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EDITOR

THE DEPUTY SUPERINTENDENT, CIVIL VETERINARY
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EDITORIAL.

It is with regret that we have to refer again to the poor support being accorded to this Journal at the present time in the way of clinical articles.

This number, for instance, has been delayed for want of sufficient material to fill it. It is a simple matter, of course, to make up the required number of pages with extracts from other journals, but we take it that articles describing conditions that are to be found any day in our midst are of far more interest to our readers than anything else.

We make another appeal therefore to each subscriber to try and contribute at least one article a year, which he might look upon as an insurance against the Journal ceasing publication, as it will have to do if matters do not improve.

TRAUMATIC PERICARDITIS WITH PUNCTURE OF HEART AND HAEMORRHAGE.

BY

*R. G. Sathe, G.B.V.C., Veterinary Inspector,
Imperial Bacteriological Laboratory, Muktesar.*

Two reports of this condition have recently appeared in the *Veterinary Record* 1923, Vol. 3. No. 14. p. 241 and No. 17 p. 299. On post-mortem examination of an animal at the Imperial Bacteriological Laboratory, Muktesar, U.P., somewhat unusual characters similar to those contained in the descriptions given in these reports were found.

The animal was a local hill bull used in the production of anti-rinderpest serum.

No detailed history was obtainable; partial loss of appetite for three days prior to death was the only symptom observed.

The post-mortem examination showed no sub-cutaneous or general œdema. A stout splinter of bamboo wood and a piece of wire had both penetrated the reticulum, with one extremity in contact with the heart. The other was directed towards the lungs.

tennis ball, which contained thick creamy white pus. There were four other abscesses present in the liver, each about the size of a walnut.

The piece of wire was 4cms. in length, rigid and sharply pointed at both ends. It was found lying free in the left pleural cavity, close to the pericardium. The track of the wire from the reticulum to this position was very clearly seen. Adhesions were presented between the reticulum and the diaphragm, and between the diaphragm and the pericardium. When these adhesions were broken down, a small dark coloured puncture, which corresponded in diameter with that of the piece of wire, was clearly seen on each of the surfaces so exposed. The internal surface of the pericardium around this puncture showed also an area of superficial ulceration about the size of a silver four-anna piece, but generalised pericarditis had not yet occurred. The pericardial cavity was filled with a large quantity of firmly coagulated blood, which on removal formed a complete cast of the heart (Fig. 1). The heart was in systole, and appeared normal with the exception of a well defined recent puncture through the wall of the left ventricle, about 4 cms. from the apex, and near to the inter-ventricular groove (Fig. 2).

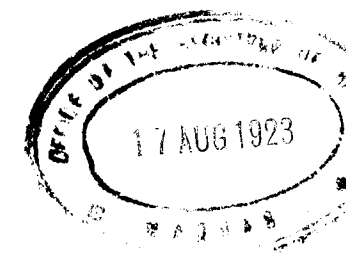
The unusual characters here recorded are : Firstly, the absence of oedema. Secondly, the perforation of the reticulum by two foreign bodies, each responsible for a separate and distinct lesion. Thirdly, the rapidly formed puncture of the heart, with extensive blood extravasation into the pericardial cavity.

BILHARZIA PARASITES IN CATTLE

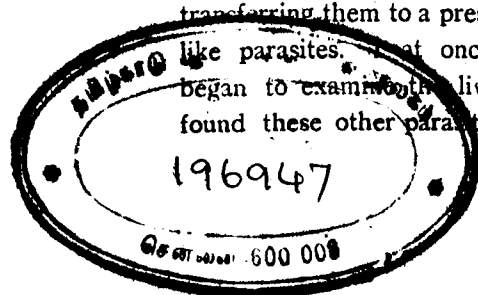
BY

Muhammad Rahimuddin, G.M.V.C., Veterinary Officer, Ootacamund Municipality.

About a month ago I had to condemn a liver of a bullock slaughtered here as it was infected with flukes which were collected for preservation. Before putting them in a preservative fluid they were allowed to remain in water for some time. At the time of transferring them to a preservative I found by chance a pair of thread like parasites. I at once thought of Bilharzia and from that day began to examine the livers infested with flukes, and invariably I found these other parasites in the portal veins. I showed these to



TO ILLUSTRATE MR. SATHE'S ARTICLE



TO ILLUSTRATE MR. SATHE'S ARTICLE



FIG. 2

the Health Officer here who said they were Bilharzia. As it is said that several kinds of these are in existence I submitted them to the Chief Superintendent, C.V.D. Madras, with a request to inform me the exact name of these parasites, and learnt subsequently that they were *Schistosomum spindalis*.

General appearance of the parasites.

Fine thread like, very delicate, white in colour, about $1/3''$ to $1/4''$ in length.

The affected animals were not showing any marked symptoms of sickness except emaciation and after slaughter various congestion on the surface of the livers was noticed. Any further symptoms observed will be duly recorded in this Journal. The animals were from Mysore Province.

N.B. About 30% of the animals slaughtered at Ootacamund are infected with *Fasciola hepaticum* and in almost all these livers, Bilharzia were detected.

* CAMPHORATED OIL AND ITS USES.

BY

*P. S. Kuppuswami Ayyar, G.M.V.C., Veterinary Assistant in charge,
Veterinary Hospital, Trichinopoly.*

CASE NO. 1.

A chestnut country bred mare, aged, was brought to the infirmary for an ulcer on the lower part of the abdomen. On examination the ulcer looked like a *bursallae* wound presenting the following characteristics.—There was constant and abundant flow of lymph from the ulcer. There was chronic induration and inflammation around the wound. Gritty stuff of bluish yellow hue was firmly lodged in the crevices of the ulcer. In addition, there was exuberant growth of granulation tissue. For a pretty long time all sorts of strong antiseptics and even curetting were tried. The ulcer did not show the slightest tendency of healing up. During this period the ulcer has increased much in circumference and looked like a big cauliflower lodged in the abdominal wall. There is oedema extending from the flap of the flank right up to the pectoral region. A section was removed

* Read before the Veterinary Graduates' Association, Trichinopoly Branch on 19.5.1923.

and sent to the Madras Veterinary College for examination. The examination revealed appearances of granulation tissue. Then, 15 grains of camphor dissolved in 3 drams of sterilised olive-oil was injected in three different places around the ulcer. After a few days the surrounding inflammation began to subside. The discharge became lessened and the irritation of the ulcer abated, as the animal did not then make attempts to bite the ulcer as it used to do before. After 10 days another injection was given. Then the ulcer began to assume normal healthy appearance and easily became cicatrised and the mare was sent home, completely cured. In this case the affection was purely local and there were no constitutional symptoms. Now the question arises how this injection has brought about a speedy recovery of the case. As camphor has got sedative and feeble antiseptic actions, the irritation of the ulcer must have been allayed and the antiseptic property of the drug might have paved the way towards healing.

CASE No. 2.

One morning I was called in to examine a conservancy bullock which had the following symptoms.—The animal was breathing hard and with difficulty. The temperature was normal. There were no symptoms of any abdominal complaint. There was emphysematous swelling on the back. Enquiry into the history of the case revealed nothing. I was told the animal did its usual work on the previous evening. Hot fomentation over the swelling followed by soothing liniment, a soothing electuary and medicated steam inhalation were given to the animal and rice congee was prescribed as its diet. The symptoms did not abate but on the contrary were growing worse. In the evening the temperature was 104° F. and the distress in breathing was very great. At about 7-30 P.M. three drachms of sterilised camphorated oil were injected sub-cutaneously in addition to the local treatment. Next morning, to my great relief, the animal was practically recovered from the ailment and began to nibble at straw and chew the cud also. But the emphysematous swelling was persistent. That too, disappeared in the course of a week by ordinary treatment such as, fomentation and application of stimulating liniment. Now coming to the etiology of the case, I am of opinion that the driver might have given a very severe blow on the back of the animal when at work. The external violence might have caused some injury to the muscles and also to the respiratory organs to a small extent. The therapeutic action of the drug used in this case is the same as in case No. 1.

A CASE OF SCROTAL ABSCESS AS A SEQUEL TO MULLING.

BY

*M. S. Ramachandra Ayyar, G.M.V.C., Veterinary Assistant in charge
Zamindar's Veterinary Hospital, Vijialapuram, Kuppam.*

Subject.—A grey country-bred bullock aged about three years, in good condition.

History.—This bullock was muled on April 10th, 1923. The necessary after-treatment such as fomentation application of hot cow-dung paste, and keeping the animal in cold water etc., were regularly done for about 10 days but yet the swelling did not decrease, whereas it increased day by day to the size of a foot ball, and the animal suffered from acute pain while walking as the scrotum came in contact with the thighs, and hence the animal had no inclination to move and assumed a peculiar gait. There was loss of condition also owing to the severe pain. After trying all the country treatment, it was brought to the hospital on 22-5-23. I suspected that it may be a case of hernia, and tested it by piercing it with the exploring needle to find out the contents. To my surprise there was pus. Then I opened it by the abscess knife and about 4 pints of liquid pus was removed together with some dead tissues. The sac was washed with cresol lotion and no trace of the spermatic artery was found. After a week's dressing with perchloride gauze and unguentum iodine the opening healed and the sac shrunk to its normal size as if it was castrated.

As the formation of pus in the scrotal sacs is of rare occurrence, I was led to bring it to the notice of the Journal to find out the cause of pus formation in a closed sac.

BOVINE EMASCULATION—ANCIENT AND MODERN METHODS.

BY

*T. A. Ratnaswami Ayyar, G.M.V.C., Veterinary Assistant,
Kallakurichi.*

As bovine castration is one of the chief duties of a Veterinarian and as the prosperity of the Agriculturist depends upon the well-being of his working bull, we have to count not only on the number of castrations but also upon the successful fulfilment of the aim with

which the animals were emasculated and it becomes our duty to find out the time and method of such emasculation which will suit our agricultural and climatic requirements and I bring this paper before this assembly in order to be enlightened on the point.

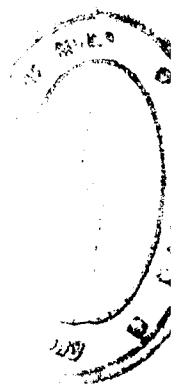
Though not for preventing improper breeding from too young or emaciated animals as evidenced by communal grazing, and though not for increasing the palatability of the meat, emasculation has been from time immemorial considered a necessary evil for the working animal to keep up strength and to be effectually controlled and has been practised by the rather cruel method of crushing the testes or the cord or both unmindful of the agony of the bull of 3 or 4 years of age. The technique of the operation of mulling is this:—The bull is cast and secured, preferably on a Sunday morning to satisfy superstitious belief and the testes or the cord, as is customary in the district, is placed between the two bars of an instrument resembling an English Twitch and is either squeezed by rolling each of the 2 bars under great pressure or beaten by a heavy blunt cudgel or crowbar till the gland becomes a mass of soft pulp. The operation generally lasting for half an hour completely disables the animal from moving even an inch owing to the monstrous swelling at the part and the unimaginable pain thereof which in its own turn tells upon the appetite of the animal for a period of even 1 to 2 weeks. The animal usually recovers health but with a complete loss of vital power in about 6 weeks. In spite of the unsightly torture requiring much care and attention thereafter some animals because of their having been released earlier do retain a little virile power and become a constant nuisance to the cows and heifers and also attack men sometimes.

To remove the ill-effects of the age long custom of communal grazing and the consequential deterioration of the breed and to replace the rather cruel and sometimes uncertain method of mulling, castration which meant total removal of the gland with or without its tunics, was advocated at so early an age of 6 months to 1 year. Leaving the operative technique which is too well known to need repetition, we shall presently see the effects. The operation is decidedly quicker and comparatively painless and brings about complete loss of virility and consequent abject submission with a markedly adipose tendency. But this method brought complaints from the agriculturists that the animals thus castrated lost the usual working capacity of the breed while those castrated at an early age became stunted in addition. For sometime we thought the complaint

was only imaginary and that the ryots praised their mulling process because of their conservative and lethargic nature. But when complaints became too numerous thought was bestowed on the fit age for castration and it was decided in one of our meetings that to suit Indian conditions bulls are best castrated after they cut 4 teeth i.e. 3 years approximately. But now even eminent men in the field do agree with the ryots. For instance, in the Veterinary Journal for September 1921, these passages occur (1) "with the individual castrated before puberty even the primary-sexual characteristics are never developed and the individual resembles a child or a woman." "The castrated man becomes depressed haunted with suicidal ideas, without energy etc." "The experiences of Steinnach and Lichtenstein demonstrate the invigorating power of testicular matter on both body and mind." Applying these observations as far as possible to our field of work, it goes to prove that removal of the gland goes with removal of energy. To correct a certain extent the bad effects found in castrated animals the Journal advocates subcutaneous injections of Testicular extracts or transplantation of normal testicles. The operative technique of such transplantation as described therein is that a portion of the testicle is cut into 2 halves and sutured on the muscle in the inguinal region with catgut and the operation is completed by one more suture in the skin.

The method of ligaturing the vas deferens which deprives the animal of sexual potency and leave the glandular tissue intact is a bit more difficult to practise and the punctured wound that results takes longer time to heal.

The other new method is that of castration by Burdizzo's castrator; it will be more correct if we call the operation emasculation and the instrument emasculator in as much as no tissue is removed out of the body and the process also is only mulling with an improved machine. The instrument resembles a farrier's shoeing pincers with blunt points. The peculiar construction of the machine with the double lever arrangement magnifies the pressure applied at the handle. The operative technique also is quite simple. The bull is cast in the ordinary way and the cord of one testes is placed between the jaws of the machine and pressure applied at the handle. The process is repeated for the 2nd one. The whole operation does not cover even a minute for a bull. In all the 120 animals with 2 teeth and above which I have emasculated by this method I have not observed even one case of failure. The quick painless operation without any



wound or removal of any tissue is much appreciated by the ryots whose animals eat the very day and are fit for work the next day. It is also inexpensive as no surgical dressings are required and saves labour. This method agrees with the latest principles and theories on the subject.

FATAL BITE BY A TARANTULA SPIDER.

BY

*M. S. Ramachandra Ayyar G. M. V. C. Veterinary assitant in charge,
Zamindar's Veterinary Hospital, Vijjalapuram, Kuppam.*

In continuation of my article under the heading 'a case of doubtful etiology' I am writing the following information for publication along with the above article, as the case is suspected of a poisonous bite by the Tarantula Spider commonly known in these parts as *Echgoti* in Telugu. The calf in question died on 24-4-1923 showing symptoms of Pneumonia and on Post-mortem a big tumour in the sternal region was detected which, when opened was filled with pus. The lungs showed numerous white patches (marble-like appearance) The calf appeared to be all right and in the morning of 24-4-1923 it showed difficulty in breathing and the temperature was 103.4°F. The calf did not take any feed or conjee the whole day and no medicine also was given that day. The calf died on the same night at about 2 A.M. and the post-mortem was held at 7-30 a.m. A week before death, a swelling in the shoulder blade began to appear which, when pressed, was hard to the touch and found to contain thick pus. As nothing definite was found in the microscopical examination and in the post-mortem also, I enquired of the cattlemen in these parts and came to know that it may be a case bitten by the *Echgoti* which insect is common in these parts. Animals bitten by that insect will show numerous subcutaneous swellings filled with pus, as a result of which the animal becomes anaemic and dies gradually. One the whole the result is death. This insect bites human beings also occasionally and in that case, the patient dies sooner, showing numerous hard swellings all over the body. As the insect was peculiar to me, I arranged to catch one of that species for our departmental investigation and fortunately, one was caught on 1-5-1923. I submitted the same to the Chief Superintendent for identification, and got a reply stating that the insect is a Tarantula Spider and it is notoriously poisonous. Hence, I have every reason

to believe that the case described above was bitten by one of this species and as the result of which the calf showed various symptoms and died. I am writing this with the hope that the symptoms given above will be useful to the members of the profession in diagnosing such cases early.

MY EXPERIENCES

BY

*T. S. Venkatesa Ayyar, G.M.V.C., Veterinary Assistant in charge
Veterinary Hospital, Madura.*

I

Haemotocele in Bullocks.

CASE NO. 1

When I was a Touring Veterinary Assistant at Amalapuram Godaveri District, in 1916 I had an occasion to see a case of Haemotocele in a bullock in a village named Bandamoor Lanka, 12 miles away from Amalapuram. This bullock was 6 years old and it was muled about the beginning of its 4th year. After the process of mulling the usual swelling subsided in the course of a month and the animal continued to be in good condition.

At the time of examination, I found a soft fluctuating swelling of the scrotum without heat and pain and its size resembled that of a big coconut. From the history I learnt that the swelling was very small 6 months ago and it gradually increased in size and the swelling had no tendency to decrease before feed or on an empty stomach. As I was called away to an urgent out-break report, I advised the owner to take the animal to the Veterinary Hospital, Amalapuram when Mr. N. Soundararaja Ayyangar was in charge. He postponed taking the animal until the scrotal swelling began to burst open and bleed profusely. This case was admitted into the hospital at once. The scrotal opening was a little more widened and all the blood clots were removed when the animal began to bleed very profusely and before attempts were made to stop bleeding, the animal lost about 10 pints of blood. Then the scrotal cavity was well plugged with carbolised tow dipped in strong cresol lotion and supported by sutures and internally plenty of saline solution and stimulant mixtures were given. But the animal died after three hours. No postmortem was conducted as the owner was unwilling.

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CASE NO. 2.

A similar case was brought to me in 1921 while I was in Hospet, (Bellary District). The owner complained to me that it was losing condition after the appearance of swelling in the scrotum in spite of good feeding and this swelling was in existence for a year. After my examination of the animal I informed the owner to bring it next day for operation. This case never came to the hospital, but I learnt later on from the owner that the animal died of bleeding as a result of the bursting of the scrotal swelling.

CASE NO. 3

A bullock suffering from this complaint was admitted in this hospital (Madura) on 5-6-22. It showed all the symptoms described in case Nos. 1 and 2. After taking the consent from the owner for a risky operation the swelling was punctured with trocar and canula with all the antiseptic precautions and about 3 pints of blood flowed out. Then the canula was removed, little pressure applied to the opening and the part was subjected to cold water irrigation, and acetic acid and chalk paste dressing applied after irrigation. This treatment was continued till 8-6-22 when a big incision about 3 inches long was made. All the blood clots and diseased tissues were removed and the scrotal cavity was packed with carbolised tow dipped in strong cresol lotion and ordinary sutures were inserted in the opening to support the tow. After this operation, the swelling increased, the animal refused all food, temperature raised to 103° F. with hurried respirations and difficulty to get up. Internally Saline and stimulant mixtures were given but the animal died next day. No post-mortem was conducted as the owner refused.

General remarks.

I am sure some of our professional brethren would have met with some cases of this nature and I shall be glad to hear what their experiences were in treatment of these cases.

II

FRACTURE OF THE FEMUR IN A BULLOCK.

Professor Williams in his Principles and Practice of Veterinary Surgery has observed that "Fracture of the Femur sometimes results from muscular contraction when the animal is cast and bound for operation, displacement generally being the immediate result; and from the numerous muscles which clothe and are attached to this bone reduction of this fracture is an impossibility."

11

A bullock with sprained right hip-joint was brought for treatment. The animal being a very bad kicker was cast very carefully on the near side and all legs were secured by suitable ropes. Necessary medicine was applied to the affected part and with due precaution, one of the fore-leg was released and when the man was in the act of releasing other legs, the animal made a violent struggle with the result that a loud crackling noise was heard which created an impression that the animal broke the ropes secured to the legs. Eventually other legs were released and the animal got up. It began to go lame on the left hind leg instead of right hind and the former leg was shivering.

When I examined the leg, I found to my surprise that the femur bone was completely fractured due to undue and sudden contraction of great muscles which surrounded the bone. This was the single instance in which a bullock had this unfortunate accident which was not due to any negligence or fault on the part of the operator. When I enquired of one of my professional brethren if he had any such accident in his experience, he informed me that he met with a similar case of fracture in femur when he was operating on the eye of a bullock. This incident is very important from a legal point of view and in a future day one of us may be asked to give an expert opinion in any law Court when any aggrieved or litigant client goes to court for damages of these kinds of accidents to which a Veterinarian is often liable in the conscientious discharge of his duties. As I am sure that many of us would have met with several such instances in their course of practice a good discussion on this point is earnestly invited.

III

A CASE OF PILES IN A BULLOCK.

With the exception of the dog, it is stated that the domestic animals rarely suffer from piles. I have to record a case of piles found in a bullock (Ongole) which was ailing with this complaint for one year. This was admitted into this hospital (Madura) as an inpatient in October 1922 and the following symptoms were observed. Congestion of the mucous membrane at the verge of the anus, switching of the tail due to irritation, bleeding and dilatation of the haemorrhoidal veins and presence of small tumours inside.

Technique of operation.—The animal was starved the previous day, backraked and an enema was given. The part was anaesthsed

with cocaine solution and all small tumours were nipped off with a pair of scissors. Their bases were well touched with Silver Nitrate, and Boric ointment was applied. The after-treatment consisted in irrigating the part with permanganate lotion and smearing Boric oint. Once in 8 days the part was swabbed with 5 per cent Silver nitrate solution. Within 20 days the animal made a complete recovery without any trace of the affection. Since this was the first case I had seen in my experience, I contribute this humble article to bring to the notice of our brethren from whom I wish to hear more about this disease.

EPHEMERAL FEVER IN CATTLE.

BY

*N. Ramanathan, G.M.V.C., Veterinary Assistant,
Kamalapuram.*

This disease appears in cattle between the months of April and December generally during the breezy weather, characterised by fever (103° to 107° F.) loss of appetite, scanty urination and defecation, recovery taking place in from 2 to 6 days.

Etiology.—Sudden changes of temperature, as in June and July months, when the temperature during day time is high and the nights are breezy and cooler.

Symptoms.—The affected animal has a temperature varying from 103° F to 107° F. It is off-feed, stiff all over the body, being unable to get up generally. When the animal is forced to walk it is lame on all its four, the back being bent, appearing as if it is suffering from acute Rheumatism. The animal looks very dull and depressed. Rumination is completely suspended, there is a staring coat and the animal rapidly loses condition very badly. The bowels are costive, the faeces being hard, dry and mucous coated. Urine is scanty, and high coloured.

Treatment.—Generally the affected animals recover in a week without any treatment. When they are treated at the onset, proper hygienic principles and feeding being observed, they recover with a single dose in a day. My favourite *Recipe* for this ailment is—

Re—

Mag. Sulph.—4 ounces.
Pot. Nitrates—2 drams.

Spts. Ammon. Aromaticus
Liqr. Ammon. Acetatis a a—1½ ounces.
Aqua ad—one pint

The dose is regulated according to the size of the animal as a matter of course.

All that is necessary is proper housing, and nursing. The period of convalescence lasts from a week to a month.

N.B. Out of about 15 animals that I treated for the complaint, there was only one case, a cow of Ongole breed, which succumbed to the disease under my treatment. Local people say that *Kurma* is of different types, this particular animal having suffered from *Yenuku Kurma* a very fatal type.

PARAPHYMOSIS IN A BULLOCK.

BY

N. Ramanathan G.M.V.C. Veterinary assistant, Kamalapuram.

Subject.—An imperfectly mulled bullock of the local breed aged about 8 years.

History.—The animal went to work in the morning and while returning home in the evening after work chased a cow and crossed it violently with the result that the penis came out of its sheath and could not be retracted. Local quacks in trying to push it home used too much violence and made the condition worse. About a week after, I was sent for and I went to the village rather reluctantly and with diffidence.

Symptoms.—On arriving at the byre, the animal was found to be lying down, rather very dull, with an anxious look, hurried respiration and quick pulse. The temperature was up above normal, (104. 6° F.) the penis about 9" protruding out of its sheath, uncomfortably lodged in the filthy canopy of urine, dung and dust. It was twisted out of proper shape, owing to much interference by local quacks, very much swollen and awfully stinking, gangrene having already set in. The rectum when examined was found to contain hard dry pellets of dung and the bladder when felt was fully distended.

Prognosis.—I told the owner about the unfavourable prognosis as uræmic poisoning and gangrene have already set in, and that he should be prepared to the "Kill or Cure" treatment.

Operation.—The animal was cast and properly secured, the penis and sheath were washed with soap and warm water and an antiseptic bandage was tightly applied at the junction of the sheath and penis which was still further drawn out. Selecting the healthy portion of the organ, it was slowly incised to prevent bleeding until it was amputated. The urethra was then picked up and continuous sutures were applied with five ordinary silk thread to the surrounding tissue (Corpus Cavernosum and Spongiosum). The amputated end was then washed completely with carbolic lotion and the organ released to find home without any difficulty after the removal of bandage. The subsequent bleeding from the stump was arrested by filling the pouch of the sheath with triple sulphate solution and allowing it to act for a sufficiently long time. Castor oil to which Iodoform was added, was then syringed into the sheath. The animal was then released and given a stimulant drench.

Feed.—Conjee made of Ragi in addition to green grass which was allowed *ad libitum*.

Daily dressing consisted in fomentations, removal of gangrenous tissues (slough) by manipulation and syringing, and the application of medicated oily dressing into the sheath.

The animal was completely cured in 10 days and is now a hard worker.

EXTRACTS.

VETERINARY SCIENCE AND MEDICINE.

BY

*Professor J. Share-Jones, D.V.Sc., M.Sc., F.R.C.V.S.,
Director of Veterinary Education, University of Liverpool.*

We, who have made veterinary education our life-work, want to know where we stand. We find that in other countries it is sought after by different Departments and by different University Faculties. In South Africa, for instance, a controversy has for some time been proceeding between two of the biggest educational centres, as to which had the better claim to veterinary science. The point was as to whether veterinary science belonged to agriculture, or whether it should be regarded as a division of the science of medicine. A

conclusion on a question of this kind can only be arrived at after an examination of the curricula for degrees in agriculture, veterinary science and medicine. As a matter of comparison, if you draw up a table with three columns, giving the subjects taken in the various years in agriculture, veterinary science and medicine, you will find that the result at a glance will be most interesting and instructive. A most casual observation can only lead to one conclusion, and that is that a curriculum for a degree in veterinary science runs closely parallel to that for a degree in medicine, that the affinity between the courses in agriculture and veterinary science is very slight, and that, judging from the requirements of the curricula for degrees, practically the same type of student, with equal mental calibre, is required for veterinary science as for human medicine. The training in the preliminary foundation science is the same, whilst the courses of study are equally protracted. This is confirmed by the findings of Lord Haldane's Royal Commission on University Education, which states that "the modern veterinary surgeon should proceed through an exacting programme of education, a course of training as specialised and as thorough as that of the student of human medicine, and, further, a future development of veterinary medicine depends upon its adoption of the methods of dealing with disease that have been worked out for human pathology. In their turn, also, many human diseases have proved to be closely associated with animal disease."

The Commission considered that research in animal disease must, of necessity, be associated with research in human disease, and that a department dealing with animal disease has become almost as necessary to a school of investigation in human medicine as the association with human pathology is to investigation in animal disease.

I regard this pronouncement, by no less an authoritative body than a Royal Commission, as the most important pronouncement on the scientific position of our work in our time. It was made in 1918—it links our work definitely with medicine and puts it on an equal plane.

This cannot be said of agriculture. Any suggestion that veterinary science should naturally fall completely under the jurisdiction of the Ministry of Agriculture as being the most appropriate Government Department cannot be substantiated. The case for the Ministry of Health is a hundred times stronger—the future veterinary absorptive capacity of the Ministry of Health is, according to the estimates given, more than five times as great as that of the Ministry of Agriculture.

The scientific study and control of disease, in whatever species disease manifests itself, should be under one Ministry, and that the Ministry of Health. We do not want rabies in animals under the Ministry of Agriculture and hydrophobia in man under the Ministry of Health. It has been pointed out that, as the light of research is shed upon contagious disease, so do we find that the number of diseases which are not communicable from one species to another, including man, becomes reduced. It is obvious, therefore, that disease in man and disease in the domesticated animal, even though they may be in separate departments, should be under the same Ministry.

The curriculum for degrees in veterinary science represents a course which, for duration and intensive study, is second to none in any of our Universities. Why, then, does it not receive the same recognition? Why were candidates reading for this degree dealt with by the Ministry of Labour? I yield to no man in my respect for labour. I have every sympathy with labour. This is not the point—the point is, why were candidates for a veterinary degree singled out from all others? If a veterinary degree is not considered representative of the highest education, then I will ask those responsible for the classification upon what principle their classification is based.

I do not wish to say, and I do not think, that the hopeless position in which we find veterinary education is brought about intentionally by the Ministers. It is rather due to the policy of drift which has been allowed to develop so that neither the public nor the Ministers themselves can definitely fix responsibility.

We want this anomaly removed. Let the Ministry of Health assume its proper responsibilities here. Then we shall progress alongside the other professions. If this comes about, then it is very certain that the time is not far distant when we shall be assessed at our true value and our close relationship to and position in medicine more appreciated.

It is with no little diffidence that one ventures to address you on this subject at present, in as much as there is always some danger lest a want of diplomacy might lead to an estrangement between the representatives of branches of a science at a time when the object is to bring those representatives closer together.

Some of us have been advocating this closer relationship more or less energetically during the last 10 or 15 years. Advocacy of this

kind always requires a high degree of delicacy, for, on the one hand, there is perhaps a tendency to regard a young and vigorous profession as an intruder in a field where a much older profession has regarded itself for centuries as holding sway. On the other hand, the young profession has found part of this field being naturally "pegged out" for it by the community, slowly, but nevertheless surely.

I ask you to believe me when I say that I speak firstly, lastly, and all the time, as a veterinary surgeon—one who is proud of the profession of his choice, and one who believes in its future. If I did not believe in it I would get out of it and make way for those who did. We cannot make a profession and keep it abreast of other learned professions unless we have faith in its possibilities. There are some in it, I hear, who have no real use for the profession, and who constantly refer to those who have as optimists and idealists. I would simply ask you to take a survey of the history of other professions which have become great, and you will have no difficulty in deciding which of these two types of members has been the means of placing those professions where they stand to-day.

For the last 17 years it has been my privilege to work along side members of our sister profession of human medicine. I have been in the closest association with them as a member of their faculty. With them I have been in the conflict of debate on scores of occasions. This must necessarily be so if men have opinions of their own and have the courage of their convictions. The outcome of this experience to me has been that I have become more and more impressed as time went on with the "oneness" of medicine—with the fact that there is one great science of medicine, of which the workers in human medicine and the workers in veterinary medicine are indispenible attributes. I feel this is very surely becoming appreciated by our colleagues in human medicine. When I say this, I refer to medical colleagues who matter. There are "small men" in every profession. The medical profession is not without them, and these are the men who rely on the great tradition of human medicine to carry them through. But the men who made that tradition are not of that type, and they are the men who are making that tradition still greater. Of the men of my acquaintance there was no one who had a higher appreciation of the work of the veterinary surgeon than the late Sir Robert Boyce. Here was one who was ever ready to stand up and fight for our cause. He had nothing to gain other than the advancement of medical science, for his reputation was world-wide as one

of the founders of tropical medicine. Again, one of the proudest moments of my life was when I heard veterinary science and veterinary students eulogised by Professor Sherrington in a manner which we could scarcely as much as hope they deserved. He spoke as my colleague for many years, but now Waynflete Professor at Oxford, and the holder of no less exalted a position than that of President of the Royal Society—the leading scientific position in the world. His successor—Professor Macdonald—is quite an appreciative. I could go through a series of names of gentlemen—including Deans Monsarrat, Beattie, Macdonald and Kelly—with whom I served throughout their tenure of office. From each I received nothing but unqualified assistance in furthering any scheme for the advancement of veterinary education. Such men as these are making human medicine. When I recall their innumerable acts of kindness and encouragement I have not the slightest difficulty in forgetting tiny pinpricks of “smaller” men, of which we have all had experience and which might otherwise keep us apart.

We have ever to remember that we belong to the younger branch and work in what some should regard as a humbler division of the science. This makes our work a target for attack by some. But humility is the very soul of a real education. There was no more humble person than Pestalozzi, and he was one of the makers of modern education. He endeavoured to instil as part of the make-up of the educated person, a respect for work in every sphere.

Please do not think I am endeavouring to write a eulogy of medical men. I am simply searching for evidence from amongst themselves that they are beginning in this country to formulate a just conception of the branch which we represent.

In the early history of veterinary science in this country there is no doubt but that much interest was taken in it by the medical faculty. We find that courses of lectures were delivered in medical schools, 20–30 years after St. Bel settled here. In the early thirties of last century, Youatt was lecturer at the University College (University of London). There is no doubt that, up to the latter part of last century, there was the closest affinity between us. Then came a long period of almost complete estrangement. To what this was actually due I will not pretend to say, but it synchronised with attempts on our part, through a series of Acts and Charters, to place ourselves and our work in a kind of water-tight compartment. Whether this was good for our own development we have to judge.

It has not been the policy of other countries, where there were no vested interests standing in the way of modern development and where progress during the last two or three decades has been most rapid.

It is interesting to note what has been happening to us during this period. If you examine the question closely you will find that we have been drifting almost entirely towards the Ministry of Agriculture. In my judgment this has been much to our detriment, for we are wrongly placed. It is up to us to see that our position is more clearly defined. It is not to be expected that the Ministry of Agriculture would attach a true value to our potentialities for the country *as a whole*. This Ministry would regard us as a means simply of curing and protecting live stock, and our service here, great as it undoubtedly is, can always be, and is, reduced to terms of L.S.D.

If veterinary science be more closely allied to medicine, then it will be seen in its true perspective as an essential instrument in the protection of man himself. And this is its highest function. The monetary estimate disappears, for you will not find the boldest of our politicians bold enough to estimate the loss to the nation of a single human life.

Furthermore, more closely allied to medicine, it might become part of our great national scheme of education. This is the tendency of all modern developments in veterinary education. Look where you will—Australia, New Zealand, Egypt, South Africa, India, Brazil, U.S.A., and Japan, about which I had an interesting discussion with Major Fugii of the University of Tokio, recently—you will find on every hand evidence of virility, a desire for reform, and endeavour to keep abreast with modern standards in other branches.

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NOTE ON HELMINTHS COMMON TO MAN AND DOMESTICATED ANIMALS

BY

*R. Daubney, M.Sc., M.R.C.V.S.,
Ministry of Agriculture and Fisheries.*

The following notes on the species of worms common to man and the domesticated animals are published at the request of the editor of the VETERINARY JOURNAL, with the idea they may

assist in showing how closely related are the problems of medical and veterinary research workers in this field.

Although some species of parasitic worms have a more or less extended range of hosts, most species are more exacting in their host requirements, and accordingly they cannot be transmitted to experimental animals in the manner employed when dealing with pathogenic bacteria. This fact at once places difficulties in the way of experimental investigation of the life-cycle of many human parasites, unless the worker is willing to act as experimental host himself, a not uncommon occurrence in this field. Elucidation by experimental methods of a life-cycle of a species parasitic in man is often a rapid sequel to the discovery that domesticated animals or small rodents can, or do, act as hosts of the species in question. Actual instances of this are numerous, e.g., *Schistosoma japonicum*, *Clonorchis sinensis*, *Fasciolopsis buskii*, etc.

Where man and a domesticated animal act in common as definitive host of a species, the true natural host may be either man (e.g. *Ascaris lumbricoides*) or the domesticated animal (e.g. *F. hepatica*). In the case of *Ascaris lumbricoides* the greater size attained by this species in man indicates man as the true natural host, although in this country the parasite is far more frequently encountered in the pig. The bearing of such cases upon any measures separately evolved for the control of the parasite in either of its hosts is too obvious to require comment. Another case in point is that of the parasite which employs man as a host in one phase of its life-cycle and a domesticated animal in another; thus man commonly acts as intermediary host for *Echinococcus*, a parasite of the dog, while on the other hand cattle and pigs harbour the intermediary stages of *Tania saginata* and *T. solium*, the former the common tapeworm of man in this country.

Two other points outside the scope of this paper might perhaps be mentioned here. Different species of the same genus frequently occur, the one species in man and the other or others in domesticated animals. In such cases the elucidation of the life-history of one species furnishes a line to be followed in work upon the other species. The liver fluke of sheep (*Fasciola hepatica*) will serve as an illustration here.

Lastly there is the question of research in anthelmintic treatment. Many drugs have acquired fallacious reputations as anthelmintics on the reports of sketchy observations. An animal or a man is given a

drug as an anthelmintic, and if some worms are passed the treatment is considered successful, particularly if it is followed by an improvement in the condition of the patient. It is, however, impossible to estimate the anthelmintic properties of a drug without careful and arduous experiments involving the use of a large number of experimental animals, some of which may be accidentally killed during the experiments. The work of Hall and others in America in recent years is an excellent illustration of how such experiments must be conducted to ensure reliable results. Hall's experiences with oil of chenopodium, chloroform, and latterly carbon tetrachloride, in the treatment of hook worm in dogs have had a profound effect throughout the world on the treatment of hook-worm in man.

I. TREMATODA.

Superfamily. PARAMPHISTOMOIDEA, Stiles and Goldberger, 1910.

Family. Gastrodisciidae, Stiles and Goldberger, 1910.

Subfamily. *Gastrodiscus hominis* Lewis and McConnell, 1876.

Synonyms: *Amphistoma hominis* Lewis and McConnell, 1876;

A. (*Gastrodiscus hominis* Sonsino, 1895; *Gastrodiscus hominis* Sonsino, 1896; *Gastrodiscoides hominis* Leiper, 1913.

This fluke was discovered by Lewis and McConnell in 1876 in the caecum of a man. It has since been recorded from India and Assam. According to Khalil (1922), its range is restricted to the Malay States, Assam, Cochin-China and India. Cases recorded from other parts of the world (e.g. Low's case in Guiana), have been traced to emigrants. Baru and Bruyant (1913), in a survey of the parasites of pigs in Cochin-China recorded its occurrence in 5 per cent, of the animals examined. They report the finding of extremely small forms in some localities. The incidence observed by Brau and Bruyant suggests that the pig is the natural host. Khalil (1922) has reported the occurrence of this parasite in the caecum of a Napu mouse deer (*Tragulus napu*) in the Zoological Gardens, London.

Leiper (1913) proposed the genus *Gastrodiscoides* with this species as type. The validity of *Gastrodiscoides* is still a subject of controversy. A second species *Gastrodiscoides minor* from pigs in Nigeria and Uganda was described by Leiper in the same paper. No pathogenic effects have been recorded as due to the presence of this species, but recently Nainsouta (1921) has described cases of peritonitis in horses due to perforation of the gut in heavy infestation with *Gastrodiscus aegyptiacus*.

Hosts.—Pig, man, Napu mouse deer (*Tragulus napu*).

Life History.—Unknown.

Superfamily. FASCIOLOIDEA, Stiles and Goldberger, 1910.

Family Fasciolidae, Railliet, 1895.

Subfamily. Fasciolinae, Stiles and Hassall, 1898.

Fasciola hepatica Linn, 1758.

Synonyms: *Distomum hepaticum* Retz., 1786; *Fasciola humana* Gmelin, 1789; *Distomum caviae* Sonsino, 1890; *Cladocelium hepaticum* Stoss., 1892.

The common liver fluke of sheep is a parasite of considerable economic importance. Its distribution is world-wide. It is annually responsible for the deaths of large numbers of sheep and under certain conditions the losses from liver fluke occasionally become enormous. Epizootics have been recognised periodically since the middle of the sixteenth century, when the disease was described by Gesner (1551), Gemma (1575), and Gabucinius (1597). In Great Britain the mortality among sheep was estimated to have been 3,000,000 annually during the years 1879 and 1880, and exceedingly heavy losses were incurred as recently as 1920-21 season. In man *Fasciola hepatica* is rarely recorded. Kuchenmeister (1857) quotes Mehlis as authority for eight cases, observed by Malpighi, Chabert, Bauhin, Biddloo, Wepfer, Pallas, Brera, and Mehlis himself. According to Bremser, however, Bauhin's parasites were not *F. hepatica*, while Kuchenmeister doubted the authenticity of Mehlis's case. Cobbold (1879) considers to be spurious also the cases alleged by Wepfer and Chabert. Budd (1852) mentions a case at Middlesex Hospital where a single specimen was found in the gall bladder. Biermer (1865) records the finding of one specimen in the course of a post-mortem examination. Prunac (1878) cites a case in which a woman patient expelled *per anum* between fifty and sixty flukes. During the epizootic of 1879-81 in this country Humble and Lush (1881) reported the death of a labourer at Corfe Castle from "liver-rot." In the case of an English soldier in Egypt, Chester (1885) records *F. hepatica* as the cause of death. Deffek (1902) has also recorded a fatal case in a young woman in Austria. More recently four cases in which the presence of the parasite was diagnosed by the finding of eggs in the faeces have been communicated, two by Laver-gne (1916) and (1918), one by Guiart (1920), and one by Vogel (1922). Romera Sierra (1918) has reported the finding of an adult liver fluke

in the duodenum of a male cadaver in Venezuela. Other cases recorded include those of Lambl (1859), Wyss (1868), Bestroem (1883), Garcia Sola (1884), and Sagarra (1890).

Aberrant parasites have not been reported as frequently as those in the liver and gall ducts. According to M. Braun (1903), *Hexathyridium venarum* (Treutler, 1793) was most probably an immature liver fluke. Adults were found by Duval (1842) in the portal vein and other veins post-mortem at Rennes, and a similar case was reported by Vital (1874) from Constantine. Giesker (1850) found two flukes in a swelling on the sole of a woman's foot. Penn Harris's case, fully recorded by Lankester (1857), in which some six or seven mature flukes are supposed to have been taken from an abscess of the occiput of a two-year-old child, is not sufficiently substantiated as to the actual source of the specimens; a second case, in which flukes were taken from an abscess behind the ear, is also reported by Lankester (loc. cit.). Dionis de Carrieres records a case in which a young liver-fluke was taken from a tumour in the right hypochondriac region of a man. Max Braun considers it possible that *Distomum ophthalmobium*, Diesing, 1850, and *Monostomum lentis*, von Nordmann, 1832 (the former from between the opaque lens or capsule of a five-months-old child, and the latter from the opaque lens of an old woman), may have been immature liver flukes. Khouri (1904) records the occurrence of an unusual type of parasitism in man in Nahr Lebanon. Adult flukes from the livers of goats are transferred to man and become reattached to the mucous membrane in the bucco-pharyngeal region. Livers of young goats are commonly eaten uncooked in this district, and it is in this manner that the transference of the flukes is effected. Only a proportion of the flukes taken in survives to reattach in this curious manner, the remainder being destroyed during mastication or swallowed and digested. Those which escape attach themselves to the mucous membrane of the pharynx, larynx, Eustachian tubes, and adjoining parts, producing symptoms of dysphagia, dyspnoea, disphonia, very occasionally resulting in death. The affection usually lasts but a few hours, and is terminated by the removal of the parasites during emesis.

Hosts.—Sheep, cattle, goats, duiker, antelope, horse, ass, rabbit, pig, cat, man, beaver (*castor*), kangaroos and wallabies.

Hosts.—Intermediate.—*Limnaea truncatula*, L., throughout Europe and Siberia, Asia Minor, Thibet. *L. oahuensis*, Souleyet, and *L. rubella*, Lea, in the Sandwich and Hawaiian Islands. *L. tenuistriatus* in Australia. *Isidora tropica* and *Limnaea natalensis* in

South Africa, Porter, 1921.. *Ampullaria luteostoma* in Venezuela (Iturbe). Possibly *Limnaea viator*, Orb., in South America, and *L. humilis*, Say, or *Physa fontinalis* in North America.

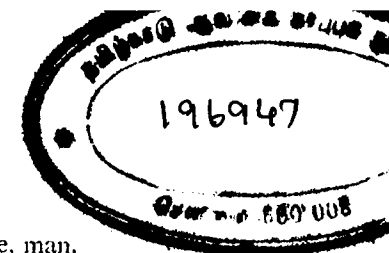
Reference should be made to the work of Ssnitsin (1914). This observer found that in cases of experimental infestation induced by feeding encysted cercariae to rabbits, the young flukes reached the peritoneal cavity by perforating the intestinal wall. After a stay of from three to fourteen days in the peritoneal cavity they enter the liver by directly penetrating the capsule. These findings were amply confirmed by the pathological observations of Frenkel (1919), and by the writer's own observations in Wales during the season 1920-21. In the case of the welsh out break the local conditions were such that the sheep on being brought down to lowland pastures in the late autumn received a very heavy initial infestation, frequently resulting in death during the stage of migration of the parasites. In such cases the loss of blood from the ruptures of the surface of the liver was enormous, and although small flukes were to be found in the substance of the liver beneath the capsule the bile ducts contained no large flukes.

Fasciola gigantica Cobbold, 1855

Synonyms: *F. gigantea*, Diesing 1858; *Cladocelium gignateum* Stoss., 1892; *Fasciola hepatica angusta* Raill., 1895; *F. aegyptiaca* Looss, 1896; *F. hepatica aegyptica* Looss, 1896, Stiles, 1898.

This is the common cattle fluke of Africa. It was originally described by Cobbold (1855) from *Giraffa camelopardalis*. It is commonly found in the gall bladder and bile ducts of cattle, buffalo, zebu, sheep and goats. It is readily distinguished from *Fasciola hepatica* by its elongated body of characteristic shape, the interior position of the large ventral sucker and its large eggs. Raillie places De Gouvea's (1895) case here, De Gouvea recorded the case of a French officer who after a period of illness characterised by fever, cough and slight blood-spitting, coughed up a fluke about one inch long. The patient had spent some time in Dakar where *F. gigantica* is common in slaughter-house animals. The description of the parasite, in which De Gouvea refers to its slender form, the size of the ventral sucker and its proximity to the oral sucker, suggests that this was a specimen of *F. gigantica*. A second case in man has been recorded by Musgrave (1907).

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Hosts.—Cattle, buffalo, zebu, sheep, goats, giraffe, man.

Life History.—According to porter (1921) the life history is similar to that of *F. hepatica*, the intermediate host in South Africa being *Limnaea natalensis*.

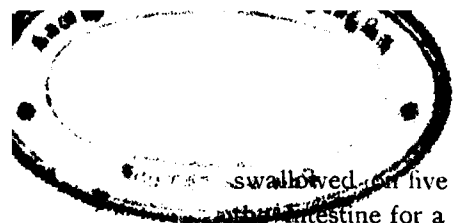
FASCIOLOPSINAE, Odhner, 1910.

Fasciolopsis buskii Lank; 1857.

Synonyms: *Distoma buskii* Lank, 1857. *D. crassum* Busk, 1859; Cobb, 1860 (*nec.* Cobbold of Leidy, 1891; *nec.* von Siebold, 1836; *nec.* Olss., 1876). *D. rathouisi*, Poirier, 1887. *Fasciolopsis ulleborni*, Rodenwaldt, 1909. *F. goddardi*, Ward, 1910. *F. spinifera*, Brown, 1917; Kwan's fluke.

Hosts. —Pig, man, dog (experimentally).

According to Heanly (1908), Mathis and Leger (1911), and Bauche, *Fasciolopsis buskii* is an extremely common parasite in the stomach and small intestines of pigs in China. Previous to the work of Barrois and Noc (1908) in Cochin-China, there were only some seven cases of infection in man with *F. buskii* on record. In the course of a systematic examination at Saigon of the faeces of natives treated with thymol these authors collected this parasite 16 times in 133 examinations. The validity of the species listed as possible synonyms, viz., *F. rathouisi* Poirier; *F. goddardi*, Ward; *F. fulleborni*, Rodenwaldt; *F. spinifera*, Brown, 1917, is still a matter of controversy. Odhner considers *F. rathouisi* to be a synonym of *F. buskii*, as also does Leiper, while Railliet and Henry take the opposite view. It seems probable, however, that most of the slight differences that are supposed to exist between the various species are in reality due to variation in size, and the degree of muscular contraction at the time of fixation, the latter by no means a negligible consideration when dealing with an active parasite of such large and fleshy proportions. The fact that the cuticle bearing the spines appears to be shed very readily during manipulation or in an unfavourable environment has also caused a certain amount of confusion as to the presence or absence of spines in this species. It is perhaps interesting to recall the observations of Barlow (1921); Barlow attempted to infect a pig by feeding three live flukes recovered from the faeces of a human patient, but the animal ceased to pass ova on the seventh day. The experiment was not repeated. He succeeded, however, infecting himself in a similar manner. Out of a total of thirty-six flukes



swallowed on five occasions, one apparently survived, to remain in the intestine for a period of thirteen months, finally to be removed by an anthelmintic.

Life History.—Nakagawa (1921) has succeeded in infecting snails, *Planorbis canosus*, Benson, and *Segmentina largillierti* in Formosa with the miracidia. He figures sporocyst, rediae, daughter rediae and cercariae in the snail, and finds that the liberated cercariae encyst on grass blades. Nakagawa infected a dog and two pigs with encysted cercariae taken from clean snails which had been experimentally infected in aquaria.

TROGLOREMIDAE, Odhner, 1914.

Paragonimus westermani (Kerbert, 1878), Braun, 1899.
Synonyms: *Distoma ringeri* Cobbold, 1880; *D. pulmonale* Baelz 1883; *D. pulmonis* Suga, 1883; (?) *Paragonimus kellicotti* Ward, 1908.

The history of the parasite has been excellently summarised by Baylis (1922). It will suffice in the present instance to recall some of the more salient facts. *P. westermani* was originally described by Kerbert from the lungs of two tigers which had died in captivity in Europe. Shortly afterwards similar parasites from the lungs of man were forwarded by Manson to Cobbold, who described the parasite under the name *Distoma ringeri*. Lane (see Baylis, 1922) takes the view that *Paragonimus westermani* and *P. ringeri* are identical, and points out that the supposed differences between them are based upon features subject to alteration by muscular contraction or methods of preservation. Perroncito (1913) claims that trematodes he found in the lungs of cattle in Italy, which are reported on by Rivolta (1868), were *Paragonimus*. According to an abstract (*Journal des Veterinaires du Midi* (1869), pp. 473-75), Rivolta states that the flukes found by him in the cysts were furnished with cuticular spines directed backwards. In addition he refers also to two branches of the intestine stretching out over the body. If, as seems probable, Perroncito's claim is correct, this would be the first record of this parasite.

Ward (1908) proposed the name *P. kellicotti* for the species occurring in the pig, dog and cat in North America, and later Ward and Hirsch (1915) stated that *P. westermani*, *P. ingeri* and *P. kellicotti* could be differentiated by means of the shape and arrangement of the cuticular spines and by certain minor characters of the

alimentary tract. Kobayashi (1918), however, considers these characters to be simply individual variations. This author states that there are no specific differences in the lung flukes from man, dog, cat, and pig in Korea. It is probable that the pig is the usual host of this parasite.

Paragonimiasis in man occurs chiefly in Far Eastern Asia, but infestation is common in pigs in North America.

The main points of the life history of the worm are known.

It has been shown by Japanese workers that it comprises two intermediate hosts; the first a snail and the second a crustacean. Kobayashi (1918) considers that one or more species of the genus *Melania* may act as the first intermediate host of the lung fluke. Nakagawa (1919) thinks that a cercaria discovered in May, 1917 in the Shinchiku Province in *Melania libertina* is possibly that of the lung fluke. He thinks it likely that the cercaria found in Korea by Kobayashi (*loc. cit.*), and stated by Miyairi also to occur in Species of *Melania*, is identical with his species. Miyairi, according to Nakagawa, has reported in Japanese that he has succeeded in obtaining this species experimentally by infecting *M. extensa* and *M. pannicicincta* with the miracidium of the human lung distome. He also expresses the view that Yoshida's cercaria "H" belongs to the same species. Nakagawa also describes an encysted larva in the crab, which he strongly affirms is the larva of the lung fluke.

Much of the work in the life history of *Paragonimus* has been published in Japanese and is only available through the extracts of Dr. Mills in the *China Medical Journal*. It seems almost certain that the first intermediate stage is passed in one or more species of *Melania*. With regard to the second intermediate host, various freshwater crustacea appear to have been incupated. Yoshida (1916) reports that he has found the encysted cercariae in Japan proper in *Potamon dehaanii* White 40-70 per cent., *Sesarma dehaanii* (Milne-Edwards) 20-80 per cent., and *Eriocheir japonicus* 70-85 per cent. *Sesarma dehaanii* is not eaten by man and therefore has little importance. Yoshida succeeded in infecting cats and dogs by feeding with crab meat. Nakagawa (1916) lists the following as second intermediate hosts: *Potamon (Geothelphusa) obtusipes*, *P. (Geothelphusa) dehaanii* and *Eriocheir japonicus* in Formosa; *Asiaticus japonicus* in Korea; *Sesarma dehaanii* in Japan. His conclusions are supported by feeding experiments on dogs and cats. Kobayashi

(1918) reports *Eriocheir japonicus* and *Astacus similis* as hosts in Korea. The fact that Nakagawa and Yokogawa (see Nakagawa, 1919) have decided that of the encysted cercariae which were successfully transmitted by Nakagawa (1917) to dogs, some at all events were not those of *Paragonimus*, but of a new species (*Stephanolecithus parvus*), evidences the need for further elaboration and confirmation of the experimental side of this work.

In Venezuela, Iturbe (1919) has investigated the life history of this fluke, and lists *Ampullaria luteostoma* and *Pseudothelphusa iturbei* as the first and second intermediate hosts.

Hosts.—Pig, man, dog, cat, cattle, tiger.

OPHISTHORCHIAE, Braun, 1901 (emend. Looss, 1902).

Ophisthorchiinae, Looss, 1899.

Ophisthorchis felineus Riv., 1884.

Synonyms: *Distoma conus* Gurlt, 1831 (nec. Creplin, 1825); *D. lanceolatum* von Siebold, 1836, von Tright, 1889, (nec. Mehlis, 1825—*Fasciola lanceolata* Rud., 1803); *Distoma sibiricum* Winogradov, 1892; *D. tenuicolle* Muhl., 1896.

Opisthorchis felineus was described originally by Rivolta from the gall bladder and bile ducts of cats and dogs in Italy. The cat appears to be the natural host, but it is also found in the dog, the fox and the glutton (*Gulo borealis*). It occurs over almost the whole of the continents of Europe, and Asia. In East Prussia, Max Braun (1906) encountered it in 80 per cent., of cats examined, while Askanazy (1900) has recorded five cases in man in the same district. Winogradov (1892), by whom this species was first found in man, recorded nine cases in man from Tomsk, where this parasite alone was found to occur more frequently (6.45 per cent) at postmortem examinations, than all other parasites put together. Max Braun (1903) considered *Opisthorchis felineus* to be a fairly frequent parasite of man in the Heydekrug district of East Prussia, having himself observed five cases there in a few years. Verdun and Bruyant (1908), and others have recorded its occurrence associated with *Clonorchis sinensis* in man in China. In Winogradov's cases more or less extensive changes in the liver had taken place, but in no case had the parasite been the cause of death. The numbers present varied from a few to several hundreds. In two of the cases reported by Askanazy carcinoma of the liver had developed at the places most invaded by flukes. The flukes may invade the pancreatic ducts, and the small intestine also.

According to Ciurea (1916), *Opisthorchis felineus* occasionally occurs in the pig, but the frequent abnormalities of structure displayed indicate that this is not a natural host relationship.

Life History.—Max Braun (1906) states that the eggs, which contain a ciliated miracidium at the time of deposition, only hatch when introduced into the intestine of *Limnea stagnalis*. Askanazy (1904) considers that *Dreysena polymorpha* possibly acts as the first intermediary host. The latter author, by feeding experiments on cats and dogs, has established the fact that the second intermediary hosts are fishes, mainly the ide (*Idus melanotus*) but also the roach (*Leuciscus rutilus*). More recently Ciurea (1917) has proved experimentally that in Roumania the tench (*Tinca tinca*) also acts as secondary intermediary host. The encysted cercaria, which is enclosed in the thin hyaline membrane, is found in the subcutaneous connective tissue and musculature. The flukes mature, according to Ciurea, twelve days after the feeding of dogs upon fish containing encysted larvae.

Hosts.—cat, dog, man, fox, glutton (*Gulo borealis*), pig.

Intermediary Hosts.—First: unknown (see text). Second: ide (*Idus melanotus*), roach *Leuciscus rutilus*, tench (*Tinca tinca*).

Opisthorchis Pseudofelineus, Ward 1901 (—*Distoma felineum* of Ward, 1895), occurring in cats in North America, appears to be a distinct species.

Clonorchis sinensis (Cobb., 1875, Looss, 1907).

Synonyms: *Distomasinense* Cobbold, 1875: *D. Spathulatum* Leuck., 1876 (nec. Rud., 1819); *D. hepatis innocuum* Baelz, 1883; *D. endemicum* Baelz, 1883; *D. hepatis endemicum* Baelz, 1883; *D. hepatis perniciosum* Baelz, 1883; *D. japonicum* Blanchard 1886; *Opisthorchis sinensis* Blanchard, 1895; *Clonorchis endemicus* (Looss, 1907.)

This form was discovered in a Chinese by McConnell (1875) and named *Distoma sinense* by Cobbold. Various authors have considered that two separate species exist in man in the Far East, a larger one, *Clonorchis sinensis* occurring chiefly in China and a smaller form *C. endemicus* widely distributed throughout Japan, Indo-China, and the eastern side of India. Of the synonyms listed above, *Distoma spathulatum*, *D. hepatis innocuum*, *Opisthorchis sinensis* refer to the

larger form, and *Distoma hepatis endemicum*, *D. hepatis perniciosum*, *D. Japonicum* and *Clonorchis endemicus* to the smaller, Verdun and Bruyant (1908) regard the two forms as varieties of the same species, and name them *major* and *minor* respectively. Looss (1907) and Braun (1893), however, considered these forms to constitute two distinct species. Kobayashi (1915) has shown that intermediate forms exist and that it is impossible in the case of larger numbers of specimens to assign these to a definite species. He therefore considers that only one species, *Clonorchis sinensis* (Cobb.) occurs.

The flukes inhabit the liver, gall bladder, and bile ducts of man, dog, cat and pig. In addition Kobayashi has succeeded in producing infection experimentally in the rabbit, guinea-pig, and rat. In man the presence of large number of *Clonorchis* is occasionally associated with carcinoma of the liver (Watson-Wemyss, 1910). It is rare in Europeans (Bell, 1912; Thibault, 1913), but extremely common in certain districts. According to Katsurada 56—67 per cent of the inhabitants are infected in the Province of Okayama. Leger (1908) at Tonkin found 54 per cent. infections in man in 300 examinations at Hanoi, while Gunn (1916) states that over 20 per cent of the Chinese immigrants arriving at San Francisco are infected. Meyer (1916) found nearly 42 per cent. of infection in Chinese ships' crews.

Life History.—Kobayashi (1915) discovered metacercariae of this worm encysted in the musculature of fishes. He lists twelve species as harbouring the cysts, but of these by far the most important are *Pseudorasbora parva* (Schlegel) and *Leucogobio guntheri* (Ishikawa). Not uncommonly, the number of larvae in a single specimen of *Pseudorasbora parva* may, he states, run to several hundred. A kitten to which six *P. parva* were fed was afterwards found to contain three thousand flukes.

With regard to the first intermediate host, Kobayashi ventured the opinion that *Melania libertina* was in all probability concerned. It has since been agreed, however, that the cercariae found in *M. libertina* are commonly those of *Metagonimus yokagawai*. Muto (1918) discovered that *Bythinia striatula* var. *japonica* harbours three species of cercariae, one of which encysts in *Pseudorasbora parva*. When dogs and mice were fed upon fishes experimentally infected in this manner infection with *Clonorchis sinensis* resulted.

Hosts:—Man, dog, cat, pig; experimentally, guinea-pig, rabbit and rat.

Intermediary Hosts:—First: *Bythinia striatula*. Second: Fishes, *Pseudorasbora parva*, *Leucogobio guntheri*, *L. mayedæ*, *Sarchoc eilichthys variegatus*, *Pseudoperilampus tyfus*, *Paracheilognathus rhombeum*, *Acheilognathus lanceolatum*, *A. limbatum*, *A. cyonastigma*, *Abbotina psegma*, *Bivia zezera*, *Carassius auratus*.

METORCHINAE, Luhe, 1909.

Metorchis truncatus Rud., 1919.

Synonyms: *Distoma conus* Creplin, 1825 (nec. Gurlt, 1831 = *Opisthorchis felinus*); *D. campanulatum* Ercolani, 1875; *Dicrocoelium lanceolatum* Mehlis, of Diesing.

This form inhabits the bile ducts and liver of the cat and dog in Eastern Europe. Its life history is unknown, but since Askanazy (1904) and Ciurea (1917) have shown that fishes act as the second intermediate host of a closely related species, *Metorchis albidus*, it is not unreasonable to assume that a similar life history holds for *M. truncatus*.

Max Braun (1903) considered that small flukes once observed in man by Winogradov (*loc. cit.*) and taken by him to be young forms of *Opisthorchis felinus*, might possibly have been *Metorchis truncatus*. Leiper (see Bagshawe, 1915), however, suggests that the spiny flukes in Winogradov's case actually belong to another, as yet undescribed, species of *Metorchis* which he has observed in dogs in China.

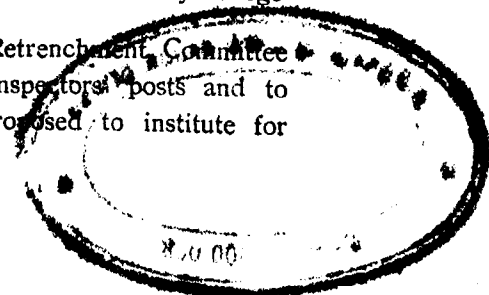
Hosts:—Seal (*Phoca vitulina*), (*Halichærus felinus*), cat, dog, fox (*Vulpes vulpes*), glutton (*Gulo borealis*), man (?). [To be Continued]

(From The Veterinary Journal for March 1923).

DEPARTMENTAL NOTES AND NEWS.

1. Veterinary Assistant G. R. Viswanathan who was working as a Veterinary Inspector at the Muktesar Laboratory has reverted to this department and is now attached to the Madras Veterinary College.

2. On the recommendations of the Retrenchment Committee Government have abolished the Range Inspectors' posts and to compensate for loss of prospects it is proposed to institute for Veterinary Assistants a selection grade.



3. It is proposed to convert the office of the Superintendent, I Division, Vizagapatam into a Circle office. The Presidency will then be divided into 5 Circle offices each working directly under the orders of the Chief Superintendent.

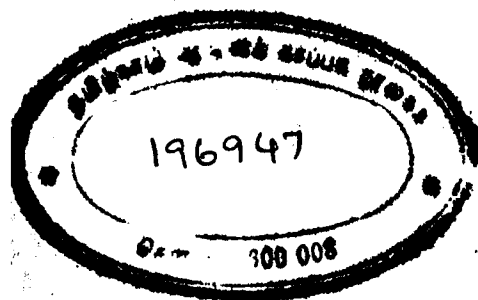
4. Government have sanctioned a revised scale of fees for introduction into certain Veterinary institutions and this has been brought into force from 1st July, 1923.

5. The second annual Post-Graduate course was started at the Madras Veterinary College on 2nd July, 1923. Six Veterinary Assistants of this department and an Assistant Veterinary Inspector of the Forest Department are undergoing training.

6. A conference of the Imperial and Provincial officers of this department in the Madras Presidency was held on the 12th, 13th and 14th July, 1923 at Madras to discuss certain professional and administrative matters.

STUDENTS' CORNER.

The College reopened on the 2nd July, 1923 after the midsummer vacation. The new batch of students have been selected and the College has begun work. P. T. Saunders Esq., has been appointed Professor of Surgery in the College. Messrs. N. Muniyappa and Viswanathan are Assistant Lecturers. Messrs. T. P. Swaminatha Ayyar, M. A. Rangaswami Ayyar, and L. P. Parameswara Menon are returning to the executive line.

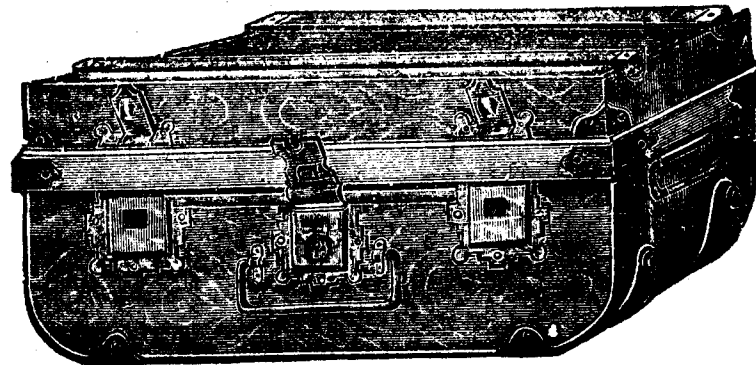


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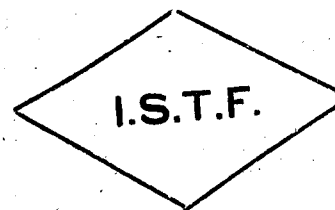
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