

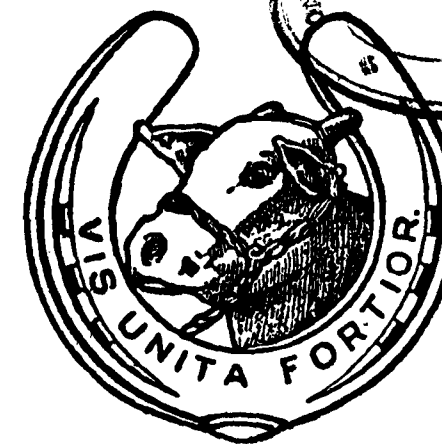
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Vol. XXXII, No. 2

4.
SEPTEMBER, 1955

THE INDIAN VETERINARY JOURNAL ^{Ab9}

(The Journal of the All-India Veterinary Association)

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EDITOR

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

Office:—26, Wallajah Road, Madras-2 (S. India)

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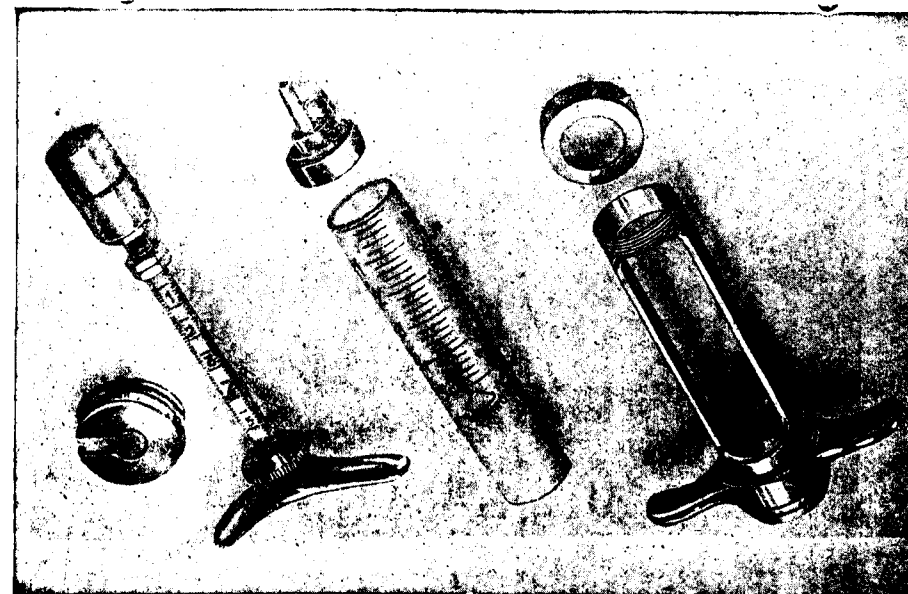
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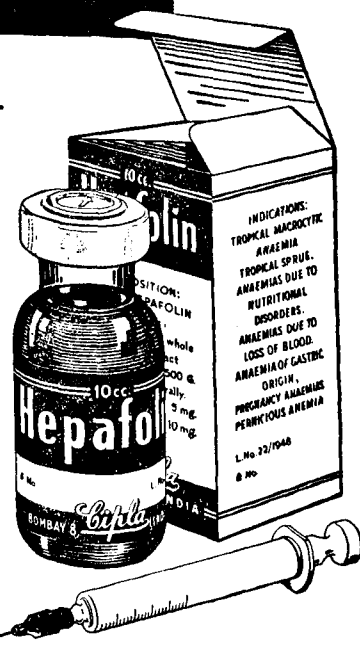
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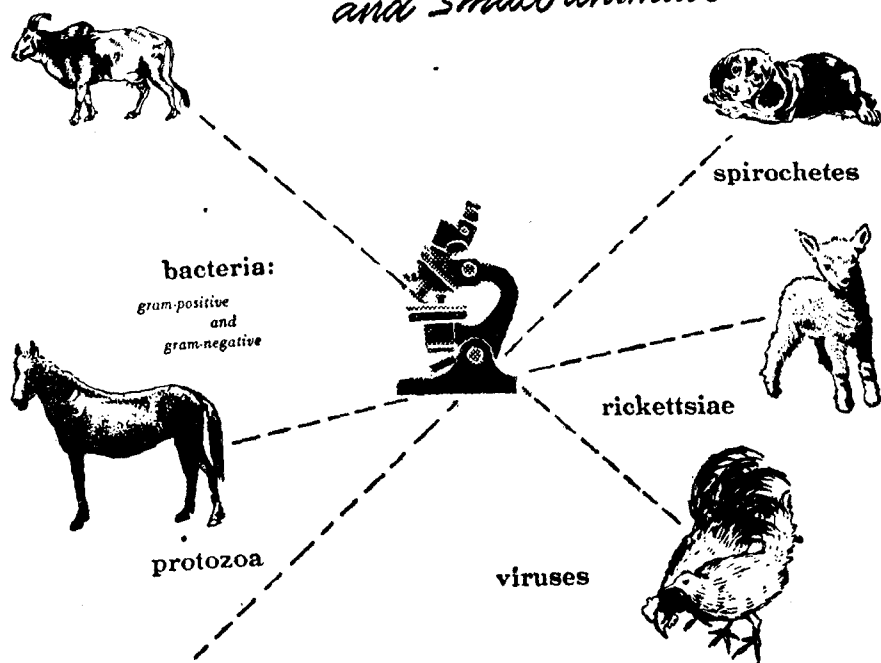
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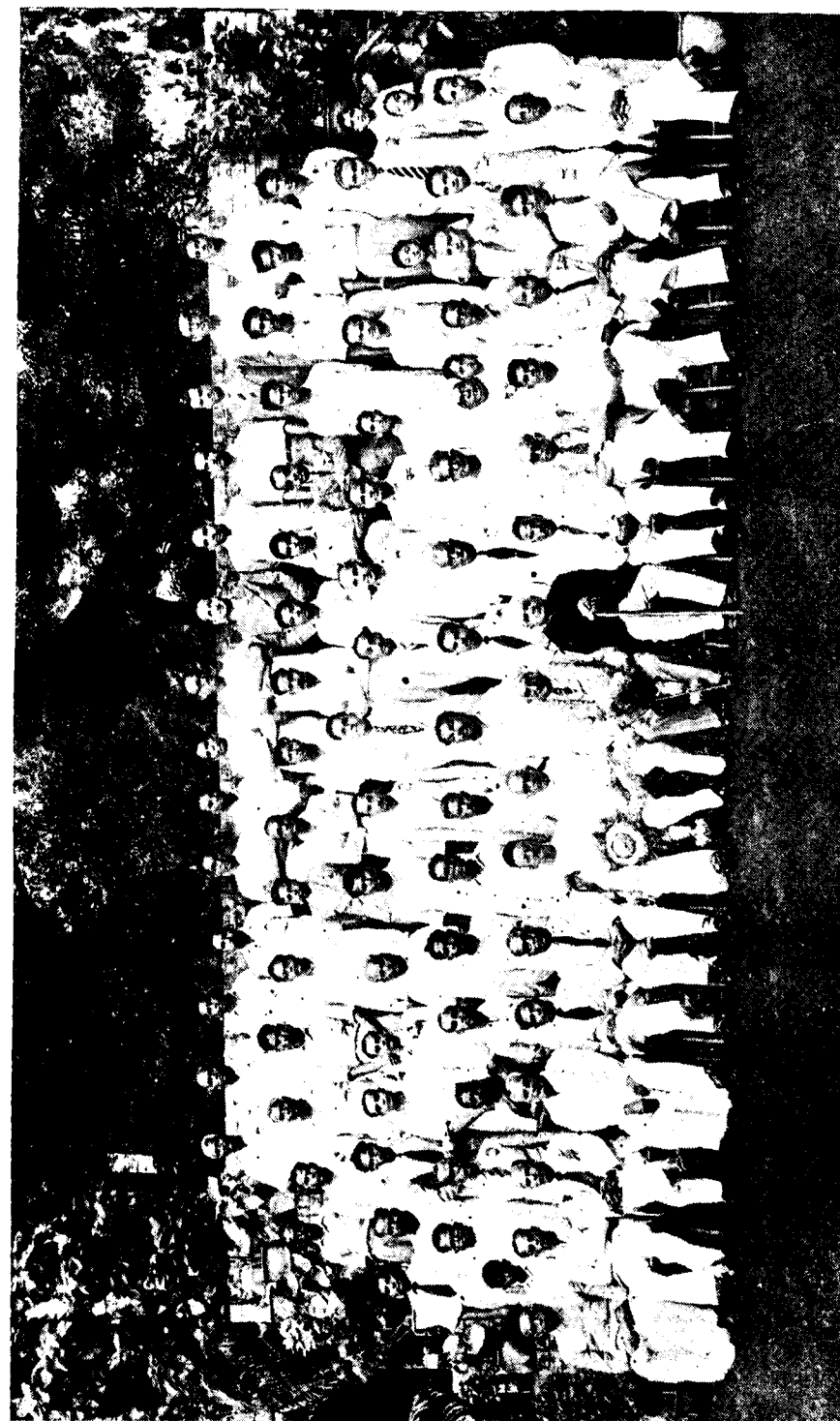
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THE
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Vol. XXXII

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Editorial

RANCHI MEETINGS - 2.

Give us men ! Men from every rank,
Fresh and free and frank —
Men of thought and reading,
Men of light and leading,
Men of loyal breeding —
The Nation's welfare speeding—
Men of faith and not of fiction,
Men of lofty aim in action ;
Give us men ; I say again,
Give us Men !

Bishop of Exeter.

We are reminded of the above lines when we go through the bitter remarks of Mr. H. B. Shahi, when he opened the discussion on the report of the Livestock (Animal Breeding) Committee at Ranchi. Speaking on milk recording, he said. "We must be very candid about the assessment in the field that the standard of honesty which is required for giving figures—and giving them correctly—is unfortunately still lacking". He further adds "I have very often seen milk recording when I was in I.C.A.R.; they were filled underneath a tree quite far away from the cow". Serious words are these, coming as they do from a person of the status of Mr. H. B. Shahi. We do not know if conditions in the field are so bad as portrayed by Mr. H. B. Shahi. But we do know that there is a general decay in the common honesty of man in recent years in all walks of life.

That is a legacy left behind by the two World wars, which taught man what it is to make hay while the sun shines. This decay is not confined to any particular class of workers. It is to be found at all levels of administration, Trade, Commerce, Labour, etc. What is needed therefore is the general toning up of society and the watchful care which Mr. Shahi insists upon is to be applied at all levels of society, whether official or non-official, if matters are to improve. But who is to watch the Watchman? Unless each individual is his own conscientious watchman, a man of "lofty aim in action", this wailing over the decay of honesty in man is bound to continue.

But we can't sit idle until matters improve. We have to progress. We are already late in the field. What is needed therefore is vigilance and close supervision, as was rightly pointed out by the Animal Husbandry Commissioner Mr. P. N. Nanda. Slackers at any level of work should not be tolerated and we make bold to say that they should have no place in Free India.

THE KEY VILLAGE SCHEME

THIS scheme was discussed thread-bare and some of the suggestions under this head need particular attention.

Legislative measures for breeding control are absolutely necessary; otherwise we will be building with one hand and pulling down with the other. We appeal to all those States which are still lagging behind in this direction to fall in line with others and thus help this great work.

There should be no paucity of breeding bulls for work in artificial insemination centres. The suggestion to avail of the help offered by the Military Farms Department, who have some form of breeding records also, is quite good. Opening of new Government Farms for purposes of producing such seed material, is highly essential; but the idea of running such breeding stations on a commercial basis, should be completely erased from the minds of all concerned. The profit is not to be found on a live-stock farm but out in the country where the standard of cattle is

bound to go up by leaps and bounds, thus leading to national prosperity.

The suggestion to appoint an Animal Nutritionist and Fodder Development Officer in each State, is good but we are only thinking of the lines quoted at the beginning of this article. Let us hope we will get such men. Several other points of great importance were discussed and definite decisions taken. Good roads, trucks, jeeps, adequate staff, fair wages, mixed farming, fodder banks, fodder cultivation, balanced rations, grassland units have all been recommended and they are all necessary. The profession has pinned its faith in this Key Village Scheme and it is up to everyone concerned to see that it is made a great success.

The Animal Health Committee and the Dairying Committee have also had their hands full. The subjects discussed were more or less of routine nature. We will return to some of these as and when occasions arise.

One other meeting of great importance that took place at Ranchi is that of the Interim Indian Veterinary Council, which met for the first time. We publish elsewhere its complete proceedings for the information of the profession.

THE NEW VETERINARY COLLEGES

A message from New Delhi dated 26th July 1955 reads "Four new Veterinary Colleges are to be opened in the States of Andhra, Orissa, Madhya Bharat and Travancore-Cochin, according to the decision of the planning Commission known to-day".

This is happy news indeed as far as it goes. But one is inclined not to be too optimistic on the appearance of so many Veterinary Colleges over-night. For some years to come, these institutions have necessarily to work under adverse conditions, through lack of proper buildings, laboratory facilities, well-organised clinics, livestock farming and dairying facilities and even suitably qualified teaching staff, etc. And as such, efficiency is likely to suffer unless strict vigilance is kept from the very

beginning and the wheels of the Government are made to move faster than their proverbial pace. These things will throw a good deal of strain and responsibility on those who are called upon to organise these institutions. But we feel sure that these officers would rise equal to the occasion and serve the nation truly and well. It is on foundations they lay that the future of the profession depends in this country. Nothing should be done, in the name of economy or emergency, to lower the high standard that the profession has been trying to build up all these years. They must think big, conceive big and act big and justify the trust placed in them. Unless the Government go all-out to help the officers called upon to organise these colleges, their task is bound to be anything but enviable.

In this connection we would suggest that the National Veterinary Council of India should come into existence soon and try to help in the laying out of standards and creating healthy conventions and precedents. We are aware that these institutions are more an emergency measure to meet the present day acute shortage of personnel. Perhaps at a later date, this may require to be re-considered as a long-range policy and a final decision taken. Factors such as demand and supply, economy in running such institutions, still further raising of standards at these colleges, unemployment, etc., will all begin to operate and demand attention. But that day is far off. Let us do the work of the present hour with confidence and good cheer.

We wish these New Veterinary Colleges in India every success!

FAREWELL

On this occasion of my retirement from the Editorship of the *Indian Veterinary Journal*, I feel I owe a few words of farewell to the readers of this *Journal*.

It was 31 years ago that I was called upon to shoulder the high responsibility of editing this *Journal*. After a good deal of hesitation I gave my consent on the definite understanding that a few of our colleagues would help me in this onerous task. They

were all men in Government service and as such could not openly identify themselves with non-official Journalism. But yet they stood by their promise through thick and thin and nurtured this child of our profession. Alas! some of them are no more with us and my thoughts naturally go over to them in grateful memory. Prominent amongst them were Mr. A. Ramalinga Mudaliar, Rao Sahib K. Kylasam Iyer, and Rao Bahadur R. Swaminatha Ayyar. The tragic death of the last one came on me as a rude shock and my health began to fail in a manner that was absolutely un-accountable. But I hoped to recover sufficiently strong to serve the profession a little longer. But that is not to be. I am advised absolute rest by my medical attendants. So I am laying down this office with great regret after obtaining the permission of the All-India Veterinary Council so far back as March 1955.

The Indian Veterinary Journal has been part and parcel of my life all these years and I can never completely divest myself from its activities. As long as there is breath left in me, I shall continue to take interest in its career. It is not without grief therefore that I am thus tearing myself away from the *Indian Veterinary Journal*.

I cannot sufficiently thank the Members of the profession, the various Reference Boards and the All-India Veterinary Association for the inestimable support they have given me in running this *Journal*. It was a labour of love no doubt but the affection and esteem I received from all quarters was something that I can never forget to the end of my days. What more could man ask or Providence give!

My only consolation is that I am leaving this *Journal* in worthy hands. Sri Rao Sahib T. Vinayaka Mudaliar is too well known to the profession to need any introduction. I make no secret of the fact that he was the *de-facto* Editor of this *Journal* for the first 15 years of its career, after which period he handed over that work to Sri Rao Bahadur R. Swaminatha Ayyar. Between them they helped me to make the *Indian Veterinary Journal* what it is to-day. I mention this fact merely to show that Mr. Mudaliar is not new to this work. He has been a tower of

strength to me from the very inception of this *Journal* and it is at great personal inconvenience that he is accepting this office to-day at the call of the profession. I wish the profession extends to him the same amount of co-operation as it has been my good fortune to receive at their hands all these years.

One other person who has been shedding the necessary light and lustre and giving us all the needed advice from time to time with his mature wisdom is the revered President of our Association, Dr. M. S. Sastry. To him, I bow in all reverence. He is 'Courage' personified and has helped us to shed all fear-Complex. He is a unique character rarely met with in ordinary life.

The Manager of this office, Sri C. S. Venkataraman, has toiled with me with great devotion and loyalty for over 30 years now. To him I offer my thanks and blessings.

So, Farewell Friends! I have done my best to serve the profession in my own humble way. Pardon me for all my faults. My parting request to you is, to continue to support the *Indian Veterinary Journal* in every possible way.

P. SRINIVASA RAO,
Retiring Editor.

ADIEU, DEAR FRIEND!

My heart is too full with feelings to say anything at the moment. An endearing friend is making his exit from the field of Veterinary Journalism. That is sad enough for a friend of over 44 years standing. Added to that, the heavy responsibility of running the *Indian Veterinary Journal* has now been shifted on to my shoulders and I dread to think of the days ahead of me. It is not easy to succeed in office so distinguished a worker as Mr. Srinivasa Rao. For patience, perseverance and professional loyalty he is leaving a record that would be hard to beat. The best time to judge a man's worth is at the time of his laying down Office. The meritorious record of the *Indian Veterinary Journal* bears ample testimony to the real worth of Mr. Rao. *The Indian Veterinary Journal* has practically grown

with the professional career of Dr. Pangal Srinivasa Rao. One cannot imagine *Indian Veterinary Journal* without Mr. Srinivasa Rao.

I can only hope to walk in his foot steps with all solemnity and try to deserve the goodwill of the profession.

Adieu, Dear Friend! Your great services, the profession can ill-afford to forget. You will continue to live in the pages of the history of our profession in India. If the good wishes of the entire profession in this country and elsewhere, for complete recovery of your health and enjoyment of a well-earned rest, should count for anything, I assure you, you have them in plenty.

T. V. M.

INTERIM INDIAN VETERINARY COUNCIL

Minutes of the First Meeting

The first meeting of the Interim Indian Veterinary Council was held at 10-00 A.M. on the 30th April 1955, in the Ranchi College Hall at Ranchi, Bihar.

The following members were present :—

1. Shri P. N. Nanda, Chairman.
2. „ L. Sahai, Director, Indian Veterinary Research Institute.
3. „ V. R. Phadke, President, Bombay Veterinary Medical Association.
4. Dr. R. B. Prasad, Professor of Animal Husbandry, Bihar Veterinary College, Patna.
5. Shri S. R. Chadha, Director of Veterinary Services, Bombay.
6. Dr. C. S. Balakrishnan, Secretary Bombay Veterinary Medical Association.
7. Shri M. Y. Mangrulkar, Principal, Veterinary College, Jabalpur.
8. Shri G. G. Oke, Deputy Director of Veterinary Services, Berar Division, Madhya Pradesh.
9. „ Shri V. R. Rajagopalan, Director of Animal Husbandry, Madras.
10. „ S. V. Mudaliar, President, Madras Veterinary Association.
11. „ B. N. Handa, Director of Veterinary Services and Warden of Fisheries, Punjab.
12. „ S. D. Sharma, In-charge Veterinary Hospital, New Delhi.
13. „ B. N. S. Chowdhry, Deputy Director of Animal Husbandry, Allahabad, U.P.

14. Dr. K. S. Shetty, Director of Veterinary Department, Hyderabad-Deccan.
15. „ S. Datta, Director of Veterinary Services and Animal Husbandry, West Bengal.
16. „ P. M. Narainaswamy Naidu, Director of Animal Husbandry Mysore.
17. Shri K. N. Trishal, Disease Investigation Officer, Jammu & Kashmir.
18. Dr. R. D. Nanjiah, Mastitis Investigation Officer, Bangalore.
19. Shri P. S. Brar, Director of Veterinary Services, Pepsu.
20. „ G. S. Rathore, Deputy Director of Agriculture (Vety.), Jodhpur, Rajasthan.
21. „ V. K. Madhava Menon, Director of Animal Husbandry, Travancore - Cochin.
22. „ K. B. Vyas, District Veterinary Officer, Junagadh, Saurashtra.
23. „ D. P. Shukla, Director of Animal Husbandry, Ajmir.
24. „ U. K. Asnani, Animal Husbandry Officer, Kutch.
25. „ N. G. Iyengar, Chief Animal Husbandry Officer, and Director of Fisheries, Vindhya Pradesh.
26. „ Gurdev Singh, Animal Husbandry Officer, Bhopal.
27. Dr. C. Krishna Rao, Deputy Director of Veterinary Services, Andhra.
28. Shri R. N. Mohan, Assistant Animal Husbandry Commissioner with the Government of India - Secretary.

The Chairman welcomed the members, outlined the history of the formation of the Council, paid a tribute to the All-India Veterinary Association and to those who had worked ceaselessly towards the formation of the Council, and exhorted the members to strive for the early formation of Statutory Councils in the States as well as at the Centre, so that the objects before the profession are achieved without undue delay.

The text of the Chairman's address is attached as Appendix I.

The members stood in silence for one minute in memory of the late Shri R. Swaminatha Ayyar.

The following decisions were taken on the different subjects of the agenda.

Subject 1: Framing of rules and regulations for the Interim Veterinary Council.

The Chairman informed the members, about the functions of the Interim Council and explained that the Interim Council, which had been set up as a forerunner of the National Veterinary Council, will have to frame certain rules and regulations for its day-to-day work in discharging those functions. He further advised that, since the Interim Council will eventually merge into the National Council it would be necessary to frame comprehensive rules, so that the same may later be adopted for the working of the statutory council with only such modifications, as may be found necessary.

The Council decided that a sub-committee consisting of the following members should meet at an early date and frame rules and regulations for the working of the Interim Council:—

1. Shri L. Sahai - Convener.
2. Dr. S. Datta
3. Shri M. Y. Mangrulkar
4. „ V. R. Rajagopalan
5. „ C. S. Balakrishnan
6. „ R. N. Mohan.

This Committee will submit the draft rules and regulations for the approval of the Executive Committee, which will adopt it for the day-to-day working of the Council pending final approval at the next meeting of the Council.

Subject 2: Formation of the Executive Committee.

The Chairman explained that the General Body of the Council is expected to meet about once in a year and said that in order to transact urgent business that might arise between the Council meetings it would be necessary, as provided for in the Resolution notifying the setting up of the Interim Council by the Government of India, to elect an Executive Committee for the Council, which may also serve as the National Veterinary Committee for maintaining liaison with the International Veterinary Congress, for discharging the various day-to-day tasks.

The following members were then duly elected to constitute the Executive Committee, besides the Chairman of the Council:—

1. Shri L. Sahai, Nominee of the Central Government,
2. Dr. S. Datta
3. Shri K. S. Shetty } Representatives of the State Governments.
4. Shri S. V. Mudaliar, Veterinary non-official representative.

The Secretary of the Council will also assist the Executive Committee.

Subject 3: Membership of the International Veterinary Congress.

The Chairman recalled the recommendations of the 14th International Congress held in London, in 1949 that in each country a permanent National Veterinary Committee should be established to effect liaison between the country and the Permanent Committee of the International Veterinary Congress and to perform certain functions on behalf of the Congress. He hoped all members would agree to the advisability of India becoming a member of the International Veterinary Congress, but he was not sure that matters in this country had reached a stage when it should seek membership of the Congress. Moreover, there was also the question of subscription payable to the Congress. Consequently, he advised that in the first instance the financial and other implications of the proposal might be ascertained.

It was decided that this question be deferred till the next meeting of the Interim Council and that in the meantime the financial and other implications of the proposal should be examined.

Subject 4: Increasing the list of members nominated by the Central Government.

The Chairman referred to the Resolution and to the list of members constituting the Interim Council but felt it would be desirable to enlarge the

scope of membership so as to make it more representative, for example by including a member from the Remount, Veterinary and Farms Department, which was not represented at present. He further suggested that it might also be helpful at least in the initial stages, to include a representative from the Indian medical Council, a lawyer, M.P., and one additional representative from among the retired veterinarians and private practitioners.

The Council recommended that the Government might be approached to take early action to increase the number of nominees of the Central Government so as to include the following :—

- (1) A veterinary representative of the Remount, Veterinary and Farms Department.
- (2) A representative of the Indian Medical Council.
- (3) One more representative of the veterinary profession covering retired veterinarians, private practitioners, veterinary journalists, etc.

Subject 5: Measures to help the formation of Statutory Councils in the States.

The Chairman exhorted the State Directors and other members present to actively pursue the matter, so that Statutory Councils were formed in the States as early as possible. He also requested them to keep the Secretariat of the Council informed about the progress from time to time.

The Council recommended that the Central Government might also take suitable action at higher administrative levels to persuade the State Government to pass necessary legislations for the constitution of the State Veterinary Councils.

Subject 6: Ways and means of financing the Councils (State and Centre)

The Chairman informed the members that the Interim Council had no independent source of income for meeting the expenses which would have to be incurred by it in exercising its various functions. The main items of expense, he said, would be as follows :—

- (1) Secretariat and T. A. of non-officials, which were at present being met by the Government of India.
- (2) Payment of subscription to International Veterinary Congress.
- (3) Miscellaneous expenses, which might have to be incurred on such items as printing of the Veterinary Practitioners' Register, etc.

In this connection the Chairman informed the members about the arrangements made in U. P. and Bombay, where fees had been prescribed for registration of veterinary practitioners, the Secretariat and T. A. expenses being met by the Governments. Some similar arrangements, he said, would also have to be made by the other State Governments when they set up statutory Veterinary Councils.

After some discussion, the Council decided that the matter should be referred to the Sub-Committee set up for drafting the rules and regulations of the Interim Council, which should also suggest ways and means of financing the Central as well as the State Councils.

Subject 7: Registration of Veterinary practitioners and Steps to prescribe qualifications for them.

The Chairman recalled the difficulties which were being experienced in certain states by Veterinarians in prescribing drugs like sulphonamides and barbiturates for the treatment of animals, as they were not included in the term "registered practitioners" for the purposes of drugs rules, and explained that various other reasons also it was necessary to maintain, authentic registers of Veterinary Practitioners in the country. The Council, he said, would also have to lay down the minimum qualifications for eligibility of registration as "Veterinary Practitioners."

The Council recommended that those States in which statutory Councils have been formed may take up the registration of Veterinary Practitioners in their States having no legislation at present may maintain authorized registers of Veterinary Practitioners; and that all practitioners registered in the States should automatically be registered in the books of the Central Council.

It was expected that the Committee set up for drafting rules and regulations would also make some concrete recommendations on this subject.

In this connection there was also some discussion on the eligibility of the trainees passing the proposed two-year course, and it was unanimously agreed that they should not be allowed registration. Consequently, it was recommended that only a certificate not a diploma, should be awarded at the termination of the two-years course.

Subject 8: Future meetings of the Council and its Executive Committee.

The Chairman referred to Subject No. 1 of the agenda, wherein it had been decided that a sub-committee be appointed for framing the rules and regulations of the Interim Council. He expected that sub-committee would include in the rules the necessary provision for the meetings of the Councils and of its Executive Committee. Pending finalization of the rules, he said, it was necessary that the members took some tentative decision, so that the functions of the Council might be discharged without undue delay.

It was agreed that the Interim Council should meet annually and the Executive Committee periodically according to the necessity of work, and that one month's clear notice should be given about the meetings.

Subject 9: Other cognate matters.

The only important subject discussed under this head was the position of Interim Veterinary Council vis-a-vis Veterinary Education in India. The Chairman informed the members that since a separate council, viz. The Indian Council of Agricultural Education, had already been set up by Government for advising on all matters concerning veterinary education, that subject would not come under the purview of the Interim Veterinary Council.

The matter was discussed by the members and it was decided to make the following recommendation to the Government :—

"The Council is unanimously of the opinion, that in as much as the aims, objects and functions of this council are centred round the subject of Veterinary Education, it should be the explicit and primary responsibility of the Council that it deals with all aspects of Veterinary Education in the country so as to

facilitate effective discharge of all the functions entrusted to it. The Council, therefore, strongly recommends that Government may be moved to refer, in future, all matters pertaining to Veterinary Education to this Council, as is the case with parallel bodies, such as the Indian Medical Council".

True Copy.

R. N. MOHAN, (Secretary).
P. N. NANDA, (Chairman).

APPENDIX I

Chairman Shri P. N. Nanda's address.

Gentlemen,

It gives me very great pleasure to welcome you all to this, the first meeting of the Interim Indian Veterinary Council. I am very glad that most of you have found it possible to be present to-day to participate in the deliberations.

It is certainly a matter for us to rejoice that, at long last the Veterinary profession in India has been able to achieve something for which it has been striving persistently for many years. We must, however, give credit where credit is due. It is mainly due to the efforts of a band of selfless workers from amongst our profession that a dream has taken shape to-day. We should, therefore, gratefully acknowledge their services and pay homage to them. We must also express our gratitude to our National Government for appreciating the validity of our aspirations and for according their approval to the setting up of a National Council.

I do not propose to take your time to tell you the whole history of the efforts made by our friends and colleagues towards constituting a National Veterinary Council for India, the many vicissitudes which hampered progress, and the obstacles and hazards which had to be faced and surmounted. Nevertheless, for the information of those who are not well acquainted with the story of the formation of this Council, I feel, I should at least briefly recount the more out-standing events.

The necessity of providing a common platform for bringing together the veterinarians located in different parts of the country was keenly felt even about 35 years ago. It is heartening to remember that the zeal with which the matter was taken up by the profession in general, and an enthusiastic band of workers, in particular, did not take long to bear fruit. The All-India Veterinary Association was formed in 1922, and its first Conference was held in Lahore in 1923, followed by a series of periodical conferences which have now become an annual affair. Many of you must have attended one or more of these conferences, especially the one recently held in Madras along with the Golden Jubilee of the Madras Veterinary College.

That the All-India Veterinary Association, since its inception has done a good job will not be denied by anyone. Its contributions to the advancement of the veterinary profession and its members in India, have indeed been many. If I may single out any one of the achievements of this Association, I would naturally mention the Indian Veterinary Journal, with which you are all so familiar.

It was felt that the scope of activity of the All-India Veterinary Association was limited. For this reason and others it was considered desirable some

years ago, to constitute a Veterinary Council, having statutory powers, somewhat on the lines of parallel Councils existing for the sister professions of Medicine and Dentistry. Meanwhile, the International Veterinary Congress in its London Session in 1949 had also recommended the establishment, in each country, of a National Veterinary Committee to effect liaison between the country and the Permanent Committee of the Congress. These matters came up for discussion at the joint session of the All-India Veterinary Association and the Bombay State Veterinary Medical Association which was held in Bombay in December 1951, in conjunction with the Diamond Jubilee of the Veterinary College there, under the Chairmanship of the Union Minister for Food & Agriculture. A steering committee was set up, and it was charged with the task of examining the matter and its implication and of making recommendations to the Government accordingly. One important fact which was realised quite early was that under the Indian Constitution Veterinary Science is a State subject, and as such it would not be possible for the Central Government to pass any legislation in this regard without the concurrence of the State Governments. Consequently, the steering committee recommended *inter alia* that State Veterinary Councils should be set up by legislation in all the States and that a Statutory Indian Veterinary Council should then be brought into being by providing representation on the Central body from the State Councils and by nominations by the Central Government. As the setting up of Statutory Veterinary Councils in the various States was likely to take time, the steering committee further recommended that till such time as the Statutory Indian Veterinary Council was established an interim Indian Veterinary Council should be established, without legislative backing composed of members nominated by the States and the Union Government.

The recommendations of the steering committee have been accepted by the Government of India and the Interim Veterinary Council has been constituted. This is the first meeting of that Council which you are attending here today. I hope that State Governments will take early steps to pass the necessary legislation so that Statutory Councils may be set up in the States as well as in the Centre. I also hope that our veterinarians in the various States will do their best to see that the desired councils are established without further delay.

The Interim Council is to serve as a liaison body between the Government and the Veterinary profession in India and between the Government and the International Veterinary Congress. It will also advise the Central and the State Governments on all matters concerning the veterinary profession. Since a separate Council, has already been set up to advise Governments on all matters concerning agricultural education, it is for consideration whether the Interim Council should interest itself in matters concerning veterinary education, and if so to what extent.

I expect you are all eagerly looking forward to participating in the discussions on the items of the agenda. I shall, therefore, not stand any longer between you and the agenda. I trust that in your discussions you will bear in mind the desirability of laying sound foundations, so that the Council may get a good start.

Original Article

THE ANATOMY OF A FOETAL INDIAN ELEPHANT

PART I

The Bones & Joints of the Fore-limb.

By

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Introduction

Skeleton of the elephant has received more attention than its soft parts by early authors. Moulin (1682) and Blair (1713) have given a good account of the skeleton. Blair for the first time figures the prepollex, described six toes on the fore-foot and incorrectly showed phalanges and sesamoids on the prepollex. But he overlooked the presence of prehallux in the hind-foot. Perrault (1734) studied the skeleton and Peter Camper (1774) noted the correct position of the prepollex but overlooked the prehallux. Later Rymer Jones (1838-47) attempted a comparison with other mammals. Macalister (1878) by reference to previous papers noted the presence of an os centrale in the carpus and absence of third trochanter and ligamentum teres in the femur. Kneeland (1850) compared it with the Manatee.

In the latter part of the nineteenth century attention was directed to the detailed study of the limbs and to its fossil history. Several German anatomists homologised the bones of the carpus and tarsus of Mammals. The typical mammalian carpus has, ulnare, intermediate and radiale in the proximal row and trapezium, trapezoid, magnum and unci-form in the distal row. A centrale between the two rows is rare, although it is usually present in the foetus. Baur (1885) found a centrale in the embryos of all mammals except the ungulates and cetacea and in (1890) announced of its presence in a young *Elephas indicus*. In older specimens the centrale fused with the radiale. Baur also emphasised the intermediate articulating with trapezoid and magnum which is unique in the elephant, the significance of which was later elaborated by Gawrilenko. Pfitzner (1887) confirmed the double nature of the radiale and found both the prepollex and prehallux had no contact with the foot. Bradeleben (1890) claimed muscular attachments for the prehallux not found by others.*

* The authors finding (in a subsequent paper) agrees with that of Bradeleben.

The serial arrangement of the carpal and tarsal bones relative to the digits and the mechanism of the foot to support the weight of the body, next attracted attention. Withofer (1889) pointed that in the carpus the osmagnum and trapezoid are serially arranged with the intermediate. In ungulates on the other hand, the osmagnum and unci-form are serial to the intermediate. Thus in the Ungulates the central weight of the foot has shifted *lateralwards* but in the Proboscidea *mesialwards*, representing two diverging lines of evolution. Gawrilenko (1924) expressed, in Ungulates the intermediate pushes ulnarwards (laterally) whereas in the Proboscidea it pushes radialwards (mesially). He traced the seriality of carpals in fossil ancestors of both living species of Elephant, and claimed that the African Elephant more nearly reached the perfectly serial carpus than its Indian relative. *Loxodon antiquus* indicates the course of evolution towards complete seriality. He thought the present evolutionary tendency was towards *tetradactyly* in the African Elephant and *tridactyly* in the Indian species. Virchow (1910) noted that the fore-foot is very much heavier than the hind-foot, owing to the necessity of supporting the head. Inside the foot-cushion the toes do not touch the nails and their terminal phalanges remain cartilagenous. The toes cannot, therefore, contribute to the support of the body. The weight is borne by the vertically placed carpals and tarsals, the oblique fingers and toes acting merely as buttresses. Eales (1928) has given a brief account of the skeleton of a foetal African Elephant, emphasising the presence of centrale in the carpus and the seriality of intermediate with the trapezoid and magnum. Hill (1938), Ayar and Mariappa (1952) have made a radiographic study of smaller foetuses of the Indian Elephant.

The Bones of the Fore Limb

The foetus having passed through nearly 2/3 of the gestation period, all the bones are well ossified, showing the features of those of the adult, except the terminal phalanges and the proximal sesamoids, which are still cartilagenous and the carpals are partly ossified. In the long bones the shafts are ossified but the epiphyses are cartilagenous.

The Scapula (Pl. 15, Fig. 1).

The scapula is massive and well developed than in the other mammals. It measures 16 cms. in length and 15 cms. in breadth at the widest part. The scapular spine is very prominent and greatly developed, terminating below in an anterior *acromian process* and a posterior *uncinate process*, both of which are curved furnishing attachment to powerful muscles. The uncinat process is largely cartilagenous. The *infraspinous fossa* unlike in the african elephant, occupies 4/5 of the lateral surface of the bone and is marked in its lower part by an oblique ridge. The fossa above the ridge furnishes attachment to the infraspi-

The Anatomy of a Foetal Indian Elephant.

natus and teres minor and below the ridge to the caput magnum. The costal surface of the bone is marked by a large rough quadrilateral area at the superior angle for the levator anguli scapuli and serratus magnus and a narrow triangular area at the posterior angle for the origin of the teres major. The rest of the area of this surface has the shallow *subscapular fossa* for the origin of the subscapularis. The *scapular cartilage* is very thick at the superior angle and thin in front and behind. The *glenoid cavity* is shallow and elliptical. The *coracoid process* is ill-developed and is in the form of a small blunt tubercle for coracohumeralis. There is no *tuber scapulae* as in other domestic mammals. Instead there is a small fossa lateral to the coracoid process, for the origin of the coraco-radialis. Behind the glenoid cavity close to the posterior border is a small rough area for the origin of the capsularis posterior.

The Humerus (Pl. 15, Fig. 2).

The humerus is well developed, measuring 23 cms. in length. The *deltoid ridge* and the *deltoid tuberosity* are well developed for the insertion of the deltoides. Medial to it on the anterior surface is a well marked vertical ridge for the insertion of the brachiocephalicus and the superficial pectoral. The *musculospiral groove* is deep. The *bicipital groove* is narrow and shallow. The *head* is ovoid and is not marked by a distinct neck. The *medial tuberosity* is very small but the *lateral tuberosity* is greatly developed projecting above the head. The *condyles* below are prominent with a shallow *inter condyloid groove*. The *medial epicondyle* is small but the *lateral epicondyle* is very large having a *crest* in front for the origin of the extensors of the forearm and digits. The *olecranon* and *supratrochlear fossae* are shallow. Both the *epiphyses* are partly ossified.

The Radius (Pl. 15, Fig. 3).

The radius is well developed, massive at the distal end and measures 17.5 cms. in length. It is united to the anterior surface of the ulna in the prone position, so that, its proximal end is directed outward and the distal end directed inward. At both the extremities it makes articulation with the ulna by a narrow elongated facet above and a large oval facet below. The proximal end shows above a *glenoid cavity* for the humeral condyle. The distal end articulates with the radial carpal and intermediate carpal. The proximal end has a small *bicipital tubercle* for the coraco-radialis. The lower epiphysis is still cartilagenous, where as the upper one is already ossified.

The Ulna (Pl. 15, Fig. 4).

The ulna is greatly developed and is thrice as massive as the radius. It measures 20 cms. in length. The *olecranon* is very massive,

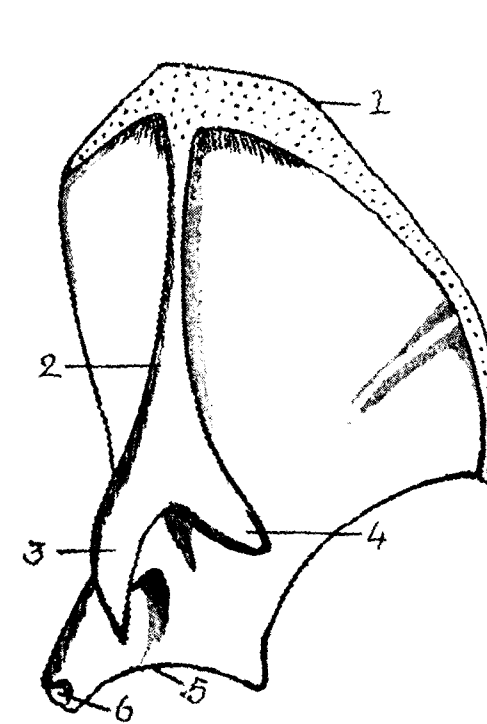


Fig. 1

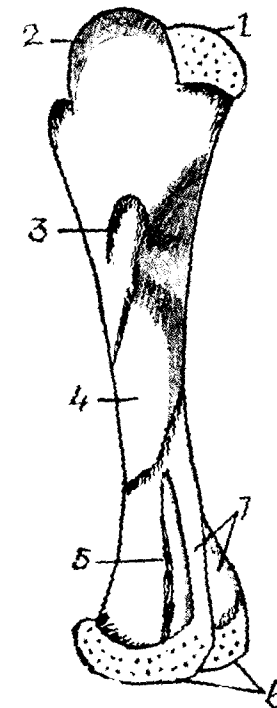
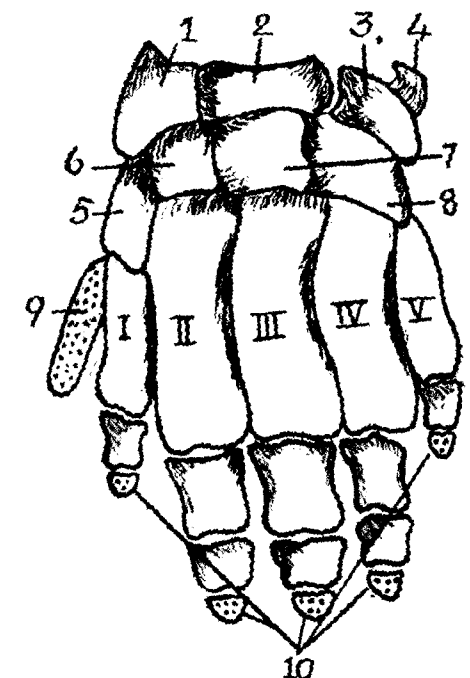
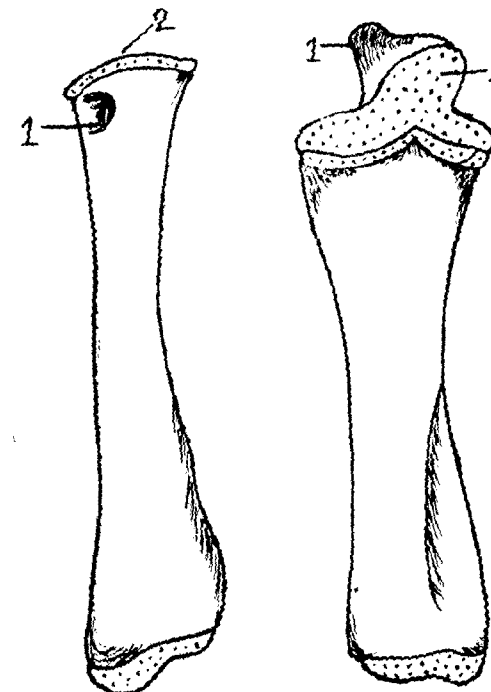


Fig. 2



The Anatomy of a Foetal Indian Elephant.

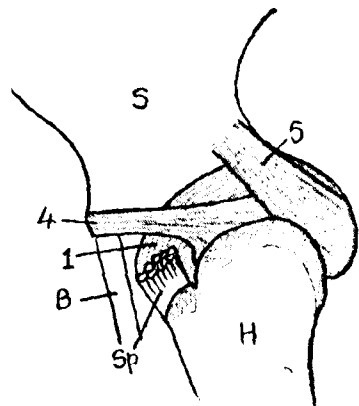


Fig. 6

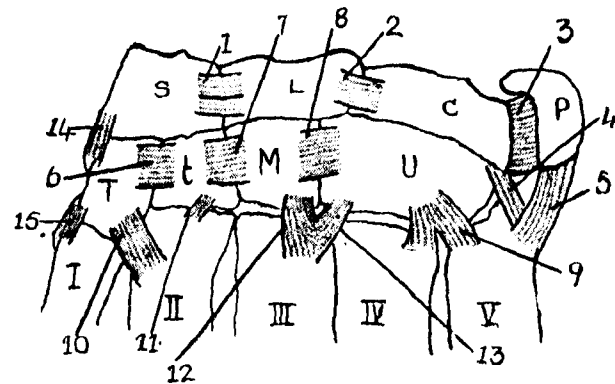


Fig. 8

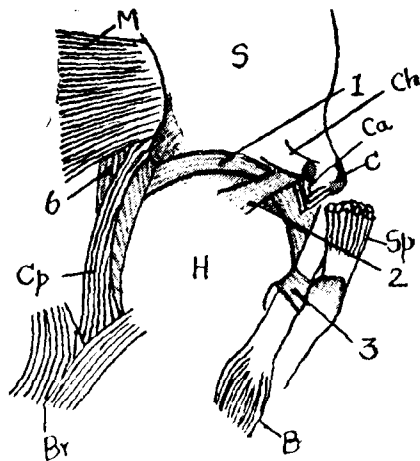


Fig. 7

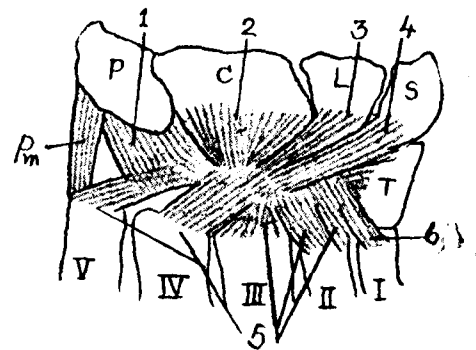


Fig. 9

wide above and on its posterior aspect is rough for muscular attachment. The *semilunar notch* is wide and prominent. The proximal end is ossified but the distal end is cartilagenous. The distal end in front shows a ridge in the middle for the attachment of the *fascial band* and an oblique groove laterally for the passage of the tendon of the *extensor digiti quinti*. The *styloid process* is prominent. The distal end articulates with the intermediate carpal, ulnar carpal and accessory carpal below and by a large oval facet medially with the radius.

The Carpal Bones (Pl. 15, Fig. 5).

The carpus consists of eight short bones arranged in two rows, four in the proximal and four in the distal row. All of them are partly ossified and their arrangement is indicated below.

<i>Proximal Row.</i>					
medial {	Scaphoid	Lunar	Cunieform	Pisiform	} lateral
	<i>Distal Row.</i>				
medial {	Trapezium	Trapezoid	Osmagnum	Unciform	} lateral

The *scaphoid* (radial carpal) is nearly a small truncated pyramid, articulating above with the medial aspect of the distal end of the radius by a small facet.

The *lunar* (intermediate carpal) is large and wedge shaped as in other domestic mammals, articulating above by a large facet with the radius and by a small facet with the ulna. Below it articulates with the trapezoid and osmagnum.

The *cunieform* (ulnar carpal) is the largest bone of the proximal row and is triangular. It articulates above with the greater extent of the articular area of the ulna. Behind, it articulates by a small facet with the pisiform. Below it articulates with the unciform and the V metacarpal.

The *pisiform* (accessory carpal) is the smallest bone of the proximal row placed behind the cunieform. It is a curved piece of bone with the posterior portion bent like a hook turned medialward. In front it articulates by a small facet with the cunieform and above by a small facet with the ulna.

The *trapezium* (I carpal) is small and pyramidal in shape.

The *trapezoid* (II carpal) is wedge shaped and is the smallest of the carpals.

The *osmagnum* (III carpal) is quadrilateral and smaller than unciform and articulates above with the lunar.

The *unciform* (IV carpal) is the largest bone of the carpus and is triangular. It articulates above with the *cunieforn* and below with the III, IV and V metacarpals.

The *manus* measures 12.5 cms. from the carpus to the terminal phalynx of the III digit.

The Metacarpal Bones (Pl. 15. Fig. 5)

The metacarpus consists of five bones. Their shafts are four sided with a constriction about the middle and are well ossified. Their relative lengths are indicated by the formula :

$3 > 2 > 4 > 5 > 1$, and their relative thickness by the formula - $5 > 4 > 2 > 3 > 1$.

The I *metacarpal* measures 3 cms. in length. On its posteromedial aspect it has the *prepollex* attached to it.

The II *metacarpal* measures 4 cms. in length.

The III *metacarpal* measures 5 cms. in length being the longest of all the metacarpals.

The IV *metacarpal* measures 4 cms. in length and is thicker than others except the V metacarpal.

The V *metacarpal* measures 3 cms. in length and 2.5 cms. in breadth, being the thickest of the metacarpals. It articulates above with the *unciform* and *cunieforn*.

The Digits (Pl. 15. Fig. 5).

There are five digits of which the II, III and IV are the longest, each consisting of three phalanges and a pair of proximal sesamoids. The I digit has two phalanges and one proximal sesamoid, whereas the V digit has two phalanges and a pair of proximal sesamoids. The terminal phalanges of all the digits and the proximal sesamoids are still cartilaginous and the rest are ossified.

The I phalanges of all the digits and the II phalanges of the II, III and IV digits are like those of the horse, being constricted in the middle and expanded at the extremities, having glenoid cavities above and condyles below for articulation. The terminal phalanges of all the digits are small and pyramidal in shape.

The proximal sesamoids are pyramidal, articulating by their anterior faces with the posterior aspect of the distal ends of the metacarpals. Each pair of proximal sesamoids articulating with a metacarpal only from a pulley on their posterior aspect for the play of the tendon of the common digital flexor. The single proximal sesamoid

of the I digit is grooved on its posterior face for the tendon of the flexor.

The Prepollex (Pl. 15. Fig. 5).

The *prepollex* is a flattened bar of hyaline cartilage measuring 3 cms. long and 1/2 cm. wide, attached to the postero-medial aspect of the I metacarpal. It furnishes attachment to the *digital cushion* of the foot and is regarded as the vestige of a digit.

The presence of the *prepollex* in the fore limb and *prehallux* in the hind limb of the elephant raises a very fundamental problem to the mammalogist, as to the proboscidian ancestors in particular and mammalian ancestors in general having been evolved from members that were *hexadactyl* or *heptadactyl* in character. Investigations in *paleo-zoology* would furnish the clue to the understanding of this problem.

The joints of the forelimb

The shoulder joint (Pl. 16. Fig. 6 & 7).—The shoulder or scapulo-humeral articulation is an *enarthrosis* formed between the glenoid cavity of the scapula and the head of the humerus. The articular area of the head is one and half times as extensive as the glenoid cavity.

1. *The capsular ligament*:—It is very extensive and thick anteriorly and laterally, being 3 cms. wide but less so medially. It allows great degree of movement permitting the bones to be separated 3 cms. apart. Its fibres run circularly. It is attached close to the rim of the glenoid cavity so that the tendons of origin of *coracohumeralis* and *coracoradialis* are outside the joint cavity. Its attachment round the humeral head is close to the articular rim except on the lateral aspect where it is attached to the medial aspect of the lateral tuberosity.

The *synovial membrane* is thick along its attachment to the capsule round the glenoid rim and the head of humerus, but thin otherwise.

2. *The coracohumeral ligament*:—This is a broad oblique band extending downward and backward on the capsule from the lower border of the coracoid process to the middle of the medial tuberosity of the humerus.

3. *The transverse humeral ligaments*:—It is a short thick band across the bicipital groove connecting the anterior borders of the two tuberosities of the humerus, binding the tendon of origin of the *coracoradialis* to the groove.

4. *The anterior glenohumeral ligament*:—This is a thick long band from the glenoid rim lateral to the origin of the *coracoradialis*, extending

downward and outward over the capsule. It expands and is inserted to the medial aspect of the lateral tuberosity of the humerus.

5. *The lateral glenohumeral ligament*:—This is a thin wide band attached 1 cm. above the lateral aspect of the glenoid rim, expands over the capsule, the anterior part blending with the preceding ligament and the posterior part blending with the capsule.

6. *The posterior glenohumeral ligament*:—This is thin and triangular interposed between capsule and the *capsularis posterior*. Its base is attached to the glenoid rim below the origin of the *capsularis*. Its apex is attached to the posterior face of the humerus deeper to the insertion of *capsularis*. The *capsularis* is adherent to the ligament which in turn is blended with the capsule.

The elbow joint

This is a *ginglymus* in which the humeral condyles articulate with the glenoid cavities and the semilunar notch of the ulna and the glenoid cavity of the radius.

The ligaments are :

1. *The capsular ligament*:—It is very thick and wide in front but is thin behind. Below it is attached round the articular rim of the ulna and the radius. Above it is attached round the rim of the humeral condyles, but over the articular groove in front and behind, it is attached 1 cm. and 2 cms. above in the supratrochlear and olecranon fossae respectively.

The *synovial membrane* is thick round the articular rim and thin elsewhere.

2. *The lateral ligament*: This is a thin band, narrow above and wide below, attaching the lateral axes of humerus and ulna.

3. *The medial ligament*: It is a thick wide band attaching the medial axes of humerus and ulna. Its anterior part extends as a narrow cord along the medial border of ulna, passes along the medial border of radius below its middle. It becomes flat lower down and is inserted to the medial border of radius about its lower third. Its anterior border furnishes origin to the fibres of the *pronator teres*.

4. *The anterior elastic ligament*: This consists of a thick wide sheet of elastic fibres extending from the margins of the supratrochlear fossa, passing over the capsule to the anterior rim of the radius and ulna. This considerably strengthens the anterior part of the capsule.

The Radioulnar Joints

The radius and ulna make proximal and distal articulations at their ends and a middle articulation by their shafts.

The proximal radioulnar joint: It is a *diarthrosis* between the elongated facet on the posterolateral aspect of the proximal end of radius and the corresponding facet of ulna. It is enclosed by the capsule of the elbow joint.

The distal radioulnar joint: The distal epiphyses of radius and ulna are cartilagenous. On their opposing faces they articulate by large oval facets forming *diarthrosis*. The margins of the facets are bound by short fibres constituting a tight capsule.

The middle radioulnar joint: This is a *syndesmosis* in which the posterior face of the radius is united to the anterior face of the ulna by an *interosseous ligament*.

The Carpal Joint

This is a composite joint consisting of three articulations:

1. *The radioulnar carpal joint* between the proximal row of carpal bones and the distal ends of radius and ulna forming a *ginglymus*;
2. *The intercarpal joint* between the proximal and distal rows of carpal bones forming a *ginglymus*;
3. *The carpometacarpal joint* between the distal row of carpal bones and the proximal ends of the metacarpals forming an *arthrodia*.

The common ligaments are :—

1. *The capsular ligament*:—This covers all the three joints, attached to the articular margins of radius and ulna above and the metacarpals below. Its deep face is attached to all the carpal bones and the special ligaments. The anterior part is thick and forms sheaths for the tendons of the extensors. The posterior part is very thick and strong due to bundles of elastic fibres descending from the radius and ulna.

The *synovial membrane* forms three sacs for the three joints.

2. *The lateral ligament*: It is a thick wide band connecting the lateral axes of ulna and the V metacarpal, cunieforn and unciform.

3. *The medial ligament*: This is a thin wide band connecting the medial aspects of radius, scaphoid, trapezium and I metacarpal.

The special ligaments :—

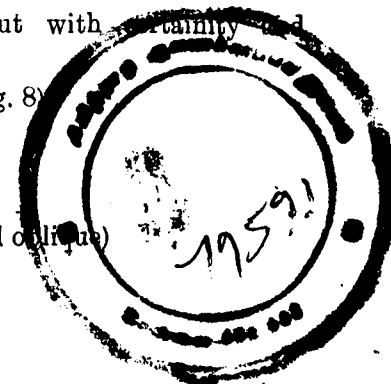
The following ligaments were made out with *carefully* possibly there are some more.

Anterior aspect (Pl. 16. Fig. 8)

1. *Scapho - ulnar*. (2 bands)
2. *Cunieforn - lunar*. (thick band)
3. *Cunieforn - pisiform*. (thick & wide)
4. *Cunieforn - metacarpal (V)* (Thin and oblique)

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5. *Pisiform - metacarpal (V)* (thick & oblique)
6. *Trapezoid - trapezium.*
7. *Trapezoid - magnum.*
8. *Magnum - unciform.*
9. *Unciform - metacarpal (IV & V)* (oblique & bifid).
10. *Trapezium - metacarpal (II)* (oblique)
11. *Trapezoid - metacarpal (II)* (small band)
12. *Magno - metacarpal (III)* }
13. *Unciform - metacarpal (III)* } (unite below)
14. *Scapho - trapezium* }
15. *Trapezium - metacarpal (I)* } (small, on medial aspect)

Posterior aspect (Pl. 16. Fig. 9).

All the ligaments appear to originate from the posterior faces of osmagnum and unciform and radiate to all the bones round them.

1. *Magno - pisiform* (wide & thick)
2. *Magno - cunieform* (large)
3. *Magno - lunar* (large)
4. *Magno - scaphoid* (long & narrow)
5. *Magno - metacarpals* to all the five metacarpals of which those to the I, II and V are large.
6. *Trapezoido - metacarpal (I)*

The interosseous ligaments

They are short bands connecting the opposing faces of the carpal bones.

The proximal row of carpal bones are connected by three ligaments:

1. *Scapho - lunar.* }
2. *Cunieform - lunar.* } (thick & strong)
3. *Cunieform - pisiform.* (small)

The distal row of carpal bones are connected by four ligaments:

1. *Trapezium - trapezoid.* }
2. *Magno - trapezoid.* } (thick & strong)
3. *Magno - unciform.* }
4. *Trapezium - metacarpal (II)* (very thick)

The Intermetacarpal Joints

The opposing faces of the shafts of the five metacarpals are united by four interosseous ligaments which are in the form of thick flat bands. The first one connecting the I metacarpal and trapezium to the II metacarpal is very thick and strong. The joints are *syndesmoses*.

The Metacarpo-Phalangeal Joints

There are five joints, each being a *ginglymus* where the distal end of a metacarpal articulates with the proximal end of the I phalynx below and a pair of proximal sesamoids behind.

The ligaments are:

1. *The capsular ligament*:—It is very thick enclosing the articular ends of the bones.

The *synovial membrane* forms two sacs, one below and the other behind in front of the sesamoids.

2. *The intersesamoidean ligament*:—It is a piece of fibro-cartilage uniting the pair of sesamoids behind to form a pulley for the flexor tendon.

The Proximal Interphalangeal Joints

There are only three joints, each being a *ginglymus* between the I and II phalanges of the II, III and IV digits. The joint *capsule* is thick.

The Distal Interphalangeal Joints

There are five joints, each being a *ginglymus* between the II and III phalanges of the II, III and IV digits and the I and III phalanges of the I and V digits. The joint *capsule* is thick and tight.

The *interdigital ligaments* are four thick bands, filling the interdigital spaces and binding the opposing faces of the phalanges.

Summary

1. Unlike in the African Elephant, *infraspinous fossa* occupies 4/5 of the dorsum of the scapula. Coracoid process is greatly reduced and lateral to it is a fossa for the origin of biceps.

2. *Brachiocephalicus* and superficial pectoral are inserted to an extensive vertical ridge on the humerus. The olecranon and supratrochlear fossae are very shallow.

3. The *centrale* has already fused with the lower part of the radiale (scaphoid) a dent indicating the line of fusion. Intermediate articulates with the trapezoid and magnum to throw the weight of the body mesialwards.

4. II, III & IV digits are the longest indicating the evolutionary trend towards *tridactyly* in *Elephas indicus*. The correct number of proximal sesamoids is noted. The terminal phalanges are cartilagenous.

5. The prepollex is on the posteromedial aspect of the I metacarpal furnishing attachment to the digital cushion. The presence of prepollex and prehallux in the elephant raises an important problem of the nature of the ancestors of the Proboscidea and mammalia.

6. The joints and their ligaments are figured and described of which there is hardly any information in the existing literature. Their close resemblance with the man and other larger domestic animals is very striking. The shoulder joint though an *enarthrosis* has only extension and flexion. By the nature of the glenoid cavity of the scapula and modification of the musculature (elaborated in the next paper) abduction of the shoulder joint has been very much restricted for the well being of the elephant—the largest living terrestrial mammal.

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Explanation to figures.

- Stippled areas indicate cartilage.
- Fig. 1. Dorsum of the left scapula—1. Scapular cartilage; 2. scapular spine; 3. Acromian process; 4. Uncinate process; 5. Glenoid cavity; 6. fossa for origin of Biceps.
- Fig. 2. Lateral view of left humerus—1. Head; 2. Lateral tuberosity; 3. Deltoid tuberosity; 4. Musculospiral groove; 5. Crest in front of lateral epicondyle; 6. condyles; 7. epicondyles.
- Fig. 3. Anterior view of left radius. 1. Bicipital tubercle; 2. glenoid cavity.
- Fig. 4. Anterior view of left Ulna. 1. olecranon process; 2. semilunar notch.
- Fig. 5. Anterior view of left manus. 1. scaphoid; 2. lunar; 3. cuneiform; 4. Pisiform; 5. trapezium; 6. trapezoid; 7. os magnum; 8. unciform; 9. prepollex; 10. Phalanges. I, II, III, IV & V. respective metacarpals.
- Fig. 6. Lateral view of the left shoulder joint. S. scapula; H. Humerus; B. tendon of origin of Biceps; Sp. supra-spinatus. Numbers correspond to those given for ligaments in the text.
- Fig. 7. Medial view of the left shoulder joint. S. scapula; H. humerus; M. caput magnum; Br. Brachialis anticus; B. Biceps; C. coracoid process; Ca. Capsularis anterior; Cp. Capsularis posterior; Ch. tendon of origin of coracobumeralis; Sp. Supraspinatus.
- Fig. 8. Anterior view of the left Carpal joint. S. scaphoid; L. lunar; C. cuneiform; P. pisiform; T. trapezium; t. trapezoid; M. os magnum; U. unciform. I, II, III, IV & V. respective metacarpals.
- Fig. 9. Posterior view of the left carpal joint.

A NOTE ON EXPERIMENTS IN DAY-OLD CHICK VACCINATION AGAINST HERTFORDSHIRE STRAIN OF NEWCASTLE DISEASE

By

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Outbreaks of Newcastle disease (ND) occur in brooder houses in India from time to time in chicks 2 to 4 weeks of age, while prophylaxis with the vaccine presently employed cannot be used in birds younger than 6 to 8 weeks. The vaccine produced from a commercial Mukteswar (India) attenuated strain has given excellent results in older birds since its introduction in 1945, but has proven severely pathogenic for baby chicks (13). As successful protection of baby chicks has been carried out by Canadian and American workers against the local virulent strains, we were prompted to investigate, under controlled conditions, the effectiveness of immunization against the Hertfordshire (Asiatic) strain with (1) a vaccine of low virulence, and (2) the ADRI, a formalin inactivated virus vaccine incorporated in an adjuvant, with a view to introduce either of these, if successful, in the Indian Union for use in brooder chicks.

Literature

Brandly *et al* (1) suggested vaccination of chickens not younger than 6 weeks at which time the congenital passive immunity fades out in chicks hatched from vaccinated breeders. Hitchner and Johnson (5), in their preliminary studies with B₁ virus of ND demonstrated immunity in vaccinated day-old chicks as early as 4 days with little reaction. The chicks were subsequently refractory to challenge with a standard virulent virus. Later, Hitchner (4) with B₁ vaccine virus showed that chicks, hatched within two months of vaccination of parents, might possess sufficient immunity to interfere with an antigenic response. However after this period, there was no indication of antiviral protection which would militate immunization, although pooled serum showed significant HI titers. Chicks from immunized flocks vaccinated by intranasal route with the B₁ virus when day-old revealed solid immunity to challenge at 5 weeks of age: this was found to extend to at least 19 weeks. Johnson and Gross (8) studied the application of ND vaccination to day-old chicks while still in chick boxes. Their method employed a

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De Vilbiss No. 40 nebulizer for spraying chicks with a fine fog in a definite concentration inside a hood for a constant period, but this method proved impractical for field use. Hitchener and Raising (6, 7), made field trials with B₁ vaccine by the spray method and found certain conditions essential to ensure successful takes. Among these were the need for a high titer virus in the vaccine, an optimal area under spray and size of spray particles, and the time of exposure to atomized virus. Crawley (2) immunized broilers as day-old chicks successfully by the spray method, using a vaccine composed of the virus of Infectious Bronchitis and the B₁ Newcastle disease virus, and this method is now being commonly used in Canada and the United States for protection of baby chicks against these diseases. The vaccine is applied by means of a sprayer fitted with a venturi-nozzle with the chicks under hovers or covers. Dunlop (3) also used a similar procedure as previously mentioned for immunizing against both the diseases by spray technique on 2-day old chicks. Phillips *et al* (12) describe a trial in immunizing different age groups of chickens against ND using a specially devised sprayer and a commercial B₁ virus vaccine. The level of antibodies induced was measured by haemagglutination inhibition (HI) and serum neutralization tests (SN) and challenge exposure to virulent virus. The results showed better protection to challenge as age at the time of vaccination increased from 2 to 23 days. The last group (23 day old), showed 93% survivors with 90% positive HI titers as compared to 2 day-olds in which there were only 13.3% survivors with a 10% positive HI titers when challenged at 14 days after vaccination. Mitchell and Walker (9, 10) and Mitchell *et al* (11) evolved the ADRI vaccine in which formalin inactivated Twiss or Herts strains of ND virus were incorporated in adjuvants and produced a strong immunity in chickens. Walker *et al* (16) later found this ADRI vaccine to retain potency under storage at room and refrigerator temperatures for at least 600 days.

Experimental Studies

1. *Use of Commercial Spray Vaccine.*—Five hundred two-day old chicks were obtained from a commercial flock which was known to be free of Newcastle disease and whose parents had not been previously immunized. Out of this group 25 baby chicks were sacrificed and their immune status was found to be negative on the HI test. Three hundred chicks of this group were exposed to a commercial vaccine containing the B₁ strain of ND virus using the special sprayer provided in precisely the manner indicated by the producers. The remainder of the chicks were raised in isolation to serve as normal susceptible controls.

A group of healthy chicks of approximately four weeks of age were injected intramuscularly with 1.0 c.c. of the ADRI vaccine to act as immune controls, and raised separately from the other chicks.

After a lapse of 21 days, 25 chicks from the sprayed group, 15 chicks from the unvaccinated control group and 5 from the ADRI vaccinated group were placed in direct contact with 5 normal baby chicks that had been infected intranasally with 0.1 c.c. of a 10^{-1} dilution of freshly harvested egg fluids from a passage of the Hertfordshire (Herts) strain of ND virus. This strain had previously proven highly pathogenic for chickens in all age groups and was considered to be representative of the exotic strains of virus common to Asiatic countries. This virus had an LD₅₀ titer of 10^{-9} in embryonating eggs.

The exposed groups of chicks were closely checked daily. Mortality commenced after 4 days in the virus inoculated chicks and continued among the in-contacts for approximately two weeks.

Simultaneously, 15 chicks from the vaccinated group, 10 from the unvaccinated control group and 5 from the ADRI vaccinated group were killed and individual blood samples collected for HI and SN tests.

The HI, SN and virus exposure tests were carried out for three successive weeks commencing at the third week after vaccination, and the details are furnished in Table I.

Post-mortem examination were carried out on dead chicks and tissue suspensions were passaged in embryonating eggs to check for the presence of virus.

A direct rapid plate haemagglutination test was attempted using a 20 percent spleen suspension in sterile broth medium with a 5 percent suspension of normal chicken red blood cells. In a proportion of 10 drops of clear tissue fluid with 1 drop of chicken r.b.c.'s this test quickly detected 68 percent of those that were later confirmed by virus isolation.

Discussion

As pre-vaccination HI titers were found to be negative there could be no check for immunization by the presence of congenital antibodies. The post vaccination positive HI titers in spray-vaccinated chicks, however, were very low and averaged only about 35 percent without much variation from the third to the fifth week after. Over the same period the sera from ADRI vaccinated chicks proved positive with high titers in every instance. Inasmuch as HI titer is not an absolute index of antiviral protection (Schmittle) (14), SN tests were also carried out with individual as well as pooled serum from chicks showing identical titers. Results in the sprayed group were inconsequential, whereas serums from ADRI vaccinated chicks proved capable of neutralizing the virus at 10^{-3} dilution, which appeared sufficient to afford full protection against challenge with the Herts strain of ND virus. In the spray vaccinated group the overall survival in the three test to virus exposure was 33.8

TABLE I
The Immunity Response in 2 day old baby chicks vaccinated with B₁ Spray Vaccine
Intranasal Type; challenged with Hertfordshire ND Virus

	No. of chicks Bled	Interval after vaccination in Days	Haemagglutination - Inhibition Test										Challenge		SN Titer	
			Titer Distribution in Power										Percent Positive	Survival Ratio		Percentage of Survival
			0	5	10	20	40	80	160	320	640					
Spray Group	15	21	—	—	—	8	2	3	1	1	—	35	8/25	32	Nil	
Normal Control Group	10	”	9	1	—	—	—	—	—	—	—	Nil	0/15	0	Nil	
ADRI Group*	5	”	—	—	—	—	—	—	—	1	4	100	5/5	100	10 ⁻³	
Spray Group	15	28	+	4	5	1	—	3	1	1	—	35	7/20	35	Nil	
Normal Control Group	10	”	8	1	1	—	—	—	—	—	—	Nil	0/15	0	Nil	
ADRI Group	5	”	—	—	—	—	—	—	—	—	5	100	5/5	100	10 ⁻³	
Spray Group	15	35	—	—	—	6	4	2	1	2	—	35	7/20	35	Nil	
Normal Control Group	10	”	9	—	1	—	—	—	—	—	—	Nil	0/15	0	Nil	
ADRI Group	5	”	—	—	—	—	—	—	—	—	5	100	5/5	100	10 ⁻³	

* ADRI Group - vaccinated with ADRI Vaccine when 30 days old.

percent: a percentage in close agreement with the positive HI titers obtained.

From the results, it is apparent that spray vaccination of baby chicks with a commercial product containing the attenuated B₁ strain of ND virus has a relatively poor immunizing power against exposure to the exotic Herts strain of ND virus.

The quick method of a haemagglutination test using spleen suspensions with chicken red cell suspensions directly could perhaps be used as an aid in rapid field diagnosis in Newcastle disease outbreaks. Such a test in a slightly different form has been shown to be applicable for this purpose by Walker 15.

2. Use of Vaccine Consisting of Inactivated Virus Incorporated in Adjuvants.—Nine hundred 2-day old chicks from the same commercial hatchery that supplied the requirements for the previous experiment were received. A group of 26 chicks were selected at random from the boxes and their sera proved negative in the HI test.

ADRI vaccine consisting of formalin inactivated ND virus incorporated in talc and mineral oil as described by Mitchell and Walker (9) was injected intramuscularly in the pectoral in two groups of 200 chicks each in doses of 0.5 c.c. and 0.2 c.c. respectively using a 20-gauge needle. These two groups together with the remainder of the chicks as normal controls were raised in battery brooders under similar conditions of feed and management. For comparative purposes in subsequent serological tests, ten chicks of approximately six weeks of age were inoculated with 1.0 c.c. of the ADRI vaccine at the time of vaccination of the two groups of younger chicks.

Each week 100 chicks were picked at random from each of the three groups and their weights recorded as shown in Table II.

TABLE II
Influence of ADRI vaccination on growth rate of baby chicks:

Group	Age in days	No. of Chicks	Mean body Weights in gms.	Mortality Ratio	Mortality %
I 0.5 cc.	7	100	13100	4/200	2.0
II 0.2 c.c.	"	"	13020	5/200	2.5
III Normal Controls	"	"	13380	11/500	2.1
I 0.5 cc.	14	100	27296	2/175	1.1
II 0.2 cc.	"	"	27560	2/175	1.1
III Normal Controls	"	"	27680	8/450	1.7
I 0.5 cc.	21	100	41460	2/151	1.5
II 0.2 cc.	"	"	41670	1/151	1.5
III Normal Controls	"	"	41560	3/400	1.2

Two weeks after vaccination and at weekly intervals thereafter ten chicks from each group together with a similar number from the normal control group were exposed to ND infection by placing them in direct contact with five chicks infected intranasally with the Herts virus as in the previous experiment. The mortality was noted daily and autopsies were conducted for routine laboratory diagnosis.

On the same day that the chicks were selected for challenge, 10 chicks from each group were bled out and the sera used for HI and SN tests.

All results are provided in Table III.

Discussion

The vaccine in 0.5 cc. dose though apparently a heavy inoculum for baby chicks seems to have no ill effects as adduced from the mortality records in comparison with the controls during the first week of vaccination (Table II). The effect of vaccination of growth rate appears also to be insignificant as shown by the weight gains of the three groups under test. The small difference in the first week between the vaccines and the normal is made up by the 0.2 cc. group in the second week, and by the 0.5 cc. group in the third week. Between the two vaccinated groups in the weekly counts of HI positive titers no significant difference is seen but the latter group shows a higher level of the same. In the 0.5 cc. group the maximum HI titer of 640 (virus titer being 640) is reached by 100% of the chicks within 4 weeks, while the 0.2 cc. group took a week longer. There is a difference of 10% in the survival percentage between the groups up to the third week which fact weighs in favour of the 0.5 cc. dose and makes up for the heavier inoculum. However both dosages are efficient in producing the highest level of immunity to challenge at 4 weeks.

The level of HI titers in 2 day old (0.5 cc. group) vaccinates is similar to those of the chickens vaccinated with ADRI vaccine at 6 weeks and has a comparable SN titer of 10^{-3} Phillips *et al* (12) demonstrated the poor immunity response in early vaccinated chicks while using the B₁ virus. Our experience, however, with ADRI vaccine has been encouraging, presumably because of the adjuvant involved in its make up which probably creates favourable conditions for a steady antigenic response in the growing chicks mechanism.

The vaccine commends itself for its introduction into countries like India, being innocuous and more welcome than a live virus vaccine. It is anticipated that a preliminary report of this nature will be of value in aiding materially in the solution of the present vexatious problem of controlling Newcastle disease in the Indian Union from every angle. It

TABLE III
The Immunity Response in 2 day-old chicks vaccinated with ADRI formalin inactivated adjuvant vaccine, challenged with Hertfordshire virus.

	Dose of Vaccine	No. of chicks Bled	Interval after Vaccination in Days	HI Titer Distribution in Power of HI Units										Challenge		SN Titer
				0	5	10	20	40	80	160	320	640	Percent Positive	Survival Ratio	Percentage of survival	
ADRI Vaccine	0.5 c.c.	10	14	1	—	1	—	3	2	1	1	1	50	8/10	80	10^{-6}
Groups	0.2 c.c.	10	"	3	—	—	—	2	3	1	1	—	50	7/10	70	10^{-6}
Controls	—	10	"	8	1	1	—	—	—	—	—	—	0	0	0	$10^{-8}-10^{-9}$
ADRI Vaccines	0.5 c.c.	10	21	1	—	—	—	—	1	—	—	7	80	10/10	100	10^{-3}
Groups	0.2 c.c.	10	"	1	—	—	1	—	1	1	3	3	80	9/10	90	10^{-4}
Controls	—	10	"	9	—	1	—	—	—	—	—	—	0	0	0	$10^{-8}-10^{-9}$
ADRI Vaccine	0.5 c.c.	10	28	—	—	—	—	—	—	—	—	10	100	10/10	100	10^{-3}
Groups	0.2 c.c.	10	"	1	—	—	—	—	1	—	3	5	90	10/10	100	10^{-4}
Controls	—	10	"	9	1	—	—	—	—	—	—	—	0	0	0	$10^{-8}-10^{-9}$
ADRI Vaccine	0.5 c.c.	10	35	—	—	—	—	—	—	—	—	10	100	10/10	100	10^{-3}
Groups	0.2 c.c.	10	"	—	—	—	—	—	1	1	2	6	100	10/10	100	10^{-4}
Controls	—	10	"	8	—	2	—	—	—	—	—	—	0	0/10	0	$10^{-8}-10^{-9}$
The immunity response in 6 weeks old chickens vaccinated with ADRI Vaccine																
ADRI Vaccinated Group at 6 weeks	1 c.c.	10	21	—	—	—	—	—	—	—	—	10	100	10/10	100	10^{-3}
Controls	—	10	—	8	1	1	—	—	—	—	—	—	0	0/10	0	$10^{-8}-10^{-9}$

is believed that by undertaking baby chick immunization on a large scale in the endemic areas with a vaccine of this nature, it would be possible to offer a 100% protection to our poultry production programme in the five year plan now in full swing. Furthermore, such a vaccine could be used for immunizing chickens which are to be exported out of India where the regulations of importing countries preclude their introduction after receiving local live virus vaccine.

As for the choice between the two dosages investigated, we would leave that to the clinician and the breeder, though we would suggest a mean between the two dosages if the higher one is not preferred.

Summary

Attempts at immunization of 2-day old baby chicks against the Hertfordshire (Asiatic) strain of Newcastle disease virus are described, using (1) a vaccine containing a virus of low virulence and administered by the intranasal route and (2) a formalin inactivated adjuvant vaccine inoculated intramuscularly. The immunity response was assessed by HI and SN tests and contact infection with the exotic strain of virus.

In the first trial with spray-exposed chicks the overall percentage of HI positive titers was 35, the SN titers were insignificant, while survival to virus exposure was 33.8 percent.

The second trial in which inactivated virus suspended in an adjuvant was used, was followed by highly favourable results inasmuch as quick rising positive HI titers were evidenced from two weeks onwards. The serum showed significant presence of antiviral bodies neutralizing the virus in 10^{-3} to 10^{-4} titers from the third week. Further the SN response compared favourably with serum of chicks vaccinated at 6 weeks of age. The survival percentage was in keeping with the HI titers, being 75.95 and 100 at 2, 3 and 4 weeks respectively. The group receiving the 0.5 cc. dose showed some advantage over the group vaccinated with 0.2 cc. by developing a higher level of HI titers. The ADRI vaccine in either dosage had no adverse effect on growth rate or unfavourable influence on mortality. The immunity tests are not over, but judging from the strong HI and SN reactions in 5 weeks old vaccinates, it appears to be a durable one, and further monthly tests are underway.

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A NOTE ON THE FIRST CASE OF A VARIANT OF SAL. PULLORUM INFECTION IN CHICKENS IN THE INDIAN UNION*

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Introduction

Since the recording of *Sal. aertrycke* infection in chickens by Iyer *et al* (1949) the existence of other important chicken Salmonella is being gradually brought to light. A virulent strain of *Sal. gallinarum* which caused an explosive outbreak has been described by Rao *et al* (1952). *Sal. anatum* and *Sal. typhimurium* were isolated by Dixit (1951, 1952). It is expected that other members of this group in chickens may be recorded as trained workers enter the field.

* The original isolation and typing studies were conducted in India in 1954. The comparative studies were completed at the Animal Diseases Research Institute, Hull, Quebec, Canada, while in attendance as a Resident Fellow-Colombo Plan Training.

Literature

Kauffman's (1940) interpretation of the serological behaviour of the typhoid organism isolated by Almond and Stovall (1939) as being due to lack of a portion of the factor XII₂ (the somatic antigen common to group A, B, and D), was the first early light thrown on the phenomenon of form-variation. Younie (1941), unearthed the occurrence of *Sal. pullorum* infection in poultry flocks where standard antigen failed to eliminate carriers. The existence of the variant strains was similarly confirmed by Byrne (1943), Wright (1944), Gwatkin and Bond (1945). Edwards and Bruner (1946), made a critical study of the standard and the variant strains of pullorum and concluded that the XII₂ factor is a variable quantity and colonies containing a large amount of XII₂ or an insignificant amount, could be fished from the same strain when freshly isolated. Such young cultures subsequently tend to stabilize in either form, giving rise to the standard or variant strain as the case may be. Gwatkin (1946) found that certain strains of *Proteus* cause a non specific pullorum reactions, the organism having a strong XII₂ component in its make up. Antisera prepared by injecting Gwatkin's *proteus* in rabbit or horse readily agglutinates variant but not standard strains, hence is useful in differentiating them. Wright and Edwards (1948) have suggested a procedure for typing variant strains. This requires mutually absorbed sera of two *Salmonellae* organisms viz. *Sal. Reading*, II, XII₁, XII₂ and *Sal. paratyphi A Vr. durazzo*, (IV, XII₁, XII₃). The absorbed sera will then contain XII₂ and XII₃ factors respectively which by agglutinating the variant and the standard strains reveal their Antigenic Structures. The former is agglutinated only by XII₂ serum while the latter is agglutinated by XII₃ serum, and slightly or not at all by XII₂ serum.

Experimental

A culture isolate suspected to be *Sal. pullorum* was received from one of the Provincial laboratories for confirmation along with an ident for the supply of test antigen. Routine tests for *Sal. pullorum* were made, the organism proving to be an-aerogenic strain of same, conforming to the pattern of sugar fermentation as per Bergey (1948), with the exception of Maltose which it fermented slowly. Serologically rapid serum slide test reaction with antisera prepared against the standard pullorum stock strain, was slow, fine and partial, as compared to that of the homologous strain which was quick, flakey, and complete. The tube test paralleled the results obtained by the plate test in as much as the organism agglutinated to a low titre with the standard sera as compared to the homologous cells. The following tests were carried out as outlined by Wright and Edwards (loc-cit), to amplify and confirm the findings. The sera for these tests were prepared freshly from the strains of *Sal.*

paratyphi A Vr. durazzo and *Sal. reading*, using boiled agar slope washings as inoculum, in increasing densities. The results of the relevant plate, tube, and absorption tests are detailed in Tables 1, 2 and 3.

The absorbed Sera were prepared according to the technique of Wright and Edwards (loc-cit) but several trials had to be made before pure factor sera sufficiently high for the purpose could be obtained. Gwatkin's *Proteus* serum with a high titre was available in Dr. Gwatkin's laboratory.

TABLE I
Results of rapid plate slide serum test.

Serum (1:5)	Antigen <i>Sal. pullorum</i>	<i>Sal. pull variant</i>
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ERRATUM.

Sal. reading for II, XII₁, XII₂

read (IV, XII₁, XII₃)

Sal. paratyphi A. Vr. durazzo for IV, XII₁, XII₃

read (II, XII₁, XII₂)

TABLE II
Results of tube agglutination tests.

Serum	Antigens				
	<i>Sal. pullorum</i> std. 17A	<i>S. pullorum</i> variant	<i>S. paratyphi</i> <i>A. Vr. durazzo</i>	<i>S. reading</i>	<i>G. proteus</i>
1. <i>Sal. pullorum</i> std. 17A	5120	640	640	320	Not done
2. <i>Sal. pullorum</i> Variant	320	5120	320	1280	N.D.
3. <i>Sal. paratyphi</i> <i>A. Vr. durazzo</i>	1280	320	2560	N.D.	N.D.
4. <i>Sal. reading</i>	400	800	N.D.	3200	N.D.
5. Gwatkin's <i>Pro-</i> <i>teus</i>	0	640	N.D.	N.D.	beyond 5120

TABLE III
Results of serum agglutinin-absorption tests.

Absorbed serum of	Antigens of				
	Sal. pullorum std. 17A	S. pullorum variant	S. paratyphi Vr. A. durazzo	S. reading	G. proteus
1. Sal. pullorum std. 17A absorbed by Sal. (variant) pullorum	2560	Not done	640	0	0
2. Sal. pullorum (variant) absorbed Sal. pullorum std. 17A	N.D.	1280	0	640	N.D.
3. Sal. paratyphi A. Vr. durazzo absorbed by Sal. reading	640	0	1280	N.D.	N.D.
4. Sal. reading absorbed by Sal. paratyphi A. Vr. durazzo	0	800	N.D.	1600	N.D.
5. Whole serum of Gwatkin's Proteus	0	640	N.D.	N.D.	beyond 5120

One hundred single colonies were selected after plating on glucose glycerine agar for disassociation and examined for formvariation with XII₂ and XII₃ sera. Seventy-two per cent of the colonies were XII₂ + + while the rest were XII₂ + and XII₃ + +. This part of the work was repeated a year later, with the inclusion of Gwatkin's Proteus serum for diagnostic help at the A.D.R.I. Hull, Que. The results were slightly different, in as much as 94 percent of the colonies were XII₂ + +, while the other kind was proportionately low.

Discussion

The 17A standard pullorum serum agglutinates the variant X in low dilutions in the plate test but the reaction is slow and partial. Younie (loc-cit) observed this in his early work. The paratyphi A Vr. durazzo serum after absorption with Sal. reading organism fails to agglutinate X strain in low dilution, showing that the variant strain contained little of XII₃ fraction; and conversely Sal. reading serum after absorption with Sal. paratyphi A. Vr. durazzo organism does not agglutinate standard strains, indicating a lack of XII₂ fraction. The reciprocal absorption test of 17A standard and variant X show that they fail to

divest each others sera completely of their agglutinins. Rapid serum slide test indicate that the XII₃ component of the variant has not developed sufficiently to agglutinate the standard Sal. pullorum, though the tube test reveals some common antigen. Form-variation was observed to some extent at first, but subsequent tests indicated the stabilization of the organism in a variant form. This was further confirmed by the Gwatkin's Proteus serological test. As a corollary to the fore-going we may assume that the standard Sal. pullorum antigen has little of the XII₂ fraction, thus making it necessary to conduct a double test with standard as well as variant antigens, or reinforcement of the former with this component. (Wright 1949, Wright anderson 1950). This finding is of considerable importance for eradication of the disease on a country wide basis, in a national programme for Poultry improvement.

Summary

An organism of the Sal. pullorum group isolated in a Provincial Laboratory in the Indian Union has been typed as a variant. This finding has a biological significance of importance for consideration in the Poultry improvement plans of the future.

Acknowledgments

I am grateful to Dr. Charles A. Mitchell, Chief, Animal Pathology Division, Hull, Que., for his keen interest, advice, and facilities for studying poultry disease problems under experts. I am highly indebted to Dr. R. Gwatkin, Animal Diseases Research Institute, Hull, Quebec, Canada, for his inspiring guidance borne of his life long experience particularly in poultry salmonella. It is also a pleasure to acknowledge thanks to Dr. J. Das A.D.I.O., Orissa for the culture isolate which is the subject of this study.

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BACTERIOLOGY OF DEVELOPING CHICK EMBRYOS

By

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A large number of eggs is used in the Virus Disease Laboratory for cultivation of viruses, notably the Ranikhet Disease virus. At one time an unusually high mortality was encountered in the embryonating eggs, more than 80% embryos being found dead in shell on the 9th day of incubation and before they could be inoculated with any virus. This brought the production of Ranikhet Disease vaccine as well as other work on this and other virus diseases requiring the use of embryonating eggs almost to a standstill. One large locally made electric incubator and a few small incubators worked by kerosine oil were in use but nothing unusual could be detected in these incubators that could account for the mortality as it was uniform in all the incubators. Other mechanical aspects to which death could be attributed were also looked into. The problem was then examined from the bacteriological stand point to see if any micro-organisms were responsible, in part or wholly for the heavy mortality.

Warrack and Dalling (1933) believed on the basis of their observations that infection with *Salmonella gaertner* among ducklings was the cause of much death-in-shell among hatching duck's eggs. Wilson (1945) isolated *S. thompson* from the duck and hen eggs and showed that the setting of infected eggs with shells contaminated with *S. typhimurium* and *S. thompson* was the means of introduction of the infection into the incubator. He also pointed out the possibility of congenital infection of the eggs. This view was supported by the isolation of *S. typhimurium* from the ovaries of two fowls (Wilson, 1947). Later the same author (Wilson, 1948) confirmed that *S. thompson* may be present in freshly laid duck eggs. However, subsequent experiments led to the belief that the presence of *Sal. thompson* infection in the hen's eggs might have been due to penetration during the period of storage which was sometimes 14 days or longer. Out of 1,023 eggs that were examined by him, 62 revealed *S. thompson* on their shells and 27 in the egg yolk. Of course no attempts was made to keep the eggs apart from one another during this period so that contamination by contact might have also been taking place. Buxton and Gordon (1947) while examining 774 hen's eggs, laid by the survivors of an out-break of *S. thompson* infection, found the organisms only on the shells and not to the egg-white or the yolk; but in the majority of cases where dead

chicks and "dead in shell" from most of the naturally occurring outbreaks of *S. thompson* infection were examined this organisms was isolated in pure culture from the yolk sacs and liver. According to them infection in the eggs that were kept together was far more than of those kept apart. Wilson (1950) has also recorded the isolation of *S. typhimurium* from hen's eggs.

In view of the fact that salmonellosis had been prevalent in the poultry farm of this Institute at Izatnagar from where most of our eggs were obtained, the possibility of these losses being due to salmonella infection could not be ignored.

Bacteriological Findings

As stated previously, most of the embryos on candling were noticed to be dead on the 9th day of incubation. In a few cases where the embryos being either small or inactive were allowed to incubate further for purposes of hatching chicks and where the eggs were not used for virus cultivation, a few embryos were observed to die later when they were fairly well developed.

For collecting material for bacteriological examination, the embryo was located by candling and a triangular cut of a fairly large size was made in the shell just above the embryo with the help of a dental drill, after disinfecting the surface of the shell with 0.1% solution of mercury perchloride. The triangular piece of the shell along with the shell-membrane and the chorioallantoic membrane was carefully removed by means of a sterile forceps under aseptic conditions thus exposing the contents of the egg. Cultures were made from the yolk by carefully pipetting off a little of the material with a sterile pipette and planting the same on freshly prepared blood agar plates. In cases where the embryos were fairly well developed cultures were made from the liver which was dissected out. The exposed surface of the liver was seared by means of a hot spatula and a small quantity of the liver tissue, collected by means of platinum loop, was streaked on the surface of the medium. The plates were incubated at 37°C. for 24 to 48 hours when the growth usually appeared. The colonies which developed were picked up for further examination.

A total of 300 "dead in shell" embryos were examined. Of these, 156, showed evidence of growth and the rest were found to be sterile. In the majority of cases, pure cultures were obtained but a few cases yielded mixed cultures, usually not more than two types being isolated from any one embryo.

The various organisms isolated were classified on the basis of their morphological, cultural and biochemical characters to determine

the genera to which they belonged and no attempt was made at detailed typing and to give them specific names. Thus, of the 156 cultures examined 11 were found to belong to the salmonella group, 65 were staphylococci, 2 streptococci, 56 belonging to the Coli-aerogenes group and 22 proved to be sporulating aerobes.

Discussion

These findings gave an indication that the various organisms had probably entered the eggs by penetrating the shells, thus causing infection of the yolk, either while the eggs were being stored before incubation or during the incubation period. According to Fleming and Allison (1922) egg-white on account of its rich lysozyme content does not usually get infected and as such no attempt was made to make cultures from the whites of the eggs. Scott (1933), and Jenson (1937) have shown that salmonella organisms can penetrate from the outside of duck eggs. The work of Haines and Moran (1940) has shown that the structure of the egg-shell is such that under certain conditions bacteria can penetrate through the shell to the contents of the egg. The rate of penetration depends on conditions of moisture and temperature. According to Schaaf (1936) it took place in duck's eggs in the incubator in five days. Buxton and Gordon (1947) found that penetration occurred in the incubated eggs in seven days while only one yolk became contaminated out of the ten stored at room temperature for fourteen days and one out of ten stored under the same conditions for twenty-one days. Wilson (1945) showed that the virulent strain could penetrate quicker than the less virulent ones.

In the present instance, practically all the organisms isolated, excepting salmonellae, are of ubiquitous nature and are of very little pathological significance. There access to the egg-shells and subsequent penetration is most likely. Whether or not these organisms played any role in directly causing the death of the embryos, it is difficult to say, but it is very probable that their presence in the large numbers encountered had a good deal of influence on the life of the embryos due to utilization of a very considerable quantity of the food material which would have normally gone to the developing embryos. As regards *Salmonella*, Wilson (1948) proved that faecal contamination during the process of egg laying takes place, and it is a possible means of introducing the infection to the incubator, should the infected eggs be placed along with others. Penetration of the organisms may also take place if the eggs are stored for sometime before incubation. The possibility of congenital transmission through the egg yolk has already been mentioned.

The isolation of salmonella organisms from eggs is of great significance economically as well as from the point of view of public

health. The increase in the number and the size of hatcheries is likely to result in the widespread dissemination of stock which may be potential reservoirs of infection. The general tendency to use mammoth incubators involving the setting of eggs from various sources will intensify the risk of infection all the more as has been noted in certain foreign countries. The importance of the public health aspects of avian salmonellosis can be well judged by the fact that in one report (Review, 1948) 56 out of 60 salmonella types or variants were isolated from birds which had also been the cause of illness in man, and after the World War II they have been widely disseminated from America to various countries importing egg powders, quite a proportion of which have been found to be contaminated with one or the other member of the *Salmonella* group. It would not be untrue if all salmonellae be regarded as potential pathogens for man. It is true that only an occasional egg infected with salmonella organisms may be consumed and only a small number of persons may get infected at a time through the consumption of such eggs, but it must not be overlooked that with the development of the industry where infected eggs or chicks may have been distributed, the condition may assume serious proportions which may be difficult to control.

Summary

1. Bacteriological examination carried out on 300 "dead in shell" chick embryos resulted in the isolation of *Salmonellas* from 11, *Staphylococci* from 65 embryos, *Streptococci* from 2, members of the *Coli-aerogenes* group 56 and sporulating aerobes from 22 embryos.

2. The importance of avian salmonellosis to the public health and to the development of poultry industry has been discussed.

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REVIEW ON THE DIFFERENTIAL CHARACTERS OF POULTRY COCCIDIA

By

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Studies on poultry coccidiosis from 1952 to 54 have revealed the too common occurrence of the various species of *Eimeria* in our poultry. Not all species are pathogenic but, unfortunately, *Eimeria tenella* causing dreaded 'caecal coccidiosis' happens to be the commonest one. It has occurred in 70% of faecal samples received from the field. Recognition of oocysts and their speciation is important from the stand point of control. Therefore, for the benefit of both field and laboratory workers differential characters short of their endogenous stages have been reviewed in this article.

Briefly, speciation is based upon : (1) the microscopic morphology of oocysts regarding their size, outline, and space occupied by the zygote mass inside the shell in unsporulated oocysts. Size of spores, position of refractile inclusion, and the time of its appearance inside the shell, in sporulated oocysts are also aids to speciation; (2) sporulation time; and (3) prepatent period.

These characters are described below in detail against each coccidium :-

Eimeria tenella Railliet and Lucet, 1891. Oocyst is broadly ovoid with no great difference in the width of its two ends. Its average size is $22.6 \mu \times 19.5 \mu$. Spores are bluntly ovoid, $11 \mu \times 7 \mu$ in size. Cytoplasmic mass is slightly irregular in freshly passed oocysts.

Eimeria necatrix Johnson, 1930. Its oocysts are broadly oval not quite unlike those of *E. tenella* but much smaller in size ($14 \mu \times 16.7 \mu$ on an average) and zygote mass fills more space of the shell than it does in the case of *E. tenella* and appears more irregular in outline.

E. hagani Levine, 1938. Oocyst is oval, has an average size of $19.17 \mu \times 17.6 \mu$.

Eimeria mitis Tyzzer, 1929. It has sub-spherical oocysts, with an average size of $16.2 \mu \times 15.5 \mu$. Zygote protoplasm in freshly passed oocysts almost completely fills the space inside the shell. Spores are $10 \mu \times 6 \mu$ in size, and appear disproportionately large for the comparatively small size of the oocyst.

Eimeria praecox Johnson, 1930. Oocyst is larger than that of *E. mitis* with which it is usually confused; however, it is ovoid in shape rather than subspherical.

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Eimeria maxima Tyzzer, 1929. It has the largest oocyst of the various *Eimeria* species described from poultry. It measures $29.3 \mu \times 22.6 \mu$ in size on an average. It has yellow colour, and is egg-shaped.

Eimeria acervulina Tyzzer, 1929. It has also an egg-shaped outline but is much smaller than *Eimeria maxima* measuring $19.54 \mu \times 14.34 \mu$ on an average. With regard to the space occupied by the zygote protoplasm, the oocyst of *E. acervulina* occupies an intermediate place between *E. mitis* and *E. tenella*.

Eimeria brunetti Levine, 1942. It has a very large size, measuring $21.7 \mu \times 26.8 \mu$ on an average. It is smaller only to *E. maxima* from which it can be differentiated by its small size, thinner and more curved (and smooth) walls, and more rounded ends.

A refractile granule is appreciable at the narrow pole in freshly passed oocysts of *E. tenella*, *E. acervulina*, *E. mitis*, and *E. maxima* (coarse in the last named species), but it appears at sporulation in *E. necatrix* and *E. brunetti*. There may be two or three such refractile granules or globules in *E. brunetti*. In *E. praecox*, unlike other seven species of *Eimeria*, the refractile granule is non-polar in position and is located laterally or among the sporocysts.

Cyst wall :—It is smooth and even in all poultry coccidia except in *E. maxima* where it may be roughened and irregular possessing yellow colour, and *Wenyonella gallinae* where it is pitted (*vide infra*).

Micropyle :—It is usually absent except in *E. tenella* where it is sometimes appreciable (personal observation).

Both the residual bodies are usually absent except in *E. tenella* which shows a sporocystic one (personal observation; and Morgan and Hawkins, 1962; which was absent according to Becker, 1954.

Sporulation time : At room temperature (30°C) preserved in 2.5 percent. potassium dichromate, oocysts of *E. acervulina* fully sporulate in 24 hours, while those of the rest of seven species of *Eimeria* take 48 hours to complete the process.

Prepatent period : i. e., the time of first appearance of oocysts in faeces after a single infective dose is 4 days for *E. praecox* and *E. acervulina*, 5 days for *E. mitis* and *E. brunetti*, 6 days for *E. maxima*, 4-8 hours less than 7 days for *E. tenella* and full 7 days for *E. necatrix* and *E. hagani*.

A very rare coccidium of poultry, *Wenyonella gallinae* has been described by Ray (1945). It has oval, or egg shaped oocysts, measuring 29.48μ to $33.5 \mu \times 19.84 \mu$ to 22.78μ in size. Surface of the oocyst is

rugged and presents a punctate appearance in optical section. The sporulation time varies from four to six days at 29°C.

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PROTEIN NEEDS OF DAIRY CATTLE

BY

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Proteins make up 17 to 18 percent of the body of a mature cow and 27 percent of the solids of milk. Cows use the proteins of their feed to form the proteins in the milk, blood, flesh and other body tissues. During growth, an abundant supply of good quality protein is required for optimum development. Dairy cows do not reach their full mature weight until they are about 6½ years old.

Though the quality of the protein is as important as the quantity during the early stage of growth in dairy animals, the quality of dietary protein is much less important in the case of adult cows as well as other ruminants. The various microorganisms in the digestive tract by their synthetic activities rework the dietary proteins and other nitrogenous compounds into protein for their own use. As these microorganisms are later digested by the animal, their synthesized bacterial proteins have a high nutritive value to the adult ruminant. The synthesis of essential amino acids and an approximate constancy of composition of rumen liquid irrespective of their composition in the food are given in Table 1. (9). This fact explains why the biological value of the protein in the nutrition of ruminants is fairly constant and ranges about 60.

Protein of the food is in part broken down in the rumen by microorganisms and in part passes on unchanged to the abomasum; part

of what is broken down by the microorganisms is assimilated by them and built into microbial protein which likewise passes to the abomasum. Another part is converted to ammonia and is absorbed by the animal directly from the rumen. Urea and other nitrogenous compounds of low molecular weight in the food, in the saliva or entering the rumen from the animal's blood may undergo the same treatment by the microorganisms. Thus, at least a fair proportion of the protein digested by the animal in the abomasum and small intestine is microbial protein, which has been shown to be a high-grade well balanced protein for laboratory experimental animals like rats.

TABLE I

The Amino Acid Composition of the Rumen Liquid and Foods Given to Dairy Cows & Sheep.

(Percent of Protein on dry basis calculated to 16 g.N.)

Amino acids	Cows				Sheep		
	Diet A		Diet B		Diet C		Diet D
	Rumen liquid	Food	Rumen liquid	Food	Rumen liquid	Food	Rumen liquid
Arginine	4.37	6.3	3.18	3.42	3.35	1.47	3.6
Histidine	1.16	1.92	1.07	1.45	1.41	1.00	1.28
Isoleucine	6.7	4.9	4.88	3.8	6.3	5.08	4.79
Leucine	5.6	4.6	4.67	3.77	9.17	16.2	4.56
Lysine	4.9	2.5	4.21	2.21	3.34	0.00	3.10
Methionine	1.7	1.11	1.63	0.9	—	—	—
Phenyl alanine	4.3	4.25	3.02	2.34	4.9	6.54	3.24
Threonine	3.5	3.48	3.15	2.09	4.7	2.24	3.99
Tryptophane	1.23	1.2	0.75	0.49	0.66	0.02	0.86
Valine	4.5	4.48	3.98	2.54	6.01	3.7	5.1

Diet A. shows a definite decrease in the rumen content of Arginine and Histidine, a marked increase in the Isoleucine, Lysine and Methionine and no change in other amino acids.

Diet B. There is a slight decrease of the Arginine and Histidine content. There is no doubt about the increase of 8 other essential amino acids.

Diet C. Lysine and Tryptophane are synthesised in the rumen. The composition of the ration used was zein 70, glucose 150, starch 300, and wheat straw 500.

Diet D. The composition of the ration used was urea 20, sodium glutamate 70, glucose 150, starch 300, and wheat straw 500.

The rumen liquid composition of these essential amino acids seems to be constant showing the real value of rumen protein to the animal irrespective of the quality of protein in the diet. (9). Different foods may give slightly different values for these amino acids in the

rumen, but the composition of rumen protein is more or less constant under normal healthy condition.

The simple nitrogenous compounds like urea can serve as a source of protein to ruminants. But many workers have found that such compounds are not as effective a source of nitrogen as is its nitrogen equivalent in the form of natural proteins for either growth (3, 4), nitrogen balance (2), or lactation (11). Such non protein nitrogen compounds can only serve in times of severe protein deficiency as protein extenders, but not as an important source of protein to ruminants under normal economic conditions.

By using four different rations differing in protein contents, it has been shown recently in a comparative investigation into nitrogen metabolism in 12 milch cows, 6 of which being Jersey and 6 Friesian cows, no differences were noticeable between the two breeds with regard to digestion of food protein, fixation of nitrogen in the tissues and the use of it in synthesising milk constituents, (5). Further, it is found that the essential factor for milk production seems to be the energy content of the diet and not the substances of protein nature. When starch is introduced into the rumen as well as casein, less ammonia is formed than when an equivalent quantity of casein is introduced alone. This is interpreted to mean that when energy in the form of starch is present, then a smaller quantity of amino acids are metabolised by rumen bacteria for the purpose of obtaining energy. The result of this may be that amino nitrogen is used in a more useful way, (10). Thus energy nutrients like carbohydrates when mixed with the required minimum amount of protein, seem to be the economic method of using protein for cows and other adult ruminants. Since the microorganisms are only converters of nitrogen into useful bacterial proteins and as the animals get their nitrogen food from feed proteins, protein can not be replaced by any other food constituents to form animal proteins, but it can take the place of carbohydrates and fats for the formation of animal fat and as a source energy.

The more protein the dairy cow receives in her forage allowance, the less protein is needed in the concentrate part of her ration. It is best to provide not only an ample quantity of protein in the ration, but also to see that the ration is made up of a variety of protein feeds. If this is done, there will be little likelihood of a reduced milk flow due to any other deficiency such as minerals in the ration. Depending upon the amount of protein in the roughage, a milch cow needs concentrate varying in protein content from 12 to 25 percent for use in supplementing the various kinds of roughages. If the cow is on good pasture or

if she eats 1½ pounds or more a day of good legume hay for each 100 pounds live weight, the concentrate need not contain more than 12 percent total protein. Heavy milkers require more legume hay or more protein in the concentrates. With mixed hay which has less protein than legume hay alone, more protein, viz. 16 percent, is needed in the concentrate. With grass hay, silage or fodder, the protein content of concentrate should be 18 percent. If fodder like straw, which has little digestible protein, is used, the percentage of protein in the concentrate must be still more 20 to 25 percent to supply the required amount. Suitable concentrate mixtures with different levels of protein can be made with available feeds to supply the necessary amount of protein according to the quality of roughage fed.

The protein requirement of a mature dairy cow for body maintenance has been shown by many workers to be about 0.6 pound digestible crude protein for a 1000 pounds body weight, (7). Lactation is a productive state of high nutrient requirements, which depend upon her body size, amount of milk produced and the percentage of butter fat in milk. The protein needs of pregnancy over maintenance requirement are about 17 percent increase, as compared with only 6 percent average increased requirement in total energy, (6). But the protein requirement rises significantly to a maximum of about 40 percent at the end of gestation. During the last quarter or third of pregnancy, when the maximum increase in growth of fetus and other tissues take place, the metabolic rate increases by 30 percent requiring more additional nutrients. (1).

The early growing stage of young dairy calves is a period of high protein needs as well as all the other nutrients. The more rapid the rate of growth, the higher are the requirements. The rapid increase in the musculature and other organs demands a high protein intake. The young calf with an undeveloped rumen and lack of normal complement of flora and fauna, requires protein of high quality as well unlike the mature dairy cow. The successive feeds of calf from birth, viz., colostrum, milk, skim milk, good quality leafy hay, calf meal or starter, growing concentrate mixture and later young pasture, all supply the requirements of the rapidly growing calf for energy, protein, minerals and vitamins.

The amounts of protein and total digestible nutrients required by the dairy animal during the stages of growth and production, as recommended by the National Research Council, United States, are given in the Table II. (8).

TABLE II
Protein and Nutrient Allowances for Dairy Cattle.

Wt. of Animal Lb.	Daily Allowance per Animal			
	Digestible Protein, Lb.	T.D.N. Lb.	Total Dry Feed, Lb.	Protein Percent in the Feed.
Growth				
50	0.30	1.0	1.3	30.0
100	0.45	2.0	2.7	22.5
150	0.60	3.0	4.0	20.0
200	0.70	4.0	5.3	17.5
400	0.80	6.5	8.7	12.5
600	0.85	8.5	11.3	10.0
800	0.90	10.0	13.3	9.0
1000	0.95	11.0	14.7	8.5
1200	1.00	12.0	16.0	8.5
Maintenance (*)				
700	0.45	6.0	8.0	7.5
1000	0.60	8.0	10.7	7.5
1200	0.70	9.5	12.7	7.5
1400	0.80	11.0	14.7	7.5
Pregnancy (Last 6 — 12 weeks)				
1000	1.20	14.0	18.7	8.5
Lactation (Per Lb. Milk)				
3.0 % fat	0.040	0.28	0.37	14.5
4.0 % fat	0.045	0.32	0.42	14.0
5.0 % fat	0.050	0.37	0.49	13.5
6.0 % fat	0.055	0.42	0.56	13.0

(*) When calculating the allowances for lactating heifers, which are still growing, it is recommended that the figure for *growth* rather than *maintenance* be used.

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A NOTE ON AN IMPROVED MINERAL MIXTURE SUPPLEMENT FOR LIVESTOCK

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The importance of mineral mixtures in animal feeds has been emphasised by many workers both in India and abroad. But systematic and detailed work on this line has not been done in this country. The problem of mineral feeding for live-stock is not a very simple one. The amount of mineral mixture required varies according to the species, age, state of being etc. Under the present stress and strain of intensive cultivation of lands for more productions of food grains, the soil is being continuously depleted and if it is not properly replenished the grasses and other fodder crops grown under such conditions are bound to be deficient in one or the other minerals. As such animals maintained in those areas are likely to suffer. It is thus necessary to supplement the existing rations of farm animals with suitable mineral mixtures. At present there are not many mineral mixtures available in the market. Even the few available ones are costly and beyond the reach of common livestock owners.

In order to make the problem of mineral feeding easy and within the reach of common man, an attempt has been made, in the present investigation to prepare a good mineral mixture supplement, from among the easily available ingredients, for feeding livestock.

Experimental

While mixing the different ingredients in suitable proportions, the regional requirements, the suggestions made by Sen (1952) and the proposals from the Indian Agricultural Research Institute, Delhi, were

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all taken into consideration. Accordingly the mineral mixture under investigation was prepared in the following proportions :

Sterilised bone flour	...	50 percent
Powdered chalk	...	24 "
Common salt	...	22 "
Sulphur	...	1.5 "
Iron oxide	...	1.3 "
Copper sulphate	...	0.6 "
Cobalt sulphate	...	0.3 "
Potassium Iodide	...	0.3 "

and the mineral mixture thus prepared was called as Nutrimineral M.S.I. The samples after mixing were taken in triplicate for analysis and the results were nearly agreeable to each other, indicating that the mixing was complete and homogeneous.

Ten she-sheep of local breed of approximately equal weight and age were selected for feeding experiment. 5 of them were fed with 12 Gm. of Nutrimineral mixture, mixed with half a pound of crushed horse gram, per head per day. The other 5 animals received no mineral mixture and received $\frac{1}{2}$ lb. only of crushed horse gram. The fortnightly body weights of all the animals were recorded for about 10 months. In another experiment 12 she-sheep of local breed, of approximately equal weights, and age, were selected, to study the comparative feeding value of different mineral mixtures, such as Churn Brand of I.C.I. and Super Mindif of Boots. 3 of them were fed with Nutrimineral, 3 of them with Churn brand, 3 of them with Super mindif and 3 of the remaining animals were kept as controls. 10 Gms. per head per day of each brand of mineral mixture mixed with half a pound of crushed horse gram was fed to the corresponding group of animals. As usual the control group received no mineral mixture and received only half a pound of crushed horse gram. This second experiment was conducted for about 3 months during which period the weekly body weights of all the animals were recorded and also the fortnightly blood samples of all the animals were collected for analysis.

In both the experiments the feeding and management were under supervision and the animals remained in sound health throughout the experiment. Animals were bled in the morning before any feed was offered to them.

The haematological constituents were determined from the oxalated blood by the methods described by Napier and Das Gupta (1945). Neutral potassium oxalate was used as an anticoagulant. The inorganic constituents were determined from the serum. Calcium was determined by the method of Kramer and Tisdall (1921), as modified by Clark

and Collip (1925), the inorganic phosphorous was determined by the method of Fiske and Subbarow (1925) and the Magnesium was determined by the method of Fiske and Subbarow (1925), as modified by Holzapfel (1934).

Results and Discussions

The fortnightly variations of body weight of all the animals of the I experiment, where the Nutrimineral mixture alone was used, is given in Table I. The weekly variations of body weights, and the fortnightly variations of haematological and chemical constituents, of all the animals of the II experiment, where different mineral mixtures were used, are given in Tables II and III respectively. The statistical analysis of the fortnightly variations of haematological and chemical constituents is given in Table IV.

From the Table I, it can be stated that in the I experiment where the Nutrimineral mixture was fed, the average total increase in the body weights of the animals, at the end of the 20th fortnight was found to be 17.2 pounds in the experimental group, where as the same for the control group was only 16.6 pounds. Further the increases in the body weights of the experiment group indicated a possible significant higher variations within the group. On application of the 't' test, it was found that the increases in the body weights of the two groups did not differ significantly.

From a perusal of the Table II, where different mineral mixtures were used, it may be stated that the Churn brand and Nutrimineral groups showed a definite increase in their body weights. It was found that the total average increase in the body weights at the end of the 12th week were, 11, 11, 4.67 and 7.33 pounds for Nutrimineral, Churn brand, Super mindif and control groups respectively. This clearly indicated the superiority of both the Nutrimineral and Churn brand mixtures to those of Supermindif and control groups. By applying the analysis of variance technique it was found that these values were found to be significant.

From the Tables III and IV it is found that the cell volume variations and the red blood corpuscles variations and possibly the mean corpuscular volume variations, were found to be statistically significant and the other constituents were found to be non-significant. The study of cell volume variations revealed that the values of the Churn brand group significantly differed from all the other groups. The same may be stated for red blood corpuscles also. However, the Nutrimineral mixture found to be quite comparable with that of Churn brand and decidedly found to be superior to Supermindif.

TABLE I
Fortnightly variations of body weights of sheep under
Nutrimeral Feeding (lb.)

No. of Fortnights	Experimental Gp.					Control Gp.				
	Animal nos.					Animal nos.				
	6	1	8	9	4	10	2	3	7	5
1	41	49	42	43	40	40	46	46	39	47
2	42	51	45	45	45	39	46	46	39	47
3	43	51	45	50	48	41	46	48	41	48
4	44	50	43	50	47	43	45	50	44	50
5	44	49	45	45	48	41	45	47	45	52
6	45	52	47	49	55	43	46	50	43	51
7	46	51	46	48	51	42	45	50	45	53
8	50	53	49	50	54	47	50	54	49	56
9	54	58	52	52	55	49	51	58	52	59
10	55	58	52	54	56	51	52	58	53	62
11	54	55	51	52	57	51	52	56	52	61
12	55	55	52	54	60	50	54	60	54	62
13	57	56	52	53	60	50	56	60	53	62
14	56	53	53	52	59	50	54	59	53	61
15	60	56	57	55	62	52	58	63	56	64
16	60	56	55	55	60	54	58	63	57	62
17	59	58	55	55	60	53	57	62	57	62
18	63	61	57	56	63	55	61	66	58	66
19	63	60	57	56	62	54	61	64	57	65
20	62	60	57	57	65	55	62	64	55	65

TABLE II
Weekly body weights of sheep under different mineral
mixture feeding (lb.)

Group	Nutrimeral			Churn brand			Super mindif			Control		
Animal nos.	3	5	6	2	X4	X2	4	7	X3	X5	X6	X7
1st week	33	34	34	37	36	34	34	35	36	40	46	40
2 "	37	39	34	40	38	35	35	37	36	41	49	43
3 "	38	42	36	42	40	36	38	36	36	41	49	42
4 "	38	42	35	41	41	36	38	36	35	42	51	42
5 "	39	41	35	41	40	42	35	36	34	40	49	42
6 "	38	41	36	41	41	36	33	35	33	42	50	45
7 "	40	42	38	45	43	40	38	38	35	42	50	45
8 "	42	44	38	46	45	39	40	37	36	44	54	47
9 "	44	42	39	47	46	39	38	36	36	45	52	48
10 "	45	45	41	47	45	40	41	40	37	45	53	47
11 "	45	47	41	48	46	42	41	39	37	45	54	47
12 "	47	46	41	48	50	42	41	40	38	47	54	47

TABLE III
Fortnightly variations of haematological and chemical constituents of blood of sheep
under different mineral mixture feeding.

Constituents	No. of bleeding	Nutrimeral group			Churn brand group			Super mindif group			Control group		
		Animal nos.			Animal nos.			Animal nos.			Animal nos.		
		3	5	6	2	X4	X2	4	7	X3	N5	X6	N7
Haemoglobin (Gm/100 c.c.)	1st	9.00	10.00	10.00	10.25	10.25	8.75	9.75	11.00	11.00	8.50	10.00	11.00
	2nd	9.00	10.25	8.75	9.25	9.25	8.50	7.25	8.75	8.25	8.75	8.50	10.75
	3rd	10.50	9.75	10.00	10.75	10.00	11.00	9.50	8.75	9.50	8.50	8.75	9.00
	4th	7.50	9.50	9.00	9.00	10.50	11.50	9.00	7.75	9.25	9.00	9.25	9.50
	5th	8.00	10.25	10.25	9.25	11.00	11.75	10.00	8.25	10.00	8.00	9.00	9.75
	6th	8.50	10.00	10.25	9.50	10.75	11.00	10.50	9.00	10.25	9.50	9.00	10.00
Cell Volume (Percent)	1st	32.70	40.33	38.53	36.33	37.43	33.06	33.06	43.60	40.33	30.76	38.53	39.63
	2nd	26.98	34.30	33.13	33.03	29.43	30.52	28.06	30.22	32.38	28.85	33.37	37.06
	3rd	30.69	32.38	32.38	36.33	37.40	40.21	29.14	27.25	31.75	28.30	37.40	31.28
	4th	23.74	30.99	32.38	30.39	33.46	37.40	26.98	22.66	29.43	26.98	29.92	30.99
	5th	26.46	37.04	36.68	31.75	41.92	44.64	31.75	27.25	32.81	27.51	33.54	34.59
	6th	26.72	37.04	34.26	35.95	39.45	40.61	33.58	32.01	32.08	33.86	37.73	34.92
Red blood Cells (in millions)	1st	8.76	9.53	7.25	8.54	10.64	8.38	7.66	7.75	9.73	8.83	9.31	9.88
	2nd	7.74	11.53	11.31	9.71	9.68	9.58	6.04	8.84	8.83	7.23	8.95	12.00
	3rd	7.55	7.07	10.09	9.96	10.57	9.11	9.67	9.90	7.63	7.83	9.85	10.46
	4th	7.60	11.67	9.66	12.68	12.07	9.44	10.07	9.25	10.41	8.32	7.86	8.70
	5th	6.47	11.83	9.56	10.86	11.07	9.84	9.61	8.54	13.06	7.92	8.13	12.91
	6th	12.47	12.26	10.20	11.80	11.31	13.29	9.86	9.08	10.03	11.85	10.48	10.21
White Blood Cells (C. m.m.)	1st	9.94	16.05	11.52	14.06	13.16	15.08	10.20	12.25	26.48	8.60	14.08	12.15
	2nd	8.44	15.68	17.72	12.36	18.16	19.76	9.24	22.88	14.76	13.40	15.72	11.90
	3rd	15.68	13.28	17.04	17.64	13.00	8.17	9.52	18.88	11.24	14.88	13.12	12.96
	4th	14.04	15.56	13.76	14.52	13.00	16.44	16.44	20.72	17.24	16.92	17.12	17.60
	5th	12.76	13.00	15.10	18.68	13.72	21.72	15.20	15.52	16.12	11.72	19.04	12.48
	6th	12.72	16.56	16.40	13.24	11.36	13.24	12.30	16.41	13.08	20.96	19.36	21.55

TABLE III—(Continued.)

Mean Corpuscular Volume (cu. microns)	1st	37.33	42.32	53.14	33.46	35.18	39.45	43.16	56.25	41.33	34.83	34.04	40.11
	2nd	34.85	29.74	29.29	34.01	30.40	31.86	46.46	34.18	36.67	39.90	40.01	40.11
	3rd	40.65	45.80	32.09	35.08	35.50	44.14	30.13	27.52	41.61	36.14	34.92	29.90
	4th	31.24	26.55	33.52	23.90	27.72	39.62	26.79	24.50	28.27	32.43	38.07	35.62
	5th	40.89	40.38	39.33	29.32	37.86	45.57	33.03	31.90	27.34	34.73	41.25	26.79
	6th	21.34	30.21	33.59	30.48	34.88	38.08	34.07	35.25	32.00	29.41	35.04	34.20
Mean Corpuscular Haemoglobin (micro-micro-Gm.)	1st	10.28	10.49	13.79	9.29	9.63	10.44	12.72	14.19	11.30	9.62	10.43	11.13
	2nd	11.63	8.89	7.73	9.53	9.55	8.87	12.00	9.90	9.34	12.07	9.49	8.96
	3rd	13.90	13.79	9.91	9.29	9.46	12.08	8.84	12.45	10.86	18.04	8.60	8.60
	4th	9.87	8.14	9.31	7.10	8.60	12.18	8.94	8.88	10.82	11.76	9.87	7.55
	5th	12.36	11.51	10.73	8.52	9.93	11.94	10.40	9.66	7.67	10.10	11.07	7.55
	6th	6.82	8.16	10.05	8.05	9.50	8.27	10.65	9.91	10.22	8.01	8.59	9.80
Mean Corpuscular haemoglobin concentration (Percent)	1st	27.52	44.80	25.95	28.21	27.38	26.47	29.50	25.23	27.27	27.63	25.95	27.75
	2nd	23.35	29.88	26.41	28.00	31.43	27.85	25.83	28.95	25.48	30.33	25.47	27.33
	3rd	34.20	30.11	30.88	29.59	26.74	27.35	32.60	32.11	29.92	30.03	23.40	28.77
	4th	31.59	30.65	27.89	29.61	31.38	30.75	33.36	34.20	31.43	33.36	30.91	30.65
	5th	34.01	27.00	27.94	29.12	26.23	26.27	31.49	30.28	31.43	29.08	26.83	28.18
	6th	31.81	27.00	29.92	26.41	27.25	27.08	31.27	28.12	31.95	28.05	23.85	28.63
Calcium (mgm./100 c.c. Serum)	1st	11.6	11.6	13.0	10.0	12.8	12.0	11.6	10.8	11.2	10.2	10.6	12.6
	2nd	10.8	11.6	11.8	11.0	11.2	11.4	9.6	9.6	11.4	12.0	11.4	11.2
	3rd	11.4	11.4	11.6	11.8	10.8	10.8	11.6	10.2	10.6	10.6	11.6	10.8
	4th	10.4	11.2	10.6	10.8	11.8	11.8	9.8	10.4	11.8	11.8	11.8	11.6
	5th	10.0	12.0	11.6	11.2	13.2	12.4	11.6	11.6	11.6	12.4	11.0	12.4
	6th	11.6	11.8	11.4	11.6	11.6	11.6	11.4	11.5	11.8	11.8	12.0	12.4
Magnesium (mgm./100 c.c. Serum)	1st	3.03	2.91	3.00	2.86	3.06	2.83	2.54	2.94	3.03	3.19	2.54	2.83
	2nd	3.75	3.23	3.73	3.57	3.26	3.37	3.30	3.11	3.12	3.95	3.33	3.61
	3rd	2.81	2.94	2.73	2.94	2.76	2.63	2.97	2.36	2.73	3.01	3.15	3.20
	4th	3.66	3.90	3.90	3.57	3.37	3.61	3.66	3.84	3.09	3.66	4.05	3.45
	5th	2.78	2.27	2.27	2.38	2.41	2.17	2.36	2.19	2.14	2.24	2.67	2.27
	6th	3.26	2.50	3.61	3.61	3.75	3.00	3.07	3.18	3.21	3.90	4.06	3.75
Inorganic Phosphorus (mgm/100 c.c. Serum)	1st	8.51	8.89	8.16	8.89	8.89	8.99	8.89	8.41	8.51	8.62	7.41	8.99
	2nd	9.10	11.27	10.81	10.39	12.50	11.76	12.50	12.12	13.58	9.76	11.29	10.39
	3rd	6.25	6.50	5.56	6.61	6.30	6.96	7.48	7.08	6.84	7.62	7.02	6.11
	4th	10.82	10.53	11.27	9.76	9.88	10.26	15.08	11.94	13.11	9.30	9.41	9.88
	5th	8.89	9.76	10.53	9.52	7.69	7.47	10.67	9.64	10.39	8.16	8.69	9.30
	6th	10.67	12.70	10.81	10.53	12.70	9.09	9.98	10.38	9.61	8.79	9.20	9.41

TABLE IV

Fortnightly variations of Haematological and Chemical Constituents
(Average of six bleedings in groups of three sheep).

Constituents	Nutri-mineral	Churn brand	Super mindiff	Control	F	Significant (s) or non-significant (N.S.)	Significant difference
Haemoglobin	28.42	30.38	27.96	27.63	2.09	N.S.	—
Cell volume	97.79	108.22	93.89	99.20	5.79	Highly S.	8.28
R.B.C.	28.76	31.46	27.66	28.45	3.40	S	2.64
W.B.C.	42.54	45.27	46.45	45.59	1.07	N.S.	—
M.C.V.	107.04	104.42	105.08	106.25	7.74	Possibly S.	—
M.C.H.V.	31.23	28.72	30.88	31.13	1.65	N.S.	—
M.C.H.C.	89.82	84.52	90.07	84.37	2.21	N.S.	—
Calcium	34.23	34.63	33.02	34.70	1.52	N.S.	—
Magnesium	9.38	9.19	10.47	9.79	2.49	N.S.	—
Inorganic Phosphorus	28.51	28.03	31.04	26.56	1.55	N.S.	—

Summary

A mineral mixture for feeding livestock, was prepared by mixing different ingredients in suitable proportions and this was named as Nutrimineral. Two experiments were conducted on sheep to assess its feeding value. It was found that the total average increase in the body weights of the Nutrimineral group were higher than the control group, and it was found to be non-significant.

When this mixture was compared with those of Churn brand and Super mindiff it was found that the total average increase of body weights of the animals of the Nutrimineral group, were as good as those of Churn brand group and they were found to be decidedly higher than the super mindiff group.

By the study of blood constituents it was found that Churn brand was superior to all other mixtures but Nutrimineral was found to be superior to Super mindiff.

Acknowledgments

The author is thankful to Sri V. S. Kuppusamy Mudaliar, Superintendent, Mysore Serum Institute, for his kind facilities provided during the course of this investigation and also to Sri M. K. Sri Rama, M.Sc., Gazetted Assistant to the Superintendent Bureau of Vital Statistics, Department of Public Health in Mysore, Bangalore, for his kind analysis of the results.

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OCCURRENCE OF MICROFILARIAE OF STEPHANOFILARIA ASAMENSIS IN THE PERIPHERAL BLOOD OF CATTLE

BY

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Orissa, Cuttack.

Stephanofilariasis which is more popularly known as "Humpsore" in India is a form of localised ulcerative dermatitis at the yoke-region, hump, withers or any other part of the body of Cattle and is known to exist in this country since more than a few decades. (Pl. 17. Fig. 1). This disease condition is widely prevalent in Assam, Orissa, Bengal and Bihar.

Pande (1935) encountered in the humpsore lesions of affected animals a filarial worm which he described as a new species—namely *Stephanofilaria asamensis* and thought it to be the causal agent of the disease. Different workers at different times attempted to study various aspects of the disease. Datta (1933) studied the histopathology of "Humpsore" lesions and Gopalakrishnan (1949) detected *S. asamensis* and its microfilariae in association with chronic otorrhoea in buffaloes. Besides describing the morphology of the parasite—*S. asamensis*, Pande (1936) demonstrated its microfilariae in the affected tissue. But there appears to be no previous record of the occurrence of the larval forms of this filarial worm in the peripheral blood of the affected animals.

In course of an investigation of Humpsore disease in Orissa during 1952-54 under a scheme sponsored by the Board of Scientific and Industrial Research, Orissa, 399 blood smears of peripheral blood out of a total 4058 clinical and sub-clinical cases of the disease were found to contain microfilariae of *Stephanofilaria asamensis* which were confirmed as such by the Head of Division Parasitology, Indian Veterinary Research Institute, Director of Malaria Institute of India, Delhi and Dr. G. S. Thapar, Helminthologist, Lucknow University.

The blood smears were taken during daytime or night from the ear vein of the animals and studied after staining with either of the Romanowsky stains or in 1 in 1000 Aq. Sol. of Methylene blue.

Further studies on the different aspects of the parasite and its mode of transmission are in progress.

Summary

Occurrence of microfilariae of *Stephanofilaria asamensis* in the peripheral blood of affected animals is reported for the 1st time.

Acknowledgment

My grateful thanks are due to Mr. G. B. Singh, B.A., M.R.C.V.S., Director Animal Husbandry and Veterinary Services, Orissa, for his kind encouragement and to Dr. H. D. Srivastava, M.Sc., D.Sc., Head of Division of Parasitology, Indian Veterinary Research Institute, Dr. N. G. S. Raghavan of Malaria Institute of India, Dr. G. S. Thapar, Helminthologist, Lucknow University and Dr. R. G. Roy of Malaria Institute of India for their useful guidance.

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Notes and News

Dr. M. Maqsood, M. S. (Michigan), Ph.D. (Cantab), L.V.P. (Hons.), M. I. Biol. (Lond.), Professor of Physiology, Punjab College of Animal Husbandry, Lahore, was selected by the Atomic Energy Commission of U.S.A. for a specialised course in the peaceful uses of Atomic Energy at the Oak Ridge Institute of Nuclear Studies, Oak Ridge. Dr. Maqsood attended this course with 32 other Scientists from 22 countries of the world in May 1955. He is the first Veterinarian who attended this course from the East and Middle East. At the termination of this course Dr. Maqsood, was selected by the University authorities to undertake research work on one of the research projects in collaboration with the U. S. Scientists, in view of his original research publications. Dr. Maqsood is considered an authority in the field of Physiology and this is the first instance, when a worker from the East and Middle East was selected to undertake research work as a "Research participant" Dr. Maqsood's work is connected with the use of Radio-active isotopes in Nutrition, Bio-Chemistry and Physiology. On his

return, Dr. Maqsood will be visiting some of the British Atomic Energy Laboratories in England.

Dr. Maqsood has contributed a large number of original research papers and his work is being mentioned in text books. He is a member of the Atomic Energy Committee, Government of Pakistan.

Sri P. Subramanyam, B.V.Sc., of Madras Veterinary College, is going to the University of Minnesota, U.S.A., for post-graduate studies in Veterinary Bacteriology on 30-8-55 by S. S. "Steel Director" from Cochin.

Vienna Police reported that an Alsatian dog seemed to have committed suicide after realising that it has endangered his six-year-old mistress's life. The girl, Helga Jellinek, was asleep when the chained dog loosened the rubber pipe of the gas oven. Her parents were out, but neighbours smelling the gas burst into the flat in time to rescue her. Later, the unchained dog suddenly jumped through the third floor kitchen window, which the neighbours had opened, and was killed instantly.

'Hindu' 7th July 1955.

The *Madras Mail* in its issue of the 5th September 1955 reports as follows:—

Vaccine kills 735 cattle. Laboratory staff suspended.—Patiala, Sept. 5: The entire staff of the Biological Laboratories of the Pepsu Animal Husbandry Department was, yesterday suspended, pending further inquiries, on charges of negligence of duty in processing a vaccine, which was stated to have killed 735 cattle in 5 villages of Patiala District.

The Agriculture Minister, Raja Surendra Singh, in his order said he had been satisfied from the investigating committee's preliminary report that the fatal results of the vaccine were due to the gross negligence of the laboratory staff—a veterinary pharmacist, and his four assistants.

The vaccine processed by the Laboratory was supplied to the Animal Husbandry staff for administration to cattle following the outbreak of foot and mouth disease in the five villages. The vaccine claimed the lives of cattle with lightning speed, killing over 400 of them within 48 hours.

Place for Brooding Hen. Pitcher Preferred to Box:—The commonly recommended 14 to 18-inch square wooden box for placing the brooding hen is found to have the disadvantage of being easily infested with ticks and other vermin because of the joints and crevices in the box.

One way of getting over this trouble would be to use a little less than half of a pukka earthen pitcher of a convenient size for the purpose. The bottom should be lined with soft material like dust, hay, ash or sand, and made hollow in the centre. On top of this a layer of sawdust, some soft hay over this layer, and finely sieved wood ashes over the hay has been found to be desirable.

The broken pitcher should be made stable with supports and placed in a partially dark, safe and quiet room. It should be placed on or close to ground level, so that the hen does not have to jump down and thereby damage the eggs kept for hatching.—ICAR 74.

Breeding Rams. Right Age for Mating:—Rams are generally able to serve females at the age of eight to nine months, but livestock experts advise that they should be allowed to mate only at the age of 15 to 18 months.

Young rams, they further advise, should not be allowed to serve more than 40 ewes during the breeding season. Rams of four to six years, however, can be allowed up to 50 ewes.

To prevent indiscriminate breeding, ram lambs in the flocks should be castrated soon after they are weaned.—ICAR 79.

A Good Ram. Physical Characteristics:—Certain physical points indicate a ram to be suitable for heading your flock, experience points out.

A good ram is muscular, vigorous and strong. Legs are short, with good bone and feet. The chest is broad and deep. The brisket or the region below the neck and between the forelimbs is wide and fleshy.

The loins are abroad, and quarters thick and full. Flesh is firm and thick. A strong head and a heavy neck indicate it has masculine looks. The sex organs are well-developed.

Rams of a woolly breed should, in addition, have a dense fleece of a good quality.

Sheep breeders are advised to avoid rams with one of the lips protruding beyond the other, or those with weak legs, or those with one testicle.—ICAR 85.

Sheep Management. A Ram for Each Group:—The best way of managing sheep is to divide the flock into groups of 40 to 50 ewes with one ram to head each group, livestock experts advise. The system has many advantages.

It enables the breeder to maintain proper records and helps him in spotting out the ram's defects if he has any, so that he may be culled away early. It also avoids the possibilities of rams fighting among themselves.

The ram, they advise, should be let in with the ewes only at night after they return from grazing and taken away at daybreak. This will enable ewes to graze undisturbed during the day, and also give rams sufficient rest between matings hours.—ICAR 88.

* * *
Selection of Ram. Tips for the Beginner:—To get the best out of sheep, great care must go to the selection of the ram. A good ram can improve the flock, while a bad one can ruin it.

The beginner should select a ram of a breed that can thrive well under local conditions. If wool production is the aim, he has to select from wooly types, while if meat production is desired, then he should choose from mutton types of sheep.

It is best to select a ram from a known pedigree stud. In case this is not possible, then rams may be obtained from any well-bred flock in the area.

It is false economy to go in for a ram without good parentage just because it is cheaper than one with known and good parentage.—ICAR 91.

* * *
Keeping the ram in condition. Attention to some details:—Rams pay well by producing better lambs if attention is paid to some important details, experts say.

The very first in the list is providing the ram with enough exercise. This gives them better appetite and good health. Consequently, they will be more active and give more and better service and fertility.

Rams should not be grazed or driven long distances during the hottest part of the day. A cool and shady place is what they need at such a time. Ample clean water is another necessity.

Dirty pieces of hair and wool around the prepuce should be clipped a week before the breeding season starts.

Overgrown hoofs should be pared off and the feet properly prepared before the breeding season.

Rams should not be used for service for two months after their recovery from illness such as blow fly-strike, foot-rot or fever.—ICAR 97.

ROYAL VETERINARY COLLEGE, STOCKHOLM, SWEDEN
 F. A. O. INTERNATIONAL TRAINING CENTRE ON ANIMAL GYNAECOLOGY 1954 - 55
 Award of F.R.V.C.S.



Standing (L to R):—T. Sudhikum (Thailand) S. N. Lukute (Uzainagar) S. M. Ishaque (Patna) C. R. Sane (Poona)
 M. P. Johari (Madhya) G. B. Singh (Cuttack) U. Saligupta (Thailand) S. P. Verma (New Delhi, Secretary)
 M. C. Chellam (Madras) M. L. Kohli (Punjab) B. K. Basu (W. Bengal) K. K. Vyas (Jaipur)
 Sitting (L to R):—E. Sevelius (Veterinarian) E. Palsson (Chief vet.) N. Lagerlof (Professor) S. Hepling (First Secretary Swedish Instt.)
 K. Eriksson (Principal) K. V. A. Padmanabhan (Charge de' Affaires, Indian Legation) A. Hjarre (Professor)
 S. Hoflund (Professor) A. Bane (Asstt. Professor) B. Lundgren (Chief Veterinarian)

Glosso Pharyngeal Paralysis

By

R. S. JOTHI,
Veterinary Officer, Ranebennur.

Fig. 1
Before Treatment.
Paralysis of the tongue.



Fig. 2
After Treatment.
Tongue withdrawn.
[Vide article on page 141]

Occurrence of *Microfilariae* of *Stephanofilaria*
Asamensis in the peripheral blood of cattle

By

K. M. DAS,
Cuttack, Orissa.

Fig. 1
Animal showing typical hump sore lesion.



Fig. 2
900 X (Oil immersion).
[Vide article on page 136]

Clinical Articles

GLOSSO PHARYNGEAL PARALYSIS

By

R. S. JOTHI,
Veterinary Officer, Ranebennur Bombay State.

General :—It was in 1818 that Pharyngeal Paralysis was first described by Ringheim. Cadeac further states that in consequence of the powerful and varied nerve-supply, paralysis of the pharynx is very rare. Paralysis of pharynx as a result of central lesions arising from injuries to the cranial region or associated with various nervous maladies such as Cerebro Spinal Meningitis, Bulbar Paralysis or rabies etc. are of common occurrence. But paralysis of pharynx due to Peripheral (local) lesions is very rare. In view of its rare occurrence as judged by the records in Veterinary practice, it is considered worthwhile to record the following case :—

History and symptoms :—A grey bullock of Halikar breed, aged about 6 years, was brought to the dispensary on 15-11-1954 for treatment with the following history and symptoms.

The animal under reference worked well in the field from morning till 11 A.M. Then the servant stopped working the animals as it was time for him to take his food. The animals were taking rest in standing posture with yoke tied on their neck. At this juncture the fellow bullock which was standing in pair got suddenly frightened up and startled at once and gave a severe pull to the other animal. As a consequence of this pull, the animal fell down strangulated, the rope and stick below the throat pressing tight against the gullet. Then the servant immediately untied the animal as it was in much distressed condition and brought back the bullock home.

Next morning this animal which was apparently normal at night was found in the morning unable to swallow or to take its food, nor was it able to drink water. It was in this condition that the animal was brought to the Dispensary for treatment. Repeated examinations failed to reveal any other symptoms except inability to swallow or drink; the tongue was protruded and hanging dropped down in the corner of the mouth; it was cold to touch, no re-action or response to pin pricks or touch. There was profuse salivation; suppressed cough; greyish white nasal discharge. Animal looked very much distressed. It was decided as a case of Glosso Pharyngeal Paralysis which occurred as a result of strangulation and tightening up of the rope round the neck and compressing the throat and nerves both sensory and motor supplying tongue and Pharynx.

The following course of treatment was adopted.

Symptoms.	Treatment.
15-11-54 Above symptoms	Mouth was washed and applied tincture iodine to the tongue. Internally Pot Iodide in one dram was given. A mild mustered plaster was applied to the throat.
16-11-54 "	Gave 50 c.c. of Lugol Solution I.V.
17-11-54 "	" Mild mustered plaster.
18-11-54 "	Injected Collosal iodine (5 M.G.) 20 c.c. I.V.
19-11-54 "	"
20-11-54 "	10 c.c. Collosal iodine I.V.
21-11-54 "	"
22-11-54 Animal appeared bright. Salivation much less. Cough disappeared. Unable to take its food and inability to drink continued.	"
23-11-54 "	Injected Sodium Iodide 30 grs. in 20 c.c. I.V.
24-11-54 "	"
27-11-54 "	Potassium Iodide 1 Dram internally.
28-11-54 "	Gave 50 c.c. of Lugol solution I.V.
29-11-54 "	"
30-11-54 Slight movement of the tongue was noticed.	Injected Sodium Iodide 30 grs. in 20 c.c. I.V.
1-12-54 Less protrusion of the tongue, warm to touch, appeared bright, took little water by itself.	"
2-12-54 "	"
3-12-54 Slowly started chewing the cud. But no mastication.	Pot. Iodide 1 dram internally.
4-12-54 "	"
5-12-54 "	10 c.c. I.V. Collosal iodine.
6-12-54 "	"
7-12-54 "	"
9-12-54 Tongue was completely withdrawn started mastication. Appeared healthy.	10 c.c. Berin I.M. was given.
11-12-54 Animal started feeding, masticated food and took water easily.	10 c.c. Berin I.M.
12-12-54 "	"
13-12-54 Animal was found in good health. Completely cured and discharged.	"

INCIDENCE, SYMPTOMS AND TREATMENT OF 'ASCARIASIS' AMONG CALVES IN PUTTUR, SOUTH KANARA DISTRICT

By

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Veterinary Hospital Puttur, S. Kanara.

Introduction :—Puttur is a small town in the district of South Kanara, and is receiving an annual rainfall of over 150", the bulk of which is received mainly during the south-west monsoon *i.e.*, from June to September. The soil is mostly gravelly loam. The cattle and buffaloes are of nondescript type but due to the maintenance of stud bulls of Sindhi and Murrah buffalo breeds at the Veterinary Hospital, most of the young stock of the locality are graded ones.

Ascariasis among young calves of white cattle and buffaloes is fairly common, the latter suffer most due to these round worms. The calving season of the local buffaloes usually starts from about the month of August each year and extends upto November. During this period nature provides plentiful grazing and green grass for the stock. The buffalo calves are generally very healthy and active during the first fortnight or a month of their life and then begin to show signs of unthriftiness, depraved appetite and intestinal disorders. The discerning stock owners bring the calves at this stage to the hospital for treatment while others lose their young calves due to neglect. Such calves are generally reported die after a severe bout of colic. A record of the incidence of ascariasis among calves brought to the hospital for the year 1954 was maintained.

Monthwar incidence of ascariasis among calves at the Veterinary Hospital Puttur for the year 1954.

Month.	No. of cases of ascariasis treated.		Total No. of other type of diseases treated.	
	Buffaloes.	White Cattle.	Buffaloes.	White Cattle.
January	1	0	12	13
February	0	0	2	13
March	0	0	7	6
April	2	0	5	16
May	0	0	2	10
June	0	0	3	14
July	0	1	2	16
August	1	1	3	17
September	2	2	16	16
October	8	2	16	21
November	11	5	11	18
December	8	0	8	11
Total	33	11	87	171

Percentage of incidence of ascariasis among calves } White cattle 6.3%
Buffaloes 37.9%

The above figures are based on the microscopical examination of the dung of all young calves (less than 6 months) brought for treatment to the hospital.

Symptoms:—Calves suffering from ascariasis have invariably shown an unhealthy coat. Scraggy coat, alopecia over the ears, head and neck are commonly met with. Loose, falling off hair among the affected is fairly common. It will be useful observation if cases of alopecia and bad coat among young calves are examined for the presence of ascariasis. Generally such cases have shown presence of these round worms and deworming and topical application of oil. Vitaminatum have given good results. Conjunctivitis and aphtha are not unusual symptoms. Urine is high coloured and dung in early cases show a greyish colour indicating disorder of the liver. Diarrhoea is not uncommon. Body temperature is normal or slightly less than normal. Cases of pyrexia in cases of severe colic are also met with. In general the young calves are much inconvenienced due to the very moist conditions and humidity prevailing during the rainy season.

Treatment:—It is not unusual to find the usual vermicide and proprietary preparations failing to expel ascaridia. In this hospital a stock mixture containing the following has been used for the past two years and more.

R/- Aloes grs.	ii.	
Thymol grs.	ss.	
Cuprisulphas grs.	ii.	
Tetrachloretheline (I.C.I.)		} m. v.
or		
Carbon tetrachloride.		
Ol. eucalyptus.	m. iv	
Mag. sulphas oz.	iv.	
Aqua ad	oz. i. ss	
Mft. mist dose	$\frac{1}{2}$ to 1 oz. given as follows:	
Age.	Dose.	
15 days.	$\frac{1}{2}$ oz. with m. v. Ol. chenopodium	
1 month	$\frac{1}{2}$ oz. " " — do —	
2 months	1 oz. " " m. XV — do —	
3 months.	1 oz. " " — do —	

Ol. chenopodium is added at the time of administering the stock mixture and is given as the initial dose. For the subsequent 2 days the stock mixture is given without the Ol. chenopodium.

In the above method of administering medicine the calves are rarely found to be adversely affected and worms are expelled in large numbers.

Acknowledgments

I express my gratitude to the District Veterinary Officer, South Kanara and the Director of Animal Husbandary, Madras for sending this paper for publication. My thanks are due to Dr. Sadashiva Bhat who was in charge of this institution before me and was responsible for compounding the valuable stock mixture for ascariasis among calves.

'SULPHAMEZATHINE' TREATMENT OF BOVINE HAEMORRHAGIC SEPTICAEMIA

By

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Following the seasonal outbreak of the disease in the neighbouring villages during August and September 1953, experimental treatment by 'Sulphamezathine' Sodium Solution 33% and 'Sulphamezathine' 5 Gm. tablets (I.C.I. (India Ltd.)) was started. It was found that advanced cases of several days' duration did not respond well, probably because of heavy toxic absorption. On the other hand average cases reacted quickly and favourably irrespective of the age of the animal. Three typical case histories are given below:

1. Buffalo calf. $1\frac{1}{2}$ years. Pyrexia, accelerated and difficult breathing, salivation, conjunctivitis and lachrymation. Treatment: 45 c.c. solution intravenously and one tablet. One tablet after four hours Cured.

2. Bullock 9 yrs. Signs as above. Treatment: 81 c.c. solution intravenously and two tablets. One tablet after six hours. Cured.

3. Buffalo cow. 8 years. Recumbent with signs as above, and heavy dullness and depression. Treatment: 99 c.c. solution intravenously and three tablets. Two tablets after four hours. Cured. A remarkably rapid response followed the injection, the cow rising after five minutes and starting to feed after 30 minutes. The owner reported the cow to be normal after four hours.

Conclusion: Though further work on additional cases during the coming season will be required to assess the value of this therapy accurately, there is no doubt that 'Sulphamezathine' in the recommended doses offers an effective and rapid means of treating clinical bovine haemorrhagic septicaemia, especially in the average case before heavy intoxication occurs.

SURRA IN DOGS

By

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The symptoms of Surra in dogs have been described as periodical attacks of fever, congestion of conjunctivae, swelling of the head, pharyngeal region and in some cases, sero-sanguineous effusions in the joints, keratitis and loss of hair.

Cases of Surra in dogs in which opacity of the cornea has been the only or the predominant symptom in the early stages, are described in this article.

Case No. 522 Sub.—Mongrel Dog; Date of admission 31-7-1954.

*Symptoms:—*Anorexia, diffuse bilateral opacity of cornea. Temp. 103.4. Blood smears were taken and sent to the Principal, Madras, Veterinary College, for microscopical examination. The patient was treated with N.A.B. intravenously and with Argyrol drops to the eye. The temperature came down to normal from the next day, but the opacity of cornea persisted. Till the result of the blood examination was received, the following symptoms appeared. Progressive weakness, inco-ordination of limbs and circling movements. There was no sign of oedema anywhere in the body. The result of blood examination, received on 14-8-54, was positive for *Trypanasoma evansi*. Antrypol 4 c.c. of 10% soln. was given intravenously and the dog recovered completely in a week, the opacity of cornea disappearing in 4 days time.

Case No. 539 Sub.—Alsatian Cross. Date of admission 4-8-54.

*Symptoms.—*Anorexia, diffuse bilateral opacity of cornea, temp. 103.4 blood smears were sent for examination. The temperature came to normal after the patient was given N.A.B. intravenously and the opacity of the cornea also cleared up completely by the 4th day. But the animal was still lethargic and from the eighteenth day, the animal developed locomotor inco-ordination, circling movements and dilated pupils. The animal did not recognise its owner and had tendency to bite even the owner when touched. The animal was kept under observation during which occasional epileptic convulsions appeared.

The result of blood examination received on 15-8-54 was positive for *Trypanasoma evansi*. The dog was treated with Antrypol (5 c. c. of 10% soln) and it completely recovered in a week.

Case No. 579. Sub:—Mongrel dog. Date of admission 15-8-54. Symptoms: diffuse bilateral opacity of cornea; temp. 102.4 appetite normal. Antrypol was given immediately after blood smears were taken. The smears were positive for *Trypanasoma evansi* and the patient made an uneventful recovery.

Case No. 1223. Sub:—Mongrel dog. Date of admission 19-2-55. Symptoms: Temp. 103. Anorexia. Dyspnoea and weakness. On Examination the animal had pleuritic effusion and pale mucous membranes. There was no oedema nor any opacity of the cornea. Blood smears were positive for *Trypanasoma evansi*. The animal was treated with Antrypol and recovered completely.

Case No. 1249. Sub:—Alsatian cross. Date of admission 25-2-55. Symptoms: Temp. 102 appetite normal. Diffuse bilateral opacity of cornea. patient otherwise normal, Blood smears were taken and antrypol was given intravenously. The smears were found to be positive for *Trypanasoma evansi*.

In the first two cases described, the disease has progressed before the result of the blood examination was received and it is interesting to note that in these advanced cases also, there was no sign of oedema anywhere in the body and in the third and fifth cases, the dogs were apparently normal excepting for the bilateral opacity of cornea which was reported to have been present for over a week before the patients were brought to the hospital. In all the above cases, blood smears were examined subsequently at regular intervals and were negative for Tryps.

Acknowledgment

I am grateful to Dr. K. S. Venkataraman G.M.V.C., former District Veterinary Officer, Madurai for his encouragement and advice and to Dr. R. Raghupathi Reddi G.M.V.C., for his kind permission to publish this article.

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NASAL GRANULOMA IN CATTLE-SOME OBSERVATIONS FROM A MASS TREATMENT UNDERTAKEN AT BALIMI, ORISSA

By

BALLAV NARAYAN PATRA B.Sc. (Hons.) M.R.C.V.S.

and

B. K. MURTY, G.B.V.C.

This disease is very common in cattle in India and particularly in Orissa characterised by development of ulcerations in the nasal passages, with emaciation.

Rao (1932) established the causative organism as *Schistosoma nasalis*. Malkani and Dutta (1932) also simultaneously reported that the *Schistosoma* is the causative organism. Treatment has been advocated by intravenous injections of Sodium or Potassium Antimony tartarate. Das (1929) was perhaps the first in the field to report treatment and cure by intravenous injection of Sodium Antimony tartarate. This method of treatment is confirmed by many other workers and is recognised as a standard form of treatment for this disease. Other forms of antimony preparations have also been advocated and considerable success claimed.

Present Sphere of Work

At and around Balimi in Orissa (Dhenkannal district) there are a group of villages where animals are affected by this disease. The plan of work is the establishment of Field Veterinary Centre at Balimi where treatment of Nasal Granuloma cases is undertaken twice a week. Treatment is by means of intravenous injections of sodium Antimony tartarate in distilled water. This form of treatment was adopted as the cheapest and the best.

Method of Injection

The dose is computed on the basis of 1.5 grams of Na. Antimony tartarate for every 100 lbs. of body weight. The injection was prepared in 4% strength in distilled water. For an average adult bullock or cow weighing between 400—500 lbs. the dose injected is as follows :

- 10 c.c. as first injection.
- 15 c.c. as second injection.
- 20 c.c. as third injection.
- 20 c.c. as fourth injection.

The injections were given on Sunday and Wednesday each week. The computation of body weight of an average animal in the area was found to be between 400—500 lbs. It was observed that the above dose of injections made a complete cure in all animals between 400—500 lbs.

NASAL GRANULOMA IN CATTLE-SOME OBSERVATIONS

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body weight. In cases of heavier animals a fifth injection of 20 c. c. as above was required. Animals below 400 but above 200 the injection was given as follows :—

- 1st. injection.....5 c. c.
- 2nd injection.....8 c. c.
- 3rd injection.....10 c. c.
- 4th injection.....10 c. c.

No animals below 200 lbs. weight came in for treatment neither has any such animal has been seen to be affected in this area.

Body weight for the work was calculated on the basis of

$$\frac{\text{Length (in inches)} \times (\text{Girth in inches})^2}{300} = \text{.....Lbs.}$$

Starting from December, 1953 upto date about 400 animals have been treated.

Reaction to the Injection

Out of the 400 animals treated reaction to the injection developed in animals in the fourth injection in the month of March and April, due perhaps to the onset of intense hot summer in these parts. There was no reaction in any animal in any other cold month and no reaction also in the first three injections was noticed. The form of treatment should not be undertaken in summer months from March to July for preference. The best season for treatment is during rains and winter.

Observations on Incidence and Effects of Treatment

In badly affected villages it was observed that only 20-25% of the animals are affected. Some are very badly affected and others less so. The reason why a large majority of animals remain unaffected, while others show severe symptoms remains unknown.

The data obtained in the course of treatment in this particular group of villages is noted below.

Villages	Total No. of animals in the village.	Animals affected with Nasal Granuloma (all treated)	Animals cured in the first course of treatment which did not develop the disease next year.
Balimi	140	40	29
Khandatir	580	142	103
San Hindol	360	30	17
Kumarusinga	490	19	16

It is also an interesting point to note that out of the animals treated during the first year of work nearly 50% of animals developed resistance to the disease during the following year also. This information will be of immense good, not only in the cure of affected animals but also will help in the gradual eradication of the disease from affected areas. Upto now the recognised method of control and eradication has been advocated through control of the intermediate host. This is a very costly process and can only be undertaken by Governments provided they are prepared to spend a huge amount on this score. Even then in Indian conditions this expenditure may not be justifiable in most areas by the value of animals saved. If the induction of resistance can be achieved by continued treatment it may be that by treating affected animals in an area through a number of years the disease from the area may be completely wiped out. This certainly will be an immensely cheaper and much more popular process under the village condition in India.

Observation in this area is being recorded and a few more years of work may give scope for a very definite conclusion.

No occurrence of the disease in goats and buffaloes has been observed in this area although Malkani (1941) and Rao (1932) report the occurrence of the disease in goats and buffaloes.

Acknowledgment

Thanks are due to Mr. G. B. Singh B.A., M.R.C.V.S. Director, Animal Husbandry and Veterinary Services, Orissa and Mr. B. Rath G.B.V.c. Deputy Director, Veterinary Services, Orissa for encouragement and help in taking up the work.

Thanks are due to Sri Bansidhar Sahu, Veterinary Stockman, Balimi, who has helped to get the villagers interested in continued treatment.

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- | | |
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College News

MADHYA PRADESH VETERINARY COLLEGE

List of candidates who have passed the B.V.Sc., Final Year Examination held in May 1955.

S. No.	Name	S. No.	Name
1.	M. A. Haleem	16.	L. N. Dudhe
2.	I. K. Dwivedi	17.	N. K. Dhanorkar
3.	L. L. Tamrakar	18.	M. S. Khan
4.	M. D. Pande	19.	P. G. Supekar
5.	M. C. Khare	20.	P. P. Dabhere
6.	S. M. I. Alvi	21.	P. V. Sulpekar
7.	T. A. Harsulkar	22.	R. P. Awadhiya
8.	A. G. Deshpande	23.	R. K. Khandekar
9.	A. V. Pandit	24.	S. K. Diwan
10.	B. S. Sathe	25.	S. S. Melag
11.	Chhote Khan	26.	S. K. Gupta
12.	D. L. Paikne	27.	S. V. Phadke
13.	D. S. Shivdekar	28.	V. A. Sapre
14.	D. N. Dharmadhikari	29.	V. D. Ghule
15.	G. N. Gore	30.	W. E. Rajhansa

Jabalpur, M.P.)
18-8-1955 }

M. Y. MANGRULKAR,
Principal.

Association News

THE ALL-INDIA VETERINARY ASSOCIATION

Farewell Entertainment to the Retiring Editor.

Dr. Pangal Srinivasa Rao is laying down the Office of the Editor of the *Indian Veterinary Journal*, due to ill-health. The All-India Veterinary Association was 'At-Home' to the retiring Editor on Monday the 5th September 1955 at the Woodlands Hotel, Madras. The Hon'ble Sri A. B. Shetty, Minister for Health, Government of Madras, presided on the occasion. It was a very pleasant function and over 200 guests were present. A group photograph was taken and Tea on a lavish scale was laid on the beautiful lawn in front of the open air theatre. The back ground music was quite entertaining. Tea over, Dr. M. S. Sastry, the President of the All-India Veterinary Association, requested Hon'ble Sri A. B. Shetty to take the Chair and conduct the proceedings.

The Hon'ble Minister reserved his remarks to the end and called upon the following gentlemen to speak :—

Dr. M. S. Sastry, the President of the All-India Veterinary Association welcomed the gathering on behalf of the All-India Veterinary Association and then delivered the following speech :—

Hon'ble Sri Shetty, Ladies and Gentlemen,

We have gathered here to honour an esteemed friend, who retires from the field of Veterinary Journalism in India after 31 years of devoted service to the profession. It is a remarkable record, considered from any point of view. And to those who know the back ground for this Journalistic venture, it is nothing short of a marvel that it should have thrived and thrived so well under most adverse circumstances during the last three decades and over. It is true many were associated with the editing of this *Journal* either overtly or covertly but the brunt of this gigantic task fell on M. Srinivasa Rao and he never groused or grumbled for a moment. But for his ready acceptance to lend his name to be the Editor of the *Journal*, it is a matter for speculation if the profession would have had this *Indian Veterinary Journal* at all. Even after 31 years of its existence, we are finding it difficult to get a suitable and willing worker to step into his shoes. What then was the position in 1924 could well be imagined than described. Further the reception which similar ventures under the auspices of more influential bodies like the Government, etc., has had in those days, was frightful enough for us to rush in where others were afraid to tread. But yet we did it putting our trust in the justice of our cause. And Dr. Srinivasa Rao was the custodian of that trust and how well he has carried that trust to this day, is now a matter of history. In the discharge of his duties, he came in for a good deal of official wrath and uncharitable comments from both within and without the profession but he never wavered from the path of his duty. The history of early days of the *Indian Veterinary Journal* was one of an epic fight with the officialdom to establish the rights of the profession on the one hand and to instil and instil vigorously the duties of the profession on the other. It is all on record for anybody to go through and assess the value of the great services rendered by the retiring Editor through the *Indian Veterinary Journal*. Of late his health has been anything but satisfactory and it is with deep regret the Council of the All-India Veterinary Association decided to accept his resignation.

On behalf of the All-India Veterinary Association, I thank Dr. Pangal Srinivasa Rao for his meritorious service to the profession and wish him the best of luck in his retired life ;

Farewell Party to the Retiring Editor

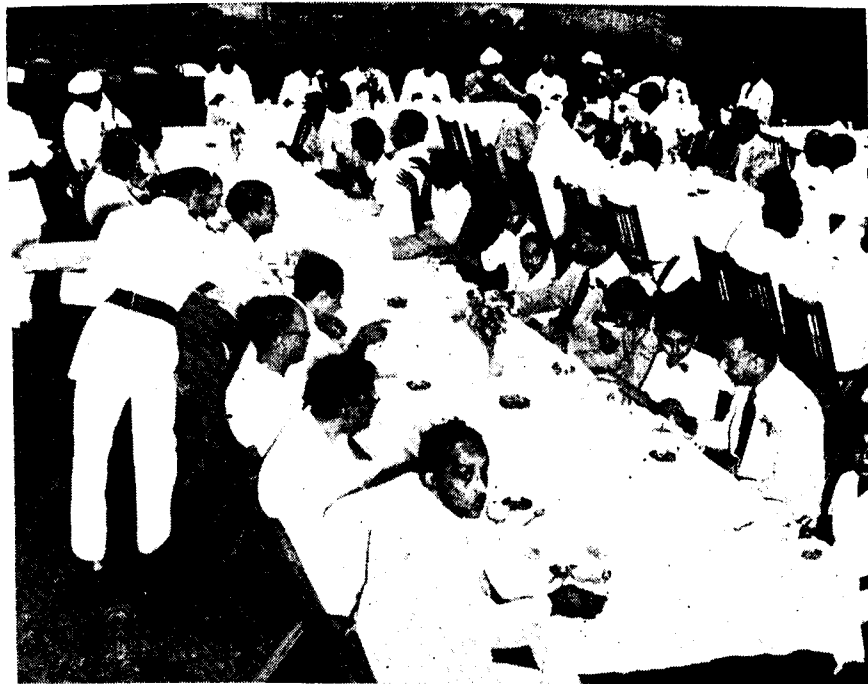


The New Editor, Rao Sahib T. Vinayaka Mudaliar, G.M.V.C., speaking on the occasion.



The Chief Guest at Tea.

Farewell Party to the Retiring Editor



Part of the gathering at Tea.



Part of the gathering at Tea.

Ladies and Gentlemen, a word about the person who has been unanimously elected by the Council of the All-India Veterinary Association to succeed Mr. Srinivasa Rao. He is Rao Sahib T. Vinayaka Mudaliar, a well-known personality in the Veterinary profession and outside. Known for his culture and character, he has been in the forefront of fighting rank for an all-round improvement in the Veterinary profession in India. He is a versatile writer and a person fully equipped for the task of an Editor. In fact, he has been connected with the *Indian Veterinary Journal* from its very inception. No better choice could have been made. But he has been reluctant to leave the salubrious climate of Bangalore and come to Madras. After great persuasion he has accepted this honorary and highly responsible job at this hour of the need of the profession. That is characteristic of the man. The profession is deeply indebted to him and I thank him for the same. I have not the least doubt that the *Journal* is in safe hands and I wish him the best of luck in his new sphere of work.

It is really very kind of the Hon'ble Sri Shetty to have acceded to our request to preside on this occasion. He has known us and this *Journal* for over 30 years now and I thank him for his presence here today.

Next, Sri Bertie D'Souza, Principal, Madras Veterinary College, spoke as follows :—

Hon'ble Sri A. B. Shetty, Ladies and Gentlemen,

Today we have assembled here to bid farewell to our retiring Editor, Dr. Srinivasa Rao. His departure from the scene of Veterinary Journalism brings back to memory many an event in the career of the *I. V. J.* and we cannot think of the *Indian Veterinary Journal* without Dr. Srinivasa Rao. As the previous speaker has said, Dr. Srinivasa Rao has nurtured this *journal*, the only professional *journal* of its kind in India for so many years. This *journal* has championed the cause of the profession very gallantly and always put before the authorities the needs of the profession and the potentialities of the profession for the good of the country. I feel that the entire veterinary profession in India owes a great debt of gratitude to him because the *Indian Veterinary Journal* has always been the champion of the profession and it is responsible to a great extent for the present shape of the veterinary profession all over India.

For years together the *Indian Veterinary Journal* had suggested a better deal for veterinarians so as to attract the right type of men in sufficient numbers to the Veterinary Colleges, but somehow this has not received much attention. But today the authorities are confronted

with the situation of acute shortage of veterinary personnel for the various schemes. As a result, great efforts are made today to turn out more number of graduates, with considerable haste. Dr. Srinivasa Rao has always been of great help to the college with his wise suggestions and co-operation. Gentlemen, I shall not take more time of yours in detailing all the great services rendered by Dr. Srinivasa Rao. Sir, you have played your part well and now you retire. May I wish you the best of health, happiness and peace in your retirement!

Next, Sri Rao Sahib T. Vinayaka Mudaliar, the in-coming Editor delivered an address which is reproduced as a sub-editorial under the heading "Adieu, Dear Friend". Finally he handed over to the Hon'ble Minister a Silver tray to be presented to the retiring Editor on behalf of the All-India Veterinary Association. The tray bore the following inscription:—

The All-India Veterinary Association

presents this memento to

Dr. Pangal Srinivasa Rao, G.M.V.O.

*in grateful appreciation of his invaluable
services as Editor of the Indian Veterinary Journal
from 1924 to 1955.*

Before presenting the Souvenir, the Hon'ble Minister said that he had followed the life and career of Dr. Srinivasa Rao with interest and had always cherished a high regard for him. He was glad to say that the *Journal* had attained "a high rank" among the professional journals of this kind and had a fairly good circulation even in foreign countries. It was the only veterinary journal of its kind in this country. It had helped to raise the standard of veterinary education to the University level and had played an active part in improving the pay and service conditions of the members of the profession. The journal fought valiantly for the transfer of the livestock section from the Agricultural to the Veterinary Department and succeeded. It pleaded vigorously for the opening of a Serum Institute in this State and it is a prospering institution now. Its efforts for the formation of an Indian Veterinary Council and registration of Veterinary Practitioners are nearing fruition.

The Veterinary Department in this State, Mr. Shetty said, had made notable progress. In this land, agriculture was the main occupation of the people and veterinary service must go hand in hand with agricultural work. In the second five years plan several schemes of development pertaining to this department have been formulated.

They would have additional key villages and artificial insemination centres. Control of cattle diseases would be one of the items to be taken up intensively. There was a proposal to start four cattle breeding stations.

It was proposed to increase the number of candidates for admission to the degree course from 80 to 120; to send Veterinarians abroad for foreign training; to establish a cattle colony in Madras; to start a two year training course; and to increase the number of co-operative milk societies.

Concluding, Mr. Shetty said that Dr. Pangal Srinivasa Rao could look back on a life well and usefully lived and he added that he had known Sri Vinayaka Mudaliar also for some time. He is a facile writer and an equally effective speaker, who had spent his life for the betterment of his profession in this country and that he felt the journal would continue to prosper as of old or even better.

Finally he presented the Souvenir to Dr. Pangal Srinivasa Rao on behalf of the All-India Veterinary Association amidst great applause.

Sri H. R. Rangaswamy, Joint Secretary and Treasurer of the Association next read out the list of persons from whom messages were received.

MESSAGES

1. Rao Bahadur V. R. Phadke, *Vice-President, A.I.V.A.*
2. Dr. Laxmi Sahai, *Director, I.V.R.I.*
3. Dr. M.R. Mahajan, *Secy. Rinderpest Control Committee, I.C.A.R.*
4. Dr. D. S. Laud, *President, B.V.M.A., Bombay.*
5. Lt. Col. A. C. Aggarwala, *Bikaner.*
6. Dr. K. S. Nair, *Trichur. (Principal, T. C. College).*
7. Dr. S. V. Mudaliar, *Principal, V. C., Bapatla.*
8. Dr. C. S. Balakrishnan, *Poona.*
9. Dr. C. Seetharaman, *I.V.R.I.*
10. Dr. J. D. Sampath Kumaran, *I.V.R.I.*
11. Dr. P. R. Nilakantan, *I.V.R.I.*
12. Dr. S. Ganapathy Iyer, *I.V.R.I.*
13. Dr. K. R. Alur, *Bombay Vety. College.*
14. Dr. F. S. Khambata, *Principal, Bombay Vety. College.*
15. Dr. D. Pattabiraman, *Dy. Dr. A. H., Madras.*
16. Dr. M. K. Garudachar, *Mandya, Mysore.*
17. Dr. P. Satyendra Rao, *D.V.O., Salem.*
18. Dr. P. Kumaran Nair, *D.V.O., South Kanara.*
19. Dr. M. Umapati Rao, *Retd. D.V.O., Draksharam*

20. Dr. G. Venkatachalam, Hosur.
21. Dr. M. Y. Mangrulkar, M.P. Veterinary College.
22. Dr. G. A. Sastry, Bapatla.
23. Dr. K. S. Shetty, Director, Hyderabad.
24. Dr. S. N. Vaidyanathan, Hosur.
25. Dr. T. Ananthapadmanabhan, Ranipet.
26. Bombay Veterinary Medical Association.
27. Bihar Veterinary Association.
28. Orissa Veterinary Association.
29. A.I.V.A., Hyderabad.
30. Dr. D. Krishnamurthy, V.I.O., U.P., Mathura.
31. Dr. K. V. Divekar, Secretary, B.V.M.A., Poona.
32. Sri M. K. Shetty, I.P.S., Madras.
33. Dr. U. L. Narayan Rao, Madras.
34. Dr. C. Perumal Pillay, Dy. Director, Peradeniya, Ceylon.
35. Dr. M. V. Krishna Rao, Sheep, Goat and Poultry Dev. Officer, Andhra State.
36. Dr. L. S. Parameswara Iyer, Retd., Vety. Surgeon, Madras.

Dr. Pangal Srinivasa Rao who was visibly moved said. "I am deeply touched by all the kind words spoken by the previous speakers. They have been more generous than just. I wish I have deserved what all they have said. I thank them for the same. I take it you have honoured the profession by honouring a humble servant of the profession; and than delivered an address which is reproduced as sub-editorial under the heading "Farewell."

Sri Rao Sahib T. Vinayaka Mudaliar in proposing a vote of thanks said as follows:-

Ladies and Gentlemen, as one who had approached the Hon'ble Sri Shetty to preside on this occasion, I feel I must openly acknowledge the grace with which he readily accepted our invitation in the midst of his highly responsible duties and other pressing engagements. As expressed by the venerable President of our Association, we have known Sri Shetty for over 40 years now. The services he has rendered to our profession are varied and many. He is held in great esteem and regard by the entire profession. I thank him on behalf of the All-India Veterinary Association for presiding over this function today.

I thank you all, Ladies and Gentlemen, for responding to our invitation and thus honouring us with your presence.

Then the National Anthem was struck and the gathering stood to attention and finally dispersed. It was a highly successful function worthy of the great event.

The Association feels deeply grateful to all those who have so liberally subscribed for this function. A statement of receipts and expenditure is given below. The balance of Rs. 87-15-0 is carried over to the I.V.J. funds.

Names of Members who have contributed to the Farewell Function.

1. Dr. V. R. Rajagopalan, Madras	...	50	0	0
2. " C. Krishna Rao, Madras	...	25	0	0
3. " T. Vinayaka Mudaliar, Madras	...	25	0	0
4. " S. V. Mudaliar, Bapatla	...	25	0	0
5. The All-India Veterinary Association, Hyderabad Branch	...	30	0	0
6. The Bihar Veterinary Association	...	25	0	0
7. The Orissa Veterinary Association	...	13	0	0
8. The Bombay Veterinary Medical Association	...	10	0	0
9. Dr. M. Anant Narayan Rao, Madras	...	15	0	0
10. " M. Y. Mangrulkar, Jabalpur	...	15	0	0
11. " Bertie A.D'Souza, Madras	...	10	0	0
12. " D. Pattabhiraman, Madras	...	10	0	0
13. " Lakshmi Sahai, Mukteswar	...	10	0	0
14. " Lt. Col. A. C. Aggarwala, Bikaner	...	10	0	0
15. " C. Seetharaman, Mukteswar	...	10	0	0
16. " J. D. Sampath Kumaran, Izatnagar	...	10	0	0
17. " K. B. Nair, Madras	...	10	8	0
18. " D. S. Laud, Bombay	...	10	0	0
19. " K. S. Nair, Trichur	...	10	0	0
20. " I. D. Mantramurthy, Madras	...	10	0	0
21. " M. C. Chellam, Madras	...	5	0	0
22. " D. Mariappa, Madras	...	5	0	0
23. " K. P. Chandrasekharan Nair, Madras	...	5	0	0
24. " S. Vancheswara Iyer, Ranipet	...	5	0	0
25. " M. N. Menon, Madras	...	5	0	0
26. " M. S. Ganapathy, Madras	...	5	0	0
27. " C. K. Velayudhan Nair, Madras	...	5	0	0
28. " V. S. Alwar, Madras	...	5	0	0
29. " G. Ramanujachari, Madras	...	5	0	0
30. " A. R. Vedanayagam, Madras	...	5	0	0
31. " Basheer Ahmed Shirazi, Madras	...	5	0	0
32. " C. T. V. Tilak, Madras	...	5	0	0
33. " Ganti A. Sastry, Bapatla	...	5	0	0
34. " S. G. Iyer, Mukteswar	...	5	0	0
35. " C. S. Balakrishnan, Poona	...	5	0	0
36. " K. R. Alur, Bombay	...	5	0	0
37. " V. Mahadevan, Madras	...	5	0	0
38. " T. Ananthapadmanabhan, Ranipet	...	5	0	0
39. " M. Umapathi Rao, Draksharama	...	5	0	0
40. " S. N. Vaidyanathan, Hosur	...	5	0	0
41. " P. Satyendra Rao, Salem	...	5	0	0
42. " M. Dharmarajan, Madras	...	5	0	0
43. Sri M. Anantharaman, Madras	...	5	0	0
44. Dr. M. S. Ramanathan, Mannantoddy	...	5	0	0
45. " F. S. Khambata, Bombay	...	5	0	0

46.	„ P. R. Nilakantan, Mukteswar	...	5	0	0
47.	„ P. Kumaran Nair, Mangalore	...	5	0	0
48.	„ M. K. Garudachar, Mandya	...	5	0	0
49.	„ L. S. Parameswara Iyer, Madras	...	5	0	0
50.	„ V. Govindaraja Iyer, Cuddalore	...	5	0	0
51.	„ K. S. Krishnaswamy, Chingleput	...	5	0	0
52.	„ P. Subramanyam, Madras	...	5	0	0
53.	„ G. Venkatachalam, Hosur	...	5	0	0
54.	„ M. S. Sastry, Bangalore	...	5	0	0
55.	„ H. R. Rangaswamy, Bangalore	...	5	0	0
56.	„ E. Thulasiram Singh, Madras	...	5	0	0
57.	„ G. Osman Khan, Madras	...	5	0	0
58.	„ T. Tiruvikrama Rao, Madras	...	4	0	0
59.	„ S. K. Balakrishnan, Madras	...	3	0	0
60.	„ P. S. Krishnamurthy, Madras	...	3	0	0
61.	„ S. Damodaran, Madras	...	3	0	0
62.	„ S. M. Dandapani, Madras	...	3	0	0
63.	„ V. Satchidanandan, Madras	...	3	0	0
64.	„ R. Rangamannar, Madras	...	3	0	0
65.	„ M. Ranganathan, Madras	...	3	0	0
66.	„ Kumari C. M. Lalitha, Madras	...	3	0	0
67.	„ R. Venkatakrishnan, Madras	...	3	0	0
68.	„ C. I. John, Madras	...	3	0	0
69.	„ V. Venkatanarayanan, Madras	...	3	0	0
70.	„ C. Bharadwajan, Madras	...	3	0	0
71.	„ Mahomed Yacoob, Madras	...	3	0	0
72.	„ S. Sowrirajan, Madras	...	3	0	0
73.	„ D. D. Michael, Madras	...	3	0	0
Total ...			570	8	0

Receipts and Expenditure account of the Farewell function.

Receipts.		Expenditure.	
	Rs. A. P.		Rs. A. P.
Total collections.	570 8 0	Tea Party expenses	258 0 0
		Cost of Souvenir Silver Tray.	81 11 3
		•Group and party photos.	55 14 0
		Printing of appeal and invitation.	37 1 3
		Postage.	27 14 6
		Charge for loud speaker and licence fee.	22 0 0
		By Balance.	87 15 0
Total	570 8 0	Total	570 8 0

The balance of Rs. 87-15-0 has been added to the Journal fund.

T. VINAYAKA MUDALIAR,
General Secretary, A. I. V. A.

14th Sept. 1955

THE BOMBAY VETERINARY MEDICAL ASSOCIATION

Proceedings of the 31st Annual Conference held at the Bombay Veterinary College on 11th & 12th June 1955

1st Day, Saturday June '55.

The chief guest Shri B. S. Hiray, Minister of Revenue and Agriculture, Bombay, who inaugurated the Conference punctually arrived at the college, at 4-30. P. M. The college was gaily decorated for the function and the chief guest was in a happy mood and everybody enjoyed the pleasant and informal atmosphere. The members of the Managing Committee were introduced to the chief guest by Rao Bahadur V. R. Phadke, President of the Association Dr. F. S. Khambata, Chairman of the Reception Committee then introduced the members of the Reception Committee to Shri Hiray. A group photograph was then taken of the chief guest with the Reception Committee and the gathering moved to the amphitheatre, which had been specially decorated for the inaugural function.

Dr. Khambata welcomed the gathering and introducing the chief guest, mentioned how Shri Hiray really shone like "Hiray" (Diamonds, in Marathi) since his early days. He had a brilliant academic career and secured a first class in the Law Examination. He was an able organiser and became the President of the Nasik Local Board when quite young. Later he was Parliamentary Secretary in the last Ministry when he was barely 32 years old. He well deserved his present position of Minister and the B.V.M.A. was fortunate in having him as the chief guest on the occasion.

Rao Bahadur V. R. Phadke, the President, then acquainted the chief guest with the activities of the Association, thanked him for all that he had done for the profession and explained the demands of the profession in a frank and forthright speech.

Dr. R. K. Raiker, the Secretary, then read out messages wishing the conference all success. Prominent among those who sent such messages were;—Dr. M. S. Sastry, President, All-India Veterinary Association, Shri Dinkerrao Desai, Minister of Law & Education, Bombay, Shri M. M. Naik-Nimbalkar, Minister for Public Works, Bombay and Dr. J. A. Kerr, Director, Virus Research Lab., Poona.

The chief guest then rose amidst cheers and delivered his speech which was characterised by clarity, gentleness and a sense of understanding and appreciation of the views and activities of the Association and replying the several points raised by the President in his speech.

Dr. S. R. Chadha, Director of Veterinary Services, Bombay, proposing the vote of thanks, specially mentioned the deep interest the chief guest took in the welfare of the profession. He expressed the thanks of the house to him for gracing the function in the midst of his numerous engagements. He duly thanked all those assembled and also all others who had contributed to the success of the function.

The proceedings came to an end with the singing of the National Anthem and the chief guest and the delegates adjourned for light refreshments that were provided. After enjoying the refreshments the gathering dispersed for the day.

The Subjects Committee of the conference later met at the college at 7-30 P.M. in the evening and discussed the papers and resolutions to be placed before the annual conference.

2nd Day, Sunday, 12th June '55.

The 31st Annual Conference of the Bombay Veterinary Medical Association started at 9-30 A.M. at the amphitheatre of the College, under the Chairmanship of the President, Rao Bahadur V. R. Phadke.

Dr. Raiker, the Secretary, read the minutes of the previous annual conference and it was unanimously adopted at the motion of the Chair.

The Secretary then read his annual report and it was unanimously adopted at the motion of the Chair.

He then apologised for his inability to present the Association's accounts as there had been some delay and the accounts had not been audited. He requested to be excused and promised to hand over the audited accounts to the incoming Secretary at an early date. At the instance of the Chair the house unanimously agreed to this, and resolved to consider the accounts of the period just ended, at the next Annual Conference.

The following professional papers were then read and discussed. Many members took part in the discussions.

1. Mortality among buffalo calves. By Drs. Manjrekar, Adkar, Dhake and Khare.
2. Haemorrhagic Septicaemia—some unusual aspects of the disease. By Dr. V. G. Khare.
3. A case of Glosso-pharyngeal paralysis. By Dr. Jyothi.
4. A case of filariasis. By Dr. Halyal.

The House then discussed the following resolutions and after careful consideration unanimously adopted them.

1. Resolved that the B.V.M.A. should arrange to start a Bulletin containing extracts from current professional literature and information about the official and social activities of the members.

Mover, Dr. V. G. Khare. Second, Dr. Bhatawadekar.

2. Resolved to start a co-operative Bank for the benefit of the members of the Association, and appoint a sub-committee of Drs. G. A. Hardikar, K. R. Alur, V. G. Khare and S. R. Nadgil to go into the details and submit a report to the Managing Committee within six months.

Mover, V. G. Khare. Second, R. K. Raiker.

3. Resolved to move the Bombay University to permit the Diploma holders to appear for the B. V.Sc. Degree Examination.

Mover, G. R. Murkibhavi, Second, K. R. Alur.

4. Resolved that in view of the revision of the pay scale of Veterinary Officers i.e. 120—250, the Government be moved to fix the pay of those in the Department as per rules laid down in the Pay Commission's Report for old entrants.

Mover, S. K. Deshpande. Second, V. G. Khare.

5. Resolved to modify Rule No. 54 of the B.V.M.A. thus, "Read 1½ third class (Mail) where Inter class is Mentioned", in view of the recent reclassification of travel on the Railways.

Mover, R. K. Raiker. Second, V. G. Khare.

On the motion of the Chair, the house then unanimously elected the following Office bearers for the ensuing year:—

President:—Dr. D. S. Laud.

Secretaries:—Drs. K. V. Divekar and V. G. Khare.

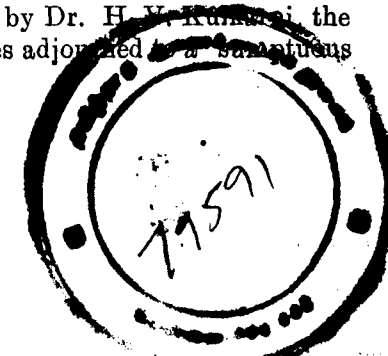
Treasurer:—Dr. S. V. Sakhdeo.

Members:—Drs. S. K. Deshpande; M. N. Mannari; M. Y. Bhatawadekar; Nadgir and Balakrishnan.

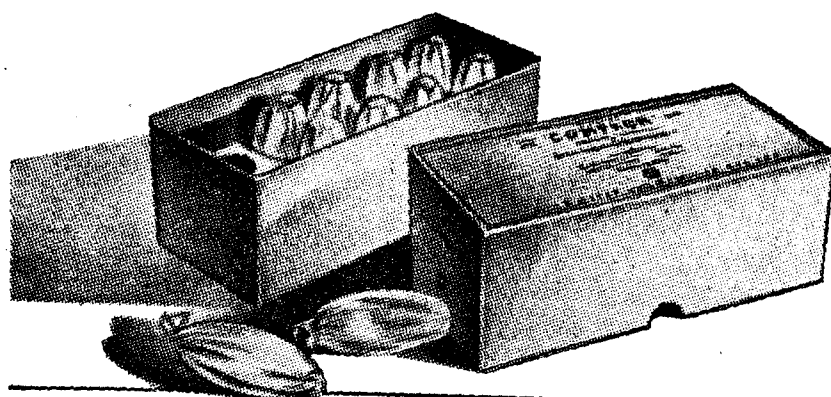
On the motion of the Chair, the appointment of Drs. F. S. Khambata and P. G. Date as Auditors, was unanimously accepted.

With the singing of Vande Mataram by Dr. H. N. Ramani, the proceedings came to a close and the delegates adjourned to a sumptuous lunch that was ready.

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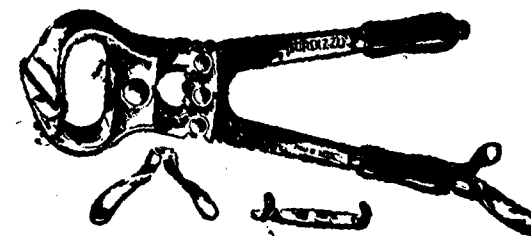
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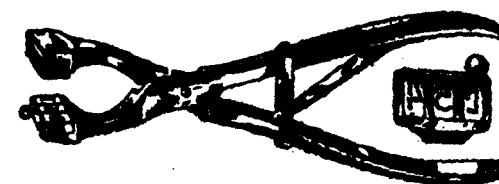
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