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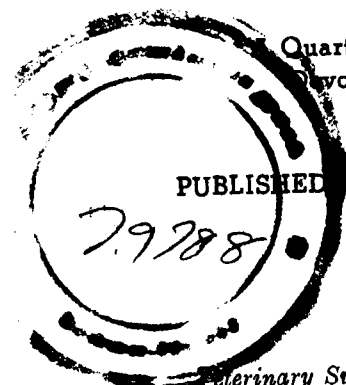
P. SRINIVASA RAO, G.M.V.C.,
Veterinary Surgeon, Madras.

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

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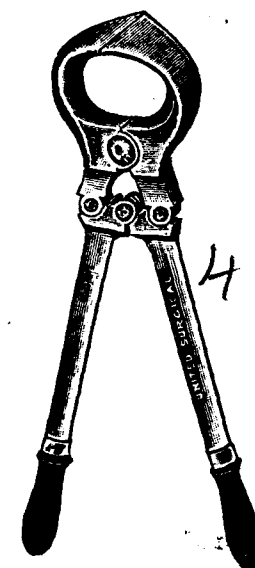
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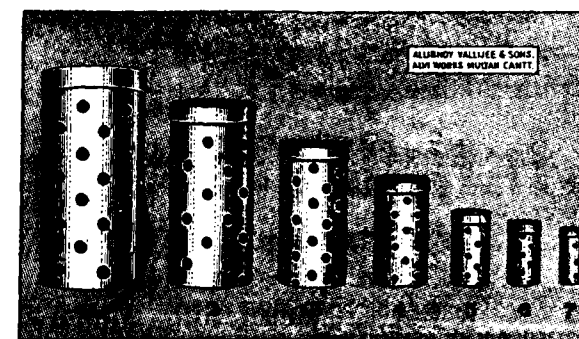
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THE
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General Articles

A BRIEF REVIEW OF THE SPECIES OF SCHISTOSOMES OF THE DOMESTICATED ANIMALS IN INDIA AND THEIR MOLLUSCAN HOSTS*

BY

M. ANANT NARAYAN RAO, G.M.V.C.,
Lecturer in Parasitology, Madras Veterinary College.

Faust (1919) laid stress on the necessity of an accurate description of schistosomes and he remarked that a superficial description of the worm is a distinct burden on the literature. He urged that the Cercariæ should also be carefully studied in minute detail so as to be helpful in working out life history investigations. The writer considers that the study of miracidia as well will be an additional aid in the differentiation of species of schistosomes.

In India, it is regrettable that some of the papers on Schistosomes, are found to be based on observations either lacking in detail or on assumptions which are altogether unproven. But a vast amount of literature on larval trematodes found in India is available. The work of Sewell (1922) on the subject is of considerable value. He has described larval trematodes from about 23 different species of fresh water snails. If the characters of true schistosome cercariae can be summed

* This paper was read at the 26th Sessions of the Indian Science Congress held at Lahore in January 1939.

up as apharyngeal, brevifurcate, and without eye spots, then the number of such cercariæ described in India becomes reduced to four, which is less than the number of species of Schistosomes found in the domesticated animals in this country.

In this paper it is proposed to briefly analyse the work done in India on the species of schistosomes including the concerned miracidia and cercariæ.

Species of Schistosomes recorded in India.

S. bovis is the first species of schistosome discovered in the portal venous system of cattle, in Egypt, by Sonsino in 1876. This worm was recorded in India by Montgomery (1906) in a sheep. Katsurada in 1904 discovered *S. japonicum* in Japan and this worm inhabits the portal venous system of man, cats, dogs, pigs, cattle and horses in that country. Bhalerao (1934) has reported these worms from a pig in Calcutta. Those two worms appear to be alien to India and their existence or otherwise in this country will be discussed later.

Montgomery (1906) was the first in India, to study schistosomes in the portal venous system of domesticated animals. He described fairly accurately, three new schistosomes in them viz. *S. spindalis*, *S. indicum* and *Ornithobilharzia bomfordi*. The first two have been found to parasitise the portal venous system of horses, cattle, sheep, goats and buffaloes. Fairley and Jesudasan (1927) have gone one step further in showing that buffaloes are the chief definitive hosts of *S. spindalis*. As regards *Ornithobilharzia bomfordi*, it is regrettable to note that there are no papers on it besides the one by Montgomery.

In 1932, an important discovery of another schistosome parasitising the nasal veins of cattle was made. Three workers viz. Malkani at Patna, Datta at Muktesar and Rao in Madras independently discovered that the cause of the so-called "Snoring Disease" in cattle, was a schistosome. The unique feature of this schistosome is that it inhabits the nasal veins

unlike the others known till then. Rao (1932) described it as a new species. He also found that buffaloes suffered from "Snoring disease" but in them, the lesions in the nose, were much less pronounced than in cattle. In 1933 and 1934, Rao worked out the life cycle of this worm, and obtained further proofs that it is a new species. Bhalerao (1938) however still holds that it is only a variety of *S. spindalis* on the ground that this worm is subject to many variations. In this then, is a comparable parallel, to what was obtained in Egypt as regards human schistosomiasis, till Leiper (1915) definitely proved that two different species of schistosomes — *S. Mansoni* and *S. haematobium* are responsible for the two types of the disease in man.

In 1933, Rao and Ayyer discovered a new schistosome, which they named *S. suis*, in the portal venous system of pigs in Madras. Later, Rao and Swaminatha Ayyar (1934) and Rao (1937) found in the faeces of dogs, suffering from dysentery, ova of *S. suis* which perhaps caused that condition in them. Chandler (1926), had described similar ova in fresh faeces collected from fields, used as defaecation areas, to which pigs had access in two villages in North Bengal. On the assumption that the sample of faeces collected by him may have been from a human being, named the yet-then-unknown schistosome as *S. incognitum*, affecting man. Obviously, the sample of faeces was from a pig. Hence, Rao and Ayyar (1933) suggested that the name *S. incognitum* being only a *nomen nudum*, it may be considered as a synonym to *S. suis*.

Molluscan Hosts.

When the last great war came to an end in 1918 and Indian troops began to return home, there arose a question, whether the troops infested with schistosomiasis in Egypt will become the sources of outbreaks of human schistosomiasis in India. This question led to a fairly exhaustive study of the molluscan fauna of fresh waters and also of the larval trematodes found in them. Kemp and Gravely (1919) studied the question first and said that the chief molluscan hosts of schistosomes affecting man viz.,

Bulinus (Isodora), *Physopsis*, and *Katayama* (Blamfordia) are not present in India. They also made several unsuccessful attempts to infect various species of fresh-water snails with miracidia of *S. haematobium*, obtained from ova in the urine of an army man, first in Hyderabad (Deccan) and later in Calcutta. They found that the miracidia were not even attracted by the snails they used in their experiments. Sewell (1919) observed that an outbreak of human schistosomiasis was not possible in India because of the absence of the kinds of snails required to complete the life-cycles of the schistosomes affecting man. In other words, if a particular type of snail is absent in a locality, the species of schistosome that has adapted itself to it, will also be absent.

It is proposed now to take each of the species of schistosomes and note its molluscan host.

1. *S. spindalis* Montgomery, 1906.—Liston and Soparkar (1918) investigated the life cycle of this worm in Bombay. They found that *Indoplanorbis exustus* (Deshayes) is the intermediary host. Their work was confirmed by Fairly and Jesudasan (1930) and Rao (1933-34). The cercariae of this worm have also been recorded in *Limnea acuminata* and *Limnea luteola*, to a much less extent than in *Indoplanorbis exustus* by Soparkar (1919) and Rao (1933) respectively.

2. *S. nasalis* Rao, 1932.—Rao (1933) found that *Limnea luteola* is the chief molluscan host and to a less extent *Indoplanorbis exustus*. The cercariae of this worm were recorded by Sewell (1919) from *L. amygdalum*, *L. acuminata* and *I. exustus* and it was named by him in 1922 as *Cercaria Indica XXX*. A reference to this cercaria will be made again.

3. *S. bovis* Sonasino, 1876.—The Molluscan hosts of these worms are recorded by Monnig (1938) as *Physopsis africana*, *Physopsis globosa* and *Bulinus contortus*. It has been pointed out above, that these snails are not found in India; hence their absence indicates non-existence of *S. bovis* in India. Montgomery (1906) was not correct therefore in saying, that the worms he found in the portal venous system of a sheep in Bareilly,

United Provinces, were *S. bovis*. He obtained from that sheep, 150 male worms and only one female worm, but he did not describe them. In the summary of his article, however, he has noted, in a table, the average lengths of worms and their paired and common caeca against each of the then-known species of schistosomes. It is interesting to note, that he gives the same measurements for *S. haematobium* and *S. bovis*. The common caecum of *S. bovis* according to Khalil (1924) and Bhalerao (1932) is about a quarter of the length of the whole worm, whereas in *S. haematobium* it is about half the body length. In *S. indicum*, the common caecum is about half the length of the whole worm. Montgomery himself has noted this fact in his table. It is gathered from his article that he was probably guided, only by the size of the worms to distinguish *S. bovis* from *S. indicum*. This factor alone, has no value in identification of this group of worms. Hence it is more than probable that Montgomery actually saw full sized *S. indicum* and regarded them as *S. bovis* because *S. indicum* is as long as *S. bovis* though less stout. His mistake is pardonable because, at that time, the amount of knowledge necessary for the identification of this group of worms was very limited, but unfortunately that mistake of his is seen repeated in Text Books on Helminthology and India is included in the areas of the regional distribution of *S. bovis*, even though the type of mollusca it requires to complete its larval development is absent in India.

A few years ago, the writer found *S. bovis* recorded in the Annual Report of Hyderabad (Deccan). Those worms were obtained by the writer, through the courtesy of the Director of Civil Veterinary Department of the State and the Veterinary Investigation Officer, for examination and they were found to be typical *S. indica*. Such a mistake, should not have occurred at all, with the amount of knowledge at our disposal, regarding the morphology of these worms. It is interesting to note here, that Brumpt (1937) attempted to infect *Indoplanorbis exustus* with *S. bovis* and failed to do so, but his control snails *Bulinus contortus*, took the infection well. Hence, *Indoplanorbis exustus* cannot be a molluscan host to *S. bovis*.

4. *S. japonicum* Katsurada, 1904.—The occurrence of *S. japonicum* in India was recorded by Bhalerao (1934). His report was based on a few male worms which he obtained from a pig slaughtered in Calcutta. Rao and Ayyar (1934) have pointed out that the description of the worms given by Bhalerao agrees more with *S. suis* than with *S. japonicum*. Further, Faust (1930) says that *S. japonicum* is adapted to a peculiar group of amphibious snails—*Katayama nosophora*, *K. formosana* and *Oncomelania hupensis*, which are very limited in their distribution over the Sino-Japanese areas and that its introduction into other regions is improbable. In the absence of that group of snails, *S. japonicum* cannot exist at all in India. So far no indigenous cases of schistosomiasis japonica have been reported. Under these circumstances it seems unlikely to find either *S. bovis* or *S. japonicum*, except in imported animals from regions where the worms are found.

The life-history of any of the remaining schistosomes viz. *S. indicum*, *O. bomfordi* and *S. suis* is not known yet, hence information regarding their molluscan hosts is wanting.

Miracidia of known Schistosomes: It is interesting to note that a study of the morphological details of miracidia of schistosomes reveals certain differences which are constant in the given species. A knowledge of these differences, particularly of the comparative length of the anterior glands with that of the gut and the number of groups of cilia in the ciliary girdle, should help in the identification of the species of schistosomes infesting an animal, when the ova of such schistosomes are more or less alike in shape. It is not a difficult matter to obtain live miracidia for examination, either in faeces or other excretions, in which ova of schistosomes are encountered. It seems that Rao (1937) is the only one in India who has given detailed description of the miracidia of *S. spindalis*, *S. nasalis* and *S. suis*. A detailed study of the anatomy of miracidia of the remaining known schistosomes will add considerably to our knowledge and help in the identification of species.

Cercariae of Schistosomes recorded in India and Their Molluscan Hosts.

The number of apharyngeal, brevifurcate cercariae recorded in India, so far, are nine in number and those can be divided into two groups, according to whether they bear eye-spots or otherwise. In the former group, there are five described, which are named below.

1. *C. indica* XXXVI Sewell, 1922, from *Indoplanorbis exustus* in Wynaad.
2. *C. indica* XXV Sewell, 1922, from *Indoplanorbis* in Ganjam.
3. *C. bombayensis* XIII Soparkar, 1920, *Indoplanorbis* in Bombay.
4. *C. bombayensis* XIX Soparkar, 1920, *Limnea acuminata* in Bombay.
5. *C. saundersi* Rao, 1931, *Limnea acuminata* in Madras.

There are reasons to believe, that the Cercariae of this group grow up into species of *Bilharziella* Looss, 1899.

In the other group without the eye spots, which is believed to be the true schistosome group of cercariae, the following four have been described.

1. *Cercariae Indicae* XXX Sewell, 1922, from *L. amygdalum*, *L. acuminata*, *L. luteola* and *Indoplanorbis exustus*.
2. *Cercaria* of *S. spindalis*, (Soparkar, 1922), from *Indoplanorbis exustus*, *L. acuminata* and *L. luteola*.
3. *Cercariae Indicae* XLVII Sewell, 1922, from *Melanoides tuberculatus*.
4. *Cercariae anomala* Rao, 1929, from *Indoplanorbis exustus*.

It is thus seen that the number of true schistosome cercariae described falls short of the number of schistosomes indigenous to India.

The adults of only two cercariae noted above are known. The cercaria *spindalis* is the larva of *S. spindalis* Montgomery, 1906 and *cercaria indica* XXX Sewell,—1922, that of *S. nasalis*, Rao, 1932.

A brief history of cercaria indica XXX is of some interest. Sewell (1919) first obtained this from *Limnea amdygdalum* at Calcutta and found that it resembled very closely the cercaria of *S. japonicum* excepting in the cephalic glands. On this account, it received considerable attention and Sewell said that the final test in separating this from that of *S. japonicum* lay in the similarity or otherwise of the adults obtained from them. Sewell appeared to have made experiments to obtain the adult but he has not published his results. Rao (1933 & 1934) showed, by experimental infection in calves, that cercariae indicae XXX develop into *S. nasalis*. Bhalerao (1934) however, argues that because cercariae indicae XXX and the adult male worms described by him as *S. japonicum* are recorded from the same locality viz. Calcutta, *S. japonicum* should be considered as the adults of those cercariae. Experimental evidence obtained by Rao and the absence of the intermediary hosts of *S. japonicum* in India are against Bhalerao's assumption and his argument. Thus, it would seem, that attempts to investigate the adults from trematode cercariae in general and schistosome cercariae in particular, are not commensurate with the amount of knowledge that has been gathered about the various cercariae, available in this country. It is regrettable that very few attempts, if any, are made in India, in obtaining adult trematodes from cercariae.

Conclusion: An endeavour has been made in these pages to show that *S. bovis* Sonsino, 1876, and *S. japonicum* do not exist in India because the molluscan hosts to which those worms are adapted, are absent in this country. Schistosomiasis in animals in India has not received adequate attention. There are reasons to believe that there is much economic loss caused by that disease in cattle, sheep and goats. Datta (1934) has pointed out that *S. indicum* is one of the causes of the so-called nodular cirrhosis of the liver in horses. Workers have successfully infected small animals, with schistosome cercariae and after the lapse of four to six weeks, have observed changes in their liver. This knowledge may be stretched further, perhaps, to raise a question, whether cercarial infection acquired while

bathing in ponds containing true schistosome cercariae of animals be one of the causes of the so-called non-alcoholic cirrhosis of the liver in man in India.

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COMMON SURGICAL CONDITIONS OF CATTLE IN INDIA.

A Lecture delivered under the auspices of the "Madras Veterinary College Medical Association."

BY

K. S. NAIR, G.B.V.C., M.R.C.V.S., D.T.V.M.

Superintendent, Serum Institute, Madras, on 17-1-39.

It is true that bovine surgery is not so spectacular as that of equine one. Operations like Neurectomy whereby the removal of a small piece of nerve, you restore a lame animal to comparative soundness are not undertaken in cattle. There is also certain difference between the cattle practice of Europe and that of the east, mainly depending upon the use cattle are put to in these countries. In India, the ox is mainly a beast of burden and there are several surgical conditions that result from such use. Even in the cow the problem is not exactly the same. In the west the cow practice confines itself to building up of healthy herds. In India the dairy industry is still in its infancy and the farmer usually owns a cow or two for his domestic needs. Herds of any size as that of the Pattagar are owned only by a few individuals.

Tuberculosis, contagious abortion, and streptococcal mastitis have not yet become acute problems with us in India.

Coming to the subject proper on the outset, permit me to make the remark that the cattle is a docile animal and will stand a great deal of insult, and healing of a surgical wound is rapid and tissue reaction satisfactory, provided the common sense surgical principles are adhered to. The day of using strong antiseptics and extensive unnecessary dissection of tissues is past.

The most common condition that is seen in any hospital is the inevitable Yokegall. These galls, once called "tumour necks" need not be interfered with the knife unless you want to

evacuate the contents. You will be surprised at the diminution of the size of the gall by the application of a smart blister or two; but when the walls have become too fibrous, dissection has to be resorted to. In any case leave sufficient skin to cover the wound and healing by first intention should be the rule and not the exception. The suturing up of such wounds should be undertaken when bleeding has been completely stopped, otherwise you are asking for trouble. Serous abscesses can be treated by tapping the contents through a hollow needle or cannula. An abscess where pus has accumulated must be evacuated and the least interference with the inside of this cavity will bring about a cure in a short time. Syringing, packing and such other old practices had better be discarded. A general rule is always to relieve tension, and help nature to repair the damage.

Now in the region of fractures, except certain fractures, a great many are not amenable to treatment. Calves are good subjects and respond to treatment satisfactorily and so treatment should be attempted in these animals in every case. Fractures of the flat bones of the head, rib fractures, and fractures of the tail do often heal without giving much trouble. The fracture of the external angle of the Ilium which is so common in the horse is not very often seen, although I did have such a case in a small she-buffalo which was crossed here in the College covering yard by one of the Delhi buffalo bulls. Fracture of the hip joints is not uncommon and heals with deformity which is not a serious thing in the cow. The humeral fractures are often oblique, and the usual treatment by means of a charge is worth a trial. But the fractures of other parts of the limbs, even when they happen to be simple do not heal satisfactorily. Crushed fractures of the digit have been occasionally seen and these often make a satisfactory recovery, provided the digit is amputated in time. Horn fractures are a class by themselves; if the core only is exposed, a good tar bandage will protect and heal up the sore. In case of a broken horn, amputation is our standby and anything over a third from the tip will lead to disaster. I may state as a general remark that broken horn is often of a trouble-

some nature, and healing is very tardy and often complicated with sinusitis of the frontal bones. One of the common conditions in India, as you all know, is what is commonly called cancer of the horn and as long as the etiology and pathology of the condition remain obscure, amputation is the only form of treatment. In certain parts of the presidency it is a veritable scourge and many young valuable cattle are lost because of its presence.

Among luxations the commonest seen is the chronic intermittent dislocation of the patella which give the animal a modified stringhalt like action. The injections into the stifle joints of Iodine do not always produce desired results, however it is worth a trial. I have not been able to get a museum specimen of this condition for the College.

Many of the common bone diseases of the Equidæ are not looked for in cattle, although it is not uncommon to see a spavined bullock.

The bursal enlargements are not of a serious nature. The hygroma of the knee of cattle which is a constant picture in every surgical text book is not a common condition in India, but occasionally capped fetlocks are seen, and one such case made an uneventful recovery by having a seaton passed through the swelling.

When I come to review the surgical conditions of the teeth, the commonest I have seen is the sharp molars and these are just cut off with the tooth shears. Plying the rasp over the cut ends will smoothen the remaining sharp edges. Caries tooth, alveolar periostitis, and other conditions are only very rarely met with. One case of actinomycotic jaw was operated upon and cured. Salivary calculi are sometimes seen, but do not require surgical interference, since they do not come against any head gear.

Ranula is occasionally seen in cattle and the ordinary practice of snipping off a portion of the cyst, and painting the inside with Tr. Iodine is a satisfactory mode of treatment.

As indicated a little while back, sinusitis, other than that of the frontal sinus is uncommon.

Tumours of the nostrils occasionally come under surgical attention and one such tumour which was removed was in the nature of a polypus seven inches long and had to be removed by trephining into the nasal cavity. It was not very long back that nasal granuloma or nasal schistosomiasis was considered a surgical condition. In this condition as in many others, a successful cure was first put into practice before investigation discovered the etiology of the disease. In this connection, I was surprised once to see an Assistant Surgeon in a hospital pushing up the nostril of a bullock a rattan cane, and using it as a swab with some drug on it.

Choking is not such a common condition in India as in the west, since we do not feed cattle on roots and tubers. However palmirafruit, mangostones and occasionally some sharp object as needle will cause choking in cattle.

Tapping the rumen can be done without any fear of complications, and the common sequelae spoken of in the text books, such as peritonitis, emphysema, abscess formation, shock, etc., are of rare occurrence.

Rumenotomy is said to be beneficial for several conditions, and is asserted to be a safe procedure, but I must admit that I have not undertaken any such procedure.

Imperforate anus of newly born calves is seen in all clinics and provided a rectum is present in the pelvic region, a plastic operation will provide an anus. An unusual case I had, did not have a normal rectum at all, but it was found in post-mortem to be floating in the abdominal cavity.

Acute hernia is not a common condition in cattle. An abdominal or ventral hernia can often be observed in cattle. As these result from injury, one should be careful when dealing with a recent case involving the abdominal wall. It is a good procedure to allow the acute symptoms to subside when probably no interference may be necessary. The other common form is

the umbilical hernia so often seen in calves. This type of hernia will often get corrected as the animal grows up, and the abdominal muscles get firmer and thicker. Pelvic hernia or gut tie though elaborately treated in your lecture notes, seldom comes for treatment in the clinics, and this is not strange since the usual cause of gut tie results from a type of castration never done in this country.

Urinary Calculi although seen in cattle of all parts, it is something of a major problem in the Andhra Districts. Since it is the symptom of a disease, the Surgeon can give only temporary relief. If we accept Col. McCarrison's findings that lithiasis depends on certain nutritive factors, then correction of the diet of the animal appears to be the logical treatment. However, once stone or sand is formed, the surgeon will have to get it away. One of the commonest forms is the accumulation of sand like material at the external urethral orifice and this may be got away by using a flexible blunt probe. If the stone happens to be in the sigmoid curve, operate just behind the scrotum and if the stone is located in the intrapelvic part, operate the same as in the horse. Our cases have healed up splendidly by leaving the wounds open without the insertion of sutures.

I do not like to dilate on castrations. Burdizzo or its modifications are eminently suited for this country. The failures reported result from bad technique or by an illmade instrument. In one of the exhibitions, I had occasion to see a large number of badly made and ill-conceived instruments. These are often put out to the market by lay people and should be used only after adequate trial.

The udder very often has to be attended to by the surgeon. Milk fistula has been seen sometimes and results from mamitis and abscess formation. The best time to treat this is when the cow is off the milk. I have seen a few cases where the teat was maliciously cut. Conservative surgery is the keynote of every operation of the udder. Gangrene of the udder has been operated on where a posterior and anterior quarter on the same

side have been removed and the resulting wound healed up splendidly. Since we got Stinson's teat instruments for the College, several cases of tight milking have been successfully operated upon.

The important cases that come for treatment for affections of the eye are cancer of the eye of the adults, and dermoid cysts in the calves. Removal of the eye is done expeditiously, but it usually takes a very long time to heal. Dermoid growths require careful dissection and results are not often very satisfactory.

Foot diseases are not so important in the cattle as in the horse. The old teaching of examining the foot even when a horse is suffering from a headache, is a sound procedure in the cattle also. Working oxen suffer from the usual troubles resulting from shoeing. Nailbind and pricks are of every day occurrence. Contusion of the sole is a prolific cause of lameness, particularly in unshod animals. Sand crack is of the transverse kind and usually results from foot and mouth infection. A certain hypertrophy in the interdigital space and consequent lameness baffles treatment. Deformity of the claws is often a genetic factor, but can also be acquired by neglect and is not uncommon in stall fed cows. Avulsion of a whole hoof results from a cart or something heavy going over the digit, and the ordinary antiseptic treatment will bring about a cure in such cases.

LARVA OF EPHESTIA KULNIELLA IN THE EGG OF A HEN

BY

F. R. BEAUDETTE, D. V. M.,

New Jersey Agricultural Experiment Station, New Brunswick,
New Jersey, U. S. A.

The yolk of a hen's egg was submitted on Sept. 30, 1938, with the request that the "worm" found therein be identified. I am indebted to Dr. John B. Schmitt, Assistant Entomologist at Rutgers University, for identifying the larva as the caterpillar of the Mediterranean flour moth, *Ephestia kulniella*.

Dr. Schmitt states that the larva of this Pyralid moth feeds on all kinds of stored grain and on flour and meal and that he has found them in laying mash. This readily accounts for the presence of the caterpillar in a chicken house and it is entirely possible that one should make its way into the oviduct of a chicken.

Although the parasite was found in the yolk it is highly improbable that it actually reached the ovary for in penetrating the yolk here the latter would have been broken in the abdominal cavity. More likely, the caterpillar was incorporated in the albumen, was enclosed in the egg and later penetrated the yolk.

Cases of aberrant parasitism involving eggs are not rare. Hall (1) records the finding of *Ascaridia galli* in a hen's egg and states that 5 such specimens are in the collection of the B. A. I. A fluke, *Distomum ovatum*, Rud. was also reported in the hen's egg by Linton. No doubt a careful search of the literature would reveal additional cases.

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THE IDENTIFICATION OF SUSPECTED DEER BLOOD STAINS

By

F. R. BEAUDETTE, D. V. M.,

*New Jersey Agricultural Experiment Station, New Brunswick,
New Jersey, U. S. A.*

Fenstermacher and Pomerooy (1) have recently reported on the use of the precipitin test in an attempt to identify some blood stains on a packsack suspected of being of beaver origin. Although the stains proved not to be beaver blood these authors mention that there is no reference in the literature to the use of the test in the identification of wild animal blood. Hektoen (2) has identified rabbit blood on two occasions, nevertheless, a case which I had five years ago might be worth recording.

The circumstances surrounding the case in question were somewhat as follows. Killing of deer out of season was suspected in a certain district. Two deputy game wardens stopped a car for the purpose of a search and when two of the men got out they threatened the wardens with arms while the third escaped—presumably for the purpose of disposing of a deer. Later the car was apprehended and the men were held on a charge of assault and battery. No deer was found but there was a blood-stained rain coat in the car. The defendants claimed that the stains were duck blood.

One of the wardens cut out a piece of the stained coat about 10 inches square and placed it in an envelope in a freezer. About the same time the warden confiscated a deer that had been killed by an automobile and collected a sample of blood from it which he also placed in a freezer. On January 13, 1933, the warden brought the envelope containing the piece of blood-stained coat and the bottle of deer blood to the laboratory for examination. It was his idea that a microscopic examination would reveal the

identity of the two samples. Obviously, the freezing had caused haemolysis of the samples so that this was not even attempted. However, such an examination would otherwise have made possible the identification of nucleated avian cells. In the end, it was decided that a precipitin test would at least make the separation of avian and mammalian blood possible.

Experimental.

The sample of known deer blood measured approximately 28 c. c. It contained some clots and haemolyzed fluid in consequence of the freezing. The sample was centrifuged and 9 c. c. of supernatant fluid removed. Nine c. c. of salt solution were added to the clotted blood and the mixture shaken and recentrifuged and the 9 c. c. of supernatant fluid removed were added to the original 9 c. c. This solution was used as an antigen for tests and for the production of an anti-deer precipitating serum in a chicken as follows:

Jan. 14. Subcutaneously 3.4 c. c. at two points in the region of the breast.

Jan. 17. Intravenously 3.2 c. c.

Jan. 21. Intravenously 3.4 c. c. A slight anaphylactic shock followed this injection.

Jan. 27. Bird bled to death by cardiac puncture. After clotting the sample was broken up and centrifuged to obtain a clear serum.

Now, since the defendants had claimed that the stains were duck blood it was necessary to have an anti-duck precipitating serum. Accordingly, 10 c. c. of blood were collected from a duck by cardiac puncture and the serum collected in the usual manner.

A chicken received the following injections:

Jan. 14. Intravenously 1.2 c. c.

Jan. 17. Intravenously 1.2 c. c.

Jan. 21. Intravenously 0.8 c. c.

It is interesting to note that in this case no shock followed the second or third injections.

On Jan. 27, and again on Feb. 6, this bird was bled from the heart and the serum collected.

The unknown sample was treated as follows: By means of a capillary pipette fitted with a rubber nipple it was possible to collect 0.2 c.c. of hemolyzed blood from the coat. Then 1.8 c.c. of salt solution were used to wash off some of the dried stains and this too was added to the 0.2 c.c. already collected. Finally, 2 c.c. of salt solution were placed in the envelope where some fluid blood had drained from the piece of coat. This too was added to that already collected and the whole was centrifuged to obtain a clear fluid.

Small tubes were made to set up the test by sealing one end of short lengths of glass tubing of small diameter. The purpose of this was to conserve the supply of immune serum. The tubes were sterilized.

In setting up the tests a small quantity of non-diluted immune serum was placed in each of a series of tubes by means of a capillary pipette. Then, an equal quantity of antigen was added to each tube by the same means and in such a manner as to stratify the immune serum and antigen. The antigen was used in a series of dilutions to get a range of 1-100 to over 1-10000. Of the three antigens, that is, duck, deer and the unknown, exact dilutions could be made only in the case of duck serum. Dilutions of the known deer blood were quite accurate because the total volume of blood was approximately 28 c.c. as already stated. In the case of the blood-stain, however, dilutions had to be calculated. With these points in mind, the tests were set up.

The serum of the chicken immunized against known duck serum was tested against known duck serum, known deer blood and the unknown stain. In this series, the serum caused a precipitate with duck serum in dilutions up to 1-10000. There was no precipitation of the known deer blood nor of the unknown sample in any dilution. This demonstrates clearly that the stains were not of duck origin as claimed by the defendants. It may be

remarked here that the precipitate formed almost immediately and incubation was really not necessary although it was carried out without changing the results.

Reciprocal tests were next made with the serum of the chicken immunized against known deer blood. In this instance the serum precipitated known deer blood up to what was calculated as a 1-10000 dilution. There was no reaction with known duck blood, but with the unknown blood stain a precipitate was formed up to a calculated 1-10000 dilution. Therefore, this test shows that the blood stain was of ruminant origin and very likely deer.

The writer was asked to appear in court to give testimony and did appear but after some delay the defendants pleaded guilty to the first charge of assault and battery and no further charge was made.

Fenstermacher and Pomeroy used fowls rather than the usual laboratory animals because the stains were suspected of rodent origin. However, the use of chickens in the production of precipitating sera is not new because Hektoen (2) for one used chickens in 1918, and even claims that they respond better than the rabbit. Hektoen advises the use of 1.9% salt solution in place of the usual .85%. My own limited observations seem to indicate too that the fowl is less likely to die from an anaphylactic shock in the course of immunization.

Summary.

A blood stain was shown not to be of duck origin as claimed since it was not precipitated by an anti-duck serum. A solution of the stain, however, was precipitated by an anti-deer serum which was used because the stains were suspected of being of deer origin.

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VETERINARY SCIENCE AND PUBLIC HEALTH*

BY

M. R. V. PANIKKER, B. SC. (EDIN.), M.R.C.V.S.,
Asst. Principal, Madras Veterinary College.

The importance of Veterinary Science in Public Health will at once become clear if we examine the scope and structure of the subject of Public Health as it is now understood as well as actually practised in countries that are scientifically well advanced. These countries from their bitter experiences of the past, have realised that the subject of Public Health should directly or indirectly deal with all matters concerned in the physical welfare of the people; it should aim at promoting their health and preventing diseases in them; it should also have the ultimate aim of eradicating the diseases themselves when that is possible. In other words it should formulate the best means in providing wholesome and nutritious food containing all the necessary constituents, wholesome water, pure air, proper sanitation and other hygienic environmental conditions that are conducive to health and that would resist, counteract, combat and eradicate diseases. Thus the administration of Public health, having such diversity of factors involved, is a many sided problem. It requires the knowledge and aid of several sciences and it is on the firm foundation of the co-ordinated and collective skill of such scientific experts as the physician, nutritionist, hygienist, sanitarian, Veterinarian, laboratory scientist etc. that the superstructure of Public Health Administration should be built.

The position in India.

The intimate and inevitable correlation of Veterinary Science to Public health is not well understood by many in this country. This is not at all surprising, because it is only an instance of 'history repeating itself.' Probably what happened in the European countries in the early part of 19th century is now being

rehearsed in India. In these countries prior to the 18th century, no appreciably keen interest was shown for exact information in Veterinary matters. It is only after the advent of Veterinary Schools, 1st of its kind at Lyons (France) in 1763 followed by others including the one at London in 1791 that the Veterinary art began to receive any public recognition. Even after this, for many years it was thought that the Veterinarian's function was only to treat sick animals. Somewhat similar was the position in India during the close of the 19th and probably the early part of this century when most of the Veterinary Colleges of India had their origin. No doubt the position to-day is somewhat altered, yet we are far behind the times.

There seems to be no other single profession that may be of so much all-round usefulness to humanity as the Veterinary. Although its scope of service in National prosperity is wide and of varied nature, I propose this evening to deal with only some of its more important aspects relating to Public Health *i.e.*, those concerned in promoting health and preventing diseases in human beings.

Veterinarian as the custodian of human health.

Here I am referring to the *nutritional factor* in Public health especially in respect of food-stuffs of animal origin namely, milk and meat and the products derived from them. Sufficiency of proper food is the first essential in maintaining health. The food-stuffs should also be of proper quality and purity.

Among the articles of food got from animals the most important is *milk*. It is of high nutritional value and has become an indispensable item of human diet. Its present deficiency in India is materially affecting our health. This is more so in the case of children. *Milk products* such as butter, ghee, butter-milk etc., are also necessary items of our diet. These like milk are not obtainable now in adequate quantities to meet our requirements. According to a recent estimation the quantity of milk now available is only about 8 ounces per man per day, whereas to maintain proper health he should have at least 16 ounces daily. Consequently a rapid increase in the production of milk is imperative.

* University extension lecture delivered on 4-2-'39, at the University Examination Hall.

This is to be achieved not by increasing the number of the poor specimens of cattle that we see to-day, but by increasing the yield of milk of good quality in individual cows by selective breeding operations and by proper animal management. Further, the interests of the general public have to be safeguarded against the malpractices committed by unscrupulous vendors who supply impure and adulterated milk and its products. Consumption of such foodstuffs not only results in malnutrition but often would be harmful in other ways. A proper system of inspection of milk and its products by duly qualified hands is necessary to avoid such preventable risks.

Other important articles of diet though not so universally used as milk are *meat and its products* derived from various species of animals such as sheep, goat, ox, buffalo, pig, poultry etc. Meat eaters of this country are not usually getting the full benefit as the meat sold in the market is often not of the proper quality. Eggs are also widely used, but their production is inadequate and still continue to be of poor quality. Much needs yet to be done in the matter of meat industry and egg production. For doing this and for solving those vital problems relating to milk and its products, that I have already mentioned, most efficiently and economically Veterinarians by their qualification, training and experience are the best suited.

Veterinarian as a preventer of diseases.

Many of the wild animals, either on account of man's liking or fancy for them or due to their usefulness, have been domesticated and they have since then become his indispensable associates. This, as Edward Jenner has remarked towards the end of the 18th century "seems to have proven to him a prolific source of diseases." It is now definitely established that man may contract many diseases from animals. Some of these diseases such as Foot and Mouth, Rabies, Glanders, Anthrax etc., are primarily occurring in certain species of animals, but man may contract them only secondarily. In the case of such diseases it is evident that man would not fall a victim to them, if we succeed in preventing their occurrence in animals. Similarly certain

parasitic conditions occurring in man can successfully be prevented by eliminating the source of contagion which is from animals. The common tape-worm infection is an example of this. Usually it is only the adult stage of these worms that harbours and causes trouble in man; while, animals are the hosts for their larval stage which could gain access into man only by ingestion. So if the connecting link in the life cycle of the parasite is broken the risk to man can be avoided. In this connection it is to be borne in mind that animals like the dogs and horses though not used for food purposes in this country would often be a source of risk to human beings. Dogs are the primary source for the incidence of the most fatal disease known as rabies in animals and the analogous condition known as hydrophobia in human beings. They are also responsible for hydatid disease and certain type of worm infestation in man. They also transmit occasionally other infectious diseases. Similarly it is only from the horse that man may contract the dreadful disease known as glanders. Apart from these diseases of animal origin, certain diseases of human beings such as Typhoid, Dysentery, Diphtheria, Septic sore-throat, human Tuberculosis etc., are at times spread through animal agency. Thus man is liable to get many an infectious disease from animals or through their agency. The assistance of skilled Veterinarians would go a long way in protecting him against such diseases and it is in recognition of this fact that most of the countries scientifically well advanced have given a very prominent place to the Veterinarians in the field of State preventive medicine.

Inspection of Milk and its Products.

This is one of the most important health measures that should be left in the hands of Veterinarians. Milk, though an ideal food would at times turn to be a veritable poison. For, there are many animal diseases such as bovine tuberculosis, Foot and Mouth disease, Malta fever of goats, Anthrax, Rabies, Cow-pox, Milk-sickness, Actinomycosis etc., that may be transmitted to human beings through the milk of diseased animals and products

made out of it. To recognise such diseased conditions, to take timely precautions against their transmission to human beings and to prevent their spread to other animals which multiply the source of risk to man, Veterinarians are the only competent persons. Further the first essential in the production of clean and wholesome milk is to have a healthy cow with a healthy udder without which all other sanitary and hygienic measures would be absolutely futile. This can be achieved only with the help of a Veterinary man. Moreover the utilisation of the skill and vigilance in connection with milk industry is not to be confined to the animals and to premises of the dairy, but should be extended to all other places where milk and its products are stored and sold for public use. Thus at every stage in milk industry, services of Veterinarians should be most profitably availed of.

Inspection of Meat and its Products.

This is another important item of public health work demanding the services of Veterinarians. It is only they who can efficiently carry out the antimortem examination of the live animal and the post-mortem inspection of the carcass, its organs and parts with a view to determine their quality and their wholesomeness or otherwise for human consumption. In countries where meat is largely used for food, considerable loss of lives used to occur due to want of proper meat inspection. For instance in Germany it was estimated that about 50 % of the cases of meat poisoning used to be due to the consumption of beef and veal and about 33% on account of the flesh got at emergency slaughter where proper meat inspection was lacking. Among the diseases that are transmissible to human beings through meat are Tuberculosis, meat poisoning, Anthrax, Actinomycosis, adult or larval stages of certain worms such as *T. Solium*, *T. Saginata*, *Trechinella spicalis* etc. The extreme importance of meat inspection in preserving human health is well expressed in the following statement of Dr. Charles Wardell Stiles of United States of America made some 42 years ago

"A well regulated system of slaughter house is as necessary to public health as is a well regulated system of schools to public education."

Purse in Public Health

There is also another aspect to be considered in connection with the maintenance of public health. The general poverty of the average Indian villager is partly responsible for his unhygienic way of living. In this as in many other matters purse is a prime concern. The scanty resources of the average man enables him only to have a mere hand to mouth existence. Naturally he cannot afford to meet the requirements of proper health standards. Consequently an improvement of his economic position is an urgent necessity so as to enable him to have a better way of living. To attain this, India being an agricultural country greatly depending upon cattle for its agricultural activities, a fuller and wider utilisation of the immense benefits available from Veterinary Science is called for.

From what I have said it may be observed that proper administration of Public Health requires the knowledge, skill and assistance of several sciences of which Veterinary Science is one that is as important as any other. It has an essential and significant role in human nutrition relating to food-stuffs derived from animals such as milk and meat and their products, in preventing diseases both of animal and human origin and in enabling the application of other Public Health measures. I shall now explain to you with the help of lantern slides how to protect ourselves against contracting diseases from animals.

A NEW BLEEDING TRAVIS*

BY

N. S. SANKARANARAYANAN, G.M.V.C.,
Animal Nutrition Section, Bangalore.

For both chemical and physiological studies, it is the general custom to draw sample of blood from the jugular vein, after casting and securing the animal. This method has been found to have many disadvantages. The first and foremost is straining the animal to such an extent that the composition of the blood is likely to vary during the time of sampling. Péters and Van Slyke have stated in the Quantitative Clinical Chemistry Interpretations, "There is concentration of Erythrocytes and Haemoglobin during exercise and shock." Secondly, taking blood samples from pregnant animals is impossible as casting a pregnant cow is not to be thought of. Further, casting a cow even when not pregnant may result in injury to the animal. Lastly blood has to be drawn from animals under digestion experiment. When such animals are cast, it always happens that both urine and faeces are lost and the digestion experiment is spoiled. Waste of time is also a point for consideration when many animals are to be bled on the same day. So, a method had to be devised for drawing blood from the animal in a standing posture. The animal has, therefore, to be firmly secured, so as to prevent it from moving backwards or forwards or from lying down or jumping up, at the same time, giving it the least exertion and pain thereby the chances of accidents are minimised. A detailed description of the travis recently put up in the Animal Nutrition Section at Bangalore satisfies most of the requirements.

The travis which is simply a modified dressing travis as used in the Veterinary Hospitals, consists of (1) Fixed wooden frame, (2) Front plank, (3) Sling pad, (4) Press pad and (5) Neck

*Reprinted from the Indian Journal of Veterinary Science & Animal Husbandry Vol. VI, Part II, June 1936.

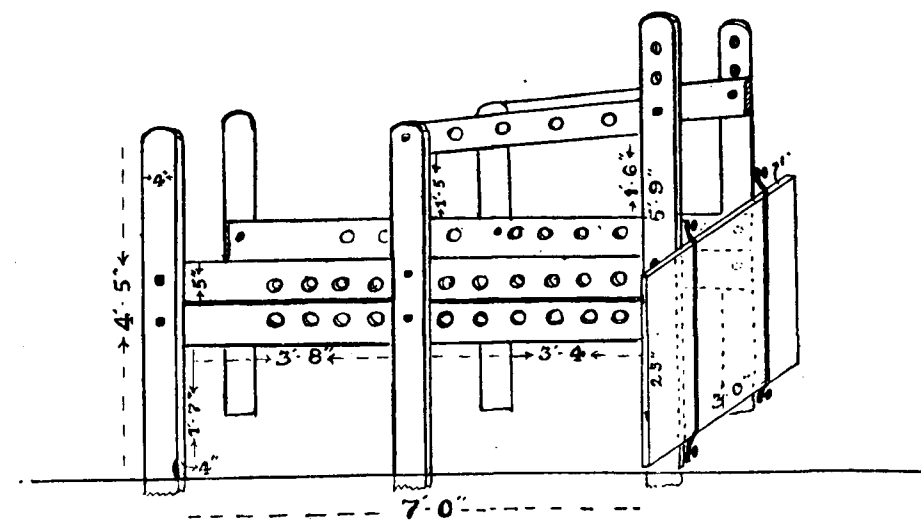


FIG. 1.

rope. The sketch (Fig. 1) above is a picture of the wooden frame with all the measurements. The front posts are longer than the back ones, the posts carry two horizontal bars in the middle with holes at suitable lengths to receive cross-bars and the horizontal bars at the top do not reach the last vertical posts. For cross-bars, pieces of G. I. pipings $1\frac{1}{2}$ in. are found suitable as they are strong and round. The two front posts carry two iron guards 2 ft. long in front of which one is fixed and the other movable from a horizontal to a vertical position with fixing arrangements. These iron guards hold the front plank in position as shown in the sketch (Fig. 1).

The front plank is $3' \times 1' 11''$ and is padded on one side and fixed between the guards with the padding inside just before the animal is brought in. This plank apart from holding the animal protects the operator also from injury.

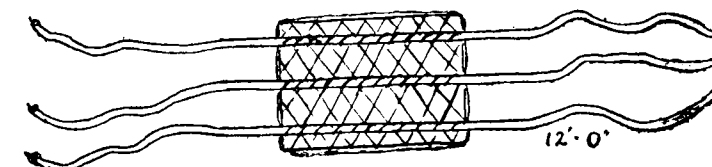


FIG. 2

Figure 2 is the *sling pad*. This is only a stuffed gunny bag to which three thick ropes (preferably cotton or jute) of suffi-

cient length are stitched on. This padding comes under the animal and with the ropes on both sides tied through holes at the top horizontal plank of the wooden frame, supports the animal as if on slings.

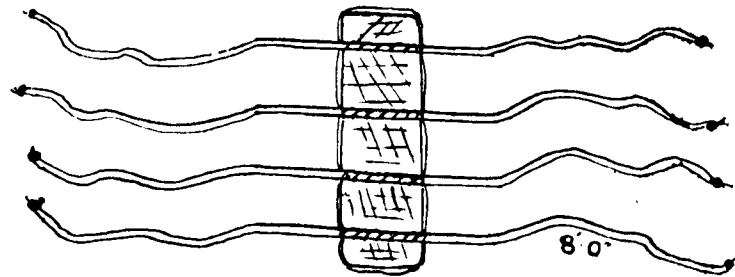


FIG. 3

Figure 3 is the *press pad*, which is another stuffed gunny bag about half as wide as the one described above to which four similar ropes are stitched on. This cushion is placed over the back of the animal and the ropes on both sides are tied to the bottom horizontal bars.

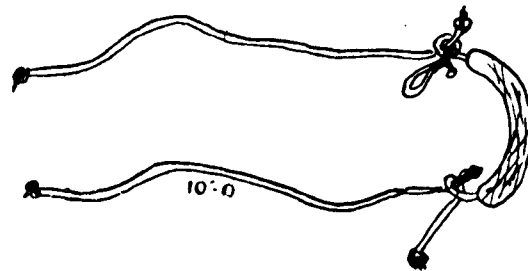


FIG. 4

Figure 4 is the *neck rope*, which has a neck loop and two long ropes on both sides. The loop enclosed in a padding is fixed at the yoke place and the side ropes are pulled tightly back and fixed to the middle vertical posts.

Besides the above parts, three or four pillow-shaped gunny cushions are made use of, one of which is tied to the post to which the animal's head is turned and fixed, by means of a muzzle rope tied to the post for bleeding from one side. Similarly other cushions are placed wherever the animal gets a moving space and wherever the body comes in contact with the hard wooden frame.

In a bullock the nose string helps a great deal in securing the head but in a cow the nose string is replaced by the muzzle and neck strap which is generally used for horses and the head is strapped to the front post.

All the edges and corners are rounded and smoothened. The sharp edges of the holes are also rounded to prevent wear and tear of the ropes of sling and press pads.

Working of the Travis.—The front plank is fixed before the animal is brought and as soon as the animal is led in, a bar is introduced at the back between the second and the third posts. The holes are to be selected according to the length of the animal. Another bar is placed in front just behind the front plank to prevent the animal from striking with its fore legs, a third one is introduced between the two front posts and this passes above the neck of the animal behind the horns. Now the animal may be considered to have been effectively secured. But it may make attempts to jump or lie down. To prevent that, the sling and the press pads are tied which hold the animal as if in a vice. If it still attempts to move, the neck rope should be tied (this must be the last operation in securing the beast). No further movement is now possible. The pressure applied at the neck by this last operation also makes the jugular vein prominent. Now the animal's head is turned towards the post and fixed over the cushion mentioned above. The entire task of securing can be completed in five minutes. In releasing, the ropes of the sling pads and press pads are untied on one side and the pads are drawn to the other side, and the neck loop is released. Finally the bars behind and above the neck are removed and the animal is then free to move back. Plate XXVII, Fig. 1, is a picture of the travis with all the parts fitted up and ready to receive the animal. Plate XXVII, Figs. 2 and 3 are pictures of the same with the animal ready for bleeding. With the devices mentioned above even the most refractory animals can be made to stand still and so far, no case of accident has happened.

Bleeding.—Drawing blood from the jugular vein is known to all professional people. They adopt very elaborate arrangements in sterilisation but those seem to be unnecessary.

An ordinary hypodermic needle and a swab of tincture iodine are all that are necessary. The needle is sterilised by swabbing all over with tincture iodine and the seat of operation is also similarly treated. To draw blood the skin at the site of operation is pinched by the left hand and raised, the needle is then thrust into the subcutaneous tissue and after adjusting the length either by drawing out or pushing in the needle, the point of the needle is brought near the projecting vein, then by giving a sharp and gentle push the needle is thrust into the vein which allows a free flow of blood. On the other hand if an attempt is made to thrust the needle direct into the vein, the force exerted to pierce the skin may displace the vein from its position and the needle is likely to miss the vein. The blood is collected by holding a tube below as shown in Plate XXVII, Fig. 4. Blood samples are being taken by this method almost every alternate day and there has not been a single case of any after-effect, not even the slightest swelling at the site of bleeding.

Before concluding it may not be out of place to mention about the quality of blood collected thus. As tincture iodine is freely used, the sample may not be fit for iodine estimations. But absolute alcohol may replace iodine in case iodine estimations are required. As regards sterility, this much can be said that the use of this travis eliminates two sources of outside contamination namely the ground and the bedding. For collecting sterile blood, therefore, this travis offers definite advantages.

I acknowledge with profound gratitude the inspiring guidance given and constant interest taken by Dr. F. J. Warth during the course of this work.

With great pleasure I also thank Mr. N. C. Das Gupta, B.Sc., Assistant to the Physiological Chemist, for his valuable suggestions in perfecting this travis.

Summary.

A new travis for drawing blood for experimental purposes from animals in standing posture is described with sketches and photographs.

A NEW BLEEDING TRAVIS

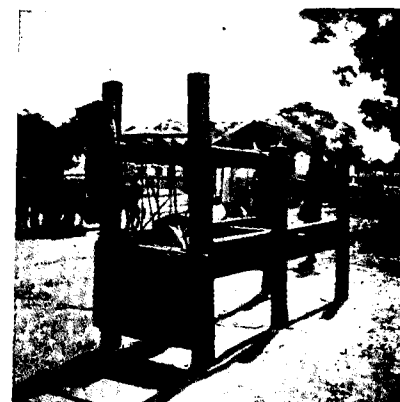


Fig. 1.

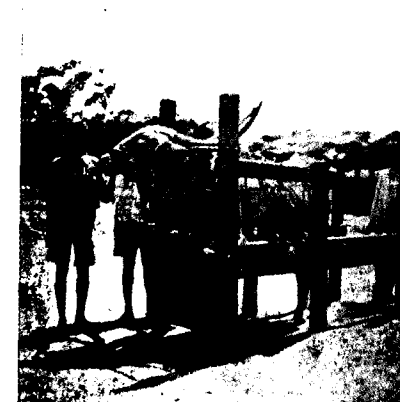


Fig. 2.

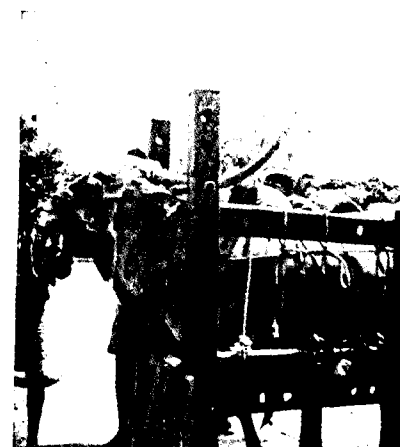


Fig. 3.



Fig. 4.

(By the Courtesy of I.C.A.R.)

IMPROVEMENT OF LIVESTOCK IN MARWAR, JODHPUR

By

DR. C. J. FERNANDEZ,

Director, Animal Husbandry Department, Government of Jodhpur.

Jodhpur is in area by far the largest State in Rajputana, and is, speaking generally, a vast sandy tract improving gradually from mere desert in the West, North-West and South-West to comparatively fertile land along the eastern border.

The main wealth of the inhabitants of the desert tract consists in large herds of camels, cattle and sheep which roam over the sandy wastes and thrive admirably in the dry climate.

The camel is a particularly useful animal in Marwar, being used for riding and drawing vehicles as well as a beast of burden. The best riding camels come from Sheo in the West and some of them are able to cover eighty or even a hundred miles in a night without difficulty. Mallani, Phalodi, Sankra and Shergarh also supply good riding camels.

Horned cattle are reared in such numbers that they supply the neighbouring States and Provinces; they are almost wild and in excellent condition.

The districts of Mallani and Sanchore are remarkable for a breed of milch-cows, which, when well taken care of, give from five to ten seers of milk at a time. The best cows are usually purchased when six months old by the cultivators of Nagour, who are very skilful in bringing them up; they are carefully looked after for two or three years and then sold. The bullocks of Nagour are famous throughout Northern India and are sold at all the principal fairs. They are noticeable for their massive humps and long horns, and are very suitable for drawing heavy vehicles. In Mallani some Thakurs breed horses, which are

possesses 50 milch-cows of pure Thar Parkar and Sanchori breeds and 24 Buffaloes of the Murrah breed. It is proposed to increase the number gradually to 300. The pasteurising plant, when installed, will supply about 1,200 lbs. of milk per day.

Disease Control Section.

This is the most important branch of the Department. In Marwar goats, sheep and other cattle die in thousands every year on account of diseases, ignorance of cattle owners and want of preventive measures. Veterinary aid is, therefore, very essential for the preservation of the cattle wealth of Marwar. Before the department came into being, there was only one Veterinary Hospital at Jodhpur. Now there are 10 more hospitals at the following places:—

Nagour, Bamer, Sanchore, Bali, Sojat, Makrana, Jalore, Phalodi, Pali in addition to a touring dispensary.

The new Veterinary Hospital at Jodhpur was constructed by means of a munificent donation of Rs. 20,000 given by Seth Tulsi Das of Jodhpur. The Nagour Hospital was constructed by the Government at a cost of Rs. 30,000.

The Veterinary Assistant Surgeons in the districts remain on tour for ten days in a month with medical and surgical equipment. An attempt is thereby made to carry Veterinary aid to the remotest village in the district. They also advise people on breeding and management of live-stock.

The Veterinary Assistant Surgeons also deal with out-breaks of contagious diseases among animals in the districts, and perform castration of inferior male animals. Since the establishment of the department 13,050 inoculations were given to combat out-breaks of contagious diseases.

This section also includes the Veterinary Investigation Laboratory, which carries on investigation into local diseases and also prepares vaccine. The Goat Virus evolved at the Imperial Research Institute, Muktesar and the Mysore Serum Institute at Bangalore was tested and found a great preventive against Rinderpest, commonly known as "Cattle Plague",

which is the chief cause of high mortality among the cattle in Marwar. This vaccine is now prepared in the local Laboratory at a low cost.

Inoculations have been carried out as an experimental measure in the districts of Nagour and Parbatsar with satisfactory results. It is proposed now to protect the cattle in all other districts of Marwar by carrying out inoculations on an extensive scale as the cost per animal comes to about an anna and a half only.

Cattle Fairs.

Three big cattle fairs are held every year at Tilwara, Parbatsar and Nagour. The Tilwara Fair dates from the 15th Century A.D., and is held in April. The Parbatsar Fair is held in August in commemoration of the heroic Tejaji Jat, who gave his life for his religion. The Nagour Fair was started lately in commemoration of Ramdeoiji a deified Rajput hero and is held in February. These fairs attract thousands of purchasers of cattle from the Punjab, United Provinces, Gujerat and Sind and on an average about 75,000 head of cattle are sold, worth approximately Rs. 37,50,000.

An attempt is being made to make these fairs attractive, with a view to disseminate knowledge regarding livestock and agricultural improvements. Demonstration stalls, Exhibitions, Lectures, Cinema Shows, etc. are also organised by the Animal Husbandry, the Agriculture and the Public Health Departments for the benefit of the agriculturists, who visit the fairs in large numbers.

Grass Farms.

There are in all 18 Grass Farms with a total area of 37,847 bighas. An attempt is also being made to improve the quality of grass and to introduce some exotics.

All-India Cattle Show.

The best specimens of the well-known Nagouri breed of cattle were sent for exhibition at the show in 1938. The Jodhpur Cup for the best Nagouri bull, the Sikar Cup for the

best cow and 6 cash prizes were won by the Marwar Cattle in that year.

Veterinary Training.

In order to secure the services of local young men as Veterinary Assistant Surgeons, the Government has awarded scholarships for Veterinary training. Two candidates are undergoing training at the Veterinary College, Bombay and two at the Bihar Veterinary College, Patna. It is proposed to send more candidates as the number of Veterinary Hospitals will increase year by year.

The total expenditure, both recurring and non-recurring incurred on the Animal Husbandry Department since its inception has been as follows:—

1935-36		Rs. 1,15,151
1936-37		„ 1,67,773
1937-38		„ 2,42,813

Two of the Veterinary Hospitals were opened by His Highness and his farm at Sardarsamand contain some of the finest specimens of the local breeds.

Society for the Prevention of Cruelty to Animals.

A Society for the Prevention of Cruelty to Animals has been recently established under the Patronage of His Highness the Maharaja Sahib Bahadur. A General Committee with Lt.-Col. G. V. B. Gillan, C. I. E., Resident, Western Rajputana States as President and 14 Members has been appointed to supervise and control the working of the Society. The business of the Society is managed by an Executive Committee of 6 Members. The Government has given a grant-in-aid of Rs. 1,200 per annum to the Society and it is hoped that all charitable minded citizens who love animals will come forward to help the Society with money and voluntary work. The Director of Animal Husbandry Department is the Secretary of the Society.

THE PROBLEM OF MILK IN INDIA

BY

DR. C. J. FERNANDEZ

Director, Animal Husbandry Department, Government of Jodhpur.

BROADCAST TALK ON 13-9-1938

Out of the travails of birth when the little human fondling sees the light of the day, its first cry is for the 'Milk'. It sucks and it grows, till one wonders how that simple white liquid could make a helpless babe, the tamer of the lion, the conqueror of nature and the master of land, sea and air.

Indeed, all scientific opinion agrees that milk is the most perfect food. It is easily digestible, is palatable, well-balanced in its constituents to furnish nourishment to all living organisms and produces the best physiological results. Sugar and fat, proteins and vitamins, are all abundant in milk and make it the most valuable food. Dr. Hylop Thompson of Herts County Council is emphatic that "In certain wasting diseases, in digestive disorders, in acute diseases which result from the stress and strain of modern life, milk provides a form of nourishment pleasant to take, easily assimilated and of proved value and benefit to the patient". As another authority has expressed, "For sucklings, it furnishes a complete dietary, in the growing children, it promotes nutrition.... For adults, it is beneficial... for all ages of life, it has been generally agreed that milk is in varying degrees beneficial".

Milk has a special importance in India. Its climate which is sub-tropical or tropical and the Vegetarian diet of the majority of the Indian population, make milk the only available source of 'first class' protein. It also makes up for the deficiency of minerals and vitamins which naturally result from a Vegetarian diet derived from a very limited variety of food stuffs and most of the luxurious dishes of an Indian dinner are the preparations of milk.

Figures of milk production, taken abstractly, are very illusive and are no index to the real state of affairs. In total output of milk, India is second to U.S.A. alone. It is somewhere about 800 million maunds.....this represents a figure four times the output of Great Britain. But this production has to be considered in relation to the population that subsists on it and the needs of that population. This total production of milk must be analysed from the point of view of production and consumption per head. The milk position of India from this point of view falls to one of the lowest in the world. The daily production of milk per head in Great Britain is 14 oz., while the consumption is 39 oz., in U.S.A., the production is 37 oz., consumption being 35 oz., whereas in India, the daily production per head is 8 oz. consumption *per capita* being 7 oz. This places India on the lowest ladder of milk production and consumption in relation to its population. Even this figures of 8 oz. production and 7 oz. consumption of milk is not at all correct, the difference between province and province being enormous. In Assam, the daily production per head is 1.4 oz., consumption being 2.2 oz., while in the Punjab it is 18.3 oz. and 9.9 oz. respectively, which is disproportionately very high.

The average *per capita* production and consumption of milk in India, in consideration of the climatic conditions and the Vegetarian dietary of the Indians, is very poor. Medical opinion differs, but considering the low standard of the poor people and their economic circumstances, the standard Indian requirement is 15 oz. of milk per head daily. This is double the quantity available in India.

To double the production of milk so that the consumption also may be increased in the same proportion, is the real problem in India and is by no means so easy to solve. It has been said that production will increase if there is greater demand from the consumers and that this could be effected by a Drink-More-Milk Propaganda. It may be true for other countries, but it is not applicable for India. From a study of figures of total food expenditure including milk, of families at various

economic stages, Prof. Wright has also come to the conclusion that there is no lack of appreciation of milk properties among Indians. To quote his own words, "The Indian appreciates the value of milk and that if he has sufficient means, he will increase his consumption of this food". The consumption of milk in India depends on the economic circumstances of the people. It has been shown that people with income of Rs. 1,000 p. m. and over, consumed about 30 oz. per head per day, while those with an income upto Rs. 25/- p. m. consumed only 2.8 oz. As calculated by Mr. D. G. Karve, the average *per capita* income in India is about Rs. 8/4/- per month. More propaganda cannot increase consumption of milk among the poorer classes which constitute 3/4ths of Indian population. Therefore, mere increase of production of milk will not achieve the ideal of milk diet in India. Cheapening the milk production is the only solution of the milk problem. It has been argued that milk could be sold at a lower rate, if the milk industry is properly organized and milk marketing is introduced in this industry. If it is not fallacious, this argument is not applicable to Indian conditions.

Milk marketing does not merely take into consideration the simple supply only, but it also safe-guards milk from various attendant dangers, like adulteration, produce from diseased animals, unhygienic condition etc. Specialized production of milk, pasteurized and produced on large scale on scientific lines, is bound to be much more costly than the home produced milk of local milkmen. It has been estimated that while an ordinary milkman is a villager who is also a farmer, and who through mixed farming, and as a bye-product of agriculture can sell milk at the remarkably low price of 6 pies a lb. Dairy Farms and large dairy concerns have their cost of milk production from 6½ to 11 pies per lb. or say about one anna a lb. This specialized production does indeed improve the quality of milk, and guarantees its safety from tuberculosis and other diseases but it does not seem to reduce the cost of production.

For reducing the cost of milk production, an increase in the efficiency of the animal factor alone can have a tangible

result. If the produce of milk from the same cow is doubled without increasing the maintenance charges, the cost of milk is thus reduced by half. From the point of view of milk yield, Indian Cattle are indeed very inferior. The average of milk production per cow as calculated for British India through Provincial Marketing Surveys is about 600 lb. per year, which is about a daily average of 4 to 6 lb. This is what really makes milk so expensive, as the amount of food required to maintain a cow is comparatively very high. On the other hand, it has been estimated, for instance that if milk production is increased from 7 lb. to 14 lb. per day, the food requirement per lb. will be reduced by 50%.

Improvement of breed of the milch cattle is therefore the main factor to be considered if Drink-More-Milk Propaganda is to yield any substantial results in our country.

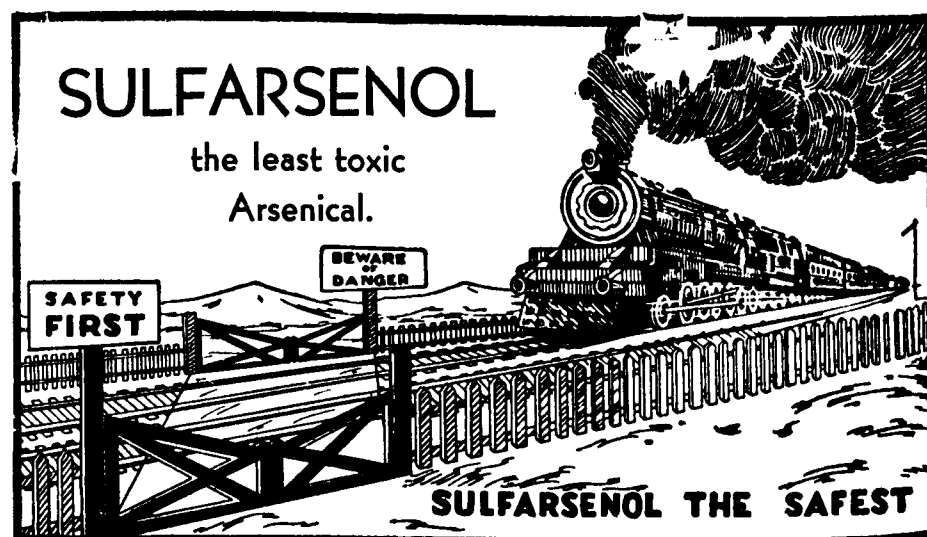
The Royal Commission on Agriculture have discussed in detail the measures that should be employed for the improvement of Cattle. The two chief methods of improvement adopted so far have been the providing of pedigree and approved bulls and the castration of undesirables and unfits, though not much could be done so far in this direction in India due to a number of reasons. Government Breeding farms for the preservation of the "type" within each breed, and a widespread use of the "animals bread under village conditions in selected breeding tracts," should be effectively combined to yield results. This activity should be supplemented by castration of the inferior males. An intensification of castration campaign in selected breeding areas will give tangible results. Along with this, herd-books and the system of milk records should also be introduced.

The second great factor which reflects upon an increase of milk yield in milch cattle, is their feeding and management. The intensive milk production may give rise to an unhealthy rivalry between the constitution of milch cattle and their economic performance. As Prof. Wright has remarked, "The preservation of constitution is very definite limiting

factor in attempts to improve milk yield beyond a certain level". External factors like daily and seasonal variations in temperature, humidity and the extent of artificial protection against excessive heat, all have cumulative effect on milk yield. Environmental conditions must therefore be carefully considered in the case of milch cattle. Management is also concerned with the problem of early maturity and increased frequency of calving, but it is yet a controversial question and may be avoided from the present discussion.

The third important factor for the improvement of milk yield is the feeding of milch cattle. The slow rate of growth, the late maturing and the long dry periods of Indian Cattle, the imaciated and mal-nourished appearance of our village cattle, all tell the same woeful tale of under-feeding and ill-nourishment. The Royal Commission have stated, "We are satisfied that no substantial improvement in the way of breeding is possible until the cattle can be better fed". The provision of a very much larger amount of food is essential before milk production can be substantially increased. Col. Sir Arthur Olver has also arrived at the conclusion that through scientific feeding and management, the average daily milk yield per cow could be increased from 8.15 lb. to 14.6 lb. and the cost of production also would be reduced by about 40%. To increase the supply of food suitable for milk production and to ensure its economical utilization, are very important indeed.

Thus to conclude, the milk problem in India is mostly a matter of improvement of the breed of milch cattle, their scientific feeding and management. Such co-ordinated efforts alone can build milk propaganda on sure and firm foundations in India. In conclusion, Marwar may be referred to as an example where these methods have been introduced and satisfactory results are being obtained. Here all the inter-related activities are grouped into one comprehensive scheme of the Animal Husbandry Department of Jodhpur.



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THE Indian Veterinary Journal

Vol. XV

APRIL 1939

No. 4

Editorials

HISTORY OF INDIAN VETERINARY MEDICINE

It was a very learned address that Dr. Tirumurti, Principal of the Stanley Medical College, Madras, in his capacity as the President of the Medical and the Veterinary Research Section, delivered at the 26th Session of the Indian Science Congress held at Lahore early this year. The subject of his address was a brief account of the history of Pathology. We are very glad, and grateful too, for the handsome tribute he has paid to the group of Veterinarians who have contributed, especially during the last decade, for the progress and advancement of Veterinary Research in this country.

Lest any one should have the temerity to question the wisdom of the selection of his subject, the Doctor has prefaced his remarks with an apt quotation of Clifford Albutt's that we cannot know modern Medicine unless we study it as a whole in the past as well as in the present. "Nothing gives a better perspective of the subject than an appreciation of the steps by which it has reached its present state" and, therefore, it is a matter for deep regret that this aspect of the study of Medicine has been very much neglected in this land of ours. Very few people have a clear grasp of the history of Medicine in this country. Neither the Colleges nor the Universities have made any earnest effort for an inquiry into this interesting subject.

As the doctor pathetically observes, the Charaka Club flourishes in America, not in the country where Charaka was born viz., India. When such is the position with regard to the study of Medicine, need we wonder that a study of the history of Indian Veterinary Medicine is not even thought of.

Our country can boast of a very ancient civilization in which all the sciences had been developed to a very high degree of perfection. There is no country in the whole world wherein the cow is held in such a degree of veneration and worship as it is in India: nor is there any other country wherein the bullock is so indispensable for the agricultural operations as in India. This worship of the cow is as old as the Vedas themselves. There have been in ancient times elaborate treatises on the care and management of livestock, on the various ailments and diseases of cattle, and on the methods of treating those afflictions. There have been works on the various colours of cattle and horses and also about their various points. Detailed instructions had been given out in those olden days for the correct methods of collecting the herbs and medicinal agents intended for internal administration.

Of very great antiquity was the sage Salihotra, one of the greatest authorities on horses in India. On that account, the horse doctors in this country came to be known as Salihotriyas. The word Salutry used nowadays in Northern India to denote Veterinary Doctors is only a corruption of the word Salihotriya. Nakula, one of the Pandavas, is said to have written a book on horses, called Asvachikitsa, while his brother, Sahadeva, who was an authority on cattle and their diseases, is understood to have written a book called Goshastra. Coming to more recent times, we read of animal hospitals during the reign of Asoka, Buddha and Chandra Gupta. But, like many other things in this land of ours, the knowledge and accumulated experience of those times are lost to us of the present day. Here and there, we hear of some old manuscripts and cadjan leaves on some ailments of animals. In centres of cattle breeding and rearing, these treatises still appear to be extant. We are told that in Kerala

and Assam there are valuable works on the diseases of Elephants and their treatment both curative and preventive. We are also given to understand that the instructions contained in those works are still being rigidly followed by some of the large owners of elephants and as a result of it they keep their herds fit and well. But they are all sealed books to the followers of western system of Veterinary Medicine.

Here, then, is splendid scope for research work. It would be a very interesting and fascinating study to find out how the people inhabiting the different places in this wide continent of ours were able to build up such fine herds of strong and hefty draught bullocks that were both the envy and despair of their enemies. For, it would not be out of place to mention here, that, as regards their conformation and shape, our cattle had been brought up to a very high degree of perfection and, if they have deteriorated latterly, it is all due to the neglect of the latter day generations. It is said that during the famous battle of Waterloo, the Duke of Wellington greatly regretted that he had not any of those magnificent Amrit Mahal bullocks which he used very successfully for transport purposes in his Indian campaigns. How were those animals kept? Were there any diseases—contagious and infectious—prevalent in those times and, if so, how were they combated? What was the position of the Veterinarians in peace and in war in those ancient days? These would form a very fascinating study for a student of Veterinary Medicine. We would then know how exactly the sufferings of the dumb animals were alleviated and attended to in those ancient days.

We, therefore, earnestly appeal to the profession as well as the various Universities in the different provinces of the country to endow Research Scholarships for this purpose and thus encourage a historical study of Indian Veterinary Medicine.

INSTITUTE OF ANIMAL NUTRITION AND POULTRY RESEARCH.

What has been rightly remarked as a landmark in the progress of Veterinary Research in India was reached on the 11th March 1939, when His Excellency the Viceroy declared open at Izatnagar the new buildings which are to house the Institute of Animal Nutrition and Poultry Research. This kind of an institution has been a long felt want in this country and it has been established none too soon. It is yet one more proof of the deep and abiding interest which H. E. the Viceroy has been evincing in the problems affecting the livestock of the country. With a population of over 300 millions of cattle, sheep, and goats, we are being confronted on all sides with varied problems crying for solution. The most important of them was the problem of control of contagious diseases. This has been to a very large extent tackled by the prophylactic measures which are now readily available. In fact, diseases like Rinderpest, Black quarter and Hæmorrhagic Septicæmia are not dreaded so much nowadays as they were a few years back. This control over contagious diseases has naturally given a sufficient amount of stimulus and encouragement for the people to go in for quality livestock. Maintenance of wellbred animals in a healthy condition requires a scientific knowledge of the various aspects of Animal Nutrition and it is for a study of this aspect of Animal Husbandry that the newly opened institution has come into existence. In his opening address His Excellency has briefly outlined the object of the Institute in the following words:

"To the great mass of the inhabitants good animals mean better and more profitable farming and more nourishing food. This important—indeed this fundamental—position which animals occupy in India's economy demands that no efforts should be spared to see that the resources of science and technical skill are devoted to examining the improvement of animal nutrition and that the resultant knowledge on this subject is made

available both to Government and in popular form, to the farming community at large. This Animal Nutrition Branch of the Imperial Institute of Veterinary Research will supply a most important need and on behalf of all present here today I wish it all success."

We heartily join this prayer and wish the institution every success.

Equally important is the research into the incidence of Poultry Diseases. These diseases have been the despair of many an enthusiastic Poultry Breeder and his Veterinary Expert Adviser. Active flocks of birds — carefully tended and reared — have been wiped out of existence with lightning rapidity by diseases, the etiology of which has not been satisfactorily worked out. Some diseases have been put down as due to Nutritional diseases while others have been ascribed to genetic factors consequent on intensive breeding: there are still others which are thought to be of virus origin. All these have to be clarified so as to enable the Poultry Breeding to rest on some sure foundation.

We, therefore, earnestly hope and wish that the newly opened institution will be able to tackle these different problems successfully at a very early date.

LIVESTOCK DEVELOPMENT

It is now nearly one year since the Livestock section was transferred from the Madras Agricultural Department to the Madras Veterinary Department and we regret that the Veterinary Department is not receiving that amount of co-operation which she is entitled to from all quarters. If the Government think that the Veterinary Department must make a success of the Livestock Section, the sooner they realise that all facilities should be placed at the disposal of the Department, the better will the country's interests be served. It is a pity that the transfer should have been effected at a time

when the finances of the Presidency are so very fluctuating and uncertain. Even so, we expect the present popular Government to realise the importance of this livestock work and render all possible help to the head of the department to make it a success. To expect the Veterinary Department to achieve anything in this field of work without additional men and money is to expect them to make bricks without straw. This is a very vital point, the importance of which, we only hope, is fully realised by all concerned.

The Director of Veterinary Services, Madras, seems to have convened a meeting of a few of his departmental officers recently, to consider in detail the methods to be adopted for the development of livestock. It is a step in the right direction and it has not come a day too early. The period of administration of the present Director is crowned with many achievements. If he perfects this livestock work or even places it on a sound basis before he retires, which we regret to note is soon due, it will be an additional feather in his cap. But the Government must give him more men and money. Until they do that, like Oliver Twist, he must keep on asking for more.

We are watching with great interest the progress of this work and we are prepared to render any help by way of propaganda and advertisement.

Dr. P. C. NAG, G.B.V.C., D.V.M. (Munich)

We feel glad to learn that Dr. P. C. Nag of Assam has obtained a Doctorate in Veterinary Science from the Veterinary College at Munich. He graduated from the Bengal Veterinary College in 1931. Before entering service as a Veterinary Assistant Surgeon in Assam, he underwent a course of practical training at the Imperial Institute of Veterinary Research, Muktesar. In August 1936 he was awarded the Wilhelm Ellenberger Scholarship from the Deutsche Akademie, Munich and entered the Veterinary College at Munich in September 1936.

As regards his work and ability we publish below the letter we received from Dr. Fochler Hauke, the Director of Deutsche Akademie, Munich.

"Our stipendiary student, Dr. P. C. Nag, Veterinary Assistant Surgeon, Sylhet, has obtained the degree of "Doctor, Veterinary Medicine" from the Munich University with note "good" by submitting a thesis on "Investigation of Johne's Disease with special reference to the cultural study, Allergy, Sero-diagnosis and Immunity."

"Dr. Nag left India in August 1936 with a Wilhelm Ellenberger Scholarship of Deutsche Akademie, Munich for higher studies of Veterinary Science in German Universities. Accordingly Dr. Nag first studied in the University of Munich, the special subjects like Pathology, Bacteriology, Hygiene and Bovine Sterility under distinguished German Professors and completed two University semesters on Veterinary subjects. Then he went to Hannover to carry on his research work on Bovine Tuberculosis and Johne's Disease. In the Veterinary College, Hannover, he worked under the famous Professor Dr. H. Miessner. The work of this famous Professor on Bovine Tuberculosis and Johne's Disease has been discussed in many International Conferences of Medicine in Europe. In the Veterinary College, Hannover, he also completed two academic semesters in Veterinary subjects. Dr. Nag was then sent by his Professor to work in different research Institutes in France and England. With exceeding interest and energy he worked on Bovine Tuberculosis and Johne's disease and finished the doctorate research on the latter disease on December 22nd 1938."

"We have read his work with great interest. This work, we consider, is of great importance for the agricultural country, where livestock industry and dairy products have recently absorbed the attention of the people and the Government. It seems, infection of Johne's disease among heavy milk dairy cattle of India is a great menace to the development of dairy industry and animal husbandry in India and this fatal disease is spreading with great rapidity without any suitable diagnostic

and prophylactic agent. The systematic investigation which Dr. Nag has carried on in Europe under different experts and the doctorate work, he has done, for a period of two years on this disease is surely a valuable contribution to the diagnosis and control of this fatal disease and we hope he will be encouraged, immediately after his return to India, with a suitable field to put to test his valuable experience and experiment on Indian cattle, so as to protect the Indian cattle from ravages of John's disease."

"On recognition of valuable work and great interest in dairy cattle, he was further awarded an Alexander von Humboldt-Stipend from Berlin for his study of milk-hygiene and practical dairying. As Dr. Nag is shortly expected in India, we wish him all success and Bon-Voyage."

We wish Dr. Nag a bright and useful career on his return home.

S. GANAPATHY AYYAR, G.M.V.C.

Mr. S. Ganapathy Ayyar, G.M.V.C., Officiating Bacteriologist, Imperial Veterinary Research Institute, Muktesar; sailed from Bombay for Great Britain on 14th February 1939 with his family. He was selected by the Government of India for training in Poultry Science that he may be appointed as Poultry Research Officer on his return to India. He will receive his training at the Harper Adam's Agricultural College, New Port and then at the Veterinary Laboratory, Ministry of Agriculture and Fisheries, Weybridge, Surrey. We wish him every success.

P. S. SUNDARAM PILLAI, G.B.V.C.,

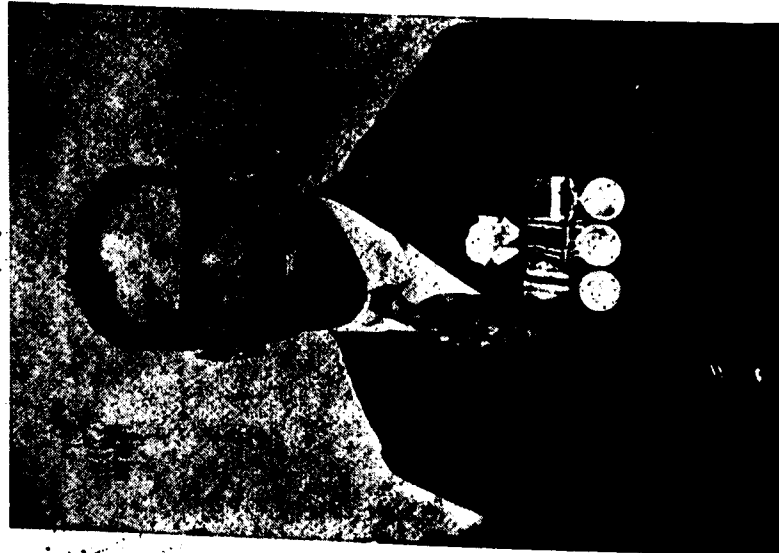
We learn with pleasure that Mr. P. S. Sundaram Pillai, G.B.V.C., has been appointed to officiate as Assistant Director of Veterinary Services, Class II, in the Central Provinces, and we offer our congratulations to him.



S. Ganapathy Ayyar, G.M.V.C., Offg. Bacteriologist, I.V.R.I., Muktesar who has sailed for Great Britain for higher studies in Poultry Science in connection with his appointment as Poultry Research Officer by the Government of India.



Dr. P. C. Nag, G.B.V.C., D.V.M. (Munich), who has obtained the degree of "Doctor, Veterinary Medicine" from the Munich University.



LIEUT. PREM NATH KAK, L.V.P. (Hons.),
who has been appointed as the Senior
Veterinary Officer of Jammu & Kashmir
State Forces.



P. S. SUNDARAM PILLAI, G.B.V.C.,
who has been appointed as the
Offg. Asst. Director of Veterinary Services,
Berar Divn. C. P.

A Case of Absence of Incisor Teeth in a Buffalo Cow 401

LIEUT. PREM NATH KAK, L.V.P. (Hons)

We congratulate Lt. Prem Nath Kak, L.V.P. (Hons), on his appointment as the Senior Veterinary Officer of Jammu and Kashmir Forces. He obtained his commission in the Army last year. He graduated in 1931 from the Punjab Veterinary College with a brilliant College career. We wish him all success.

Anatomical Section

AN INTERESTING CASE OF ABSENCE OF
INCISOR TEETH IN A BUFFALO COW

(An Anatomical Freak)

BY

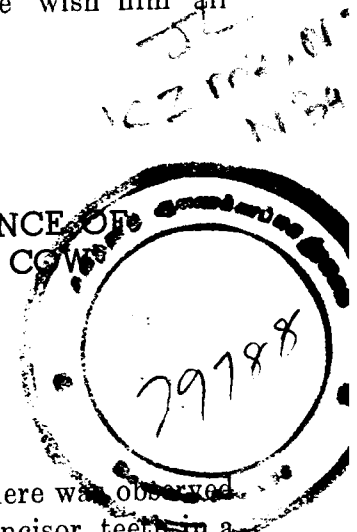
KISHEN SINGH, B.A., L.V.P.,
Punjab Veterinary College, Lahore.

In the course of routine outdoor clinics, there was observed an unusual condition of entire absence of incisor teeth in a buffalo cow which perhaps warrants a brief description together with a brief discussion of this condition in the interest of the profession.

History.

A buffalo cow was brought to the outdoor section of the Veterinary Hospital, Punjab Veterinary College, on the 3rd September 1938 for treatment of the impaction of rumen. At the time of drenching the animal it was noticed that all the incisor teeth were missing in this animal's mouth. The case being an unusual one the buccal cavity was thoroughly examined again and the following observations were made.

1. The incisor teeth were altogether absent and no stump or root of the teeth above or below the mucous membrane of the gum was palpable.
2. There were no marks of injuries on or about the alveolar border.



3. The alveolar border was comparatively very thin and the edge was sharp.
4. All the molars in both the upper and lower jaws were present and they were 24 in all.

As the incisors were absent a proper determination of the animal's age was not possible. The general condition of the body was found to be quite good. The rings on the horn were counted which, though indistinct, were five in number. According to Wooldridge's formula the animal was found to be about seven years of age. On enquiry from the owner the information that the animal was in calf for the third time and that the previous pregnancies, calving and lactation were quite normal in this animal was elicited. The animal was stall-fed all along the period it remained with the present owner and apparently it had no difficulty in the prehension of food.

A photograph of the mouth, Plate XXX, shows clearly the absence of incisor teeth in the lower jaw.

Discussion.

There is a remarkable paucity of record of the occurrence of such anatomical freaks in the domestic animals especially regarding animal dentistry. Now the question naturally arises as to how this condition occurred. The owner was not able to help us in this matter any further.

The condition may occur due to any one of the following causes such as (1) Diseases of Teeth (2) Malicious extraction or loss due to injury (3) Falling off of the teeth due to old age and (4) the congenital absence of incisors.

Here the writer wishes to discuss these points in detail.

1. Disease of the Teeth.

The most common disease affecting the teeth among the domesticated animals is caries. In caries of teeth after the teeth have been shed off, their alveoli get filled up with granulation tissue which adds to the thickness of the affected alveolar border when this border appears flat. Here the

border was quite sharp which fact together with the absence of any evidence of any granulation tissue rules out the suggestion of caries being the cause of this interesting condition.

2. Malicious Extraction of Teeth or Loss due to Injury.

Malicious extraction of teeth is occasionally practised by cheats and cattle thieves. Cheats do it to pass off an aged animal as a young one and cattle thieves do it to wipe out any evidence of age or marks of identification to mislead the real owner and the police investigation. This animal could not be more than three years old when it came in the possession of the present owner and as such the question of malicious extraction can be ruled out. The owner's respectability did not warrant the deed of a cattle lifter also. Moreover in such cases the alveolar border should not have assumed the sharpness of a cutting edge due to the reasons given in the preceding paragraph.

3. Falling off of the Teeth due to Old Age.

It is a well known fact that very old animals shed off their teeth as the human beings do. Due to old age teeth do at times get completely worn out also in which case the stumps and roots can be felt. This animal however was found to be in its prime of youth fecundation fertility and its condition did not suggest the question of old age at all.

4. Congenital Absence of Incisor Teeth.

Having excluded all other possibilities one naturally automatically comes to the conclusion that the incisors never developed in the alveoli of this animal. The sharpness of the alveolar edge which has assumed the sharpness of the incisors is a compensatory attempt on the part of nature to make up the deficiency of the teeth. The owner stated that he never cared to know whether the animal had any temporary incisor or not as the animal gave no cause to worry about it.

A perusal of the available literature regarding animal dentition, dental malformation and absence of formation of the dentine tissue shows that there is great paucity of records on such conditions.

Chauveau (1891) states that the only deformity affecting the incisor teeth of equines which is not very uncommon is the variation in the number of the incisors, generally a decrease. In such cases the interdenticular tissue disappears at the stage of formation which leads to the fusion of the adjacent teeth into one which fusion brings about a reduction in their numbers. Such phenomenon could not have taken place as there was not any evidence of any teeth in this animal.

Conditions similar to the present case are not quite uncommon in the human being. Colyer and Sprawson (1931) record the absence of mandibular incisors both temporary and permanent in the human beings. The whole group of incisors may be absent and occasionally the molars too as a congenital defect. Such cases are those of retarded eruption associated with their subsequent atrophy and total disappearance.

Bennet (1931) states that the absence of incisors and molars may be due to a congenital absence of the requisite tooth-building material in the body or a failure of the tooth germs to calcify. He adds that the failure of the calcified tooth to erupt may be due to any one of the following causes such as impaction due to slight misplacement of the tooth, total misplacement of the formed tooth, new growths such as cysts or traumatic dislocation of the forming teeth. Injury and death of the developing tooth from trauma or sepsis has been known to occur in the human beings. Necrosis of bone tissue may occur in certain infectious fevers and in bismuth poisoning. In such cases all the tooth germs may be destroyed and the dead portion are sequestered or sloughed off. Whatever be the nature of the etiological agent, the author feels sure that in this case the incisors never existed and the character of the gum associated with the sharpness and hardness of the toothless cutting edge gives ample support to this view.

Summary.

An interesting case of an entire absence of congenital absence of incisor teeth in a buffalo cow together with a photograph of the toothless mouth is recorded. This animal



Photograph of a Buffalo Cow without Incisor Teeth



A Case of Super-Numerary Cervical Vertebra in a Horse 405

was not found to be apparently inconvenienced in any way due to the absence of these teeth and it had apparently no difficulty in the prehension of food in view of the fact that the alveolar border in the lower jaw had assumed the hardness and sharpness which are characteristic of a cutting edge. This buffalo cow was found to be about seven years old and in very good condition. She was stall fed and her lactations and pregnancies were quite normal.

The author discusses the various methods by which the teeth may get lost and is in favour of the view that it is a case of congenital deficiency.

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A CASE OF SUPER-NUMERARY CERVICAL VERTEBRA IN A HORSE (An Anatomical Variation)

BY

KISHEN SINGH, B.A., L.V.P.,

Demonstrator of Anatomy, Punjab Veterinary College, Lahore.

The vertebral column or spine is the fundamental part of the skeleton. It consists of a chain of median, unpaired and irregular bones called vertebrae. It extends from the skull to the end of the tail. The column is subdivided for description into five regions, these are cervical, thoracic, lumbar, sacral and coccygeal. Veterinary Anatomists are agreed that invariably each region consists of fairly constant number of vertebrae except the last which possesses a variable number of verte-

brae. The vertebral formula for a horse may be expressed as follows :—

$$C_7, T_{12}, L_6, S, CY_{15-21}$$

Many variations in the number of thoracic and lumbar vertebrae of the horse have been recorded. It has frequently been observed that five lumbar vertebrae are present, which may or may not be compensated by an additional thoracic vertebra. Cases have also been recorded having seven lumbar vertebrae with normal thoracic number. Similarly variations in the number of thoracic and lumbar vertebrae of the ox and dog have been observed. However, so far, no record is available showing the variations in the number of cervical vertebrae of either horse, ox or dog.

The writer has come across a case (horse) which had eight cervical vertebrae instead of the usual seven. This unusual increase in the number of cervical vertebrae resulted in bringing about many important changes in the form and structure of some of the cervical vertebrae, a brief account of which is given below in the interest of the profession :—

The Atlas: This is relatively much shorter and compressed from before backward to half of the normal size, so much so, that on the ventral arch the transverse rough excavation and a ridge for the attachment of the ligamentum dentis is almost absent, the fovea dentis is sloping backward.

The two deep oval anterior articular cavities of the lateral masses which receive the occipital condyles are unequal in size, that of the right side being larger than that of the left.

The dorsal arch is compressed from before backward. The intervertebral foramen of the left side is placed somewhat lower down than that of the other side and is much smaller.

The wings are unequal in size, the right being larger than the left. Their free margins are rough. The foramen in the fossa atlantis of both the wings is absent. The foramina alar and transversarium are absent from the left wing only.

The Axis: This is the smallest of the cervical vertebrae and reduced to less than half the usual size of the axis which is always the longest in the normal cases. The body is much shorter in length, the den is also relatively small. The arch is compressed from before backward. The notches on the posterior border are not well defined.

The posterior articular processes are absent. The transverse processes are large and arise by two roots, one from the arch and other from the body. Between these is the foramen transversarium which is very large.

The spinous process is well developed, large and strong and ends abruptly posteriorly; this surface is very rough and has projections and cavities. It articulates with the reciprocal cavities and projections on the spinous process of the ADDITIONAL VERTEBRA in such a manner that looked from above the two vertebrae appear to be one and undivided. The spinous process resembles that of the normal axis vertebra. When seen from below the bodies of the two vertebrae are quite separate and possess the characteristics of two separate cervical vertebrae.

The Additional Vertebra: This is the longest of the cervical vertebrae and possesses all the characteristic features of this region of the vertebral column. It consists of the body, the arch and the processes.

The body is long as compared with those of the other vertebrae. The ventral surface presents a median ventral spine which becomes more prominent backward, and is tuberculated at its posterior end. It separates two concave areas. The dorsal surface has a flat central area which is narrow in the middle and wide at either end. On either side of this area there is a groove. These lateral grooves are connected about in the middle by a transverse furrow. The anterior extremity or head has an oval articular surface which faces forward and downward. It is strongly convex wider above than below. The posterior extremity is larger and has nearly a circular cotyloid cavity. The vertebral foramen is narrower.

The arch is large and strong. It is perforated on either side by a foramen which communicates with the foramen transversarium.

The anterior articular processes are absent. The posterior articular processes have their articular surfaces which are extensive, oval in outline and slightly concave, and are directed ventrolaterally. The remaining surface is rough.

The transverse processes are small, single and project backward. The foramen transversarium is slightly smaller. These resemble the processes of the normal axis vertebra.

The spinous process is very large and strong like that of the normal axis vertebra. Its free border is rough. It is thick anteriorly, thins out posteriorly and is continued to the articular processes by two ridges. On its front it has the projections and cavities which articulate with reciprocal cavities and projections on the spinous process of the Axis. The lateral surfaces are rough and tuberculate particularly in the middle.

The rest of the cervical vertebrae, i.e., 3rd, 4th, 5th, 6th and 7th possess the typical characteristics of the normal cervical vertebrae.

From the foregoing descriptions it will appear that the Axis and the Additional Vertebra taken together are comparable to the normal Axis vertebra. Plate XXXI.

The Indian Veterinary Journal.

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Translations

ASVAVAIIDYAKAM.

Chapter VII. (Continued.)

Dosa-Guṇa Tarana Vivaranam — Merits and Demerits
(of a rider and of striking a horse.)

(Continued from page 6, Vol. V. No. 3.)

Translated from the original Sanskrit, with
Notes and Commentaries,

BY

NRIPENDRA NATH MAJUMDAR
(late of Bengal Veterinary Service.)

ALL RIGHTS RESERVED.

- Sl. 46. The horses should then be employed (for practice) in the KATAS' (in the different paces) Dhārā, Vikrama etc. with iron bit.
- Sl. 47. When the horse is well trained in Dhārā (amble) with the bit, then the rider should make it (the horse) move in Vikrama' (gallop) etc. in the training ground (Kata).
- Sl. 48. In a ground 100 cubits long and 7 cubits broad, the rider or trainer should make the horse move in both the directions' right and left.

1. Kata — A training ground for horses, generally 100 cubits long and 7 cubits broad. The word has been used in the plural form possibly to indicate the different grounds for the different paces. There are five kinds for the five different paces.
2. Vikrama — For different kinds of paces — See Sl. 24-27 ante.
3. See Sl. 43-44 ante — where the trainer is advised to use both hands (right & left) to hold the reins and here it is advised to move the horse in both directions — right and left.

- Sl. 49. (The horse) should then be moved in the five Katas (training grounds) in the following order,—Mandala,¹ Caturasra,² Gomūtra,³ Ardha-candraka,⁴ and Nāgapāsa.⁵
- Sl. 50. (The rider) who trains his horse in the Kata or training ground in the three⁶ other paces with the iron bit, has no trouble (afterwards).
- Sl. 51. This, as has been described, is the secret of being a good trainer; this removes the fear of the timid and makes the reckless cautious.
- Sl. 52. It has been said before that a horse is to be struck at six places for the six⁷ different kinds of vices, but at other times, *i.e.*, when not in training, they should never be struck even if guilty of a hundred faults.
- Sl. 53. No rider will ever be able to remove the vices acquired by a horse (at the time of training) through the faults of the trainer.
- Sl. 54. A rider who trains his horses in this manner according to sāstras has his horses under his control (and his training) becomes successful.

1. Mandala means a Circle *i.e.*, the horse is to be moved in a circle.
2. Caturasra — pronounce Chaturaara — Rectangle or square, *i.e.*, in a straight line on all sides.
3. Gomūtra — literally means Urine of a cow, *i.e.*, the way the urine leaves marks on the ground while the cow is running and at the same time urinating — the Serpentine of the riding classes.
4. Ardha-candraka — means half moon *i.e.*, semi-circular.
5. Nagapasa — literally means the magical noose or knot used in battle to entangle the enemy, here it means the Serpentine, with this difference that a short circle in the form of a knot is to be made in the middle.
6. Three other paces are Pulaka, Purnakanthi and Tvarita. See Sl. 24-27 ante.
7. See Sl. 17-19 ante.

- Sl. 55. Now shall I describe the fumigations, unguenta, mantras etc., as had been said by the Sages for curing vicious horses¹ (of their vices).
- Sl. 56. The bones and teeth of wolves, the big tooth (fang) of Biṣamakara (a marine animal) and clarified butter² have been said by the wise as (ingredients) for fumigation.
- Sl. 57. A vicious horse is to be fumigated with cardamom (seeds of Elatteris Cardamom), red sandal, musk (that class known as Aguru), the root of a fragrant grass commonly known as Khus (Andropogon Muricatum), Nageswara flower (Mesua Ferrea), the resin exuded by the Sal tree, mixed with sesamum oil.³
- Sl. 58. The filaments and anthers of the lotus (Nelumbium Speciosum), Aguru sandal (Aquilaria Agallocha), or Eagle wood, the Costus (Sanseere

1. It is of interest here to note the following: "To make a new horse quickly fond of you, scrape some shreds off its thumbs (known as chestnuts) and rub them over its nose with the palm of the hand. The horse will whinny and eagerly follow you to get another sniff. The thumbs are the four large excrescences on the inner side of the legs, two above the knees and two below the hocks. Oil of Rhodium (Convolvulus Scorparius) rubbed on the nose will act in the same way, and, in Australia, Oil of Cumin (Cuminum Cynnum) is similarly used with colts. (Take care that your hand is free from smell of tobacco or mare — if it is a stallion)" — Horse notes by Major C. — page 5. So, such practices are not obsolete as yet.
2. In Sanskrit books, generally, the weights of the ingredients are not given in the body of the book. There is a separate book called Paribhasa — which gives such things. Regarding fumigation, it is mentioned there, that the powdered ingredients should weigh 3 Karsas, (One Karsa is equal to 2 tolas; all the ingredients should, therefore, weigh 6 tolas only,) and clarified butter should weigh one Karsa, *i.e.*, two tolas only.
3. This is the second formula and in this too, the oil should be 2 tolas and the other ingredients — 6 tolas in all.

Auriculāṣa), Cardamom and Sandal and curd, ghee and sesamum oil; this fumigation has been mentioned as completely eradicating the defects (vices) of horses.¹

Sl. 59. The vicious (horses) fumigated as above, should be smeared with cow-dung over all the joints in the morning and night, specially on the eighth day of the moon (and they will) become tamed and controlled.²

Sl. 60 & 61. Sulphate of iron,³ sandal, renuka (Piper Aurantiacum), white mustard (Crucifera Sinapis), black pepper (Piper Nigrum), rock salt, pippali (Piper Longum), duralava (Alhagi Maurarum), Vacha (Acorus Calamus), and wax of the ear. Equal parts of these should be very finely powdered and made into a fine paste with the urine of a cow or mare; this is to be applied as a collyrium to all vicious horses on all the Parva⁴ days.

Sl. 62. A horse, treated with this collyrium, attains to calmness, gives up anger, delusion and fear and becomes very much attached to its rider.

1. This is the third formula. Here too, the total weight of the curd, ghee and oil should be 2 tolas only and that of the rest (powders) should be 6 tolas only.

2. This is the unguentum mentioned before; this is still in vogue in the up-country specially Bihar.

3. Such drugs are never to be used in their crude state. They should be purified before being used, e.g., Ferri. Sulph. is purified by boiling it in the juice of Bhringaraja (Wedelia Calendulacea). These things are also given in the Paribhāṣa. Oils and ghees should similarly be purified before being medicated.

(Oils and ghees should similarly be purified before being medicated). The processes will be given under the respective Chapters.

4. Parva days are:—New moon, Full moon, 8th and 14th day of the moon and the last day of the month.

Sadikaryavivaranam. — Description of duties of a rider.

Sl. 63. The rider, in the morning after having his bath and being clean and pure and clad in white garments, and being in a state of fast and ascetism¹ should cant (the following mantra) in the right ear (of his horse).

Sl. 64 to 70. The Mantra itself: "Haya gandharvaraja tvam s'nuṣva bacanam mama. Gandharvakulajatastvam mā bhuyāḥ kuladūṣaṇaḥ. 65. Dvijānām satyavākyaṇām somasya garuḥasya ca. Rudrasya varuṇasyaiva pavanasya valena ca. 66. Hutāsanasya diptāsyā smara jātim turangama. Smara rājendraputrastvam satyavākya manasvara 67. Smara tvam vārunim kanyam smara tvam kaustubham manim. Kṣīrodasāgare caivamavamathya surāsuraiḥ. 68. Tatra devakule jātaḥ svavākyaṇam paripālāya. 69. Kule jāta stvamasvānām mitram me bhava sās'vatam. Vijayoham dharāncaivasangrāme sidhimāvaha. 70. Tava prṣṭham samāruhya hatā daityāḥ suraiḥ purā. Adhuna tvam samāruhya jeṣyami ripuvāhinim. (Mantra ends.)

Sl. 71. The intelligent, after canting the above mantra, should take leave of all the gods invoked² and then harness his horse.

* 1. In a state of fast and ascetism — without breaking his fast i.e., before taking any food. Yati is an ascetic; yatirbhutva—being in a state of ascetism, i.e., in a state of mental restraint.

2. The mantra when freely translated purports thus: O Horse! You are the king of horses. (Here is a pun on the word Gandharva which means horse as well as a class of demi-gods said to be the choristers of Heaven.) Hear my words. You are born in the gandharva race (here the allusion is to the demi-gods) so do not be a disgrace to your race. Remember the truthfulness of the Brahmins, the Moon god and Garuḥ; the prowess of Rudra (the god of thunder), Varuṇa (the god of water) and Pavana (the god

- Sl. 72. Those who want to be riders should be well-versed in the Equine Science (Sastras) for, such are the friends of horses while others are their enemies.

End of Chapter VII of the Treatise on Horses by
Sri Mahasamanta Jayadatta.

of air) and your own race and follow the truth. Remember that you belong to the race that came out of the Ocean. (the allusion is that the horse of Indra — Uccaisrava — is said to have risen among other things from the Ocean when it was churned by the gods.) So, being born in the race of the gods, you should keep your words. Become my friend for all time to come. The gods, riding on your back, killed the Danavas in by-gone days and now, riding on you I will win my victory over the forces of the enemy.

1. According to the Hindu s'āstras, it is necessary that a worshipper after finishing his Puja or worship, should take leave of the Deity.

Chapter VIII — Vandhopacāra — Treatment of Sterility will follow next.

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SELECTED ARTICLES FROM SHALIHOTRA'S ASHWASHASTRA

BY

CAPTAIN M. S. APTE, G.B.V.C.,

Director, Civil Veterinary Department, Gwalior.

INTRODUCTION

What I am going to place before you hereafter is not an original thesis of mine. It is a translation of a Sanskrit work representing two conversations between the great Muni Shalihotra and his disciple Sushruta firstly on the subject of diagnostic symptoms of the diseases of horses as affecting the eye of the animal and secondly on the science of judging the age of a horse by his incisors.

It is my singular good fortune to possess in manuscript form considerable Sanskrit literature pertaining to horse and elephants. This literature came down to me from my ancestors, having been originally collected by my great-grandfather who in his time (*i.e.*, about the Mutiny) was accepted on all hands to be one of the greatest horseman in the country and who being patronised by Maharaja Jayaji Rao Scindia, the foremost Chief, was well-versed in the tradition of horsemanship. Amongst the best disciples of my great-grandfather was the well-known Vishnu Pant Chhattre, the first Indian to train and own a Circus.

I will not detain you further over the origin of the chapters, though I may in passing mention the fact that the great sage Shalihotra has been known to have been the greatest authority on the science of horses in ancient times. The secrets which Shalihotra Muni discloses in his dialogues, specially those about the symptoms appearing in the eye are very profound indeed, and deserve the closest attention even at the present day. They point to the depth and extent attained by the

Veterinary science in this country in the past ages, and I would earnestly request my professional brothers to test the truth or otherwise of these statements in their day-to-day practice. If they do so it will be a most pleasant surprise to them to find the observations of the great Sage of ancient India borne out by experience and repeated identically in the far later works of such authorities as Hutyra and Marek. If my friends can further favour me by furnishing me the results of their observations carried out to test the truth of Shalihotra's shlokas they shall not only be placing me under a deep obligation, but shall also encourage me in undertaking further translations of the great work which I happen to possess.

As regards the second dialogue which pertains to the judging of the age of a horse, I need hardly point out how, and in what concise and easy manner the great sage has given us the crystallised science on the subject, and how extremely helpful would it be to the profession if the shloka or its purport were understood and employed in judging the age of a horse.

I shall enumerate the original verses and their translations one after the other.

॥ अथ नेत्राध्यायः ॥

पुनरुतं सुश्रुतः प्राह संशयोऽयं समागतः

नेत्रचर्मं पुटोऽपि किमर्थमवलोक्यते ॥ १ ॥

I am very doubtful as to why the eyelids of horses are opened and seen, said Sushruta.

कतिधारिरूपानि बिंदुकाकतिधामवेत्

नेत्ररश्मिर्दोषैः कर्लिर्गं लक्षयेत्तत् ॥ २ ॥

How many species of alarming signs and types of Petichæ occur in the eyes which affect the sight due to the various derangements of the system, and how to diagnose them.

एवं पृष्टो महाचार्यः शालिहोत्रः प्रमादिते

अव्यजितपदं पुत्रं प्रयत्नेन शृणुष्वमे ॥ ३ ॥

The great Acharya Shalihotra on being thus asked, spoke as follows :—

Listen to me my son with attention as I am going to explain what was unknown before.

दृष्टिरूक्षा सिता वातात् पित्तात् पीताऽऽरुणप्रभा

कफात् श्वेता जलाद्रा च पीतादृश च ज्वरगमे ॥ ४ ॥

If the physician finds the eyes dry and glassy then the horse is affected by वात Vata (one of the three vital forces); and when the eyes are seen yellow and dark pink then the animal is affected by पित्त Pitta (one of the three vital forces); and when the eyes are white and watery then he is affected by कफ Kapha (one of the three vital forces); and if the horse is suffering from fever the eyes are dark yellow.

नेत्रेति दृश्यते यस्य बिंदुका बहुधा तथा

मृत्युमाप्नोत्यसौ वाजी षण्मासाभ्यंतरे मृतम् ॥ ५ ॥

The horse who shows number of Petichæ on the conjunctiva he is to die within six months.

स्वस्थस्यापि हि नेत्रेति यदानीलेचवाजिनः

गंधेन सद्वैश्वेद्रात् तदा मृत्युर्दिमासिकः ॥ ६ ॥

In the same way when a healthy horse's eye shows bluish tint and the discharge smells like honey then the animal is sure to die within two months.

पित्तरक्तप्रदुष्टेयो रक्तमश्रु प्रमुचति

नेत्रेति पांडुरत्वं च सद्यो मृत्युमवाप्नुया ॥ ७ ॥

When the blood is diseased by Pitta (one of the vital forces, the lachrymation is of blood tint, and the conjunctiva is pale, it is certain that the animal is to die immediately.

नीलपीते च नेत्राणि स्यातां वाजिसमागमे
सोऽपि निर्वाणमाप्नोति त्रिभिर्मासैर्न संशयः ॥ ८ ॥

When the conjunctiva of a horse is observed carefully and a bluish yellow tint is seen, the animal is sure to meet his death within three months. 8.

यस्य नेत्रांतरे रेखा बहुवर्णा प्रजायते
त्रिषेष्वात् शरदीतस्य चातुर्मासिकमादिशेत् ॥ ९ ॥

The appearance of streaks of various colours on the conjunctiva of a horse particularly during the cold season, i.e., (October, November) shows that the horse is to die within four months. 9.

पयः सुवर्णवपस्य नेत्राभ्यां संप्रकाशते
दशमांसं समासाद्य कृततोऽपि भिनश्यति ॥ १० ॥

No divine power can stop the death of a horse within ten months from whose eyes a watery golden discharge is seen flowing. 10.

यस्यानीलप्रमे नेत्रे स्यातां वातादितस्य तत्
मासत्रयं स कृच्छ्रेण जीवेद्यदि तुरंगमः ॥ ११ ॥

If the conjunctiva is of bluish tint the animal is supposed to be affected by Vata (one of the three vital forces); in that case the animal can hardly survive for three months 11.

यस्य नेत्रे हरिद्राणि स्यातां पिच्छादितस्य तत्
तस्यायुःसप्तमासाख्यं घृणिभिः परिकीर्तितम् ॥ १२ ॥

If an animal is affected by Pitta (one of the three vital forces) his eyes acquire a colour similar to that of curcuma Longum (हल्कुंड), the death is certain within seven months according to the calculation of the great Muni. 12.

बहुवर्णेष्वथवा नेत्रे स्यातां ऋतुसमागमे
तस्य च प्रमथेन मृत्युः सप्तरात्रिर्न संशयः ॥ १३ ॥

The appearance of various colours on the conjunctiva of a horse in the early part of a season leads to his death undoubtedly within seven days. 13.

यस्यैकं लोचनं नीलं द्वितीयं रक्तसंनिभं
पुटान्ते च सविज्ञेयः पित्ताब्धो मासजीवधृक् ॥ १४ ॥

When intensity of Pitta (one of the three vital forces) is increased and one eye of the animal is found blue and the eyelid inside of the other eye is found red then in that case the animal will hardly live for a month. 14

यस्य पित्तप्रपन्नस्य कालिमाकशवर्तिनी
जानीयात् जीवितं तस्य दिनानि दशपंचवच ॥ १५ ॥

When the animal is affected by intensity of Pitta and the eyelid inside becomes dark black, then it is certain that the animal will only survive for a fortnight. 15

नासानिकटहस्तंतु प्रसार्योश्चस्य लक्षयेत्
अतिरक्तप्रभोचोभौ निस्नेहावथवापुनः ॥ १६ ॥
बिंदुभिर्भेचकोऽयावौ सिर्तो हारिद्रवर्णकौ
उच्छिन्नमांसप्रतिभौ तदागंतायमक्षयम् ॥ १७ ॥

The examiner should fully open the eyes of a horse for examination at the inner canthus (i.e., near the nasal chamber); and if he finds that the inner canthus of both the eyes are dark red or dry or if there are dots similar to those on the peacock feathers or black or yellow (and resembling warts) disquamation of Epithilia on different parts of the eye, then the horse is sure to meet his death immediately. 16, 17

॥ इति नेत्राध्यायः ॥

॥ अथ वयोज्ञानाध्यायः ॥

षड्मिर्दतैः सिताग्रैर्भवंति ह्यशिशु स्तैः कषायैर्द्विरद्रः
संदंशैर्मध्यमातैः पतित समुदितैस्त्रिभ्रतुः पंचकाद्वः
संदंशानुक्रमेण त्रिकसमयुणिता कालिकापीतशुक्ला
काचामाक्षीकशंखा वटचलनदत्तो अंशितः स्यात् समृद्धिः

Judging the age of a horse.

The great Muni Shalihotra has based the principles of judging the age of a horse on the six lower incisors and has

divided them in three pairs (central, lateral and corner) where these front six incisors grow firstly in a line and are milky white the sage lays down that the animal becomes one year old; and when these change their colour to muddy white then the animal according to the authority is two years old. Now when these three milk pairs fall off and permanent pairs are fully grown according to the above order, then the animal is 3, 4 and 5 years old respectively.

The incisors of a horse are thick and have a table surface. The great sage lays down that as dots of the colours black, yellow, white glassy, chocolate and cream appear on the tables of pairs of incisors in the order of (1) central pair, (2) lateral pair and (3) corner pair, they in their sequence denote that the animal is three years older in each case commencing from the age of 5 when the black dot appears on the central pair and ending with the 23rd year with cream colour dots on the corner pair.

After this there appear depressions on the tables of each pair in the above order showing that the age is 24, 25 and 26 according to the same order. After this when the 3 pairs of teeth in the above order get loose then the age is calculated to be 27, 28 and 29 respectively. When the three pairs fall off in the above order then the age of the animal is calculated to be 30, 31 and 32, respectively.

ब्राह्मिषद्वन्द्वानि तुरंगमायुः

पुरापुराणैर्मुनिभिः प्रणीतम्

The great sage Shalihotra says that according to the authorities on the subject, the maximum age of a horse is laid down to be 32 years.

॥ इति वयोज्ञानाध्यायः ॥

Clinical Articles

THROMBOSIS OF THE ABDOMINAL AORTA IN A HORSE

BY

V. D. RATNAM, G. M. V. C.,

Veterinary Assistant Surgeon, On Glanders Duty, Madras.

Subject:— Bay Aust. Mare, aged 9 years—Silver Jubilee No. 59 H. E. The Governor's Bodyguard.

History:—The animal worked all right ever since it joined the Troop and never had any serious complaint worth mentioning.

She did her usual daily work without any complaint for the last 2 years and 10 months.

While I was on leave for a week in Nov. '38, it was reported that the animal went lame on the off hind during her morning work and that she was immediately returned to the stables. After one hour the animal was trotted and she was found to be going sound. The same thing happened on the next day also. As soon as I returned to duty on 23-11-1938, I examined the animal and found her trotting sound the moment she came out of the stable. A Sowar was asked to ride the horse for a while, while I watched her. After 20 minutes, the animal went dead lame on her off hind. She lifted her off hind and it was shivering. She showed symptoms of distress and anxiety and was pawing with her fore-limbs. The affected limb was cold to the feel when compared with other limbs. The digital pulse on the affected limb was scarcely perceptible. No atrophy of any of the muscles of hind quarters was observed. Suspecting Iliac thrombosis, a rectal examination was made. The abdominal aorta was found to be hard and corded at its quardrification and it was not compressable; and the pulsation in the Iliac and other branches was

not pronounced as in normal horses. The condition was not as described.

The specimen was sent to the Veterinary College, Madras, for the purpose of my diagnosis. It was found to be a case of thrombosis and was described by the Lecturer in Anatomy as follows:—The affected parts and

... were found blocked.

The iliac artery for about 2" at its base was blocked. The iliac from its origin to its posterior branch was normal except at their junction.

The iliac artery was blocked throughout.

The iliac—the right more completely blocked—the blocking extended further than the left iliac.

The iliac was blocked.

The iliac was blocked for a longer extent than

the iliac artery was blocked to a greater extent than the obturator foramen than the iliac. Both sides were equally blocked.

The affected thrombosed vessels were found. I am sure, be found in

Mr. T. J. Hurley, Principal, for permission of having kindly examined the animal. The publication of this report in the *Indian Veterinary Journal* is also due to Sri H. N. Iyengar, Lecturer in Anatomy who made the necessary



Photograph of the Specimen of 'Thrombosis of Abdominal Aorta' in a horse.

DORSAL—RECUMBENT POSITION

- A. A. Abdominal Aorta.
- I. Q. Iliac Quadrification.
- C. I. Circumflex Iliac Atery.
- E. I. External Iliac Artery.
- I. L. Ilio-lumbar Artery.
- I. I. Internal Iliac Artery.
- G. Anterior Gluteal Artery.
- P. G. Posterior Gluteal Artery.
- O. Obturator Artery.
- I. F. Iliaco-femoral Artery.

RABIES IN HORSES

BY

H. V. KULKARNI, G.B.V.C., P.G.,

Chief Veterinary Surgeon, Baroda.

On 3-9-'39 at about 1 A. M. a bay mare of one of the Regiments of the Baroda Army was reported to be showing symptoms of colic and was being sent over to the Hospital for treatment. On reaching half the way, the animal refused to move on and was reported to be behaving as though it had gone mad. On attending the case at the spot it was found to be a case of furious form of Rabies. It was immediately destroyed when it became too vicious, aggressive and violent.

Due precautions were taken and the contacts were removed to the Isolation Ward for Anti-rabic treatment.

On the very same day at about 10 A. M. another mare was reported to be exhibiting signs of Rabies. On inspecting the animal at the lines the following symptoms were noted: profuse salivation, great desire to masticate, excitement at the slightest move, tendency to bite any object within its reach and mutilating its own body. The symptoms were rapidly aggravating and by 11-30 A. M., the animal got very furious. To put an end to the pangs of the animal and also to avoid the danger of its getting loose, the animal was immediately shot dead.

There were signs of dog-bite on the body of the above two cases. But as two other horses in the same regiment had been bitten by a rabid dog on 15-8-'38, it was surmised that the above two horses might have been infected by the same rabid dog.

Considering the incidence of two cases of Rabies in the regiment, the unit was completely isolated and kept separate from mixing with other units for a period of 45 days. Stray dogs entering the lines were ordered to be destroyed.

It will be a great help to the poor agriculturists and their cattle, in these hard days if such Tanks were constructed at various centres.

This is the first of its kind for the use of the farmers in the Bombay Province, to wipe out this Ectoparasitic infection of cattle; otherwise many cattle die every year.

AN UNUSUAL FOETUS IN A BUFFALO COW

BY
BHAGAT SINGH REKHI, L.V.P.,

Veterinary Assistant Surgeon, Pind Dadan Khan, (Punjab.)

Subject:—Buffalo-cow, nine years, indoor case No. 46.

*History:—*The animal was brought to the hospital on the 20th October 1938 at about 11 A. M., with the history that it developed labour pains two days previously, that "water-bag" had burst on the same day, and that the foetus was not forthcoming though several village lay men had tried.

On examination it was found that the presentation was posterior with the head of the foetus at the pelvic inlet. There was a large quantity of mucus and the foetus was dead.

The pouch, later on, the abdominal cavity was incised. A large quantity of mucus came out. Delivery was then easily effected.

*Shape of the foetus:—*Foetus had two heads, six legs, and three tails. The abdominal cavity in the shape of a pouch was attached to the buttocks. (Plate No. XXXIV Fig. 1.)

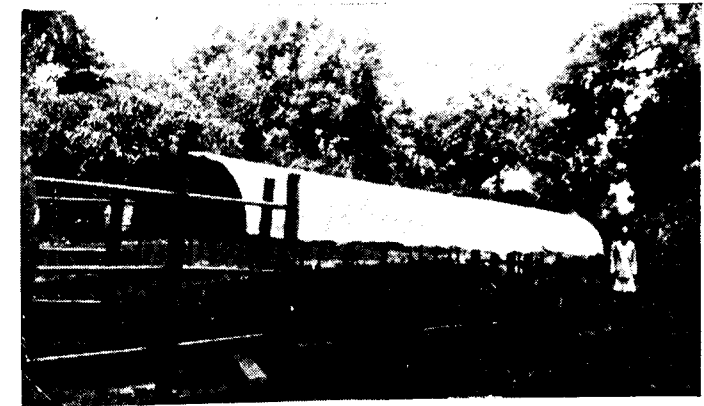


Fig. 1. Photo of the Cattle Dipping Tank at Turkewadi, Belgaum Dt. (Side view)



Fig. 2. Photo of the Cattle Dipping Tank at Turkewadi, Belgaum Dt. (Front View)



Fig. 1. Photo of an Unusual Foetus in a Buffalo-Cow



Fig. 2. Photo of a Cow-Calf suffering from Umbilical Hernia

A CASE OF UMBILICAL HERNIA IN A COW-CALF

BY

KARTAROHAND ASSI, G.B.V.C.,
Veterinary Assistant Surgeon, Barwani State, O.I.

Subject:—Four-months cow-calf in fair condition, Nimadi breed. Plate No. XXXIV Fig. 2.

History:—Four or five days after calving, the owner noticed a very small swelling round about the umbilical cord of the cow-calf, but did not take serious notice of it.

By and by the small swelling continued growing up to the size of a big water-melon. The animal was brought to the Veterinary Hospital, Barwani, on the 15th January 1939 for treatment.

After examination, the case was diagnosed to be one of umbilical hernia. The general condition of the animal was good on admission.

Treatment:—On the 17th January, the animal was cast, anaesthetized and fixed in the dorsal position. After washing the part thoroughly with antiseptic lotion, the skin over the sac was incised longitudinally until the peritoneal lining was exposed. The hernial contents were reduced and the hernial orifice about 9×3 was sutured with catgut. The loose skin was cut and shortened and sutured with silk thread. The part was painted with Tincture Iodine, a pressure pad of Carbolised tow soaked in Tincture Iodine was put on the sutures and bandaged.

The case progressed without complications. The silk sutures of the skin were removed on the 25th January. The wound healed up by first intention and the cow-calf was discharged cured on the 26th January 1939.

This is the third case of umbilical hernia treated radically by me with success in this hospital.

College News

BIHAR VETERINARY COLLEGE, PATNA

NOTICE.

Rules for Admission to Bihar Veterinary College.

The next session of the Bihar Veterinary College will commence from the 1st July, 1939.

1. Candidates desiring admission should submit their applications on the prescribed forms together with the following certificates, so as to reach the Principal on or before the 1st June, 1939. The certificates will not be returned.

- (a) Age and moral character certificate from the Head master of the school or Principal of the college which he last attended (true copy).
- (b) University certificate or a certificate from the School or University authorities to show that he has passed the Matriculation Examination (true copy).
- (c) Medical certificate of fitness from an Assistant Surgeon.
- (d) Certificate from a gazetted officer to the effect that he is a Bihari or domiciled in Bihar (applies to candidates claiming Bihar domicile).
- (e) Letter of identification from some well known person stating that the candidate is known to him and that the statements made in the application form are correct (in original).
- (f) Letter from his guardian stating that all expenses incurred by his ward during the latter's period of study at the college will be paid (in original).

2. An applicant must be a Matriculate of a recognised University. Preference will be given to a candidate

Rules for Admission to Bihar Veterinary College, Patna 429

passed the I. A. or I.Sc. Examination. A good knowledge of English is essential. Height should not be under 5'-4" and chest unexpanded, not less than 30 inches. A candidate must not be below 16 and over 25 years of age.

3. A non-stipendiary candidate will have to appear before the Governing Body of the college when called for interview.

4. Fees must be paid in advance according to the scale under rule 8 of the college rules, the initial payment due at the time of admission being Rs. 35/8/- only.

5. A candidate on admission may be required to reside in the college hostel.

6. Admission forms may be had free on application to the Principal. Prospectus will be supplied on receipt of 4 as. by money order, for each copy required. Stamps sent in lieu of money will not be accepted.

7. *For candidates from the province of Bihar only.*—A candidate for a District Board stipend to assist him while under training at the college should apply in the first instance to the Chairman of his home district board, with necessary certificates as soon as possible so that when selected he may be interviewed and approved by the Director of Veterinary Services, Bihar, before he is recommended for admission. Such a candidate should in addition to the certificates required in para 1, produce at the time of admission a letter from the Director of Veterinary Services, Bihar or the Chairman, District Board concerned regarding his selection as a stipendiary.

8. *For candidates from provinces other than Bihar and from Indian States.*—A candidate from other provinces and Indian States should apply to the head of Veterinary Department of his province or state for reservation of a seat for him, on payment of an annual contribution by the Government of his province or State. Applications received direct from such candidates will not be considered.

9. The scale of pay of the Bihar Veterinary Service is as follows:—

Provincial.		Rs. 200-40 2-560-40-3-640.
Subordinate.	(a) Veterinary Inspectors.	
	1st grade	Rs. 170/-
	2nd grade	Rs. 135/-
	3rd grade	Rs. 100/-
	(b) Veterinary Assistant Surgeons.	
		Rs. 50/- to Rs. 100/-

(Fixed travelling allowance. Free house or house allowance in lieu thereof).

(Note.—Revision of the above scale of pay is under consideration of Government).

10. Stamped & addressed envelopes must be enclosed replies to queries etc.

PATNA,
28th March, 1939. }

Principal,
Bihar Veterinary College.

MADRAS VETERINARY COLLEGE

EXAMINATION RESULTS.

List of students who have graduated in March 1939.

- I. Satyendra Rao, P.
- II. Koil Pillai, J. W. G.
- III. Shunmugasundaram, K. S.
- IV. Doraiswamy Ayyar, P. V.
- V. Ramanujachari, G.
- VI. Chandrasekharan, K. P.
- VII. Maung Ko Gyi.
- VIII. Bertee A. D'Souza.
- IX. Sankaranarayanan, M. V.
- X. Ganapati, M. S.

- XI. Parameswaran Nayar, P. N.
- XII. Maung Kyi.
- XIII. Tiang Sun Tan Sanguan.
- XIV. Maung Ba Hla Thein.
- XV. Wilson, F. D.
- XVI. Sambamurti, B.
- XVII. { Hariprasada Sarma B.
Jayaraman, M. S.
- XVIII. Kakumani Kotayya.
- XIX. Jayaraman D.

VEPERY, MADRAS. }
1st April 1939. }

M. ANANT NARAYANA RAO,
for Principal Madras Veterinary College.

BENGAL VETERINARY COLLEGE

EXAMINATION RESULTS.

The undermentioned students have passed in order of merit the Diploma Examination of the Bengal Veterinary College for the session 1938-39.

No. in order of merit.	Name.	Place of origin.
1	Manomohan Bhattacharyya	... Bengal.
2	Manohar Shankar Gupte	... C. P.
3	Edward Festing Edrisinghe	... Ceylon.
4	Nikunja Behari Bhattacharyya	... Bengal.
5	Mirza Abdul Khaliq	... Punjab.
6	Gadadhar Roy Chaudhuri	... Assam.
7	Aryadasa Amarasingha	... Ceylon.
8	Avadhut Jayarampant Gupte	... C. P.
9	Charles Lambert Watkins	... U. P.
10	Mumtaz Awni Al-Tai	... Iraq.
11	Mohammad Yaqub	... U. P.
12	{ Nand Kishor Nantiyal Hemendra Kumar Gohain	... U. P. ... Assam.
13	Alfred Cyril Fernandez	... F. M. S.
14	Naresh Chandra Ghosh	... Bengal.

No. in order of merit.	Name.	Place of origin.
15	V. Ramachandran	... Travancore.
16	Qadir Bakhsh	... U. P.
17	Bidhu Bhusan Ghose	... Bengal.
18	Nilkantha Dattatraya Bhawe	... C. P.
19	Ghulam Rabbani	... N. W. F. P.
20	Paresh Nath Pratiher	... Bengal.
21	Narman Dewan	... Bengal.
22	Sandy Tan	... F. M. S.
23	{ Maung San	... Burma.
	{ Naba Kumar Ghosh	... Bengal.
24	Firoze Bakth	... Assam.
25	Kumar Narayan Singh Shekhavat	... Jaipur.
26	Ubaidur Rahman	... Punjab.
27	{ Tungi Prasad Gairola	... U. P.
	{ Sulaiman Amin Zaki Alzuybare	... Iraq.
28	{ Syed Abdul Wahid	... Bengal.
	{ Md. Hamidur Rahman	... Bengal.
29	Md. Abdus Salam	... Bengal.
30	Maung Thein Maung II	... Burma.
31	P. V. Thomas	... F. M. S.
32	Daya Pall Shukla	... Rajputana.
33	Faiyaz Ahmed Khan	... U. P.
34	Patrick Merl Fernando	... Ceylon.
35	Kathiravaloo Subramaniam	... Singapore.
36	{ Profulla Kumar Banerjee	... Bengal.
	{ Santosh Kumar Chakrabarty	... Bengal.
37	Saw Brown E. Maung	... Burma.
38	Subodh Kumar Ghosh Dastidar	... Bengal.
39	Maung Ba Pe	... Burma.
40	Mahammed Abdul Aziz	... Bengal.
41	Mahi Pal Singh	... U. P.
42	Bijan Behary Mittra	... Bengal.
43	{ Jadeja Josangji	... Bombay.
	{ Manzur Alam	... Punjab.
44	Mohd. Abdul Razaq	... Punjab.
45	Himansu Kumar Sen	... Bengal.
46	Maung Thein Maung I	... Burma.
	Wahidur Rahman	... Bengal.

A. D. MAC GREGOR, ESQ., F.R.C.V.S., F.Z.S., I.V.S.,
Principal, Bengal Veterinary College.

Communication

To

THE EDITOR

The Indian Veterinary Journal

Sir,

Please Publish the following in your valuable journal and oblige.

JODHPUR RULER DECLARES OPEN THE NEW VETERINARY HOSPITAL AT NAGOUR.

His Highness the Maharaja Sahib Bahadur accompanied by the Chief Minister, the Revenue Minister and the Controller of the Household flew to Nagour to open the new Veterinary Hospital. This is the first modern District Veterinary Hospital built at a cost of Rs. 30,000 under the present scheme for developing animal husbandry. Attached to this hospital, there is also a Cattle Breeding Station.

On arrival, His Highness and party, were received by the Director, Animal Husbandry Department, the Thakur of Khinwsar representing the Jagirdars from the Nagour district, a representative from the public of Nagour, and two cultivators representing the peasants. His Highness was then conducted to the dais when the public of Nagour gave an address for the great boon that His Highness had conferred on them by establishing the most modern Veterinary Hospital and the Cattle Breeding Farm. His Highness then expressed his thanks for the sentiments of their loyalty and devotion and said that for the welfare of his people especially the peasants who form the bulk of his subjects, the Animal Husbandry Department was established, being the most important Department as the peasants had to fall back on their animal wealth every time when the monsoon failed and famine prevailed. He was very glad, he said, to note that the people are taking full advantage of the Department.

His Highness then proceeded to the building and declared it open by untying the gold ribbon that was tied to the door of

the main building. His Highness then visited the Veterinary Officer's consultation room, Small Animal's Surgery room, Pharmacy, Stores, Records, Operation theatre and the Cattle Farm. The party was then entertained at a lunch on the upper storey of the building and after spending about 2½ hours in the Hospital and Farm, His Highness and the party flew to Didwana to inspect the measures which are being taken to meet prevailing famine conditions. These include relief works on roads, improvement of wells, and supply of grass and fodder in particular.

(Sd). DR. C. J. FERNANDEZ,

Director, Animal Husbandry, Department, Jodhpur.

Extracts

VETERINARY AID IN INDIA

In his address at the Imperial Veterinary Research Institute at Izatnagar on Saturday, His Excellency Lord Linlithgow made reference to some of the problems affecting the cattle wealth of India. The most important of these is the vastness of the animal population of the country. With a total of 215 million animals, Lord Linlithgow points out, she carries over one-fourth of the world's stock of cattle and two-thirds of its buffaloes. From this results an acute problem, the problem of the fodder. "There can be little doubt," Lord Linlithgow observes, "that the prevalence of animal diseases in India is in the main due to the enormous stock of animals which India houses." As in the case of human population, so in that of the animals, it is perhaps the case that malnutrition is at the bottom of the trouble. But what is the remedy? So long as valuable and economically the better yielding stock run the risk of contracting diseases against which there is no widespread protection, it is useless to expect farmers to go in for the more valuable stock, and so long as they maintain third rate stock, the ultimate cost to them must continue to be high. Is there no way out? Possibly, if veterinary aid could be made available to farmers more freely and at cheaper cost than is at present the case, then, they may go in for the more valuable varieties of stock. It is necessary that, as was recommended by the inter-departmental Committee on Veterinary Education in Great Britain, veterinary clinics should in India too be established in the farming areas clinics which could be treated as outlying stations of the Veterinary College. That report pointed out that "the State has not contributed liberally to the training of the profession." Seeing that a higher grade of health in animals will lead to an improvement in the health of the people — a proposition which the Committee referred to above accepted — the State should do all it could to improve the health of the animals. We may look to the new popular Governments in the Provinces to devote more attention to this question than their predecessors did in the past — "*Hindu Leaderette*", 13th March 1939.

ANIMAL NUTRITION RESEARCH

Viceroy Opens New Buildings

Place of Cattle in Rural Economy

- WORK IN VETERINARY INSTITUTE REVIEWED

A landmark in the history of nutritional research work in India was reached this afternoon when His Excellency the Viceroy opened the buildings which are to house the two new sections of the Imperial Veterinary Research Institute here.

The buildings comprise the animal nutrition and the poultry research wings as well as residential quarters for the staff. The other proposed constructions at the Institute include a Genetics Institute. Together with the Biological Products Section, the new branches form a unit of noteworthy size and importance. The total cost of construction of the new buildings is, it is learned about eight lakhs of rupees.

After declaring the new buildings open, His Excellency and party which included the hon. Kunwar Sir Jagdish Prasad, Member for Education, Health and Lands, and Mr. J. R. Hadow, the Director of the Imperial Veterinary Research Institute, toured the Sectional Wings of the Institute where demonstrations were given.

At the entrance, His Excellency saw a representation in silver of a cow and her calf mounted on a pedestal, flanked by plaques also in silver of other domestic animals including an elephant. Here His Excellency signed the Visitors' Book. Next the Library, one of the best in India as regards nutritional science was inspected and then the physiological laboratories, where the physiology of Indian domestic animals is being studied and data collected. The party moved through rooms which contained mills, gas and electric ovens, incubators, refrigerators, sterilizers, centrifuges and other machinery. In the fodder room the various types of fodder raised at the Institute were on view.

The Biochemical Laboratory where the important question of malnutrition of Indian live stock is being studied and the Pathological Laboratory which is concerned with deficiency diseases of Indian animals were reviewed and the Viceroy passed on to the Farm Laboratories where he saw the metabolism stalls, the weighbridge and the post-mortem room and also the experimental plot where pure species of fodder grasses are to be grown and studied.

His Excellency concluded his tour with an inspection of the Poultry Research Section, which is concerned with research in nutrition, Genetics and diseases of poultry and which will act as a Bureau for the dissemination of information on these subjects. This Section will also carry out investigations in the proceeding and disposal of poultry and egg products.

After tea, His Excellency and party entrained for New Delhi.

Advance in Animal Husbandry

"It is our earnest hope that this afternoon's ceremony under Your Excellency's auspices marks a notable advance in the development of animal husbandry on scientific lines in this country and that these two institutes which we have now the honour to ask Your Excellency to open will be so conducted as to secure the esteem of scientists and confidence of lay public." Thus declared the hon. Kunwar Sir Jagdish Prasad, while requesting H. E. the Viceroy to declare open the Animal Nutrition Institute this evening. He concluded by tracing the history and growth of the Institute and pointed out the various activities which it was carrying on.

Viceroy's Address

Declaring open the new buildings, the Viceroy said:—

"Sir Jagdish Prasad, ladies and gentlemen,—Knowing my great interest in agricultural and veterinary matters, you will realise how glad I am to be here to-day for this, to my mind, most important occasion.

"I was much interested in the account which, you, Sir Jagdish, have just given in your address of the development of the Institute and the expansion of its work. These two buildings which I have come to open, and indeed the whole of this estate here, and the hilltop buildings in Kumaun, which together form the Imperial Veterinary Research Institute, represent not so much the maturing of a considered plan as a process of inevitable growth. It is a matter of common observation that in the medical profession, the progress of attention has been from cure of disease to prevention of disease and then to the establishment of health. This progress does not mean that medical interest is directed towards the latter aim in substitution of the former. It merely indicates that with the growth of human knowledge and experience and of a proper understanding and use of scientific enquiry, attention, which at first is confined to phenomena, extends itself to cover causes.

"The general trend of veterinary activities presents a good example of this general progress which I have just described. Let me explain. The first point I would emphasise is the vastness of India's animal population, which is to the student perhaps the most significant characteristic of her veterinary problems. She holds a substantial proportion of the domestic animals of the world. Indeed, with an estimated total of 215 million animals, she carries over one-fourth of the world's stock of cattle and two-thirds of its buffaloes. In addition, she sustains something like 97 million sheep and goats. It is generally agreed that this aggregate of domestic animals is larger than is required in a properly balanced economy and that it imposes a too heavy demand in terms of fodder and feeding stuffs.

Prevention of Animal Diseases

"There can be the little doubt that the prevalence of animal disease in India is the main clue to the enormous stock of animals which India houses. In the past very heavy losses have been suffered from contagious diseases of animals, such as rinderpest, anthrax, surra and the like. These losses menaced

often the actual carrying out of agricultural operations which, since their timing and rotation is fixed by the cycle of the seasons, must be punctually carried out, and will indeed wait for no man. In India, the bullock is almost the only source of tractive power, and epidemics of animal disease may deprive the cultivator both of the value of his working bullocks and of a large part of his crop. So long, therefore, as disease reigned more or less uncontrolled, the cultivator and all who depended on the use of animals tended to carry a very large stock of them, since experience had taught that, in the event of epizootic disease, there would then be the chance of sufficient animals surviving to enable them at least to carry on. Clearly, under conditions where these diseases had more or less a free run, numbers were more important than quality and with overstocking and consequent shortage of fodder, it was unlikely that the average cultivator would maintain animals of substantial value.

"A first and essential step towards the improvement of the quality of our stock has, therefore, been the control of animal diseases, and it was to meet this need that this Institute was founded almost 50 years ago. The decades intervening provide a record of the success in this most important aim. This Institute has established a deserved reputation and if animal disease is no longer the terror in India that it was half a century ago, much of the credit must be given to this and to similar establishments elsewhere which have concentrated on the study of animal diseases and on the production of remedies and preventives for them.

Work in the Institute

"The importance of preventive work, which is the second in the sequence I mentioned, was early realised, and those in charge of the Institute set themselves to organising this side of veterinary work. The serum products which this Institute has produced and of which it is now so large a supplier are, I am sure, you will agree, a testimony to the efficiency with which this work has been carried out. The annual production of anti-rinderpest serum alone is over 700,000 doses, while the figures for other sera are equally of impressive dimensions. The rinderpest vaccine, in the development of which this Institute played a distinguished part, is an illustration of the results of continued efficient research, for it represents a comparatively cheap and easy method of bringing rinderpest under control, and the local preparation of this vaccine in a properly-equipped provincial laboratory is now quite feasible. Advance in economy, simplicity and safety are all represented in this effort of research. You will all appreciate how the climatic conditions of India add to the difficulties attendant on serum manufacture and the preservation of the availability of these delicate products; and how, in consequence, provision of cold storage in the near future at Izatnagar will simplify and cheapen this storage problem.

"The third stage in the sequence which I mentioned was the establishment of health which means, for veterinary purposes, the establishment of animal well-being and of the general conditions which will strengthen the animal's resistance and improve its quality. This animal nutrition building which is before us now represents, as it were, the realisation in brick and mortar of the full recognition of this important branch of veterinary science. It is not appropriate for me to dilate here on the vital importance of scientific

Importance of Cattle Wealth

The Poultry Industry

"In comparison with world figures, India's total of domestic ducks is not so striking as the annual total. Nevertheless, the number of domestic fowls in India is estimated at 173 million birds — a figure which the dimensions of the problem and the opportunity for its realisation. A point of great interest is that in the particular case of ducks, the Institute is getting to grips at last with the commercial poultry industry. I am convinced that there is a great scope for that department of the poultry industry. I do that requisite to provide it with knowledge and it is the object of this Institute to provide it with confidence that the Officers and a good working staff will be able to date to render more profitable and successful poultry keeping in India."

"I will not detain you longer. I ask you, Sir Jagdish, here to-day. I have much pleasure in declaring these buildings

BY

(Prepared for the Madras Meeting of the Indian Academy of Sciences, 1938.)

About forty years ago a separate department of Government known as the Civil Veterinary Department was organised under the administrative control of the Board of Revenue to tackle the problem of the heavy mortality among cattle and other agricultural livestock occurring year after year. It was soon realised that to recruit properly trained and qualified men to meet the growing demands of this new service from the existing Veterinary Colleges at Bombay and Calcutta was an unsatisfactory expedient and that the proper solution was to establish a College for Madras. Accordingly the Government decided to build and equip a Veterinary College for this province and the Madras Veterinary College became an accomplished fact, with a staff consisting of a part-time Principal (who was also the Superintendent of the Department), an Assistant Principal and three Lecturers, for a three years course of study leading to the Diploma. The first batch of Graduates from this college came out in December 1906. In 1909 a whole time Principal was appointed and other improvements and additions to the staff and equipment of the College were made. Besides additional accommodation for the departments of Anatomy, Bacteriology, Pathology and Pharmacy, further facilities for clinical instruction and extensions to the Hostel were provided from time to time.

In 1930 the curriculum of studies was so revised as to provide for a wider range of training including a thorough grasp of the fundamentals of the basic sciences, with the necessary additions to the teaching staff of gazetted and non-gazetted officers.

A new Hostel was built and occupied in 1931. Further extensions to the laboratory accomodation for Bacteriology, Pathology and Parasitology as well as for experimental animals large and small, were built and occupied in the year 1932 and in the following year the old Hostel building was remodelled to convert the first floor into additional lecture rooms and laboratory for Practical Physiology and Biochemistry, and the ground floor into a hospital for dogs. Other material improvements were also made to the Hospital

attached to the College which included a new Operation Theatre, X-ray and Actinotherapy, so as to keep pace with the modern methods in the practical and theoretical instruction imparted to the students.

The College provides for a Refresher Course for Veterinary Graduates in the service of the Government, Municipalities, Local Boards, Indian States, etc. A progressive policy in the matter of Veterinary Education in this province led to the affiliation of the College to the University of Madras for the course of studies leading to the Degree of Bachelor of Veterinary Science; and the period of studies for the Diploma was extended to four years. A further extension of the course for the B. V. Sc., degree to a period of five years has recently been approved by the University. The College has to its credit a commendable amount of research work especially in Parasitology and has the distinction of being the leading Veterinary College in India, teaching up to the highest standard.

This College has been in existence now for about three and a half decades, and measured by the pace of progress for India as a whole in the matter of Veterinary Education it may justly feel proud of its advance and challenge comparison with other Institutions of its kind.

Reviews

Annual Report of the Civil Veterinary Department, United Provinces, for 1936-'37.

The staff consisted of one Director, three Superintendents, one Veterinary Investigation Officer, 20 Veterinary Inspectors, and 206 Veterinary Assistant Surgeons. There were 182 (180) Hospitals and Dispensaries. 10444 in-patients and 450924 out-patients were treated, the total being 461368 (432611). 85204 (71780) cases not brought to the hospital were supplied with medicines. 84079 castrations were also done in these institutions. The Veterinary Assistant Surgeons visited 14879 villages, castrated 25092 animals, treated 53831 contagious cases and 18006 non-contagious cases while on tour. Total castrations were 99571 (92360).

Reported total mortality from contagious diseases was 56779 (29332); from Rinderpest 20901 (18517), Hæmorrhagic Septicæmia 12248 (6315), Black-Quarter 639 (139), Foot and Mouth 605 (1240), Anthrax 351 Bovines and 2 Equines, Surra 200 Bovines and Glanders 36 equines. 22391 (2285) deaths were recorded among animals other than bovines and equines from contagious diseases.

9054 serum-alone inoculations, 202148 Goat Tissue Vaccinations and 532 S. S. inoculations against Rinderpest, 108079 serum-alone inoculations and 47091 vaccinations against Hæmorrhagic Septicæmia, 9068 against Black-Quarter and 4621 inoculations against Anthrax were done.

2059 (1349) cases of Surra among equines and camels were treated. The incidence of Bovine Surra was more prevalent than suspected and these cases were often confused with Hæmorrhagic Septicæmia and Anthrax formerly.

There were 5 cases of cattle poisoning, 1663 smears and specimens were examined in the Central and Circle Laboratories.

15486 deaths from causes other than contagious have been recorded for the first time among bovines.

There were 52 horse and 92 donkey stallions. 6 new stallion stands were opened during the year.

The Veterinary Investigation Officer worked on (1) Bovine Trypanosomiasis (2) Joint ill in goats and goat-pox and an obscure disease among goats, (3) Otorrhoea among buffaloes, (3) Pasteurellosis and Foot and Mouth in pigs, (5) Sterility in cattle and (6) Rinderpest — its control by Goat Tissue vaccine and computation of minimum dose of ordinary Anti Rinderpest Serum: The available experimental evidence indicated — "(1) The smallest protected dose of serum should not be less than 20 c. c. (2) A dose of 4 to 6 c. c. for 100 pound body weight is sufficient to control the severity of reactions in animals of all ages. (3) Administration of serum at the rate of 6 to 8 c. c. per 100 pound body weight with a minimum of 40 c. c. is sufficient to counter-act the adverse effect of tissue vaccine on milk yield. This dose is also effective in warding off the danger of abortion. (4) In some animals reaction may appear later, though a majority manifests it between the 4th and the 8th day.

29 important horse and cattle shows were held and attended by the departmental officers. Propaganda was carried on with the limited resources, by means of lectures, exhibits, distribution of leaflets during Fairs and Shows, Exhibitions, Rural Development centres and different educational institutions. To carry out effective propaganda, on the scale desired and necessary, more men and money are required. Total receipts of the Civil Veterinary Department during the year were Rs. 130525-0-0 and charges Rs. 449707-0-0.

We are glad to note that the report testifies to the creditable record of service of Mr. S. M. Raza Hussain, who retired on the 16th September 1936. His valuable service to the Indian Veterinary Profession are well-known to our readers. The report under review says on his retirement "the Department lost a capable and experienced officer" who "commenced his career as a Veterinary Assistant Surgeon, and finished as a Circle Superintendent."

The report is a good record of increased work.

(The figures in the brackets are those of the previous year).

Annual Report of the Civil Veterinary Department, United Provinces, for 1937-38.

The gazetted staff of the department consisted of one Director, three Superintendents, and one Veterinary Investigation Officer as in the previous year. The subordinate staff consisted of 21 (20) Veterinary Inspectors and 221 (206) Veterinary Assistant Surgeons and the total number of Veterinary Hospitals and dispensaries was 187 (182). 497832 (461368) cases were treated and 70902 (85204) cases not brought to the hospital, were given

medicines in the institutions. The Veterinary Assistant Surgeons visited 12784 (14879) villages and treated 82366 (81837) cases while on tour. Castrations numbered 123004 (99571). There were also a few cases of cattle poisoning.

The reported cattle mortality from contagious diseases was 33992 (56779) of which 604 (959) were among the equines. There were 8 cases of equine glanders. 772 (2059) cases of equine surra were treated. 17288 (20901) bovines died of rinderpest. 14007 serum-alone inoculations, 172933 goat tissue vaccinations, and 16899 s.s. inoculations were done against Rinderpest. 6339 (12248) animals died from Haemorrhagic septicaemia and against this disease 75984 serum-alone inoculations and 47509 vaccinations were done. 1176 (605) animals died from Foot and Mouth disease and 390 (639) from Black-Quarter. 5292 serum-alone and 209 vaccinations were done against Black-Quarter. Anthrax claimed 703 (351) deaths amongst bovines and 7310 (4628) inoculations were done against this disease. 162 (200) cases died from Surra. 1078 (482) deaths were from other contagious diseases among bovines. 2203 (15486) deaths were recorded from causes other than contagious diseases among bovines. 224 (700) sheep, 229 (603) goats, 695 (854) dogs and 63 (82) camels were recorded to have died from contagious diseases. Causes other than contagious diseases were responsible for 1838 (2669) deaths among other animals. 1794 (1663) specimens and smears were examined in the Central and Circle Laboratories. 28 (12) cases were given anti-rabic treatment.

The experimental work on computation of the minimum dose of A. R. Serum for controlling severe reactions among sheep and goats simultaneously necessary with Goat Tissue vaccine revealed that the required dose of serum for adult goats and sheep was between 15 to 30 c. c. per animal. Similar experiments tried in buffaloes worked out at 3 to 6 c. c. per 100 pound body weight with a minimum of 15 c. c. per animal and the minimum dose among the pregnant and milch buffaloes was between 30 to 40 c. c. Treatment of Surra cases and controlled experiments showed that most of the cures were obtained with the doses at 4, 5 and 6 grammes of Naganol per 1000 pound body weight administered twice at an interval of a fortnight while a single dose failed to effect a complete cure. The drug was also employed prophylactically with promising results in single and repeated doses varying from 1 to 5 grammes, per 1000 pound body weight. The report mentions "a typical outbreak of sheep-pox was noticed in Muttra District. Prophylactic vaccination of the incontact flocks with vaccine obtained from the Mysore Serum Institute, was conducted and it was observed that though the mortality dropped from 90 to about 20 per cent., the vaccine was not effective in imparting a solid immunity to the vaccinated animal." We are sure that all the concerned authorities have been paying attention to bring this system of vaccination to perfection.

Tuberculosis of severe type in 3 birds in the Mission Poultry Farm, Etah, was confirmed by the examination of morbid material at Muktesar. Tests conducted for the detection of Tuberculosis and Johne's disease on 28 animals in the district Jail, Sultanpur, resulted in 7 positive and 5 doubtful for Tuberculosis and 2 positive and 2 doubtful for Johne's disease; out of 8 tested in the Xian College, Lucknow, two were positive and one

doubtful for Tuberculosis and one positive for Johne's disease; out of 201 tested on the Government Cattle Farm, Manjhra, 36 were positive and 15 doubtful for Tuberculosis and 13 positive and 8 doubtful for Johne's disease and out of 108 tested on Balrampur Estate Dairy Farm, 5 were positive and 2 doubtful for Tuberculosis, and it was decided to repeat the test for Johne's disease at this Farm as the reactions produced by avian tuberculin were severe and no definite conclusions could be arrived at. The report, therefore, rightly says that, these findings have particular significance from the "Public Health," point of view and indicate the necessity for legislation for the control and distribution of clean milk." But so far there is no indication if any move has been made in this direction. We, however, hope that the Public Health and Veterinary authorities will pursue the matter with vigour and promptness before it assumes dangerous proportions. Otherwise the best intentions and efforts of the Lady Linlithgow in having started the Anti-Tuberculosis Fund and campaign will not be of much avail.

There were 56 (52) horse and 10 (9) donkey stallions. 36 (29) horse and cattle fairs, shows and exhibitions were held. Rs. 1500 (Rs. 1300) were spent for the award of prizes at the shows. In addition to the distribution of leaflets in fairs and shows, 483 lectures were delivered by the staff in various educational and other institutions interested in Rural Development."

Propaganda "section of the Department's activities is not financed by Government." We hope the present popular Government will at once remove this defect. 38 (47) candidates were given compounder's training. Handsome mention is made in the report of the meritorious services of Khan Sahab Chaudhuri Ghulam Qudir, Superintendent, Lucknow, who retired in June 1937.

The receipts were Rs. 133347 (130525) and the charges Rs. 436118 (Rs. 449707) in a province with a total revenue and expenditure of over Rs. 136200000 and Rs. 136900000 respectively budgetted for 1939-40!

The report records a good progress of work.

The figures within the brackets relate to the previous year.

The Annual Report of the Civil Veterinary Department Mysore for 1936-1937.

"It is gratifying to note that eight philanthropic gentlemen came forward to make liberal donations for the construction of new buildings of the type-design for the location of dispensaries at Sagar, Chikmagalur, Hole-Narasapur, Nanjangod, Saligrama, Anekal, Gubbi and Chintamani." This pleasing reference to the noble philanthropy of the generous donors is made in the Government Review on the work of C. V. D., in Mysore State during the year. Thanks to the administrators in the State for their having tapped and encour-

raged the private philanthropy to flow into such modern and useful channels. There is much scope for similar work in the other States and Provinces. The magic wand of personal contact and co-operation among the Government Officers and the public has been mainly responsible for this desirable step in Mysore and surely it can produce similar results elsewhere also, only if such contacts and co-operations are established by the leading officers.

The staff of the department consisted of one Superintendent, 4 divisional Assistant Superintendents, one Veterinary Research Officer, one V. I. O. in charge of Scientific Section, one Assistant Superintendent attached to the Mysore Military Department, one Assistant Superintendent attached to the Forest Department and 95 Veterinary Inspectors. The Department has also got 105 salustries, 78 compounders and 10 farriers. The Live-Stock Census of the State is:—Cattle and buffaloes 5,129,815; sheep 2,535,359 and goats 1,402,925. Area of the State is 29469 Square miles with 175 head of cattle per square mile. There were 72 (68) Veterinary Institutions. Each institution serves for 415 sq. miles and 72251 head of cattle on an average. 250227 (283633) fresh cases were admitted into the institutions for treatment. 19121 (16285) operations and 26571 (23222) castrations were done there. The Bangalore and Mysore Veterinary Hospitals were provided with bio-ray apparatus and equipment for the treatment of chronic skin and nervous diseases. The Divisional Assistant Superintendents were all supplied with a microscope each.

It is the intention of the Government to make use of the services of veterinary inspectors of such hospitals which do not provide enough work to occupy their full time, in the rural uplift schemes in the surroundings especially for the improvement of Live Stock industry 52845 (106106) cases were treated. 1241 (1561) operations and 41061 (58264) castrations were done and 13163 (16481) villages were visited by the veterinary officers while on tour. They also attended 78 (112) cattle-fairs and shows and 6 (12) Panchayat Conferences.

There were 124 (5) R. P. out-breaks mostly in Shimoga and Kadur Districts adjoining the British Indian Provinces. This sudden and heavy rise is attributed to the infected herds from adjoining British Indian Provinces passing through the villages in the State. It has become customary for the adjacent Indian States and British Indian Provinces to trace the source of these contagious diseases to one another. After all, contagious diseases are no respecters of borders of administrative units. A Province or State weakly organised from a veterinary point of view, is a fruitful source of danger to the whole country. A strong central authority which will recognise this truth is necessary to enforce on all units to adopt adequate measures against epizootics as in the case of epidemics. Mere exchange of information through belated reports as is done now is no an effective step in the control of these diseases.

Restriction of movements of cattle in infected areas, closure of cattle fairs and preventive inoculations on an intensive scale proved helpful in preventing further spread of the disease. These effective measures should be adopted in every Province and State so that the whole country may be free from the ravages of these epizootics.

Report of the C. V. Department, Mysore, for 1936-'37 445

There were 1078 (53) deaths from R. P. (38520 (1423). animals by G. Virus alone method and 1290 (288) animals by S. S. method were protected against R. P. in 106 infected villages with a bovine population of 45024.

There were 1414 (1308) out-breaks of anthrax with 2096 (2041) deaths in 506 villages with a bovine population of 52137, 19992 (18886) animals were inoculated in 116 out-breaks. There were 456 (547) out-breaks of H. S. with a mortality of 1190 (1935) in 316 villages with a cattle population of 62622. Vaccine alone when infection was sporadic, and serovaccine method, where infection was heavy, were adopted. 30356 (47132) animals in all were thus protected against H. S.

1273 B. Q. out-breaks were reported with a mortality of 3281 (1677) in 1049 villages with a bovine population of 194085. B. Q. Filtrate was given to 50 animals, Filtrate and Serum to 564 and bacterin to 87421 animals, total number protected against B. Q. being 88095 (50432) in 715 out-breaks. There were 704 (1175) deaths from F & M, 3 (3) from Surra, 8 (27) from Red Water, 1159 (1960) from parasitic diarrhoea and, 4600 (2696) from other contagious diseases. Total mortality reported was 14002 (11567) and total number of animals protected was 219977 (148362). There were 738 Hallikar and 97 Amrit Mahal Stud bulls maintained. Poultry, pig and sheep-breeding received due attention. "Since it is the unfortunate veterinarian and his staff who have to remain in the cattle-fair grounds from the very beginning to the very end of it inhaling dust all though", the report rightly pleads that, it is very necessary, that the Veterinary staff so deputed should be provided with at least moderately suitable accommodation in the jathra premises." The patient pleading and the modest proposal of the superintendent to provide "at least pucca stone mantaps" in each cattle-fair should appeal to the benign authorities in Mysore who have a special corner in their heart for the poor veterinary inspector.

Inspection of jutka ponies and abattoirs was carried in some municipalities.

The work on Johne's Disease among cattle and parasitic diseases among the Live Stock in the State was continued in the Scientific Section. Maps and charts were under preparation after the epizootological surveys for the incidence of Johne's Disease in Bangalore and Mysore. Serological tests as an aid to diagnosis were under investigation. Feeding on minerals was undertaken for experimental purpose. Ten out of 31 post-mortem examinations and 171 specimens out of 565 suspected for Johne's Disease proved positive. Periodical dosing of sheep for parasitic diseases was continued with favourable results. The cause of delayed oestrus among the ewes in Government flocks, as a result of continuous dosings with copper sulphate referred to in the previous report was investigated during the year. From statistics collected it is evident that owing to starvation before and after dosing,—suggested to enable the dosing reaching the abomasum and first part of the bowel in sufficient concentration,—coupled with errors in feeding brought about debility resulting in delaying oestrus. This has now been rectified, and with the revision of feeding programme, more than 50% of the ewes have come into oestrus during the year. Besides, the number of dosings

and the interval between dosings have also been revised. 60 buffaloes were treated with Naganol for Trypanosomiasis in Hebhal Dairy Farm. 10,000 c. c.'s of Urine Hormone were prepared and supplied for the treatment of sterility among cows and impotency in breeding bulls. 499 specimens were examined in the scientific section for the department.

The Veterinary Research Officer worked on some of the obscure diseases. The most important diseases tackled by this officer were Polypoid growths, Gastro-enteritis of the Malnad cattle and Poultry diseases. He conducted 335 post-mortem examinations on various animals and birds and collected materials from them for research, examined 779 blood-smears and other specimens. He also carried out protective vaccinations against anthrax among sheep and against Strangles among military horses with the help of auto-genous vaccines, in both cases prepared by him.

The report is an interesting record of good work.

OBITUARY

MR. R. JAYARAMA RAO, G.M.V.C.

We regret, we have to announce the demise of Mr. R. Jayarama Rao, G.M.V.C., Veterinary Assistant Surgeon, Civil Veterinary Department, Madras, on the 23rd March 1939, at the age of 50, after 26 years service. He leaves behind him his wife, a son and a daughter and a large circle of friends and relatives to bemoan his loss.

We offer our heartfelt condolences to the members of the bereaved family.



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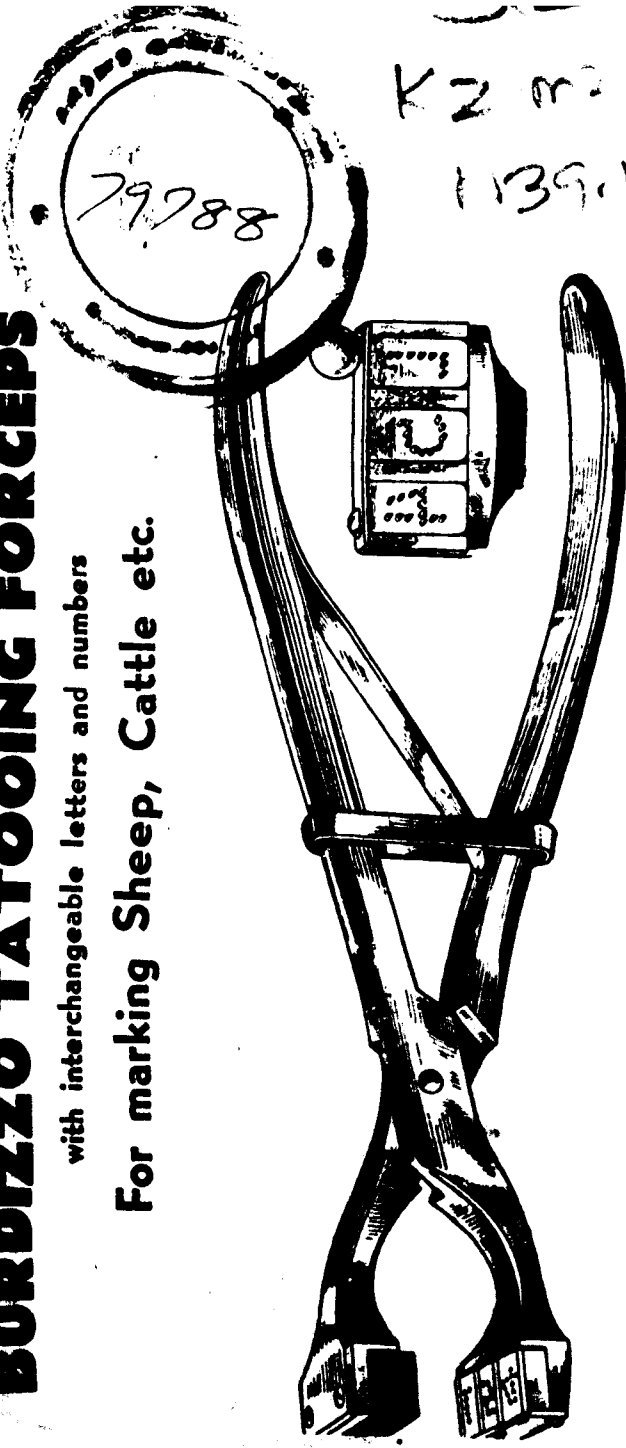
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