stevenson had sent an article to the New Yale University Students' Magazine. It incorporated reprint material from an earlier work and the student Editor summarily rejected it with the remark "the magazine prints only original articles". It is well to remember that "even a University Journal insists on un-published material" as expressed by the *Madras Mail*.

* * *

Hole in heart:—"A brown and white mongrel terrier called Nipper is probably the first dog in the world to have a hole in the heart operation. Nipper was put into a machine to keep him active, while his heart was stopped and the hole stitched up. Nipper was in pitiful condition because of his heart condition. Now he is likely to become an active normal dog". *Madras Mail* 22nd Feb. 1962.

* * *

Animal Husbandry in elections:—Mr. Nehru was asked to come out with his views on cow-slaughter in the course of his hurricanic electioneering campaign. Here is his reply:—"This question betrays stupidity. Are we to stop slaughter of people in India first or only think of cow slaughter? I respect the cow as it has an important part in the nation's economy. But I don't worship it. The cow has to be looked after and not worshipped. The way the cow is treated in India

is shocking. It is a bundle of bones, emaciated, neglected and not cared for. In contrast, the cow is a beautiful well-fed thing in European countries, where nobody worshipped it. A cow there gave up to 43 seers of milk a day. If you merely worship the cow, it will only die and not flourish. These things should be viewed with a measure of intelligence".

* * *

Among the first Twelve:—When questioned about corruption in India, Mr. Nehru said "Corruption can only be removed gradually. Even foreign experts had stated that the level of administration in India is very high. They put India among the first twelve countries in the world, which had the least corruption in administration". It is only a question of degree. Let us have no consolation in that. Absolute evils admit no compromise.

* * *

Robot Teachers:—Scientists at Sheffield University have developed an electronic robot "teacher" which could, they claim, give individual teaching to school children on various subjects, including Greek and Mathematics. The inventors are ready with plans to have it manufactured commercially. Let not this news frighten our Professors and Lecturers.

* * *

F.A.O. Conference on H.S.:—The Second International meeting on Haemorrhagic Septicaemia was held under the auspices of the Food and Agricultural Organisation, in Kuala Lumpur (Malaya) from 29th January to 3rd February 1962. Mr. C. Seetharaman, Head of the Division of Biological Products, I. V. R. I., Izatnagar was deputed by the Government of India, as a delegate. In all fifteen countries were represented. The meeting gave serious consideration to the problem of control of the disease more effectively and considered the necessity of establishing a Reference Laboratory for H. S. in South-East Asia. Recognition of the importance of carriers, necessity of intensive study in regard to the improvement of vaccine with special reference to multiple component vaccine and establishing a working party for the collection and dissemination of information on developments relating to etiology and control of H.S. in livestock were some of the other aspects discussed.

Association News

The Indian Veterinary Association

Proceedings of the meeting of the Managing Council
held on 17-1-62 at 5 p.m. at the office of the I.V.J.

Members present:—

- Dr. T. Vinayaka Mudaliar, President, I. V. A. and Editor,
I. V. J. (in the Chair).
„ V. S. Alwar, General Secretary, I. V. A. and Associate
Editor, I. V. J.
„ C. I. John, Joint Secretary and Treasurer, I. V. A.

The agenda was circulated in advance to all members and the opinions of some of the absentee members were received and recorded.

1. Minutes of the last meeting held on 3-12-61 at Hotel Dasaprakash, Madras, were read and confirmed.

2. The action taken by the General Secretary on the several resolutions passed by the Council at its last meeting, was explained by him and approved.

3. Read letter No. 9-1/61-I.D. dated 23-12-61 of the Government of India regarding their decision to grant representation to this Association on the Animal Welfare Board and asking us to elect a representative as per procedure laid down under the rules and communicate the same as early as possible. Read also the circular letter sent round to all the Council Members by the President proposing the General Secretary of the Association to represent this Association. Read the letters of consent sent by Dr. Anupam Chatterjee and Dr. R. Y. Pande, Members of this Council.

Resolved to elect Dr. V. S. Alwar, G.M.V.C., B.V.Sc., M.Sc., General Secretary of the I.V.A., and Associate Editor of the I.V.J., as a member of the Animal Welfare Board. The President is requested to communicate the same to the Government of India.

4. Reports of the General Secretary and the Editor I.V.J. to be presented at the ensuing General Body meeting at Mathura, were considered and passed.

5. Read the letter from the Secretary, Orissa Veterinary Association asking for clarification about the Admission of the Emergency Diploma holders as members of State Veterinary Association.

Resolved to invite the attention of the Secretary to the decision of the Interim Indian Veterinary Council against the eligibility of such people to get themselves registered as Veterinary Practitioners and as such their enrolment as members of a professional body like the State Veterinary Association may not be in order.

6. Read the letter of the Secretary, Orissa Veterinary Association suggesting the fixation of an annual lump sum affiliation fees for State Veterinary Associations instead of the present system of collecting 10 per cent of their annual income.

Resolved to put up an amendment to the existing rules on the above subject at the ensuing General Body meeting at Mathura.

Madras, }
17-1-1962 }

V. S. ALWAR,
General Secretary.

THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal*. Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and Science advance.

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the *Journal* both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the following scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	Rs. 100/- and above.
Class II Officers	...	Rs. 50/- and above.
All others	...	Rs. 25/- and above.

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of ours should begin to rise higher and higher. On the success or otherwise of this venture, the solidarity of our profession depends. "Pay and Prosper" is the slogan we pass on to the members of our profession.

Jai Hind!

T. VINAYAKA MUDALIAR,
Editor, *The Indian Veterinary Journal*.

THE I. V. J. RESERVE FUND

LIST OF CONTRIBUTORS

	Rs. nP.
Amount acknowledged (February 1962 issue) ...	7,309.05
Dr. J. S. Srivastava, S. R. O., Planning Commission, New Delhi	51.00
, K. Venugopal Rao, Pamulphad, A. P., 1st instalment	10.00
, N. S. Kulkarni, Talaja, Gujarat	25.00
, C. V. G. Choudary, Principal, Mathura Veterinary College	101.50
, C. G. Bhasker, S. I. T. C. Madras, 8th & 9th instalments	50.00
, M. M. Billali, Koratagere, Mysore 1st instal.	5.00
Total ...	7,551.55

Cheques, money orders and all correspondence should be addressed to the Editor, *The Indian Veterinary Journal*, Madras-17.

Andhra Pradesh Veterinary Association

Second Annual Conference, Vijayawada,
8th and 9th January, 1962

Proceedings

The Second Annual Conference of the Andhra Pradesh Veterinary Association, Hyderabad was held at Vijayawada on 8th and 9th January 1962 in conjunction with the Annual Conference of the Andhra Pradesh Veterinary Assistant Surgeons' Service Association in the Andhra Pradesh Rice Mill Association hall. As many as 127 members drawn from all over the State attended the Conference.

The Honourable Minister for Animal Husbandry, Fisheries and Local Administration, Sri M. Narasinga Rao, who inaugurated the conference was received by the Chairman and members of the Reception Committee at the entrance of the hall and was conducted to the dias.

After prayer, the messages received, from the following wishing the conference success, were read out by Dr. C. Krishna Rao, Vice-President of the Association.

1. Vice-President of India.
2. Governor of Andhra Pradesh.
3. Governor of West Bengal.
4. Governor of Kerala.
5. Governor of Uttar Pradesh.
6. Chief Minister of Andhra Pradesh.
7. Minister for Agriculture, Government of India.
8. Chairman, Legislative Council, Andhra Pradesh.
9. Minister for Planning and Development, Andhra Pradesh.
10. Minister for Agriculture, Andhra Pradesh.
11. Vice-Chancellor, Andhra University.
12. Vice-Chancellor, Osmania University.
13. President, Indian Veterinary Association.
14. Dr. D. Govinda Reddy, Director, Upgraded Institute of Pathology, K. G. Hospital, Visakhapatnam.

Dr. D. Sanjeeva Reddy, the Chairman of the reception committee welcoming the Hon. Minister and the delegates to the Conference drew attention to the cause of the profession for better treatment at the hands of the Government, which constantly appeared to be as much neglected as the cattle wealth of this country. He paid glowing tributes to Dr. P. M. N. Naidu, the Director of Animal Husbandry whose inspiring leadership contributed in a large measure to the success of this Association. Speaking at length on the disparity in the scales of pay of various cadres in the Department as compared to others in Medical and Engineering Departments, he requested for immediate redressal commensurate with the nature of the job entrusted to the members of the Department. He expressed concern at the progressive detachment of certain functional activities of this Department such as co-operative dairy activities, special projects relating to dairy production etc., which may ultimately lead to the employment of non-veterinary personnel in such schemes. As for the argument, as to who should manage the schemes of animal production, processing and technology has been settled as early as 1938, he strongly pleaded for carrying out those wise decisions for the well being of the state. He demanded that the entire range of animal and dairy production, technology, marketing and disease control be brought in an integrated manner under one Department as is done in the case of Agricultural activities in Agriculture Department. "There are a number of other matters such as third plan outlay, Veterinary Education and Research, formation of State Veterinary Council, revival

of "Pasusampada" etc. about which we as a profession feel concerned" observed the chairman.

Dr. M. Ahmed Hussain, the President of the Association presiding traced the origin and growth of the Association and stressed the need for the upward revision of the scales of pay, early introduction of post-graduate Veterinary education, establishment of a well equipped Central Animal Husbandry and Veterinary Research Institute in Hyderabad and establishment of the Agricultural University. He suggested that an Indian Veterinary Service be created to pool and make available the best talent in the country to different regions.

He requested the State Government to initiate the move and place it before the Union Government. He has also requested for the early formation of State Veterinary Council and the Indian Veterinary Council to safeguard the interest of the profession.

Inaugurating the conference Sri M. Narsinga Rao, the Honourable Minister, for Animal Husbandry said that the Veterinary profession was great and praise-worthy, as they served the dumb animals and without them there cannot be any preservation of cattle-wealth. He said that the Government would always sympathetically consider any genuine demand of the Association. He entirely agreed to the institution of Post-Graduate courses in the Veterinary Colleges. He however pointed out that the Rural University proposed to be set up at Hyderabad, might have to take up the entire work of research, experimentation and extension work in the fields connected with cattle wealth and agriculture. Hence he observed that no purpose would be served if Universities instituted these post-graduate courses. He hoped that this subject would be kept in view by the select committee which would consider the plan for the Rural University shortly.

On the resumption of the Veterinary periodical "Pasusampada" he assured State Subsidy, provided the Association took the necessary steps to find a major portion of the required finance.

With a vote of thanks by Dr. C. Venkateswara Rao, the Secretary of the Association, the conference was adjourned to meet in the evening at 2-30 P. M. for the Scientific Session.

The Scientific Session

Inaugurating the Scientific Session of the conference Dr. P. M. N. Naidu, the Director of Animal Husbandry exhorted the members to cultivate the habit of rational thinking and scientific approach to problems, that confront them daily. He said that with the present knowledge and available equipment in the hands of the profession it

would not be difficult to solve our problems. While expressing appreciation of the keen interest that some members of special branches have taken by way of new findings, he expressed confidence in the members to tide over difficulties and in keeping abreast with latest scientific development so that the prestige of the profession can be always kept high.

The following papers were read and discussed:—

1. A resume on the evolution of H. S. Vaccine by Sri Sivarama Krishnan.
2. Collection, Preservation and Transport of Specimens to a Diagnostic or Disease Investigation Laboratory by Sri V. Gurumurthi.
3. Estimates of Heritability by Sib analysis by Sri G. Venkatratnam.
4. A note on experiments in day-old-chick-vaccination with F₁ strain of New Castle Disease Virus by Sri P. Panduranga Rao.
5. Parasites of Pigs in Andhra Pradesh by Sri J. Venkat Narayana.
6. Tuberculosis in Ducks in Andhra Pradesh by Sri C. H. Govinda Rao.
7. Magnesium metabolism and Hypomagnesaemia by Sri K. Satyanarayana.
8. A Preliminary note on infectious disease of viral origin in sheep in Andhra Pradesh by Sri K. V. Satyanarayana.
9. A Preliminary report on Mycotic Pneumonia in Sheep and Goats in Andhra Pradesh by Sri A. Madhav Krishna Reddy.
10. An outbreak of Ranikhet Disease at Poultry Research Station, Kakinada by Messrs. T. Rama Rao and P. Bapa Reddi.
11. Fowl Cholera by Messrs. T. Rama Rao and P. Bapa Reddi.
12. Anthrax Spore Vaccine and body resistance by Sri M. Munuruddin Khan.
13. Some Observations on Fowl Cholera in Andhra Pradesh by Sri V. Gurumurthi.
14. Diseases of Swine prevalent in Andhra Pradesh by Sri J. Venkat Narayana.
15. Present State of Pig Husbandry and Industry in India and some suggestions for its improvement by Sri J. Venkat Narayana.
16. Some observations on the incidence of Johnes Disease in bovines in Andhra Pradesh by Sri K. V. Satyanarayana.

17. A Report on *Euphorbia tirucalli* as the cause of eye tumours in bovines by Sri A. Madhav Krishna Reddy.
18. A case of *Encephalitozon cuniculi* infection in rabbit in Andhra Pradesh by Sri A. Madhav Krishna Reddy.
19. A preliminary note on the occurrence of *Mukerjeella caprae* in a goat in Andhra Pradesh by Sri A. Madhav Krishna Reddy.
20. Influence of feeding and plane of nutrition on the protein content of cow's milk by Sri G. Venkatratnam.

With a vote of thanks by the Secretary, the Conference was adjourned to next day for business session.

Business Session (9-1-'62)

Dr. C. Venkateswara Rao presenting the Annual Report of the Association for the year 1961 thanked Dr. M. V. Krishna Rao for all the good work turned out by him as Secretary during the year and who had to resign and go out to Rajasthan on a new assignment and promotion and who could not be present on the occasion. He emphasised that though the total membership went upto 423 during the year 1961 he requested all to enroll themselves as members to muster strength for the association. He expressed gratitude to Dr. P. M. N. Naidu, the Director of Animal Husbandry and Dr. C. Krishna Rao, Deputy Director (Veterinary) and other members of the association for their active co-operation, lively interest and timely help rendered for the success of the association.

He presented the statement of accounts for the year 1961.

The following Office-bearers were elected for the year 1962.

1. President: Dr. B. Purushotham Rao.
2. Vice-President: Dr. B. A. Shiraji.
3. Secretary: Dr. P. Panduranga Rao.
4. Joint-Secretary: Dr. C. Venkateswara Rao.
5. Treasurer: Dr. V. Gurumurthy.

Members:

1. Dr. C. Krishna Rao.
2. Dr. Poornachandra Rao.
3. Dr. V. Rajeswary.
4. Dr. P. Ranga Reddy.
5. Dr. Aukil Ali Shah.

Ex-Officio:

1. Dr. M. Ahmed Hussain - Past President.
2. Dr. B. K. Mohan Rao, Secretary, Andhra Pradesh Veterinary Assistant Surgeons Service Association.

With Dr. C. Krishna Rao in the chair, the following resolutions were considered and passed:

1. Resolved to request the Government for the donation of a suitable building site for the Association either in Khairatabad or Saifabad area in Hyderabad and also accord permission to the members of this Association to collect the necessary donations for "A BUILDING FUND" for this Association.

2. This conference while viewing with concern the progressive deterioration in service conditions of teaching personnel in the two Veterinary Colleges in the State, resolved to request the Government to take immediate steps to improve their status on a par with those of similar cadres in Madras Veterinary College and other Veterinary Colleges in India and (2) to narrow the present wide gap in the teacher pupil ratio so that the undergraduate instruction is strengthened and concurrently a basis is established for the early introduction of Post-Graduate courses.

3. This conference while welcoming the efforts of the State Government for an early establishment of an Agricultural University in the State suggests that all the Veterinary Education and selected Research Institutes in the State be simultaneously placed under the control of the Agricultural University with a view to develop common standards in Education, Co-ordinate spheres of activities covering the entire state and for a more equitable utilisation of existing trained personnel working in these institutions.

4. Resolved to ratify the resolution passed by the Managing Committee to institute a 'Doctor Mahumudullah Memorial Fund' and direct the Managing Committee to take necessary steps in this direction.

5. Resolved to add the words "Special District Branches may be created wherever necessary" to byelaw 7 (a) after the words "District branches" in the first sentence. And also to add "Vice-President" after the word president in Bylaw 7 (b).

6. Resolved to request the Government to start post-graduate studies at the two Veterinary Colleges in this State at a very early date with a view to providing requisite number of technically trained personnel to man the specialised schemes under the third Five year Plan.

7. Resolved that in respect of persons appointed to posts created on or after 1-11-1956 in the State Animal Husbandry Services and sub-ordinate Services, the recruitment rules may be made common whether they belong to Andhra or Telangana areas.

8. Resolved that the Veterinary Biological and Research Institute, Hyderabad and such other similar offices having State wide

jurisdiction should not be treated as regional units but shall be treated as state units for the purpose of recruitment of persons to posts in the subordinate cadre also with the object of utilising the best talent in the State.

9. This conference views with concern the total disbanding of nearly 300 trained vaccinators of the Rinderpest Eradication Scheme with a service ranging from 2 to 6 years which apart from creating an enormous human problem resulted also in a wastage of technically trained and experienced personnel whose experience and talents can be usefully employed for the control of livestock diseases in the State and recommend that priority may be given for absorbing them in the regular service in any of the new schemes sanctioned more particularly in the mobile squads and vacancies in the category of compounders, laboratory attendants, technicians, maistris and Fieldmen in the Andhra Animal Husbandry subordinate service, as most of these people are over aged to enter any other service.

10. The conference notes with regret the inordinate delay caused in the matter of regularisation of services in the State Veterinary Department which has resulted in avoidable hardship and discontentment to a large number of personnel and hence requests the Government to direct the appropriate authorities to expedite the process of regularisation.

11. Resolved to request the Government to upgrade the Veterinary Biological and Research Institute, Hyderabad into a Central Research Institute.

12. Resolved to request the Andhra Pradesh Government to move the Central Government to Institute an All India Cadre for the Veterinary Service.

The venue of next year's Conference was then discussed. Drs. P. L. Narayana Rao and Patan Shah Alam Khan and I. Vijayarazu came forward to arrange it at Tirupati, Guntur and Vijayawada respectively. After discussion it was decided to hold it at Tirupati.

With a vote of thanks by Dr. Ranga Reddy on behalf of the delegates the Conference came to a close.

P. PANDURANGA RAO,
Secretary,
The Andhra Pradesh Veterinary Association.

Correspondence

[The views and opinions expressed in correspondence are those of the writers themselves and are not always endorsed by the Editor.]

From Dr. K. S. Nair, M.B.O.V.S., D.T.V.M. (Edin.),
"Sudarsana",
Near Forest Office,
Vazhuthacaud, Trivandrum.

To The Editor,
Indian Veterinary Journal,
Madras.

Dear Sir,

Permit me to congratulate you on the correct lead you have given, as a New Year present, in the editorial "Crossbreeding for Milk" in the January issue. The present Cross Breeding Schemes of the I.C.A.R. are not leading us anywhere. I have knowledge of two such schemes in the Kerala State. Jersey seed is being broadcasted among the scrubs and it is asserted that cross-bred calves fetch a high price and that milk is more from these two areas. This may be so to some extent, but it is mongrelisation that is going on.

Time has come for a survey to assess by some independent body, the effects and results of this type of uncontrolled Cross Breeding. Necessary examination of registers to trace the progeny and also scrutiny of milk records for finding out milk yields have to be undertaken for this purpose.

As there is no scheme to develop a useful cow in the present cross breeding plans, is it not of vital importance to lay down breeding plans for evolving new breeds? In Texas in the U.S.A. many new breeds have been developed with the bulls imported from India, called Brahman by Americans. Much bold work has been done in Texas for creating heat tolerant and insect resistant herds, but the new breeds are all for meat production. Charbrey formed from Brahman blood and the French Charollis breed are very popular. Santa Gertrudis developed by King Ranch in Texas is said to have three eighth Brahman and five eighth Short-horn and is selected for red colour and is breeding true. Beefmaster also developed in Texas, is having Brahman stock on Short-horn and Hereford. Again another breed is Brangus where Brahman is crossed with Angus. Lastly I also understand that experiments are on, where the Red Sindhi bull is crossed with certain dairy breeds for evolving a suitable dairy breed adaptable to Gulf Coast area.

I am conscious that breed formation is a long term business and of an expensive nature. Therefore this work can be undertaken in our

country only through Government Agency. As the modern Veterinary Colleges in India are generally established in or near livestock farms, and as the college staff are composed of highly qualified teachers, I would strongly advocate that pilot breeding plans be started in those farms. Again the work should be undertaken only in centres where there are no fixed breeds. Further it would be useful to have a coordinating body of knowledgeable people of an All-India nature, say in the I. C. A. R., but most of the work would be in the hands of local committees.

"Changing horses in the mid stream" is often resorted to, especially in cross breeding programmes. Some time back Ayrshire was the favourite, later came Holstein-Friesian and now the bias has gone to the Jersey. In all this work no permanent result has been achieved due to want of direction, objective and patience. In other words, work of this nature has not been sustained enough; scientific basis with the object of creating breeds suited to the different parts of the country has yet to be formulated. Therefore it is time that work is started as early as possible. If there is no prospect of developing a new breed suited to areas of non-descript cattle, it would be the wisest policy to scrap this type of cross breeding schemes, thus saving the country from the prospect of flooding our land with C3 Cross breeds.

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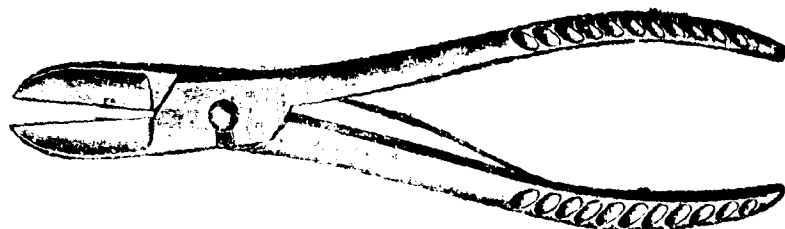
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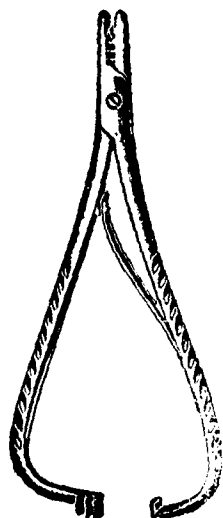
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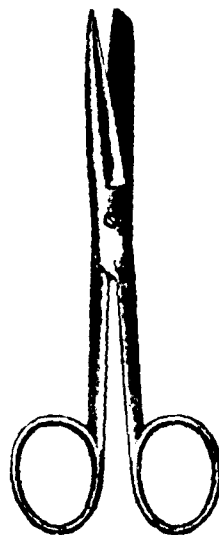


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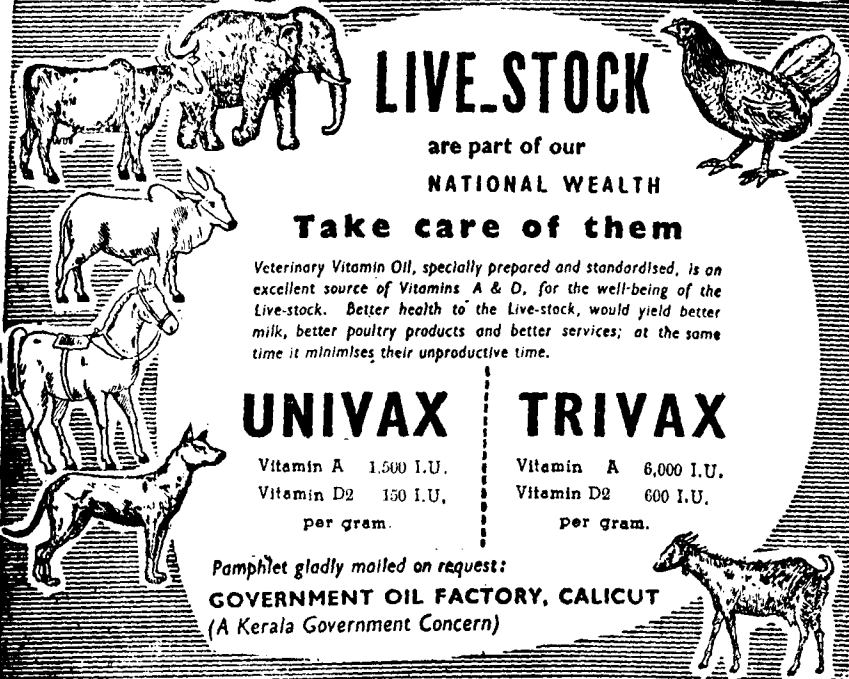
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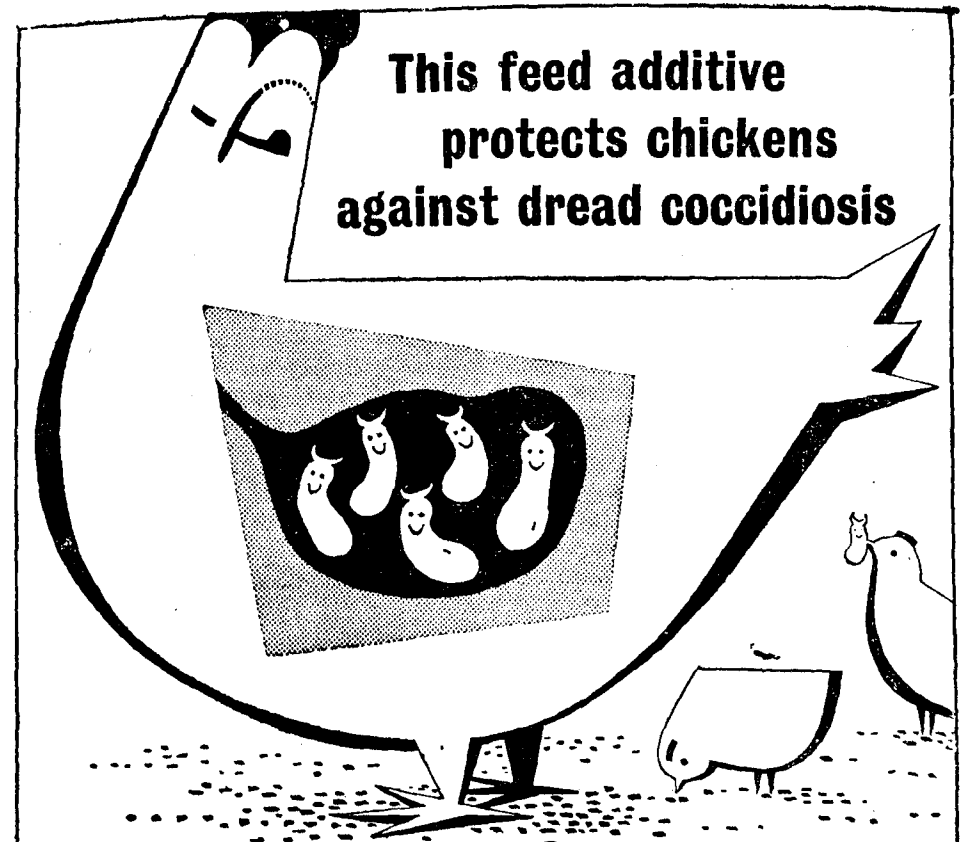
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