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The Indian Veterinary Journal

1926 - July

VOL. 3. NO. 1

THE INDIAN VETERINARY JOURNAL

Vol. III.

EDITOR :
P. SRINIVASA RAO,
G.M.V.C.,
Veterinary Surgeon,
MADRAS.

No. 1.

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RAO SAHIB BABU SARAT CHANDRA PAUL.
Assistant Director, C.V.D., Bengal.

RAO SAHIB M.R.Ry. V. P. SUBRAMANIYA MUDALIYAR AVL., G.B.V.C.

Published Quarterly. **July 1926**

Vol. III. **No. 1.**

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

Editor:

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

Veterinary Surgeon, Madras.

Office: 26, WALLAJAH ROAD, MOUNT ROAD, MADRAS (S. INDIA).

MADRAS
METHODIST PUBLISHING HOUSE
1926

NOTICE

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

Published for the All-India Veterinary Association.

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

Veterinary Surgeon and Proprietor, Dr. Pangal's Veterinary Institute, 26, Wallajah Road, Mount Road, Madras, S. India.

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3. All contributions should be sent to the Editor. Contributors are requested to sign their contributions. All communications must be authenticated by the name and address of the writer, whether intended for publication or not.

4. **Members who do not receive the journal regularly or who find it wrongly addressed are requested to communicate correct address to the Editor at once.**

THE INDIAN VETERINARY JOURNAL

(The Journal of the All-India Veterinary Association)

VOL. III. JULY, 1926. No. 1.

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Indian Veterinary Journal

Vol. 3.] JULY, 1926 [No. 1

Editorials

OUR THIRD YEAR

WITH this number of our Journal we enter into the third year of its existence. We congratulate the profession on the splendid response made to the call of the All-India Veterinary Association. We feel, our anxiety as to the success or otherwise of this new venture in Veterinary Journalism was greatly minimised by the uniform support the Journal has received from the members of the profession. We thank them most heartily, and we beg leave to remind them *there is yet much to be done.*

We are conscious that the Journal is not reaching the home of every veterinarian. If only each subscriber could help us to enlist a new member, the utility of this Journal will be doubly increased. Increased number of articles, wider circulation, wider range of professional subjects and improved stability of the Journal itself, will be the net result of the help we eagerly look forward to from our subscribers in the current year. We are aware that many are diffident to record what appears to them to be too simple a remedy or method to go into print, even though they admit that cases of a particular nature are few and far between. We submit it is not to every body that a particular line of treatment or method will suggest itself on the spur of the moment. No science could have advanced but for the recording of all materials, good, bad and indifferent. Pages of professional histories afford ample proof of the above statement. Failures of many have been the stepping stones of success of a few.

There are other colleagues who dread the wielding of pen, though they are adepts in the wielding of their scalpels or filling up their prescription tickets. To the above class of colleagues we suggest we are here 'in duty-bound' to produce their articles in proper form if they only send us their complete notes.

We are suggesting under our 'notes' the desirability of converting this Journal as a bi-monthly production. We hope the profession will force the hands of the management of this Journal to commit itself to the above proposal by sending in a large number of articles—too large to be met by the present quarterly publications. For ourselves, we will feel it a pleasure to shoulder any increased work in the direction suggested. But we will be no party to any hasty decision unless we feel our ground certain to move in the matter.

We appeal to every member of the profession to help the Journal in all possible ways.

RAO SAHIB BABU SARAT CHANDRA PAUL,

Assistant Director, Civil Veterinary Department, Bengal.

It is indeed a matter of great pride to us to record in this issue the lives of two of our professional colleagues who have received titular honours at the hands of the Government.

Rao Sahib Babu Sarat Ghandra Paul is an Assistant Director of the Civil Veterinary Department, Bengal, and he may well claim to be the "Only survivor amongst those who joined the Veterinary Department in Bengal, Bihar and Orissa on the day of its creation".

His struggles to reach his present eminence provide a study of great perseverance and patience. From the day of his joining the Veterinary Institution in Bengal on 10th January, 1894, he was faced with innumerable difficulties which would have made a less stout heart quail and falter. The profession in those days was very far from being liked. Most of the students selected with Mr. Paul as the first batch of students on the above date, did not turn up for studies with the result that a fresh selection of students had to be done after the summer vacation. Mr. Paul had thus to waste nearly six months with all attendant hardships and expenses. Again for nearly nine months even after passing out of the school he could not secure any appointment, as the Veterinary Department in Bengal was not then properly organised. In December, 1895, he took up a temporary appointment under the District Board of Saran. Soon after, Mr. Paul was placed permanently in charge of the Patna Veterinary Dispensary, a very important institution patronised much by the British officers both Civil and Military and was passing rich on a fat salary of Rs. 40 a month!

When the Bengal Veterinary Institution was raised to the status of a college and the course of studies extended from two to three

years, Mr. Paul undertook to qualify himself for the higher degree at his own cost, and taking leave for one full year on loss of pay, he joined the College in 1900 and took his diploma.

The good reports about the work of this Veterinary Officer were daily accumulating while he was in charge of the Patna Veterinary Hospital. Sir James Bourdillon the then Commissioner of Patna had also spoken favourably on Mr. Paul's services." Fortune after all seemed to have smiled on Mr. Paul on the 8th December, 1902, when he was appointed as the First Veterinary Inspector in the Civil Veterinary Department, Bengal. This was a change from the District Board to the Government. Later he held the responsible office of the Chief Glanders Inspector when he was considered to have acted "with firmness and tact." He also underwent a post graduate training at the Raymond Research Laboratory in Calcutta and thus qualified himself for promotion to the provincial cadre of the Bengal Civil Veterinary Department. He was for a time a lecturer in the Bengal Veterinary College and was appointed a Deputy Superintendent (now Assistant Director) in 1915.

Almost every officer under whom he had to serve had nothing but praise for Mr. Paul's services. "Extremely capable and reliable"; "Active and energetic and deserving of promotion"; "Has contributed largely to the efficient supervision of the department" are some of the opinions recorded in the Annual Reports about Mr. Paul.

Under orders of the Bengal Government, Mr. Paul had translated Col. Walker's work on "Some diseases of cattle in India". He was also responsible for the preparation of a monograph on the breed of cattle of Bengal and for the purchase of a select type of indigenous cows for the Pusa Cattle Breeding Farm in order to improve the cattle of Bengal.

Mr. Paul is now 51 years of age and is eagerly looking forward to the day when he can rest for a while unburdening himself of the present official harness. The current year brought him a New Year gift more valuable than any he had all these years, in the form of 'Rao Sahib' and we congratulate him on the well-deserved honour.

RAO SAHIB M. R. Ry., V. P. SUBRAMANIYA MUDALIYAR, AVERGAL, G.B.V.C.,

Retired Deputy Superintendent, Civil Veterinary Department, Madras.

We are conscious that in trying to record the life of Rao Sahib M. R. Ry. V. P. Subramaniya Mudaliyar Avergal, we have taken upon ourselves the very difficult task of presenting to our readers the life of a gentleman, whose versatile genius, erudite scholarship and spotless character should have made him known to the world much better than is his lot to-day. But the task is not without its pleasant and inspiring side and we most willingly set ourselves to the task.

Born of a rich Vellala family in the district of Tinnevelly, Madras Presidency, on the 14th August, 1857, Mr. Mudaliyar was blessed with all the worldly advantages that wealth could procure and unlike many in similar circumstances it had made him humble and pious, devoted and dutiful, upright and honest and highly cultured and conscientious. He was educated in the Hindu College, Tinnevelly, and subsequently in the Christian College, Madras. Finishing his education in 1879, he joined the old Agricultural College at Saidapet, near Madras, in 1881 and taking his diploma in 1885, he was entertained in the same year as Cattle Disease Inspector. In 1894 he was deputed by the Government of Madras to undergo training in the Bombay Veterinary College and he came out of that College in flying colours in 1895 passing in first class and that first in the Presidency, carrying away three prizes and a medal.

Mr. Mudaliyar's record of work from the very beginning of his service was, to say the least, brilliant. It would be too numerous to mention here all the excellent remarks left on official records by successive heads of departments and civilian officers under whom he had served. "Bears a very high character"; "Most capable and energetic"; "Extremely hard working and trustworthy"; "Cannot speak too highly of his work"; "Zealous and efficient"; "Absolutely honest"; "The success of the inoculation work has been largely due to him"; "He has been responsible for nearly one-half of the total number of cattle inoculated by this Department during the year"; are some of the opinions of persons like Lt. Col. J. Mills, Major J. D. E. Holmes, Lt.- Col. W. D. Gunn and others.

Mr. Mudaliyar rose by degrees from the lowest rung of the official ladder by the sheer force of his merit, with none to back him up excepting his own good work in the field, until in 1911, he was raised as the Deputy Superintendent of the Civil Veterinary Department,

Madras. He held office in that capacity for nearly four years and retired from service on the 14th August, 1915, *i.e.*, exactly on his 59th birthday after an approved service of nearly 30 years under the Government of Madras. Mr. F. Ware, the then Chief Superintendent, Civil Veterinary Department, Madras, wrote in the Administration Report for 1915—16 "The Department and the public generally have suffered a loss through the retirement of M. R. Ry. V. P. Subramaniya Mudaliyar Avergal."

We have narrated till now his official career; but his larger field of work, nay of fame, lay in the domain of Tamil literature. From his very early days he proved to be an ardent admirer of all that is ancient and of exquisite beauty in that language. As age advanced the little spark of love for that language grew into a flame until we find Mr. Mudaliyar in the prime of his life a poet of extraordinary merit blending the richness of thought of the East and of the refreshing delicacy of the West.

We wish we could take our readers through his works to give them a glimpse of that panorama of thought and language that has held many a reader spell-bound. We fear we will be failing in our duty if we do not impress on our readers the eminence of this professional colleague in the poetic world.

Mr. T. Ponnambalam Pillai, Retired Excise Commissioner, Government of Travancore, reviewing "Akalikai Venba" one of the works of Mr. Mudaliyar wrote in the "Justice" of 18th April, 1921, as follows: "The plot of the poem is the well-known story of the seduction of Akalikai by Indra, the king of the celestials. Though it is trite, the way in which the life an shape have been given to it, and the delicate manner in which the tragic end has been contrived, go to show that such a consummation could have been brought about only by a poet of Mr. Subramaniya Mudaliyar's imagination and calibre".

Pandit Maha Mahopadyaya Swaminatha Iyer, an acknowledged celebrity of incomparable talents in the Tamil world, writing on the same book says, "The work reveals various beauties not hitherto found in Tamil literature and will, I believe, establish your fame for all time. I am going through the rare work very slowly. Though the diction is clear, I am tempted to read every stanza at least twice. The stanzas are beautifully formed. They exhibit your literary ability, your erudition, your capacity for literary composition and your innate love for the Tamil language. Though the work is a small one, it will arouse a big stir. The work is the quintessence of beauty. I am sure that those

well read in Tamil will derive from this a pleasure not hitherto expected. My conviction is that such a beautiful poem is rare to come across."

There are nearly a dozen of his works in Tamil, each great in its own way and praised by countless admirers. Even as a Tamil scholar he did not forget the profession he had chosen to serve. In the interest of the Tamil reading public he had issued many a professional pamphlet such as "Preventive inoculation and its uses", "Improvement of the local cattle", "Methods of improving the milch cattle" and at the instance of the Government had translated "Indian stock owner's manual" and "The more deadly forms of cattle diseases in India."

It is no wonder then that such an erudite scholar of Tamil literature did not escape the attention of "Madura Tamil Sangam," an academy of very great antiquity and of greater repute. He was an examiner of their Literary Board for a number of years. Not content with all these manifold activities, he waited for an opportunity to serve the public on a greater scale. Soon after retirement he identified himself with all institutions of Local Self-Government and was a member, Vice-President and President respectively of the Taluk Board of Tinnevelly. He was also on the District Board and on the District Educational Council. We believe even now he is the President of the Bench Court of Tenkasi in the District of Tinnevelly.

The profession was not slow to do him the honour that lay in its power. He was the first elected President of the Madras Veterinary Graduates' Conference held in 1921, when he gave utterance to thoughtful address full of sound advice to the profession and indicating the lines on which progress should proceed.

For all these benefactions of service extending over four decades, Mr. Mudaliyar was honoured by the Government with the title of Rao Sahib on the last New Year day. It had come late to him and is certainly much less than his deserts, but is none the less welcome. We thank the Government for this belated recognition of an individual who had laboured hard in a profession which does not usually receive the recognition it deserves. We congratulate Mr. V. P. S. (to use the familiar and endearing initials by which he is popularly known amongst his professional colleagues) on the well-merited honour conferred on him by the Government which he had served so loyally and so long. We wish him many more years of full enjoyment of health in his palatial residence at Vellakal and earnestly hope that greater honours await him at the hands of the Government.

Notes

We are sorry we are forced to withhold many good articles from publication in this issue due to pressure of space. We request the contributors to excuse us for the little delay involved in publishing their articles.

We hope the A. I. V. A. will consider the desirability of running this Journal as a bi-monthly one or of increasing the size of each volume.

The office of the Journal has been transferred from No. 18 to No. 26 Wallaja Road, Mound Road, Madras and all communications are to be sent in future to the new address.

General Articles.

A reply to the Rejoinder of Mr. M. Anant Narayan Rao to the criticisms on his paper on

HÆMOGREGARINA CANIS.

By L. S. PARAMESWARA AYYAR, G.M.V.C.,
Senior Laboratory Assistant, Madras Veterinary College.

Mr. M. A. Rao, in his rejoinder to my criticisms, has not only made an attack on me for my gentle reminder to him that he has overstepped the boundary of established truths regarding the bionomics of the tick Rhipecephalus sanguineus and that the period of sporogony mentioned in his paper varies very much from the findings of Christophers, but also has gone out of the way in having misstated my view on

his paper on " Cercariæ," quite unconnected with the paper under discussion. He also remarks in the course of the article, " One gentleman remarked to him that a critic must be more generous in his criticism over a paper which is a practical one than to base his theories on second hand information." One fails to see the relevency of the remark in this connection. Can it by any means be argued that my criticism was unfair or conceived in a spirit of carping or asperity? I request every one of the readers of this Journal to kindly go over my criticisms once again, if necessary, and say if I had been ungenerous anywhere. Now, since Mr. Rao persists in maintaining his position I think I must further elucidate his methods. In this paper I propose to examine in some detail his recent observations on the sporogony of this parasite and also deal shortly with his reply to my criticism.

From a perusal of his discussion on the nomenclature of the parasite it would appear as if Mr. Rao is not quite conversant with the rules of nomenclature, adopted by the International Zoological Congress. So I am giving below a snmmary of the same as far as they are necessary for the discussion :—

1. A species should be named by two Latin names of which the first denotes the generic name and this should be commenced with a capital letter and the second denotes the specific name and this should be commenced with a small letter. After the name of the species is placed the name of the author and the year in which it was described.

2. Some species have been given different names in different countries at various times. Starting from Limeus (1758) the correct name is the oldest one and all others are synonyms.

3. Specific names will not change but generic names may be changed—for want of proper description the species may be wrongly placed under a genus—but when the correct description is available they may have to be placed under the correct genus.

4. If a new generic name is created for a species and later it is found that it has been applied to another group with which the author was not conversant it falls and a new one has to be given the specific name, the author's title and date in parenthesis however remain.

Coming to the nomenclature of the parasite under discussion since Mr. Rao has asked me to produce authorities I shall discuss them in brief. It is no doubt that this was the first mammalian hæmogregarine observed in the leucocytes. Bentley noted this parasite first and James described the same in 1905 and named it " Leucocytozoon canis " since

he thought, as has been quoted by Mr. Rao himself, that there was justification for creating a genus with this as its type species and added, " Until further research shall have revealed its exact zoological position the name ' Leucocytozoon canis' appears to be an appropriate one for further references." Unfortunately the name of the genus Leucocytozoon is not a new one because the same has been already applied to a group of protozoon parasites in birds by Ziemann in 1898. This genus is related to Hæmamœbidæ and not at all to Hæmogregarinidæ. Thus the genus Leucocytozoon is not appropriate to this parasite.

In 1908 Miller described the full life history of a protozoon parasite in the leucocytes of rats and finding that the parasite not only differs in its habitat but also in its cyclical development from the known hæmogregarines suggested the name Hepatozoon perniciosm. Thus the genus Hepatozoon was formed by Miller in 1908 with Hepatozoon perniciosm as its type species. This paper has been admitted to be best for the purpose of classifying the Hæmogregarines. One fails to understand what Mr. Rao means by saying that Miller did not suggest that Hepatozoon should be the generic name. If he means to say that he did not suggest this name for the parasite under discussion I have to tell my friend that it is not necessary that Miller should suggest but it is the business of Parasitologists to place or not other parasites under the genus after knowing the habits and cyclical development of each of them.

Again according to the rules of priority the specific name " perniciosm " had to be dropped since the same parasite was already found and named by Balfour in 1906 as " Hæmogregarina muris." As Miller's species is only the same as that of Balfour, Hepatozoon perniciosm Miller, 1908 is the synonymn for Hæmogregarina muris Balfour, 1906, since renamed as Hepatozoon muris (Balfour 1906) after its life history had become known.

Mr. Rao says, " Therefore Leucocytozoon canis was the type species." A type species is one on whose basic description a genus is created. What is the name of the genus that was created on the basic description of the parasite under discussion? If he means " Leucocytozoon " it has been already pointed out that there is no place for it.

In 1909 Porter, realising that the generic name " Leucocytozoon " was inappropriate, suggested the name of " Leucocytogregarina " for the hæmogregarines found in the leucocytes of mammals. Wenyon in 1910 rightly pointed out that the generic name Hepatozoon of Miller should have priority. Porter in her reply to Wenyon not only says

that " Hepatozoon is a monotypic genus and does not suit as a generic name " as has been quoted by Mr. Rao but also suggests that her name " Leucocytogregarina " should stand. To maintain her generic name she even goes to the length of suggesting that the rule of priority should be ignored. Thus she also finds the necessity for a new generic name. Now from our knowledge of the parasite it may be said that it is allied to Hepatozoon muris, not only in its habitat but also in the developmental stages both sexual and asexual.

Wenyon in 1911 has also pointed out that the course of development of hæmogregarines of dogs, as far as it is complete, agrees in almost every detail with that of Miller for the similar parasite of the rat.

Christophers in 1912 says that the actual cycle described by Wenyon is correct and corresponds with that described by Miller for Hepatozoon perniciosm in the mite.

It is also evident from Mr. Rao's quotation of Minchin that Hepatozoon should be preferred.

Castellani and Chalmers (1919) in the classification of hæmogregarines have stated that some authors choose to adopt the generic name Hepatozoon Miller, 1908 with Hepatozoon muris as its type species.

Franca in 1917 has adopted the genus Hepatozoon in his classification of Hæmosporidia and also stated that Hepatozoon canis is the most important species under the genus.

Wenyon in 1923, in reviewing a book on " Pathogenic protozoon of Man and Animals " by Sangiorgi says, " Furthermore it may be pointed out that Hepatozoon, not Leucocytogregarina is the correct generic name for Mammalian hæmogregarines. "

Loa of the London School of Tropical Medicine in his classification of the Protozoa in 1923 has adopted the genus Hepatozoon and this parasite is placed under it.

Fantham in his book on " Animal Parasites of man ", 1916 writes that the Hæmogregarines occurring in the white cells (mono-nuclears or Polynuclears) of mammals have been referred to a separate genus Leucocytogregarina (Porter) or Hepatozoon (Miller). Such hæmogregarines are known in the dog, rat, etc. Schizogony occurs in the internal organs such as liver, lung and bone-marrow of hosts. They are apparently transmitted by ectoparasitic arthropods such as ticks, mites and lice."

Thus it will be seen that the discussion has been centered on the adoptibility of the generic names " Hepatozoon " or " Leucocytogregarina " and nowhere has it been stated that the generic name hæmogregarina should be preferred even to the generic name of " Leucocytozoon " provisionally adopted by James, the original finder.

Mr. Rao says that the life history of some more such parasite should be worked out before the correct zoological status of this parasite is established. Till now the life histories of two parasites in the leucocytes of rats have been fully worked out—Hepatozoon muris (Balfour, 1906) and Leucocytogregarina innoxia Kobayshi, Kusama and Kasai, 1920 which also should be named only as Hepatozoon innoxia according to the rules of priority. Also the life history of the parasite under reference is almost complete. We also know the life cycle of Haemogregarina stephanouvi and Haemogregarina nicoriae of tortoises. Stephens and Christophers in their book on " The practical study of Malaria and other blood parasites " have stated that H. stephanouvi could be taken as the type species of the genus Hæmogregarina. In these parasites gametocytes are seen in red corpuscles and not in leucocytes and Schizogony is also seen in the red corpuscles like Malarial parasites. Further in the case of sexual development of these parasites in the intermediate hosts only eight sporozoites are seen to occur in each sporocyst, whereas 16 sporozoites are seen in each sporocyst in the case of Hepatozoon muris and the haemogregarina of the dog. Therefore it may be said that there is enough material for making a classification of hæmogregarines and further it may also be said that the classification is not based merely on habitat of the parasite as is presumed by Mr. Rao, in spite of my references to the same in my criticism. Therefore it is my contention that the name of the parasite under discussion should be Hepatozoon canis (Bentley and James 1906).

Regarding my expressed desire to see the free vermicules in the blood smears and Mr. Rao's remarks thereon that if I had been in earnest I could have seen them which were placed under the microscopes on the day, I must state here that I did see through the microscopes on that day but did not see the free vermicules under any of the two microscopes.

As regards the time taken for sporogony in Rhipecephalus sanguineus, if one goes through the paper of Christophers, so freely referred to by Mr. Rao and then turns to Mr. Rao's paper one would find that

the development in the case of Mr. Rao's findings is curtailed to less than one-third of the time recorded by Christophers in his original paper and to nearly one-seventh of the time subsequently recorded by Chrisophers from his further work; and yet Mr. Rao had no word of explanation to offer in his original paper on this until his attention was invited by me to this difference. Now he says that it may differ from the findings of Christophers and this he attributes to the climatic condition, chiefly thermal, existing then and adds, "More is the reason, therefore, that one should honestly work it out for himself instead of basing his criticisms on second-hand knowledge." No doubt I have based my criticisms on the findings of eminent authors (Christophers, Wenyon, and others) and I am not ashamed to quote them.

The author says that the only paper on sporogony of this parasite is that of Christophers and yet in his anxiety to get himself recognised as the first man to complete the life history of this parasite, he has ignored the findings of Christophers and has failed to record and discuss the difference in his original paper. In fact he has suppressed the findings of Christophers. Is it fair to have done so? Is one to be called ungenerous in criticism for having simply invited attention to this difference? Rather more is the reason that one who is anxious to be recognised as an original worker should accept freely the merits and demerits, success and failures and should not wantonly ignore the findings of other workers.

Again anyone who knows Madras and Guindy—(Christophers made his research in the latter place)—will know exactly whether there could be any appreciable climatic change between these two places and even then whether it would be sufficient for showing such a great difference in the developmental period of the parasite in the ticks.

Regarding the actual transmission of the disease with the emulsion of ticks removed from an infected dog, Mr. Rao did not inform us in his original paper of the state of the ticks used for emulsion nor did he then or even in his rejoinder speak to his having kept the ticks for sometime for the sporogony to be completed. According to Christophers sporogony could not have been completed in the ticks just removed from the body if these had been fed on infected dogs as adults. So the emulsion made by Mr. Rao could not have contained sporozoites. Thus successful transmission of the disease with this emulsion should either be considered as "Mechanical transmission" or the animal's infection should be attributed to something else. I have stated in my criticism that Mechanical transmission is opposed to the

findings of the authorities and also to those of Mr. Rao because Mr. Rao has stated that the blood drawn from an infected animal, if injected into a healthy animal, does not produce the disease and the same has been proved by Christophers and similar negative transmission has also been proved by Miller in the case of Hepatozoon muris and by Kusama and others in the case of Hepatozoon innoxia. It is really strange that Mr. Rao should have become annoyed at my having spoken of "Authorities" in this connection. I might point out here that Wenyon has not only recorded schizogony in spleen but also had observed the development of the parasite in the tick Rhipecephalus sanguineus. In fact it was he that first recorded the large oocyst, as in Hepatozoon muris, outside the gut wall embedded in the surrounding tissues and described the cyst to have 30 to 50 sporocysts, each sporocyst, containing 16 sporozoites. But he studied the development only in naturally infected ticks. He also remarked that by making smears it is impossible to avoid breaking of the large oocyst, and scattering the sporozoites and in this way Christophers appears to have described the sporocysts as oocysts and probably overlooked the occysts.

Christophers admitted his error and added, "The error was not merely that of missing the large oocysts, since described by Wenyon. Just as I believe Wenyon has done, I here short circuited the developmental cycle by describing stages which were not the result of development of parasites taken in by the adult tick at all but were the last stages of development undergone by a previous brood of parasites taken in by the tick in the nymphal stage." From his further work he comes to the conclusion that the large cysts in adults that have sucked infected blood do not show complete development, even when the tick becomes completely shrivelled, but when a tick was fed as nymph upon an infected dog the large cysts were already well advanced in development by the time the adult has hatched out from the pupa-like nymphal resting stage and during the engorgement of the adult the large cysts develop rapidly and become mature.

Mr. Rao comes forward with the story that he studied the development of the parasites in *home-bred ticks* by feeding them on infected dogs and has come to the conclusion that it takes only 3 days for the sporogony to be completed. In his description of the development in ticks he is not able to distinguish between an oocyst and sporocyst and in fact he has omitted to note the large oocyst because he says each nuclear bit found in the oocyst—of Mr. Rao—becomes the

nucleus of the sporozoite. What a short circuited life history when compared with the findings of Christophers! Again Mr. Rao has not given any data as to when he bred the ticks, how they were bred and how he kept the strain of the parasite till he was able to get at the adult home-bred ticks. In this connection it may be said that the tick Riphecephalus sanguineus is a 3 host tick and it takes nearly 2½ months as noted below according to Christophers for the cycle to be completed:—

Eggs to larvæ off the host	....	....	....	30 days.
Larvae on the host	....	....	....	3 ,,
Larvae to nymph off the host	....	....	....	9 ,,
Nymph on host	....	....	....	5 ,,
Nymphs to adult off the host	....	....	....	15 ,,
Adults on the host	....	....	....	3 to 4 days.
Ovipositio	....	....	....	3 to 8 days.

Now Mr. Rao says in his rejoinder that he injected the emulsion only after satisfying himself that it contained sporozoites and he also adds that sporozoites can invariably be seen in ticks which had remained on an infected host for some days. Even according to the rapid developmental story of Mr. Rao (3 days to complete the development in ticks) the emulsion of tick could not have contained sufficient sporozoites, even though the ticks fed as adults were examined when they are fully engorged, for it takes nearly 3 or 4 days for the tick to suck blood but most of the blood is taken in the last 24 hours. So only the parasites, if any, contained in the very minute quantity of blood drawn in the first few hours might develop into sporozoites. So one cannot resist the conclusion that Mr. Rao must have mistaken the free vermicules from the infected leucocytes of blood drawn by the tick in the last 24 hours for sporozoites and the transmission of the disease with the emulsion of ticks fed as adults on infected dogs, in the circumstance, is therefore very doubtful.

Coming to the actual transmission of the disease from an infected host to a clean host Mr. Rao, who says that he has studied more of the bionomics of the ticks, has made the tick Riphecephalus sanguineus to change the host in its adult stage by making it fall down by extraneous force and climb other dogs for completing its feed—a feat opposed to nature—to make his research a success. Thus one would see that the tick Riphecephalus sanguineus has been converted into a 4 host tick—such an one having been never heard of.

Ticks have four stages, eggs, larvæ, nymph and adults and of these the last 3 stages are spent on the host. Theiler has classified them as a single host, 2 host, and 3 host ticks according as whether all the 3 stages are spent on one or two or three hosts. It has been already said that the tick Riphecephalus sanguineus is a 3 host tick. Further a tick at any stage of its development sticks on to one individual host and as such a tick feeding at a given stage of existence on an infected host has no scope for passing on the infection until the next stage of development or in the next generation.

Mr. Rao defines an interrupted feeder as one that may change its host any number of times and get eaten up in the end. He also, in quoting from my criticism that it is quite opposed to nature to find half engorged ticks to bite and that it is a known fact that engorged ticks do not bite again, says, "Therefore, according to him a tick is not an interrupted feeder. So it cannot change a host and cannot be eaten by other dogs." It is not known what Mr. Rao really means by this.

Certainly the tick Riphecephalus sanguineus is not an interrupted feeder in the sense of Mr. Rao's definition. What is generally meant to be an interrupted feeder is one that may have one or more breaks in its feed during its lifetime. Ticks are classed as continuous feeders when all the 3 stages are spent on only one host and as interrupted feeders when all the 3 stages are spent on *2* or 3 hosts.

I have stated that in the case of half-engorged ticks if, according to Mr. Rao, they are made to fall by extraneous force several will lose their piercing apparatus and would therefore be unfit for feeding again. In support of the same I am quoting the following from Christophers' Memoirs on the Anatomy and histology of ticks, "If an attempt be made to remove a tick at this state, considerable force is necessary and the mouth parts are practically torn from their situation in the tissues." Because I have said that several will lose the mouth parts he concludes that I admit that there are still some whose mouth parts are intact and adds that they might carry the infection. My object was merely to demonstrate the impossibility and impracticability of making the half-engorged ticks removed by force, feed again.

It has been already pointed out that the ticks draw greater portion of the blood during the last 24 hours and the ticks removed some days prior to full engorgement would have sucked only a very minute quantity of blood. Even of these, only in a small percentage can infection and development of the parasite take place, as has been the

case in the development of similar protozoon parasites in arthropods. Yet with these disabled and doubtfully infected ticks Mr. Rao says that he has successfully infected 2 pups without any failure.

I have quoted Christophers to the effect that by the ingestion of shrivelled ticks the disease is likely to spread and added that the ingestion theory seems very probable on account of the dogs often eating ticks and other insects and on account of the positive transmission experiments by ingestion in the case of Hepatozoon muris and Hepatozoon innoxia. Wenyon has also said that it is possible that in the dog also infection takes place in a manner similar to Hepatozoon muris through the intestinal wall by the dog eating infected ticks. Christophers in 1912 writes, "In my first note I suggested that infection might take place by the dog swallowing the gorged adult ticks and Miller has actually produced infection by feeding white rats on infected mites. Unfortunately such an experiment has not yet been carried in the case of Leucocytozoon canis." It is strange that Mr. Rao should have brushed aside the suggestion of these authorities in his original paper, but when he was reminded about it he should surprise us by saying that he tried the ingestion method also but failed in transmitting the disease. In this connection if I were to ask him to give data regarding the experiment, *i.e.*, about the number of dogs used, stage of ticks used, number of the same used, period of observation, etc., I anticipate he will refer me to his rejoinder, "a scientific fact whether it was discovered in Greenland or in Tasmania must always be the same irrespective of the place and conditions, etc." Though he says that the place, conditions, etc., are immaterial, yet as has been already pointed out, he has given great variations in the development of the parasites in Guindy and Madras which are situated almost on the same plane within 6 miles of each other. Mr. Rao in his original paper has stated that he utilised 3 dogs and 3 pups for his experimental purposes. Of these he has used 2 for the inoculation of tick emulsion, and 2 for transmitting the disease by making the half-engorged infected ticks to bite. He has not said anything about the remaining 2 dogs. But it can be presumed from the paper that he should have utilised, one for inoculating with infected blood to prove the impossibility of mechanical transmission and the other for injecting the blood, drawn from the spleen of an infected dog to prove that it could be given a light infection. So it is not known which dog was used for the ingestion experiment, which he now says that he tried and found unsuccessful. Thus one cannot but come to the conclusion that adequate

experiments for disproving the theory of ingestion have not been made. Therefore the question of how the dogs would get at the engorged ticks does not arise. But since he invites a discussion on the matter I feel bound to reply to him. The ticks need not change the host in their adult stages for the dogs to get at the engorged or shrivelled ticks as suggested by Mr. Rao. It is only for proving his transmission theory that Mr. Rao has made the tick to change the host in its adult stage.

Again Mr. Rao says that it is impossible for the dogs to find shrivelled ticks since the ticks would ascend to a height of 15 feet or more in search of suitable places for laying eggs, and ingeniously suggests that it must be a clever dog, indeed, with its filthy habits to hunt up and eat these ticks high up in crevices of any post, pillar or wall, just to infect itself. As regards this contention I shall put this to the author whether the ticks require crevices or a certain height to lay their eggs. They only require crevices. If they find them near the base of the wall or even on the floor certainly they will lay eggs and shrivelled eggs can therefore be found there. The Bionomics of ticks have been studied in enclosed walls or cages wherein certainly there would not have been opportunity for many crevices near the floor so they might have been forced to go up the wall in search of suitable places for laying eggs. Are all the dogs housed? What about the Pariah dogs? We see them lying anywhere and everywhere in the middle of a road, field, garden, etc. What would be the fate of ticks that fall engorged in these places? Do they go in search of walls or pillars for laying eggs? Certainly they will make the best of the situation and lay eggs in the crevices in the floor or those made by grass, etc., and in fact the engorged and shrivelled ticks have been observed in these places. In this connection I would ask the author to remember the common experiment in the breeding of ticks. The engorged tick, placed in ordinary tubes or dishes, lay eggs and the eggs are also seen to hatch in the same. Ticks have also been received from the moffusil in bottles and tubes wherein eggs are found in the bottom and sides of the bottles and tubes. So it does not mean that the ticks will lay eggs only in crevices of walls, etc., in a height of 15 feet or more but do so in the crevices on the floor or even without that, when none is available as we see in the breeding experiments.

Therefore the dogs need not be very clever ones to hunt up and eat the ticks high up in the crevices of post, pillar, wall, etc. Further we see

this parasite infecting only Pariah dogs which lie anywhere and every where and which have therefore chances of picking up engorged and shrivelled ticks from the floor, grass, etc. on account of their filthy habits.

Yet there is another and more possible way in which the dogs can get at the engorged ticks.

We often see the dogs bite and swallow the engored ticks whilst gnawing at their coat and it is in this way infection is possible since these ticks, if they had been fed as nymphs on infected dogs, would have mature oocysts in them by the time they are fully engorged.

Mr. Rao states in his rejoinder that he worked till the end of June in the Madras Veterinary College and afterwards began to work in his own humble house. It is not apparent why he chose his house in the middle of his researches leaving the advantages of a well-equipped laboratory and a dog ward attached to the Madras Veterinary College. It is not known how he carried the strain from the dog ward to his own house. On the whole it cannot but be once again pointed out that the whole paper is wanting in definite data. Under the circumstances one cannot but repeat that Mr. Rao's story of development in the ticks and his transmission theory should be accepted with greatest reserve and caution.

Mr. Rao in the concluding portion of his rejoinder has stated that I remarked on the day on which he read his paper on cercariae in 1923, that it was no use making the Veterinarians Biologists, etc. It is really strange that Mr. Rao should have taken this opportunity of misstating my views. Evidently Mr. Rao was anxious to impress upon the readers of this Journal that he has done some work on cercariae also just as he has compared and contrasted a protozoon parasite (H. canis) with a metazoon parasite (F. recondita) in his original paper. On that day he made us understand that all the 9 snails that were bred in the laboratory with difficulty, when put in along with plenty of miracida, hatched out of Paramphistomes died in two to twenty days due to very heavy infection, even without having examined a single snail after death, especially when almost all the snails had been dying a natural death on account of captivity and added that he had no time to cut serial sections of these (dead snails) for examination and that he had them with him embedded in paraffin and this part of the work would soon be done. It may be said in this connection that one can know the presence or absence of the larval stages of these flukes by

simply pressing the liver and lungs of the snails between two slides and examining the same under a microscope.

Yet one more instance and I have finished. Mr. Rao in his lecture on "Hook-worm disease" on 29-12-21, published along with the proceedings of the "Annual general meeting of the Veterinary Graduates' Association, Vellore, held on 29-12-21" has commenced by saying, "Each man has a fad and sticks to it. So I have one and that it is to try and learn all about hook-worms in dogs. . . . I have had the benefit of attending a lecture on hook-worm in man and also of seeing an interesting cinema film pertaining to the life history of this parasite and its mode of infection, etc. I was very much impressed by it and began to think that we Veterinarians should try more to imitate the human doctors by adopting their modes of treatment, etc."

Then he told, "I had the impulse to see if I could find any larvae of hook-worms in the dog-ward compound. I started collecting dew from various places in the compound and examining it under a microscope but I failed to see any. A dog, whose fæces were very rich in ova, was made to defecate on grass in a shady corner and everyday the dew from that place was examined but no larvae could be discovered. *From this I learnt that in Madras the sun is too hot and larvae cannot develop in the dew in the open. This experiment was carried on during the latter part of November and early in December* 1921. Then I started examining the washings from the floor of the ward. For over a fortnight I examined the water from different places in the ward but failed to see any larvae. The floors are disinfected with cresol lotion every day. So I concluded that the chance of a dog getting infected in the ward was remote. I fed an experimental dog with plenty of ova. This dog of course was free from ova in its fæces. The dog did not get the disease. The fæces of the dog was examined at intervals of 3 days for more than a month but no ova of ankylostomes could be detected."

Then he said he tried to hatch larvæ from the eggs by keeping the latter in a hang drop culture in a thermostat but failed. Finally he told us that he succeeded in hatching the larvæ in 12 hours when the fæces were mixed with bone-black and when he fed a dog with larvæ, the dog within a fortnight from that date started getting fits, etc., and died and that more than 150 mature worms were recovered from the intestines of this dog in the post-mortem examination.

Comment on this is needless. The readers who have learnt the life history of the parasite practically or from other authors will

realise that the whole manner of experiment has been thoroughly misconceived.

Finally I crave the indulgence of the readers of this journal for a rather long digression, but may I also say that it was practically forced upon me by the wholly unnecessary reference to cercariæ ?

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FIFTEEN POINTS OF A GOOD HORSE.

(As advanced by Wynkyn de Worde—Second Printer in 1496.)

"A good horse sholde have three propyrtees of a man, three of a woman, three of a foxe, three of a haare, and three of an asse. Of a man, bolde, prowde and hardy. Of a woman, fayre-breasted, fair of heere, and easy to move. Of a foxe, a fair taylle, short eers, with a good trotte. Of a haare, a grate eye, a dry head, and well rennynge. Of an asse, a bygge chynn, a flat legge, and a good hoof."

VETERINARY JOURNALISM.

(A composition on the art of writing professional papers.)

By R. N. NAIK, G.B.V.C.,

Veterinary Assistant Surgeon, Kumta, Bombay Presidency.

(*Continued from page* 150, *Vol. II.*)

The Construction.—Writing professional papers is no mean art. Modern usage in the use of words and phrases, construction of sentences and paragraphs and the style suited to the subject are all to be considered in the plane of constructing a paper. Besides, the writers should follow the few practical hints given below.

Italics.—The following should be written in italics.

(*a*) Foreign words.
(*b*) Scientific names of *genera* and *species* when used together *e.g.*, *B. necrophorus*, *Trypanosoma evansi.*
(*c*) Inserted sub-heads in papers.
(*d*) Symbols (*a*), (*b*), (*c*) and so forth used to indicate subdivisions when beginning a paragraph.

(*e*) The titles of books and articles quoted in regular matter and unquoted in *footnotes*.

(*f*) Letters of the alphabet when referred to singly *e.g.*, the letter *s*.

Note—Quotation marks are not used with an italicized word. Certain names of *genera* when standing alone are naturalised as common nouns and these should be written in Roman *e.g.* Bacillus, Streptococcus, Ankylostoma, Spirochaetae, etc.

Spell out.—The following words should be written in letters.

(*a*) All numbers at the beginning of sentences.

e.g. Seventeen hundred and fifty-five head of cattle died of anthrax.

(*b*) All numbers consisting of less than three digits except those denoting respiration, pulse, temperature, specific gravity, weight, length, area, capacity, degree, percentage and ratio, etc.

e.g. He examined twenty cows. He prescribed 20 grains.

(*c*) All fractions except decimals.

e.g. Two pounds and a half. 2.50 inches.

(*d*) Length of time.

e.g. Fifteen months. Ten days. Twenty minutes.

(*e*) Months except when necessary in tabulated matter.

e.g. January 1, 1926.

(*f*) Centuries.

e.g. Nineteenth century.

(*g*) Dosages in ordinary matter.

e.g. 4 grains, three times a day, and not grs. IV, t. i. d.

(*h*) Write in full as 4 by 8 inches and not 4 × 5 × 8 in.

(*i*) Do not use ditto marks. Spell out ditto.

Footnotes.—Superior figures 1, 2, 3, 4, and so forth and symbols *, †, ‡, §, ||, ¶, are used to denote footnotes. It is preferable to use the former as they can be extended indefinitely. The figures are also used to denote references in the bibliography. When symbols are used they are placed in the order given above.

Tables, Charts, Diagrams, and Photos.—They should, as far as possible, be so arranged that printers should find them easy to fit them to the size of the page of the journal. They must bear descriptive heading. When they are more than one they must be serially numbered. When necessary abbreviate statistical data in charts and tables. On the photos description should be written on the back of them.

Divisions and sub-divisions.

(*a*) The capital letters A, B, C, and so forth will mark the main divisions of the subject.

(*b*) The Roman numerals I, II, III, and so forth will mark the sub-divisions of A, B, C, and so forth.

(*c*) The Arabic figures 1, 2, 3, and so on will mark the sub-divisions of I, II, III, and so on.

(*d*) The italic lower case letters, a, b, c, and so on will mark the sub-divisions of 1, 2, 3, and so on.

The Manuscript.—For the convenience of printers all literary works are written according to certain rules and formulae which are as follows :—

1. The manuscript should be typewritten or written by hand legibly on one side of a good white foolscap paper.
2. A margin from one and a half to two inches should be left on the left side of the page.
3. The number of the page should be written in the upper right corner of the sheet, and consecutive paging should be maintained throughout.
4. Headings should be placed in the order of their respective importance.

(*a*) Main headings are written in large capitals.

(*b*) Centre headings are written in small capitals.

(*c*) Subordinate or side headings are written in bold face type or italics.

5. Indications of the type should be done as follows on the manuscript :—

(*a*) Draw three lines ≡ to indicate large capitals. *e.g.* CAPITAL.

(*b*) Draw two lines = to indicate small capitals. *e.g.* CAPITAL.

(*c*) Draw a wavy line ~~~ to indicate bold face type. *e.g.* **Bold face type**.

(*d*) Draw two lines and add the words "*Ital. Caps.*" in the margin to indicate italic capitals.

(*e*) Draw one line to indicate italic, *e.g.* *B. Anthracis*.

Tables, bibliographies, explanation of figures and all notes should be written under their individual headings on separate sheets for the convenience of printers.

Printers are expected to set the quoted matter exceeding five or six lines in the type of smaller size than that of the body of the text.

If a paper contains more than 5,000 words it is usually published in parts.

Miscellaneous Notes.—The use of first person "I" is said to be indecent in professional papers. Because, by using "I" frequently self-praise and egoism are apt to manifest themselves, by which the paper loses its worth. When it is necessary the writer should make use of this word only to such an extent that the reader is attuned to it. He should not also indulge in his own praises even when great discoveries and inventions are made; for, the essay itself is the proof which exhibits the author's capacity, ability and originality.

In the writers of academic papers, opinion is almost obsolete as it almost amounts to guess.

I believe, I don't believe, according to my opinion, perhaps, possibly, and such other words or phrases should be rarely used. The reader wants to know what you have seen done and found actually and not how you grope in the mysterious side of the subject.

Theory, hypothesis and conception are drawn when they have found a convenient halting place in mind. Theory is an exposition of the abstract principles of a science or art. Hypothesis is a proposition to be proved or disproved by reference to facts. Conception is a formation in the mind of a clear and definite image or idea.

Measurements of pathological findings should be given in the metric system and not in the terms of eggs, fists, lemons and cocoanuts, etc.

It is said that it is advisable to give the percentage of recoveries rather than that of mortalities except when absolutely necessary. For, the former is more pleasing and encouraging than the latter though there is no numerical difference between the two.

In the course of composition of a paper the beginning and the end should be kept in view for the purposes of assimilation and logical finality. Arguments should not be mixed up or wrongly advanced. As a rule one should begin with the simplest and end with the most complex arguments in order that the end may reach the climax of the argument. The paper should end leaving a sense of completeness and not redundancy in the mind of the

reader; and "let your leave taking be easy, gracious, and impressive in proportion to the theme and not ponderous, pompous, epigrammatic and austere".

Omit everything which has not a close connection with the subject or is alien to the matter in hand however interesting the same may be in another subject. Do not introduce inappropriate illustrations or illustrations which prove nothing.

Long quotations should be avoided as they carry no credit to the writer. If any long passage of a copyrighted work is made use of in any new matter the consent of the owner of the copyright should be obtained before publishing it.

Revision of a paper is quite necessary. All authors revise their works not only once but several times. Drafting again and again enables the writer to eliminate perverse construction, equivocal or defective words, crystallised or slovenly phrases, ornamental or figurative passages and inaccuracies from his paper. Every writer should bear in mind that a composition with which he himself is not well pleased can never please the reader.

Occasions may occur when differences of opinion will arise or even when some one has made wrong deductions or has displayed imperfect skill; but all criticisms, if at all necessary, should be done in perfect harmony with the principles of *Medical Ethics;* the writer should avoid casting reflection upon the good faith, professional reputation and skill of his professional brothers; he should on no account try to score off his colleague and attempt to show his own special superiority and competence over him.

The conclusion.—In the brief narration given above almost all the important practical points related to the subject have been dealt with my meagre knowledge and ability. And, in conclusion, I desire to point out, what we all hold and what was frequently and rightly said by all nation builders and persons who have realised the importance of the question of livestock that, *Veterinary Profession is a noble one.* It is, therefore, imperative that the members of this profession should avoid doing or writing anything which will in any way destroy or diminish the traditions of dignity, self-respect, and status which the past and present generations of the profession have so laboriously earned. It further behoves every one of us to cherish a pride in our vocation and endeavour to increase the public esteem in which our profession is held by acting honourably in word and deed. To play the game in

its truest and noblest sense should be the avowed object of all who make the practice of veterinary science their life work.

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HOUSING AND CARE OF ANIMALS AND PUBLIC HEALTH.

BY P. MARGABHANDU MUDALIAR, G.M.V.C.,
Veterinary Assistant Surgeon,
In charge of Veterinary Dispensary, Cuddapah.

(A paper read at the Public Health Week.)

Since I am of opinion that a short paper on the "Housing and care of Animals" will be more comprehensive and instructive than a lecture on the subject for 15 or 20 minutes, the time allotted to me by the Secretary of the Health Week Celebrations, I have written this paper as concisely and as carefully as possible to give you some useful hints on animal and Public Health.

I am glad to avail of the opportunity offered to me during this Health Week to speak on matters Veterinary and I shall in this connection explain to you how Public Health is jeopardised by a want of knowledge about Veterinary Contagious Diseases. I think that Public Health work without Veterinary knowledge will be imperfect. I am afraid that a majority of the lay public do not realise the merits of Veterinaty Hygiene and how a neglect of which affects their dear Health and Wealth. Almost every house is sure to have some domestic animal either as a pet animal or as working animal or for other purposes. In this way men and animals are brought together so closely that their health is interdependent upon each other and actually some diseases are transmitted from animals to man and *vice versa*. Besides this, if Veterinary Hygiene is neglected, there is the economic loss of condition and lives of animals, which are not conducive to one's progress and gradually impede national prosperity. Animal Health is, therefore, as essential as Human Health.

Importance of cattle, etc.—In this agricultural India cattle and sheep form the main domestic animal population and next in order, horses, fowls, dogs, etc., come. Ryots invest a good amount of their wealth especially in the purchase of cattle and sheep for agricultural purposes but very few realise that their progress depends on the health of their cattle. They are very conservative in the management of cattle and never try new scientific methods now in vogue and appreciated only by a few owners of cattle. Let us pass on to know something about the *Care and Management of Healthy Animals.*

We shall first consider about the quality of food, water and air necessary for health. Food is intended to build up and repair the tissues of the body and to supply energy or heat for its internal and external work. Food should, therefore, contain salts, nitrogenous or flesh-forming substances and fatty and starchy ingredients with an approved ratio between them, *viz.*, one part of flesh-forming materials to six parts of starchy food. Food ration consisting of more or less than this 1 to 6 ratio does not promote health, inasmuch as it is either not digested or benefit the animal substantially. This is not a constant ratio. It varies with age, habit, climate and work. For example young animals require more of flesh-forming materials to promote their growth. Animals require more of fat formers during cold weather than during hot season to maintain animal heat. Diet varies with the degree of work. A hard working animal must get more of flesh formers and the same animal should be allowed a shorter ration during rest. A free allowance of common salt is quite essential for the proper maintenance of health, for it aids digestion, nourishes bone and nervous tissue and promotes healthy skin.

Pure water is as necessary as food to dissolve the solid ingredients of food so that they can be digested and absorbed. Habitual drinking of polluted water causes impaired health and leads on to an increased liability to general and bacterial diseases. If water is allowed during or after feeding, the digestive juice which commences its secretion only when the stomach is nearly full gets diluted with water and digestion is not perfect with a weak juice. As a rule, therefore, water should be allowed half-an-hour previous to feeding. Further, it is necessary to feed an animal two hours before work so that food may be digested properly.

Pure air is an important factor in animal health, and is required to oxidise the absorbed food stuffs and evolve animal heat.

Housing of cattle deserves a closer attention. Cattle and other domestic animals should not be kept near human dwellings. They should be housed at a reasonable distance from the main building. The cattle sheds must be built in such a way as to expose its flooring and mangers to sun's rays and movements of wind so that they may be disinfected daily by natural agencies. A cattle shed should, therefore, face east and west and run north and south to get the benefits of sun's rays and mild draughts of air. Every shed must have a good non-slippery flooring with good drainage and its atmosphere must neither be close nor cold. Its surroundings must be clean and free from bushes or prickly pear, which harbour venomous reptiles. The sheds must be cleaned at least once a day in the mornings and animals freed from dust and dirt and waste products heaped up in a manure pit erected on the leeward side of the shed and all the drains directed to a pool built at a reasonable distance.

Every animal, even though out of work, must have some exercise and some grooming to tone the muscles and to keep the skin in perfect order. During inclement weather some warm covering is essential to preserve the sensibility of skin and to prevent exposure. Faithful servants are required to maintain an ideal standard of health and above all master's personal supervision is highly desirable.

We shall now consider about the *Care and Management of Sick Animals*. The attendant of animals and especially the owner of them must always observe their normal and abnormal habits. Appearance of abnormal habits in one's animal must attract one's attention and possibility of some systemic disturbance suspected and early veterinary aid sought for. Contrary to this, even though an animal shows visible signs of ill health such as dullness, off feed, suspended rumination and lactation, it is either worked or treatment deferred. When the animal becomes seriously ill, treatment is thought of and a native quack steps in with his uniform "Cure all" prescription. After trying him for a few days the patient is passed on from quack to quack and finally during the last stage Government Hospitals must give the necessary aid successfully. Unfortunately Government Hospitals are measured by their failures and quacks by their successes. Every patient must be attended to early and the cause of the disease removed by medical and hygienic treatment. Prevention is better than cure. Therefore, Hygiene plays an important part in the treatment of disease and medicine is only secondary. The diagnosis of disease and the prescribing of medicines are but a part of a practioner's duties in the

treatment of a patient. Attention to the surroundings of a patient, to clothing, diet, nursing, etc., is of vital importance for successful results. The greater clinical experience we possess, the more importance we attach to hygienic treatment. Cattle sheds must be kept clean and well ventilated and must be of suitable temperature. Well-adjusted clothing adds comfort to a patient. Diet must be tempting and easily digestible. Forcing of diet cannot be highly condemned. Such forcing not only distresses a patient but is likely to cause mechanical bronchitis and to damage the already weak digestion. At all events Nature's indications must be carefully attended to as far as possible and our duty is to aid Nature and never to adopt heroic measures. Clean water must always be kept within easy reach of a patient so that he may drink it when he feels inclined. It will reduce temperature, allay thirst, and digestion and assimilation and promote normal functions of bowels and kidneys. Grooming and gentle exercise when necessary add comforts to a patient and help speedy recovery from disease.

I request you earnestly to give a patient hearing to the following *animal diseases and their prevention*. Let us classify animal diseases as follows to suit our sanitary point of view :—

(1) Physiological diseases.
(2) Microbic diseases.
(3) Parasitic diseases.

Physiological diseases are those which are due to the alterations of functions and of structure of different organs of the body resulting from causes other than Microbes and Parasites. Diarrhoea due to the irritability of indigestible food is an example. Some of the important causes of these diseases are errors in diet or exercise or clothing, climatic influences and chemical poisons. These may be prevented by attending to the diet, personal hygiene and every habit of body promoting vitality and resistance to disease. In the second classification we have microbic diseases. These are due to disease germs of extremely minute vegetable origin. These germs grow both inside the living body and also outside the body. Under favourable conditions of heat, moisture, etc., they multiply rapidly and some of them are harmful in as much as they form poisons or destroy the tissues, which they grow upon. These pathogenic germs cause either infections or contagious diseases. These microbes are capable of communication by aerial infection, through fodder, water, milk, other bodily secretions and excretions, flies and other insects, by actual contact and by inoculation. We can as far as possible cut short the course of the

disease and mitigate the virulence of epidemics, by keeping the cattle sheds and their surroundings clean and dry, by securing wholesome food and pure water by adopting other hygienic measures likely to promote vitality and natural resistance to the ingress of disease germs, by isolating the affected and the in-contact animals in different lots, by disinfecting the infected locality and by preventive inoculation.

We have in our third classification parasitic diseases. These are caused by animal parasites such as round, thread or tape worms, fluke worms, mange and ring worm parasites, etc. These parasites are internal and external. Internal parasites find their way into the body through food or water contaminated with their eggs or larvæ and external parasites by contact. These animal parasites are more likely to attack animals of low vitality. Very old and very young and underfed animals are readily attacked but robust health is no guarantee. Some animal parasites cause serious illness and death. Some are of less serious nature such as tape-worms, round worms, flukes, guinea worms and some others cause disease when in abundance such as bots. These are mostly introduced into system through food, water and bad sanitation. These diseases may be prevented by cleanliness, non-contact with affected animals, by freeing sheds from fleas and ticks, by avoiding suspicious fodder and water and by burning or burying the dung and other products of animals suffering from parasitic diseases.

Animal diseases are many and a description of them in a short paper may not be instructive and interesting. So we shall consider about some animal diseases communicable to man and their prevention.

Anthrax.—This is a specific infective bacillary disease characterised by sudden high fever, serious general disturbance and sudden death affecting all animals including man. To man it is communicated directly or indirectly by animals and takes the form either of local infection through inoculation or of a combined pleurisy and pneumonia through inhalation. Local infection causes malignant pustule and infection through inhalation causes "woolsorter's disease." The name- "woolsorter's disease" takes its origin from the fact that workmen of wool factories in England working on Anthrax-infected Indian wool get an attack of Anthrax. No other wool is suspected, because stringent measures are adopted in other countries to check the spread of Anthrax. But in India in spite of the State Legislation which is in force the ryots have not yet realised the dangerous character of the disease. Cattle

and sheep suffer from an acute attack of the disease and it is with these animals we are much concerned. Anthrax is transmissible from animal to animal or from animal to man through infected flesh, by inoculation and by inhalation. Indian Penal Code compels the burial or cremation of Anthrax carcasses intact for fear of spreading infection among men and animals.

Glanders.—This is a specific disease of horses, etc., excepting ox characterised by gradual loss of condition without apparent cause, by diabetes and by febrile condition, etc., and finally death. This is transmissible to man through food or inoculation from the discharges and it is a loathsome disease in man. To control and eradicate this disease Glanders and Farcy Act is in force in India and provides for the seizure and destruction of affected animals.

Tuberculosis.—Popularly known as consumption is a contagious inoculable disease affecting all animals including man. This is a very important disease since it causes serious losses to owners of cattle and owing to its marked prevalence among the bovine species, there is a grave risk of transmission to men through food and milk of infected animals. Royal Commission on Tuberculosis finally reported in 1911 that many cases of fatal Tuberculosis in human beings were caused by infected bovines and that infected milk conveyed the disease to man. As such, active steps to eradicate the diseases in bovine species is highly desirable and efficient meat and milk inspection is instituted. Tuberculosis in animals has been extensively investigated in many countries and their researches have resulted in a clear conception of the disease and the necessary preventive measures likely to be of far-reaching importance have been devised. The discovery of Tubercle Bacillus and of Tuberculin to it are important achievements of their researches. We shall now consider about its transmission in the light of the recent researches. The offspring of Tuberculosis parents have not the same vital power to resist infection as those born of healthy parents. Therefore hereditary predisposition plays an important part in its genesis but cases of hereditary transmission is very rare. Infection through inhalation in animals is considered by some authorities as not very frequent. Consensus of opinion is in favour of its communicability through injection of infected meat and milk. Infection through inoculation is considered rare in animals but butchers and handlers of hides are likely to get it through wound infection. Coition is considered as a rare mode of transmission. There are certain conditions which influence infection. The Tubercle Bacilli are less likely to be destroyed under bad sanitary

conditions. Bad sanitation favours infection. Overcrowding is another factor which influences infection. Respiratory affections aid the penetration of the bacilli. Deep milkers are apt to get it. Strain of yearly breeding tend to weaken the system and natural resistance to infection. Continuous in-breeding is regarded as a predisposing factor. This disease is characterised in cattle by insidious development and a chronic course. Marked emaciation, cough, chronic respiratory disease, diarrhoea, inflammation of udder, etc., are some of the symptoms of tuberculosis but are not diagnostic. Tuberculin test is the only means by which we detect the disease in bovines in its initial stages and is being extensively used for the periodical testing of herds of cattle to control the disease in England and America.

Variola.—Known as small-pox is an acute contagious and inoculable disease affecting all animals including man and is characterised by slight febrile disturbance and subsequent appearance of eruptions passing through papular, vesicular, pustular and crustaceous stages.

Foot and mouth.—This is an acute infectious and inoculable disease affecting cattle, sheep, etc., characterised by febrile disturbance and vesicles in mouth, tongue, foot, udder and teats. Man gets an infection of it through infected milk and butter and by milking of cows whose udders are affected. In man the eruptions show a predilection for fingers, the roots of nails and the mouth with constitutional symptoms such as fever, gastric disturbance and diarrhœa. Young children are specially susceptible to foot and mouth disease with fatal results. Thorough boiling of the infected milk makes it inert. Disinfection, cauterisation of wounds, if any, on the infected hands, are safe measures to prevent infection from foot and mouth disease.

Rabies.—This is an acute specific infectious and inoculable disease characterised by nervous disorder, and affects all warm-blooded animals. Man gets an attack of it through the bite of a rabid dog and is known as Hydrophobia.

Mediterranean Fever.—(Known as intermittent Typhoid Fever). This infectious disease affects goats, cows, dogs, fowls, etc. This is communicated to human beings through milk and inoculation of the infected products such as blood, flesh and urine. Goat is a natural reservoir of the disease and transmits it to men through contact milk and urinated dust. Infected mosquitoes also transmit the disease to man.

Dengue Fever.—This spreads quickly over a wide area from animal to animal and from animal to man.

Leishmaniasis of dogs.—This is an important disease since dogs are believed to be the natural reservoir for communication to young children under two years, of infantile Kala-Azaar through dog fleas. This disease is characterised in dogs by progressive bloodlessness, emaciation, enlargement of liver and spleen.

Diptheria.—This is another disease believed to be communicated to man especially to children through infected milk.

Sore Throat.—Septic infection of throat and intestinal disorders in human beings are believed to be caused by germs contained in the milk of cows with inflammation of udder.

Bacterial Diseases : Fish and Quail.—We must guard ourselves against the infection of some bacterial diseases through fish and quail.

Infections caused by Rats.—Rats are really a menace to Public Health. They act as carriers of dangerous diseases to man and also as contaminators of food materials and water. Rats carry three serious diseases to man known as (1) Rat bite fever. (2) Weil's disease or a peculiar form of jaundice (Spirochæteial) and (3) Plague.

Intestinal and other Worms.—Some of the internal animal parasites or worm infections in man are caused by eating improperly cooked meat of animals including fish suffering from worm infections. Out of many worm infections transmitted from animals to man hook-worm disease is one.

Mange, Ringworm.—These are commonly met with in horse, cattle, sheep, dog, etc., and cases are on record in which affected animals have transmitted the disease to man.

We shall now consider about the ways and means to prevent the above infections. We have now understood that some animal diseases are communicated to man through the following ways. (1) By eating infectious material through meat, milk and infected food materials. (2) By actual contact. (3) By inhalation and (4) By inoculations. Thorough cooking and boiling of suspected food stuffs are highly imperative to ward off infection through the first means *i.e.* through infected meat, milk, etc.; systematic inspection of food materials by duly qualified officers is highly desirable to eliminate infections at their very source, and it is one of the important duties of Municipalities and Unions and I may say as important as the collection of various taxes. Infections through the other means may be prevented by segregation, disinfection and inoculation.

Good health is the greatest of blessings universally recognised as the one indispensable quality of happiness for animated beings, fame, rank, wealth and all else, which men do covet are nothing as compared with health. As such, this must be preserved by men but such is far from being the case. Premature death of mankind from more or less preventable disease is conspicuous in Death Statistics and many more are made miserable by it either temporarily or permanently. Ignorance of the origin and of the nature of disease and of the means of preventing it and apathy and innutrition due to poverty are the causes of this high rate of mortality and misery from preventative diseases.

Poverty is certainly a great bar to sanitary improvement and bad sanitary conditions beget poverty, and these factors conjointly tend to diminish people's vitality for work and capacity for improvement. If a nation should prosper well, Public Health must be attended to as jealously as other items conducive for national well being. The task of initiating sanitary improvements must devolve upon the educated and wealthy class of a community and apart from the higher motive of philanthropic duty in relieving the sufferings and ameliorating the lot of their poorer, more ignorant and dependent brethren, it is plainly their personal interest to ward off disease from their own doors. Epidemic diseases, whose breeding places are in the slums and poverty-stricken area leave their endemic haunts and seek out their victims in the neighbouring houses of rank and opulence. Spasmodic efforts to stay an epidemic at that time are not only ineffective but also waste of money and energy, which a wiser fore-thought would have prevented. Deliberate training and preparation are as necessary to protect a country against the invasions of disease as to fortify it against the inroads of an enemy.

Public Helath is one of the most serious concerns of the State, since bad sanitary conditions lessen the working power and shorten the life of an individual. Healthy, long lived community has many advantatages over an unhealthy, short lived one inasmuch as it possesses a larger proportion of working adults. This alone would ensure its supremacy in any commercial or military struggle. Good sanitation promotes vigorous health and vigorous health is conducive to National prosperity and good Government, for every useful man is the most precious capital of the State.

Apart from the duty of the State and of the influential and wealthy classes to promote sanitation, co-operation of people is essential for without which every effort of the State and of influential people is rendered useless by the passive resistance of people. To counteract this

tendency on the part of ignorant masses, National Health Exhibitions such as these have a special educative value and dispel gradually their ignorance and apathy towards sanitation both among men and animals.

ASAFETIDA IN THE TREATMENT OF WOUNDS.

BY CH. MUSHTAQ AHMAD, G.P.V.C.,
Clinical Assistant and Assistant to the Professor of Surgery,
Punjab Veterinary College, Lahore.

Where other sciences and professions are making progress, Veterinary Science, too, is rapidly progressing. Major operations on the delicate parts of the body which in the past were considered impossible in the veterinary patients are being performed every day with great success. Although we have advanced considerably in a comparatively short time, we have not yet reached the stage of perfection. The successful results of modern Veterinary Surgery are due to the efforts of several well-known surgeons who have published the results of their experiments on antiseptic and aseptic surgery together with their operative technique. Even in the daily routine work of dressing wounds there is always room for improvement in the matter of selecting suitable antiseptics and of adopting their special actions and uses to certain conditions.

In the Cruelty Ward (a branch of the Indoor Hospital of the Punjab Veterinary College) many neglected cases of wounds of a large variety and lameness are received for free treatment from the S.P.C.A. Inspector. The wounds of these animals are nearly always badly infected and (fly blown,) the latter being one of the commonest sources of wound infection in India.

I decided to give Asafetida a trial on account of its cheapness and peculiar odour, to see if the latter had any effect in keeping flies off a wound. I found that such was the case. It had a decided action in this respect, while its continued use as a wound dressing proved it to be without any doubt an excellent antiseptic. Along with these actions it was found to possess other properties to which I shall presently refer. There are many wound dressings which can be used with the same object in view, some being more expensive than others and not so easily obtainable. With regard to Asafetida, I wish to emphasize its cheapness and the fact that it is procurable almost everywhere in India, while its actions and uses are equal to, if not better, than the majority of drugs employed for the external treatment of wounds.

Before I describe a few cases out of many which I have treated with this drug, I would like to say a few words about the drug itself, its actions and uses.

ASAFETIDA.

Synonyms.—Asafetida, B. P. Asa-mastic, and faetida stinking. Vernacular—Hing, Arabic—Hiltit, Sanskrit-Hingu, Persian—Anguza.

An Oleo gum resin obtained by incision from the root of the Ferula fetida (Fam. Umbelliferari).

Habitat—Persia, Afghanistan and Turkistan.

1. *Characters and Tests.*—Rounded or flattened tears from twelve to twenty-five millimeters in diameter, or masses containing tears, greyish-white to dull yellow, darkening on keeping. Fresh tears usually tough at ordinary temperatures, hard when cold. Internally yellowish and translucent, or milk-white and opaque; freshly exposed surfaces often slowly become pink, then red, and finally reddish-brown. Odour strong, alliaceous and persistent; taste bitter, acrid and alliaceous. When triturated with water Asafetida forms a white emulsion. When the freshly fractured surface of a tear is touched with Sulphuric Acid, a bright red or brownish red colour is produced. The tincture obtained by macerating 0·5 gramme of Asafetida with 10 millimeters of Alcohol (90 per cent) filtered, made alkaline with strong solution of Ammonia, and then largely diluted with alcohol (90 per cent) does not exhibit a blue fluorescence (distinction from and absence of galbanum) contains not more than 50 per cent of matter insoluble in alcohol (90 per cent). Ash not more than 15 per cent.

2. Chemistry-Resin (40 to 60 per cent) consisting of ferulaic acid ($C_{10}H_{10}O_4$) and a ferulic ester of Asaresinotannol; gum (25 per cent). Volatile oil (3 to 6 per cent) ash (10 to 30 per cent). The resin yields umbelliferona ($C_9 H_6 O_3$) under the action of heat or sulphuric acid, and when fused with Caustic Potash gives resorcin. The oil has S. G. ·975 to ·990, and contains two terpenes and several sulphur compounds having formulæ ($C_7 H_{14} S_2$), ($C_{11} H_{20} S_2$ etc.)

3. Volatile oil contains allyl sulphide which gives Asafetida its disagreeable odour.

1. B. P. 1914 *vide* Page 57.
2. Southall's Materia Medica Eighth Edition, Page 250.
3. Veterinary Materia Medica and Therapeutics by Kenelm Winslow, Eighth Edition, Page 389.

History.—Apparently the drug has been known for centuries all over the world, under various names. The Egyptians knew the medicine by the name of (1) Laser, as imported in Alexandria from India and Persia in the 2nd century; but to Indians it was known much earlier, as it is mentioned by the earliest Sanskrit writers under the name of Hingra. The old Greek and Latin writers have mentioned it as two kinds of (2) Silphium. Amongst the Mohammedan writers on Materia Medica, (3) Ibu Sina has mentioned two kinds of Asafetida-tyib (good) and muntin (fœtid). Other Mohammedan writers have mentioned this drug as a product of Persia and Western Afghanistan. Haji Zein, the druggist, in the 14th century writes that the two kinds of Asafetida are produced by two different plants, the black and the white Anjudan, and that the white one produces the tyib (good) Asafetida. The first European writer who pointed out in 1850 the difference between the Asafetida of India (Hing) and that of the European Pharmacopœias (known in India as Hingra) was Guilbourt. (4) In the 13th century "Physicians of Myddfai" in Wales considered Asafetida as one of the substances which every physician ought to know and use."

Pharmacographia
A
(1) and (4) History of drugs
By
Fluckiger and Hanbury
2nd edition 1879. P. 318.

Pharmacographia Indica
(2) History of the principal drugs of vegetable origin.
By
W. Dymock.
Vol. ii. P. 141.

(3) The Commercial Products of India By Sir George Watt
July 1908, Page 533.

Actions and Uses.—Where the drug was known to the ancients, they made use of it for certain ailments, and in the regions where the plant grows the fresh leaves are cooked as an article of diet. In the sanskrit book, Suśruta, it is called Hingu from its killing or over powering all other odours. It is known as Rámatha, Bhûtá ñáşans,

which means "destroying demons," and superstitious people are sometimes seen wearing amulets containing the substance for warding off evil spirits and Śúlanāśana which means "removing pain in the stomach." It is described as hot, digestive, appetizing, pungent, a remedy for phlegm, rheumatism, griping, flatulence, diseases of the belly, satiety and worms. It increases the secretions of bile. It is used as an antispasmodic in nervous affections; taken daily it is thought to ward off attacks of malarial fever. It has great reputation as a condiment among vegetarians. It is described by old writers as "Cibus deorum, Stercus diaboli" (food of gods, stink of the devil).

In modern European medicine, Asafetida is used as a stimulant and antispasmodic in chronic bronchitis, hysteria and tympanites. It is often administered in the form of enema, as it is apt to give rise to a sense of weight and heat in the stomach when given by the mouth. Dr. Paolo Negri of Venice, has reported the successful treatment of a few cases of abortion with asafetida given to the extent of one gramme daily. Dr. Turazze following the prescription of Dr. P. Negri has recently treated four cases with success. In modern medicine it is chiefly used as a carminative, stimulating expectorant, and nerve stimulant or an antispasmodic. Liquid preparations may cause nausea and vomiting in dogs owing to nauseous taste. It is very useful in flatulent colic in horses when it is combined with ammonium carbonate in balls, or is given in this form simultaneously with linseed oil and oil of turpentine. For constipation of horses it is given with aloes in balls. I have also found this drug useful in coughs and chills of horses when given along with other suitable drugs such as camphor, garlic and ammonium chloride in the form of electuary. I do not propose to discuss here at any length the actions of the drug when used internally as the article concerns with the external actions and uses of the drug. The European writers have not so far mentioned its external uses, with the exception of Winslow, who, under the heading of actions and uses, states that tincture asafetida applied externally stops feather pulling in birds and bandage chewing in dogs.

From the chemical compositions of the drug it is quite plain that it is a compound of all those drugs that have been used in the treatment of wounds in the past as resin, sulphur, venice turpentine, resorcin, etc.

In my experience in the treatment of wounds it has shown the following properties :—Styptic, stimulant, non-irritant antiseptic, disinfectant, deodorant and keeps off flies and so prevents the transmission of infection. It does not destroy the tissue cells.

The Hindu and Mohammedan medical practitioners of antiquity have used this drug in the treatment of wounds and skin diseases.

(*a*) Bhutāri—Enemy of the ærial germ such as flies, mosquitos and fleas.

(*b*) Jantunāsh—Parasiticide.

(*c*) Bhedan—Remover of discharge.

(*d*) Sura—Remover of filthy matters.

2. (*a*) Its application on lalat (forehead) in the form of paste cures hemicranium.

(*b*) Tooth powder consisting of this drug is useful in dental diseases.

(*c*) Inhalations of aqueous solution cures headache.

(*d*) Application of asafetida with opium assuages the dental pain.

(*e*) Its application containing vinegar to the sty is found useful.

(*f*) Poultice prepared of Phaseolus aconitifolius (moth) flour containing asafetida makes the guinea-worm come out easily.

(*g*) Asafetida and yellow arsenic rubbed in lemon juice is antidote for scorpion poison.

(*h*) Its use along with vinegar is said to be useful in the treatment of sinus.

(*i*) Aqueous solution is very useful in burns.

3. Its application on tooth caries is useful. If applied on swelling after incisions it removes the dirty matter and stops its further formation. Its application on abscesses blended in simple ointment, or along with dry fig, is said to be useful. It is most useful for cleaning the wounds. In ring-worm and grease it is used along with fig and vinegar, and it is also useful for warts and glandular swellings when applied with simple ointment. Its application by itself, or along with vinegar or black pepper, or other suitable drug, is useful in favus. It also cures scrofula when applied with wax and tar ointment. It is applied after dissolving it in ash water or river water on incisions of muscles. Its application keeps off mosquitos, flies and other poisonous insects. It is found useful in poisoned arrow wounds. Together with garlic and gentian it is applied on the bite of rabid dog.

4. Mr. Atchison who travelled in the districts in the vicinity of Afghanistan, Baluchistan and Persia with the Afghan Baluchistan boundary commission in 1884, writes that the people of Kurrum Valley apply asafetida in wounds and contusions and also on ringworm.

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(1) Validic Shabda Sindu. p. 1191 (hingu).
(2) Anubhut Chakitsa Sagar Vol. II, p. 780.
(3) Muheet-i-Azam, By Hakim Mohammad Azam Khan (Banazim-i-Jahan) Vol. II, pp. 149, 150.
(4) The Indian Medicinal plants by Col. Kirtekar and Major B. D. Basu. p. 626.

I have used the following preparations of Asafetida in the treatment of wounds.

(1) *Alcoholic solution of Asafetida.*—

Asafetida	....	....	.... One part.
Rectified or methylated spirit			.... 7 parts.

Clear the asafetida if adulterated, and dissolve it, by adding spirit slowly, then filter.

(2) *Aqueous solution.*—

Asafetida	....	....	.... 1 part.
Spirit	....	....	.... 2 parts.
Boiled water	....	....	.... 10 to 20parts.

Dissolve slowly by trituration in spirit. Add hot water gradually and when dissolved, filter. It should be prepared afresh.

N.B.—In the absence of spirit, it may be dissolved in boiling water and then filtered.

(3) *Glycerinated solution of Asafetida.*—

Alcoholic solution	....	....	.... 1 part.
Glycerine	...	....	.... 4 parts.
Shake well			

(4) *Asafetida Ointment.*—

Asafetida	....	....	.... 1 part.
Spirit	....	....	.... ½ to 1 part.
Simple ointment		....	.... 6 parts.

Grind well by adding spirit. Then mix well with simple ointment. If it becomes hard add a little liquid paraffin.

N.B.—Asafetida must be pure and genuine.

Adulterations.—The common adulterations in asafetida are potato slices, gum arabic, sand, earth, gypsum, wheat flour and pieces of bark. Its odour hides the adulterated materials as the bitterness of quinine conceals chalk adulteration in it to stand the market competition.

External uses.—In my experiments the application of its preparations to the open wounds keeps off flies. Its alcoholic solution if used for disinfecting the seat of an operation wards off flies while operating. It is advisable that the operation wound should be dressed before and after suturing, and its dressing once daily heals the wound by first intention, provided other conditions remain normal. In recent or chronic suppurating wounds its application after cleaning the wound with warm water stops the formation of pus. It stimulates indolent ulcers to granulate. In fresh wounds and burns of any kind its application inhibits suppuration and healing occurs rapidly. The syringing out of fresh infected punctured wounds once, destroys microorganisms. Glycerinated solution applied to broken knees and other wounds of the joints hastens the healing of the wound and keeps the skin soft and pliable. In punctured wounds with efficient drainage provided, it may be injected by means of a syringe. Cotton wool pads saturated in an aqueous solution are placed on infected wounds. The application of the alcoholic and aqueous solution produces a whiteness on the surface of the wound or ulcer. When using an alcoholic solution a film of resin remains on the granulating surfaces which serves to protect the wound from atmospheric effects, dust, etc., and also hastens the reparative process. This film which may be regarded as an aseptic scab need not be removed daily as long as there is no discharge of pus.

By the application of its aqueous solution there is produced a thin serous discharge that brings out the deep infection and coagulated lymph which helps the separation of the slough in three to six days. When the slough is ready for separation the wound smells. After the removal of the slough there appear healthy granulations that were hidden under the dead tissue. The slough should be removed very carefully so that the granulations may not get injured and fresh infection may not take place.

The following are a few cases out of many treated with Asafetida preparations.

Case No. 1.—Brown mare, C. B. aged, the property of Mr. H. D. Kapur, Banker and Government Contractor, Lahore.

Admitted on the 9th June, 1924.

History.—The mare collided with a motor car.

Injury.—A lacerated punctured wound on shoulder joint 8" long 4" wide, and 1½" deep, with a pocket at its bottom.

Treatment.—The mare was cast and chloroformed. Dirty infected tissues were removed by dissection. Counteropening made, irrigated well with warm water, dried and painted with alcoholic solution of Asafetida; the wound was sutured and bandaged.

20-6-1924.—There was a slight swelling around the wound and a sero sanguineous discharge. The wound was cleaned and dressed with the same solution without washing. Antitetanic serum 3000 units was injected subcutaneously.

24-6-1924.—The margins of the wound had healed. There was a slight swelling around the wound but no discharge.

26-6-1924.—Wound discharging slightly from lower extremity and this was wiped off. The bottom stitch was removed and the same solution applied.

27-6-1924.—The remaining sutures were removed and the wound had healed; the wound of the counteropening was healing satisfactorily.

4-7-1924.—The countropening wound had healed.

Summary.—A wound 8" long, 4" wide and 1½" deep healed in 15 days.

Case No. 2.—Brown mare, aged about 6 years, the property of Mr. Heapburn, Lahore.

Admitted on the 8th July, 1924.

History.—While the mare was grazing in the compound of the bungalow, she got frightened and bolted, and fell on a pukka road, and injured her left shoulder and elbow.

Injuries.—There were two wounds on the shoulder about 3" long and 2½" wide and 4" long and 3" wide respectively, of contused lacerated nature. On the elbow was a lacerated wound, about 3" long and 1½" deep. Air had entered this wound on account of walking, there was frothy discharge running from it.

Treatment.—The hair was clipped and the wounds were thoroughly cleaned and dressed with alcoholic solution of Asafetida. All wounds healed in 14 days, without suppuration.

Case No. 3.—White ox, the property of Mohd. Din, Lahore. This ox was admitted on the 20th October, 1924, for the treatment of a yoke gall. The lesion consisted of two ulcers, each of about 3" in diameter and without any granulations, and discharging pus, with fibrous tumours at their base.

Treatment.—Injected 3% apothesine solution, two drams subcutaneously around both the ulcers and after 15 minutes dissected out the tumours and plugged the wound with aqueous solution of Asafetida.

21-10-24.—The plug was saturated with a serous discharge and the asafetida odour was still present in it, and the surface of the wound was covered with a film of resin.

24-10-24.—Superficial sloughing took place and underneath the latter healthy granulations had formed occupying about half of the wound cavity.

27-10-24.—There was no smell in the wound, and it was full of healthy granulations; the wound cavity was filled up and it was dressed with alcoholic solution.

31-10-24.—The granulations of the wound of the left side were exuberant and therefore Copper Sulphate was applied.

1-11-24.—Dressed with Tursal ointment.

Oleo Resin of turpentine	....	....	1 part.
Sulphur	....	....	1 part.
Simple ointment	....	....	4 parts.

As prescribed by Col. G. K. Walker, C.I.E., O.B.E., F.R.C.V.S., Principal of the Punjab Veterinary College, Lahore.

10-11-24.—The animal was discharged, cured.

Case No. 4.—Grey mare, C. B., about 4 years old. Admitted on the 29th November, 1924.

History.—The injury resulted from a collision with a tonga; the shaft of the tonga entered the chest on the near side and caused a punctured wound between the breast and shoulder 12" deep. The orifice of the wound measured 3½" in diameter.

Treatment.—Hair was shaved from the edges of the wound and alcoholic solution of Asafetida was injected into the cavity. The wound was then plugged with muslin soaked in the same solution.

30-11-24.—When the plug was removed there was a serous discharge. The wound was cleaned with aqueous solution and plugged with muslin soaked in the same solution. The wound healed after 20 days without suppuration.

Case No. 5.—Bay mare, C. B., aged, the property of Pir Baksh Lahore.

Admitted on the 19th December, 1924.

History.—The animal collided with a bullock cart, sustained two lacerated contused wounds, one on off shoulder 3″ long and 2½″ wide and 2″ deep. The other on the breast on the off side, 9″ long, 6″ wide and 3½ deep. In the breast wound the pectoral anticus muscle was severed.

Treatment.—The wounds were cleaned and washed with aqueous solution of Asafetida, wiped with absorbent cotton wool and were painted with alcoholic solution and upper part of the wound sutured.

20-12-24.—There was a yellowish discharge from the wound and swelling around it.

23-12-24.—The swelling had subsided and the discharge had diminished. The owner seeing such a large wound lost all hope of the animal's recovery and abandoned it.

24-12-24.—As the stitches had become loose, they were removed and the wound dressed with aqueos solution.

27-12-24.—The granulations were inclined slightly to be excessive; therefore Nitrate of Silver was applied.

28-12-24.—The surface of the wound was quite even and aqueous solution pad was applied and continued up to the 19th January, 1925, when the animal was discharged cured after one month.

Case No. 6.—Grey ox, age about 7 years, the property of Fazal Din, was admitted on 27th January, 1926, as a cruelty case for the treatment of yoke gall about 3″ in diameter and a cold abscess about the size of a duck's egg, on the right side of the neck.

Treatment—28-1-26.—The yoke gall and the seat of abscess were washed with soap and water, and a pad of an aqueous solution of Asafetida was employed on the gall and bandaged.

29-1-26.—The gall and the seat of abscess were painted with alcoholic solution of Asafetida and 4 per cent solution of Apothesine was injected subcutaneously all round the gall and abscess to cause local anæsthesia. After 15 minutes the yoke gall and the abscess, were extirpated. The wounds were painted before and after suturing with alcoholic solution and bandaged.

The sutured parts were painted once daily for 7 days with the solution. Both the wounds healed by first intention, and the sutures were removed on the 7th February, 1926.

Case No. 7.—Chestnut, C.B., 2½ years old, the property of Col. E. H. Cole. The animal was admitted on the 18th December, 1925, for the Steinach operation. The operation was performed on the 6th January, 1926, by Capt. U. W. F. Walker, M.C., M.R.C.V.S., Professor of Surgery. The operation wound was painted before and after suturing with an alcoholic solution of Asafetida. This dressing was applied once daily. The sutures were removed 7 days later. The wound had healed by first intention.

My article would be incomplete if I did not thank Col. G. K. Walker, C.I.E., O.B.E., F.R.C.V.S., Principal of the Punjab Veterinary College, and Capt. U. W. F. Walker, M.C., M.R.C.V.S., I.V.S., Professor of Surgery, who are taking ceaseless interest in improving and advancing Veterinary Surgery in the Punjab, and in affording me many opportunities of observing and carrying out experiments. They have always encouraged me to further efforts and have favoured me with sound advice whenever any occasion arose.

I also express my heartfelt thanks to K. S. M. Ghulam Rasul Khan, House Surgeon, and S. Mool Singh, Professor of Materia Medica, who have also used the drug which I suggested and found it a success.

A REVIEW ON THE LIFE HISTORY OF DAVAINEA TETRAGONA (MOLLIN).—A FOWL TAPEWORM.

By JAMES E. ACKART.

(Contribution No. 26, from the Department of Zoology, Kansas State, Agricultural College, Aid of Agricultural Experiment Station):—
Journal of Parasitology, September, 1919, Vol. VI, pp. 28—34.

Reported by G. A. Ajwani, M. Sc., D.V.M., G.B.V.C., D.V.H.

The writer performed this experiment to know if the common house fly, *Musca domestica*, could be the transmitting agent for the fowl tapeworm—Davainea tetragona. He bore in mind that Grassi and Rovelli (1892: 33, 87) found in the body of *M. domestica* larvae whose scolices closely resembled those of Choanotæmia infundibuliformis (Goez), and "Gutberlet (1916: 235) succeeded both in infecting *M. domestica* with cysticerci by feeding onchospheres of this tapeworm, and in rearing adult worms by giving to fowls house flies taken from nature. And the writer (1918: 41) reared *Davainea cesticillus* (Mollin) in Gallus domesticus by feeding *M. domestica* which some weeks previously had been given onchospheres of this cestode."

In this experiment, Dr. Ackart took newly hatched chicks from incubators and confined them to a cleaned chicken house which was fumigated for ten hours with sodium cynide. All precautions against contamination from without were properly and thoroughly taken. The chicks were fed on experimental and examined food and occasionally fresh beef was given.

In September, 1918, the writer visited several poultry yards in Manhattan, Kansas, to get the infected flies. Some chickens were found infected with *D. tetragona* among other tapeworms. Flies were seen to be sitting on the freshly voided fæces. Flies were caught at those places by means of fly traps, then dipped in water for seventeen hours, slightly dried and *M. domestica* sorted out. These flies were fed to the experimental chickens in the following order :—

" Chicks 2½ months old during the autumn of 1918: 3,506 flies to each of chicks 233, 234, 235, in eighteen feedings, ranging from 39 to 493 between September 23 and October 19, 3,467 flies to chick 236 in seventeen feedings, varying from 89 to 493 between September 24 and October 19, 2938 flies to each of chicks 239, 240, 241, 242, 243, 245, 246, 247, in fifteen lots of flies, numbering 260 to 293 between September 30 and October 19, and 2,026 flies to each of chicks 248, 249, 250, 251 in 13 feedings of 50 to 290 from October 4 to October 19."

On examination of four chicks in the early part of November, after the first feeding of flies, two were found negative and the other two had mature tapeworms in the intestines, chick 235 had ten long worms, and in chick 250 two medium-sized ones ; they were all sexually mature and some of them with gravid proglottids. Chick 249 was found with two large tapeworms one month later.

Dr. Ackart makes these out as *Davainea Tetragona* (Blanchard 1891) (Notices Helminthologiques Mem. Soc. Zool France 4: 436), with certain variations in structure but closely allied to the same species.

Having done this the worker took into consideration that the onchospheres, which were in masses, were several times the diameter of an embryo, and that it suggested that *M. domestica* might not be able to ingest them. To accomplish this problem he offered fifty egg masses from a live proglottid in a small drop of sweetened water on a glass slide to chicken lot 424. Except twenty nine eggs all were taken up by the flies from the slide. He repeated this three more times. He also found that the walls of some of the egg masses had been ruptured by the sucking of the flies which drew out some of the

enclosed onchospheres. At this stage two questions arose in the author's mind, " Are ingested egg masses or onchospheres regurgitated by the flies and lost ? Do the onchospheres pass through the digestive tract of the flies unaltered ? " It has been already known that *M. domestica* usually regurgitates when fully gorged and at other times that regurgitated stuff is again taken up by the fly. The author wanted to ascertain whether or not the onchospheres go through the flies unaltered, and the length of the time required for the passage of food through their digestive tracts.

He describes the following typical test :—

Three *M. domestica* (lot 309) taken from a trap baited with vinegar and corn syrup were placed in one of the test cages where they were given a few drops of sweetened water coloured red by the addition of carmine grains. That the flies fed freely was evident from the bright red appearance of the anteroventral portions of their abdomens—the areas immediately below their crops. Each fly regurgitated once. After fifteen minutes the base slide with the red liquid was removed and a clean one substituted. Two hours and thirty-eight minutes later four characteristic red fæcal specks appeared. During the ensuing three hours, six specks, respectively, were defecated, while a maximum of ten were deposited during the seventh hour after feeding. In the next two hours the number of specks in the cage was increased by only five. The tenth hour showed an addition of six faintly red fæcal specks, and in the eleventh hour after feeding there were four defecations which contained so few carmine grains that the latter were visible only by aid of a microscope.

To be certain that red colour of the fæcal specks was due to the carmine and not to the vinegar and syrup with which the trap had been baited, the fæcal deposits from lots 283–303 of *M. domestica*, isolated in lantern globes from the same trap, were carefully examined. Not one of the several specks was coloured red, and examination with a lens confirmed the absence of any red particles.

Other similar tests were made with fresh blood for knowing the length of time required for food to pass through the digestive tract of *M. domestica*. It was found out that it takes between one hour and fifty minutes to twelve hours for the food to pass through the digestive tract of the house fly.

To find out whether the egg masses or onchospheres are lost by regurgitation, and that they pass through the alimentary canal unaltered, the investigator took lots 430 and 431, consisting of six and four *M.*

domestica, respectively, isolated in test cage. To this effect author states that "gravid proglottids of D. tetragona from freshly voided chicken fæces were teased in slightly sweetened tap water. In this medium, fifty six egg masses were offered to lot 430, and ninety to lot 431. The first lot took seven masses, and the second twelve. As each mass contains six or more onchospheres, lot 430 took at least thirty-six of these embryos and lot 431 a minimum of seventy-two. After feeding the egg masses, each lot of flies was transferred to a clean test cage, whereupon the vacated cages were tried apart and every regurgitation spot examined by the aid of a compound microscope. No structure resembling either an egg mass or an onchosphere was present in any of the spots. At two-hour intervals the flies were transferred to clean test cages, each fæcal speck studied, a mechanical stage being used to locate the fæcal deposits. The examination of these specks was continued until the nineteenth hour after feeding the egg masses. In one instance a globular shaped structure about the size of an onchosphere occurred in a speck, but it lacked hooks and internal membranes. Thus it is known that "few, if any, injested onchospheres of the cestode in question are either lost by regurgitation or passed through the digestive tracts of these flies unaltered."

The author concludes his article with the following summary:—

1. Flies trapped at poultry yards infested with Davainea tetragona (Mollin) and other tapeworms were given (many alive) to young chicks reared in a screened house. The food of all controls was free from animal tissues.

2. In two months the chicks were examined; three contained mature tapeworms, several with embryos. The twelve control chicks were free from parasitic worms.

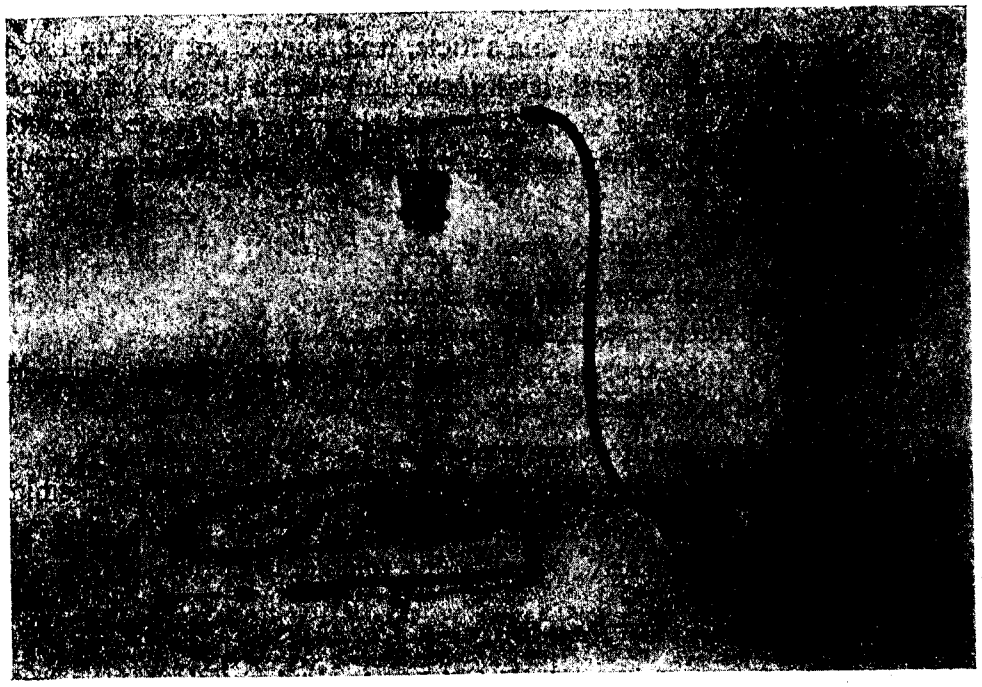
3. Flies eat both onchospheres and egg masses of D. tetragona, and when ingested are either lost by regurgitation, or passed through the digestive tract unaltered.

4. As common house flies from infected poultry yards constituted the only difference between the food given to the experimental chicks and that fed to the control chicks, evidently D. tetragona may be transmitted from one fowl to another by *M. domestica*.

APPARATUS FOR INTRAVENOUS INJECTION INTO LARGER ANIMALS.

By Col. G. K. WALKER, C.I.E., O.B.E., M.R.C.V.S.,
Principal, Punjab Veterinary College, Lahore, India.

The apparatus illustrated below has been devised to facilitate the intravenous injections of large quantities of fluids and is particularly useful in the larger animals. The container, which can be firmly held in one hand by an assistant, consists of a graduated Calcium Chloride glass jar with rubber attachments as shown.



The needle is inserted into the vein and when it is seen by the upward flow of blood that it is free in the lumen of the vessel, the fluid is allowed to arrive at the nozzle of the rubber tube, which is then inserted in the needle. Pressure is exerted by the hand bellows fixed to the glass tube in the top of the jar. If bellows are not available there is no objection, in the case of antiseptics, to the human mouth being substituted. The quantity of fluid injected is restricted to that contained in the portion of the jar above the reservoir, that in the latter being allowed to remain to safeguard the danger to be apprehended from the unwitting injection of air or breath. It is suggested that, ordinarily, two jars should be used, one containing normal saline solution, and the other the fluid to be injected. Normal saline is first

injected to ascertain that the needle is properly inserted in the lumen of the vessel and then, without moving the needle, the fluid from the second jar is injected. Finally more saline is injected to wash out the needle before withdrawing it. When irritant fluids are to be injected this procedure appears to be essential.

HINTS ON BREEDING AND REARING OF CATTLE.

By T. SESHACHALAM NAIDU,

Assist. Agricultural Demonstrator, Live Stock, Veterinary College, Madras.

(In the covering letter to this article, it is pointed out that, in these hints is compressed a fund of information which when elaborated would easily fill a modest volume.....and they are really the product of years of observation and research by the Live Stock Expert of this Province.—Ed.)

How to keep a Stud Bull.

1. Give him plenty of food and exercise.
2. There should be regularity in feeding.
3. Use him for service, only when he is over 2½ years old and discard him after 8 years.
4. Don't allow him to serve more then 6—8 cows a month.
5. Let him be attended to by the same man always as far as possible.
6. Treat him kindly lest he should develop vicious habits.
7. House him properly, not exposing to cold and sun.

Advantages of Rearing over Purchasing Stock.

1. The history of the animal is known which is very important in rearing live-stock.
2. It is less expensive with better results.
3. One can study the individual character of an animal and make suitable changes in rearing.
4. One can easily select the best animals to build up a good stock.
5. A breeder can have a practical experience of live stock which can be turned to very good advantage.

Advantages of a Cross-bred Cow over an Indian Breed.

1. A cross-bred cow is a heavy milker.
2. A cross-bred cow is generally docile.
3. Dry period is very short.
4. Can be milked without calf.
5. Breeds regularly.
6. Matures early.

Symptoms of Heat in a Cow.

1. The cow is restless : if tied, frequently shifts about, flicks the ears, carries the head higher than usual and the eye appears to stare slightly.
2. Bellows more frequently than usual and at intervals looks towards the tail which she switches frequently.
3. If let loose, she jumps on other animals and allows herself to be jumped on ; annoys other animals by butting with the head.
4. Withholds milk altogether or partly.
5. There is a slight discharge of a slimy fluid from the genitals.
6. The genital parts become swollen.
7. Urine is passed frequently and in small quantities.

What to do when you notice Symptoms of Heat in a Cow.

1. Postpone all other works and take the cow at once to a bull.
2. Remember that the heat in a cow does not last for more than half to one day.
3. See that you take the cow to a good pedigree bull in order to get a valuable issue.
4. Satisfy yourself that your cow gets one thorough service.
5. Watch your cow from the 19th to 22nd day after service to see that the heat has not recurred.

How to treat a Cow nearing Parturition.

1. Have her separated from other cows.
2. House her in a quiet place.
3. Give slight, but regular exercise.
4. Provide bedding ; shelter her from cold and sun.
5. Leave her loose in the calving shed.
6. Do not unnecessarily interfere at the time of parturition.

A few Points in Rearing Calves.

1. Feed them always with warm food and at regular intervals.
2. Let the feed be sufficient ; but in small quantities 4 or 5 times a day.

3. Leave them loose in paddocks to have plenty of exercise and a bite.
4. Give them access to pure water.
5. Keep them in airy and clean sheds.
6. Treat them always gently and kindly.

MEASLY MEAT.

By MUHAMMAD RAHIMUDDIN, G.M.V.C.,
Municipal Veterinary Officer, Ootacamund.

I have been working in this station for a period of more than 4 years and it was my desire to write something about the meat inspection. I now mention an interesting thing I came across in the slaughter houses. During the first 3 years, I had seen a few cases of measly infection in pork. A year and a few months back a piece of measly pork, killed surreptitiously, reached the hands of a lady. Since then I made it a point to cut each and every carcass (beef and pork) into the meat before it was passed and sent to the market. The result of such inspection led to the discovery of a large number of measly (Cysticercus) infection both in cattle and pigs. I should also like to say that, for detecting the measly infection of the meat, it is essential, in my experience, that the carcasses be cut into 2 or 3 places, since the Cysticerci are generally found deep in the muscles. These measly carcasses are condemned, and to make the meat inaccessible for human consumption, we were sending the carcasses to the Hunt Club for the hounds with instructions to boil the meat for a couple of hours before giving it to the dogs. Lately the Veterinary Adviser to the Government of Madras instructed that the dogs should receive underdone meat. Another method of rendering the meat inaccessible for human consumption is to burn the carcasses. As this is costly, at present the condemned carcasses are well smeared with tar and buried, so that the scavengers may not tamper with them. A few months ago I sent specimens of measly beef and pork to the Veterinary Adviser to the Government of Madras, which he examined microscopically and said that they are Cysticercus bovis and Cysticercus cellulosae respectively. We draw our supplies of beef and pork from Mysore and Coimbatore sides. The Mysore supply always gives a high percentage of Cysticercus infection. Now, on the whole, the careful examination has led to the conclusion that over one

per cent of the cattle and about 15 per cent of the pigs slaughtered suffer from the measly infection.

The readers would like to know as to where I cut the carcass for the purpose of meat inspection. I cut into the meat on either side of the pubic symphysis along the hip-joint and into the shoulder muscles along the shoulder joint, so that the butchers may not grumble that by cutting indiscriminately, the meat is spoiled. Now I shall give shortly the description of these cysticerci.

1. *Cysticercus bovis.*—Is otherwise known as " Beef bladderworm." It is about the size of a boiled sago and grey in colour. The (Scolex) invaginated head of the worm is covered by the capsule of the worm which is again covered by a connective tissue. The worm is of the size of a pea. It may become fibrous, suppurate, or caseate and calcify at any stage in its development. When injested by a man it develops into a fully grown tapeworm, " Taenia madeocanulata ", if the meat is not thoroughly boiled. For the naked eye appearance, as I have said before, it looks like boiled sago. To examine microscopically press the cysticercus, after dissecting the outer covering, between two glass slides and examine under low power. The four suckers on the head with the neck will be distinctly seen.

2. *Cysticercus cellulosae.*—Is also known as " Hog bladder-worm." It is very similar in appearance to the Cysticercus bovis, but the cyst is more delicate and transparent. Under microscope the scolex is provided with a double circle of hooks along with the four suckers. Like cysticercus bovis it also undergoes caseation, etc. Its injestion leads to the development of tape-worm, " Taenia solium ". Here the attention is invited to the fact, that, by eating measly pork one is also subjected to auto-infection with the cysticercus cellulosae, as the ripe proglottids make their way back to the stomach, or by sucking up fæces soiled fingers.

During the life of the animals the diagnosis is difficult, though it is said that by palpating the base of the tongue the presence of the cysticerci can be ascertained. I have seen in many cases of measly carcasses that the tongues are quite free from the the cysts.

Lastly, I request the readers to kindly enlighten us more, through this Journal, if they have come across the measly meat during the meat inspection.

AUTOPSY OF FOWL (GENERAL TECHNIC.)

By G. A. AJWANI, M. Sc., D.V.M., D.V.H., G.B.V.C.,
Shikarpur, Sind.

Little work or none at all is done or taught, regarding the poultry and its diseases, at the Indian Veterinary Colleges. Quite an important work is being done at the European and American Veterinary Institutes and a regular course offered to the Veterinary student. Poultry stock owners and farmers send live samples of sick birds to the State College for post-mortem and diagnosis and the owner is advised how to overcome the difficulty.

Symptoms of a live sick bird are of great value and in the case of a contagious or infectious disease "live" symptoms taken together with the lesions presented at the post-mortem examination will usually lead to correct diagnosis.

Killing of the bird.—The aim in killing the bird for post-mortem examination should be not to scatter the blood which is likely to spread the infection. This is best done by "breaking the neck". Both the legs and wings are tightly held in the left hand and in the right hand grasp the head and the base of the skull between the thumb and the forefinger of the same hand. The head is firmly but slowly pulled and twisted on its back until dislocated—taking sufficient care not to break the skin for fear of blood contamination.

Post-mortem examination of the bird.—After the bird has been killed it is well to clean it thoroughly under water-tap in a washing sink, or wetted by other means. The bird is then laid on its back on a special table intended for post-mortem. This done, the skin between the legs and the body is cut and a cross cut made at the back end of the breast bone. This will enable spreading of both the legs and dislocating them at the joint. With scissors cut the ribs on each side of the breast bone at the attachment of the wings, leaving the internal organs intact and avoiding contamination from without. In old birds it might be necessary to use a pair of pliers for cutting the ribs or removing the entire breast by breaking. By doing this, liver, heart, lungs, spleen and intestines are exposed. These organs are examined in order for size, color, consistency and other things which might be suspected, in its natural position. It is well to take cultures, at this stage for bacteriological examination, from liver, spleen and heart. A few drops of blood are pipetted from heart and submitted for agglutination and other laboratory tests. Having done this the organs are taken out and cut open. The intestines are opened from end to end with scissors, nature of the food, worms, hæmorrhages, inflammation, ulcers, tumours, abscess, and foreign bodies, noted. Special attention for small hair-like worms should be given for they are likely to be missed. The contents of the gizzard and crop are examined and the order noted, as in botulinus poisoning it gives a putrid odour.

Next, the trachea and the œsophagus are dissected and these with lungs and heart are examined for abnormality.

Kidneys and ovaries are then examined.

It is best that the post-mortem is done at day time in a room which gets the direct sunlight to enable easy detection from the normal.

A SUCCESSFUL METHOD OF TREATING PROLAPSE OF THE RECTUM IN HORSES AND CATTLE.

By Ch. MUSHTAQ AHMED,
Assistant to the Professor of Surgery, Punjab Veterinary College, Lahore.

Prolapse of the rectum is not an uncommon occurrence in the larger animals though it is said to be more frequently met with in dogs. It is not proposed to discuss the various causes and symptoms in this communication, which will be confined to treatment. Various methods of treatment have been recently published in the Veterinary Record and other Veterinary Journals. In some success was obtained whilst in others the results were disappointing. It is clear that the longer the condition is neglected the more difficult it is to treat.

The following method of treatment has been adopted by the writer in twelve cases at the Punjab Veterinary College, Lahore, and found uniformly successful.

After administering per orem a sedative such as Chloral Hydrate or Extract Belladonna, the preliminary treatment consists in thoroughly irrigating the prolapsed part with cold water from half to one hour, in order to relieve congestion and to cleanse the part. If the prolapse is much enlarged and œdematous, scarification may be carried out. Any portion of the prolapse showing signs of sloughing due to the onset of gangrene or necrosis should be curetted or preferably removed. The prolapsed portion should then be subjected to a thorough douching with a reliable antiseptic such as Potassium Permanganate (1-1,500), or a weak solution of Chinosol (1-1,000), followed by the application of Glycerine Belladonna, Glycerinum acidi carbolici or Camphorated Oil.

The prolapse is then reduced manually, either in the standing or recumbent position and as a rule little or no difficulty is encountered. When the bowel is reduced it is necessary to ascertain that it is in its normal position and that no invagination is present. A perforated bamboo or aluminium tube of suitable dimensions according to the size of the patient is then inserted. This tube, an illustration of which is shown, is perforated close to its neck by four small holes for the purpose of retaining it in position by sutures. The remaining perforations are for the purpose of allowing any discharge oozing from the inflamed mucous membrane to escape along with the fæces. The tube is left in position for six to thirty-six hours, according to the severity of the case. The bowels must be kept in a laxative condition by the administration of linseed oil, or castor oil and lukewarm enemas. Anodynes may be administered internally if necessary to reduce straining. Diet should be laxative and easily digestible such as boiled linseed, soft bran mashes, oatmeal gruel, milk, etc.

On removing the tube it has been found that the prolapse does not re-occur in spite of any subsequent straining.

No dogs have hitherto been treated by this method but it may be tried with every prospect of success.

Conclusions.—The method of treatment now described is to be recommended for the following reasons:—

(1) The tube supports the walls of the inverted bowel and exerts pressure on the prolapsed part.

(2) It allows the passage of gas and fæces. If required, enemas can be given through the tube.

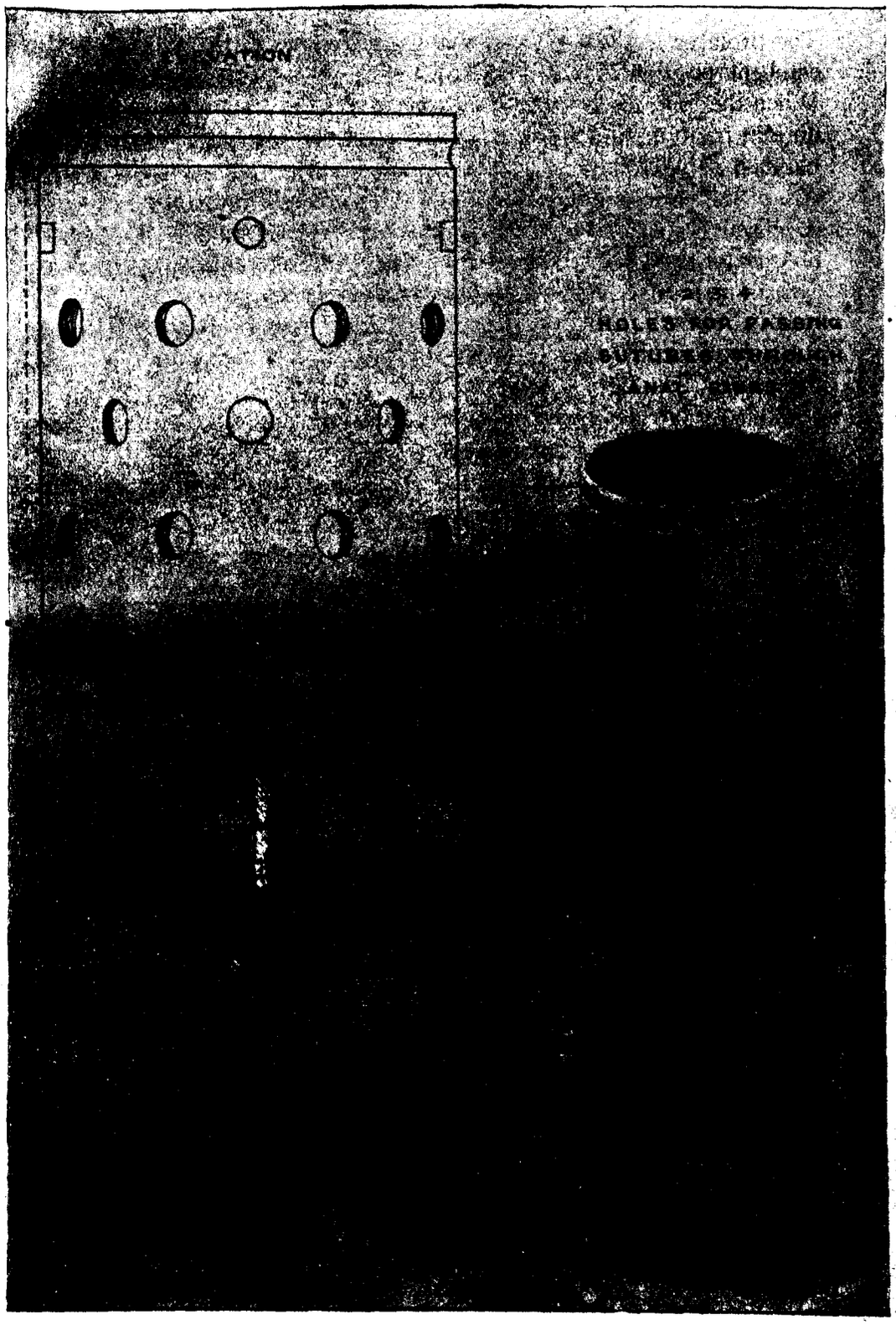
(3) There is no danger of constriction or septic infection taking place as occurs after amputation.

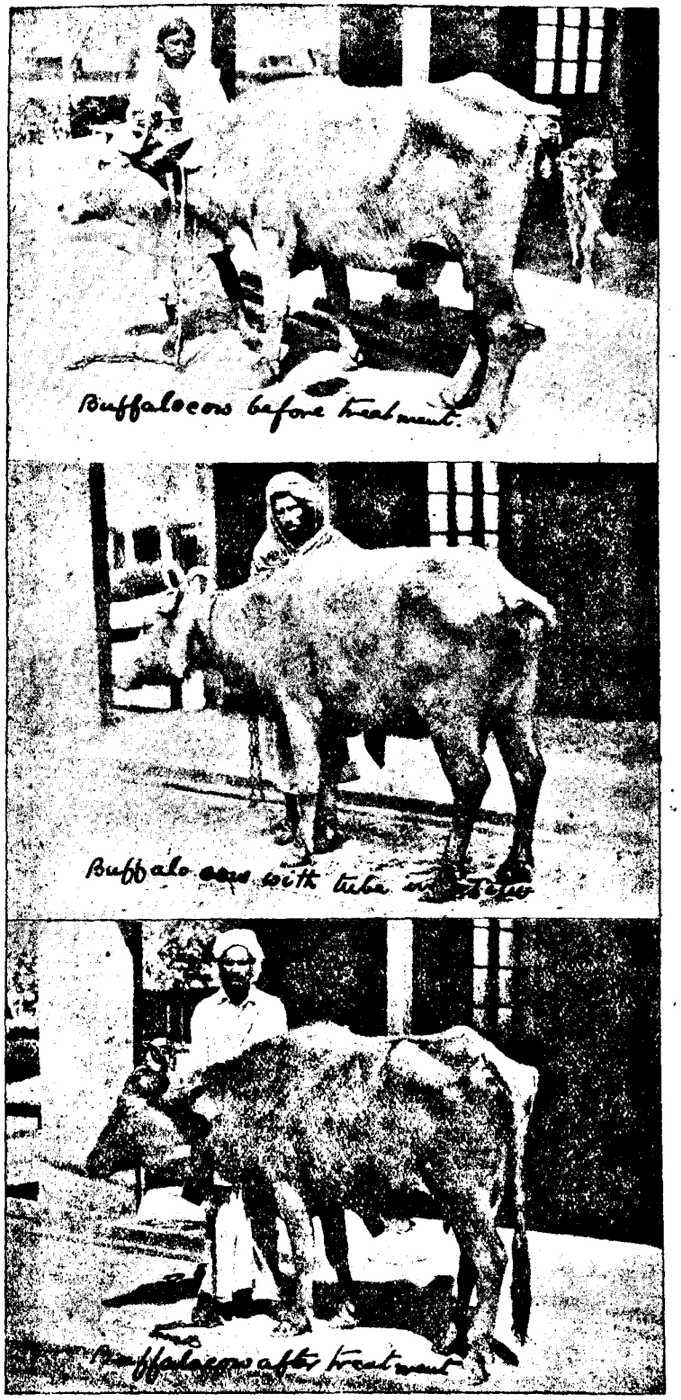
(4) It may be adopted both for recent cases and in those where treatment has been delayed.

Two typical cases out of the twelve which were successfully treated are recorded in detail with photographs.

Subject.—Roan, Country bred entire pony aged 8 years, height 12-3".

Symptoms.—The animal was found recumbent showing signs of colic with straining and constipation. The mucous membranes were congested. The perineal region was smeared with blood and about 9 inches of everted rectum was found.




Buffalo cow before treatment.
Buffalo cow after treatment

Treatment.—The following was administered with the stomach tube :—

Ext. Belladonna Sic. 1½ drams, Ol. Lini 1 pint.

The everted rectum was irrigated with cold water for half an hour and after being washed with solution of permanganate of potash, was smeared with glycerine belladonna.

Reduction having been effected, a bamboo tube 6″ long and 2½″ diameter of the kind described above was inserted and fixed in position by two interrupted sutures. Straining continued but eversion did not occur. After eleven hours the tube was removed and an enema of warm water with soap and oil was given. As the animal continued to strain and passed no fæces this treatment was repeated after three hours. On the second occasion some hard fæces were removed from the rectum and the following was administered by the stomach tube :— Ext. Belladonna Sic. one dram, Camphor one dram, Ol. Lini one pint.

On the following morning the patient was still constipated and the treatment was again repeated. In the evening soft fæces were passed naturally and the animal had ceased to strain.

On the next day the animal was found to have passed liquid fæces during the night and appeared to be comfortable. Soft food was given. Five days afterwards the patient was discharged, having made an uninterrupted recovery.

2. *Subject.*—Female Buffalo, aged seven years.

Symptoms.—It was stated that the rectum had been injured during the coition on the previous day. The rectum was everted twelve inches and the part was congested with some sloughing of the mucous membrane. The animal was straining and passing fæces in small quantities.

Treatment.—One ounce of chloral hydrate was adminstered and the prolapsed rectum was irrigated for one hour with cold water.

The sloughing parts of the mucous membrane were removed with scissors and the parts washed with permanganate solution, and afterwards smeared with glycerine belladonna. Reduction was effected and a bamboo tube 6 inches long and 3 inches diameter introduced and secured by sutures. One and a half pints of linseed oil were administered. In the evening a drench consisting of Ext. Belladonna Sic. 1½ drams, and Ol. Lini 1 pint was given.

On the next morning the animal was found to be passing soft fæces through the tube with no great effort.

Twelve hours from the time of insertion the tube was removed, the rectum washed out with permanganate solution and glycerine belladonna applied. An ounce of chloral hydrate was administered.

On the following day there was slight straining during the act of passing soft fæces. The animal was feeding well.

A drench consisting of chloral hydrate six drams, Potassium Bromide two drams, Treacle four ounces, Water one pint and an enema of luke warm water, soap and oil was given followed by an application of glycerine belladonna to the rectum.

On the fourth day from the commencement of the treatment the animal was discharged cured.

Clinical cases.

RECORDED CASES.

BY MAJOR C. DAVENPORT, O.B.E., F.R.C.V.S.,

Royal Army Veterinary Corps, Thornhill, Aldershot, England.

The following notes have been abstracted from some clinical records maintained during a tour of duty in India. They contain nothing of peculiar interest or of special merit and are intended to be merely simple records of clinical procedure. They are published in the hope that they may be of some interest or use to others engaged in general practice in India.

The Action of Hydrogen Peroxide Solution in a Case of Malignant Oedema.

Disease.—Primarily a lacerated wound (pig cut).

Secondarily.—Malignant Oedema.

Subject.—A bay waler gelding, aged.

History.—The horse hunted a pig in the Ganges Kadir on 5th July, and was badly cut by the pig's tusk. The chase was continued until the pig was killed.

The horse walked back to the line immediately afterwards where the wound was dressed with Hydrarg. Perchlor. solution and bandaged. The horse then returned to camp and from thence to M—a distance of 26 miles, was stiff but not lame. The case was admitted to the Veterinary Hospital at M—at 7 A.M. on 6th July.

Symptoms.—6th July, a wound about 3 in. long located immediately over the inner condyle at the distal end of the radius (O.F.) and running in an upwards and backwards direction. It was apparently fairly deep. Muscle and torn ligaments were exposed. The horse was not very lame. The leg was filled both upwards and downwards from the seat of injury. Flexion of limb was resented, Respiration was accelerated.

Clinical notes.—6th July a hosepipe was played on the wound for one hour followed by dressing with equal parts Acid Boric and Zn. Oxide powder and orders given for exercise for a half hour morning and evening and bran mash feed only. Two hours later as the horse was dull and respiration accelerated he was moved to a loose box and bedded down.

7th July. Not so well. Leg more filled and painful. Respiration accelerated but temperature was normal. Septicæmia was suspected.

8th July. Leg was more filled and tender and horse more lame. Wound looked unhealthy and the tissues were protruding through the cut. Temperature normal and the horse feeding well. Ordered chattie irrigation to be continued day and night. Eusol lotion to be applied to the depths of the wound by means of a syringe four times daily; eupad dry dressing applied to wound after syringing. Also five minutes exercise to be given three times a day. One thousand five-hundred units of antitetanic serum was injected.

9th July. Wound looking more healthy but leg was very swollen and tender. Horse was eating well and was fairly bright. Temperature 102° F.

Respiration rapid. Gave aloes dr. iv. and yesterday's treatment was continued.

10th July. Serious developments. The leg was now filled from elbow to foot. Skin was distended, puffy and tender and there seemed to be emphysematous tissue beneath. Suspected traumatic gangrene and infection by B. maligni œdematis. Temperature 102° F. Decided to operate.

Operation.—Chloral Hydras 1 oz. was given per os and horse thrown on the operating bed and chloroformed.

Examination revealed thick blue sanguineous discharge from a low channel; tissues cheesy looking, black, yellow and apparently necrotic in parts. Tried to probe but could only find two small channels both of which were free of pus. Case strongly suspicious of

21st July. Blistered. Horse still refused to put any but very little weight on the leg.

29th July. Putting weight on the leg. Walking well but when trotted was dead lame. Almost sound at a walk. The blister had taken well.

Subsequent history.—The horse improved slowly day by day and was finally discharged from Hospital sound on 20th September. The horse continued to go sound and was put to duty.

Remarks.—The application of continuous cold irrigation combined with rest is a successful line of treatment in cases of kick wounds in the region of unprotected bone. Such cases require long convalescense.

A PRESCRIPTION FOR INCREASING THE MILK IN CATTLE.

By DES RAJ BALI,
Veterinary Assistant Surgeon, Bhalwal, Shahpur District.

I am very much thankful for the prescription of Mr. V. P. Gokhale, Veterinary Inspector, published in the third issue of the second volume of the Journal. I am of opinion that though there is no such specific galactagogues remedy, yet my last five years' trial for increasing the quantity of milk in cattle shows a deliberate and prominent result. I have tried the drugs mentioned below in not less than twelve cases with entire success. The prescription is as follows :

Country mustard	....	....	1 oz.
Copper sulphate	....	....	1 dram.
Aqua	....	....	12 oz.

Mft. Mist.

Sig:—To be given once a day at morning time.

Ten doses are quite sufficient. Moreover it is very cheap and can be had in each and every village.

I expect the veterinarians will give a fair trial to the above remedy and publish the result.

EVERSION OF THE RECTUM IN DOG.

By K. S. PRAKASA RAO,
Touring Veterinary Assistant Surgeon, Vizagapatam

The affection occurs as a result of debility and in prolonged cases of diarrhoea or dysentery or superpurgation.

The best way to handle such cases is to clean the rectum and then scarify the black spots that may be found on the wall. Then a candle, the size of which may be modified according to the size of the dog, is to be introduced into the opening. The hind part of the animal should be raised by holding both the hind limbs upwards. The belladona ointment or three drops of Tr. Opium in a small quantity of vaseline is to be smeared over the rectal wall. The candle is then introduced into the opening and pushed home until the rectum recedes. The candle is then slowly removed.

The next step is to suture round the anus, the needle passing in and out of the skin only at close intervals round the anus and when both the threads are brought together and tightened or released the orifice will either be closed or released.

With both the ends of the thread so sutured a loose knot is made leaving a narrow opening to permit the passage of fluid and not the rectal wall. The suture is left there for a week and then removed.

During the period, milk diet with 3 to 15 m. of Tr. Opium according to size of the animal are prescribed.

PILES IN A BULLOCK.

By K. S. PRAKASA RAO,
Touring Veterinary Assistant Surgeon, Vizagapatam.

On requisition from the Chairman, Municipal Council, Anakapalle I had to attend to a middle-aged country-bred bullock which was reported to be passing blood from the rectum whenever the animal was worked hard.

After giving soap water enema the animal was thrown down and secured. The hand was passed into the rectum, when a big mass of the size of the wrist was found about an inch from outside in the rectum. Assisted by Mr. V. Venkataraman, Touring Veterinary Assistant Surgeon, Yellamanchili, the sphincter ani was dilated with both the hands and the rectal wall averted. When the pile mass was visible a tight silk ligature was applied to it close to the wall. The loose threads of the ligature were clipped close to the knot and the animal was released.

In our handling there was some bleeding which stopped immediately after the mass was ligatured. The mass was about 6 inches long and it was allowed to remain inside undisturbed.

During the second visit the bullock was examined and it was found that the mass had sloughed off and the bullock was alright.

Translation

AŚVAVAIDYAKAM.

(Equine Medicine.[1])

BY SRI MAHĀSĀMANT JAYADATTA.

Translated into English from the original Sanskrit, with notes and commentaries.

BY NRIPENDRA NATH MAJUMDAR. (*Bengal Veterinary Service*).

CHAPTER I.

Uddesah—Introduction.

Sloka 1. Having made obeisance to Śaṅkara[2] who does good to all corporeal beings, with due deference, specially to Śivā[3] who revealed herself for the good of the world.

Sloka 2, 3 and 4. Having thoroughly gone through all the literature on horses as mentioned by the sages, [4] the signs and characteristics of a horse's body and also treatment of diseases with medicines of proved efficacy, are now described briefly and in regular order, in words easily comprehensible, (and) without any circumlocution, by Śrimatā Jayadatta, son of Srimat Vijayadatta, for the good of horses.

(1) Asvavidyakam literally means Equine Medicine, but the book practically includes everything relating to horses as stated in the introductory chapter. It is now difficult to ascertain the period when this book was written.

(2) Śankara—A god of the Hindu triad. It was the practice of old Hindu authors to invoke the aid of the particular god of whom he may be the worshipper, in the beginning of a book. (Root meaning—who does good).

(3) Śivā—the consort of Śankara or Śiva.

(4) Among the sages, Śālihotra was the oldest and greatest authority on horses, so much so that afterwards veterinarians came to be known as Śalihotriya. The present word "Salutri" in the Punjab derives its origin from this word Salihotriya which was commonly pronounced as Shalhutri. Nakula, one of the Pāndavas who reigned some 4300 years ago (Rājtarangini) in his book Aśvacikitsitam—Treatment of horses, mentions this Śalihotra—a fact that undoubtedly proves the antiquity of the great Veterinarian. Nakul, too, was considered an authority on horses, while Sahadeva, his brother was an authority on cattle, but his book on the treatment of cattle—Gausastram—(mss) is not available.

[The translator will be greatly obliged if any of the readers can give any information regarding the manuscript.]

Sl. 5. In sixtyeight chapters consisting of one thousand and eight hundred [1] slokas (couplets).

Sl. 6. (I shall describe) the different parts [2] of the body, the signs and characteristics, longevity, ageing, the different periods of life with reference to the particular parts of the body as the basis of determining health, [3] the different breeds, the mode of managing the different classes of horses.

Sl. 7. The treatment of sterility, the care of mother and foal, the names of drugs, their posology and the mode of administration, and the mode of housing and rearing of animals according to the prevailing season.

Sl. 8. The mode of cauterisation with caustics, the mode of firing, the technique of operations, of phlebotomy and the mode of the administration of the two forms of enemas Niruha and Anuvāsana. [4]

Sl. 9. The rules for administering drugs through the nose, the mode of sweating, of giving oleaginous drenches and the mode of preparation of medicated oils and ghees. [5]

Sl. 10. The proper care of animals after exercise, the three signs prognosticating sure death as Vedharişta[6] and Kītavedha. [7]

Sl. 11. The treatment of Mrgroga[8] with symptoms in brief and also of diseases caused by the irritation of vāyu[9] etc.

[1] There are 68 chapters, but in both the texts I have got, there are only 1652 slokas. The rest, in all probabilities, were lost during the process of copying from manuscripts.

[2] Parts etc.—These will be described more fully in their respective chapters arranged in the order given in these slokas.

[3] The ancients believed certain periods of life had some influence over certain parts of the body, so in examining an animal in a particular age, the parts over which that particular period of age or year has influence should be very carefully examined for determining the state of health.

[4] Anuvāsana is an enema containing oleaginous drugs and Niruha is an enema containing medicinal extracts.

[5] Ghee is clarified butter.

[6] These are known as Arista and are Svasthārista, Vedharista and Kītarista. They will be dealt with in their respective chapters.

[7] In both the texts it is given as Kativedha which literally means puncturing the loins. This is possibly a mistake and should be Kītavedha which is an Arista.

[8] Mrgroga is possibly Glanders. (Pronunciation—mrigaroga).

[9] According to Hindu medicine there are three humours (?) of the body, Vāyu, Pitta and Kafa. Vāyu literally means air but it includes the air we breathe and the gases formed in the intestines as well as the nervous system and also the subtle force that governs the nervous system—Prāna (life) force. Similarly Pitta means bile, heat as well as the force that governs metabolism and combustion. So about Kafa regarding water and it includes Phlegm also. These will be dealt with fully when we come to them next.

Sl. 12 and 13. The description of diseases in due order such as diseases of the mouth and diseases of the eyes and so on. (The description of) the well-known eye diseases *e.g.* Kācam,[1] Pracāram, Raktam, Patalam and Munjajālam.

Sl. 13 and 14. The severe diseases of the brain arising from Vāyu, Pitta, Kafa and from the combination[2] of these three and from excessive pressure of blood, their etiology, symptomatology and treatment.

Sl. 15. I shall describe in the above order the prognosis of diseases curable and incurable as well as of those that can be cured with difficulty, the temperament of horses and about the uses of garlic, etc. and drugs given in balls as mentioned by the sages.

End of chapter on Uddesa.

CHAPTER II.

Pradeśah—Parts.[3]

Sl. 1. The fool, who does not know the different parts of a horse's body in detail, does not know the signs (bad or good) of horses nor the treatment of their diseases.

Sl. 2. So, the denotation of the different parts are first described and they are to be learnt very carefully for the good of horses.

Sl. 3. The tongue is well-known to all, near the base of which is the soft palate (Sūna)[4] and above it is the hard palate (Tālu) and in front of it is the Gum (Dantapīthakam).

Sl. 4. Next come the teeth (Dantāh) which are upper and lower and below them is the chin (Cibukam) as had been told by the wise.

Sl. 5. Just above the chin is the lower lip (Adharaustha) and on both sides of the chin are the lower jaws (Hanu).

Sl. 6. The learned should know that on both sides of the mouth are the two angles of the mouth (Srkka). The upper lip is called Prapāna just above which is the tip of the nose (Protha).

[1] Kācam is opacity, Prācaram is tumour or any similar growth on the inner or outer canthus, Raktam is conjunctivities, Patala is the formation of a substance like a membrane on the eye and Munjajala is filaria oculi. (Pronunciation—Kācham)

[2] Combination of Vāyu, Pitta and Kafa is called sānnipāta.

[3] It should be noted that the parts are divided in a way very nearly similar to what we have got now.

[4] Sūna literally means uvula.

Sl. 7. On both sides of the tip of the nose (Protha) are the nostrils (Nāsāchidra) and the portion between the nostrils and the eyes is known as face (Ghona)[1].

Sl. 8. On both sides of the face are the cheeks (Ganda) and then come the Ksīrike[2] (Jowl ?)

The part just below the eye is called Asrupāta[3].

Sl. 9. The learned say that, that end of the eye which points towards the ear is the outer canthus (Apānga) and that towards the nose is the inner canthus (Kanīnika).

Sl. 10. The black and white portion between these (two ends) is the eyeball (Netramandal) to cover which are the eye-lids (Vartma) and then is the orbit (Akṣikuta).

Sl. 11. Above that (orbit) is the eyebrow (Bhrūvorlekhā) above which is the forehead (Lalāta) and above the forehead is the head (Kesāntam)[4] and then is the Śruva.

Sl. 12. The wise should know that above the Śruva is the poll (Śira) on both sides of which are the two ears (Karṇa) at the base of which is the root of the ear (Śaṣkuli)[5].

Sl. 13. Two fingers' breadth from the outer canthus is the temple (Śankha) between which and the root of the ear is the portion known as Kataksa.[6]

Sl. 14. Six fingers' breadth downward from the root of the ear is a vital point (Marma)[7] known as Vidu. The portion near the region where bells are tied is neck (Nigāla).

Sl. 15. Below this (Nigāla) is the throat (Gāla) and then the Kaṇṭha[8] (possibly the trachoea).

Sl. 16. The intelligent should know that the breast (Vaksa), sternum (Krola), heart or chest (Hrdaya) and the belly or abdomen (Kuksi) come underneath in succession.

[1] Hence the common vernacular name Ghona or Ghorha.

[2] Ksīrike is the dual form which means that there are two such things, so it cannot mean Jowl. Possibly the portion inside the cheeks where the pulse is felt is meant.

[3] Asrupata literally means where the tears fall. This is possibly to locate the situation of the angular vein, puncturing of which has been recommended in the treatment of some eye diseases afterwards.

[4] Kesanta literally means where the hairs end. The head, therefore, is the portion above the forehead to the point where the mane begins. Sruva is the part on which the forelock grows.

[5] Saskuli also means the opening of the ear.

[6] There is no such division in English. (Kataksa).

[7] Marma is that part, injury or violence to which causes death *i.e.* a vital point. Vidu is a Marma and is that point below the ear where animals are generally shot for the purpose of killing them instantaneously. There is no corresponding English name for that.

[8] Gala and Kantha both mean throat, but Kantha is only meant for the trachoeal portion.

(To be continued)

Extracts

THE NUTRITION OF CATTLE.*

The subject of the feeding of cattle assumes importance from the large part their products play in human dietaries. An accurate knowledge of their metabolism and nutritive requirements, apart from its intrinsic scientific interest, may lead both to more economical methods of feeding and at the same time to an improvement in the quality and quantity of the products, meat and milk, obtained from them. In this survey a brief account will be given of some recent work on the energy, protein and mineral requirements of these animals with special reference to the production of milk in dairy cows.

The measurement of the energy requirement resolves itself into the problem of estimating the heat given out by the animal, since to maintain the body in equilibrium a similar amount of energy must be taken in the food. The output of heat can be measured directly by placing the animal in a calorimeter, or chamber in which the heat emitted is measured by the amount absorbed by a current of cold water circulating through the chamber ; the analysis of the ingoing and outgoing air at the same time will give the consumption of oxygen and output of carbon dioxide during the experimental period. The method requires the use of elaborate apparatus, so that in practice the indirect method of determination of the heat output is more frequently employed. In this the output of carbon dioxide and consumption of oxygen are determined over a short period, and from these data, together with the value of the respiratory quōtient, *i.e.*, the ratio of carbon dioxide produced to oxygen consumed, a value can be found for the heat production which is sufficiently accurate for most purposes. The respiratory quotient conveys information as to the types of food-stuffs which are being oxidized in the body, and this information is essential since the heat produced varies according to the type of food-stuff, protein, fat or carbohydrate utilized.

The problem of estimating the heat output in the case of cattle has been still further simplified by W. W. Braman (*Jour. Biol. Chem.*, 1924, Vol. LX, p. 79) : the only data required are the output of carbon dioxide and the amount of food taken. In a large number of experiments he has found that the ratio heat/carbon dioxide is highest in starvation and falls steadily with increase in the amount of food eaten, the heat production increasing more slowly than the carbon dioxide formed. The change is due to the fact that in starvation most of the heat produced comes from the oxidation of fat, which has a high calorie value, whereas the food is chiefly carbohydrate with a relatively low calorie value. These experiments enable an investigator, by estimating the carbon dioxide production and noting the food consumption, to determine the approximate heat output by applying the formula given by the author or by reading from the graph relating the ratio heat/carbon dioxide to the food consumption, which is approximately a straight line. The heat output thus calculated agrees closely with that actully observed in a calorimeter.

A more elaborate, but more accurate, indirect method of estimating the heat output of cows has been utilized by J. A. Fries, W. W. Braman, and D. C. Cochrane (*U. S. Dept., Agri. Bull.* 1281, 1924). The method depends on the fact that in an animal which is maintaining its weight, the heat output must equal the energy of the food actually utilized by the body during the experimental period. Of the food taken, some is not absorbed and some is excreted in an incompletely oxidized form. The digestibility of the food is usually estimated by taking the difference between the amount eaten and the amount excreted in the faeces, but the authors point out that in cattle, bacteria in the intestine play an important part in digestion. At the same time, one of the products of their fermentative action is a gas, methane, whilst the process itself is accompanied by an output of heat. The methane produced has been estimated in the respiration calorimeter, and heat of fermentation from the ratio of methane to carbon dioxide in the products of fermentation. The results show that whereas the digestible portion of the food appears to be about 66 per cent of that taken by estimation by the usual method, by taking account of the above two factors also, only about 50 per cent of the food consumed is actually absorbed and available for energy and heat production. The actual energy of the food was determined directly by the bomb calorimeter, and thus the actual energy available to the body is known. Nearly all this energy is available for maintenance, growth (or increase of protein or fat in the body) work and the production of milk, about 10 per cent being lost in the processes of digestion and in the formation and elimination of the excreta. The authors have compared the heat production calculated from the available energy of the food with that actually observed during the same period in the respiration calorimeter and have obtained a very good agreement. The result indicates, in their opinion, that this method of "indirect calorimetry is sufficiently accurate for purposes of research in the feeding of farm animals."

* Reprinted from Agricultural Journal, March, 1926, Page 140.

Of the energy available to the body in the food, about half is required to maintain the body-weight constant; the remainder can be utilized for increase in body-weight or for milk production. The data show that a larger proportion of the energy available is found as energy in the milk than in any increase of body-weight; the process of milk formation appears to be more economical than that of body tissue and fat formation. The result suggests that the food materials are available directly for milk formation and do not have to become body tissue first and milk later. Of the available energy, 90 per cent or more can, under certain conditions, be utilized in milk production.

It is of course essential that the conditions of the experiment should be kept as constant as possible in different experiments. One factor which may introduce a disturbing element is the relative amount of time spent by the animal in the standing and lying positions. This subject has been considered in more detail by J. A. Fries and M. Kriss (*Amer. Jour. Physiol.*, 1924, Vol. LXXI, p. 60). They found that allowance must be made for the taking up of heat by the floor on which the animal lies in the respiration calorimeter, this heat being afterwards given up when the animal stands, making the heat output of this period too high. The magnitude of this error can be ascertained by estimating the carbon dioxide output and assuming that the ratio heat/carbon dioxide is a constant. Making this allowance, it was found that the heat out-put of a 400 kgm. cow increased by about 25 calories per hour on standing. The authors recommend that the heat production be calculated to a standard day of twelve hours lying and twelve hours standing, so as to obtain uniformity in the expression of the results obtained by different observers.

It is of interest to note that in the later stages of gestation, a cow appears to require about 2 per cent more food for maintenance than a non-pregnant animal of the same weight.

The utilization of protein in milk production has been considered by J. A. Fries, W. W. Braman and M. Kriss, and also more recently by E. B. Forbes and R. W. Swift. (*Jour. of Dairy Science*, 1924, Vol. VII, P. 11; and 1925, Vol. VIII, p. 15). The two sets of experiments agree fairly well in showing that in well-fed animals the utilization of protein for milk production is about 40 per cent of that available for this purpose (that is, the digestible protein of the food less that required for maintenance). With decrease in the protein intake, however, the former authors found that a larger proportion of the available protein, up to 85 per cent became available for milk production, since the

nitrogen excretion falls *pari passu* with the drop in nitrogen intake, whilst the nitrogen in the milk remains almost constant. With a higher percentage utilization, however, the amount of milk produced tends to fall off, being increased again with increase in the protein intake. The optimum nitrogen intake was an amount of available nitrogen about 10 per cent greater than the nitrogen found in the milk produced. The animals maintained their weight, whereas with a larger protein intake the animals gained in weight by the deposition of fat, together with an increased formation of body tissue. The fact that with low nitrogen intakes the quantity of milk produced tends to fall off in a cow producing a large amount daily, suggests that the level of optimum intake of nitrogen as regards the nitrogen of the milk is not the optimum level for the production of a large quantity of milk which contains both fats and carbohydrates as well as protein, and therefore that the animals should be well fed, if the best results as regards milk production are to be obtained.

In addition to the proteins, fats and carbohydrates present in milk, account should also be taken of its vitamin and mineral content in estimating its quality. Ultimately these factors come from the food in which they should therefore be present, but the amounts passed into the milk may be greater than can be absorbed in the food, leading to a depletion of the animal's own stores. This appears to occur especially in the case of the calcium of the milk. During liberal milk production on winter foodstuffs there may be a definite loss of calcium from the body; on fresh foodstuffs this loss is less or may be absent (E. B. Forbes, Washington Government Printing Office, 1924). This effect is quite probably to be related to different amounts of vitamin A present in the dry and fresh green foodstuffs, but it seems to be clear that the cow should be encouraged to store as much calcium as possible in her body during her dry period by the giving of calcium, for example, in the form of bonemeal, in addition to an adequate supply of fresh green foodstuffs. It is possible also that the addition of sodium phosphate to a dried ration may increase the milk yield after parturition, suggesting that this food my be defficient not only in calcium but also in phosphorus, or that the availability of these elements present in the food is impaired by a deficiency in the fat soluble vitamin A.

The general result of all these investigations is that a dairy cow should be fed on an abundance of fresh green food, containing a supply of protein, etc., which is sufficient to maintain both the quantity of the milk produced at a high level as well as its protein, mineral and vitamin

content. If this be done, the supply of energy will certainly be adequate also.

THE SIGNIFICANCE OF MILK RECORDS.*

Not only do milk records assist the herd owner in selecting the heifer calves from his best milkers to be retained for coming into the herd three years hence, but they are also invaluable in the selection of a bull. This statement was made by Mr. G. H. Garrad in a paper on milk records at the recent conference on dairy cows at the Midland Agricultural College.

Later in his paper he stated that the influence of agricultural shows in the development of our milk breeds has been gradually diminishing, because as an indication of commercial value the agricultural show takes second place to the record of performance.

The only certain test of a cow's ability to milk, he said, is the evidence of the milk recording dial, and those who start keeping milk records for the first time are usually astonished at the disclosures that quickly follow. With the evidence of the milk-record sheet, the herd owner has the necessary information on which he can weed out his unprofitable cows, and by raising his standard year by year and disposing of such cows as do not come up to that standard he is in a position gradually to increase the output of milk from the same number of cows.

The existence of milk records assists the herd owner in selecting the heifer calves from his best milkers to be retained for coming into the herd three years hence. But milk records are also invaluable in the selection of a bull. Like begets like, and we know that the father and the mother exert an approximately equal influence on the dairy qualities of the offspring. Seeing that the bull that fathers the herd has some 50 sons and daughters in the course of the year, whereas the cow only has one or two, it follows that the bull is far more important than any individual cow. A bull that is to be useful to the dairy farmer must carry a guarantee not only as regards the outward appearance and the constitution of his offspring, but also as regards their milking ability. This is merely a matter of ancestry.

The larger the number of good milking ancestors that the bull can count in his pedigree, especially amongst his nearest relatives, the more likely is he to transmit these milking qualities to his daughters.

* Reprinted from the Agricultural Journal of India, March 1926, Page 144.

BREEDING UP THE HERD.

Thus the milk-recording movement will become increasingly valuable in the development of our dairy breeds as it becomes older and more widely established. A bull's prepotency, *i.e.*, his power of transmitting his character to his offspring, depends on the length of his pedigree, the number of generations for which he has been bred to a particular pattern. If he is used for mating mongrel cows that have never been bred to any particular pattern, his influence will be so much the greater. The worse the cows, the more important it is to have a good bull, because the greater is the scope for improvement and the stronger is the influence of the bull. Breeding experiments have shown that by the use of carefully selected bulls it is possible to build up a high-class herd from the poorest herd of mongrel cows in three or four generations.

In recent years the influence of agricultural shows in the development of our milk breeds has been gradually diminishing because as an indication of commercial value the agricultural show takes second place to the record of performance. Nor is the fact that a cow is a pedigree animal a guarantee that she is a good milker. At the London Dairy Show the non-pedigree Shorthorns consistently do better in the milking trials than the pedigree cattle, and in most commercial dairy herds the mongrel Shorthorns milk better than the pedigree Shorthorns. The record of performance is the real test. Unfortunately a bull does not produce milk, so we cannot tell directly his milking ability, and we must rely on the milk records of his nearest female relatives, his dam, granddams and, if available, his full sisters.

"BY THEIR FRUITS."

On any dairy farm where the cattle are homebred, the external influence of the bull can be seen by a glance at the young stock. But "by their fruits ye shall know them", and it is only when the heifers come into milk that the influence of the bull on the milk yield of the herd is apparent. Real improvement in a herd means that the heifers reared to maintain the stock are better milkers than their dams. By comparing the milk records of a number of heifers, bred from the same bull, with the milk records of their mothers when they were first-calf cows a clear indication is given as to whether or not and to what extent that bull is improving the milking capacity of his herd.

Daily Recording.

Continuing, Mr. Garrad said he was entirely in favour of daily recording as opposed to weekly recording. Weekly weighings are approved by the Ministry of Agriculture, and at the end of the year the total yield obtained by weekly weighings will be within about 2 per cent of the truth, but daily recording, once it becomes a habit, entails very little trouble and is not so likely to be forgotten. Daily records are far more instructive, and they draw attention at once to a cow whose milk yield has dropped down a pound or two since yesterday. Inquiry is made at once as to the cause of it. Is she bulling? If so, the information is valuable. Is she ill? If so, the necessary treatment or isolation can often be adopted before the mischief has gone too far. If the milk yield of all the cows has dropped they may have been overdriven or wrongly-fed.

Inefficient milking is responsible for an enormous amount of loss in the cowshed, and if each milker is made to put his initials when he enters the yield of each cow on the milk record sheet, and the figures for each man are added up at the end of a fortnight or a month, it is easy to find out which are the most efficient milkers and which would be better employed elsewhere. Some herd owners organize competitions amongst their milkers. Each one milks each cow a certain number of times, and at the end of a month the man who has obtained the most milk, as disclosed by the milk record sheet, wins the prize. Efficient milking may easily make a difference of 10 per cent in the yield and a still greater difference in the percentage of butter fat. Some herd owners give a bonus to the milkers at the end of the year for every gallon the herd average is above 700, 800, 900 or 1,000 gallons, as the case may be, according to the milking capacity of the herd.

How Recording can Help.

Milk records in themselves are valueless; their value depends entirely on the use that the herd owner makes of them. They can be used in many ways directly or indirectly, and can have a most stimulating effect both on the owner and the milkers. There is rivalry between cow and cow and between one milker and another. An increased or decreased yield on any particular day gives rise to speculation and investigation as to the cause, the effect of change of feeding is watched in connection with the milk yield, and there is an altogether different atmosphere amongst the workers in the cowshed. Milk recording has a strong educational value, and tends to greater interest

and efficiency all round on a farm where the milk records are kept and interpreted intelligently.

Selling Recorded Stock.

Cows sold with officially certified milk records make much higher prices in the market than cows sold without a record, but in his opinion it would be in the true interests of the milk-recording movement if, when milk-recorded stock are sold, some indication were given as to how the cows had been fed and managed. Three times milking and forceful feeding has sometimes been adopted for the sole purpose of getting high milk records for sale purposes. Such practices throw milk recording into disrepute, and somehow or other must be stopped. There is also need of some uniform system of publishing milk and butterfat records. Sometimes they are stated for a lactation period and sometimes for a period of twelve months, sometimes in pounds and sometimes in gallons. In England the gallon is usually taken as equivalent to $10\frac{1}{4}$ lbs. in Scotland as 10 lb., whilst in America it is only $8\frac{1}{3}$ lbs. Mr. Mackintosh, of Reading, has made a strong case in favour of the milk yield being always stated in terms of pounds per lactation period, the lactation period being stated in days, and the date given of the next calving and the number of days the cow was dry before the next calving. The weight of butterfat produced in the lactation period, if known, should be stated in pounds, and the method of calculation of the weight of butterfat should be specified.

Extract from the Report on Milk Supply, etc., when investigations were being carried out by the late Dr. L. L. Joshi, the Municipal Analyst, on the Milk problems in Bombay about the years 1913 and 1914.

By D. S. Laud, G.B.V.C.,

Veterinary Officer and Assistant Superintendent, Zoological Collection, Bombay.

About the years 1913 and 1914 when working as Veterinary Inspector in the Health Department in the South division of Bombay City, I was deputed to assist the late Dr. L. L. Joshi, the Municipal Analyst in collecting samples of milk and gather other information about the Milk Supply in Bombay. The samples of milk were taken directly from animals of different breeds from various Milch Cattle stables under very strict aseptic precautions. The milk tests were

carried out by Dr. Joshi, under the direction of the late Health Officer, Dr. J. A. Turner with a view to establishing standards of milk in the City, and enforcing regulations and measures, etc., in regard to the licensing of dairies and milk shops, local milk vendors and gawlis and the prevention of adulteration of milk. Simultaneously it may be stated that investigations were being carried out by Dr. H. Mann in Poona and other parts of Deccan. In connection with this inquiry I was asked by the Municipal Analyst to submit a report on the following heads, *viz.*—

(1) Some factors influencing and affecting the quality of milk and

(2) Some suggestions for the control of Milk Supply in the Town and Island of Bombay.

I give below extract from the report submitted by me at the time with some modifications, etc..—

I. Some factors influencing and affecting the quality of Milk.—

The influence of breeds is not very appreciable so much on the qualitative as on the quantitative supply. The richness in quality of milk depends more on the food and water supply, seasonal and climatic influences, diseases of animals, and to some extent to bad and insanitary stabling. Given a good Sindhi cow with full udders and with all the prominent points of a better and deep milker food poor in nitrogenous elements and fatty matters, the milk yield will always remain poor inspite of the good breed and the points of a good milker. The effect of breed does more to influence the quantity of milk. It is a well-known fact that cows from Gujerat, Kathiawar and Sindh are better and deep milkers than the Deccan breed ones. They are larger animals with large paunch massiveness of hind quarters and with well-developed udders. One peculiarity of Sindh cows, imported here, is their tendency to suffer from inflammation of of the milk glands.

However, with regard to the buffaloes, it is the experience of gawlis and dairymen in Bombay that Surat-bred buffaloes yield milk rich in cream though poor in quantity; Delhi-bred buffaloes coming next in this respect, and Jaffrabad-bred buffaloes coming last, which means that the qualitative supply in buffalo breeds is in inverse ratio to the quantitative supply.

Now, as regards other points influencing the quality of milk, the first thing which influences the quality of milk is food, and regular, pure and sufficient water supply. Rich food will yield milk rich in

quality and for this reason oil cakes, cotton seeds and chuni (husk of Canjanus Indicus) form part of the daily ration of the Milch Cattle. Thus, cream from milk of buffaloes largely fed on oil cakes will churn into greasy butter; even if the temperature in the churn is lowered artificially to the most favourable point. Cotton seed tends to produce fine firm butter, and the cream can be churned at a comparatively high temperature. The cream of milk from cows fed on chuni (husk of Cajanus Indicus) gives butter, which has nice flavour and better colour than usual.

In monsoon, when green and succulent food is available, the quantity of milk supply is increased at the expense of the quality. It is a belief among gawlis, cow-owners and dairymen that watering animals before milking, increases the yield of milk. The quality must necessarily be decreased to a corresponding degree. A gawli, when selling a Buffalo, guaranteeing a certain amount of milk yield, will invariably allow the animal to drink water freely before milking. It is possible that the milk yield may be affected this way; for succulent and green food lowers undoubtedly the percentage of solids, making the milk watery.

Food influences the quality of milk as also the season and time of calving.

The stabling of animals, defective sanitation and overcrowding in the stables, also affect more or less the quality of milk. Though these factors may not operate directly on the milk, still they indirectly do so by lowering the vitality of the animals. Milch cattle stables have lofts. Though they are built at a height and do not affect the air and ventilation of stables, they form suitable places for storing hay, keeping of milk utensils and also for dwelling purposes for gawlis. Stables should not be built on a site where they would be open to rain and wind so that animals tethered therein would be subjected to all the vicissitudes of climatic influences. Stables should not be built in or near the heart of the city and in thickly populated quarters, and they should not be allowed to keep 300 to 400 animals. No stable, however big should be allowed to accomodate more than 100 animals, as proper supervision and cleanliness cannot be observed and carried out by the owners, if the number of animals is large and in the monsoon the condition is bad.

Bad and insufficient water supply also lowers the vitality of the animals, and thus indirectly affects the quality of milk. Hence pure and sufficient water supply should always be provided.

Now we come to the most important factor, which influences the quality of milk *viz.*, disease. Apart from such specific diseases: Foot and Mouth Disease, Cow-pox of Varida vaccine, and Tuberculosis of the udder, there are other diseases of the udder which affect the milk supply. These diseases are the following :—

(1) Traumatic mastitis.
(2) Acute Parenchymatus Mastitis.
(3) Sub-cutaneous or Interestitial Mastitis.
(4) Specific or Contagious Mastitis.

In all the diseases of the udder, the milk undergoes a certain amount of change—the changes running from thin watery to Muco-purulent or even curdy and thick mass. There is alteration in the colour of milk and in specific diseases there is the presence of virus and Bacteria.

As for Tuberculosis of the udder, it is rather a disputed point, whether Indian cattle suffer from this disease. No proper investigations have been made or proper evidence has been forthcoming. Indian cattle live more an out-door life and all the year round in districts are allowed to graze in the open except in big cities, where they are tied up in stables the whole day long. This fact may give immunity to the disease; but prolonged and further investigation is necessary before any definite opinion could be formed.

II. Some suggestions for the control of Milk Supply in the Town and Island of Bombay.

Before making any suggestion as regards the control of milk supply in the Bombay City, the first thing to be noted is the source and manner in which the supply is made to the Bombay public.

1. Most of the milk in Bombay comes from the suburbs in Salsette—from Kalyan and Virar, Bassein, Nall Sopara, and even from Palghar. The manner in which this is brought down to Bombay is most primitive. The Railways do not provide the milk-man's early train as in London and other big European cities of trade, commerce and activity; nor do they provide special and separate compartments for the milkmen. The consequences are that these milkmen travel in the first and early train, coming from overland from Surat and Poona or Nasik. These milkmen travel in the same third class compartment as the other railway travellers, shelving their open milk cans, which are covered with concentric rings of straw, assumed to prevent the spilling of milk, under the seats in the carriage. The state of the carriages,

the dirt and the dust and the habits of the passengers occupying the compartments are well known and need not be discussed; and to add to these environments the open uncovered milk vessels give entrance to all such dirt and dust and thus form suitable nidus for the growth of Bacteria. In such a state the milk after say 2 or 3 hours journey in the crowded carriages and hot atmosphere, reaches this principality and is then distributed to the Bombay public. The adulteration of this milk and the fraud played on the public are an evident feature.

2. The second source of milk supply of the city is from local stables and cow sheds and dairies, and the supply is made in three ways.

(*a*) Supply is made by individual purveyor of milk to his constituents going on his daily rounds and distributing milk.

(*b*) Supply is made by the milk vendors from milkshops, milk stalls, sweet-meat sellers' shops seen in the town of Bombay.

(*c*) In the first two instances, the milk supply is never truly genuine, as adulteration is generally the rule, except in cases of few honest dealers. These traders belong to the uneducated lower class and are quite ignorant of the laws of sanitation and Public Health. Their places and shops, their milk vessels and their mode of living are very dirty. The milk is carried and sold by them in open vessels, and on their rounds often dip their hands into the milk cans, when measuring milk to their constituents. In cases of shops, all such milk and preparations whereof are exposed for sale. The gawlis never wash the udders and milk glands of animals, before milking. The milk vessels are never properly washed, and the gawlis use the same vessels for other domestic purposes. The gawlis never strain milk, nor keep it in cool places before distributing.

Although there are so many dairies in Bombay, the milk supplied by them is in no way superior to the milk supplied by common gawlis, except in cases of a few firms; and the cleanliness in them is far from satisfactory. The people who take up this trade are generally educated and belong to the middle class. Besides, trading in milk, the dairymen trade in Butter and Cheese. For the preparation of these milk products, cream is required. This cream is removed by dairymen from fresh milk by the process of skimming, leaving skimmed milk and to prevent detection he adds to this skimmed milk such substances as Arrowroot flour, etc., ... to make up for its thickness and to attain its original and natural consistency. Further, to prevent staleness and getting rancid preservatives such as Boric Acid, Alum and Salylic Acid Formalin are added to the milk. In some instances, stale

milk is added to fresh milk, sold by dairies in special bottles or in closed milk cans, locked and sealed, giving false sense of faith. Even some of the common gawlis are adepts in this form of trick.

Now we come to the most important question of controlling the milk supply to the city and an effort must be directed according to the source from which the supply is made.

To effect control on the supply, made from the suburbs, co-operation of both the Railways is necessary, in as much as providing special milk-trains or special compartments for the safe transit of milk only, giving facilities to the local authorities for inspecting milk on the stations.

The general provisions for the control of milk in Bombay should be made for the following :—

(1) All such persons trading in milk whether as cowkeepers, milk vendors or dairy-men to possess license from the local authorities. A Register of all such persons to be kept by the local authorities, and the same revised by them every year.

(2) In case of stables, where stalls are tenanted by individual cowkeepers or buffalo owners, provision should be made insisting on all such animal owners to exhibit their license in their stalls and in front of their animals.

(3) For securing the cleanliness of milk-stores, milk-shops and of milk utensils, used for containing milk for sale by such persons. Also provisions for washing the udders of animals before milking.

(4) For securing precautions to be taken for protecting milk against infection or contamination by purveyors of milk in dairies, milk-shops, milch cattle stables, or during transit and when selling the same by retail or wholesale.

(5) For the inspection of dairies, milch cattle stables and milk-stalls for sanitary purposes, and to take samples of milk for bacteriological examination and chemical analysis.

(6) For the inspection of cattle against disease or sickness, provisions of restricting the sale of milk from animals suffering from diseases of the udder, whether Tuberculosis or not, and in the opinion of the Health Officer unfit for human consumption. All such animals to be segregated and in case of doubt as to Tuberculosis, Tuberculin tests carried out.

(7) Provision of all the recommendations of the Royal Commission on Tuberculosis.

(8) For the inspection of men working in dairies or trading in milk against disease or sickness.

(9) No milch cattle stables, however big, to be licensed for more than 100 animals.

(10) Provisions for inspecting food given to milch cattle, unwholesome food to be destroyed just as stable litter, etc. Alteration to be made in the present Section 384 C. In this case there is only fine, which is inadequate to suppress the practice of feeding on litter. This fine to be substituted by fine and imprisonment.

(11) Milk depots to be provided by the Sanitary authorities, where genuine milk should be sold, and all samples of milk taken from the city to be examined and certified by the local authorities.

Since the above investigations effective measures and regulations for the control of milk supply in Bombay have been established. The Municipal Act of 1888 has been amended ; provisions have been made therein ; all the dairies, milkshops, milk vendors, gawlis, importers and hawkers and their servants are required to obtain license from the Municipal authorities and comply with certain Municipal requirements. The licenses are being renewed every year. Systematic Inspection of the milkshops, etc., is done by the Sanitary or Medical Inspectors with the aid of the MILK STAFF. At the Railway stations imported milk is inspected every week or as often as possible. Hundreds of milk samples are taken every week by the Sanitary and Milk Staff and sent to the Municipal Analyst for examination and test in the Municipal Laboratory. In the event of these samples that are proved to be adulterated (*i.e.*, if they fall below the standards laid down) the offenders are prosecuted by the Sanitary authorities and fined in the Police Courts. For infringement of license condition similar action is taken against the license of milkshops, etc. Sweet-meat shops and milk products are also brought under license regulations. Every credit in this respect is due to the Municipal Executive and the " Urbs Prima In Indis " has maintained its own name.

Association News.

THE PUNJAB VETERINARY ASSOCIATION, LAHORE.

An Extract of the Annual Report of the Punjab Veterinary Association, Lahore, for the year ending 30th November, 1925.

The following were the patrons of the Association during the year under report :—

(1) Col : G. K. Walker, C.I.E ; O.B.E ; I.V.S.
(2) Mr. T. F. Quirke, I. V. S.
(3) K. B. S. Sardar Shah Gilani.
(4) K. S. M. Ghulam Rasool Khan.

Office Bearers :—

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Vice-Presidents :—(1) K. Ghulam Hassan. (2) S. Hardit Singh.
Secretary :—Ghulam Safdar Khan.
Assistant Secretary :—Mr. Mohd. Alam.
Treasurer :—S. Shamshad Hussain.
Editor, Pb : Vety. Journal :—S. Riazul Hassan.
Sub-Editor :—P. Gopal Krishna Sharma.
Auditors :—(1)M. Barkat Ali. (2) L. Durga Dass.

Members of the Managing Committee :—

(1) K. S. M. Ghulam Rasool Khan, (2) Mr : Karm Ellahie,
(3) CH : Mushtaq Ahmad, (4) M. Qamar Din, (5) M. Mohd Jan.

Total number of the members during the year was 46.

Income :—Total income of the Association was Rs. 2,338-8-0 only excluding outstanding balance of Rs. 294 only.

Expenditure :—Total expenditure was Rs. 1,848-15-0 as against estimated expenditure of Rs. 2,298-0-0 only.

Meetings of the Association :— Five General and 12 Managing Committee meetings were held.

Punjab Veterinary Journal :—All the four issues of the Journal were very satisfactory. Some literary articles were also published in it to make it more interesting. The number of subscribers to the Journal was 266.

Honoraria :—To Secretary, Rs. 100.
To Editor, Rs. 100.

Prizes :—(1) Ch : Mushtaq Ahmad, Rs. 25 only for reading original articles in the meetings of the Association.

(2) M. Abdul Ghafoor Arbang, Hissar, Rs. 15 and (3) M. Abdul Haq, Rawalpindi, Rs. 10 for contributing good articles to the Journal.

On the whole the year was very successful and the financial condition quite stable.

(Sd.) GHULAM SAFDAR KHAN,
Secretary.

Reviews.

Veterinary Posology.—By G. A. BANHAM, F.R.C.V.S., *Cambridge* and W. M. J. YOUNG, F.R.C.V.S., D.V.S.M., (*vict.*), *Edinburgh.*

Published by Bailliere Tindall and Co., 8 Henrietta Street, Covent Garden, London, size Fscp. octavo, Number of Pages XII + 359. Price 8/6 net.

We have much pleasure in congratulating the author on the successful issue of the fifth edition of this useful work. It is a very well-written and instructive work containing choice collections of varied items of special veterinary interest and serves as a book of ready reference for a busy practitioner. Each subject is arranged in such a regular order as to facilitate quick reference. In addition to dealing with Posology it deals with many important subjects with a clear grasp of different standpoints.

We are far from being wrong if we say that it contains in a nut-shell the whole of the practical side of the veterinary medicine. The chapter on therapeutical classification of drugs and other agents, Table of diseases and suggested therapeutics, Notes on Bacteriology, Parasitology, Protozoology and Entemology are wellworth mentioning besides other items of practical importance which are too many to enumerate.

We sincerely recommend the book to all practitioners and students who wish to be up-to-date in the profession.

Veterinary Toxicology.—We are in receipt of a copy of the 2nd Edition of Veterinary Toxicology by G. D. Lander, D.Sc., Demy 8 vo., pp. xiv-326, figures in the text 39 published by Messrs. Bailliere, Tindall & Cox, 8, Henrietta Street, Covent Garden, London.

The book is a very neat little publication containing very valuable up-to-date information regarding poison and poisoning in animals.

We unhesitatingly recommend the same to the profession in general : to profession and students it will be a first class text book and to practitioners a ready reference book.

Printed by W. L. KING at the Methodist Publishing House, Madras and Published by the EDITOR "The Indian Veterinary Journal" Madras.

The Indian Veterinary Journal.

A Quarterly record of Medicine, Surgery and of General Veterinary Intelligence.

Devoted to the Cause of the Veterinary Profession in the Indian Empire.

EDITED BY

P. SRINIVASA RAO, G.M.V.C.,
Veterinary Surgeon, Madras.

CONTENTS:

Original Articles, Reports of interesting cases, Editorials, Veterinary Society Reports, Extracts, Reviews and Notices of Books, New Veterinary inventions in Medicine and Surgery, Therapeutic Notes, Service Notes and Correspondence.

Amongst the Contributors to the Indian Veterinary Journal are some of the most eminent men in the profession in India and abroad.

The Indian Veterinary Journal circulates among Veterinary men of all classes and ranks in Civil, Military, Municipal, Local Fund and Mission Services Private Practitioners, etc.

The Indian Veterinary Journal visits Government, Municipal and Local Fund and Private Hospitals, Dispensaries, Charitable Institutions, etc., etc., in India and abroad.

The Indian Veterinary Journal affords a very powerful medium for all advertisements appealing to the Veterinary profession in these countries.

It isespecially suitable for advertisements relating to :—

Drugs
Fine Chemicals
Surgical Instruments & Dressings
India Rubber
Surgical Goods
Disinfectants
Soaps
Veterinary Books
Hospital Furniture
Appliances
Proprietary Medicines
Toilet Goods
Optical Goods
Veterinary Publications
Dietetic Preparations
Laboratory Fittings, Etc.

Advertisements of a select character only are admitted into the Journal.

All correspondence relating to Advertisements should be addressed to :—

The Editor, 18, Wallajah Road, Mount Road, Madras.
Remittance and Cheques should be made to the Editor.

N.B.—The Editor reserves the right to exclude from the Journal any advertisement which, in his opinion, is contrary to the ethics of the Veterinary profession.

Size of Printed Page of the Journal.

Sc... of Charges for Advertisement :—

Whole page per insertion	...	...	...	Rs. 15
Half page do.	...	...	...	„ 8
Quarter page do.	...	...	...	„ 5
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2. The Editor declines any responsibility in the event of one or mo of advertisements being omitted from any cause whatever, and he also account any responsibility for damage to or loss of blocks.

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