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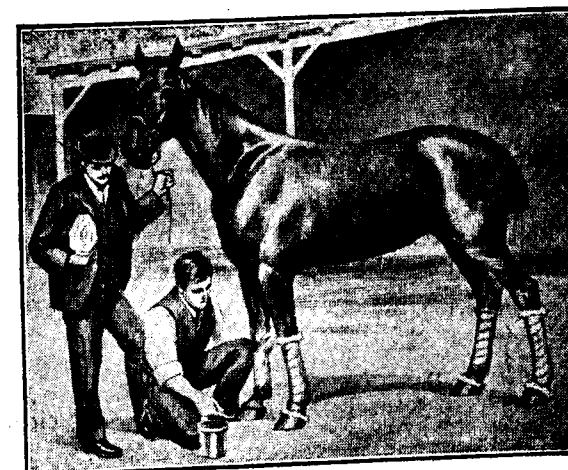
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THE

Indian Veterinary Journal

Vol. IV]

OCTOBER 1927

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EDITORIAL

CONTAGIOUS DISEASES AND THEIR CONTROL

In our previous issue of the Journal we dealt exhaustively on the immediate necessity of combating on right and efficient lines, that scourge of cattle, Rinderpest, which accounts for a very high mortality in India. We only hope that it will receive the attention it deserves, at the hands of the Veterinary Advisers of several provinces and serve as a means of concentrating all efforts to wipe out that disease from our land for ever if possible. We shall now point out how far efforts are also lacking to control efficiently some of the other contagious diseases of cattle in India.

Next to Rinderpest, Hæmorrhagic Septicæmia accounts for the largest losses. This disease like Black-Quarter is seasonal. Outbreaks generally occur sporadically during or after rains and seldom assume an epidemic form. The annual report of the Imperial Institute of Veterinary Research for 1924 says, "In the Laboratory, sero-vaccination, performed by the simultaneous inoculation of anti-serum and a living culture of the virus, has given the best results, for protection is conferred immediately by the serum and the animal subsequently possesses a solid permanent immunity following upon the symptomless infection set up by the suppressed virus. However, at the present time, we are not in a position to

press forward the application of this method in the field."

The report of the following year of the same institute says, "that much progress was made in our knowledge of methods for dealing effectively with this second most important disease condition of cattle in India. In affected districts, notably in the Punjab, liable to seasonal visitations cattle are treated preventively on a large scale by vaccination based upon similar methods of intervention to those adopted for combating human plague. The local authorities report very favourably upon the efficacy of the system.....A most powerful immunity is set up in susceptible animals by the simultaneous treatment with anti-serum and a small dose of living culture of degraded virulence."

So the Imperial Institute prepares a vaccine and an anti-serum to prevent this disease. Holmes (1913) says that the vaccine should not be used during an outbreak because for a period of four days following the vaccination the animal is still susceptible to the disease. Perhaps this accounts for the serum alone method so widely adopted during outbreaks of this disease. The result has not been satisfactory. The mortality from this disease is practically constant though an increasingly good number of cattle are reported to be inoculated year after year. The serum-simultaneous method of inoculation against this disease also needs immediate consideration.

Black-Quarter.—None can make bold to say that the mortality under this disease does not warrant any serious attention. Vaccination with either germ-free filtrate or Agressin has been praised a good deal and the Imperial Institute says that it is taking steps to estimate the efficacy of it in preventive inoculation against this disease. We wish it is done on a wider scale than hitherto and reliable statistics compiled. The anti-serum that is generally used in outbreaks of this disease serves to decrease the mortality to some extent. But again the shortage of

hands and an impossible extent of jurisdiction leave much to be desired in that direction.

Anthrax:—At the second meeting of the Veterinary officers in India held at Calcutta in 1923, it was opined that this disease was much more prevalent than the official records would indicate and that the only sure way of dealing with the situation was by making a persistent effort to prevent the spread of infection among animals and thereby secure the control and ultimate eradication of this disease. What active steps have been taken "to prevent the spread of infection" we are at a loss to understand. The annual report of the Imperial Institute of Veterinary Research for 1924 says "It is probable however, that vaccination against this disease would have to be adopted in many localities where this disease was prevalent, and the laboratory was prepared to face a demand for products for the inoculations. However the manufacture of a spore-vaccine has not been started hitherto, as there has been no demand for it from field workers." Why no demand? Who is responsible for such apathy? Are not the several Veterinary Advisers bound to pay more attention than hitherto? This is a disease of international importance. There was a threat of embargo upon the importation of Indian wool, hair and hides into manufacturing countries unless steps were taken to eliminate infection, as a result of the action taken by the special Anthrax committee of the International Labour Organisation of the League of Nations. Action was contemplated in the form of compelling exporting countries to undertake disinfection of wool at the ports of export, or to institute a proper sanitary organisation for the control of disease among animals. We ask what action has materialised on this all important question.

There are again diseases like Piroplasmosis and Trypanosomiasis in cattle which contribute their own humble mite towards the huge loss of cattle wealth of

India annually. It has been found that a large number of bovines in India are infected more with *Theileria mutans* than *Piroplasma bigeminum*. Usually *T. mutans* may be regarded as a harmless ubiquitous parasite, but occasionally it becomes exalted in virulence and produces tissue and other changes closely similar to those seen in East Coast fever of Africa. Against *P. bigeminum* we have the Trypan Blue provided it is given in time and in adequate dose. But researches into the true extent of ravages by this disease, destruction of ticks and cattle dipping, suitable to the conditions of India yet remain to be undertaken.

T. evansi is said to be the parasite commonly prevalent in cattle in India. If so it will be interesting to know how and under what conditions it becomes pathogenic to cattle and how far they serve as sources of infection to equines. Mr. H. C. Sampath Iyengar, Deputy Superintendent, C. V. D., Madras raised a very pertinent question in the Madras Veterinary Journal in 1919, when he said "the point also will arise as to whether we are justified in destroying horses suffering from Surra under the Glanders and Farcy Act while the same disease in cattle is allowed to run its course". The only way of getting over this difficulty is to take up researches in the mode of transmission of this disease, because it will not be possible to kill all cattle showing trypanosomes in their blood in the same way as horses are dealt with under the act. Simultaneously the adequacy of Chemotherapeutic treatment should be tried on a large scale to find out a specific as was done by Nuttall for Piroplasmosis.

Thus enough of problems await solution at the hands of experts. Yet one central Research Institute for a country like India is expected to cope with the work! An inadequate and illpaid staff is hard put to combat these diseases in the field. They acquit themselves nobly and well. But what is entrusted to them is too much for their

numerical strength. When will the Government realise all these? If they are earnest about efficiently controlling the contagious diseases of cattle in India and not merely camouflage the credulous public, it is high time that each Provincial Government realises its responsibility and thinks of more laboratories, more research institutes, better and more efficient prophylactic measures, increased number of staff with a living wage—and not the present, low, wretched and miserably poor amount dignified by the term salary—and a sufficient number of superior staff for a closer and better supervision. Will they do it? Now that there has been a remission in the provincial contributions, the old bogey of financial bankruptcy cannot be trotted out with any justification. We shall wait and see how far the Provincial Governments are going to deal squarely with the Veterinary Department.

NOTES

Till recently only ten posts on Rs. 125-5-175 were in existence in the Madras Civil Veterinary Department. After years of memorialising and petitioning the Government sanctioned 10% of the cadre as selection grade, which is far below the just demand of the profession viz. 15%.

The hard worked seniors of the department eagerly looked forward to their chance. But when it came, they found to their cost that there is many a slip between the cup and the lip. Some of the juniors had been promoted to the selection grade. No reason had been given for overlooking the claims of men, who have nothing against them on record.

We leave it to our readers to imagine the grief of the wronged seniors. Will those responsible for such injustice place themselves in the position of the injured men and realise their agony? So those men must continue to stagnate on Rs. 120/-per month! What prospects for a Veterinary Graduate!

Those unfortunate men are afraid to appeal even, lest something should be contrived to justify the 'once-passed-orders' or to put it in more intelligent and familiar language, to uphold the official prestige! Oh, the Irony of it!

Official Prestige! What horrors are done in Thy name! It is merely a stroke of pen to Departmental heads but a life's prospects deprived to the sufferers! Men holding responsible position should realise it. Be just before you are generous.

This world does not seem to be the place for honest and un-ostentatious workers. Why is it? It is a philosophy by itself. We shall not venture to solve it here.

We learn that orders have been issued by the Government of Madras permitting the use of text books by the Post-Graduate men for answering their practical examination papers!. We question the wisdom of such an order.

The Profession has been asking for the complete abolition of the examination at the end of the course. Perhaps the Government thinks that by such an ingenious devise they can meet the demand half-way. Far from it. Such remedies are worse than the disease itself.

Why only for practical examinations? If they think that due to infirmities of age the Post-Graduate men do not possess robust power of memory, the concession must

be for both practical and theoretical examinations. But why is the Government so particular about an examination at all?

Instances have been placed before them where an examination is not held at the end of Post-Graduate trainings. Probably it is again that demon of 'Prestige' that stands in the way.

Anyway, we congratulate the Post-Graduate men that they have not been asked to undergo a course of training in *Pelmanism* to improve their power of memory, by a Government that seems to be bent upon having some fun before it yields to the reasonable demand of the profession. Let us hope the Government will change its flippant mood soon!

GENERAL ARTICLES

THE FUNCTION OF PERIOSTEUM AND ITS APPLICATION IN MODERN SURGERY.

BY R. V. PILLAI G. B. V. C.,

Post Graduate, Muktesar, Offg. Second Superintendent (C. V. D. C. P.)

I have chosen this subject as a suitable one for discussion here so that we may be benefitted to the extent possible by a correct appreciation of the latest knowledge available on the subject. If you look at any text book or better still fall back on your memory on the function of periosteum of a growing bone you will find that periosteum is a fibrous membrane covering a living bone and is composed of two layers the inner of which contains many elastic fibres. In the outer layer numerous blood vessels ramify and send branches to the Haversian canals of the bone. The periosteum ministers to the nutrition of the

Paper read at the second Annual Conference of the Central Provinces and Berar Veterinary Association, 1926.

bone partly on account of the blood vessels and lymphatics it contains and especially in young animals on account of the existence between it and the bone of a layer of osteoblasts or bone forming cells. In the development of bone, it is believed that true bone is formed by ossification of connective tissue preceded by cartilage which becomes calcified and is then invaded by embryonic connective tissue which re-deposits bony matter in the interior of the cartilage. At the same time layers of bone are being formed outside the cartilage by the periosteum. We are here concerned with the latter process termed periosteal ossification which is the process generally said to take place in all fractures and in bone grafting operation now somewhat restrictedly carried out by the medical profession. It is therefore believed that periosteum being the generator of bone plays a great part in exostosis such as splints, spavins, ring bone, jarde and others. One of the surest ways of checking a growing splint is believed to be periosteotomy or destruction of the periosteum by pyropuncture.

With this conception of the known functions of periosteum one has to seek the aid of nature in finding a true parallel in that arena. The credit for this discovery goes to Sir William Macewan, the great Surgeon, who fixed his thoughts on the antler of a male deer and made a comparison between the velvet of the antler and periosteum of the bone. The male deer produces annually within three months antlers of solid bone, which in some species grow to immense size. They carry these antlers for a few months, then shed them and repeat the process every season. The antlers are outgrowths from the frontal bones of the skull. The annual growth takes place between June and August and within these few months not only does the bone grow but, the whole of this outgrowth is enveloped from base to tip by the velvet which keeps pace with the rapid growth.

What is the function of this velvet? Does it possess the function of the periosteum? As a covering and a limiting membrane, besides giving general protection including the supply of heat and moisture through its blood vessels, the highly sensitive velvet protects the soft pulpy growing antler by causing the animal to avoid issues of combat and even slight contact with foreign bodies; without such protection, the pulpy antler might be burst and the consequent hæmorrhage would have endangered the animal's life.

When the osseous matter in the antler is solidified, the covering has become useless, the growth of the bone at the base or corona compresses the blood vessels of the velvet which, on losing its blood supply withers and is shrivelled and cast. The solid antler now remains—a formidable insensitive weapon for offence and defence.

The antler is usually described as an ornamental weapon. It is however more intimately correlated to the sexual function. The antlers through the velvet are supposed to have a periodic reflex action on the function of the testes. The greatest sensitivity of the velvet corresponds to the period of minimal testicular activity. When the velvet is shed, the insensitive bloodless, nerveless, antler is left as a weapon fit for combat. If however the velvet is to serve the retardative function over the reproductive organs then it must be shed annually and grow afresh.

An examination of the structure of the velvet points to two distinct layers.

1. The stratum lucidum.
2. The cutis of the velvet which grows directly on the bone.

Has the stratum lucidum an independent vitality?

The evidence adduced tends to indicate that the stratum lucidum possesses an independent vitality and is endowed with the power of more rapid surface

extension than the deeper layer. In the growing period of a contusion, osseous tissue is first rapidly covered by stratum lucidum, the stratum malpighi following. This independent vitality and the rapid surface extension possessed by stratum lucidum show itself when this tissue is grafted on to a granulation surface.

Again in the antler one sees the cutis of the velvet growing directly on the bone with no intervening membrane such as the periosteum. An analogy is found in man or animal in a compound fracture of a long bone with loss of soft tissue. The skin may then grow directly over the embryonic osseous tissue in course of formation becoming rigidly attached and form an adhering cicatrix. The same may occur after amputations which have healed by granulation tissue, the skin becoming fixed to the osseous tissue much to the detriment of the patient.

When an amputation is performed in childhood, in the course of years the soft tissues may atrophy through sheer disuse while the bone continues to grow. The bone gradually protruding through the soft tissues is covered only by a thin, stretched layer of cutis, chiefly lucidum; like the velvet in the antler, the human skin tries to keep pace with the growing bone but it only succeeds in covering it by such a thin layer of closely adhering skin that it is liable to injury on slight occasion.

What analogy can be drawn between the growth of the antler and growth of bone?

The frontal bone from which the antler springs is only covered by ptericranium to which osteogenic powers of a high order are not ordinarily assigned. The method by which the stag's antler grows from the pedicle is somewhat analogous to the growth of a long bone.

Metchnikoff believed that old age is brought about by the impairment of phagocytic activity in the body and the consequent invasion of the body by germs introduced

through the large intestines. In this way senescence, decay and death occurred.

In the stag's antler these factors are conspicuous by their absence. The whole evolution, ultimate sclerosis, death and separation of the antler is aseptic, phagocytosis playing no part therein. The osteoblasts therefore are understood to extract from the blood the ossein, which they deposit in their periphery and build themselves in, cut off their food supply and become entombed.

There is no senescence or old age in the cells of the antler—they all die young—the whole period of existence being about a year.

In the outpouring of osteoblasts in the repair of a fractured bone the same question arises in an intensified form as the osteoblasts are then outside of their own direct nerve control. Why do the regenerating cells which have been actively proliferating know when to stop the reproduction? Why do they not go on producing indefinitely? There must be conditions governing the product of outpouring beyond the influence of the trophic nerves of the bone; otherwise after a union of a fracture a huge lump of bone should result.

A case may be sighted of a seaman. Ship wrecked in Bristol channel and washed overboard; stranded on a rock, his injured leg was swinging to and fro by waves for 48 hours—a great tumor was formed within muscles. Extensive quarrying with chisel and mallet had to be resorted to and then rapid healing resulted.

From the observation of Sir William an osteoblastic tissue breeds true to specific type and no other. Periosteum is not capable of producing an osteoblast. The bone cell is derived from tissue primarily osteoblastic and which produces nothing other than osteoblasts. Not only is this the case, the osteoblasts are produced according to specialised type of bone to which they belong.

In the canine species it would be natural to expect that there existed a generic canine cell, which was so indifferent to specialisation that it would develop into a fox terrier or sheep dog as chance might direct as to believe that a single bone cell could be so indifferent to the behests of heredity as to produce a diaphyseal or epiphyseal bone on demand!

The cell observes the same adhesion to type in response to the demands necessitated for repair following injury. The diaphyseal is robust in regeneration and vigorous in pouring out the embryonic tissue or callus. The epiphyseal is very economical just issuing sufficient ossific substance to cement the damaged parts.

If this had not been the case innumerable stiff joints would result. If the minute cells did not breed true, slight injuries would result in stiff joints. If the intramembranous parietal bone were as vigorous at repair as a diaphysis, the mass of bone thus formed might press upon and injure the brain. Can a living osteoblast be carried by the blood stream into a distance and be deposited within the body in a structure other than osseous and if so can growth of bone result there from?

Although artificial tests failed to prove this result a case is cited in which from about a fractured humerus, the osteoblast had become peripherally distributed and entangled in the meshes of the fibrin formed from the coagulated blood. Although in this instance the osteoblasts were conveyed by the blood stream for a short distance only, it established the possibility that living osteoblasts, in favourable circumstances may be detached from a naked bone in process of regeneration and may be conveyed by the blood stream to a distance and there grow and produce new bone.

A case is again cited in which osteoblasts were conveyed by blood stream and deposited in the cicatrix of a laparotomy wound. The new bone was formed in a ci-

catrix in the midst of abdominal muscles at the sight of a Laparotomy wound made seventeen days previously. There had been no bone present in that tissue at the time of operation.

An artificial antler is created by bone grown in a glass tube inside of tissue. Such a bone received all its blood supply from its base in the pre-existing bone. The main artery of the bone passes up the centre which sends out branches and capillaries which are most abundant next the glass of the tube. The osteoblasts in some places are in actual contact with the glass just as in the antler without the presence of a periosteum like membrane. There is therefore no peripheral blood supply all the nutrition being obtained from the base, yet the bone grows and thrives rapidly and abundantly.

As far back as 1739 Duhamel placed a silver ring round a bone under the periosteum in a living animal and found some time after that the ring had become covered by bone. It was therefore inferred that periosteum secreted bone which deduction was accepted ever since. This is the origin of the theory of osteogenic function of the periosteum.

This deduction is illogical and wrong, according to Sir William who placed a ring on a growing bone devoid of periosteum with the result that the silver ring was completely covered—greater than would have formed if the periosteum remained intact!!

The conclusion is that the mere destruction of periosteum should not warrant the sacrifice of a bone in practice. So long as the nutrient vessels maintain the blood supply the shaft of the bone will grow and function.

Even portions of detached living bone severed from all blood supply preserved aseptically and replaced among tissues have a probability of life. The osteoblasts receive in this case sufficient food from blood serum until the vessels of the part penetrate the bone. Recogni-

tion of this fact is of extreme importance in bone grafting.

The most interesting case of bone grafting recorded is that of a boy aged three years whose humeral shaft had to be completely removed as a result of pyaemic osteomyelitis. The periosteum in this case was uninjured and it was presumed that some bone would be formed by the so called osteogenic membrane of the periosteum; but this did not take place.

An year after, the boy was brought back by the mother who desired that the arm should be amputated as the sound limb was required to look after the hanging limb. Instead of acceding to the mother's request bone grafting was resorted to.

Six pieces of bone—one each from six different legs of three different men were divided into fragments and placed between the muscles of the arm where the shaft ought to have been. They became firmly united to one another and to the epiphysis in course of time so as to form a solid shaft. Though the arm was shorter than its fellow it has been of great service to its owner.

This paper is but an endeavour to give a glimpse into some phases of the comparative anatomy of the antler of the deer and the periosteum of bone in man and animals.

In brief Sir William MacEwen's work on the osteoblast as the one and only begetter of bone has very largely proved itself. He shows us how far reaching in its effects is his conception of the formation of bone. The doctrine he inculcates obviously has a very important bearing not only on surgical pathology, but also on histological Anatomy and Physiology.

THE DISEASES OF TEETH IN ANIMALS.

BY G. A. AJWANI, M. SC. D. V. M. D. V. H.

Shikarpur, Sind.

Continued from page 37 1st issue 4th volume.

Removal of the Molar by Repulsion or Punching

Indication.—This operation is indicated for the removal of the molar teeth that cannot be extracted and in which it is not advisable to the resort of the removal of the external alveolar plate. Also, those cases where the alveolar periostitis is complicated by more or less serious pus formation or empyema of the sinuses, repulsion is the operation to be given primary consideration.

Resortment.—For repulsion the animal is placed in lateral recumbency and dental nerve blocking resorted to. Location of the trephine opening.—As near as possible, this should be over the root of the tooth so that the punch cannot be placed on a straight line with the long axis of the tooth in young horses because of the deeper implantation of the teeth the trephine opening should be somewhat closer to the median line of the head. It should also be remembered that commencing with the first premolar the root of the succeeding molar are inclined more and more backward.

For the inferior of the jaw the openings are made at the border of the jaw in rare cases except the last two molars, and in these the openings are made on the side of the jaw and may necessitate an opening through the masseter muscle.

On making the trephine openings for either upper molar teeth we must avoid injuring the following structures. 1. Steno's duct. 2. Lachremal duct. 3. Glossofacial artery and vein and their branches. 4. Superior dental canal and its contents. 5. The trifacial nerve after it emerges from infraorbital canal. 6. The facial nerve and its branches.

The trephine opening is made in the usual manner

the animal's mouth is held open with the speculum, the operator places one hand in the animal's mouth with the finger on the tooth to be repulsed, with the other hand he guides the punch and his helper hits the punch. Failure to transmit the impact blows to the tooth is an indication that the punch is not advantageously located.

Sequelæ.—

1. Alveolo-nasal fistula.—After repulsion of those teeth the roots of those teeth extend into the sinus, it is not un-common for food to pass into the sinuses and break down structures into the nose so that there is a constant discharge of food from the nose.

Prevention of the development of this condition consists in daily packing of the alveola until it is closed. In old horses the reparative process is so slow that the alveolus may remain permanently opened. In these cases a guttapercha plug may be used to fill it up.

2. Persistence of the nasal catarrh.—This occurs occasionally and is usually the result of imperfect drainage from the sinuses into the nasal cavity or because all the diseased tissue has not been removed.

3. Dental fistula of the lower jaw.—Repulsion of an inferior molar is occasionally followed by the establishment of a permanent fistula at the place where the trephine opening was made. This condition is due to the fact that a particle of tooth is in the alveolus.

4. Deglutition or inspiration pneumonia.—This condition occasionally results from the passage of blood, pus and detritus into the lungs during the operation of repulsion. It is likely to result if the animal is under the influence of general anæsthetic. It is prevented by avoiding general anæsthetics and by having the animals head properly inclined so that the fluid will run out of the mouth.

Removal of Molar by Preliminary Spœlittig of the Tooth With a Chisel.

This method is occasionally employed and consists

in an attempt to divide the tooth to be removed into smaller segments by chiselling after which the segments are removed one at a time.

Removal of the Incisors.

This operation is seldom required. Permanent incisors of the horse cannot be extracted owing to their deep implantation and curvature of the root. This does not hold true in old horses. During youth and middle age incisors can only be removed by preliminary removal of the anterior alveolar plate under the influence of local anæsthetic by means of nerve blocking as in other dental operations.

The animal is placed in lateral recumbency and the mouth tied shut with cord rope or leather straps. By means of a knife and currette, the gums, mucous membrane, and periosteum are removed over the root of the tooth to be removed. Anterior alveolar plate is removed by the chisel so as to expose fang throughout its entire length. Chisel is then driven under the root and the latter tried out.

The canine teeth of the horse when necessary may be removed in a similar manner.

Dental Caries.

Characterization.—This is a biochemic decomposition of the teeth having a superficial origin and is commonly spoken of as rottenness of teeth. It seldom or never occurs in herbivorous animals because the herbivorous animals are affected with alveolar periostitis.

Of the domesticated animals old dogs, cats, and swine are occasionally affected. In man dental caries is the commonest of all pathological conditions and few human beings escape the ravages of this disease.

Etiology.—The exciting cause of caries is infection due to the entrance of the microorganisms through a break in the enamel. Instead of a break the enamel is occasionally eroded by acid condition of the mouth. There

are also certain predisposing factors such as low mineral content in the diet, pregnancy, unthriftiness specially during the period of dental evolution, uncleanliness of the mouth and so forth.

The disease is rare in veterinary practice because of the comparatively short life of animals.

Treatment.—Because of its rarity in animals, caries will probably never be universally treated as it is in man by burnishing and filling the carious cavity. In very rare cases owners had their pet dog so treated. In veterinary practice extraction is the method of treatment. In dogs extraction is quite simple provided the tooth has been loosened by the diseased process. If the roots are firmly implanted attempts at ordinary extraction almost invariably result in fracture of the tooth. In these cases, therefore, the implantation of the tooth should first be disturbed by means of a pair of bone cutting forceps. After this has been accomplished extraction is quite easy.

Extraction of Temporary Teeth.

In regard to the molars in herbivora for some unknown reason permanent molars are retarded in their growth and fail to push the temporary molars from the tissues. The animal attempts to masticate with the temporary molars in this position which results in the laceration of the gums followed by infection and tumefaction of the jaw. In two and half or three and half years in herbivora swelling of the jaw and difficult mastication should cause the veterinarian to make an examination for the presence of temporary molars or caps, and, if found, removed.

Occasionally the temporary incisors are not properly shed and if this is a source of annoyance to the animal or if it is likely to cause permanent irregularity in the disposition of the permanent incisors it is best to attempt extraction of the offending temporary incisor at proper age, i. e., two and a half, three and a half, four and a half

years. It should be borne in mind that the permanent incisors normally appear posterior to the temporary incisor.

Dental Cysts.

Not infrequently in horses there develop along the course of the artery supplying the molar tooth sacs varying in size and filled with the fluid. The sac may be so large that the entire sinus may be filled and cause bulging of the facial bones. In some instances the sac contents become infected resulting in alveolar periostitis and foetid, purulent nasal discharge. Regardless of their size or nature of their content the cyst destroys the nutrient vessel of the tooth and in course of time the root of the dead tooth is entirely denuded of its periodontal covering so that it projects into the sinus and looks like a naked stump. In most cases the affected tooth becomes loose and is easily extracted. In rare cases the root of the tooth becomes encysted in new tissue and its implantation is not disturbed.

Treatment.—When this condition is recognised by an exploratory puncture into the sinus, by bulging facial bone, by persistent nasal discharge, by difficult mastication, by discoloration of the affected tooth, by looseness of the affected tooth, or in any other manner, it should be removed.

Odontoma.

This is a non-inflammatory bone tumour frequently occurring on the roots of the molar teeth.

Etiology.—Obscure but believed to be due to some perversion in the foetal evolution of the teeth.

Symptoms.—Occasionally they cause bulging of the face though frequently their presence is not suspected until an attempt is made to extract tooth. The tooth loosens easily but resists all attempts at extraction.

In some cases their presence may be suspected because the affected tooth will also have a monstrous crown.

Treatment.—If a diagnosis can be made and if the odontoma causes no inconvenience it is best to leave it alone.

When the tooth has been loosened either by attempts at extraction or when its removal is necessary on account of any other disease the odontoma must first be removed from the root of the tooth by trephining over it and then by means of a chisel dividing it so that the tooth may be removed.

Parrot Mouth or Receding Chin.

This is a congenital deformity; shows a tendency to become aggravated with age and in the course of time lower incisors will press against the hard palate. Furthermore, the upper molars are also carried forward so that the first upper premolar has no opponent and it becomes much elongated.

Treatment.—Affected animals are unsound and should be so classed. They are usually in an unthrifty condition but elongated premolar may be shortened from time to time with the molar cutter. If the elongated inferior incisors inhibit mastication by pressing against the hard palate they should be shortened by filing moderately but never by cutting off because they have never been in wear and are sensitive to the very surface of the table and they bleed easily.

Prognathism.

This is the so called undershot jaw in which the inferior incisors and a first inferior premolar extend farther forward than the corresponding upper teeth. Its handling is similar to those of other conditions.

Parvognathism or Scissor Mouth.

This is also a congenital deformity in which the lower jaw is too narrow, so that the superior and inferior molars do not meet. The condition may be either bilateral or unilateral. The bilateral condition is absolutely unsound because the animal cannot masticate properly and is always

unfit. The unilateral condition is not very serious as an animal soon learns to masticate food on the sound side. This condition is frequently complicated by decay.

Treatment.—By means of a lateral molar cutter the excessively elongated edges of the entire upper and lower archades must be trimmed off.

Enamel Points.

This is a condition that occurs only in herbivora for the simple reason that in a normally formed mouth the outer edges of the upper molars and inner edges of the lower molars are never in wear so that they become elongated and may be so sharp that during the mastication they are productive of more or less extensive laceration of the cheek and tongue.

Treatment.—In floating or rasping the teeth of horses the aim should be to blunt the enamel points along the outer edge of the superior molars, the inner edge of the inferior molars and to round up the first superior and the last inferior molars until they are round and free from projection.

Remnant Teeth.

This is known as supernumerary teeth or also wolf teeth. These remnant teeth when they become visible make their appearance just anterior to the first upper premolar. They are harmless. The only excuse for their removal is the strong prejudice against them by the horse owners.

Treatment.—Attempt to extract them, though they usually break off on account of animal throwing his head and the lateral movement of the lower jaw.

Elongation of the Incisors.

This is a very rare condition. The incisors are wearing down as they come into use. The lengthening of incisors is very seldom harmful. There is a common impression that the incisors may become so long as to

prevent contact between the molars. This is an erroneous impression.

Formerly shortening of the incisors was extensively practised to hide the animal's real age.

The operation simply consists in filing a deep groove through the enamel on the anterior surface and at the point or along the line where shortening ought to be effective. The tooth is then amputated with a pair of incisor nippers.

Bishoping.

This is a common term used to designate the production of artificial cups in the incisor teeth. It is seldom practised today and never by any veterinarian.

The operation consists in cutting large cups in the inferior corners, smaller cups in the lateral and mere dots in the central. The cups are made with the dental drill. They are carefully stained with the nitrate of silver solution. Horsemen use a saturated solution of nitrate of silver, very carefully applied to the artificial cups and immediately dried by plunging into it the head of the burning iron. This immediately blackens the cup. If any of the nitrate of silver flows over the tooth it must be fired off. *Artificial cups lack encircling enamel.*

Tartar.

This is an accumulation of a deposit along the gingival margin of teeth; chemical analysis indicates, that the deposit usually contains Phosphate of calcium 80%, mucus 11½%, Ptyalin 1%, foreign material 7½%.

Symptoms.—It is commonest in canines though occasionally a horse's teeth specially the canines are so encrusted as to have the appearance of Odontoma. If permitted to remain, specially in dogs it almost always results in ulcerative *gingivitis* (inflammation of the gums) and loosening of the tooth.

Treatment.—It should be removed frequently by scraping with a dull knife, with a currette, or with a file.

Foreign Bodies in the Mouth.

In all domesticated animals foreign bodies occasionally become lodged in the mouth so that the animal cannot remove them. In horses and cattle foreign bodies frequently lodge across the hard palate and transversely between the two upper archades. Occasionally splinters of wood lodge between the molar teeth. In dogs and cats pieces of bone may lodge between the teeth or in or around the tongue.

Symptoms.—There is suddenly disturbed mastication, ptyalism and later foul odour and loss of condition by the animal.

Treatment.—Removal of the foreign body, followed by irrigation with borax water or a solution of borax.

Fracture of the Lower Jaw

The lower jaw may be fractured in any one of the various conditions. The following fractures have been observed.

1. Simple—Unilateral—transverse, fracture of the neck of the condyle.
 2. Bilateral as in 1.
 3. Unilateral—simple—transverse fracture of the rimous in the vicinity of the molar teeth.
 4. Bilateral as in 3.
- In 3 & 4 there are usually dental complications.
5. Unilateral—transverse—simple fracture through the angle of the rimous without dental complication.
 6. Simple unilateral fracture of the neck of the rimous.
 7. Bilateral fracture as in 6.

Prognosis.—Simple unilateral fracture without dental complications is favourable and requires no other treatment than feeding on soft food of a concentrated nature so as to limit the masticatory movement. Bilateral fractures have a very unfavourable prognosis and unless the

animal is very valuable one it is better to destroy it. If the animal is a valuable one the mouth must be kept shut for a period of 4 to 5 weeks and rectal feeding and watering resorted to during this period. If the animal loses condition rapidly the prognosis is unfavourable.

If the teeth are implicated in the fracture so that they are extensively loosened they should be removed. Prognosis, when the teeth are implicated, is much less favourable than without their implication.

Luxation (dislocation) of the Temporo—Mandibular Articulation.

In domesticated animals this is observed only in carnivora. It occurs in dogs either during yawning or when chewing a long bone. It is always accompanied by considerable injury to the ligaments of the articulation. The condition is usually bilateral or may be unilateral.

Symptoms.—In bilateral luxation there is inability to close the mouth. In the unilateral condition the lower jaw is in addition turned towards the sound side.

Differential diagnosis.—In paralysis of the lower jaw the mouth is open and the animal cannot close it. It can easily be closed by the attendant. It should never be forgotten that paralysis of the lower jaw is frequently the first symptom of rabies.

Treatment.—This consists in placing the hard wood stick transversely across the lower molars and as far back in the mouth as commissures of the lips will permit. It is well tied in position. In large dogs it is a good plan to administer a general anæsthetic. The stick is held and if sufficient pressure is brought to bear to bring the incisor teeth in contact, the luxation would be reduced. The animal should be fed on soft or liquid food for several days afterwards.

Gnathitis.

It means the inflammation of the bars of the mouth due to hard bit, commonly known as bit-sores. The con-

dition is essentially a more or less an extensive inflammation of the bars or the interdental space of the lower jaw.

Etiology.—It is due to unusually severe bit or to the use of chains as bits or to the continual sawing on the bit by bringing that driveness.

Symptoms.—These vary considerably. In mild cases it may be no more than tenderness of the affected region and slight redness and swelling of the parts. There may be some ptyalism, the mucous membrane may be intact, in more severe cases the membrane is broken, the underlying bone becomes denuded of periosteum and occasionally results in necrosis of the bone. In very unusual cases the process has resulted in complete division of the rimous at the affected point.

Treatment.—Cause must be removed. If there is a pus pocket draining must be established even to the extent of drilling through the bone. There should be no undue haste in removing dead bone until it is mostly bare. During the healing process the bit must not be used.

Malignant tumour of the hard palate in the horse.

Occasionally carcinoma and sarcoma develop in the hard palate of the horse specially opposite the 4th, 5th and 6th upper molars. The condition begins as a very small point and very gradually invades the surrounding tissue. In the course of time it perforates the hard palate, may invade the alveoli, loosens the teeth, may result in an offensive nasal catarrh, and in some instances it will practically destroy the animal's head while the growth is slow specially in the early stage or, as soon as loose teeth are unsound the growth seems usually active and soon invades the surrounding tissue.

There is no cure, destruction of animal is advisable.

Dental teratoma (Dentigerous cyst, mastoid fistula).

Etiology.—This condition is of embryonic origin as a result of which one or more, more or less perfect, form

teeth and occasionally develop at the base of the ear posterior to the temporal mandibular articulation.

Symptoms.—There is usually a swelling of gradually increasing size, many of them at later period have a fistula constantly discharging; when incised the swelling is found to contain teeth of varying size and shape.

Treatment.—Under local or general condition expose the lower part of the swelling and by means of a dental extractor or tooth forceps and dental chisel loosen and remove the teeth. Occasionally the fistula extends up into the cartilage of the ear and its entire lining must be destroyed.

Dental Fistula.

This is a tract leading usually from the diseased tooth to the outer surface of the jaw. They are the result of outward punching of an infective or abscessed tooth. They are more frequent in dental fistula in the lower than in the upper jaw.

Symptoms.—In the lower jaw they appear as small openings near the border of the jaw and if they have not been treated discharge a very limited amount of pus. In old standing cases the skin is drawn inward into the fistulous tract and the jaw bone is perceptibly thick. In some cases a probe introduced into the opening will lead in a straight line to the diseased tooth but in most cases the tract is a horse shoe in form and the locations of the outward opening is no indication as to which tooth is diseased.

In order to detect the diseased tooth it is advisable to force a stream of water into the outward fistulous opening and in some cases water will emerge through the diseased tooth.

Treatment.—The offending molar must be removed for healing of the fistula.

Lampas.

This is a congestion of the hard palate of the mouth,

usually of traumatic origin, though it may be of thermic or chemical origin. In young horses it is frequently observed during eruption of the teeth.

Symptoms.—The hard palate just back of the upper incisor teeth is swollen so that it projects below the level of the teeth. It is sensitive.

Treatment.—Eliminate hard, coarse, woody food from the diet and substituting soft green food together, with astringent swabbing of the mouth will effect recovery. Cauterization and scarification are inhumane absolute methods of treatment.

FOOT AND MOUTH DISEASE IN KEDAH.

Some Observations in the field.

BY. R. S. NARAYANAN. G. M. V. C.

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Introduction:—A distinguished worker once remarked that any disease to be well understood must be studied in places of frequent occurrence and where there are considerable opportunities of seeing them from the onset to death. The writer was closely associated during the year with an extensive outbreak of foot and mouth disease and personally attended to outbreaks upwards of 15,000 affected animals. These notes which form a brief survey of the writer's observations from the recent outbreak have been gathered in anticipation of extending knowledge on a branch of the professional work upon which the officers of the department here are very often called to combat.

Foot and mouth disease had never been so widespread in this State as during this year and it was with some difficulty that the staff were able to deal with it especially in North Kedah. From time to time this disease spreads rapidly and over extensive areas as a severe disease—more intense than that often encountered in India—affect-

ing principally buffaloes and cattle. There was hardly any year of freedom from this disease and the spread was especially rapid in years 1914, 1917, 1923 and 1927 and the uniformity in the endemic nature of the disease was not regular. It is no doubt the most important of the epizootics, first, due to the great prevalence and wide-spread occurrence; secondly, due to the difficulties encountered in its control. This disease has invaded almost all mukims in N. Kedah and raging with varying intensity, could not readily be controlled and is possibly a striking illustration of the effects of developed transportation.

In N. Kedah the initial outbreak during the year occurred in a mukim that is not on the main line of communication by road and no accurate information was forthcoming in regard to the way by which natural infection took place in this mukim. The disease was spreading very slowly and it was only just after a month the neighbouring mukims were reported affected. As these mukims are on the mainline of communication the spread was comparatively fast resulting in a chain of outbreaks. The last few weeks were marked by increased invasions, some of which were followed by widespread extensions approaching the character of pestilence.

Dissemination :—The ways in which foot and mouth disease may be disseminated from a given centre, once the disease has become established on the mainroad of transport, are numerous and varied. The spread of infection is evidently effected by movements of men and animals to and from the focus of contagion. The ordinary livestock here, especially buffaloes, appear to be very susceptible and the spread was apparently with amazing jumps and incredible rapidity,—vitality of the virus being best assured just after the rains.

Virulence :—Sometimes the infectious nature of the disease is extreme and in others very slight. Intensive

breeding of the virus and the rapid animal passage in herds of buffaloes are found to be directly responsible for the virus becoming of highly virulent character. The virus which is adopted to buffaloes loses much of its virulence in passing through a herd of cattle.

Susceptibility :—Goats and men have invariably escaped. The native attendants who usually show a total disregard for the virtues of disinfectants have not contracted the disease.

The percentage of attacks was about 90 p. c. in buffaloes 70 p. c. in cattle and 15 p. c. in Indian imported cattle and in goats nil.

Symptoms and lesions :—Foot and mouth disease is observed variable in manifestation by different workers, but it was observed almost uniform and typical here and diagnosis of this malady in an outbreak was very easy and definite and is almost impossible to mistake it for any other disease. Difficulty is experienced in the very early stages in an initial outbreak, because in the first stage one cannot discern it expect on looking for a rise of temperature. From the commencement of the rise in temperature it is observed that the animal is capable of spreading the contagion, wherever it passes, and passes the disease unsuspected to others, which again dispose it in the same manner. In the evolution of foot and mouth disease the 1st period—thermal with an internal temperature of 104 to 106 degrees—lasts till about 2 to 3 days and falls to near normal after the appearance of the vesicles and from this time onwards the infectivity is also observed considerably less so.

It is in the second period, which is indicated by the expressive title of this specific disease, the attention of the least observant is attracted. This stage of the disease is apparently the most painful for the animal and characterised by development of noticeable symptoms such as systemic disturbance, lame-

ness and the presence of vesicular ulcerations of the mucous membrane of mouth and skin at inter-digital spaces. Constitutional disturbance and falling off in condition is most striking in young buffaloes and milch cattle, though less so in the latter stock. Quidding of food is commonly present due to the idiopathic stomatitis. Salivation is very marked with the appearance of the vesicles. The dribbling saliva is first frothy and later on ropy in character depending upon the extent of lesions present. The characteristic 'smacking of the lips' occurring in the early stages with the appearance of the vesicles is invariably noticed in stock with severe and extensive lesions on the tongue.

The usual seat of lesions are under the upper lip—laterally near the junction of the skin and mucous membrane—and at the anterior third of the tongue, less frequently on the membranes of cheeks and hard palate and rarely inside the nostrils. The lesion of the size of 20 to 50 cents coin is invariably present at the tip of the tongue. The lesions elsewhere are comparatively smaller.

The lesion before rupture is well defined and prominent. A straw coloured fluid escapes on rupturing these bladders. The tongue lesions are ordinarily ruptured by the animal on manipulating its tongue and before long after their formation. The ruptured lesion exposes a scarlet base and the mucous membrane around the edges around it appear free and very irregular.

Passing the hand down each leg, the animal resents gentle pressure near the coronet between the claws. Lesions on all the four feet are invariably present and are commonly situated on the anterior part of the digits and very uncommon to find at the heel part. The acute and well marked lameness, striking out with the affected foot (especially the hind) as if some foreign body is lodged between the digits are very constant symptoms and very significant until the lesions of the feet have ruptured.

Course:—The disease generally runs thro' its course in from a week to about a fortnight in cattle and sometimes upto a month in buffaloes, depending upon the severity of the malady in the latter stock. Lesions on the tongue heal very rapidly.

Mortality:—The actual deaths among adult cattle were few—even negligible—but invariably calves under 2 weeks and up to a month old die. The loss from the disease is estimated at the average about 4 per thousand during the recent outbreak. The following table is for the years of extensive outbreaks:—

Year	No. affected.	No. of deaths.
1914	12,962	20
1917	15,614	32
1923	16,635	103
1927	17,084	81

Immunity:—Immunity conferred by an attack of foot and mouth disease is variable in duration. The duration of immunity after a natural attack may not last longer than 2 to 3 months, but a subsequent attack is comparatively mild and of shorter duration.

Prevention and control:—Kedah being mostly an agricultural state in Malay the measures for the prevention and spread of the disease are well inaugurated. Phunghulus, who correspond to the village officers in India are called to assist in the suppression and in the supply and distribution of the necessary disinfectants in areas affected. Lectures are often given by the State Veterinary Surgeon to the phunghulus of all mukims emphasizing the importance of quarantine measures and routine disinfection in the notified area of outbreak.

Recognising the importance of early recognition of the diseases wherever it appears and the necessity for the unified control, this State has notified that owners of cattle diseased or dead should forthwith give notice of such disease or death at the nearest Police station or to

the phunghulu of the mukim and who in turn inform the Veterinary Officer in-charge of the area. Veterinary Officer visits the scene of the affected or dead as soon he is informed and if the suffering or the death be from any contagious disease, suspected or affected, is notified to the phunghulu and everything is done to prevent the escape of infection.

On account of the marked infectivity of foot and mouth disease and its easy spread to other premises, no animal is permitted to be moved to other premises. Animals within a radius of 100 yards of the affected premises are considered 'contacts' and movements of animals which are within this area are never allowed to move outwards. A bucket of Jeye's fluid lotion is arranged for, placed at the entrance of isolation premises and renewed as required. Everything used about the affected and in-contact animals are cleansed and disinfected after use.

In this country the disease appears to be almost indigenous and hence during an outbreak of this disease, attempts are made to spread the disease thro' the herd in the affected area and thus curtail the period of outbreak.

Slaughter policy as a means of suppressing outbreaks of this disease is not advocated where frontiers are land frontiers. This drastic step may be well justified in an island country like England but is impracticable here.

The writer has already observed above that infectivity is maximum in the very early stage of the disease till after the appearance of the vesicles. Hence, sanitary measures to be effective and to produce the desired result should be rigidly applied in the early stages of the disease; measures after the epidemic has developed are found to be powerless.

The Economic Importance:—Foot and mouth disease in its nature is a mild affection, death occurring only very rarely under normal conditions. The economic factors lie (1) in the considerable inconveniences and hence losses

which the owners are obliged to incur due to the long period of inactivity of the affected and in-contact animals, especially in the harvesting and ploughing seasons; (2) diminished milk production of milch cattle; (3) loss of calves from the point of importance of animal husbandry. Even after recovery the secretion of milk rarely ever comes to the original standard inspite of the best available nursing. In a few cases the milk has entirely ceased till the next calving.

Differential diagnosis:—The only other foot affection encountered by the writer in the neighbourhood of a foot and mouth disease outbreak was a case of a bullock suffering from acute travelling lameness. This condition corresponds to laminitis—a painful condition often affecting the fore feet of cattle overdriven along hard roads. The coronet is hot, painful and swollen and the lesion is generally just above the interdigital spaces. Symptoms are found intensified in hot season.

A BRIEF REPORT ON THE OUTBREAK OF FOOT AND MOUTH DISEASE AT THE WILLINGDON CATTLE FARM, PHIHAI AND ITS CONTROL BY CHEMOTHERAPY.

By C. S. G. HAJI, G. B. V. C.,

Veterinary Inspector, C. V. D., Lower Sind Circle, Karachi.

The Veterinary Assistant Surgeon, Karachi first visited the scene of outbreak on 27th April 1927, when two head of cattle were affected. Subsequently the disease spread and 37 head of cattle were affected upto 6th May, 1927, out of which number, 9 calves died. As the disease had assumed a virulent form, the Superintendent, C. V. D., Sind & Rajputana, ordered the Veterinary Inspector, C. V. D., Lower Sind Circle, to visit the Willingdon Cattle Farm

Phihai and try to control the disease by Chemotherapy as advocated by Col. G. W. Walker & W. Taylor, in Veterinary Bulletin No. 17, Department of Agriculture, Punjab, 1926. The Veterinary Inspector visited the Farm on 8th May, 1927, and carried out the treatment.

Iodine Treatment:—40 head of cattle, including 5 head of healthy cattle were treated with Lugol's solution in doses varying from 20 c. c. to 100 c. c. The Iodine solution was mostly injected intravenously and a few cases were treated subcutaneously. These injections were done under antiseptic precautions. Lugol's solution used in all cases consisted of Iodine 1 gm., Pot. Iodide 2 gms., and distilled water 300 c. c., filtered through filter paper. Temperature of each head of cattle was recorded before injection and also on the morning following the inoculations. In most cases it dropped to normal, but those in which the temperature remained above normal did not yield to treatment. In some cases temperature went down to subnormal and the extremities became cold. These were treated with stimulants and they recovered.

Mortality before Treatment:—The mortality before treatment was 25 %.

Mortality in the treated cattle:—4 head of cattle succumbed to the disease, viz:—

3 calves being 6½ months, 3 months and 7 days old and 1 cow 6 years old. This cow suffered from distokia during the outbreak and afterwards developed a virulent form of the disease. Evidently she lost her vitality and succumbed to the disease. She gave birth to a weak calf which also fell victim to the disease although it was treated with Lugol's solution, when healthy.

Treatment of Healthy Cattle:—With a view to ascertaining the protective power of Lugol's solution, 5 head of healthy cattle were treated, viz:—

3 working bullocks and 2 calves. Out of these 2 bullocks developed a mild attack of the disease but were able

to do their daily task of drawing carts. 1 calf whose mother suffered from a virulent form of the disease, died.

Virulence of the disease:—The subjoined table shows that cattle of all ages suffered from the disease, but its virulence was chiefly confined to young calves of 6 months and upwards and caused a great mortality amongst them:—

Total No. of cattle.	Bulls	Cows	6 months bulls.	6 months heifers	Bull calves	Heifer calves	Working cattle	Total
Total No. of cattle at the farm	4	27	16	11	14	6	10	
No. Attacked	3	17	5	11	12	4	8	60
No. died.	0	1	2	1	6	4	0	14

Results of Treatment:—So far, the results of the treatment have been encouraging. Out of 40 head of cattle treated with Lugol's solution, 4 succumbed to the disease, giving a percentage of 10, in an outbreak of a virulent type. The treatment is cheap and effective. Additional advantages are that the treated animals show no obvious lesions of foot and mouth disease. Their general health is little affected and there is no appreciable loss in weight and condition. In milch cattle, their normal yield of milk is restored sooner than in cattle not treated.

In some cases, the feet lesions which were so severe as to cause an apprehension of sloughing, soon responded to the treatment without any complication.

In healthy cattle, the treatment did not give any immunity, but it appeared to lower the intensity of the virus.

DISCUSSION ON MEDICINES USED AGAINST INTERNAL PARASITES AMONGST ELEPHANTS

BY DR. M. C. GUPTA

Late Medical & Veterinary Officer,
Messrs. Macgregor & Co., Ltd., Toungoo, Burma, India, (1925),
Subscribed by his son, Mr. S. Gupta.

Before discussing the value of medicines used either as preventive or curative against *internal parasites* amongst elephants it is necessary to give a short description of parasites from which elephants generally suffer. Mr. Henry Gray's notes on "Worms in animals" does not unfortunately deal with any of the species of worms found in elephants. The ordinary worms which generally affect elephants are (1) Bots (2) Round Worms (3) Hook Worms (4) Flukes—including liver-flukes and amphistomes and (5) Tape Worms which were found on post-mortems examination in two cases held by Mr. Easton. So far this variety of *worms* (tape-like) are not mentioned in any of the books dealt with elephant parasites. With a view to scientifically study this hitherto unknown parasite I sent a specimen of certain portion of this worm to Dr. Meggitt, Professor of Biology, University College, Rangoon and Dr. Lieper, Professor in the Department of Helminthology London school of Tropical Medicine and both these Professors identified this specimen as *Anoplocephala Manubriata*.

Treatment:—(a) Preventive (b) Curative. As for the first, liberal allowance of salt, periodical use of Epsom salts, Gupta's Tonic Powder—a patent medicine which contains blacksalts and other ingredients favourable to kill internal parasites and also hygienic measures which we have been adopting. Elephants, by nature are fond of salt licks and it has been found that the domesticated animals roam about in the forests and drink stagnant water full of different varieties of maggots swarming in this water

at the end of the dry season, when the scarcity of water is keenly felt in some of the working forests. To eliminate these poisonous germs from their system, salt alone is not enough, neither the Tonic Powder; but at the end of the season we give them a dose of Santonin mixed with Calomel and Areca-nut which clear the system to a large extent.

(b) Curative:—To kill (1) bots (2) round worms and (3) hookworms we treat the elephants with Santonin. As for liver flukes and tape worms Santonin is of no use. In the latter cases we have to administer "Male Fern"—a preparation of which is now labelled as "Danistol"—a patent medicine.

Santonin:—There is a suggestion to substitute "Worm-seed" in place of "Santonin" from economical point of view. I am the staunch supporter of this most valuable vermifuge (worm expeller) and vermicide (worm-killer). To substitute "Worm-seed" in place of "Santonin", in my opinion, is not possible; first (a) Quantity:—after studying Eastern and Russian Trading Company's letter, I find that "Worm-Seed" contains $2\frac{1}{4}$ grs. of Santonin in 100 per cent; that is to say to give the minimum dose of two drams of Santonin we have to administer 12 ounces of "Worm-seed" a very bulky quantity indeed when it will be well mixed in tamarind. The contention that "worm-seed" being much bulkier it reaches a greater intestinal surface than the concentrated "Santonin" appears to me to be groundless. It is not the quantity but the quality which acts on the intestines. "Santonin" is extracted from "Worm seed" by chemical process and it being the active principle of crude "Worm-seed" goes even to the most minute part of the intestines. This can be proved just after giving a dose of Santonin and examining the excreta. What a great difference in colour of the dung before "Santonin" was administered and soon after its administration! Elephant, by nature is a nervous and

fastidious beast; to dose such a bulky worm-seed mixed in tamarined will, in my opinion, be next to impossible. To treat valuable animals like elephants, the cost of which is hundred times more than an ordinary horse or an ox with "Worm-seed" is surely not recommendable. "Santonin" is irreplaceable by other drugs. I have been repeatedly asked by the Company (Messrs. Macgregor & Co, Ltd., Toungoo) to suggest a substitute, but I have always refrained from such suggestions.

The following is an extract from an eminent London authority with whom I had a correspondence about the use of this drug:—

"Santonin is a direct poison to intestinal worms killing them in the intestines. It is a most valuable anthelmintic. The action for expelling worm is possibly due to an unknown oxidation product of Santonin which does not kill the worm outside the body." The efficiency of "Santonin" has never been questioned and efficiency I submit has to be paid for. To keep our elephants fit we shall have to buy such a costly drug as "Santonin".*

We cannot expect to buy a Rolls-Royce for the price of a Ford.

Dose of Santonin:—According to Mr. Henry Gray's pamphlet the dose for a horse is 60 to 120 grains. This evidently shows that 120 grain dose which we give to our elephants is not enough. The average body weight of an elephant is 2 tons. 14 cwts. which is equal to 6048 lbs. Taking $\frac{1}{2}$ grain for every pound of body weight a dose for an elephant comes approximately to 300 grains (5 drams). Our standard prescription to treat elephants for worms is as follows:—

Powdered Areca-nut—One to two ounces according to individual cases.

Crystal Santonin—Two drams.

Calomel—Two drams.

It is observed that the price of "Worm seed" is 10 S.

per lb. A dose for 12 ounces will therefore be 7 s. 6 d. Now let us calculate the price of a dose of Santonin. The price of a pound of Santonin is £ 32. 10s. an ounce (16 ounces=1 lb.) costs £. 2-0-7 $\frac{1}{2}$ d. and a two dram (8 drams=1 ounce) dose costs 10 s. 2 d. approximately. Therefore, the difference between the treatment of "Santonin" and "Worm seed" will be 2 s. 8 d. per dose. But taking into consideration the efficacy of Santonin I feel inclined to think that this is worth spending."

Preparation of "Male Fern":—"Danistol" of the Crown Chemical Company:—

I understand from the cutting of the "Asian" that "Danistol" was the preparation of "Male Fern" eliminating the poisonous effect of the drug. I may be permitted to say that "Male Fern" is not a new drug to us. We have used it in our elephants for "Flukes" and we have got stock of this medicine as well. I would not recommend to buy a patent medicine of a very costly nature as we have to strictly observe *economy* which is the order of the day. I need hardly say that the symptoms due to different parasites are often exhibited in the same case. In some cases we shall have to administer both Santonin and "Danistol" to a patient which is suspected to be suffering from Internal Parasites.

Copy of letter from Dr. F. J. Meggitt, Biological Department, University College, Rangoon, dated 26-2-24, to Dr. M. C. Gupta.

Many thanks for the cestode I received this morning. The only adult tapeworm recorded from an elephant is "*Anoplocephala Manubriata*" Raillet, Henry and Bauche 1914 from Siam. The species sent certainly belongs to the same genus but differs from it in the character of the scolex: it may turn out to be new. I should be extremely glad if you could send me more material should you find any. It is better to kill the worms either in Bonin's fluid (equal parts of saturated aqueous solution of picric acid,

formalin and glacial acetic acid) or in a saturated solution of corrosive-sublimate in 7% alcohol plus 5% glacial acetic acid in the latter case the worm should be removed after three hours at longest, washed in water and preserved in 70% alcohol.

The genus "Anoplocephala" belongs to a family of cestodes the adults of which specialise in herbivorous animals (rabbits, horses, sheep, cows, etc.) Mostly they appear to be harmless at least that is the general accepted opinion although there is evidence to the contrary—but in at least two cases they have caused bad epidemic. "Moniezia" results every year in the loss to the sheep farmers of North Wales, in 1922 of 10,000. I believe "Stilesia" is a South African form, and causes similar epidemics in cows and goats. It would be interesting to see if any evil effects result from this species; so far as I am aware, none are known of the elephant. The life-history of all members of this family is entirely unknown. I should be glad of any material as I wish to start a university collection.

Copy of letter from Dr. R. C. Leiper, Helminthological Department, London School of Hygiene and Tropical Medicine dated 24-10-24 to Dr. M. C. Gupta.

I am very much obliged for your letter of 7th August and specimen sent by you on February '25, by registered parcel post which arrived safely. It was handed over to Dr. Theiber who has made special study of Anoplocephalidae to which family it obviously belonged. She had great difficulty in staining the specimen successfully and making out the anatomy but before leaving for South Africa recently she reported to me that the worm belonged to the species *Anoplocephala Manubriata* which has only once before been described by Railliet in 1914. I may say that the identification has not been sent earlier owing to changes in the Department and the summer vacation.

We should be very grateful if you could send us in 5%

formalin the discorded Amphistome *Gastrodiscus Secundus* which is common in the large intestine of the horse in India. A similar parasite *Gastrodis-coides hominis* has been recorded from the pig in Indo-China.

References:—

Veterinary Journal (London) January 1921.
Gupta "Internal Parasites in Elephants".
Mr. Henry Gray's pamphlet on 'Worms in animals.'

NOTES ON THE DEVELOPMENT OF MEDICAL ART.

BY T. N. KULKARNI.

Veterinary Assistant Surgeon, Nargund.

PART I.

The Almighty God, along with human being, created a number of things with certain properties with the object that they should serve some purpose in this world. Man with his superior mental capacity began to take advantage of his surroundings. It is therefore not quite wrong to say that the art of medicine began with the creation of the world, or to say precisely the first drop of blood from the first inflicted wound must have compelled the man to seek immediate help, thus the art of healing had its genesis. There is no country on the face of the earth, the people of which are ignorant of the knowledge of medicine, however rude the modes employed may be or may appear to us so now.

Coming to the lower animals with their lower mental calibre they know their own ways of treating themselves. One medical writer states that the animals drew the attention of man to the use of several means for the cure of diseases. The ancients learned from the dog the use

of purgatives, the bird called Ibis paved the way of the use of injections, the practice of bleeding was shown by the hippopotamus to the Egyptians, the value of the juice of Chelidonium in ophthalmia was pointed out by the swallows and so on. Man therefore is highly indebted to animals in gaining the knowledge of medicine.

The origin of the medical art was attributed by the ancients to their Gods—by the Hindoos to Brahman, by the Greeks to Apollo, and by the Egyptians to Thoth and so on. In the early ages when societies and religion were just making their appearance the sick were taken to the priest and monks for treatment and therefore every priest or monk claimed to be a doctor. These priests and monks of all nations not only administered the drugs, but also had recourse to charms and incantations etc. (Homer writes that the bleeding of Ulysses was arrested by repeating a charm. "Clauster and Hartp.")

Before writing on the development of Ayurvedic medicine let us have a glimpse of the Medical art practised among contemporary nations.

Egypt:—As I have already said the Egyptians attributed the origin of the medical art to their God Thoth. (Hermes.) He is said to have written 42 books of which six were devoted to medicine the rest 36 to Philosophy. These were written on (1) Anatomy, (2) Medicaments (3) Surgical instruments, (4) Illness, (5) Eye, and (6) Female diseases. Priests were both doctors and administrators of law. They advanced their knowledge of medicine by carrying the sick to the market and to public roads with a view of receiving advice from those who had an occasion to treat, with success, similar complaints. The temples then served as asylums. When medicine failed they trusted to charms. Later on each physician treated the complaint of a particular member of the body:—eyes, teeth, abdominal diseases etc. and thus posed as specialists. Egyptians had also made much progress in surgery. I have

already mentioned that they learnt blood letting from the hippopotamus.

Greece:—Greeks before they came in contact with the Egyptians were superstitious and uncivilised. Sickness was attributed to wrath of God or Goddess. They learnt the art of medicine from the Egyptians. The first Greek physician named Melampus, lived about the 14th century B. C. Aesculapius was the next well known physician in Greece. After his death temples of health called Asclepia were built in his honour. His sons were also good physicians, as well as warriors.

New period of Greek literature began after 660 B. C. when the Egyptians allowed them to settle in Egypt and gave some privileges to them. Many people moved from place to place and therefore became travelling physicians. Literature in this period made rapid strides. People travelled a good deal, exchanged their ideas and studied Astronomy, Mathematics, Geography, Healing Art etc. Anaximander was the first person to prepare a map. Empedocles was not only renowned for his skill in curing diseases but for preventing them by proper sanitation. Alemaeon of Crotona was another Philosopher and Physician who took great interest in dissection of animals and the study of medicine.

It would have been interesting if the author were to write the development of medicine in India. Ed.

CLINICAL ARTICLES.

GONORRHŒA IN DOG

BY S. K. ACHARYA, G.B.V.C.,

Veterinary Assistant Surgeon, i/c Laboratory, C.V.D., U.P., Agra.

It is a matter of common knowledge in the world of Veterinary Science that gonorrhœa is very rare in the

lower animals; and as such this portion of the subject has not been worked out by eminent Veterinarians for some reason or other. I was fortunate enough to meet with a case during my short professional career and I feel that I should put it on record. I hope this will prove helpful to other members of the profession.

The subject was a terrier dog, 5 years old and so far as I could ascertain had not previously suffered from any serious disease.

History.—No definite history could be obtained from the owner and possibly the disease passed unnoticed in its earlier stages. All that I could gather from him was that the dog was discharging white fluid from the prepuce for some time and subsequently tumours developed on the genital organ which gradually increased in number and size.

From the above history I took the cause to be that of an ordinary preputial catarrh which is very commonly met with in dogs, associated with genital tumours. But on careful examination and continued observation I found that the catarrh had extended to urethra and the inguinal lymphatic glands had enlarged with the formation of a bubo. Thus the case could be described as one of "gonorrhœa" in the proper sense of the term or more specially "Specific gonorrhœa" in dogs.

Etiology.—The real cause of the disease could not be ascertained, and in all probability the disease was of bacterial origin.

Bacteriology.—I dealt with this case whilst holding charge of a dispensary, therefore could not avail myself of the facilities necessary to carry out researches on this portion of the subject. But since the disease of gonorrhœa associated with genital tumours has been abundantly proved by Washburn and Smith to be contagious* and more specially the formation of bubo and the characteristic

*Disease of the Dog by Muller and Glass.

catarrh of the urethra, I am led to suspect strongly that the disease of gonorrhœa is also contagious.

Since Veterinary Science is making rapid progress in all its branches, due to the earnest devotion of research workers, my suspicion, I feel sure, may prove to be correct in the near future.

Symptoms.—On examination of the dog the following symptoms were observed:—

- (1) A thin purulent discharge sometimes tinged with blood dripping from the urethra.
- (2) Inflammation of the mucous membrane of the penis.
- (3) The formation on the side and base of the penis of infectious genital tumours of size varying from $\frac{1}{2}$ " diameter to that of a pea, which were round and nodular, deep red in colour, later on purplish red, hard and painful, which had a tendency to bleed easily on touch.
- (4) Enlargement of both the inguinal lymphatic glands or formation of a bubo, which were hard, painful and purplish red in colour.
- (5) The dog showed great pain when urinating and it was in small quantities, due partly to inflammation of the m. m. of the ulcerated urethra.

Treatment.—The case was very obstinate to treatment and took over three months and a half to cure. The treatment included both surgical and medicinal.

Surgery.—The tumours and bubo were first subjected to hot antiseptic fomentation and then were operated upon. The tumours were removed from the base and antiseptic dressing continued; when the wounds caused by the removal of tumours were nearly healed fresh tumours appeared by the side of the old ones and developed gradually. These too were removed and subsequent-

ly another group of tumours appeared and these were the last. Thus we see that inspite of all precautions the tumours persisted in appearing again and again and it was only after long and continued treatment that they disappeared permanently.

The following were tried as dressing for the urethra in the form of lotions of one percent strength:-

1. Sulphate of Zinc.
2. Acetate of lead.
3. Permanganate of potassium.

Of these the last mentioned proved most effective. The discharge from the urethra was very obstinate and could be stopped only after a prolonged treatment.

Medicine:—Internally the following mixture was given during the whole course of treatment and proved to be effective:—

R Liq. Hydrag. perchlor.	....	....	....	dm ½
Pot. Iodide.	....	....	....	grs iii.
Ammon carb.	....	....	....	grs iii.
Glycerine	....	....	....	dm ½
Aqua ad.	....	....	....	oz ½

Mft mist to be given B. D.

On administration of the above mixture the dog exhibited symptoms of iodism. The dog was fed with warm milk by spoon and the dose of potassium iodide was increased to grs. vi, and this helped to relieve the symptoms of iodism. Subsequently the dose of potassium iodide was again brought down to grs. iii.

Sulphate of Magnesium was tried internally as purgative and to my surprise I found this drug had a special action of stopping the purulent discharge from the urethra temporarily. Continued administration of this drug failed to achieve the above action on the urethral discharge.

In conclusion I would like to point out the important points of interest met with in the above case:-

1. The catarrh extended to urethra and there was formation of bubo or enlargement of the inguinal lymphatic glands.
- (2) Infectious genital tumours appeared on the side and base of the penis which were recurring.
- (3) Sulphate of Magnesium was found to have the special action of stopping the urethral discharge temporarily.
- (4) The animal had simultaneous attacks of two infective diseases viz:—Specific gonorrhœa and infectious genital tumours.
- (5) The case was not amenable to treatment.

The article is an interesting one but from the description given by the author it looks to us that it was only a case of Infectious Granuloma which is so commonly met with in this country. It is true that in some cases the glands enlarge and are found to be "cancerous". It is a pity that the author did not send the smears of pus for examination and also make endeavours to get cultures made to find out if the lesions could have been due to Gonorrhœa. It is a matter of doubt if this disease can be met with in the dog. Ed.

SODIUM CACODYLATE IN THE TREATMENT OF CONTINUOUS FEVER IN DOGS

BY G.N. ROY CHAUDHURI, G.B.V.C.,

Veterinary Surgeon, Calcutta.

For the last two years, I had to treat number of cases in dogs, both imported and country born, with a peculiar type of continuous fever with progressive anæmia ending in death.

Symptoms:—Temperature varied between 104°F. to 106°F., loss of appetite, tenderness in the region of liver

and spleen, fever remained constant, anæmia increased gradually, weakness in the hind quarters became a prominent feature and the animal could hardly walk. Blood examination revealed no protozoa. The disease was at first suspected to belong to the group of Distemper organisms, but the absence of nasal discharge and of eruptions upon the inner thighs and abdomen characteristic of distemper together with the fact that at no stage lung showed any complication confirmed me in my belief that it is some unknown disease. My opinion was also shared by some other well-known members of the profession in Calcutta.

Full opportunity for observing all the clinical symptoms was taken and the advice of Mr. A. D. Mac Gregor, M.R.C.V.S., Principal, Veterinary College, was obtained when two imported dogs one Irish Setter and a Great Dane belonging to the Hon'ble the Maharaja of Mysensing were attacked; both the dogs had it in a very severe form.

Treatment:—Quinine, Salicylates, Aspirin-phinalgin were given a fair trial without any effect. Tripin Blue and Acriflavine solutions were injected subcutaneously without any result. Sodium Cacodylate (Sodium Dimethyl arsenate; this salt contains 35%-Arsenic) being an organic preparation and because its arsenic is liberated more slowly than that of inorganic combinations and because it can be given in larger doses—was given a full trial, the dose being Sodium Cacodylate gr. $\frac{1}{2}$ in 1 cc. sterile solution injected subcutaneously on every alternate day. Seventh or eighth injection generally brought down the temperature to normal and 12 to 15 injections were given to Bull Terriers, Spaniels, Air-dailes without any bad effect. It was found that this solution is also sold by Messrs. Parke Davis & Co., in $\frac{3}{4}$ gr. doses: which may be given to big dogs without untoward results. Passing, it may be mentioned, that Sodium Cacodylate has got a very beneficial

effect on the skin and I had very satisfactory results in mange and eczema in dogs where ordinary parasitic applications failed.

Diet:—It is necessary to maintain the strength of the dog by giving nourishing food, viz. milk, egg, meat juice, soup etc.

Points of observation:—Where quinine and other antipyretic agents fail and the necessity of administration of arsenic is felt, it seems it is best given in the form of Sodium Cacodylate without any bad effect.

AN OUTBREAK OF CLINICAL BOVINE COCCIDIOSIS.

BY R.N. NAIK, G.B.V.C., POST GRADUATE,
(I.I.V.R. MUKTESAR),

Veterinary Assistant Surgeon, Kumta, Bombay Presidency.

The village officers of Algeri, Ankola Taluka, North Canara District, reported that there was an outbreak of cattle disease prevailing in the village and the symptoms noticed were bloody diarrhoea, straining at the time of defecation and bellowing pitiously at the time of death. The report showed that six animals were attacked and three had died.

From these symptoms and statistics I was not able to arrive at a definite conclusion what the disease could be, however, I hurried to the village and it was found that out of the three living animals two had recovered and one was in the state of convalescence. The latter case, on examination, presented an emaciated condition, and presented the following symptoms, eyes sunken, temperature 103.4° F., hind quarters were soiled with faeces which were, as seen from a number of droppings around the patient, reddish grey in colour, semiliquid in consistency, and had very fetid smell, the conjunctiva almost normal. The

appetite was very good. It was a cow-calf, fifteen months old.

Enquiries into the details of every case showed that the disease was prevalent only among calves between the ages of eight and fifteen months; the calves had been allowed to graze upon the bank of a dried up stream. The symptoms shown by the calves that had recovered and those which died were not quite the same. The recovered ones presented the following set of symptoms.

At the onset of the disease diarrhoea was the only symptom that was present. Two days later, faeces were passed much more frequently and they contained a mixture of blood and mucous shreds and were quite watery. On the fifth day they contained only traces of blood and mucus but their consistency and frequency were approximately the same. Thereafter the consistency of the faeces improved gradually and on the tenth day they were as soft as that passed by animals left on a green pasture. The faeces passed had very foetid smell and it was more marked from third to fifth day. There was a rapid loss of condition though the animals kept a very good appetite; and there was straining at the time of defecation, which symptom was most prominent at the height of the disease.

Those cases which succumbed to the disease presented a slightly different set of symptoms, to wit:—

There was diarrhoea for the first two days. On the third day, the faeces were very thin and watery, the smell resembling that emanating from putrid flesh; the appetite was completely lost. On the fifth day, there was practically no faecal matter in the stools; the animal strained very often and passed liquid faeces containing blood, blood clots and mucous shreds which were in some cases long pieces of the lining membranes similar to those passed by severe cases of rinderpest. The animal became

rapidly emaciated; the eyes were very much sunken. One peculiarity was that the expression of the face and the movements of ears were not much affected. In the last stage, that was about the fifth to seventh day, staggering gait and severe attacks of tenesmus with prolapse of the rectum were noticed and there was complete prostration before death. Two of the calves bellowed pitiously at the time of death.

The owners of all these animals were not able to notice a rise in temperature, because they never knew that animals got fever.

A clinical diagnosis of the disease as *Bovine Coccidiosis* was made on the field for the following reasons:—

1. Calves alone were affected.
2. Rapid emaciation, fever, very fetid diarrhoea with shreds and blood clots and tenesmus with prolapse of the rectum.
3. Absence of loss of appetite in mild cases.

The disease was differentiated from rinderpest as there were no mouth lesions, no discharge from the eyes.

Pathological materials were carefully collected for microscopical examination and confirmation of the diagnosis. The material was submitted to the Principal, Bombay Veterinary College and the Director, Imperial Institute of Veterinary Research, Muktesar. Both the authorities confirmed the diagnosis and the letter written by Mr. H. Cooper, the Pathologist at the latter place runs in these words:—

“Examination of the samples confirms the diagnosis that both the calves were certainly suffering from clinical coccidiosis affection.”

Such conditions have been observed in a few cases in calves in Madras, especially young calves about a month or six weeks old. Even adult cattle get the disease and very often mortality is high. More research is needed in this country regarding this disease. Ed.

A CASE OF DYSTOKIA IN A COW

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

Assistant Veterinary Surgeon, Municipal Veterinary Department, Penang

I was called in on the night of the 23rd May last to attend on a cow, the property of a Tamil woman, living close to the Infirmary.

The history of the case was, that the animal suddenly developed labour pains in the noon of the same day. I saw the animal lying down in great pains and a portion of the fore legs up to the knees was seen projecting out. There was enough proof to suspect that the case was badly handled by lay men. On manipulation, I found the calf was dead and its head was turned to one side. I made several attempts to remove the dead calf for nearly two hours, but failed. Time and place were so unsuitable and inconvenient for further trials that I had to postpone the operation for the next day. On my advice, the animal was removed to the Infirmary on the next morning. As the patient was in very great pains, I got permission from the owner to remove the calf by laparotomy, cautioning her at the same time the nature and seriousness of the operation. I think it is unnecessary here to give a full detail of the methods of operation, because it is known to all Veterinarians. Having made all preliminaries, with the valuable assistance of two second year students, Messrs. K. S. Pillai and Bapji who happened to be here to study the clinique of this hospital during their vacation, the cow was anaesthetized with chloroform and I performed the operation on the right side of the flanks. I slowly put my hand down and on feeling the head of the calf, I found the head was double. Removed the whole calf out which presented a double head with two ears, four eyes and two distinct nostrils. Having carefully removed the blood and other dirt from the cavity by sponging with a clean sterile towel, the seat of operation was sutured in order. A stimulant

A calf with double head with two ears, four eyes and two distinct nostrils.



drench was administered in hot conjee and the body vigorously massaged. The animal raised her head and sat for more than two hours eating a little of green grass and other food stuffs offered by the owner. Towards evening it was reported to me that the animal was dead.

The interesting point about this is centred round the monster calf that was removed. The infirmary was crowded with people to see the double faced calf.

COLIC IN A HORSE

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

Assistant Veterinary Surgeon, Municipal Veterinary Department, Penang.

The subject of this small article was a brown waler gelding, aged about fifteen, in an exceptionally good condition, the property of an influential person in Penang.

History:—The animal arrived in this country twelve years ago as a race horse from Australia. He raced continually for some years, in all parts of Malaya, and it was a great favourite. After some time he proved unfit for racing and therefore he was used as an ordinary hack. He passed through many owners and during 1923, came into the hands of the present owner. On July 23rd 1926, I was called in to see the animal which had developed severe symptoms of colic at night. The usual colic drench was administered and the animal got alright. Four months later I was called in again to see the animal which showed similar symptoms as before. This second attack made me to go into details very carefully. The food was not defective. There were no symptoms of irregular teeth, droppings were free from worms of any sort, and looked normal. Rectal examination revealed no calculi or tumour. The animal was then put under a course of nervine tonics and the owner was advised to give it regular exercise. During 1927, colic reappeared four times, on

2-4-27, 8-4-27, 29-4-27 and 6-5-27 and lasted only a day or two at the most as before every time. In spite of these intermittent attacks, the condition of the animal was quite good. The owner however got tired of the animal and considering its age, he requested me to have the animal destroyed. It was destroyed and I made a careful Post-mortem examination. All the internal organs were quite normal. About the middle of the small intestines in the wall, there was a fatty tumour (Lipoma) fairly big in size and weighing about 12 ounces. There is every reason to believe that this tumour must have been the cause of periodical attacks of colic. I think that colics of this nature are not very commonly met with by Veterinarians, and I should think that a diagnosis of such a condition is not an easy matter when the horse is alive.

TRANSLATION.

ASVAVAIIDYAKAM.

BY SRI MAHASAMANTA JAYADATTA.

*Translated into English with Notes and Commentaries by
Nripendra Nath Majumdra.*

Chapter III. (Continued)

Svarah.—Voice.

Continued from page 53 of the first issue 4th Volume.

Sl. 125. The neigh of a horse is said to be praiseworthy when it is deep, sweet and nasal, and is neither interrupted nor weak (i. e. strong).

Sl. 126. It is a good omen when a horse neighs at seeing fire, a vessel filled with water, a brahmin, flowers or curd.

Sl. 127. If a horse neighs on hearing the sound of a musical instrument and specially if its mouth be full of

food at the time, then it indicates success to its owner.

Sl. 128. When a horse neighs cheerfully and several times at the sight of the point of a flag or ensign, or the Sun, know then that it bespeaks of its owner's success.

Sl. 129&130. Sages well versed in Equine science had said that the neigh of a horse which is different from those stated above, such as, an indistinct, stuttering, harsh or a rattling one, is not desirable.

Sl. 131. The (aforesaid) indications of a neigh are not applicable to that of a foal, or to that of a diseased, old, hungry, thirsty, fatigued, frightened or a debilitated animal.

Sl. 132. Now, in some horses when in motion (running) a soft indistinct sound is produced within the body, that sound is called "Pluta".

Sl. 133. This low murmur is caused by the expansion and consequent over-flow of wind in those four portions¹ of the intestines situated in the anal, pelvic, scrotal and naval regions.

Sl. 134. But this (sound) does not occur in horses at rest, nor in mares, as in them the portions of the intestines have their opening downwards.

MAHADOSA.—THE GREAT BLEMISHES.

Sl. 135-138. Animals with the following blemishes² are not worth taking:—Kakudi, Karali,³ Hinadanta, Adhi-kadanta, Srngi⁴, Ekanda, Jatanda, Kancuki, Trisari, Marjarpada, Vyaghrabha, Trikarna, Dwikhuri, Stani, Jamaja, Vamana,⁵ Musali, Indravrdha, Kubja (hump backed) and animals with black tongue, palate, scrotum or yard, or animals with a colour like that of a Fran-

1. The meaning of this and the following sloka is not very clear.

2. The names only are given here; they will be explained in the slokas that follow. Those for which no separate description is given, have been rendered into English, e. g., one born with teeth is Jatadantaka.

3. It may also mean a horse with a disease of the teeth called Karala.

4. Srnga—horn; Srngi—with horn.

5. Vamana—a dwarf

coline partridge, or animals with eyes like those of a monkey or a cat, or animals on which the owner died, or those born with teeth.

Sl. 139 & 140. These (animals with the above mentioned blemishes) bring in loss of life and property and cause rupture among friends and I will describe their signs which are known to horsemen and according to the Sastras and sayings of the sages.

Sl. 140. (A horse) which has a whorl on the withers is known as Kakudi.

Sl. 141. Karali is that which has got one or more of its teeth on the upper or lower gum larger than the others and projecting beyond the mouth and a Hinadanta has been described as one having 4 or 5 teeth only.

Sl. 142. And one with 7 or 8 teeth is known as Adhikadanta.

Sl. 142-145. A horse with a protuberance on the head where the mane ends or on the space between the ears, of the size of the first joint of the thumb, or like the horn of a goat, or like a Jaman¹ fruit, plum, amlaki,² myrobalan or the seed of a mango, or like a quantity of sand, or having the appearance of charred skin, is called Srngi and is the carrier of all evils. Such a Srngi (horse) should not be allowed to remain in the State.

Sl. 146. A horse with only one of the testis depending is termed Ekanda and when the scrotum is thickly coated with hairs it is called Jatanda.

Sl. 147. A horse with a different colour (from that of the body) on the shoulders, breast and the forearms is called Kancuki.

Sl. 148. That (horse) having lines of a different colour on the feet and fetlock is called Marjarapada³ and

1. Jaman—*Engenia Jambolana*.

2. Amlaki is *Phyllanthus Emblica*. Syn. *Emblica officinalis*.

3. Marjara—a cat; pada—foot; having feet like those of a cat.

is not auspicious and causes extinction of the family (of its owner).

Sl. 149. When a horse of a different colour (other than black) has its head black,¹ it is called Trisari and causes extinction of the family.

Sl. 150. The wise should know (a horse to be) Dvikhura² when its hoof is divided like that of a cow or has a mark like a suture in the middle throughout.

Sl. 151. A horse born with scrotum is Sanjatabrsana and if born with well developed teats as well, it is called Stani.

Sl. 152. A horse with three ears is Trikarni and one with a colour like that of a tiger is Vyaghrabha.

Sl. 152 & 153. Horses devoid of any part of the body or with any part broken or crooked are known as Jamaja and one with unusually or disproportionately short stature is Vamana.

Sl. 153 & 154. The well versed in Equine science have termed a horse with the colour of one of its legs different from that of the body as Musali.

Sl. 154 & 155. That which is without any scrotum and does not show its mettle on seeing a mare is well known as Indravrdhva and causes destruction of the family of its owner.

Sl. 155 & 156. But when such a horse (without any scrotum) shows its spirit at the sight of a mare it is called Nigulhavrsana which is praised and causes fulfilment of every desire of its owner.

Sl. 156 & 157. The teeth and the scrotum may grow from the age of two to five years; above this (5 years) the teeth or the scrotum do not come up or grow.

Sl. 158 & 159.³ The good or bad should be judged

1. Sukra says—A black horse with white tail is condemned.

2. Dvi—two; khura—Hoof.

3. Slokas 158 & 159 do not occur in one Mss. and the fact mentioned with the historical names are also of doubtful authenticity. The annihilation of the family of King Sagara is mentioned in the Mahabharata, but there is nothing to show that he possessed a Srngi horse; similarly, there is nothing in the Ramayana to show that Ravana, king of Ceylon who was killed by Rama, had a horse with a whorl on the knees.

according to the presence or absence of the above. King Suratha lost his kingdom for possessing a Kakudi horse (with whorls on the withers); Vaikarna lost his blanket for owning a horse with bad teeth (Karala); Sagar was destroyed with his family for having Srngi and Stani horses; and Ravana lost his life for owning a horse with whorls on the knees.

UTPATA—FOREBODINGS.

Sl. 160. Now shall I describe the good or bad results as indicated by the burning of the different parts of a horse's body.

Sl. 161. When fire burns the whole of a horse's body then one should know that there will be drought for a year.

Sl. 162. When the yard (of a horse) becomes burnt it indicates death in the Zenana¹; the burning of the belly means loss of money and that of the anus and tail means defeat.

Sl. 163. The burning of the head, face, shoulders, back or near the eyes, it indicates success to its owner.

Sl. 164. The burning of the forehead, arms or breast is praised, but if smoke only appears on those parts, it is condemned; the burning of the nose is auspicious.

Sl. 165. When a horse, not affected by any disease, appears dull and depressed, refuses food and sheds tears, then (these portend some) mishap to the owner.

Sl. 166. When the face of a horse looks spontaneously cheerful and neighs for starting, then one should know that it means success to its owner.

Sl. 167. But one that always wags its head is never praised and pawing the ground (at the time of starting) forbids the owner to undertake the journey.

Sl. 168. When a horse, the sooner its owner mounts, looks towards its right side, then it means success.

1. i. e., among the ladies of the family.

Sl. 169. When a horse whisks a portion of its tail always to the left, it indicates that the owner will have to stay away from home, but when on the right, it indicates success.

Sl. 170. When horses spread the whole of their tails upwards, then there will arise some sudden cause of fear to their owner (i.e., a sign of impending danger).

CHAYA¹—LUSTRE.

Sl. 171. The lustre of a horse's body is indicative of good or evil to itself and to its owner and I shall describe them in regular order:

Sl. 172. The lustre which is pleasing to the eye and from which emanates various kinds of flashes of colours is (known as) Parthivi² and that which is pink like a ruby, has been described as Agneyi³.

Sl. 173. A pleasing lustre like that of clear crystal or quartz is Varuni⁴ and a poor, rough and harsh one (known as) Vayavi⁵ is condemned.

Sl. 174. Those three described as Parthivi, Agneyi and Varuni are auspicious, but Vayavi brings in evils.

Sl. 175. The wise have described the (different kinds of) odour emitting from the bodies of horses when perspiring, to be indicative of good or bad (to their owner).

Sl. 176. That odour, which when coming within the range of the sense of smell, is pleasing to the mind, is lucky and the contrary is unlucky.

Sl. 177. A horse with the lucky odour brings in wealth, happiness, success, friends and sons to its owner.

Sl. 178. All sorts of evils follow the horse with the

1. Ohaya literally means shadow, but here it means lustre or refulgence; the first impression of colour created on the eye on seeing a horse from a little distance.

2. Parthivi—pertaining to earth, or Prthivi.

3. Agneyi—pertaining to fire, or Agni, the fire god.

4. Varuni—pertaining to water or Varuna, the water god.

5. Vayavi—pertaining to Vayu, i.e., air.

unlucky odour and so a horse with a good smell is to be sought for with utmost care.

Sl. 179. None should knowingly accept a horse with a bad smell. Thus have I described the odours of horses as mentioned in the Sastras.

SATVA.—NATURE.

Sl. 180. A horse that has a natural aversion to unclean things, mud and specially to the urine of a goat, has been described as Devasatva ¹.

Sl. 181. A horse with qualities contrary (to those mentioned above) should be known as Pisacasatva. ² Devasatva is lucky while Pisacasatva is unlucky.

PRAMANA.—MEASUREMENTS.

Sl. 182. & 183. Great sages, well versed in Equine science like Saalihotra and others had said that three and a half ³ barleys make one finger (a measure of finger's breadth). Thirty four ⁴ fingers make one hand (cubit).

Sl. 183 & 184. It had been stated in the Sastras that a Good horse should be four cubits ⁵; half a cubit less

1. Deva—god and Satva—quality or nature.

2. Pisaca—(pishacha) a species of malignant demi gods; a demon.

3. In ordinary Indian linear measurement we find:—3 barleys=1 finger, and 24 fingers=1 cubit (hasta or hand). But, "sardham yavatrayam" means 3½ barleys; in another text it is "urdham yavatrayam" which means three barleys and this seems to be correct. In the translation the word "finger" has been used to denote the measure of a finger's breadth.

4. Thirty four should be Twenty four. The words "trimsatya caturuttaraya" (30+4) are grammatically incorrect; they should be "vimsatya caturuttaraya" which are not only grammatically correct but also correspond to the measurement still in vogue as they mean twenty plus four i. e. 24. There are more reasons for accepting the latter, viz, 24 fingers=1 cubit. A Good horse is stated to be 4 cubits in height and if it be calculated at 34 fingers=1 cubit, then it comes to 25½ hands (English) which is an impossibility, but when calculated at 24 fingers=cubit, it comes to 18 English hands which can be said to be the best height of a horse. Moreover, Nakul does not give any special measurements which shows that he accepted the ordinary measurements.

5. Thus it comes to:—the height of a Good horse should be 18 English hands; of a Medium one—15—3"; of an Inferior—a little over 13 hands. An inch which is also equal to 3 barleys should not be confused with a finger, for 18 inches make one cubit while in fingers it is 24 fingers. One cubit is one hand measured from elbow to the tip of middle finger.

(i. e., 3½ cubits) is Medium and when it is less by a length of a hand when it is stretched (i. e., one cubit less=3 cubits) it is Adhama or Inferior.

Sl. 185. The above measurements are of height, but they apply to girth¹ also according to the classifications—Good, Medium and Inferior.

Sl. 186. The wise have fixed the length of a Good horse to be 7½ cubits and that of a Medium one to be six mustis (i. e., 1½ cubits) less.

Sl. 187. (A horse) five cubits long has been said to be Inferior. The face of a good horse should be 32 fingers (in length).

Sl. 188. It has been said that the measurements of the back, breast and loins are the same as that of the face. ² The measurements of face &c. of Medium and Inferior horses are two fingers less successively.

Sl. 189 & 190. Intelligent veterinarians have indicated that the hoof of a good horse should be 7 fingers; that of a Medium, 6 fingers and that of an Inferior one—four.

Sl. 190 & 191. The shank of a Good horse is 16 fingers long, of a Medium one—14, and of an Inferior horse—12 fingers only. Such are the measurements indicated by scientific men.

Sl. 192. The length is to be measured from the outer canthus of the eye to the root of the tail and the height from the end of the hoof to the withers.

Sl. 193. An intelligent veterinarian should measure the Girth (Parinaha) by encircling the barrel over the chest with a rope or thread.

Sl. 194. The body of a horse thus proportioned is

1. According to this author, the measurements of height and girth are equal. It is not actually to be found in all horses, but it was the conception at the time that in a well proportioned animal it should be so.

2. Sukra in his Nitisara (Book IV Chap. VII Slokas 45, 46 and 52) gives a rule of thumb method of calculation in reference to the measurement of the face. The height should be thrice the measurement of the face and the length should be thrice the face plus ¼th of the whole, the neck should be twice the face plus ¼th of the whole.

known to be good or auspicious while those exceeding or falling short of these, are not praised.

End of Chapter III on General signs in the treatise on Equine Science by Sri Jayadatta.

(To be continued.)

THERAPEUTICAL NOTES.

Anthelmintics in the Horse.

1. Is the carbon tetrachloride alone a good agent against equine strongyles?

2. Can it be combined with oil of chenopodium and in what dosage?

3. Is there any objection to using a solution of Barbadoes aloes with oil of chenopodium against equine strongyles—L. J. K. Wantage, Eng.

Reply:—1. According to the best authorities on vermifuges carbon tetrachloride is a reliable vermifuge for the expulsion of all round worms. There has been some question concerning its reliability in removing the strongyles and some prefer the oil of chenopodium to carbon tetrachloride.

2. So far as pharmaceutical preparation is concerned two products can be combined. The dosage would essentially depend upon the size of the animal.

3. There may be no serious objection to the use of aloes succeeding the administration of oil of chenopodium but the oil of chenopodium is more or less an intestinal irritant and such irritation may be intensified by the use of aloes. The preferable method consists of following the administration of oil of chenopodium followed by raw linseed oil.

Splendid results have been obtained by several practitioners in the elimination of intestinal strongyles in horses by first fasting the animal for thirty-six hours. Then

Therapeutical Notes

administer 16 to 18 c.c. oil of chenopodium and follow this in two to four hours with from one to two quarts of raw linseed oil.—A. T. K.

Veterinary Medicine April 1927.

Treatment for Stomach Worms in sheep.—

What is the best method of treating a large flock of sheep for stomach worms?—P. S., Wis.

Reply:—Use the copper sulphate treatment.

Make up a copper sulphate solution by dissolving four ounces of copper sulphate in three gallons of water. Give lambs weighing 40 pounds, two ounces of the solution. Sheep weighing 80 pounds or over, four ounces.

Use three feet of thick rubber hose with a three-eighths of an inch aperture. In one end of the hose, insert a granite funnel, in the other insert a six-inch copper tube to be placed in the mouth of the animal.

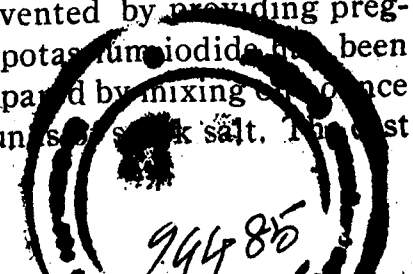
Make certain the lambs are standing on all fours before the fluid is poured into the funnel. It is best to drive several into a narrow chute and dose individually, making certain that they swallow naturally.

If the herd cannot be placed on a clean pasture, they should be dosed monthly. This will control the infection.

The size of the dose is the one recommended by Dr. Cooper Curtice—H. B. R. *V. M. June 1927.*

Intensive inbreeding is a questionable practice even in poultry. Thus it has been found that the inbreeding of brothers and sisters of white leghorns for three generations resulted in diminished hatchability of eggs, diminished production of eggs in the first year, and increased mortality not only in chicks but also in pullets, retarded rate of growth and maturity. *V. M. July 1927.*

Goitre in lambs can be prevented by providing pregnant ewes with salt to which potassium iodide has been added. The iodized salt is prepared by mixing one ounce of potassium iodide to 100 pounds of salt. The salt



of this preventive measure is approximately one cent per sheep per year.

V. M. July 1927.

It has been demonstrated that tetrachlorethylene in one c. c. dose is a valuable agent in the removal of hookworms and to a lesser degree in the removal of ascarids from foxes. Tetrachlorethylene produces injurious effects upon the liver but the injurious action is diminished by the administration of a purgative two hours after the vermifuge has been given.

V. M. July 1927.

Treatment of Periodic Ophthalmia:—Inspired by the results obtained by Muller and Thamer in human ocular pathology, Houdemer has made use of similar treatment upon two horses attacked by ophthalmia, one of which presented a case of iridiocyclitis.

A series of four intra-muscular injections of 10 to 20 c. c. of cow's milk, homogenised and sterilized, was followed by prompt recovery.

With a horse suffering a second attack of periodic ophthalmia we obtained a cure by using two series of four subcutaneous injections of 10 c. c. of milk, boiled and filtered, the series being separated by intervals of four days.

The same success is reported by our confrere, Mr. Carray of Montbeliard, with colts affected with periodic ophthalmia.

The boiled milk appears to be an excellent treatment against irido-choroiditis. It might prove useful in regions where the frequency of periodic ophthalmia is high, so high that it seems contagious.

V. M. July 1927.

Equine trypanosomiasis is very prevalent and fatal in Venezuela, particularly during the rainy season throughout October and November. Tejera has demonstrated that 20.5 grams of Bayer 20.5 injected once every six months is a reliable preventive. He has also demonstrated that three grams of Bayer 20 injected every ten days

until several doses have been given is a reliable curative agent.

V. M. September 1927.

Trypan Blue a Specific in the Treatment of True Piroplasmoses of Ruminants:—Donatien et Lestoquard call attention to their experiences with the above-mentioned therapy in Northern Africa (principality of Algiers), where they have made use of it extensively. Beneficial results are to be looked for only where a true infection with either the Pir. bigeminum or Pir. ovis exists. Wherever Babesiella herbera, Babesiella major or Babesiella ovis are involved or dominate the bacteriological findings trypan blue is of no value. The same findings were made by Lignieres with regard to Bab. argentina, by Mac Fadyean and Stockman with regard to Babesiella bovis. The typical form amenable to the treatment is the pear-shaped Piroplasma sensu stricto where two parasites form a pointed angle always. They are mostly over 3 microns in length. The dosage formerly employed was one gram of trypanblue for each hundred pounds of body-weight intravenously. The following morning the temperature was generally normal and the parasites disappeared from the bloodpicture. Still the clinical aspects after the treatment were of such an aggravated character that experiments were made leading to the adoption of a much smaller dose of the dye—namely, 0.2–0.1 gram of the dye per hundred pounds of bodyweight.

1–20 c. c. of water will suffice to carry the amount of the dye necessary.

2. Neither milk nor meat will be discoloured or stained by so small a dose.

3. More economical.

One need not fear that through prolonged use of this therapy a strain of Piroplasma bigeminum will be bred, resisting or becoming immune to the influences and work of the dye. Experiments have proved this beyond a doubt.

V. M. Sept. 1927.

Follicular Acne of Young Dogs.

Antoine and Liegois, discussing follicular acne in the young even in suckling puppies, state that it mostly prefers for its location the head (lips, eyelids). It seems that the types and breeds endowed with finer texture of the skin are the most affected, such as griffons, foxterriers and spaniels, etc. The symptoms, according to Leblois, are marked and typical. The tumefaction is very similar to that of human erysipelas; general condition increasingly poor. In most cases *B. streptococcus pyogenes* is isolated. It seems that the affected females nursing in that way import the trouble to the young. The lesions persist for weeks and weeks, cases unfavourable in appearance receding only very slowly. For that reason a very guarded prognosis is advisable (auto-intoxication, asphyxiation).

Treatment is very similar to the treatment of ordinary acne, splitting of nodules and pustules, antiseptic ointments such as "iodex" being indicated, supported by general treatment indicated in infections; hygienic conditions, light but nourishing food; subcutaneous injections of "electragol". Specific treatment consisting in bacteriological measures might be tried. In one instance streptostaphylococco discharges were demonstrated.

V. M. *Septr.* 1927.

Autopyotherapy.—Robin and Mglej discuss this method in the treatment of broncho-pneumonia of young dogs. It is of value in the treatment of the types of broncho-pneumonia aggravating distemper of young dogs to high degree. The authors take from the nostrils of the sick animal one cc. of nasal discharge; they add, after placing it into an Erlemeyer flask, 4 cc. of ether, stirring it several times during twenty-four hours. The following day 4 c. c. of sterile salt solution is added and the whole product shaken for several minutes to obtain a homogeneous

product. This suspension in the dosage of one cc. is given three or four days apart subcutaneously. V. M. *Septr.* 1927.

Equine Piroplasmosis.—This disease existed, according to Gaupillat and Neveux (October, 1926, issue), in the department Haute-Marne. The blood revealed presence of *Piroplasmosis caballi*. The worst outbreaks of the disease are in the fall and spring, although sporadic cases have been observed at all times. Like in cattle, the urine is coloured red or dark brown. Sometimes œdema of the lower extremities exists together with jaundice of the eyeball, etc., which disappears again with the sinking of the fever. The conjunctiva is whitish in colour, thereby revealing the anemic character of the disease. Treatment consists of intravenous injections of three grams of trypanblue with 100 parts of water. Quinine is useless.

V. M. *Septr.* 1927.

Turpentine Intravenously in Contused Wounds.—Vet. Major F. Ancon of the 43rd Regt. of Artillery of Caen, relates of his superior experiences with the essence of turpentine used intravenously. The work has been carried on in Morocco as well as in France. Over three hundred cases were presented. The drug seems to influence favourably scarification and bring suppurations down to a minimum. It is essential to use glass syringes only, due to rapid dis-integration of the rubber plungers with ensuing troubles in intravenous injections. Two cc. are injected intravenously at a dose and the treatment is to be repeated in two to three days or even five days. Turpentine exposed to light and air is superior, since it oxidizes. Parts of the oxygen are later on given off as ozone by the essence which is the essential part of the treatment.

V. M. *Septr.* 1927.

EXTRACTS

The Losses Caused by Cattle Ticks and how to Avoid Them.

The Losses Caused by Cattle Ticks.

Many cattle owners who have always been accustomed to see both ticks and ticky cattle on their farms are unfortunately not inclined to attach much importance to cattle ticks, and, as a rule, through lack of appreciation of their damaging effects, placidly consider them as of little consequence. That ticks may cause losses in many different ways has probably not suggested itself to these stockmen, who are really most vitally affected and it therefore seems necessary to emphasize the fact that, in addition to their relation to diseases such as Texas Fever (or Redwater), ticks may also be the cause of serious loss in many directions.

While the transmitting of Redwater (and other diseases in other countries) is undoubtedly the most dangerous power possessed by cattle ticks, and is the principal cause for adopting stringent measures in securing their complete eradication, nevertheless, there still remain other good reasons for the accomplishment of this, as will be gathered from a reading of the following notes.

Loss of Condition in Cattle.

Apart from questions of disease, the presence of ticks on cattle reduces their condition.

During the period of an experiment made specially to test this point, heavily infested cattle *lost an average of 9 lbs.* in weight, whilst the tick-free cattle *gained an average of 44 lbs.*, both lots of cattle being fed alike.

There is another instance of a tick-infested steer which weighed 730 lbs., and after being freed from ticks by dipping, weighed 1015 lbs. two months later, the feed remaining the same as before dipping.

Decreased Milk Yield.

Great loss is caused by the presence of ticks on milch cows, reducing the milk yield, and in some cases so injuring the teats and udders as to render them useless.

A series of experiments on this point were carried out by the United States Department of Agriculture, and it was shown that:—

- (1) Cows *lightly* infested with ticks produced 18½% less milk than tick-free cows;
- (2) Cows *heavily* infested with ticks produced 42.4% less milk than tick-free cows.

Reduced Working Power.

Cattle whose vitality is reduced by tick infestation cannot give the same returns in work as healthy cattle. This is another source of loss in countries where cattle are used for haulage, ploughing, and other working purposes.

Damage to Hides.

The market value of hides is greatly reduced by the perforations caused by the cattle tick. Tick-bitten hides are worth 1½d. per pound less than uninjured hides. Even on a hide weighing 50 lbs., there would be a dead loss of over six shillings.

Decreased Fecundity.

A further cause of loss to be recorded against the tick is the reduction of the fecundity of female cattle; perhaps also is the greater liability of tick-infested cattle to diseases or abnormal conditions of the reproductive organs.

Higher Mortality Rate.

If the vitality of cattle is kept at a low point by tick-infestation, they will be much more liable to disease, and much less able to offer resistance to any disease by which they are attacked. In the tick-infested area of the United States, the death rate amongst cattle is nearly three times greater than in the tick-free area.

Stunting of Growth.

This is another material loss caused by ticks.

With tick-infestation at babyhood, there is very little chance of bringing cattle to early maturity. The stunting of their growth requires them to be kept as much as two years longer before they are fit for the butcher.

That means two years of extra feed and care, and loss of interest on capital tied up unnecessarily long.

Increased Liability to Disease.

Ticks suck blood, and thus, by reducing the general vitality of cattle, render them much more liable to diseases of all kinds.

But there are some diseases the attack of which is directly facilitated by tick bites, such as *Ulcerative Lymphangitis* and *Sporotrichosis* of horses. The spread of *Demodectic Mange* is also greatly assisted, and the same applies to many skin diseases, such as *Ringworm*, caused by fungus growths. Ticks also inoculate the microbes of suppuration, causing obstinate abscesses.

The discharge from such sores, and in some cases the mere oozing of blood serum through incisions made by the mouth parts of the tick, keeps the hair moist and matted together, the laying and hatching of fly eggs in such areas give rise to infestation with destructive maggots, causing ulcers and other complications that require medical treatment.

Loss of Blood.

It has been calculated that cattle heavily infested with ticks may lose as much as 500 lbs. of blood in the course of a year.

This drain on the system of an animal means that extra feed is required, and involves a greater expenditure of energy on the part of the animal in obtaining, digesting, and assimilating this additional amount of food.

All this extra food and extra energy mean loss of money.

(To be Continued)

A New Therapy for Ascites in dogs.

BY E.L. QUITMAN, D.V.S., AND A.M. EHLE, D.V.M.
CHICAGO, ILLINOIS.

Patient.—Country type shepherd male. Two year old.

History.—The patient had been declining for at least one year and the abdomen enlarging for over two months. The diet had been mainly of table scraps, consisting largely of starchy ingredients and very little meat. The dog was first seen on May 20, 1927, when it had to be carried into the hospital.

Examination showed the patient to be very weak and depressed; moving about was accomplished with difficulty, hind legs oedematous, pulse scarcely perceptible and abdomen pendulous and greatly distended. Diagnosis was ascites.

Treatment.—Though the abdomen was extended to such a degree that evacuation of the fluid by tapping seemed imperative, they did not resort to that method, as they had acquired confidence in the merits of novasurol (sodium mercurichlorophenyl oxacetate with diethylbarbituric acid), a new and non-official remedy containing 33.9 per cent of mercury. The dose ranges from 0.5 c.c. to 2 c.c. of a 10 per cent solution injected intramuscularly at 3, 5, or 7 day intervals, depending upon the progress of the ailment.

An injection of one 1.2 c.c. ampoule of novasurol was given intramuscularly in the right gluteal region. In addition 5-grain tablets of ammonium chloride were

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dispensed with instructions to administer a 15-grain dose three times daily. The owner was asked to bring the dog for another injection on the fourth day (May 24) and meanwhile to feed him with nothing but raw meat.

On May 24th the marked improvement was noticed. The patient was able to walk to the hospital, looked brighter, and the œdema on the leg was disappearing. The dog had passed urine copiously on returning home after the first injection and continued to pass like that till the next day May 21, after which it decreased a little, though it was above normal. There was less fluid in the abdominal cavity, pulse and respiration were approaching the normal rate. A second injection of 1.2 c. c. of novasurol solution was given into the left gluteal region and ammonium chloride tablets were continued, with raw meat diet.

On May 27, the pulse and respiration were normal and the hind legs of natural size. The abdomen was almost normal in size and contained very little fluid. The dog was more lively, jumped about, barked his thanks and wanted to play. A third injection of 1.2 c. c. of novasurol solution was given in the right gluteal region and the ammonium chloride and raw meat diet continued as before. Less urine has been voided than during the previous interval. The owner was instructed to get the dog 5 days after for further examination and treatment.

On examining the dog on June 1, the dog was found to be more lively and far better and revealed slight trace of fluid in the abdomen. There was however a slightly pendulous condition of the abdomen; urine slightly above normal. A fourth injection of one 1.2 c. c. ampoule of novasurol solution was given in the left gluteal region and ammonium chloride and meat diet continued.

On account of the remarkable improvement, the owner was instructed to get the dog after an interval of seven days. (June 8). The dog was brought after 8 days

(June 9) when the abdominal fluid had disappeared. Pulse, respiration, hind-legs, and quantity of urine voided were normal and the dog was full of "pep." A fifth injection of the same dose was given on the right gluteal muscles, and meat diet and ammonium chloride continued. The patient was seen again after two weeks (June 23). The dog was normal in every respect. However a sixth injection was given in the left gluteal and meat diet and ammonium chloride continued and the owner instructed to discontinue it after ten days and give the usual diet and informed that no further treatment would be necessary.

Ed. It may be that this proprietary remedy may not be a specific in all cases of ascites, but is worth trying in all cases when usual methods of treatment hold out no hope. The rapidity of recovery is also worthy of notice since marked improvement was shown four days after the first injection and in one month the dog was perfectly alright in every respect. Additional reports from the profession in regard to this line of treatment will be of much value.

Lesboursies writes of the treatment of ascites in dogs with calcium chlorin (CaCl_2) by mouth daily from 15 to 20 grammes, in many instances only one drawing being necessary.

Indian Beliefs Regarding the Hairmarks on Horses and Cattle *

Throughout India, but more especially in the Southern Presidency, among the native population, the value of a horse or ox principally depends on the existence and situation of certain hairmarks on the body of the animal. These hairmarks are formed by the changes in the direc-

* Madras Agricultural Bulletin No. 43.

tion in which the hair grows at certain places and according to their shape are called a crown, ridge or feather mark. The relative position of these marks is supposed to indicate that the animal will bring good or bad luck to the owner and his relatives.

There is a saying that "a man may face a rifle fire and may escape, but he cannot avoid the luck, good or evil, foretold by hairmarks."

The purchaser first considers these marks and if they are propitious, the points of conformation, age and soundness are of little importance. So much are the people influenced by these omens that they seldom keep an animal with unlucky marks and would not allow their mares to be covered by a stallion having unpropitious marks.

In the Northern Provinces, owners and breeders are not so much guided by these superstitions, because by them the good and bad points of a horse are better understood. In purchasing cattle less stress is laid on these marks than in the selection of a horse. In purchasing a cow, her hairmarks are not at all considered in certain places, a cow being held sacred and auspicious under all circumstances. The hairmarks on the body of a bullock born and bred in the house indicate neither good nor ill luck.

The following is a description of these marks and the significance attached to them:—

Horse,

Every horse should possess what are called "Dasadhruvas" or the ten marks. These are also known as "Neutral" marks.

The following are the "Dasadhruvas."

The one on the forehead is known as "Pillayar Suli." "Chathika Phownra" or "Rakka Suli." These two exist on either side of the breast of the animal.

"Kookavir" or Jarnak are two marks on either side of the belly. A hair twist at the navel,

"Masthakas." Two marks on either side of the crest of the neck.

"Kharta-Ukhad." A ridge on each hind leg below hocks with the hair directed upwards.

Lucky marks

Kantabharanam (the jewel of the neck) is situated one or two inches below the angle of the jaw along the line of the wind-pipe. The hair twists will be arranged like the petals of a lotus flower. If this twist be on a line with the two jaw corners, it is called the "Mannaipudi", and is then an unlucky mark.

"Devamani." This mark is situated in front of the neck about two-thirds down the trachea above the breast. It is considered to be the most lucky mark a horse can possess. The presence of this hair twist is said to counterbalance the existence of bad twists, and when "Devamani" is present with other good hair twists, the possessor of the animal will be freed from all misfortunes.

"Masthakas" are the pair of hair twists over the head and behind the ears. These marks should be opposite to each other. But if one of these is not directly opposite to its fellow, it is known as "Theescut", which is not a good mark.

"Torun or Sera." Two crowns on the forehead side by side. This is said to indicate a second marriage to the purchaser if once married or marriage if unmarried.

Panchakalyani.—Horses of any colour other than white or grey having a white mark on the face and also four white legs or pasterns and tail white are held to be very lucky.

Colours.—Hindus consider the white or Sukhra, the iron-grey, piebald, and the skewbald, as good colours.

Unlucky marks

I. If the star twist be below the line joining the inner canthus, it is called "Ashuddhal" or "Shokavirtam" (the

weeping twist). This is popularly known as donkey mark. The owner will be in sorrows.

2. Two marks on the forehead one over the other indicate either prosperity or adversity. In the former it is known as "Umbrella twists or Kudaimelkudai," i.e., prosperity over prosperity. In the latter it is called "Idimelidi," i.e., disaster after disaster. But if there be three on the forehead they are called "Chulla" and considered to be very unlucky marks.

3. Herda.—This twist will be situated in the breast between the fore legs. It is considered a very unlucky mark and to indicate the owner's death by accident.

4. Gome or Jerri.—This twist will be below the chest in the middle line where the girth of the saddle passes. This is also considered to be very bad.

5. Gungapet is a large crown on the abdomen between the sternum and the sheath.

6. Sapeen (snake).—If the masthakas are not properly situated one on each side behind the ear over the top of the head, and if two twists are placed on one side and none on the other, it is called "Sapeen" and it is a very bad mark.

If the Sapeen comes down to the withers, i.e., right over the shoulders, it is called "Prethasarpa" or "Pethsapeen" or "Hasthawkode."

7. Janaza (Coffin) Padaichuli.—This term is applied when the Masthakas are present and from them on either side there are two ridges, one to three inches, running down the neck and ending in a whirl or twist.

If there is a ridge on one side only it is termed "Akhaja." Both are very unlucky marks.

8. Badi (fetter) or Vilanguchuli.—This generally consists of a hair ridge either on the fore arms or shanks of the fore-legs and sometimes in the hind legs also. It indicates that the owner of the animal will be sent to jail.

9. Khorthagad or Khilagad is a hair ridge on either

or both of the hind legs, with hair pointing downwards. It is said that so long as the horse with this mark is kept in the stables, no other horse can find a sale. If the hair in the ridge point upwards, it is called as "Khila-uper" and is a neutral mark.

10. Thannie.—If there are teat-like projections on the sheath of the horse, it is called "Thannie" which is considered unlucky.

Cattle.

All cattle should possess two marks "Nethichuli" on the forehead and "Rajachuli" hairmark on the middle line of the back.

Lucky marks

1. Tamani suli is situated on either side of the neck of the cattle. It indicates that the possessor will acquire a large number of cattle.

2. Lakshmi suli.—If there be one mark instead of two on the side of the neck it is known as "Lakshmi suli." This is considered the most lucky mark. A bullock with such a mark is highly esteemed and fetches a high price.

3. Irattai kavam consists of two ridges of hair one on each side of the brisket.

4. Jodi suli.—When the mark situated on the forehead is in a pair side by side, it indicates that if the purchaser be a bachelor or widower he will soon get married. If the purchaser be a married man he will either have the misfortune to lose his wife and marry again or have the good fortune to obtain two wives.

5. Gopura suli, is a mark on the crest of the hump. It is considered a very lucky mark.

6. Erupuran (Ascending centepede).—A ridge of hair on the hind quarters curving up to the back is a sign of coming prosperity.

7. Nir Suli is a mark situated on the middle line of the back just opposite to the opening of the urethra in a

bull. This is a doubtful mark and this will either bring prosperity or disaster to a family.

Unlucky marks

1. Mukkan suli or Agni suli.—Three crowns on the forehead arranged in the form of a triangle said to represent the three eyes of Siva, of which the one in the forehead will, if opened, burn up all things within the range of vision. This is considered to be a very bad mark.

2. Kudaimelkudai.—Two crowns one over the other on the forehead. These predict either prosperity or disaster.

3. Ottai kavam.—A single hair mark on one side of the brisket close to the middle line forbodes disaster to all other cattle in the house and the death of the purchaser.

4. Vilangu suli.—In Kangayam firka the marks on either side of the middle line of the back are considered as fetter marks but in other places the hair marks on the legs are supposed to be fetter marks. These indicate that the purchaser will soon be in jail.

5. Padai suli.—Two ridges of hair on either side of the croup are known as "Padai suli". It indicates that the purchaser will soon need a bier.

6. Pendilai kondan suli.—If the above marks be still lower down near the tail they are known as "Pendilai kondan suli." The purchaser will become a widower.

7. Irangupuran (Descending centepede).—A ridge of hair on the hind quarters curving downwards indicates adversity.

8. Nagapadam.—A ridge of hair on the haunch spreading out at one end like the hood of cobra. Some consider this to be a lucky mark.

9. Thadangal suli.—A crown situated on the back between the points of the hip. It indicates that any business undertaken by the purchaser will fail.

Other superstitions regarding cattle

A bullock whose tail has the root of the tuft of hair situated above the hock is said to have "Eruval" and to bring ill luck. A cow having "Eruval" is not objected to.

A bullock having white hair, skin, horns and hoof is considered of weak constitution and not to be purchased.

A black bullock is generally considered a Jibber. If not a rogue he is considered of great value according to the saying, "a black bullock is but the fourth of a bull but if he be guileless he is a bullock and a quarter."

A bullock with numerous small spots over the body "like a deer" is considered very lucky provided these spots do not increase in number.

The form of the horns is supposed to indicate many things. The different forms of horns go by different names. They are:—

1. Mattaikombu means horns bent backwards. This is a good sign in a cow. The saying is, "Let any man who does not know how to select a cow purchase one with horns curved backwards."

2. Nerkombu (straight horns.)

3. Mun kombu or horns pointed forwards indicate spirit.

4. Shurutai.—Animals with twisted horns are considered to be good workers.

5. Kollikombu.—Horns which are hollow and present white looking patches as if they were rotten are considered to be very unlucky.

6. Poongombu.—Horns with white tops are also considered bad.

If a cow at the time of purchase voids urine, it is considered a very good omen, but if she passes dung it is considered bad. The reverse is the case with a bullock.

A bullock which fails to cut the fourth pair of perma-

nent incisors is called Arukatti-madu and is considered lucky, that is, "one who purchases a bullock with only six permanent incisors will become rich enough to keep an elephant."

A bullock which cuts only seven permanent incisors is unlucky to the owner. The saying is that one who purchases such a bullock should have his coffin ready.

A Veterinary Entomology for India *

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In the present article we commence a series of papers dealing with the subject of Veterinary Entomology in India, that is to say, with all the Insects which are known to be pests of domesticated animals in the Indian Region. A good deal has already been published, especially on the various Biting Flies, but the information thus given is so scattered that it is practically inaccessible to Veterinary Officers, who require to utilize this for research or daily routine or for instruction in Veterinary Colleges.

We realize that, after collecting all the information available at present, there will still be many gaps which it will probably take many years to fill and that anything published now must therefore be incomplete to a considerable extent, but it seems that there is a decided want on the part of Veterinary Officers, and especially perhaps in the case of Veterinary Colleges in India, of at least a *resume* of what is already known, and this is what we propose to supply as far as possible. Probably also these papers may serve to stimulate interest in this subject and to bring to light the occurrence in India of

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many Insect Pests of Domesticated Animals of whose very existence we are as yet ignorant.

How Insects are of importance to Domestic Animals.

Insects are of importance to domesticated animals by direct annoyance and by conveying or carrying disease, either directly or indirectly. No domestic animal is exempt from the attentions of Insects, whether it be a mammal or a bird, and even the lordly elephant is attacked by Biting Flies and suffers loss of condition, sometimes even resulting in death, from fly maggots which live in its stomach or bore into its skin. It has been estimated that the annual loss of the national wealth of India, due to the attacks of Insects and Arachnids on domesticated animals, is approximately four crores of rupees.

Annoyance and Worry.

That animals suffer considerable annoyance and worry from the attentions of insects is a matter of everyday observation. It is only necessary to watch an animal, such as a bullock or a horse, for a very short time to notice the continual state of worry in which it is kept by biting and other flies; its tail is swung about in a state of constant activity in brushing away flies, its skin is kept quivering in efforts to dislodge them, it stamps its feet and continually lunges with its mouth at specially irritable parts of its body. This sort of thing is looked on as a rule as quite natural in India, but a little consideration will show that such continual annoyance must lead to a considerable loss of energy and health which is directly reflected in reduced efficiency of the animals which are thus worried, whether such loss is concerned with the ploughing capacity of a bullock, the milk yield of a cow, or the egg-laying of poultry. In extreme cases animals may even be driven quite frantic by the attacks of insects, so that they lose all control of themselves and in-

jure themselves or their owners. And, apart from the worry caused to animals by insects resting on their bodies some animals suffer great uneasiness from the buzzing or other sounds made by insects flying around them.

Direct Injury.

Direct injury, such as poisoning, may be caused at times by insects, as by the stings of bees and wasps, the blistering effect caused by the excretions of Meloid beetles, and the extremely irritating effect produced by the hairs of some lepidopterous larvæ. The stings of many bees and wasps are very painful and in the case of the larger social species, when many stings may be inflicted at once, the results may be serious and even fatal. According to Craig (1923), considerable dyspnoea may result if the head, mouth, throat and nose are affected. The Blister or Meloid* beetles are well-known to excrete a fluid containing a considerable proportion of cantharidin in and, as the beetles themselves occur in large numbers on forage crops, there is a distinct possibility of their being swallowed, or at least taken into the mouth, by animals. Instances have also been recorded in which animals have suffered from inflammation of the mouth after feeding on forage crops, especially on clover, that had been attacked by Aphids. Samsonoff has recently described (abstr. in *Trop. Vet. Bull.*, VIII, 91-92: March 1920) cases in Palestine in which many cattle, sheep and goats died after eating Sorghum leaves that had been attacked by locusts or after drinking water in which large numbers of locusts had been drowned. Lamson (1922) also records cases in Connecticut in which many chickens died within twenty-four hours after eating Rose Chafer Beetles (*Macrodactylus subspinosus*). Some caterpillars also are provided with barbed hairs which contain poisonous secretions capable

* Until recently commonly referred to in literature as Cantharid beetles or Cantharidæ; but the name Cantharidæ is now applied to a group of beetles other than the true Blister-beetles.

of causing intense inflammation when brought into contact with the tender skin. Instances are also on record in which direct injury has resulted from massive infection by blood-sucking insects. Thus, in a recent article Schuurman Stekhoven (1926) states that in the Dutch Eastern Archipelago, where a horse may harbour several hundreds of Tick-flies (*Hippobosca maculata*, a species of common occurrence in India also), the natives ascribe the mortality among these animals in the dry season to the influence of this pest, and an experiment carried out by the author would seem to confirm this belief. Civrea and Dinulesen (1924) have described cases in Rumania in which as many as 16,474 domestic animals died in 1923 as the result of an extraordinary invasion by Buffalo-gnats (*Simulium*). An outbreak of the Sticttight Flea (*Echidnophaga gallinacea*) in the South-Western United States is reported to have been responsible for severe losses among chickens, while egg-production was reduced by from five to fifty per cent. and the total loss during the Spring season amounted to over £200,000. Delanoe and Lelavrin (1923) have also recorded an instance of an outbreak of this flea which proved fatal to fowls in Morocco in 1920.

Dermatosis.

Dermatosis, caused by the direct attack on the bodies of animals by insects, such as lice is of common occurrence and may cause considerable ill-health and consequent loss of condition.

Myiasis.

Myiasis may be defined as the condition or conditions caused by the invasion of the tissues or intestinal tract of an animal by the immature stages of any fly, thus excluding from the definition the direct attacks on animals by adult blood-sucking flies. Myiasis may be rhinal, oral, cutaneous, intestinal, vaginal, etc., according to the portion of the animal attacked. Many flies (such as the Oestridæ and some Muscidæ) are entirely modified for

existence as myiasis-producing insects, that is to say, their larvæ are only able to live as internal parasites of animals. In other cases, fly larvæ may live normally in decaying organic matter and may occur abnormally, but not uncommonly in some cases, in wounds or sores, burrowing into the tissues and causing extensive injury. The injury caused to the host by myiasis may be very serious in the case of fly maggots burrowing into the living tissues surrounding wounds or sores on which they have been deposited by the female fly, but in cases of moderate infection by intestinal parasites it is probable that comparatively little damage is done to the host-animal. On the other hand, the result may be serious in cases of heavy infestation, or when the parasites are lodged in regions other than their normal habitat, or when intestinal myiasis is due to an insect which does not normally live in its larval stage in the intestines of animals. According to Larisch (1925), serious losses were caused by Bot-flies (*Gasterophilus* spp.) in Germany during the War. Horton (1925) records an instance in which a mare that had been destroyed owing to paralysis of the pharynx, was found to be infested in its œsophagus with numerous larvæ of Bot-flies, many of which were embedded two thirds under the mucosa. Notvig (1924) cites a fatal case of myiasis in the digestive tract of a cow due to the larvæ of a Hover-fly (*Eristalis*), whose "rat-tailed" maggots occur commonly in dirty water. In the case of Warble grubs, the produce (hides) of the animals affected may be damaged more or less seriously and their value considerably reduced. Cross and Patel (1921) report that in India much damage is done to the skins of goats by a species of Warble grub and that as a result, one quarter of the hides exported are depreciated in value to the extent of fifty to seventy percent. Many years ago also it was reported (*Ind. Museum Notes*, I., 207: 1891) "that hides shipped from Calcutta, Madras and Bombay

were depreciated perhaps to the extent of fifty per cent on ten per cent. of the skins, while those from Karachi had an average of about a quarter damaged to the extent of sixty or seventy percent., the hides being sometimes riddled down the centre (along the back bone) by as many as 500 warble-holes and thus reduced to but an eighth of the value they otherwise would have.*

The extent to which the grubs may be distributed throughout the body is illustrated by an instance recorded by Howchin (1924), in the United States of America, in which a grub occurred in the teat canal of a cow. Stegmann (1920), in Germany, observed that infestation by Warble grubs reduced milk production, hindered fattening and growth and spoilt the quality of the meat. Hadwen and Fulton (1924), in Canada, state that in all post-mortem examinations made by them during certain Spring seasons, except in young animals, striking lesions were encountered under the skin on the legs, especially severe above the heels and in the triangular space above the sesamoid bones. They further state that Veterinary Surgeons have noted lameness in cattle during the Warble season, which may be attributed to this cause. One rather unusual sequela of myiasis may also be mentioned here and that is the occurrence of anaphylaxis (sometimes even followed by death from anaphylactic shock) caused by the use of improper methods in extract-

* The following figures illustrate the extent of the annual losses suffered by certain countries on account of the depreciation in the value of hides as a result of damage caused by Warble-grubs (the sources of information are given in brackets):-

Great Britain. Between £400,000 and £500,000 (Report for the Departmental Committee on Warble Fly Pest. Ministry of Agriculture, 1926).

United States of America. Over £1,000,000 (Bishopp, Laake, Brundrett and Wells; 1926). According to Webb (1926, the animal loss is between £1,000,000 and £2,000,000 about 19 percent, of all hides being infested.

Canada. 27. 5 percent. of the hides seriously damaged (Hadwen: 1923).

Germany.—Between £150,000 and £200,000 (Detjens: 1925.)

France.—Francs 11,000,000 (Gabert 1924).

Italy.—Lire 5,500,000 to 7,000,000 (Pacheioni: 1924).

ing Warble grubs whereby these are damaged in the process of extraction from the backs of cattle. Reference may also be made in this connection to what is known as "Rose Fever" caused by Warble grubs (Hadwen, 1922; Jensen, 1924) and regarded by Hadwen as a form of anaphylaxis. In regard to rhinal myiasis in sheep caused by the Head Maggot (*Oestrus ovis*), although the great majority of cases do not result fatally, death may ensue in cases where the maggots have burrowed into the deeper tissues. Van Saceghem (1923) records a remarkable instance in which the larvæ were found as deep as in the bronchi of a sheep.

In cases of cutaneous myiasis, the chances of secondary contamination with pathogenic organisms are obviously numerous and in this connection reference may be made to the possibility, recently emphasized by Hadwen and Fulton, that as Warble grubs bore through the skin in regions that come in contact with the soil, diseases such as Black-leg and Anthrax might be inoculated by the larvæ in their passage through the skin, although no experiments have been made to prove or disprove this hypothesis. Similarly, Morgan (1925), in Venezuela, is inclined to regard joint-ill as being brought about in calves as a result of infestation with maggots in their umbilical region.

Setiasis.

The new term *Setiasis* (Greek *ses*, a moth) may be applied to the rare cases in which lepidopterous larvæ are found boring into animal tissues. We have recently received information of a case of this kind, in which a bullock, which had broken a horn, was taken to the Madras Veterinary Hospital for treatment; after amputation of the broken horn, there emerged from the frontal sinus of the bullock a large caterpillar of a Cossid moth which had somehow obtained access through the broken horn and had bored in; normally, of course, these caterpillars are wood-borers.

Communication of Diseases by Insects.

Many animal diseases are communicated from one animal to another by insects, the organisms causing the disease being conveyed either directly and more or less mechanically by an insect which acquires it from an infected animal or its dejecta or from other morbid material, such as the carcasses of animals dead of disease, and carries it in an unaltered form to another animal; or the causal organism may undergo multiplication (so as to be in sufficient numbers) or a cycle of development within the insect carrier before it is ready to infect a new non-insect host. Very little is on record in India regarding the conveyance of animal diseases by insects, especially in comparison with the mass of work that has been accomplished regarding the transmission of human diseases such as Malaria and Plague, and in dealing briefly with this aspect of our subject it will be necessary to give examples of the methods of conveyance of animal diseases by insects, some of which may not eventually be shown to occur in India or to be applicable to Indian conditions; but it seems desirable to refer to such cases as are known from other parts of the World, even if they may be foreign to our subject strictly considered, because they help to illustrate the methods by which such conveyance is attained and may even perhaps be of assistance to workers in India by indicating possible sources of infection in cases which would otherwise be obscure.

Methods of Disease-Transmission by Insects.

The methods by which Insects are able to transmit diseases are extra-ordinarily varied and in some cases are rather complex. The disease-producing organism (hereafter called simply the organism) may be conveyed to a healthy animal by being carried on the mouth-parts, legs or other part of the body of the insect-porter and simply deposited in or on wounds or sores or

on tissues opened during surgical operations or on the mucous membrane, or may be transmitted by the insect by direct inoculation by the proboscis of the insect, and in such cases the following possibilities should be borne in mind:—

- (1) the organism may be carried externally on the proboscis and inoculated mechanically at the time of sucking in exactly the same way as it might be carried on a needle used to prick firstly the diseased and then the healthy animal, and in such cases the organism, carried on the proboscis of the insect, may attain entrance into its new host (a) by its own active movements or (b) by passive transmission in the reflex action which takes place during the sucking of blood; or
- (2) the organism may be located in the mouth-parts (including the salivary glands) of the insect and emerge and burrow into its new host at the time of feeding, and in such cases it will have taken the organism some time to attain its location in the proboscis, so that such cases are usually restricted to those in which Metaxeny occurs; or
- (3) the organism may be in a resting state on the insect and be stirred to attack by the warmth of the body (or moisture etc.) of its new host or
- (4) the organism may be contained in the crop or intestine of the insect which regurgitates it on to the body of its new host to which it obtains access either by its own activity or by being scratched in or licked up by the host; or,
- (5) the organism may pass through the insect and be extruded in its faeces or in Malpighian excretions and may be washed into the wound made by the insect at the time of feeding or into any open sore or wound on the body of the animal, or it may be placed on the animal in the

faeces of the insect and attain access through the mucous membrane or be scratched in or licked up by the host; or, again,

- (6) the organism may never normally pass out of the insect but may be inoculated by the crushing of the insect on the body or by the scratching of infected portions of the insect into the blood, or may be transmitted only by the swallowing of the insect by the animal.

The pathogenic organisms may be bacteria, fungi, parasitic worms, eggs of other insects, or protozoa. In the case of protozoa (and to some extent in 'worms') specialized environmental conditions, in the form of specific intermediary hosts are necessary, and Metaxeny (i. e., alternation of hosts) is usual, whilst the other pathogenic organisms may be carried mechanically by various insect porters, and therefore with these the chances of dissemination (and of consequent pathogenicity) are greater, especially as their longevity outside of their hosts is greater than in the case of protozoa.

All the above methods of conveyance of disease by insects have been considered primarily as regards the insect carrier; but, as regards the organism carried, attention must now be drawn to two very distinct differences in the relationship of the organism to its insect vector. The organism may be carried more or less mechanically by the insect carrier from one host to another and in such cases the insect is a more or less casual porter. It can readily be understood how easily, for example, a blood-living parasite may be carried directly from one host to another by transfer on the mouth parts of a blood sucking insect which is disturbed from one host and at once proceeds to complete its meal on another individual of the same kind of animal (i. e., by interrupted feeding). Under natural conditions transmission of disease by interrupted feeding is probably more likely in the case

of non-biting hæmatophagous Muscid flies, which feed intermittently, than in the case of true biting flies which often take a full meal at each feed. Disease may also be spread by permanent parasites, such as Lice, transferred from one host to another by close association of the animals living in close quarters or during coitus. The term "Miastor" (Greek *miastor*, a carrier of pollution) has been proposed by Alcock as a term applicable to insects which by mainly mechanical means spread abroad any kind of hardy pathogenic "germs," under which heading we may include not only bacteria but organisms such as the eggs of parasitic worms. In comparison with such cases may be contrasted those in which the insect is a true carrier in which the parasite causing the disease in animals is intimately adapted to the insect-carrier in which it undergoes at least a part of its life-cycle. The term "Metaxeny" is applied to these latter cases in which the insect transmitter of a disease is itself a true host (and not a mere carrier) in which the disease-parasite itself undergoes transformation. One result of the fact that the disease organism goes through a portion of its life-cycle in the insect carrier is that the insect is not ready to carry infection from one host to another until a considerable interval of time (usually several days) after it has bitten the infected animal, the minimum time-interval being that requisite for the disease-organism to undergo its cycle in the insect. Malaria is a well-known example of this in the case of human diseases. It should, however, be mentioned that the mere fact that an insect can transmit a disease only after an interval of time since it sucked infected blood is not in itself necessarily indicative of the fact that the causal organism undergoes a developmental cycle within the insect-host, such as is understood by the term Metaxeny; for, under such conditions, there is also the possibility that the insect-vector may function as a cul-

tural medium for the ingested parasite to multiply in order that it may be in sufficiently large numbers for the insect-vector to transmit enough to produce infection. According to Noguchi (1919), this is probably what happens in the case of human Yellow Fever, the organism merely undergoing multiplication in its insect-vector (the mosquito) although this hypothesis is contrary to the generally accepted view that the organism undergoes a part of its life-cycle in the mosquito. The fact that, under experimental conditions, infection developed in animals subjected to the bites of mosquitos that had imbibed infected blood only about eight days previously—instead of twelve days, which has hitherto been regarded as the minimum interval necessary—would seem to lend support to the hypothesis advanced by Noguchi. Should this view prove to be correct, it would be of interest to determine whether for such multiplication a specific invertebrate host is necessary.

It is important to remember, in connection with insect-borne diseases, that, in addition to cases in which there is a very short time interval between inoculation from a sick to a healthy animal (as in the case of the interrupted feed of a biting fly when the disease organism is carried more or less mechanically on the proboscis of the fly from one animal to another), there may also be cases in which the time interval is a long one, so that insects which have fed on diseased animals days (or possibly weeks or even months) before may yet be capable of conveying a disease to healthy animals. Few animal diseases have as yet definitely been shown to belong to this latter class in India; but, on the analogy of human diseases which are better known, we expect that many will be shown to spread in this way. In some cases it is possible that a disease may be carried both by casual insect-porters and by adapted true insect-carriers; thus, species of *Tabanus* and of *Stomoxys* have been incriminated outside

of India as carriers of Camel Surra but it seems unlikely that this is the only or perhaps the normal method of spread of Surra in India.

(To be continued)

ASSOCIATION NEWS.

Proceedings of the Annual Conference of the United Provinces Veterinary Association.—

The Annual Conference of the United Provinces Veterinary Association was held at Jaunpur on 2nd March 1927, and on two subsequent days under the Presidentship of Mohamad Moin Khan, Esq., Deputy Superintendent C. V. D., Basti Division. The Conference was very successful and was conspicuous in its attendance by many Chairmen and members of the District Boards. The following important resolutions were unanimously passed at the conference.

Resolution No. 4.—

Resolved that this conference approves the resolution No. 17 passed by the Executive Committee held at Allahabad on August 20th of 1926, and suggests that a deputation consisting of the following members under the leadership of Khan-Sahib Shiekh Niaz Mohamad should wait on the Honourable Minister in-charge of Agriculture and Industries Department of the United Provinces Government and lay before him the grievances of the Subordinate Veterinary staff regarding their pay, strength and other departmental and professional matters.

- (1) Syed Mohamad Raza Hussain.—Divisional Superintendent, Cattle Breeding Depot, Muttra.
- (2) M. Tahir Mirza, Veterinary Inspector, Ballia.
- (3) Sirdar Udhan Singh, Veterinary Asst. Surgeon, Agra.

- (4) Syed Ajaj Hussain, Veterinary Asst. Surgeon, Fyzabad.
- (5) Yusaf Ali Khan, Veterinary Asst. Surgeon, Pilibhit.
- 6 Sirdar Udey Singh, Veterinary Asst. Surgeon, Shahajahanpur.
- (7) Lieutenant Fazul Karim, Veterinary Asst. Surgeon, Meerut.
- (8) Mohamad Moin Khan, Deputy Superintendent, Basti.

Resolution No. 7.—

Resolved that in view of the public interest and in order to maintain the efficiency of the Veterinary Hospitals and Dispensaries in these Provinces, the conference request the Local Government that all the public Veterinary Hospitals and Dispensaries irrespective of their being maintained by any local body, such as District Boards, Municipal Boards, notified are as etc. etc., should be under the direct control of the Civil Veterinary Department, as is done in the Punjab and other Provinces of India. At present the department is supposed to control such institutions as are maintained by District Boards.

Resolution No. 8:—

As some of the District Boards have expressed their desire to appoint to important Veterinary Hospitals or district work Veterinary officers of Inspector grade, this conference request the Local Government to encourage such Boards by allowing them to do so and fix a proportionate contribution for such appointments.

COMMUNICATIONS

To

*The Editor,**The Indian Veterinary Journal, Madras.*

Dear Sir.,

I shall be much obliged if you will kindly publish the following article in your esteemed Journal.

Ahmedabad. } Yours truly,
3rd September 1927. } P. D. MANIAR G. B. V. C.

"The All-India Veterinary Association and its need"

I have carefully read the article and found that some of the points referred to there in deserve due consideration by all concerned, they being as follows:—

(1) *Registration*:—The All-India Veterinary Association as well as the Provincial Associations may be registered under the rules sanctioned by the Government of India, in order to receive recognition of their representations by Government for due consideration of the various questions of professional and public importance submitted by them. It may be noted here that the All-India Sub-Assistant Surgeons Association has been registered with the same object. Under the circumstances the question deserves due consideration, at least by those Associations, to whom consideration of their representations is refused by Government, simply on the ground of their association having not been registered.

(2) *Service Associations*:—In the case of Veterinary Associations, the servicemen form a majority of their members, as the number of private Veterinary Practitioners is quite insignificant, as compared with the Medical Profession. It is, therefore, desirable that service Associations similar to those for other Government services may be formed in each Presidency, separate from the Provincial Associations, with the main object of receiving recognition of their representations of departmental grievances to be redressed. There is one such association in

the Madras Presidency, and every other Province, which feels its need, may better have one to safe-guard the interests of its members. At the same time it will be a means of removing the prejudice entertained in some quarters that the Provincial Association is mainly doing the work of representing grievances of the service men who are its members and doing nothing else.

(3) As to the question of need of the All-India Association raised by the author of the article under review, I cannot agree with him. It may be true as far as the Provincial Civil Veterinary Department is concerned, it being under the full control of the Provincial Government, but it is certainly untrue as far as the Veterinary profession is concerned. I would, therefore, suggest that the question may better be brought before the next Conference of the All-India Association to be held in Bombay during the next Christmas by the Honorary Secretary for free discussion, if there be no objection.

To.

*Dr. H. R. Sadashiva Rao, L. M. & S.,**Medical Officer,**Madanapalle.*

Dear Doctor,

I understand that you had recently an interesting case of Hydrophobia in man who was bitten by a rabid dog some three years ago and has been since then having the disease every six months, but after three or four days recovers from it. Since this is an interesting case worth recording in the Medical and Veterinary journals, I shall be much obliged if you will kindly send me the full history of the case for publication in this Journal.

Thanking you in anticipation,

Yours faithfully,
P. Srinivasa Rao.
Editor.

Madras,
2-7-1927.

From

11th July, 1927.
M. R. Ry. H. R. Sadashiva Rao, Avl., L. M. & S.,
Asst. Surgeon, L. F. Hospital,
Madanapalle.

To.

The Editor,
The Indian Veterinary Journal, Madras.

Sir,

With reference to your letter dated 2nd July 1927, I wish to give you details of the case in question as far as information is available.

A person aged about 45, male approver in Mudivedu murder case in this jurisdiction was seen in a fit on 24-6-1927 in the Local Sub Jail, Madanapalle at 6 A. M. The man was unconscious. Breathing was laboured. There was a severe spasm of the neck muscles and the muscles of the upper extremity. The arms were raised and the hands were showing clutching movements. The mouth was open; the tongue was being put out, saliva dribbling freely from it. Pupils were contracted and showed no response to light stimuli. The head was being raised from the ground in a spasm frequently. The fit lasted for about three hours. Then the man became slightly conscious and could sit up. He was given water to drink. He swallowed the first draught and the subsequent one brought on a spasm which lasted for half an hour. On recovering slight consciousness he was again given water. The very sight of water brought on another spasm, which lasted for fifteen minutes. I satisfied myself by giving him water to drink three times in his conscious hours, that fit was due to the sight of water and that there was great difficulty in drinking water.

Previous History:—I gathered information from his associates and from him later on to the effect that he had been bitten by a rabid dog about three years back, and that he had gone to Coonoor to undergo treatment. Ever since, he has been getting these fits periodically i. e.,

once in three or four months. The periods of quiescence varied considerably depending on changes in weather and other odd things. He ascribes them to rainy weather, cold winds, or hot season, and other things such as changes in diet. During fits I have observed him crying out "O, dog has bitten my leg, I am gone, the cursed dog is coming." The man was admitted into this hospital on 24-6-1927 and was here for two days under sedative treatment. He recovered completely and was discharged on 26-6-1927.

The man again developed signs and symptoms of Hydrophobia on 2-7-1927, when it was rainy here and was admitted in this hospital immediately and was discharged on 6-7-1927 having completely recovered.

It remains to be seen when he will get his next fit. He has now been sent to Chittoor.

Since writing the above note I have received a communication from the Pasteur Institute, Coonoor stating that there is no case on record which has recovered from Hydrophobia and that his case cannot be considered a case of Hydrophobia.

In the light of this authoritative view expressed above I consider that it must be the neurosthenic effects left behind by his previous attack of Hydrophobia in spite of his treatment at Coonoor.

(Sd.) H. R. Sadashiva Rao.

Assistant Surgeon.

This is evidently a case of what Osler describes as Pseudo-Hydrophobia. It is nothing more than a neurotic or hysterical manifestation on the part the patient and not the disease itself.

The last paragraph of the above communication suggests a previous attack of the disease and the present as its neurosthenic effects. That means a recovery from Hydrophobia, the possibility of which is denied by highest authorities. *Ed.*

To.

*The Editor**The Indian Veterinary Journal.*
Veterinary Profession in India.

Sir,

I have read carefully your thought provoking articles on the raising of standard in the Veterinary colleges in India. I do not know whether this profession as an independent one has any prospect in our country, speaking for Bengal and I believe the same is true all over India, that anything is going to happen in the near future, which in any way can improve the material and moral prospect of those who have or going to have this profession as a living—notwithstanding your Royal Commission on Agriculture.

If the standard is to be raised, then the prospect is to be improved and men with higher general education can be attracted. Now let us see if this is possible.

At the present moment a young man who takes up Veterinary profession has got the following courses open for his living:-

- (a) Government service
- (b) Service under Indian States and Local bodies.
- (c) Private practice.

The water tight compartments, in which the Government services are divided are three in number.-

- (1) Imperial (2) Provincial (3) Subordinate.

The holes in the partition are so small and so few that few have any chance of escaping in the higher chamber, the majority will have to pass their days at the bottom rank, whose pay and prospect are too well known; the miserable pittance, which the Government dole out to the subordinate service, is not even a living wage and any decent young man with self-respect, energy and with a desire to better himself in life, will never care to take up a profession with such a

gloomy future. A few higher appointments in the services which a fortunate few are holding are no incentive to those who are at the bottom—the number of superior appointments are limited and promotion depends on various factors which I do not like to discuss here.

Now Mr. Editor, do you think, that because of the Agricultural Commission, in the near future anything would be done to alter and improve the present state of affairs? At present to qualify as a Veterinary Surgeon you require general education upto Matriculation standard and three subsequent years of hard professional training—then to begin and end your career as at present—is not in my mind at all tempting, with the additional risk to life and limbs thrown in the bargain.

Service under Indian States and Private Bodies.

Here as you know appointments are very few and whatever may be in other spheres, they are very fond of copying so far as salaries etc., are concerned from the Government Department. Additional disadvantages to these appointments are—insecure tenure, no pension and sometime no provident funds, and the disappearance of horse has further reduced scope for appointments under these bodies.

Some other special appointments with better pay and prospect are not generally given to Veterinary qualified men. To make room and provide for friends of powers-that-be, they are always bestowed on persons “with administrative and practical knowledge”. You are old enough to understand its meaning.

Private Practice

Here Mr. Editor, we can both compare notes. It is uncertain, expensive, and except in a few big cities, there is no chance of success even to the limited number of practitioners that we have in India.

I now ask you, in view of the state of affairs described

above, how can you honestly shed your tears for this profession. I know from experience, Europeans with British and other qualifications can make no living without some sort of special aid in this country. What chance of success do you hold out to those prospective practitioners with superior general education and professional training—why then raise the standard and blight the prospect of life of those who if not misled may prosper in other walks of life!

To tell you my opinion - so long the value of the cattle is not increased, cattle breeding, poultry farming and other live stock business are not taken up by educated, rich landholders and others, our profession has not a great future in this country: again I firmly believe, that Veterinary Education, employment and the general interest of the profession must be controlled not by a number of officials only, but by a *Veterinary Council*, which must undertake these duties—on which body should be represented both official and non-official members of the profession. But that day is still far off—as at present situated our activities are circumscribed—we have no representative in the Central Government. Our opinions and resolutions do not count in the counsels of the Government and those who represent our cause do not fully appreciate our difficulties and always try to ignore our representations. The profession in England and elsewhere would not have attained their present respectable status if it had been only under the control of a body of officials, who do not permanently reside in this country. Take for instance, the only professional journal which we have in India, does not receive from them that help and co-operation which we have a right to demand and expect. You search its pages in vain to find any professional article from them; they would rather occupy a position at the tail end of an official journal, than a place of honour in ours, they forget that in honouring its pages with their

articles they do not lose their prestige, but it enhances their reputation and increases popularity. If we could but stand united to uplift our status, and place before the Government our united demand for the betterment of the profession, I see no reason why they should not hear us and do justice to our cause.

During the course of the last few years the All India Veterinary Association, spent over 20 thousand rupees, to hold its meetings in different parts of India, to pass important resolutions and its meetings were presided over by persons whom the Government cannot call impractical but what response have they given? Our resolutions have been thrown in the waste paper baskets, our demands have been ignored, and even the Association is not recognised officially. This fact alone ought to convince those who really love their profession, that in the interest and welfare of the profession, we should be all one, whether we are born in this country or come from abroad; our endeavour first will be to form a Veterinary Council, with authority to control every thing relating to the profession. The next session of the All-India Veterinary Association should make 'Veterinary Council' its slogan and the rest will follow.

117, Dhurumtolla Street
Calcutta.
21-9-27.

Yours truly,
G. N. ROY CHAUDHURI.

We gladly publish the above letter from so well-known a member of our profession, as Mr. Roy Chaudhuri. The letter, we make bold to say, is typical of the feeling of despair that pervades the entire profession in India. Unless attempts are made to relieve the economic distress, sapping the very vitals of the profession, the situation is likely to prove disastrous. But to Mr. Roy Chaudhuri and others of his way of thinking, we will only counsel patience and remind them that it is only on the sacrificial

blood of the pioneers of any cause, that the cause itself thrives and bears fruit.—Ed.

NOTICE.

The All India Veterinary Conference which was unavoidably not held last year, will be held this year at Bombay on 27th, 28th and 29th of December 1927. As we remarked in a previous issue, the previous Conferences have all been a splendid success. Much depends upon our organization and representation and we need hardly remind our readers about the absolute necessity of mustering strong on that occasion and make the conference a success this year also. We are quite sure that Bombay will with its usual generosity welcome all the delegates and give them an interesting and useful programme of work.

Khan Sahib N. D. Dhakmarwala, G. B. V. C., Retired Professor and Bovine Pathologist of Bombay Veterinary College is the Chairman of the Reception Committee. His name should be a sufficient guarantee for the success of the Conference.

We appeal to all our professional friends Indian and European to gather in good numbers on the occasion.

Notices of resolutions and papers to be read on the occasion may kindly be sent to the General Secretary, All India Veterinary Association, Muttra, before 30th November 1927.

The members of the All India Veterinary Association, Madras Branch are informed that Mr. M. S. Sastry, the Secretary is undergoing Post-Graduate course at the Madras Veterinary College and his present address is 35, Dobbin Hall, Vepery, Madras and Mr. V. Janakiram Ayyar, the Joint Secretary and Treasurer has been transferred as the Third Lecturer, Madras Veterinary College and all letters intended for them are to be sent to the above addresses.

Indian Veterinary Journal

**A Quarterly record of Medicine, Surgery and of
General Veterinary Intelligence.
Devoted to the Cause of the Veterinary Profession
in the Indian Empire.**

EDITED BY

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

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