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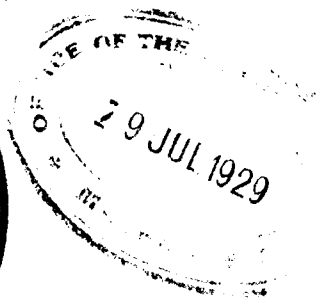
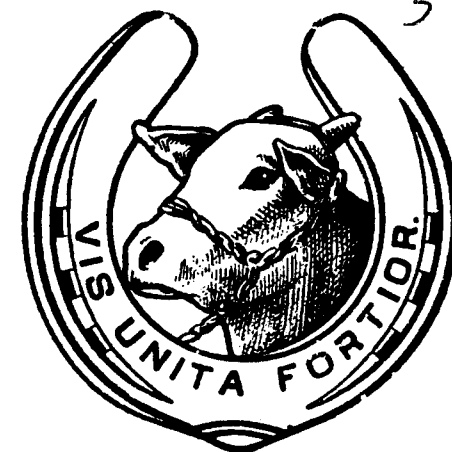
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Journal

1929 - July.

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THE
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VETERINARY
JOURNAL



Vol. VI.	EDITOR : P. SRINIVASA RAO, G.M.V.C., Veterinary Surgeon, MADRAS.	No. 1. July 1929.
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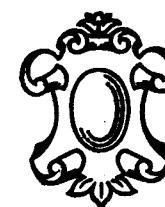
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(The Journal of The All-India Veterinary Association).



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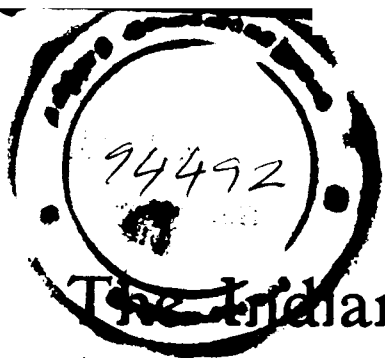
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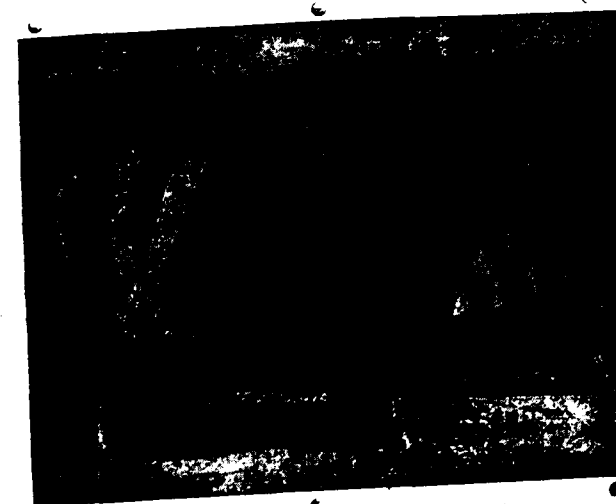
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(The Journal of the All-India Veterinary Association)

Vol. VI.]

JULY, 1929.

[No. 1.

CONTENTS

	PAGE
I. EDITORIALS.	
OUR SIXTH YEAR ...	1
COME BACK ...	2
ILL-FATED MADRAS ...	2
MR. F. WARE ...	4
FARCE OF AN ASSOCIATION ...	4
II. NOTES ...	6
III. ORIGINAL ARTICLES.	
THE MANUFACTURE OF A SIMPLE PATTERN OF HOT AIR STERILISER.—By D. C. Matheson, F.R.C.V.S., D. V. S. N. (Vict.) ...	7
TETANY IN WELSH MOUNTAIN PONIES.—By R. F. Montgomerie B.Sc., Ph. D., F.R. C.V.S., W. Hall Savage, M.R.C.V.S. and E.C. Dodds, M.D., Ph. D. ...	13
A REPORT UPON THE CAUSE AND PREVENTION OF DOG DISTEMPER.—By P. P. Laidlaw B. Ch., F. R. S., and G. W. Dunkin M.R.C.V.S., D.V.H. ...	30
IV. CLINICAL ARTICLES.	
A CASE OF ACCIDENTAL MISPLACEMENT OF PENIS.—By M. V. Suryanarayana, G.M.V.C. ...	47
CALCULI IN A DOG—By G. Osman Khan, G.M.V.C. ...	48
URTICARIA IN A COW.—By G. Osman Khan, G.M.V.C. ...	49
TREATMENT OF CASES OF GENERAL DEBILITY WITH TRY PAN-BLUE.—By R. S. Kalyanasundaram, G.M.V.C. ...	51
SUPPURATION OF ANAL GLANDS IN A DOG.—By A. Latiff ...	51
A CASE OF PUSTULAR ECZEMA IN A DOG.—By Abdul Majid G.P.V.C. ...	53
V. NOTANDA. ...	54
VI. THERAPEUTICAL NOTES.	
LOCAL TREATMENT FOR VERMINOUS BRONCHITIS ...	57
MILK FEVER PREVENTED, by food rich in calcium and vitamin D. ...	58
ARECOLINE-HYDROBROMIDE AS AN ANTHELMINTIC ...	58



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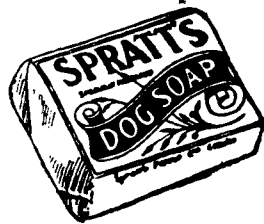
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CONTENTS

	PAGE
TAPEWORMS IN HORSES	59
ARECOLINE IN MILK FEVER	59
WOUND TREATMENT	60
NEW TREATMENT OF MALIGNANT TUMOUR	60
MAGNESIUM SALTS IN THE DESTRUCTION OF DOGS	60
 VII. EXTRACTS.	
THE ACTION OF PHENOL AND FORMOL ON AEROBIC AND ANAEROBIC ORGANISMS.—By Joseph P. Scott	62
SORRA IN A PACK OF FOX HOUNDS.—By F. Ware	64
OBSERVATIONS ON RINDERPEST.—By R. Daubney	65
ANTI-RINDERPEST SERUM, PRELIMINARY FIELD RESEARCH IN UGANDA.—By Carmichael	66
THE ETIOLOGY OF BLACKLEG AND METHODS OF DIFFERENTIATING CLAUSTRIDUM CHAUVÆI FROM OTHER ANAEROBIC ORGANISMS FOUND IN CASES OF BLACKLEG.—By Joseph P. Scott	67
A NOTE ON SPIRILLUM MINUS (CARTER), THE CAUSATIVE ORGANISM OF RAT-BITE FEVER.—By Dr. M. J. Parmanand, M.D., (Bomb.)	71
 VIII. ASSOCIATION NEWS.	
THE MYSORE VETERINARY MEDICAL ASSOCIATION	73
 IX. DEPARTMENTAL NEWS.	
C. V. D. MADRAS	73
 X. COLLEGE NEWS.	
BOMBAY VETERINARY COLLEGE	74

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THE

Indian Veterinary Journal

Vol. VI]

JULY, 1929

[No. 1

Editorials

OUR SIXTH YEAR.

It is with no small amount of joy that we remind our readers, that with this issue of our Journal, we are entering on its sixth year. The very thought sends in us a thrill of joy and a feeling of gratefulness, to the All-Merciful. Open expression of such a sentiment might be looked upon by some as highly primitive; but we, who have been working under most adverse circumstances during the past five years, cannot but openly acknowledge the feeling, that it was the Hand of Providence that was directing the destiny of this Journal during most trying periods.

With most of the provinces and presidencies starving us without any communication, professional or otherwise, with heads of departments swearing at us for too much of spice in our editorials, with other subordinate controlling officers who watch our work quite unconcerned as if it is not theirs also, with a queer Government order which prohibits *professional* articles being sent to us direct but only through several departmental officers, who sometimes do us the favour of not forwarding the articles under some pretext or other, with an all-India association which after a period of unprecedented activities seems now to be hybernating, perhaps only to wake up to find that it has slept too long, with a few members of the profession who dishonour our V.P.P. without the least compunction, and with several similar disabilities, our work has been anything but comfortable. But Providence has kept us up with sufficient courage, patience and optimism and we

have weathered the storm successfully all these five years. May He continue to help us is our earnest prayer.

We will be unjust in our remarks if we do not unconditionally acknowledge the invaluable help we have received from many of the members of the profession. Their loyalty to this Journal is something very touching. Thanks to them all, our Journal is now in a much better position, financially and otherwise. The demand for it is growing every day. Our circulation has doubled; but what we complain of, is the absence of sufficient number of professional articles and news from various provinces of this vast country.

Our thanks are due to such eminent members of the profession as Prof. D. C. Matheson, Professors Henry Dryerre and Russel Greig and Mr. R. F. Montgomerie, for honouring our pages with their articles from time to time. We hope their good example will be followed by many in the coming year.

COME BACK.

In our October issue of 1928, we announced the fact that Mr. K. Kylasamier G.B.V.C., Circle Officer, Civil Veterinary Department, Madras, had gone to England for Post Graduate studies. He has now come back and we welcome him home on behalf of the profession. He has been taken on the staff of the Madras Veterinary College, where we feel sure, he will prove an asset. We wish him all success in life.

ILL-FATED MADRAS.

We fear we raised a good deal of 'Hope' in the hearts of many of our Madras colleagues, with our article under the same caption in the previous issue of our Journal. We dread to announce that much of it is to be ruthlessly shattered. We learn that the Head of the Department has not favourably recommended the claims of the profession. He seems to think that the present minimum pay of Rs. 60 is sufficient for his subordinates and that only the selection grade is to be the old Inspector's grade of Rs. 150—5—200. We are weary at heart to repeat often what we had said many a time in these pages. Madras had always suffered for want of sympathetic

officers at the helm of affairs of the Civil Veterinary Department. Not one would care to dive deep and understand the pangs of suffering and dishonour of his subordinates. The head of the department is very keen in getting his own pay and emoluments increased, and his designation suitably altered; but lo! the poor subordinates alone should continue to writhe in their miserable existence. What does it matter him if the ill-paid subordinates get into debt every month; what does it matter him if they had given expression to their sorrows year after year in the form of pious resolutions; what does it matter him if they had said that their worries due to low pay interfere with their work; what does it matter him if the Legislative Council itself is prepared to consider their case favourably; what does it matter him even if a Minister is willing to raise their scale of pay? Is he not the Director of the department? Should he not direct the destiny of the motely crowd of his subordinates? He knows their wants more than they themselves know; nay, more than their own countrymen in the Legislative Council know! With a stroke of his pen, he decides that a Veterinary Assistant Surgeon should start life only on Rs. 60 a month; that is in common with a Sub-Inspector of Police, with a First class vaccinator, with a Sanitary Inspector, with an Excise Sub-Inspector, who all have no necessity of undergoing three years of technical studies. But we forget such appeals are in vain with men who do not want to see the injustice of the whole affair.

As we said in our previous article, a more favourable atmosphere than the present one could not have been created in Madras, for enhancing the pay of the subordinates of the Civil Veterinary Department. But yet the departmental head is not ready with a liberal scheme; if anything, he asks them to stay where they are! Ill-fated Madras! God only should help you.

But what is the Hon'ble Minister going to do? Is he going to pay heed to such unsympathetic recommendations, even when he is convinced that the Veterinary Assistant Surgeons deserve better at his hands? Will he in collaboration with his sympathetic secretary act boldly and give effect to the wishes of the honourable members of the Madras Legislative

Council, by improving the prospects of the profession all round? We shall wait and see.

Mr. F. WARE

Mr. F. Ware F. R. C. V. S., I. V. S., has left Madras probably for good, as Director of the Imperial Institute at Muktesar in place of Dr. Edwards. He was connected with Madras for over 16 years and he has been responsible a good deal for shaping the C. V. D., Madras, to its present efficiency. It does no doubt credit to his head, but not to his heart. He has not done anything substantial to improve the prospects of the profession. A stern master he was, with very little sympathy towards his subordinates. Anyhow, we are thankful to him for his services to this presidency and we wish him well in his new sphere of work.

FARCE OF AN ASSOCIATION

By accident or devise, we find on our table a printed copy of the proceedings of the annual meeting of the Madras Veterinary Assistant Surgeons Service Association with a booklet on the action taken by the Association subsequently and the reply of the Director of Veterinary Services on the several resolutions passed. We have no desire to force ourselves on such a 'sacred' body as the Service Association. But certain broad principles are ruthlessly trodden over by the Director of Veterinary Services that we feel that we will be failing in our duty if we do not point them out. The members asked for permission to wait in Deputation on their Departmental head (not a big request) to represent to him in person their several disabilities and to request him to lead them in deputation to the Hon'ble the Minister in charge of the Veterinary Portfolio and H.E. the Governor by previous arrangement, as was done by members of several other services in the presidency. The reply of the Director is characteristic of the man.

"In view of the above remarks on the various representations of the Association, the Director considers that it would be an unnecessary waste of time and money and

no useful purpose would be served by his receiving a deputation at the present time."

The request of an association is thrown to the winds. It is not for them to suggest ways and means. It is for him to decide what is best for them! Why then such a farce of an Association? Years of weeping has done no good and the members finally took heart in their hands and made bold to make such a big request! Down comes the snubbing with all its usual autocratic force! Why should he foreshadow 'no useful purpose being served! Why meet the Devil half the way? Even an attempt is not made. Comment is needless.

Again the Association brought to the notice of the Director that junior men are posted by certain Circle Officers to hospitals, while seniors with cleanest possible record even, are kept on as Touring Assistants. To this the reply is

"This is a matter which is within the competence of Circle Officers to deal with. It is open to any Veterinary Assistant Surgeon having a grievance in this respect to appeal to the Director."

We wonder if our readers who are not in service in India understand what this means. It means complaint is to be made by assistants against his Circle Officer and that through that very Circle Officer to the Director of Veterinary Services. In his attempt he may succeed or he may fail, but in either case he is a marked man in the books of that Circle Officer. To avoid trouble to individuals, a well, legally constituted, Government recognised, association has submitted the complaint to the Director. He must take cognisance of the complaint and ask for a list of such cases to be put up for scrutiny and necessary action. Even that he will not do. Let the subordinate suffer. Leave it to the 'Competence of Circle Officers'. Has he abdicated his powers completely? It is the incompetence of a few unjust Circle Officers that has been brought to the notice of the Director; but yet he does not want to see. He shelves it with a show of justice that is really amusing.

There are several other items, but we have taken only two, which we think are broad enough without forcing us to get into the details of the department.

Notes.

A great discovery indeed is the one made by Mr. V. Krishnamoorthy Iyer, I.V.S., that the organism of Bovine Lymphangitis is identical with the B. Pestis. We learn that it has been accepted as such after proper test at a conference of Medical men at the Hafkin Institute, Bombay.

If that be so, the greatness of the man deserves better recognition than at present. We doubt not that the results of this discovery will be far reaching.

It is in fitness of things that such a great Research worker is now the Acting Principal of the Madras Veterinary College. We offer him our heartiest congratulations.

Mr. S. S. Ahamed of the Bengal Veterinary College gets a Khan Sahib in the Birth Day Honours List. We most heartily congratulate him on the well deserved Honour,

It is queer to note how Rinderpest is being fought in the Presidency of Madras. The poor subordinate staff have popularised the S. S. inoculation. There is such a demand now for it. But the supply of serum is short almost every alternate month.

If it is not the serum, it is the virus that is short. If both are available no sufficient hands in a district or division to fight the disease!

The talk of opening a Serum Institute seems to be hanging in the air. In the meanwhile cattle are dying in thousands and tens of thousands.

More men, better paid men, more serum and more virus are the needs of Madras. Will Government attend to these in time?

Original Articles

THE MANUFACTURE OF A SIMPLE PATTERN OF HOT AIR STERILISER

BY

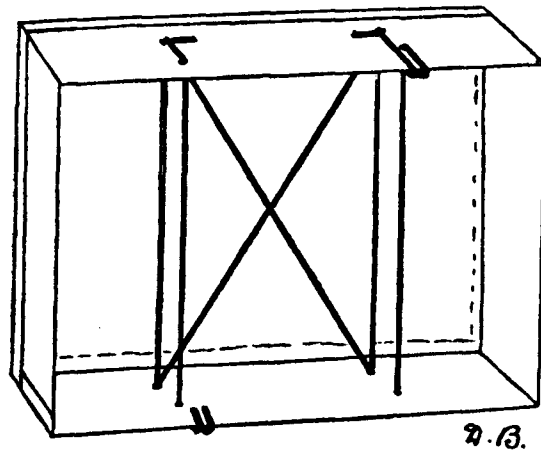
D. C. MATHESON, F.R.C.V.S., D.V.S.M. (VICT).
FROM THE DEPARTMENT OF PATHOLOGY AND
BACTERIOLOGY.

Royal (Dick) Veterinary College, Edinburgh.

In a recent issue of the Indian Veterinary Journal, the present writer, (Matheson (1)), described an improved pattern of cotton-wool swab: the motive of the present article is to describe a simple form of hot-air steriliser which may be used for the sterilisation of such cotton-wool swabs and also pipettes, test-tubes and tubes intended to hold potato medium, in which the wedge of potato is to be supported upon a small layer of cotton-wool placed in the bottom of the tubes. The steriliser, presently to be described, permits us to support the swabs or test-tubes etc. in the horizontal position. It is important that the horizontal position be adopted in the case of swabs, pipettes, and tubes having cotton-wool at both ends, because, if the perpendicular position be adopted, there is considerable risk that the swab or couch of cotton-wool may be scorched, while the cotton-wool plug, at the top of the tube, remains only partially sterilised. Considerable differences of temperature may be noted in a deep steriliser, if two thermometers be simultaneously used, one near the bottom and one near the top of the steriliser. Such differences are apt to be overlooked when only one thermometer is used, but they become very manifest, when swabs or similar objects, having cotton-wool at two different depths are sterilised in the perpendicular position: such articles should be placed in the horizontal position for sterilisation: that may be done in the steriliser now to be described.

A metal box, about 24cm. in length by 16cm. in breadth by 8.5cm. in depth is selected. The box need not be exactly of

these dimensions but it must be sufficiently long to enable as to lay the tubes, pipettes etc. in a horizontal position and its shallowness enables us to obtain a more uniform temperature inside it. The measurements, given hereafter, are intended for a box, of the dimensions mentioned above. They must be modified to meet the requirements of a box of a slightly different size.



Sample pattern of hot air Steriliser lid removed to show the arrangement of the wires.

A false bottom may be improvised from the lid of a box, similar to the one to be converted into a steriliser but slightly smaller—small enough to go into the box but large enough to cover as much as possible of the inside bottom of the box—but still to fit loosely—it should not be jammed in—room must be left for expansion when heated. The turned-down edge of the lid, utilised for a false bottom to the steriliser, should not be more than 1cm. in depth. If a suitable lid be not available, a thin sheet of metal may be used: a portion, not more than 1cm. deep, may be turned down at each end to support it in the position of the lid just described. Such a false bottom facilitates the distribution of the heat, minimises the risk of scorching the plugs and assists in the maintenance of a uniform temperature within the steriliser. The false bottom must be placed in position before the following manipulations are carried out.

Holes have now to be made in the sides of the box to carry wires on which to support the tubes. Four holes should be made in each side, not in the ends. The lower holes are

placed, one toward each end, 7cm. from that end and 3.5cm. above the bottom of the box, measured from the outside. The upper holes are placed 2cm. above the lower holes and at the same distance as these from the ends of the box. The holes are readily made by taking a nail slightly stouter than the wire to be used and driving its point through the side of the box with a sharp tap from a hammer. To do that, the box is stood up on one side, the lid being removed and a column of resistance made by standing a conveniently sized tin box or block of wood on one end and placing a cork on the top. This column is then placed under the side of our box to receive the nail when it is driven through. Next, a piece of wire to support the tubes must be selected. Any wire that is sufficiently flexible to lend itself to the manipulation, shortly to be described, will serve our purpose, but the best is what is usually termed "tying wire". A 47 cm. length is taken and passed through the bottom hole on one side across the box and out through the corresponding hole on the other side. The wire is passed through the first hole till within 6 cm. of its end and then it is to be turned up at a right angle when about 1.5 cm. will be found to project above the side of the box and this piece is to be turned sharply in the shape of a hook over the edge of the box and serves to hold the wire taut. The long arm of the wire which projects through the lower hole on the opposite side is now to be turned up and passed back through the upper hole of the same side across the box again and out through the upper hole of the opposite side; it is then to be turned up and bent over the edge in the same fashion as already described for the other end of the wire. A similar length of wire is now to be passed through the other set of holes and there are thus made four strands of wire to support two rows of tubes, an upper and a lower.

It is convenient, though not absolutely necessary, to have two additional wires passing diagonally between the two sets of horizontal wires. The holes, already made for the parallel wires will serve also for the diagonal ones, but, unless a slightly finer wire be used for the latter, the holes may require to be slightly enlarged. The wires, when passing through the holes, should practically fill them: large holes

are not suitable—they would permit too much of the heated air to escape, when the steriliser is in use. These holes, together with one in the lid, presently to be described, afford sufficient outlets for the heated air. The wires, to be placed diagonally, may be 20cm. in length. Each wire is to be passed through a lower hole in one side of the box and across to the lower hole, diagonally opposite. The wires will then, of course, cross each other in the middle of the box. The ends which project from either hole are to be turned to form an acute angle with the main length of the wire. This angle will serve to hold the wire taut. That means the two ends of a diagonally placed wire will point in opposite directions on the outside of the box. Next, a hole has to be cut in the lid for the reception of a cork. The cork may measure 2.5cm. in length by 1.5cm. top diameter. The hole should be the same distance from one end of the lid as the wires are from the ends of the box, viz. 7cm. in the present case. This distance enables us to keep the thermometer close to the cotton-wool of the swabs and so, to be informed as to the heat to which they are actually exposed. The flexibility of the wire supports enables us to have the thermometer to one side or the other as may be required. The hole may be made, either by cutting two narrow slits about 1.3cm. in length, joining each other at a right angle and then turning back the flap of metal, so produced, or by taking the half of an old pair of scissors with a blade about 1.3 cm. wide at the broadest part and driving it through the lid with a sharp tap from a hammer and then by turning the scissors blade round, almost a complete turn, an approximately spherical hole can be made. The slits, referred to above, may be made with the help of the scissors blade. The cork should fit tightly into the hole; the tiny spaces left at the sides serve with the holes, already made in the sides of the box (to hold the wires) as exits for the heated air. With the aid of a cork-borer, a hole is made through the cork for the reception of a thermometer. This hole should be made before the cork is finally fitted into the lid. The thermometer must be capable of registering at least 200°C. The milk-glass scale pattern is the best but the paper-scale pattern will answer the purpose quite well and is cheaper.

Thus made, the steriliser is ready for use but a thin coat of black enamel improves its appearance. Modifications,

in the direction of improvement will immediately suggest themselves to experienced users, such as an asbestos covering, the use of a fire brick plate, a double wall etc. but our present idea is to produce as simple a pattern as possible, compatible with efficiency. The pattern described is simple, it has proved reliable. The tubes should be arranged alternately with the top end of one against the lower end of that next to it.

The bulb of the thermometer should be in a line with the lower row of tubes. In use, the steriliser should be stood up on an ordinary tripod or other convenient stand and heated by a bunsen burner. The small pattern, specially made for hot-air ovens, is the best, because the flame can be turned sufficiently low without fear of its going out. An adjustable burette-clip—Moir's for example—should be passed over the rubber tube connecting the bunsen burner with the gas pipe. By the use of such an adjustable clip, the gas may be regulated to the nicety required for the production and maintenance of the requisite temperature for sterilisation.

If an ordinary bunsen burner be used, it should be of the pattern fitted with an air regulator and capable of giving a luminous flame because, for lower temperatures, the luminous flame is steadier and can be turned down lower than the non-luminous one owing to the absence of the air draught. An ordinary domestic gas ring of small size may be used but is more difficult to regulate; in the absence of gas, an oil-stove can be adapted. A sheet of metal, e.g. a tin lid, slightly larger than the steriliser, may be placed under the bunsen burner to protect the bench from the heat. A wire-gauze mat about 12.5 cm. square having an asbestos centre may be placed on the tripod between the steriliser and the source of heat. It will assist us to regulate the heat and will lengthen the period of service of the steriliser.

A thin sheet of a metal or fire-brick plate may be used but the latter will take more gas to heat it up, although it has the not inconsiderable advantage of cooling more slowly.

The following hints may be useful to anyone unfamiliar with the use of the hot-air steriliser:—

(1) Everything must be dry before it is put into the steriliser.

(2) The temperature should not be allowed to rise above 60°C. for the first thirty minutes. Thereafter the heat is gradually increased until, within the next thirty minutes or so the thermometer registers 150°C. It may be permitted to reach 155° or even 160°C., after which, the heat is gradually reduced. When removed from the steriliser, the cotton-wool plugs etc. will be found to have turned to a pale fawn or "café au lait" colour, which may be taken to indicate that sterilisation is complete. It is very important to secure that the wool is exposed only to the heat registered by the thermometer—a difference may result in scorching of the plugs. When only one row of tubes or pipettes are to be sterilised, the tubes etc. should be placed on the upper wire. When two rows are used, place the thermometer on a level with the lower row. When a small number of pipettes is to be sterilised, they should not be tied in a bundle, but laid side by side being held together, if necessary by a piece of flexible wire, each end of which is turned down at a right angle. The wire is then placed as a "rider" over the pipettes.

(3) Raise or lower the temperature gradually; avoid excessive sudden changes of heat.

(4) The bulb of the thermometer should be on a level with the tubes (v. s.)

(5) The light should not be turned out until the temperature has fallen to at least 65°C.

(6) The steriliser must not be opened until the thermometer registers 50°C., otherwise cracked tubes may result.

REFERENCE.

Matheson. D. C. "The preparation of an improved pattern of cotton-wool swab". *Indian Vet. Journal*, Vol. 5., No. 3, Jan. 1929, p 231.

TETANY IN WELSH MOUNTAIN PONIES

BY

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One of us (W. H. S.) has over a period of some twenty years, encountered an occasional case of the condition described by Harvey in 1923 (8). The subject of the case detailed in that article (Harvey, 1923) was a three-year-old pony mare which had led a wild moorland life until placed in a box on the 7th of May, 1923. She had foaled about one year previously and was still lactating. On the morning of the 8th of May some restlessness preceded the appearance of trismus, disturbed respiration and twitching of different muscles. When Harvey saw the pony late that afternoon she was in a critical condition—the clonic spasms were general, the jaws tightly closed, the masseters in a state of fibrillation, the neck muscles contracting and the limbs alternately straightened and drawn up. The heart's action was laboured, the breathing distressed, the body bathed in sweat and the temperature 102°F. The eyelids were drooping, and the pupils dilated. There was no protrusion of the *nictitans*.

This condition is not uncommon among Welsh Mountain ponies. Pony-owners of North Wales know it well and have called it "lock-jaw." They appear to have avoided making its existence known because, we think, they feared interference with their perfectly legitimate trade in these ponies.

During an influx of ponies into the Bangor district in October, 1928, the opportunity to observe five cases and investigate the nature of the condition arose. It was thought desirable to study this problem, not only from the clinical point of view, but also from a biochemical standpoint. Two

of us (R. F. M. and W. H. S.) were responsible for the clinical work, whilst the third (E. C. D.) was responsible for the biochemical analyses.

GENERAL OBSERVATIONS.

Occurrence. Occasional cases are met in pony mares which have been removed from their foal and housed for as short a period as twelve hours. More commonly the disease appears among ponies which have been rounded up on their mountain or moorland grazings and taken a considerable distance (a journey of one or two days) by rail. They travel in cattle trucks which are often "sheeted" by tying a tarpaulin over the roof and the upper part of the sides. On arrival at their destination it is not uncommon to find one or two of each drove of about twenty affected. Mild cases may become advanced on turning out to pasture or may, we are informed, recover spontaneously.

Two of our recent cases were suckling mares, two were stallions and one a barren mare. Other similar ponies in the same truck loads were not affected. Three were found affected on arrival at Bangor station, the other two developing the disease after unloading.

Clinical Picture. Each pony has been seriously affected when first seen by us. Standing bathed in sweat, it could only move with great difficulty and uncertainty, the gait being stiff and jerky and the step short. Antagonistic muscles often appeared to contract simultaneously and co-ordination was partly lost. The general appearance did suggest the rocking-horse-like attitude seen in tetanus. The respirations were much accelerated and pumping in nature. A peculiar, almost putrid, odour of the breath was observed. The nostrils were widely dilated and the lower jaw so retracted that "parrotmouth" was suggested. Fibrillation of the muscles, particularly over the masseter and shoulder regions, was obvious and trismus was always pronounced. The *membrana nictitans* could not be made to protrude on elevating the head. The tail was occasionally held a little away from the body. It was always freely moveable in all directions. The temperature was normal or but slightly elevated. A distinct thumping sound emanating from the chest and believed to be associated with contractions of the diaphragm was

occasionally observed. Thirst was marked, but the ponies were unable to drink, despite repeated attempts to do so. The *faeces* were firm or rather hard. Frequently a pony would go down heavily and lie showing severe twitching of various groups of muscles. It was noted that although the sudden whistling of an adjacent railway engine produced no exaggeration of the symptoms, attempts to handle the animal frequently did.

Diagnosis. These symptoms appeared to justify a confident diagnosis of tetany. That the *membrana* could not be made to protrude and that the tail was flaccid, together with the history of the case and the symptoms exhibited—fibrillation, clonic spasms, etc.—served to differentiate it readily from tetanus.

Course. Each of the earlier cases seen by W. H. S. terminated fatally within forty-eight hours of the appearance of serious symptoms. In each the spasms increased in severity until the convulsive state was general and almost without remission. The owner of the five recent cases has had a considerable experience of the condition. He asserted that mild cases quite frequently recover spontaneously. Of the ninety or so severe cases which he had seen some sixty died. He believed that spontaneous recovery was more common among suckling mares and declared that all his cases in stallions, approximately fifteen, had ended in death. He expected each of the cases here recounted, with the possible exception of the first, to terminate fatally. All five made a quick and complete return to normal, following treatment.

Treatment. Harvey's original case resulted in recovery following udder inflation. Our first case was similarly treated. In each of the others air was subcutaneously injected at a site high up over the ribs. Generally a foot bellows was employed and the injection continued until the subcutaneous tissue over the ribs, shoulder and lower part of the neck, on one side, was infiltrated with air.

THE FIVE RECENT CASES IN DETAIL.

CASE NO. 1.

Subject. Aged Mountain pony mare in good condition which had recently been suckling a foal. On arrival at the

station she was showing moderately severe symptoms (10 A.M. 11-10-'28).

Treatment and Observations. Each quarter of the udder was milked out and inflated until tense by one duct only. Within half-an-hour she was able to walk to a field some 200 yards from the station. There she immediately attempted to graze, forcing her teeth into tufts of grass and prehending only a little, which remained between the incisors and the lips. The jaws could only be moved a little apart. The accumulated grass was removed several times and each further attempt to graze appeared to be rather more successful. At the third hour after inflation she was grazing well, but some of the grass tended to accumulate at the angles of the mouth. She moved freely and passed a quantity of hard, mucus-coated, faeces. Thereafter she made a complete return to normal.

CASE NO. 2.

Subject. Three-year-old Mountain pony stallion in moderate condition; a member of the same truck-load as the previous case. It was walked with others to a field about one mile from the station and there found seriously affected four hours later.

Treatment and Observations. A small quantity of air was subcutaneously injected, by means of a Higginson syringe. Three hours later, the pony being only a little better, a further injection, using the foot bellows, was made. On the following morning the stallion showed only some dragging of the toes and a curious snatching action in front. The jaws were freely moveable. Recovery was quite complete within twenty-four hours of the first injection.

CASE NO. 3.

Subject. Aged barren mare in good condition found down in the truck and seriously affected on arrival at the station, 5 p.m., 14/10/28.

Treatment and Observations. Subcutaneous injection of air was quickly followed by marked improvement and by 9 p.m. the jaws were quite free. Although the gait was still distinctly stilty, the mare walked to the field and by the following morning had made a complete recovery.

CASE NO. 4.

Subject. Aged pony mare with four-months-old foal at foot. On arrival at Bangor station about 11 p.m. on the 14th October, the owner noticed that she was breathing "hard" and that her gait was unsteady. She walked to the grazing and next morning was a moderately severe case of tetany.

Treatment and Observations. About 10 a.m. on the 15th, a blood sample having been obtained for analysis, a quantity of air was injected subcutaneously. Within an hour improvement was marked and at the fourth hour she was grazing and moving freely. There was some stertorous breathing and an occasional violent sneeze. That evening the pony appeared normal and next morning she walked with other ponies to a fresh grazing, a distance of about three miles. A second blood sample was obtained on the fourth day after treatment.

CASE NO. 5.

Subject. A six-year-old pony stallion in good condition which on arrival at the station, 4-30 p.m., 17-10-28, was very seriously affected. In attempting to evade haltering he fell heavily and was quite unable to rise.

Treatment and Observations. A sample of blood was obtained from the jugular vein and thereafter subcutaneous injection of air effected (5 p.m.). Only a little improvement was seen during the hour following treatment, but by 8 p.m. the pony was able to walk to pasture. At 9 p.m. it was walked a further distance of half-a-mile to a small stable and here a second sample of blood was taken, five hours after the injection of air. The pony showed some exacerbation of the symptoms while the sample was being taken. It went down heavily and the injection of air was again resorted to. On being assisted into the open it very quickly recovered and was driven out to pasture. It is noteworthy that the building was small, occupied by other stock and very stuffy. Next morning the stallion appeared to be quite normal.

EXPERIMENTS

To Test the Effect of Confinement.

Three pony mares grazing moorland pasture were taken from their six-months-old foals during the late afternoon of

the 15th January, 1929, and placed in a large open shed. The "old" mare was nine years of age, the "grey" about five and the "young" one a three-year-old. On the following morning they were confined in a small unventilated brick built and slated shed, whose ill-fitting door was kept closed. There they remained forty-eight hours during which time they ate only a little hay and drank a small quantity of water.

A blood sample was obtained from each, from the jugular vein, before the commencement of the experiment, at the twenty-fourth, at the thirtieth and at the forty-eighth hour; the vein being raised for the purpose by tightening a cord placed round the base of the neck. In handling these ponies every endeavour was made to avoid unduly exciting them. Throughout the experimental period the weather was dry and cold with bright periods during the day.

While confined, none of these mares showed any marked abnormality but each, particularly at the thirtieth and forty-eighth hours, showed a distinct tendency to go down when the cord round the neck was tightened to raise the vein. In haltering some excitement was caused, occasionally accompanied by a regular thumping sound emanating from the chest. Owing to its transient nature it could not be determined whether this sound was associated with contractions of the heart or of the diaphragm.

On being turned out at the close of the experiment, each pony showed some stiffness in gait and in the "old" and "grey" mares an occasional muscular tremor over the shoulder region was observed.

To Test the Effect of Subcutaneous Injection of Air.

The three pony mares used in the foregoing experiment were taken into the open shed on the evening of the 30th of January, 1929. On the following morning they were placed in the small shed. The door was kept open. The day was damp and mild and the barometric pressure was low. A sample of blood was taken from each pony prior to subcutaneous injection of air after the fashion used in the treatment

of our tetany cases. Further blood samples were obtained, from the "young" mare at 15 minutes and at two hours, from the "grey" at 30 minutes and at four hours, and from the "old" pony at one hour and at six hours after the injections of air. No clinical effect was observed.

BIOCHEMICAL OBSERVATIONS

Whilst it would appear that the condition under discussion has been proved to be tetany on clinical evidence, and therefore not lock-jaw, it was thought that the matter could be clinched by a careful chemical analysis of the blood. The fact that tetany resulting from parathyroidectomy is associated with low blood calcium is well known, and many conditions in which tetanic contractions of muscles have been observed are known to be associated with reduction in the calcium content. Some observers (MacCallum and Voegtlin (15) and (16)) have maintained that the reduction in the blood calcium content is definitely the cause of the tetanic symptoms and that the clinical syndrome of tetany does not appear until the calcium falls below 7 mgs. per 100 cc. In support of this view is the fact that experimental tetany can often be abolished by the cautious administration of calcium salts intravenously. Another group of workers (Koch (13); Paton and Findlay (18)) have described the accumulation of guanidine derivatives following parathyroidectomy, and have ascribed the symptoms to this body.

This investigation was confined to studying the variations in the calcium content of the blood of afflicted animals. Various forms of tetany are associated with a reduction of the calcium content of the blood, and from this it has been deduced that the parathyroid glands are at fault. It can readily be seen, however, that such a deduction is very unsafe unless direct histological evidence of a parathyroid lesion is obtained.

There is another well-established cause of tetany, namely, the production of an alkalosis. It will be remembered that the reaction of the blood is kept at a constant level by means of a series of buffers, of which sodium bicarbonate is probably

the most important. This buffer system is known as the alkali reserve and it is possible to get considerable fluctuations in this without any alterations of the hydrogen ion concentration of the blood. Thus an increase in the alkali reserve above normal without a change in the Ph is called an alkalosis, whilst the reverse is termed acidosis. The best measure of the alkali reserve is to determine the CO₂ carrying power of the serum by Van Slyke's method, and this is expressed as cc. CO₂ under standard conditions carried by 100 cc. of serum. If the alkali reserve is increased it is found that there is an increased elimination of calcium from the blood and an increased amount in the urine. As the calcium content falls, so does the phosphorus rise. The biochemical findings, therefore in a case of tetany due to alkalosis would be a low blood calcium and a high blood phosphorus with an increase in the alkali reserve. It will be seen that the ponies suffering from the symptoms already described possessed all the factors, thereby proving conclusively that the condition was a tetany in the biochemical sense of the word.

BLOOD ANALYSIS. (See table, pages 22 and 23.)

Normal Ponies. The analysis of the blood taken before the commencement of each experiment may be taken as that of normal blood. We would focus attention on the figures for:

(a) Before confinement. (b) Before injection of air.

Calcium: (a) 12.8, 12.8 and 14.2 }
(b) 12.4, 12.8 and 13 } Average 13.

Phosphorus: (a) 3.5, — and 4.3 }
(b) 2.7, 3.4 and 2.75 } Average 3.33,

Alkali Reserve: (a) 57.4, 56.5 and 56 }
(b) 78.7, 77.8 and 63.2 } Average 64.9.

A trace of bile was present in each sample.

Tetany Cases. In each sample taken before treatment remarkable departure from the normal was seen in the figures for:

Calcium: 5.2 and 6.1.

Phosphorus: 4.8 and 6.2.

Alkali Reserve: 84 and 86.

Bile was present in each sample, Fouchet's test being positive and the van den Bergh reaction delayed direct, indirect, strongly positive. It may also be noted that the urea and non-protein nitrogen figures were higher than normal.

In case No. 4, blood taken four days after treatment gave normal figures except for alkali reserve which was still rather high. Bile was not present. Whilst the alterations in the figures for blood constituents were not very marked in the sample taken from Case No. 5 five hours after treatment, nevertheless they show a tendency to improvement. The blood calcium had risen from 6.1 to 7 mgs. per 100 cc., the phosphorus fallen from 6.2 to 5.5, the alkali reserve showed only a very slight drop and tests for bile were still strongly positive.

Confined Ponies. Despite some variation, the average figures showed a fall in calcium, a rise in phosphorus and alkali reserve and the change from a trace of bile to a definitely positive reaction.

Air-injected Ponies. On analysis it was found that while the pre-injection samples gave values for calcium and phosphorus similar to those of the previous pre-experimental samples, the figures for alkali reserve were higher: 78.7, 77.8 and 63.2. In the post-injection samples the calcium content showed some tendency to fall slightly or remain almost stationary while the phosphorus content and alkali reserve stayed at the "normal" level. It appeared that the injection of air had produced no effect that could be detected.

DISCUSSION

Harvey has recorded two cases of tetany in mares (8) (9), has evidently seen several others and has received reports from three veterinary surgeons who have met the condition

Six "Normal" Samples.	Average values		...
	Highest values		...
	Lowest values		...
Tetany Cases	Case No. 4	Before treatment	...
		4 days later	...
	Case No. 5	Before treatment	...
		5 hours later	...
Confinement Experiment	Old Pony	Before	...
		After 24 hours	...
		After 30 hours	...
		After 48 hours	...
	Grey Pony	Before	...
		After 24 hours	...
		After 30 hours	...
		After 48 hours	...
	Young Pony	Before	...
		After 24 hours	...
		After 30 hours	...
		After 48 hours	...
	Average Values	Before	...
		After 24 hours	...
		After 30 hours	...
		After 48 hours	...

mgs. par. 100 c.c.							c.c. CO ₂ %	
Urea.	Non-Protein N.	Crea- tinin.	Chlor- ides.	Cal- cium	Phos- phorus.	Choles- terol.	Alkali Re- serve.	Bile.
32.1	27.4	1.4	520.8	13	3.33	84.6	64.9	Trace.
42.6	30	1.5	556	14.2	4.3	136	78.7	—
24.2	22.8	1.3	443	12.4	2.7	53	56	—
64	42	—	—	5.2	4.8	—	84	Pos.
50	36	—	—	12.8	3.9	—	78.5	—
56.4	48	—	—	6.1	6.2	—	86	Pos.
82	55	—	—	7	5.5	—	82	Pos.
42.6	22.6	1.5	531	12.8	3.5	120	57.4	Trace.
34.7	25.7	1.5	462	13.6	4.5	122	73.9	Pos.
37.8	24.3	1.5	414	10	4.8	102	72.9	Pos.
34.7	28.6	1.7	456	10.2	5.7	111	68.1	Pos.
29.5	30	1.5	525	12.8	—	—	56.5	Trace.
40.2	28	1.4	462	12.4	4	150	76.8	Pos.
39.7	30	1.4	473	13.2	4	131	80.7	Pos.
37.3	31.7	1.5	438	11.6	4.1	142	80.7	Pos.
36.7	29.6	1.4	443	14.2	4.3	136	56	Trace.
28.5	24.9	1.4	490	12.2	3.9	115	65.2	Pos.
37.8	23.3	1.3	462	12	4.1	120	70	Pos.
28.5	24	1.5	456	12	4.3	136	72.9	Pos.
36.3	29.7	1.5	499.7	13.3	3.9	128	56.6	—
34.5	26.2	1.4	471.3	12.7	4.1	129	72	—
38.4	25.8	1.4	449.7	11.7	4.3	117.7	74.5	—
33.5	28.1	1.6	450	11.3	4.7	129.7	73.9	—

in mares. It is possible that the "Fleeting Tetanus" of "Irish Vet." (12), Bray (2) and "Country Vet." (3) was tetany. Williams (20) considers that the condition described under the title, "Parturient Eclampsia in the Mare," in his text book (19), corresponds with that seen by Harvey. It would seem that Williams was the first to describe the condition. Hutyra and Marek (11) do not mention tetany in the horse as we understand it. Wallis Hoare (10) saw a case in a mare which had recently foaled. His patient showed similar symptoms again while rearing her next foal.

With one exception these cases were encountered in mares with foal at foot. Since in the filly subject of the record by "Country Vet." the jaw movements were free and protrusion of the *membrana nictitans* pronounced, we hesitate in accepting this as a record of tetany. We have seen the condition in suckling mares, in one barren mare and in two stallion ponies. It cannot, therefore, be accepted as of the puerperal eclamptic group.

In each of Harvey's cases the mare had been running on poor pasture and the disease appeared soon after she was housed. Williams wrote (19, p. 610), "In nearly, if not all the cases I have related, the mares had been enjoying unrestricted freedom at pasture constantly since foaling, until taken up a few hours prior to attack, which was ushered in without warning." In the cases recorded by Bray and "Irish Vet." the mare appears to have been at pasture (protrusion of the *membrana* was recorded in each but Harvey (7) suggested that this might have been taken for granted). While the housing of a suckling mare has led to the appearance of tetany in Welsh Mountain ponies, the condition has been more frequently observed among ponies which have just reached the end of a railway journey. It would therefore appear that, whatever the predisposing influences, the confinement of these animals, normally running wild, is the determining factor.

It may well be that the ponies most liable to attack are those whose available calcium has been reduced by grazing deficient pastures and or as a result of pregnancy and lactation. The excitement associated with handling, confinement, re-

moval of the foal or a journey by rail would certainly appear responsible, at least in part, for the upset of metabolism which ushers in the attack of tetany.

Our investigations have shown that in these cases of tetany the blood calcium was very low, the phosphorus high and the alkali reserve figure above normal. The presence of bile pigments was also remarkable and the tests indicated that the jaundice was due to some cause other than biliary obstruction, the pigment being probably of hæmolytic origin. In so far as we know, no connection between tetany and such jaundice has been noted, and further work must be done on this problem. Otherwise, as has been pointed out, the cases described in this article possessed all the biochemical changes characteristic of tetany due to alkalosis.

In the human subject a similar state of affairs can be brought about by the excessive administration of alkalis, such as sodium bicarbonate, for various therapeutic purposes and by prolonged vomiting attended by great loss of gastric acidity. There is also a definite group of cases caused by intestinal infections; this form is seen in the convulsions of children. Yet another variety is found: the hyperpnœa associated with the breathing of rarified atmosphere, as in ascending a mountain. The importance of hyperpnœa due to an increased temperature must also be mentioned here. It has been shown in man that hyperpnœa is attended with an alkalosis, this being due to the washing out of CO_2 from the blood, with the result that the alkali reserve becomes increased. It was shown by Bazett and Haldane (1) that if human beings were immersed in a hot bath at a temperature of 37°C or over, there was hyperpnœa, faintness, mental confusion and tingling: the alveolar CO_2 tension fell in their experiments from 38.7 to 25.6 mm. and the hydrogen ion concentration of the urine was greatly diminished. Thus, one of their subjects passed urine with a pH of 9, containing no ammonia, but considerable quantities of bicarbonate and some acetone bodies. Although Bazett and Haldane do not push the conditions in their experiments to such an extent as to induce tetany, this has been recorded by other workers.

It is difficult to see in any of these factors one that could have operated in the ponies under consideration. Loss of

acid from the body in the form of vomiting can at once be excluded, whilst there is hardly sufficient evidence to explain the condition by postulating an intestinal infection. It is possible that the crowded conditions under which the animals were moved might have produced an atmosphere so deficient in oxygen and so warm that hyperpnœa may have followed. It is, of course, extremely unlikely that actual anoxæmia played any part in the production of the condition, but it is quite possible that the warmth of the crowded trucks may have produced hyperpnœa similar to that obtained by immersing subjects in a hot bath. The mechanism for the production of tetany in this case has been discussed and it remains to be seen whether there is sufficient evidence in favour of excessive warmth as a cause of hyperpnœa and then tetany.

These ponies were small, 10 to 12 hands high, their heads did not reach the upper sparred portion of the sides of the truck and they travelled closely packed. The air of the truck would certainly become foul and very warm. Owners are much against the practice of sheeting the truck, for they believe that more cases occur in sheeted than in unsheeted loads. Again, one (or more) of the ponies may be crushed into a position from which it cannot extricate itself during part of the journey. Its head may be forced low into a corner or caught between the flanks of its fellows. In addition to the crowded atmosphere, the strange surroundings and continual frights would produce a condition of nervous excitement in the animals which, in itself, would tend to produce hyperpnœa. It is possible that this may explain the genesis of alkalosis and tetany, and the view is supported by the reappearance of serious symptoms in the pony, Case No. 5, which was taken into a stuffy building to be bled.

While it is difficult to see that the warm vitiated atmosphere played the major part in producing tetany when it appeared some time after unloading or in mares taken into a box, nervous excitement may then have been the important factor. It has been shown that the simple confinement of three mountain pony mares produced a departure from the normal blood analysis very similar to, but much less marked than, that seen in our tetany cases. It will

be seen, therefore, that the hyperpnœa theories can only be regarded as a hypothesis, and more work must be done on this suggestion in order to determine the exact part played by these factors.

Our observations appear to have a particular interest in view of the Parathyroid Deficiency (Hypocalcæmia) Theory of the etiology of milk fever in cows enunciated by Dryerre and Greig (4). The researches of Little and Wright (14), of Dryerre and Greig (5) and of Fish (6) showed that the blood calcium of affected cows is much below the normal level. Tetany in ponies and milk fever in cows may not, however, be parallel conditions, since the characteristic secondary coma of the latter is not a feature of the former. Where death terminates a case of tetany in the horse the spasms continue to the end.

One suggestion offered as an explanation of the remarkable curative effect of intramammary injections of air in milk fever is that by arresting all lactation further loss of calcium is prevented and its reaccumulation in the blood permitted. Since the subcutaneous injection of air appears to act quite as efficiently as intramammary injection, this suggestion cannot explain the recovery of our tetany cases. Yet, while Dryerre and Greig (5, p. 724) have shown that mammary inflation will increase the blood calcium of normal lactating ewes about 10 percent., we were unable to influence it in pony mares by the subcutaneous injection of air. Despite that evidence and since Maguire (17) has seen recovery in a case of milk fever following subcutaneous injection of oxygen, we are tempted to suggest that the injection of air, or oxygen, under the skin should be given an extended trial in the treatment of that disease.

SUMMARY.

1. A condition met among Welsh Mountain ponies, known to pony-owners of North Wales as "lock-jaw" and diagnosed as tetany, is described.
2. It has been observed in suckling mares soon after their being housed and in ponies of either sex which have just completed a journey by rail.
3. The subcutaneous or, in the mare, intramammary injection of air produced a rapid return to normal.

4. Analysis showed that the calcium content of the blood of affected ponies was very low, the phosphorus and alkali reserve figures high and that bile pigments, probably of hæmolytic origin, were present.

5. Simple confinement produced a similar, but much less marked, departure from the "normal" analysis in three pony mares.

6. Subcutaneous injection of air altered little, if at all, the chemical composition of the blood of three healthy ponies.

7. The part which hyperpnoea—resulting from the conditions under which the affected ponies had travelled—may have played in the genesis of alkalosis and tetany, is discussed.

It is a pleasure to acknowledge the assistance given by Mr. Lawson and Dr. Robertson, of the Biochemical Department, The Middlesex Hospital, in the very large number of analyses contained in this paper. The owner of the affected ponies was most helpful and the source of much information.

POSTSCRIPT.

Since the foregoing was written two records of interest in considering the disease described above have appeared.

Davies, under the title "Railroad Disease" (*Vety Jnl.*, Vol. lxxxv, p. 81, Feb. 1929), writes of a "mob" of cows, each having borne several calves and lived entirely at pasture and having been trucked a considerable distance, arriving at a New Zealand freezing works during the night. In the morning one was found dead, two were so seriously ill that they were immediately slaughtered, one was staggering about the pen, hocks extended and with the peculiar stiff gait observed in milk fever—and two, although down, were able to struggle to their feet only to blunder about the pen and go down again. Inflation of the udder produced a marked improvement—sufficient to get the patients to the slaughter-pen.

Spicer (*Vety Record*, Vol. ix., p. 178, March, 1929) spoke of some dozen out of fifty ewes with lambs of some age at foot "suffering from what was apparently milk fever" on completion of a journey by rail. They recovered after inflation of the udder.

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A REPORT UPON THE CAUSE AND PREVENTION OF DOG DISTEMPER.*

BY

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Historical Introduction

Dog-distemper is justly regarded as the most serious disease which threatens the well-being of the canine population of this country. It pays no respect to race or breed, but attacks the high-born and the low-bred animal alike. At times it may cause a comparatively trivial illness of a transient nature, and at others infection is followed by a serious and prolonged illness with a high mortality rate. Cases which ultimately recover from the more severe forms of the malady frequently show some pronounced disability which places the animal at a serious disadvantage with its fellows.

Distemper has apparently existed for very many years. Laosson (1882) in his review of the history of the disease attributes the first record to Aristotle, but in this instance, as is also the case with many of the other early records, the description of the disease is so scanty that identification with distemper must remain uncertain. In this country distemper was certainly present early in the nineteenth century for it attracted the attention of Jenner (1809) who considered that the disease had existed for more than 50 years previously, but had been confused with rabies. He gives a masterly description of the disease as observed amongst fox-hounds, draws comparisons between this and the infectious fevers of man and describes a detailed routine for the disinfection of kennels, which, however, gave disappointing results in practice. Delabere Blaine (1817) considers the disease was unknown in England about 1700 though very common in his day.

Distemper was then, and had been for years, rampant on the Continent of Europe, but at this time it was believed

A Report upon the Cause and Prevention of Dog Distemper 31

that cat-distemper was identical with dog-distemper. Laosson (1882) and Karajewski (1882) adduced experimental evidence in favour of this view, with the result that confusion persists, in certain quarters, to the present day.

Distemper appears to have been confused with jaundice (yellows) and also with rabies. Numerous examples of records of the disease might be quoted, but summed up they show that distemper was present in the canine population of most countries of the world for very many years and from time to time in different places there might occur a sudden increase in virulence of the disease with disastrous results for the dogs in questions.

The recognition of the importance of bacteria as causes of disease towards the close of the nineteenth century, naturally led to the search for an organism which could be shown to be the causal agent of dog-distemper, and from time to time, new organisms were isolated and claims put forward on their behalf. Galli-Valerio in 1896 claimed to have secured cultures of the responsible organism. Copeman (1900) isolated a small bacillus which he considered was the infecting agent and prepared a vaccine for the prevention of the disease. In 1905 Von Wunschheim isolated a small bacillus which he regarded as of the first importance. An entirely different view was put forward by Carré (1905), who claimed that it was possible to transmit dog-distemper by means of filtrates of infective material and that the filters might be so fine that no known visible organism could pass through them. In other words Carré was convinced that the infecting agent was so small as to be invisible under the modern microscope. Kregenow (1906) in a series of carefully conducted experiments entirely failed to confirm Carré's results, and Carré's conclusions were not generally accepted. Lignières (1906), who had previously regarded an organism isolated by himself as the true infective agent, repeated some of Carré's filtration experiments and abandoned his original conclusions and accepted those of Carré.

In 1911 from two independent sources there was announced the isolation of an organism from cases of dog-distemper. This organism is now named *Bacillus bronchisepticus*, and is probably identical with that previously isolated by Copeman

in 1900. M'Gowan (1911) was able to isolate this organism from the majority of distemper dogs and also found it in other species of animals including man. Ferry (1911, 1912, 1912-13) found this organism in the great majority of distemper cases when they were examined in the earlier stages of the disease, and frequently found it in pure culture in the respiratory tract. Torrey and Rahe (1913) also showed that this organism was present in many cases of distemper and might be secured in pure culture. The evidence in favour of this organism playing an important part in the disease is thus weighty for all these workers adduced evidence that the bacillus, when recently isolated, was pathogenic for dogs. They claimed, indeed, that the disease produced by the bacillus was genuine dog-distemper, and if their conclusions were correct, it would seem that Carré's view was wrong. Ferry (1914) showed that *B. bronchisepticus* might pass certain bacterial filters in small numbers, but the fundamental divergence between the two schools remained, for Carré claimed that the disease might be transmitted to young puppies by filtrates from which no bacterial growth could be secured, and *B. bronchisepticus* is an organism which is readily grown on ordinary laboratory culture media; the other school maintained that this easily-cultivated organism was the primary cause of the disease.

At the time the Scientific Committee of the Field Distemper Council commenced its work, this divergence in view regarding the ætiology of the disease was considered of the highest importance, and a decision between the two opposing views was a necessary preliminary to much further work. Critical examination of the claims for *B. bronchisepticus* being the causal agent showed that the production of typical disease by cultures of this organism was not convincing. The difficulty of proof was recognised by the discoverers of the organism. The previous research workers never knew for certain that the experimental dogs used for their tests were susceptible to the disease, or if they had, at some time, suffered a mild attack of distemper, recovered therefrom and become immune. An experiment in which no typical result followed inoculation of the bacillus could be explained away by supposing that the animal was immune from the first,

leaving only the successes to be considered. Again, the disease is so highly infectious and the mode of spread was so little understood, that it was very difficult to guard against accidental infections during the course of crucial experiments. These considerations were recognised by M'Gowan, who stated that accurate experimental work in infecting dogs was almost impossible. He performed a few experiments with his cultures, but does not consider them free from error. Ferry, and Torrey and Rahe, also saw the difficulties, but conducted experiments under the best conditions they could secure. These four workers considered that their experiments, though not conclusive, indicated that *B. bronchisepticus* was the causal organism. Similarly critical examination of the claims for protection of dogs against the disease by means of cultures of this bacillus, vaccines, etc., shows that the ordinary dog is of small value for such experiments. If some of the dogs are immune when they come up for experiment, some degree of success is sure to follow *any* vaccination method and until really large numbers are dealt with the net result may be quite misleading. It was thus abundantly clear that for accurate research a supply of dogs of known susceptibility was essential. The only way to secure this was to breed dogs specially for the purpose under conditions which would guarantee that the experimental animal had never come in contact with distemper infection. It was decided that the only method which would ensure this was: to breed the dogs inside a ring fence in the strictest possible isolation; to remove the parents from inside the ring as soon as practicable; and do everything possible to prevent infection from gaining access to the susceptible stock. It was recognised that this decision involved considerable outlay, considerable expense in upkeep, and serious delay in experimental work with dogs. But experience has amply justified those responsible for the decision, for there is now available a supply of dogs of known susceptibility which the research workers consider an inestimable advantage for all experimental work and especially in all protection experiments. Without this supply of dogs, the work would have been very much more difficult and the interpretation of many experiments would have remained doubtful. Another advantage of the special supply of dogs was the fact that all animals were in first-

class health and condition at the time they came under experiment, with the result that it was possible to study distemper in its simplest form uncomplicated by secondary infections.

It may be noted here that the maintenance of this clean stock of dogs for four years without distemper appearing shows that the disease does not arise spontaneously, and it is very probable that all cases of distemper are due to transference of infection from one animal to another.

The Compound.

The arrangements for the breeding of the susceptible dogs were as follows: A piece of ground on the farm was selected some hundreds of yards removed from all buildings and was completely enclosed by corrugated iron fencing sunk three feet into the ground and extending six feet above the surface. Inside the enclosure, towards one end of the compound, 16 kennels were erected and each kennel was provided with an appropriate enclosed run open at the top. Towards the other end of the compound, a small bungalow was built to accommodate two kennel maids, who were expected to live inside the compound, isolated with the dogs. At one corner of the iron fencing forming the wall of the compound, a small building was made, and this formed the sole means of entrance or exit from the enclosure. This building was divided into three compartments. Entering the building from without the compound, the first compartment forms a disrobing room, the second a bathroom, and the third a dressing room where sterile clothing is available. From the third compartment a door opens into the interior of the compound. The arrangement will be made clear by reference to the ground plan of the compound and its buildings. (This has been illustrated in *The Field*.—(Ed. V. J.)

On every occasion of entry into the isolated area, the routine of disrobing, bath, donning sterile clothing, is carried out. The number of persons allowed to enter is strictly limited. At one other position in the wall of the compound there is a second small building, which consists of two compartments. The first forms a small storehouse for food, etc.; the

A Report upon the cause and Prevention of Dog Distemper 35

second is fitted as a sterilising room and contains a large copper and an autoclave. A small hatchway is the only means of communication between this building and the interior of the compound. All food for the dogs is boiled or autoclaved before being passed through the hatchway, with the exception of a ration of codliver oil for the younger animals. All blankets, etc., for the dogs are autoclaved, and as far as it is practicable, everything entering the compound is sterilized.

It will be observed that the precautions taken to prevent infection spreading to the interior of the compound are very elaborate, but it was felt that no risks should be taken with a disease which is known to be so extremely infectious. After the first introduction of dogs into the compound, everything went well for some weeks. But distemper occurred, and the entire stock of dogs was removed and a fresh start made. It may be pointed out that the occurrence of distemper in the compound *now* would cause some 12 or 18 months' interruption in the work, for it would be necessary to start all over again and build up a new stock of susceptible dogs.

For the past four years the isolation compound has been working smoothly owing to the loyalty and care of those entrusted with the administration of the routine, and their attention to the disinfecting ritual which is insisted upon. It is clear that some small oversight or carelessness in disinfection or sterilization might admit infection to the compound with disastrous results, and Mr. G. Gamage's services here have been invaluable. It must be remembered further that the life of comparative isolation led by the kennel maids within the compound must have been tedious and at times irksome. Miss Smith and Miss Hyslop followed by Miss Gray and Miss Reason, have been unremitting in their care, and owing to their expert attendance the dogs and puppies have flourished.

As soon as practicable the original stock introduced into the compound was withdrawn, and the longer the work is carried on the more remote is the contact of this stock of dogs with distemper. There is no evidence that the stock is increasing in sensitivity to the disease, but it is of enormous

assistance to work with dogs of known susceptibility, and this has been possible for the last four years.

The Arrangements for Experiments with Dogs.

With such an infectious disease as distemper it was evidently necessary to try and exclude all possibility of accidental infection occurring in the animals under experiment. The dog hospital, was built originally for experiments on dogs. It is a fly-proof structure divided into two symmetrical portions by a central *post-mortem* room. Each of these portions consists of a series of cubicles, completely separated from each other, arranged about a central hall which contains a large tank of disinfectant. The building is heated and the walls and roof are lined with "Uralite" and the joints sealed as completely as possible. Entrance to either half of the building is only possible through a short corridor, the floor of which is sunk and contains constantly three inches of disinfectant solution. Every person entering the building wears rubber boots to thigh or knee, and a rubber-covered overcoat which overlaps the boots. On entry into the building, boots, coats and hands are washed with disinfectant.

After every visit to a cubicle containing an animal, whether showing symptoms or apparently normal, the rubber armour is washed down with disinfectant once more. The floors of the central halls are thus kept wet with disinfectant all the time work is in progress, and any infective material settling on coats or floors is rapidly sterilized. No two cubicles are opened at one and the same time.

At the outset of the work, this method appeared to be satisfactory, but it was discovered that when most of the cubicles were filled with experimental dogs, infection would spread within the building to healthy control animals in spite of the rigid antiseptic precautions. Work with ferrets showed that it was not possible to limit the spread of infection in a small closed space, and another plan of experiment had to be devised. The experimental house is now used as a dog hospital for special cases and for work with ferrets.

It was believed that the infection was due to contamination of the air enclosed in the building, and a series of kennels were constructed and scattered about the grounds

A Report upon the Cause and Prevention of Dog Distemper 37

around the laboratory buildings. Each kennel had a small run attached, was surrounded by fencing and wire netting and was separated from its nearest neighbour by a distance of 15 or 20 yards. The attendants wear the rubber equipment previously described, and are washed down with disinfectant before and after visiting any single kennel. Working in this way the free dilution by the external air appears to have prevented air-borne infection from occurring, and it has proved possible to keep a susceptible dog for months in one kennel while experiments were carried on in the adjacent kennels. As far as can be ascertained there are only two instances of accidental infection during the time this system has been in use, so that on the whole it may be said that the method has proved satisfactory.

After kennel and run had been inhabited by infected animals they required disinfection, and for this purpose a thorough scrub and wash down with a disinfectant, such as one per cent. Lysol, was found to be all that was required. The infecting agent is readily destroyed and there is no evidence of infection persisting in the kennels after such treatment. A disinfected kennel may be used the following day with safety.

Experimental Distemper in the Dog.

The experience of workers in the field shows that dog-distemper is a disease of variable severity with symptoms of protean character. The divergence in symptoms is so great that some observers distinguish several types of the disease; and it was possible, when the work began, that there were really several distinct diseases grouped under the term distemper. It may be said at once that the experimental work indicates that dog distemper is a single entity, and that there is no evidence of several diseases masquerading under one name. A dog which is immune to one strain is immune to strains from other sources.

Everyone is agreed that the variable symptoms are due, in part at any rate, to mixed infections and that the secondary infections are responsible for much in the sum total of the disease. Broncho-pneumonia for example, is met with in distemper cases, but it is not an essential part of the distemper picture; many dogs pass through distemper without any sign

or symptom of pneumonia. When pneumonia occurs it is due to the invasion of damaged lung tissue by a secondary infection. The naturally occurring disease is spread by contact between diseased and healthy dogs, and there is thus an excellent change of the secondary infection being passed on at the same time. In kennels with packs of hounds or in dog hospitals where numbers of animals are in close relationship, the changes of the spread of secondary infections are greatly increased. It thus comes about that distemper as seen by the veterinary surgeon is frequently a complex.

Under experimental conditions the position is very different. Here infection is thrust upon a perfectly healthy dog by a method which excludes the secondary infecting agent with the result that distemper develops in its simplest form and, as a rule, runs an uncomplicated course.

Experimental distemper may be defined in brief as follows:—Dog distemper is an acute infectious fever characterised by an incubation period of four days, a coryza at the onset of the disease, an unusual temperature curve, severe gastro-intestinal disturbance and a variable set of symptoms due to inflammation in the respiratory tract. In a proportion of cases nerve symptoms, due to an encephalitis, may develop.

The incubation period is remarkably constant. It is occasionally as short as three days and may in exceptional cases be prolonged to six days, but in the great majority of instances it is four days.

The onset of the disease is sharply defined by fever and a watery discharge from the eyes and nose. The discharge is frequently trivial even in very severe cases, but it may be profuse. Within 24 hours the discharge may become faintly purulent, and the conjunctivæ acutely congested. Crusts of half-dried cells collect at the angles of the eyelids, and a purulent discharge may persist throughout the illness.

The temperature rises abruptly at the commencement of the illness and may reach 105°F., or even more, within 24 hours. After one or two days it subsides to near the normal level of 101.4°F.; but it soon rises again. The second rise is usually slower than the first and more prolonged. Its duration is exceedingly variable and may be as short as 48 hours

in the mild cases, or as long as three weeks in the more severe cases.

At the onset of the disease the dog usually vomits and refuses food. With the fall of temperature appetite returns for a time, to diminish once more as the secondary fever develops. In practically every case there is diarrhoea and in the secondary febrile period; this may be profuse. The motions are slimy, may contain streaks of blood, and have an offensive and somewhat characteristic odour. The diarrhoea may persist for some days after the remission of the fever. The poor appetite coupled with the diarrhoea interferes with the nutrition and the animal wastes rapidly.

Symptoms from the respiratory system are usually slight. A slight cough is not uncommon in the period of secondary fever, but definite bronchitis or bronchopneumonia does not occur. At the same time, there is nearly always some evidence of inflammation in the respiratory passages during life or at autopsy.

Involvement of the nervous system may take place early or late in the disease and is very variable in occurrence. The earliest symptom is a sudden attack of semi-consciousness with vigorous chewing movements, accompanied by the secretion of thick saliva which exudes from the angles of the jaws. The fit may pass off after a few seconds or persist for a minute, after which the dog appears to be perfectly conscious once more. Fits of this type may occur at irregular intervals, but as a rule they come more severe and merge into attacks of epileptiform convulsions. Muscular spasms and twitches may be observed in those cases which develop nerve symptoms late in the disease, and these in turn may become exaggerated and lead to convulsions. Whenever fits were observed the affected animal was destroyed with chloroform, so that there is no information as to the late results in the nerve type of case.

The response in very young puppies is frequently atypical, and only a few experiments were done with puppies about two months old.

Experience of distemper under experimental conditions shows that it is a disease of very variable severity. The variation is partly attributable to differences in susceptibility

in dogs, but it is clear that different strains of virus possess different degrees of virulence. Taking all cases together, it may be said that experimental distemper is a disease with a comparatively low mortality rate. There are cases in which the infection overwhelms the patient, but these are unusual and occur for the most part in quite young puppies. Cases which show signs of infection in the nervous system are always serious, but they again only account for a proportion of the whole. For the rest, though the disease may be acute and the animal hard hit for a time, the prognosis is good. This finding is at first sight, ~~at~~ variance with the experience of workers in the field, but is readily explained by the absence of secondary infections under the best experimental conditions. Dog-distemper may be regarded as an acute infectious fever, comparable in many respects with influenza or measles in man, a disease which by itself will produce a severe fever and serious bodily disturbance, but is rarely fatal, and yet a disease which may light up a latent infection or enable secondary infections of various kinds to gain a foothold on damaged tissue.

Experimental work also shows the extremely infectious nature of distemper in the early stages of the disease. At the onset of the disease before symptoms are manifest, the distemper dog is a source of danger to its fellows. The nasal discharge and the circulating blood are uniformly infective at the early stages of the disease and uncertain in the later stages. There is evidence that infection may spread for short distances through the air in a confined space, and that actual contact between animals is not necessary for the transference of infection from one dog to another. It is probable that in these cases the infection enters by the respiratory tract, and corresponding with this, it is quite easy to infect a dog by the insufflation of a small quantity of virus into the nasal passages. No evidence of an ectoparasite acting as a vector of infection has been discovered.

Vesico-pustules, which have been and in certain quarters still are regarded as a diagnostic sign of distemper appear to be only indirectly connected with the disease. They may occur in susceptible animals without any other symptom, and after recovery from the eruption, the dogs are fully sensitive

to small doses of distemper virus, and the resultant disease runs a typical and unmodified course. Dunkin (1926). In many cases of experimental distemper, vesico-pustules are never seen throughout the whole course of the disease. The contents of the pustule will not infect, nor will they induce protection in a susceptible animal. Laosson (1882). It seems clear, therefore, that the eruption is due to some cause other than distemper, and when it develops in a case of this disease, it must be due to some secondary infective agent. The occurrence of pustules may suggest distemper and draw attention to other symptoms of greater significance, but by themselves they are insufficient to justify a diagnosis of dog-distemper.

As distemper is a disease of very variable severity, in the milder cases it may be very difficult to diagnose it with certainty. Cases occur in which a bi-daily temperature record is almost the only guide to a correct diagnosis, and temperature charts should be of the greatest value to the clinician in all doubtful cases; isolated records are, on the other hand, of much less value.

During the first febrile period the dog may show very few clinical symptoms, and yet at this time his secretions and excretions, as also his blood, are all very ineffective for susceptible animals. The isolation of animals from their fellows at the earliest stage of the disease would probably do much to stop the spread of infection.

As stated above, uncomplicated distemper is not a very fatal disease for healthy animals, if the cases which develop nerve symptoms are excluded. Efforts should be made to keep cases of distemper separate from each other as it is exceedingly probable that the crowding of dogs together is largely responsible for the spread of secondary infections. These secondary infections may be the determining cause of death. For example, broncho-pneumonia developing in a dog already depressed and weakened by the distemper infection is always serious and may lead to a fatal outcome though the distemper infection by itself might have been overcome with ease.

Close contact between susceptible animals during a distemper outbreak leads inevitably to the rapid passage of the disease from dog to dog. Under these conditions it is to be expected that the virulence of the disease will increase and,

though there is no experimental proof of this rise in virulence, it is so probable on general grounds that ample spacing for animals must be strongly recommended to dog owners.

Distemper in Ferrets.

When the investigation was being planned, it was felt to be highly desirable to be able to employ some animal other than the dog for certain phases of the work. If possible the alternative animal should be small and capable of being maintained in rigorous confinement. Unfortunately dog-distemper is not a disease which can be communicated to the ordinary laboratory animals. Rabbits, guinea-pigs and white rats are resistant to infection. The records of distemper in wolves, wild dogs, lynxes and racoons, in captivity, did not help, Fox (1923). The distemper in the foxes in the silver fox farms, studied by Green (1925) is probably dog-distemper as Laosson (1882) found no difficulty in transmitting dog-distemper to two captive foxes. Distemper in cats was believed by many to be the same as distemper in the dog. There was even some experimental evidence in favour of this view, Laosson (1882). Krajewski (1882), but a number of experiments were made by us, and all gave completely negative results. The hedgehog was used by Sanfelice (1915) and was reported by him to be susceptible when injected intracerebrally. In the only experiment tried, a hedgehog proved resistant to a massive dose of virus administered subcutaneously. Ferrets were reputed to be very susceptible to dog distemper, and these were tested and found to be admirably adapted for experimental work. It may be noted in passing that the weasel and the stoat have also been found to be susceptible animals.

In several respects the ferret is a peculiarly suitable animal for the experimental study of dog-distemper. First, it is exceedingly susceptible to infection. Secondly, the disease is nearly always fatal. On account of these two facts, it is very unusual to find a resistant animal in a batch of ferrets purchased in the open market. Thirdly, the ferret will thrive in the most rigorous confinement, which is a very important point when studying such an infectious disease as distemper. Fourthly the ferret breeds readily and quickly, if it is kept under good conditions and well fed.

A Report upon the Cause and Prevention of Dog Distemper 43

The ferret has been employed extensively throughout the whole investigation, and it is not too much to say that such success as has been achieved is largely due to work with ferrets. It is needless to state that all crucial experiments have been confirmed on dogs, but the use of the ferret allowed a great deal more work to be carried out, and at the commencement of the work when the specially bred dogs were not available, the ferrets proved invaluable.

The majority of the ferrets used for the investigation were specially bred for the purpose, but purchased animals have also been used freely. The ferrets are bred in a special hut about 40 yards distant from the nearest distemper area. The hut is fly proof, and warmed in winter time. The attendants never come in contact with distemper cases and are not allowed to keep dogs of their own. Visits to the hut are discouraged. The ferrets are fed on raw horse meat and milk with an occasional ration of bread. Two litters of young are obtained each year and occasionally three. The average number in the litter is nine.

For experimental purposes the ferret is placed in a special cage made of sheet zinc, which is similar to that designed by Prof. Topley for the study of epizootics in mice. This type of cage allows of observation of the animal for prolonged periods without handling it, and thus eliminates one possibility of unconscious transference of infection. The Topley cage containing the ferret is placed in the cubicle in the experimental house previously described, and thus a second barrier is raised against the spread of infection. The attendants wear the rubber armour, which is washed down with disinfectant between visits to different cubicles.

Working in the above manner it has proved easy to limit infection to a single cubicle, but it has not been possible to prevent the spread of infection within a cubicle. A control (uninoculated) ferret may be kept for weeks in one cubicle, while infected ferrets are tended in the adjacent compartments and infection does not spread to the control animal. On the other hand, if there be two ferrets in Topley cages inside one cubicle, one of which is infected and the other uninoculated, infection of the control animal occurs. The most plausible explanation for this result, which has been obtained

on several occasions, is the air-borne infection occurs. This view is in harmony with the fact that infection may pass from dog to ferret without any actual contact occurring. It is sufficient to bring ferret and a distemper dog near together, for a time, in a confined space and the ferret will acquire the disease. Again, this explanation is in harmony with the results which have already been reported in the case of dogs.

It is not surprising, in view of the spread described above, to note that contact between sick and normal animals for a brief time leads to a spread of the disease or that the introduction of a clean ferret into a cage from which a sick ferret has been removed results in infection of the sound animal. Minute quantities of blood or tissue from a sick ferret will almost invariably cause disease in a susceptible animal if injected subcutaneously.

In the case of the ferret there is usually an incubation period of about 10 days, during which time the infected ferret appears to be quite normal. When very large doses of virus are given, and especially when the strain of virus is a potent one, the incubation period may be shortened to six or seven days. When small doses are given, the incubation period may be prolonged.

The onset of the disease is shown by watery discharge from the eyes and nose. Within 24 hours the discharge becomes faintly purulent and the eyelids frequently become puffy. The chin is reddened and soon minute vesicles appear at the junction of the naked skin of the lip with the fur. The feet become swollen, the pads red, and occasionally the skin on the lower half of the abdomen and inner aspect of the thighs becomes reddened. On the third day the vesicles on the chin become small pustules and the ferret remains curled up in a corner, refusing all food. Improvement is quite unusual, and the ferret becomes gradually weaker and is often moribund on the fifth or sixth day. Occasionally the progress of the disease is slower, and an animal may remain in a sick state for more than a week, but ultimately the ferret dies from inanition, bronchopneumonia, or convulsions. Cases which appear to be recovering frequently relapse or succumb to acute nerve symptoms. The clinical picture is thus fairly

A Report upon the Cause and Prevention of Dog Distemper 45

characteristic and as there are not many mild cases of distemper in this species, the ferret is a very useful test animal to employ in those cases where the diagnosis in dogs remains doubtful.

- Ferrets which did happen to recover from one attack of distemper proved to be resistant to infection, not only by the strain of virus which caused the original disease, but also to all other strains of distemper which were obtainable.

The Nature of the Infecting Agent in Dog Distemper.

Quite early in this report it was pointed out that there were two divergent views regarding the ætiology of dog distemper. The one supported by M'Gowan, Ferry, Torrey and Rahe taught that the disease was due to *B. bronchisepticus*, a recognisable bacillus with definite morphology and cultural characteristics; the other, supported by Carré, considered that the infective agent was an ultramicroscopic organism.

Experimental work with ferrets and dogs soon showed that the view of Carré was probably the correct one. As has been pointed out, it is exceedingly easy to transmit the disease to a healthy dog or ferret by injecting a minute amount of blood or emulsion of tissue taken from a diseased animal, and yet it has always proved to be impossible to secure cultures of an organism resembling *B. bronchisepticus* from such material. In the great majority of cultural experiments, the infecting blood and tissue proved to be sterile. In this connection it may be mentioned that the advocates for a bacterial origin of the disease admit that they were nearly always unable to secure cultures of bacteria from the circulating blood, so that the new results are in agreement with theirs in this respect, but it must be added that blood, if collected early in the disease, is one of the most certain agents that can be employed for the transmission of infection.

Direct confirmation of Carré's filtration experiments was not so easy and all the earlier experiments gave negative results. For a time the experience was similar to that of Kregenow, who failed in every instance to secure infective

filtrates. Ultimately it was found possible to filter the infecting principle through standard bacterial filters with uniformly successful results. Infective filtrates were secured when employing Pasteur Chamberland L2 filters, Mandler filters and membrane filters of known porosity. All these filters are known to retain nearly all visible bacteria, and it was further demonstrated that the filters actually employed would hold back bacteria and yet allow the infecting principle to pass. Filtration of biological fluids and mixtures through filters of the type commonly employed by bacteriologists is exceedingly complex and many factors are involved, each of which may alter the result of a given experiment. The analysis of the factors involved in this problem has engaged the attention of Mr. Elford, who is working under the supervision of Mr. Barnard. It may be mentioned that quite recently Mr. Elford has succeeded in filtering distemper virus through membrane filters of standard porosity, and the data available indicate that the organism causing distemper is of the same order of size as the organism causing pleuropneumonia of cattle.

Throughout all the experimental work efforts have been made to secure cultures of the infecting agent, but in every instance failure has resulted. In no experiment has there been found any evidence of multiplication of the virus. In some experiments the virus persisted for a short time, but in every case it ultimately died. Subcultures were never found to be infective for healthy animals. This experience is in harmony with the view expressed above regarding the aetiology of the disease, for it is the experience of nearly all laboratory workers that with the single exception of pleuropneumonia of cattle filterable viruses cannot be cultivated on any ordinary culture medium. Efforts are still being made to secure cultures of the distemper virus as this is regarded as essential to complete success, but it is now doubtful if any satisfactory result can be achieved.

The results of the work so far recorded confirm the view propounded by Carré, viz. that dog distemper in its simplest form is an acute infectious fever caused by a filterable virus or ultramicroscopic organism. This fever lowers the body resistance to other infecting agents and as a result complica-

ted cases of distemper are common. In field-work and in crowded kennels complications are the rule.

(To be Continued.)

Clinical Articles.

A CASE OF ACCIDENTAL MISPLACEMENT OF PENIS

BY

M. V. SURYANARAYANA,

*Veterinary Assistant Surgeon, i.c. Veterinary Dispensary,
Bhadrachalam*

Subject:—A local bred bullock, aged approximately 12 years.



History:—One day in the year 1922, this bullock managed to get into a compound surrounded by pucca walls, for grazing. The animal had to jump across the gate provided with vertical wooden posts tapering at their ends to find his

way home after grazing as the gate of the compound was closed. While jumping across the gate one of the posts perforated the sheath about its middle and the penis was protruding through this opening.

Treatment:—Four days after the accident the animal was brought to the dispensary for treatment. All possible attempts at returning the protruded penis to normal position proved futile and the animal was discharged when the wound healed up.

I was quite surprised to see him again in good health in October, 1928. In spite of the misplacement of penis nothing abnormal could be noticed in the act of micturition except that instead of urine being sent out straight in a stream as in the normal condition it was voided laterally.

[Ed. The case is, perhaps, of interest for the reason, that the bullock suffered little ill-effect in spite of the misplaced position of the penis.]

CALCULI IN A DOG

BY

G. OSMAN KHAN, G. M. V. C.

Veterinary Inspector, In charge of Kuala Selangor District, F. M. S.

I was in charge of Animal Infirmary, Kuala Lumpur for some time. On the evening of 29th of December, 1928, a cross bred brown dog of 30 lbs. weight was brought for Anti-Rabic Inoculation. On 31-12-28 the same dog was brought with a note that the dog was ill as a result of inoculation on 29-12-28. On clinical examination I found that the dog had neither rise of temperature nor any loss of appetite. It was however, slightly constipated. There was no difficulty in micturition. On 1-1-29 the dog was found very restless, strained very much while urinating and the urine was dribbling in drops. From the symptoms presented, I suspected the dog to be suffering from urethral obstruction-calculi. I had not a catheter on hand, so I examined it superficially and found undue development in the prostate glands. On 2-1-29 it strained again. The Government Veterinary Surgeon,

Selangor was present. The catheter was inserted but it did no good. It failed to penetrate beyond the os-penis. After this it passed urine in blood-drops. I suggested the owner to allow an operation. He was reluctant. He said that it was too old (15 years) to stand the strain of operation and he did not wish it to be destroyed either.

On 7-1-29 morning the dog died. I conducted the autopsy in the presence of the Government Veterinary Surgeon and found the following:—

1. Lungs congested.
2. Heart contained four parasites.—*Filaria immitis*).
3. The prostate glands swollen to the size of two big eggs of a pigeon.
4. Calculi in the bladder (weight 60½ grs.)
5. The ventral part of the bladder congested and inflamed.
6. Kidneys swollen and pale.
7. Calculi in the right kidney (weight 3½ grs.)
8. One calculus blocking the urethra at the os-penis (weight 1 gr.)

The peculiarity of the prostate glands and the period taken in the formation of 65 grains of calculi in the bladder and the kidney are noteworthy.

URTICARIA IN A COW

BY

G. OSMAN KHAN, G.M.V.C.

Veterinary Inspector, In charge of Kuala Selangor District, F.M.S.

On the evening of the 18th April, 1929, I had a telephone call to attend on a cow with unusual swelling on the vulva. As it was too late in the evening and as the owner lived six miles away, I went over there the next day. The

cow was about 15 years old, in weak and debilitated condition. The owner had noticed for a fortnight previous to seeking advice that the cow was not feeding well, and about a week ago she had patchy swellings all over the body about the size of one cent (half-anna piece). She had been passing loose motions and was unusually slow in chewing the cud. Her temperature was 102.2° F and the face was swollen right up to the dew-lap. The senior dresser suspected it to be some contagious disease, for her eyelids, nostrils and the foot below the fetlock joint were swollen.

After examining the patient, I concluded that the condition was one of toxic absorption from the alimentary tract and prescribed the following :—

R	Mag. sulph	oz. vii.
	Sodi sulph	oz. ii.
	Soda Bicarb	dr. ii.
	Tr. Digitalis	dr. p.
	Tr. Nucis-vom.	dr. p.
	Tr. Zingib	dr. ii.
	Aqua ad	pint i.
	Mft. Haust : Sig. now.	

The swelling did not completely go down after this dose. Hence the next day, I prescribed the following :—

R	Soda Bicarb	dr. i.
	Pot. Iodide	dr. i.
	Soda salicilus	dr. p.
	Tr. Zingiberis	dr. ii.
	Tr. Gention co.	dr. ii.
	Aqua ad	pint i.
	Mft. Haust : sig. now.	

With this the swelling disappeared completely. The cow returned to normal condition, and on the third day she started to graze as usual. The patient made an excellent and uninterrupted recovery.

TREATMENT OF CASES OF GENERAL DEBILITY WITH TRYPANBLUE

BY

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Veterinary Inspector, Veterinary Dispensary, Chintamani, Kolar

Treating bad cases of general debility with Tonics and Hæmotonics, take considerably a long time. To bring them to condition, the ryots do not continue the treatment for a long period, and practically, it is not possible to supply drugs from the dispensary for a month or two especially for every case that attends by representation.

The use of 2% solution of Trypanblue in 20 c. c. doses intravenously, was tried in some very bad cases of debility. The results were unparalleled. The improvement was noticed in three days. Three injections were given at an interval of a week. The owners were much surprised to see the good results of the drug even after the first dose.

Trypanblue seems to be a good Galactagogue. In milch cattle, the milk yield is improved decidedly. In two milch buffaloes which yielded very little quantity of milk entirely due to causes unknown, were found to yield more even after the first injection. After two more injections, they improved not only in their condition, but the yield of milk was almost double the quantity. No undesirable effects were noticed in any of the cases treated with the drug.

I request, this treatment may be tried and the results reported through this journal.

SUPPURATION OF ANAL GLANDS IN A DOG

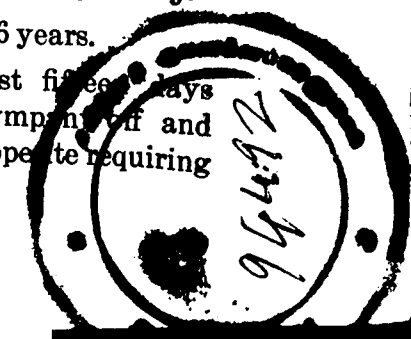
BY

A. LATIFF.

Hospital Surgeon, Canine Clinic, Bengal Veterinary College

Subject :—A Dachshund dog, aged about 6 years.

History :—He had been ailing for the last fifteen days from partial paralysis of the hind quarters, tympany of the on, constipation often requiring enema, dull appetite requiring



coaxing in feeding, sometimes forced feeding, urine scanty and high coloured, occasional pain on shoulder, side or thigh as was indicated by lameness and ascertained by manipulation, dullness, temperature ranging between 102° and 104° F with other febrile symptoms. History of a previous rat bite about 3 years back, was also narrated by the owner for us to judge if the present illness had anything to do with that because, on that occasion also he was said to have behaved similarly. The case was reported to have been treated for rheumatism by other practitioners.

It was admitted in our clinic on the 6th May, 1929, with a temperature 102·8° F., in fairly good condition, but very much dull and depressed, tympanitic abdomen, scanty high-coloured urine, constipation, dull appetite and with mattering of the eyes.

No conclusive diagnosis could be made on the date of admission and he was kept under observation. The case was shown to the Principal the following day during his rounds. He ordered the dog to be put in the compound and observing him closely noted erection of the tail, painful attempt at defecation and prominent anus. Further examination of the anus revealed suppuration of anal glands.

Treatment:—About half-an-ounce of matter was squeezed out from the glands and then Boro-Glycerine was applied over the part after fomentation, twice a day. One tablespoonful of Liquid Paraffin was given internally after enema. Nothing else was done. Next day the patient had a foetid blackish motion with a lot of slime in it, without enema, free micturition and temperature came down to 102° F. The same treatment (excepting enema) was continued and the patient made an uneventful recovery and was discharged on 11-5-29.

Conclusion:—As we are gaining experience about dogs, we find that among other things a power of keen observation, judicious circumspection and correct attribution of symptoms are the main essentials in canine practice. Hasty examination of cases in their new environments before they are settled down and composed and are still shy, timid or fretting, may lead one to blunder. In some cases the secondary symptoms

of a disease quite overshadowing the primary ones, create difficulty in diagnosis as the case quoted herein did.

A CASE OF PUSTULAR ECZEMA IN A DOG

BY

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Veterinary Assistant Surgeon, R. C. Veterinary Dispensary, Karachi

Subject:—A pedigree Airedale black and tan Bitch, aged 5 years. The bitch was brought for treatment to the Richmond Crawford Veterinary Hospital, Karachi, on 10th October, 1928.

History:—She had been suffering off and on from Eczema for some considerable time, and had been treated by her owner with various remedies.

Diagnosis:—Pustular Eczema. Scrapings from the skin were examined microscopically but did not reveal the presence of Acari.

Treatment:—At first, Mist. Alba was given internally and Sulphur and Oleum. Picis ointment applied externally. In addition, Iodalbin capsules were tried. This treatment was continued until November 1st, when subcutaneous injections of Sodium Cacodylate (3 grs. in 1 c. c.) was tried. There was slight improvement, but the skin was still badly affected and there was intense irritation.

It was decided to try Odylen (Bayer's) combined with Aricyl (Bayer's) injections.

After six applications of Odylen and five injections of Aricyl on alternate days, the patient showed marked improvement. The irritation subsided and the raw patches healed up.

The bitch was seen again on December 5th, when it was found that the improvement had been maintained, hair was beginning to grow on the affected parts and the general condition of the animal had improved considerably. A further course of five injections of Aricyl was given and a third

course from January 21st, 1929. Odylen was applied a few times on local patches of Eczema.

Result :—The Odylen and Aricyl treatment has been a marked success. The bitch is now in excellent condition, with a good coat, and has had no further skin disease.

Remarks :—Odylen has since been tried on some milder cases with good results.

I should like to acknowledge the help and advice which Mr. J.H.G. Jerrom, M.R.C.V.S., I.V.S., gave me during the treatment of this case.

Notanda

Pernicious anemia (human) is believed by Reckzeh (*Zeit. f. Klin. Med., Berlin*, May, 1928) to be a denuding of the red blood cells of their lipid covering which leaves them vulnerable to the action of toxins. The author believes that liver and liver extracts supply the blood cells with covering materials.

The North American Veterinarian, April, 19.

Day blindness (hemeralopia), according to a Vienna Scientist, is due to vitamin A deficiency. In women the disease is more common during pregnancy and in the early spring months when epidemics prevail. The significance of this research is that another ocular disease is added to the list of dietary deficiency.

N. A. V. April, 1929.

The treatment of undulant (Malta) fever with intradermal and intramuscular injections of a filtrate made from a fifteen day old culture of *Br. melitensis* followed by subcutaneous injection of antimelococcic vaccine, is a vogue (in man) described in current medical literature.

N. A. V. April, 1929.

For over-heated horses, I use nitro-glycerin and aconitine hypodermically every twenty or thirty minutes for two or three hours, and if the respirations are distressed, I also administer lobeline sulphate. Try it. *F. G. Gatton, D. V. M Robinson Illinois.*

N. A. V. April 1929.

Skin diseases are sometimes associated with ovarian disturbances, and as a consequence the state of the genitals is to be considered in attempting to determine the cause of mysterious eczemas. In eczema of ovarian origin in human medicine, ovarian extracts are recommended and said to be employed with considerable success.

N.A.V., April. 1929.

According to the best authorities, frequent milking is, *Par excellence*, the most efficacious treatment for streptococci mastitis.

N.A.V. April, 1929.

With intradermal *abortin* and *Johnin* in prospect, the diagnosis of abortion disease and paratuberculosis may soon be simplified. While their use is still in the experimental stage, promising results in the use of these two diagnostic products have been recorded.

N.A.V., April. 1929.

Coition and Abortion. The question of the transmission of abortion disease by coition is widely discussed. From many concordant results obtained by Americans they conclude that the disease is not transmitted in this manner.

In the present experiments, eighteen goats were served by a buck that received into the prepuce, just before coition, an injection of bacteria obtained from the placenta of an affected cow. No contagion was observed.

Three other series of tests were made, each with twelve to fourteen goats. They were infected by way of the mouth at different stages of gestation—one series on the day of coition; one on the second day; and a third on the twentieth day, and so on.

It was observed that a period of susceptibility exists during gestation, or rather two periods of resistance during which infection does not occur.

The goats infected before the twentieth day after coition had normal parturitions and the placentas were not infected. The same results were obtained in those infected more than a hundred days after coition.

It is therefore obvious that the hypothesis of infection by coition cannot be sustained, although it is possible that the infected bull transmits the disease in some other way and this part of the question remains to be studied.—*Thomson. Ext. Rev. Gen. de Med. Vet., Jan. 1929.*

N. A. V., May, 1929.

Ten to fifteen grains of calcium chloride daily for a dog, is the classical treatment for ascites, irrespective of the causal lesion which can seldom be ameliorated by medication.

N. A. V., May, 1929.

In purpura hæmorrhagica of horses, one ounce of calcium chloride given intravenously in isotonic solution will produce abundant diuresis and after five to six daily doses, the edema will diminish.—*Robin in The Veterinary Record.*

N. A. V., May, 1929.

When a large number of chickens of a flock are lame, it's usually tuberculosis.

N. A. V., May, 1929.

Johne's Disease in Sheep and Goats. While sheep and goats are somewhat less susceptible to Johne's disease than cattle the disease nevertheless occurs among them. Vukovic (1910) described the disease in sheep in Bosnia, as did also Lange and Berge (1915) in Germany, McFadyean et al. (1916) confirmed the relative frequency among sheep in England. And Rossi (1928) reports that the disease is by no means rare among goats in Italy where the incidence corresponds to that of bovine enzootics, without however taking the form of an enzootic but remains limited to isolated cases which were exposed to infected cows.

The symptoms in these ruminants are similar to those in cattle; persistent diarrhoea, active persistalsis, normal temperature, fair appetite, and gradual emaciation.

N. A. V., May, 1929.

That Carbon tetrachloride is efficient in eliminating hook worms has been amply proved. Many small animal specialists use this agent exclusively for this purpose. Certain contra-indications must be taken into consideration in the use of

carbon tetrachloride otherwise serious results may occur. Thus, ascariasis and calcium deficiency are conditions in which carbon tetrachlorid should not be used.

Veterinary Medicine May, 1929.

Tests with sprouted oats as a means of correcting or improving temporary sterility in cows and heifers were continued throughout the year with favourable results. Feeding 5 pounds of dry oats a day, in the sprouted form, was effective in the case of six cows and ten heifers during the year, making a total of 14 cows and 19 heifers effectively treated since sprouted-oats feeding experiments were begun.—L. A. Rogers, in Report of the Bureau of Dairy Industry, U.S. Dept. of Agriculture.

V. M., May, 1929.

A Rapid Method for the Detection of Ova and Cysts of Intestinal Parasites :—*Dr. D. Rivas, (Jour. Trop. Med., 1928).* 1. Place 1 to 2 gm. feces in a medium or large sized test tube and add 5 c.c. of 5 percent. acetic acid for each 5 gm. of feces. 2. Stopper tube and shake until suspension is homogenous. 3. Allow to stand one minute for coarse particles to settle. 4. Remove supernatant fluid with a pipette or, if necessary, filter through double layer of cheesecloth. 5. Place 5 c. c. of filtrate in centrifuge tube, add an equal volume of ether: stopper and shake horizontally until homogenous (a few seconds). 6. Centrifuge for one or two minutes. 7. Pour off all but the sediment (which may be very scanty). 8. Mount and examine the sediment.—*The Jour. of Laboratory & Clinical Medicine.*

Practical Medicine. April, 1929.

Therapeutical Notes.

Local Treatment for Verminous Bronchitis. Veloppe (*Revue de Pathologie Comparee*, January 1928) after recalling the various drugs employed intratracheally in the treatment of bronchial strongylidiosis, recounts the good results which may be obtained from intratracheal injections of iodine dissolved in benzene, 1 to 10. Tests made on a number of ani-

mals enable the author to conclude that the use of such injections in verminous bronchitis of cattle is justifiable. The treated animals are not inconvenienced except for a marked but transient respiratory syncope. Doses of from 3 to 10 c. c. ($\frac{3}{4}$ dr. to $1\frac{1}{2}$ drs) are perfectly tolerated by the bronchial epithelium even when inflamed. The injection is made slowly and near the anterior extremity of the trachea, preferably through the first intertracheal ligament. The treatment is so effective against worm parasites of the bronchial tree that one or two injections, or in serious cases, four injections, are sufficient to bring satisfactory results.

The North American Veterinarian, May, 1929.

Sjollemo (*Tijd. v. Diergeneeskunde, December, 1928*) believes that food rich in calcium and vitamin D may prove to be preventive of milk fever, although no definite results were obtained from intravenous injection of calcium chloride. The same author advocates intravenous injection of calcium and glucose together with epinephrine, parathyroid extract, and atropine in the treatment of the disease.

N. A. V., May, 1929.

Arecoline-Hydrobromide as an Anthelmintic. The dose rate for arecoline hydrobromide for dogs should be between $\frac{1}{16}$ of a grain for dogs weighing 5 to 10 pounds and $\frac{1}{2}$ grain for those over 30 pounds, according to Ross (*Reprints of the Sidney University, Series 1*) who establishes the dose by experimental tests. It should be diluted at the rate of $\frac{1}{16}$ of a grain to the dram of water ($\frac{1}{2}$ grain to the ounce) for therapeutic purposes, and administered after fasting. It shows a high percentage of efficiency against tape-worms but is ineffective against ascarids and other nematodes. In small, highly strung dogs the dose may be lessened. The safety factor is at least 8 to 16 between the effective and minimum lethal dose.

Reviewing the literature, the author finds that the British pharmacopoeia does not contain arecoline; Hoare says it is not used in canine practice; Quitman does not mention it is an anthelmintic; Milks and Gray consider that it should

not be used in debilitated pups; Brumpt in a splendid work on parasitology does not mention arecoline among the teniacids; Finlay Dun mentions taenaline as a proprietary areca-nut preparation from which recoline has been extracted; and Hall, quoting Lentz, speaks of the efficacy of the drug against tapeworms when given per oz.

Ross attributes the anthelmintic action to a combination of factors, namely, (1) the increased activities of the intestinal glands which appears to make the worms let lose their hold to the mucous membrane; (2) the increased peristalsis which sweeps them onward to be voided with the feces; and (3) to a specific anthelmintic action.

N. A. V., May, 1929.

Tapeworms in Horses. The diagnosis of tapeworms in horses is not always an easy matter, for unless the presence of segments, is detected in the excrement, they cause no characteristic symptoms, notwithstanding a gradual depreciation of the general health, heavy infestations are capable of provoking. The most serious results are observed in weak colts and enfeeble adults or horses debilitated by age. Chronic indigestion; more or less anemia, and periodic attacks of colics not attributable to extraneous factors, and finally careful examination of the feces, macroscopically furnishes the diagnostic evidence.

Oil of terebinth, notwithstanding that it has never been highly rated among the teniacides, is practically specific against equine tapeworms, provided it is given over a considerable period of time. Sometimes only a few doses are required. A two-ounce dose, in capsules followed with one-ounce doses every second day will generally clean out the intestinal tract of tapeworms in a series of ten to twelve doses. The last dose of the series may be increased to two or three ounces and given with a cathartic dose of castor or mineral oil. The horse is kept on a restricted diet during the treatment.

N. A. V., May, 1929.

In the case of cows down with milk fever which revive from the unconscious state and yet remain recumbent,

Caidwell declares that mental lassitude if not just sheer stubbornness is often the cause, and in that event a good hypodermic dose of arecoline will sometimes make them bounce to their feet. *N. A. V., May, 1929.*

Wound Treatment. Any wound treatment that does not reckon with the remarkable phenomena of traumatism is apt to be more harmful than helpful. A wound bleeds to carry away bacteria and foreign material; defensive bodies in the plasma act as antiseptics, phagocytes englobe and dispose of assailable invaders, the blood serum containing, leucocytes form a protecting coating over the raw tissues viable tissues and dead tissues separate from each other and the latter is cast off. As a rule, any interference with the operation of any one or all of these biochemical processes does harm and delays rather than accelerates regeneration. Preventing additional injury and invasion, trimming, and draining out exudates which block regeneration or serve as nourishment for bacteria, is therefore the sum total of what can be done for a wound. Nothing in medicine is more quackish than the use of local applications which do not take these natural processes into strict account.

N. A. V. April, 1929.

New treatment of Malignant Tumor:—Dr. Minervini (*in Reforma Medica, Naples, May, 21, 1928*), says that antimony and salts, especially antimony and potassium tartarate exert a beneficial effect, sometimes have a decided effect in healing process of some cases of malignant tumour. He found that extract of Ipecac root acts most promptly than Emetine. He combined the salt of antimony and potassium with extract of Ipecac, and in a number of cases a complete arrest of all pathological manifestations has been obtained after two or three months of treatment.

Practical Medicins, April, 29.

Destroying dogs with magnesium salts. Authors first summarise the different methods used for destruction of dogs. Shooting, suffocating, poisoning with illuminating gas, potassium cyanide, strychnine, chloroform, ether, morphin and

finally electric current. All these methods are more or less dangerous and cause pain, and death is often delayed.

Jacob reports the destroying of dogs with intracardial injections of magnesium sulphate. He uses 1 c.c. of a solution of 1 gram magnesium sulphate and 1 c.c. distilled water for each pound of body weight. The dog is laid upon a table on his right side and the needle of a syringe containing 10 c.c. of a bodywarm solution is pushed inward and upward between the fifth and sixth ribs behind and above the olecranon. As soon as blood appears in the syringe, the solution is slowly injected and the needle withdrawn. Death occurs in 25 to 50 seconds.

The authors tried injection of magnesium nitrate and magnesium chloride solutions for the same purpose intracardial, because magnesium sulphate, which was used by Jacob is not as soluble in water as magnesium nitrate and magnesium chloride. 1 gram $MgSO_4$ is soluble in 1 gram of water above $15^{\circ}C.$ ($59^{\circ}F.$); 1 gram of $MgCl_2$ is soluble in 0.6 gram of cold water. 1 gram of $Mg(NO_3)_2$ is soluble in 0.5 gram of cold water.

A higher magnesium concentration is therefore available. The solution was made in proportion of 2:1. Dogs above 20 pounds of bodyweight received 10 c.c. of the bodywarm solution. Below 10 pounds of body weight 5 c.c. of the solution. The longest time required to kill was 20 seconds, and the death occurred without any pain or struggle.

Considering the low price of the magnesium salts, which is about 10 cents the pound, the easy and safe application and the quick death, the use of this method should be preferred.—*M. Jensen and G. Slawoff, Berlin. "Tierarztl. Rdsch. No. 5, 1927, page 73"*—Extracted by Oscar Gleuck, Pearl River, N. Y.

The American Veterinarian, June 27.

Extracts

THE ACTION OF PHENOL AND FORMOL ON AEROBIC AND ANAEROBIC ORGANISMS.

BY

JOSEPH P. SCOTT.

(The Journal of Infectious Diseases, Vol. 43, No. 1, July, 28, 90-92.)

The author studied the action of dilute solutions of Phenol and Formol on cultures of spore forming and nonsporeforming organisms. The small phenol stock solutions were made by adding 5 c.c. of melted crystalline phenol c.p. to 95 c.c. of water, and 5% formol solution by adding 12.5 c.c. of commercial 40% formaldehyde to 87.5 cc. of water.

Cultures of the following organisms were employed during the investigation.

Anærobic spore-forming. *C. chauvoei*, *C. septicus*, *C. botulinum A & B*, *C. welchii*, *C. novyi*, *C. tetani*, *C. tertius*, *C. multifermentans* and *C. histolyticus*.

Ærobic sporeforming. *B. anthracis*, *B. subtilis*, *B. mycoides* and *B. megatherium*.

Nonspore-forming anærobes. *Micrococcus gasogenes* and *C. fallax*.

Nonspore-forming anærobes. *Escherichia coli*, *Eberthella bienstockii*, *Micrococcus cereus* and *Staphylococcus aureus*. The cultures of all these organisms were transferred to brain liver medium and ærobes also to liver broth medium, the amount in each tube being 18 cc.

To these were added 2 to 3 c.c. of 5% phenol or 5% formol after 24 to 48 hours incubation making dilutions in 0.5 and 0.75%. From these subcultures at intervals of 2, 4, 6, 15 and 24 hours, also of 2, 3, and 4 days and after one to 3 or 4 weeks at room temperature and at 37°C. were made.

The author's observations are as follows :

"It was found that phenol in strengths of 0.5% (2 cc. of 5% phenol to 18 cc. culture) did not destroy any of the anærobes studied during the course of one month either at room temperature or in the incubator. Strengths of 1% had also no effect. Five per cent solutions sterilized some cultures in a few days, others were not affected for ten days. Isolations of *Cl. chauvoei* and *Cl. welchii* were made from fresh muscle kept in 2% and 5% phenol solution for four days and from material kept in 1% phenol for ten days. Tubes containing muscle covered with 15 cc. of 1% to 2% phenol developed gas and cloudiness when incubated for 24 hours.

Among the ærobes *B. anthracis* and *B. vulgatus* were also resistant to 0.5% phenol for two weeks. *B. coli* was in some cases still viable after ten days on 0.5% phenol brain liver medium. *B. subtilis* was also occasionally found viable after exposure for one week to 0.5% phenol. *B. dysenteria*, *B. mycoides*, and *B. megatherium* were sterilized in from four to seven days.

The Action of Phenol and Formol on Micro organisms 63

The nonspore-forming anærobes withstood concentrations of 0.5% phenol. The nonspore-forming ærobes, however, were destroyed in from 12 hours to two days.

Formol in strengths of 0.5% (2 c.c. of 5% formol to 18 cc. of culture) sterilized all ærobic organisms both spore-forming and non-spore-forming, in six to twelve hours.

The sacharolytic anærobes, *Cl. chauvoei*, *Cl. septicus*, *Cl. tertius*, and *Cl. welchii* were sterilized in 48 hours. The proteolytic types *Cl. tetani*, *Cl. sporogenes*, *Cl. botulinum*, and *Cl. histolyticus* were not readily sterilized by this strength of formol. These organisms were sterilized in four days by 0.5% formol which sterilized the other anærobes in six to twelve hours.

The striking difference between the action of phenol and formol in anærobic and ærobic organisms has led to the use of these disinfectants for the elimination of ærobic organisms during the course of isolation of anærobic cultures. Cultures containing both ærobes and anærobes are purified by inoculating two tubes of brain liver medium containing 0.5% phenol with one loopful of the mixed culture. One of these tubes is then heated to 65°C. for 15 minutes. These two subcultures are incubated for 24 hours, and the process repeated. An agar slant test for ærobes is made each time. After two to five transfers the ærobe will be found to have been eliminated.

It is often possible to hasten the action of phenol or formol by using 24 to 48 hour culture of the mixture. Two c.c. of 5% phenol or 2 c.c. of 5% formol is added to the culture medium which is then heated to 75 or 80°C. for five minutes. After cooling subcultures are made to fresh brain liver medium and to agar slants. One such treatment is usually sufficient to eliminate the ærobe.

The older the culture the greater heat can be applied. Leclainche and Vallee find that spores of 24-hour cultures of *Cl. chauvoei* are killed at 70°C. in one-half hour. Four day old spores resist a temperature of 80°C. for two hours and 95°C. for one-half hour. Dry spores are not killed at 100 to 105°C. for one-half hour. Two-tenths cc. of commercial 40 cc. formol seemed to have a greater efficiency than 2 cc. of 5% formol in the sterilization of anaerobic cultures.

The possibility of pathogenic anærobes developing in biological products containing 0.5% phenol and causing disease must be guarded against by special care in the production of these products. Anærobic culture mediums such as brain, liver or meat piece mediums should be included in all sterility tests and should be inoculated with from 5 to 10 cc. of the material to be tested. Recent reports of losses in cattle and poultry following the use of biological products have been proved to be due to the presence of pathogenic anærobes or their toxins in the products used.

SUMMARY.

It is shown that phenol in strengths up to 5% acts very slowly on anaerobic organisms, while formaldehyde in dilutions of 0.5 to 0.75% sterilizes anaerobic cultures rapidly.

The greater susceptibility of aerobic spore-forming organisms to these disinfectants make it possible to eliminate aerobic contaminations from anaerobic cultures by the use of 0.5% phenol or formal.

SURRA IN A PACK OF FOX HOUNDS.

BY

F. WARE, F.R.C.V.S.

(*Jl. Comp. Path. & Therap.* 1928 Sept. Vol. 41 No. 3 pp. 249-254.
Abstract in Tropical Veterinary Bulletin 1928,
 Vol. 17. No. 1. Pages 1-2.)

An account is given of an epidemic of surra which obliterated a pack of imported foxhounds.

The first animal died suddenly and on the following day another was seen to be ill, but it recovered and was able to hunt two days later. A few days later relapse occurred and the hound died. Within a week of the appearance of disease in the pack ten couples of hounds were taken ill and three died. Anthrax was suspected, but the evidence afforded by the animals' temperatures negative this. Nevertheless, the whole pack was treated with anti-anthrax serum. Many more hounds fell sick and five couples died within the next few days. Examination of a blood smear of one of these showed that trypanosomes were present.

In the early stages of the disease the only symptom appeared to be fever. The animals retained their appetites and were quite bright. The next symptom was a clouding of the aqueous humour and a sinking in of the eyes with protrusion of the membrana nictitans. Then dullness and loss of appetite were noted, a staggering gait, and acceleration of pulse and respirations. Later nervous symptoms set in twitching of the limbs, and then coma.

A fairly constant complication of the chronic cases was a severe dermatitis which responded to no ordinary treatment. Animals for the most part recovered consciousness for a variable period before death occurred. In a few instances symptoms resembling those of furious rabies appeared before coma set in.

Novarsenobillon was given intravenously in 0.45 gm. doses with 0.3 gm. given ten days later, but it appeared to have no effect beyond prolonging the course of the disease?

Some were treated with Bayer 205, but without satisfactory results. Possibly better results might have been obtained if this drug had been given earlier.

An interesting feature of these occasional outbreaks of surra in the dog is the question of the method of infection and there is some body of opinion in India to support the view that it is by ingestion.

In the epidemic in question the following points are noted. The kennels were very free from parasites, and further horses stabled near by did not contract the infection. Two and a half couples of hounds which arrived from England on December 7, 1926, were not included in the hunting of the 23 couples involved and did not become infected.

There is little possibility of Tabanidae being involved as flies are very seldom seen biting dogs of any kind in India and, as already stated, no horses were infected. It is specially noted that there was definite evidence of mortality occurring simultaneously among large animals and jackals in the region where the pack hunts.

Possibly ingestion was the method of infection.

OBSERVATIONS ON RINDERPEST

BY

R. DAUBNEY

(*Jl. comp. Path. & Therap.* 1929. Sept. Vol. No. 3. pp. 228-248.
Abstract in Trop. Vet. Bulletin, 1929, Vol. 17. No. 1. pp. 24.
 and 25.)

Daubney finds that 0.001 cc. of whole blood is a reliable small infective dose for experimental purposes. The incubation period following this dose is quite regular, and very little longer than that following a dose of say 2.5 c.c.

In a number of experiments it was shown that the virus is closely attached to the leucocytes, and attempts were made to detach the virus from them. It was thought that the virus might simply be absorbed to the leucocytes and that detachment might be achieved by alteration of physical conditions. As apparatus for subjecting blood to cataphoresis was not available resort was had to replacement of the plasma by lightly buffered solution which were more acid and more alkaline than normal plasma.

In every case negative results were obtained, but it was found that the virus in the cells was destroyed by acid solutions of pH 4.5.

All attempts to cultivate the virus have failed, and it is specially noted that Gye and Barnard's method was included in the experiments. From these latter experiments the fact emerged that the rinderpest virus is killed readily by chloroform and that such killed virus has no antigenic powers.

In connexion with immunization against rinderpest the author draws attention to the disadvantages attaching to the serum-simultaneous method, namely the risk of forming a new centre of infection and the transmission of protozoan parasites.

Occasional success in conferring immunity by means of sub-infective doses of spleen pulp led the author to experiment with that material as a vaccine. The use of formalized virus in foot-and mouth disease suggested a similar treatment of spleen pulp for the purpose of preparing a rinderpest vaccine.

A small number of experiments have been carried out using spleen, blood liver, lymph glands, and kidney treated with varying strengths of formalin, and for the most part incubated at 37°C. for 72 hours. The indications appear to be that the weaker the formalin the better the result with spleen pulp. Lymph gland and kidney appear to be of lower value as formalized vaccine, while blood and liver are apparently valueless.

ANTI-RINDERPEST SERUM-PRELIMINARY FIELD RESEARCH IN UGANDA

BY
CARMICHAEL

(*Jl. Comp. Path. & Therap.* 1928. Sept. Vol. 41. No. 2. pp. 185-190.
Abstract in Trop. Vety. Bulln. 1928. Vol. 17. 1. 25-26.)

In a previous paper Richardson and Carmichael reported upon the control of an outbreak of rinderpest by means of locally produced serum. The earlier brews of serum were of remarkably high titre. 10 c. c. of serum blocked out the reaction due to a simultaneous inoculation of 2 c. c. of virulent blood. The animals used weighed 400-500 lb.

The potency of this serum gradually declined until a dose of 100 cc was required per 100 lb. weight. At this level it remained constant.

The original serum producers were animals which had recovered naturally, which were hyperimmunized with 3,000 cc. virulent blood.

It appeared to be reasonable to suppose that if naturally recovered animals could after hyperimmunization yield so powerful a serum, then the serum of such animals could be used before hyperimmunization in doses of practicable size for the control of outbreaks in the field.

If this could be established then in an outbreak of the disease or in an area where the disease is enzootic, the serum of recovered animals could be used on the spot, eliminating hyperimmunization, transport and serum-producing plant.

The opportunity to test this view came about a year later, when an outbreak occurred on the eastern border of the Protectorate.

The opportunity was taken to determine the relative value of serum from various types of animals, and the practicability of serum production in the absence of laboratory facilities.

Serum was tested from three groups of animals. (1). Those which had recovered from a natural attack. Those obtained for the purpose had recovered eleven, seven, and four weeks previously. (2) Animals subjected to the serum simultaneous inoculation with thermal and clinical reactions. (3) Animals, immunized 6 weeks previously which had shown no reaction to the inoculation.

In all 108 animals were used for the experiment with 4 controls.

A tabular statement shows the number of animals used in each section of the experiment, the dose of serum given (both rate per 100 lb. and actual dose), and the mortality in each section.

Six animals were treated with 2 c. c. of virus and 50 to 100 c. c. of serum from a doubly inoculated animal which had shown no evidence whatever of reaction. Five of these died.

Twenty-four had serum from an animal recovered 7 weeks previously. Of these six died. Twenty-one were given serum from an animal which had recovered from a natural attack four weeks previously. All of these survived.

Ten were treated with virus and a mixture of serum from recently recovered animals. One died.

The general reactions to the inoculations are summarised as follows:

Serum from "blocked out" reactors-very severe, despite large doses.

Serum from artificially immunized animals-marked.

Serum from naturally recovered animals-the severity of the reaction was inversely as the dose used.

In 13 out of 31 animals which received 50 cc. of serum from naturally recovered animals, "blocked out" reactions resulted. The results in general indicate that the protective value of the serum is in direct relationship to the severity of the original reaction of the serum producer. Hyperimmunization would appear to increase the titre in the same proportion. It is confirmed that the "blocked out" reaction confers immunity.

THE ETIOLOGY OF BLACKLEG AND METHODS OF DIFFERENTIATING CLOSTRIDIUM CHAUVAEI FROM OTHER ANAEROBIC ORGANISMS FOUND IN CASES OF BLACKLEG

BY
JOSEPH P. SCOTT

(*Cornell Veterinarian*. 1928, XVIII, 3, 259-271)

The author reviews in full the cause of Blackleg. He gives introductory remarks as under:—

"Blackleg is essentially a disease of young cattle, but it sometimes affects aged cattle and sheep. The symptoms of the disease are lameness followed by swellings over the muscles, prostration, and death in from twenty-four to forty-eight hours after the symptoms—first develop. The lesions on autopsy are oedema of the subcutis, an accumulation of varying amounts of gelatinous exudate, considerable dark red black fluid exudate and some gas. The affected muscles are dry and contain gas bubbles and black spots or areas which—give them a mottled appearance. Adjacent muscles are normal.

"The internal organs are almost normal in appearance. There may be some gas in the liver and kidneys which may also show yellowish degeneration. The liver may show the typical yellow degenerated—areas, and the kidneys the punctiform or confluent infarcts described by Warringholz. The heart is in diastole and contains a large black clot.

"Morito finds that the pathological changes in the muscles and skin are of an inflammatory nature. There is first a serous transudation which becomes sero-fibrinous and discolored with the products of hemolysis. The muscles undergo cloudy swellings, waxy degeneration and coagulation necrosis followed by myolysis. There is a marked oedema which always precedes gas formation. Gas formation is slight and may be absent. Morito finds that degeneration of the adrenals is of great significance. Warringholz and Rassfeld lay great emphasis on the changes found in the liver and kidneys by which they are able to differentiate true *Rauschbrand* (Forth) from *Pararouschbrand* (Kitt) caused by *Clostridium septicus*. Bacteriological examination confirmed—their diagnosis in nearly all of seventy-eight cases examined. Warringholz in 1908 describes cases of blackleg in very young calves where practically no pathological lesions were found."

In etiology of the disease he states that it is caused by an anaerobic organism *Clostridium chauvæi*. It is motile, spore forming rod, 4 to 7 μ , long, 0.5 μ broad, spores oval in shape and are situated in the subterminal position, no sporulation readily in body tissues or in ordinary culture media, spores produced fairly readily on liver-agar or blood agar slants grown by the alkaline pyrogallol acid method of Wright. Then he describes other characteristics of this organism.

He contends that *C. chauvæi*, usually gains entrance to the body through the intestinal tract. "Cases of blackleg developing in the hind or fore quarters of the body have been found following castration or dehorning; in these cases no lesions were found near the castration or dehorning wound."

As the result of his study on ninety-nine strains of *C. chauvæi* he gives the following cultural characteristics of the organism.

"Cultural Characteristics.—*Clostridium chauvæi* is a saccharolytic anaerobe. It does not attack coagulated albumin. Milk is usually unaffected, though gas and a slight clot may be found, especially if fre

blood is added. Rottgardt finds that Tarozzi milk, milk containing small pieces of meat, is coagulated without formation of whey. *C. septicus*, on the other hand, forms a hard clot with expression of whey. *C. tetani* is said to cause the complete digestion of the coagulum.

Gelatine is liquefied by *C. chauvæi*, especially if the peptone used contains iron or if a trace of ferric sulfate is added. There is no blackening of the precipitate.

C. chauvæi does not grow in 2 per cent glucose agar, according to Goss, Barbarin, and Haines.

Clostridium chauvæi ferments glucose, lactose, and saccharose but does not ferment glycerol, inulin, or salicin. In several tests, media which gave good fermentation reactions with *C. septicus* failed to allow *C. chauvæi* to develop and all fermentations remained negative. This was especially true when meat infusion media was used, but also occurred when liver infusion media formed the basis for the sugar free substratum. The cause of this failure could not be determined; the same peptone and about the same hydrogenion concentration were used in all cases. The use of phosphates and a trace of ferric sulfate greatly reduces these failures. The sugar tubes were inoculated by means of a Pasteur pipette, the vaseline seal being liquefied in the flame. Gas formation was noted as a growth reaction but fermentation was determined by removing one cubic centimeter of the medium after incubation, placing this on a porcelain or enamel dish and testing for acid production by the use of brom thymol blue.

The surface colony formation of *C. chauvæi* and other anaerobes has been used by Zeiszler as the chief basis for the differentiation of these organisms. This, as Schnurer points out, has led to the division of the disease into blackleg, and para-blackleg Meiszner. Schnurer considers that this division beclouds the issue. Colony formation is a very poor criterion for the differentiation of organisms, and surface methods are probably less reliable than deep agar colony methods for the isolation and identification of anaerobes.

Surface methods should not be used alone in the isolation of anaerobes.

Then he deals with *C. septicus* (*Vibrio septique*).

"At the Kansas Agricultural Experiment Station during the past ten years over 150 samples of material from cases of black leg and from disease reported as blackleg have been examined. Whenever fresh material from cases diagnosed as blackleg by a competent veterinarian has been examined, *C. chauvæi* has been isolated, either alone or in a few instances associated with other organisms. In a few instances in which the material was atypical, or the history uncertain, only *C. septicus* or *C. welchii* could be found, though there is the possibility that *C. chauvæi* was also present.

It is not easy to reisolate *C. chauvæi* from mixed cultures of anaerobes even if these cultures are mixed intentionally and both organisms are known to be present. Even first attempts to separate the organisms in

such mixtures have failed. In studying pathological material it is usually only possible to attempt one series of isolations. It is probable that if greater time could be spent many cases in which *C. septicus* or *C. welchii* were found alone would also reveal the presence of *C. chauvæi*.

"*Clostridium welchii* has been reported in material obtained from cases of blackleg by Warringholz and Rassfeld, Karman and Seired, Zwick, and Wagener. This laboratory has isolated it seven times from cases from which *Clostridium chauvæi* was also isolated, once with *C. novyi* once with *C. sporogenes*, and a few times alone in material from animals vaccinated with commercial aggressions before shipment to the owners, the disease in these cases occurred from two weeks to two months after vaccination. Recently a case of clinical blackleg was studied from which *C. septicus* and *C. welchii* were isolated.

"Seven strains of *Clostridium novyi* have been isolated from blackleg cultures or material obtained from cases of blackleg. The first strain was obtained in connection with *C. welchii* in a case of clinical blackleg. A second strain from dried sheep muscle which also contained *C. tertius* and *C. sporogenes*. *C. chauvæi* was reported to have been isolated from this material some months previously in India. Two samples of dried muscle virus sent to this laboratory as blackleg virus, contained *C. novyi* only. The fifth strain was obtained from the atypical *C. chauvæi* culture (Reddish) previously reported by Scott. On first examination, this type was atypical in reactions and in its power to grow in 2 per cent glucose agar. One culture of this strain kept in the ice box for four years contained only *C. novyi*. Another culture having the original characters yielded *C. novyi* after repeatedly growing in 12 per cent glucose medium and also by repeatedly heating young cultures to 80° C. in media containing 0.5 per cent phenol, and 0.5 per cent formaldehyde. The sixth strain was isolated from a case of clinical blackleg. A study of a recent outbreak of blackleg-like disease in a flock of lambs revealed the presence of *C. novyi* in these cases."

He gives the following summary :

1. It is shown that *C. chauvæi* is the primary cause of blackleg.
2. *C. septicus* and other anaerobes may be associated with *C. chauvæi* in the production of blackleg in cattle.
3. *C. chauvæi* is shown to be a diffident saccharolytic fermenting organism. It is comparatively susceptible to heat and drying.
4. Differentiation of *C. chauvæi* depends upon morphological and culture characteristics and on the serum protection test.
5. Ninety-nine strains of *C. chauvæi* obtained from United States, England, Ireland, France, Switzerland, Germany, South Africa, Argentina and Brazil have been examined and found to be identical in all respects".

In appendix the author has given a scheme for the isolation of *C. chauvæi*.

"Isolation of *C. chauvæi*." Inoculate four tubes containing 18 cc. of brain medium with the material to be examined. Add 2 cc. of 5 per cent

phenol to two of these tubes. Heat one phenolized tube and one other to 65 degrees for 15 m. Incubate at 37 degrees centigrade. Inoculate three 1 per cent agar dilution tubes from each tube showing growth. Pour into Burri tubes. Incubate. Pick out isolated colonies and repeat till at least four agar transfers have been made. A guinea pig should also be inoculated with the material and isolation made from the lesion and from the heart blood.

"Media.—Brain liver medium. Equal weights of liver and brains are ground up separately then cooked with water. The brains are pressed through a potato ricer, the liver broth is made up to 1000 cubic centimeters per pound liver, 2 per cent peptone. 1 per 1000 glucose, 1 per 1000 ferric dication of growth, but must not be used as criterion of fermentation. This is determined by removing one cubic centimeter of the culture from below the seal, placing it into a porcelain dish and adding brom thymol blue."

A NOTE ON SPIRILLUM MINUS (CARTER), THE CAUSATIVE ORGANISM OF RAT-BITE FEVER.*

BY

DR. M. J. PARMANAND, M. D. (BOMB)

(From the Adams-Wylie Memorial Hospital and Pathology Department of the Seth Gordhandas Medical College.)

The Author of this note investigated a few cases of rat-bite fever at the Adams-Wylie Hospital in the year 1922. A detailed description of the morphology of the causative spirillum and the technique employed in isolating and demonstrating the organisms was then given (Parmanand, 1923.)

Most workers on this subject have recognised the difficulty of staining the flagella of *Spirillum minus*, the causative organism of rat-bite fever. Futaki (1917), the discoverer of this organism in his article says that "the flagella may or may not become stained by Giemsa's stain or silver solution." Adachi (1921) recommends fixation of the smears with methyl alcohol or osmic acid vapour and staining with Akashi's solution rendered slightly alkaline. Akashi's solution, he says, is a modification of Giemsa's stain. He further states that "it was not always possible to obtain the same staining power though the method of preparation was always the same." Mackie and McDermott (1926) however appear to have obtained satisfactory results with this method. "Staining of the flagella was only occasionally achieved" by Mooser (1924), but he was able to demonstrate them more easily by Burri's method. Robertson (1924) encountered the same difficulty and says that "for some reason the flagella are very difficult to stain and even using the same technique constant results could not be obtained." Knowles (1928) stains his specimens with Tribondeau's modification of Fontana's stain and in his experience this method brings out the terminal flagella with considerable constancy.

* Indian Medical Gazette April 1929.

The presence of flagella in my strains of the organism was first noticed in specimens stained by the usual Fontana's method. Since then I have been able to demonstrate them by the Indian ink method on repeated occasions. I must here state that the only brand of ink found suitable for the purpose is "Pelican" brand Indian ink made by Gunther and Wagner. The number of successful preparations showing the organisms with flagella were very few indeed. An attempt was then made to find out a good method for staining the flagella and the following modification of Fontana's method was devised and was found to give a greater number of successful preparations than any other method:—

(1) *Solution No. 1 (Fixative).*

Formalin.	...	20 c. c.
Aqua distill	...	100 c. c.

(2) *Solution No. 2 (Mordant).*

Tannic acid.	...	20 G.
Aqua distill	...	100 c. c.

(3) *Solution No. 3*

Silver nitrate	...	5 G.
Aqua distill	...	100 c. c.

This solution is ammoniated before use till one gets a faintly opalescent fluid. The method of staining is the same as in the original Fontana method. The smears must be thin and the slides must be warmed carefully after sufficiently flooding them with solutions No. 2 and No. 3.

The smears or portions of smears in which the plasma layer has remained unruffled and do not show any tears under the microscope, contain the best specimens of the organism showing the flagella. I generally prepare a dozen smears from the blood of an infected guinea-pig and stain them by the above method and am able to get at least two or three good preparations showing the organisms with unmistakable flagella.

Recently, however, I have been using the method recommended by Coles (1926) of relief staining with a saturated aqueous solution of nigrosin. The organisms appear white against a uniformly blue background. The flagella are clearly brought out by this method of relief staining. The technique is precisely the same as in the Indian ink method, but the slides must be absolutely clean and grease free.

Some observers have occasionally come across more than one flagellum at each end. This appearance, however, is said to be produced by the fraying of the flagellum brought about by the action of fixatives and mordants used in the various processes of staining. Futaki, Takaki, Taniguchi and Ohsumi (1917) also noted two terminal flagella in some of their preparations. But later on Futaki, Takaki, Taniguchi, Ohsumi, Ishiwara and Ohtawara (1925) concluded that this was probably due to some technical errors, and further say that "this organism has only a single long flagellum at each end of its body." Robertson (1924.) observes that the appearance of multiple flagella at each end "seems to be more the result of the fixative than a

characteristic of the parasite, as in fresh specimens in which the movements have showed it has only rarely been possible to demonstrate more than one flagellum." McDermott (1928) stained his specimens with Adachi's method and found one to seven flagella at each end of this organisms. The author of this note has occasionally encountered organisms showing two flagella at each end in films stained by the modified Fontana's method but has never seen more than one flagellum at each end when the organisms are observed in the living condition under dark-ground illumination.

Finally several attempts were made to cultivate the organisms in Noguchi's and Joekes' media but they were all unsuccessful.

The photomicrographs were taken in the Pathology Department of the Seth Gordhandas Sunderdas Medical College, with Bausch and Lomb's euscope with the camera attachment.

ACKNOWLEDGEMENTS.

I am grateful to Professor V. R. Khanolkar, M. D., B. Sc., (Lond.), Professor of Pathology and Bacteriology at the Seth Gordhandas Sunderdas Medical College, for giving me an opportunity to work in his Department and also for much kindness and advice. My thanks are also due to Dr. R. N. Parmanand, Medical Officer, in charge of the Adams-Wylie Memorial Hospital, for giving me facilities in obtaining clinical and other material.

Association News.

THE MYSORE VETERINARY MEDICAL ASSOCIATION.

The First Annual Meeting of the Association was held at "Mashie Lodge," Lal Bag Road, Bangalore, at 8 A. M. on Sturday, the 22nd June, 1929. Dr. L. C. Coleman, M. A., Ph. D., Director of Agriculture in Mysore, presided on the occasion.

Proceedings of the meeting will be published in the next issue of the Journal.

Departmental News.

C.V.D., Madras.

Mr. F. Ware, F.R.C.V.S., the Director of Veterinary Services, Madras, has been transferred to Muktesar as Director in place of Dr. J. T. Edwards.

Mr. T. J. Hurley, M.R.C.V.S., Ag. Principal, Madras Veterinary College, has been appointed as the acting Director of Veterinary Services to the Government of Madras in place of Mr. F. Ware.

Mr. V. Krishnamurthi Iyer, I. V. S., Professor of Pathology and Bacteriology, Madras Veterinary College, has been appointed as the acting Principal, Madras Veterinary College, in place of Mr. T. J. Hurley.

Mr. K. Kylasam Iyer, G.B.V.C., Circle Officer, C. V. D. Madras, Coimbatore, has been taken into the staff of the Madras Veterinary College.

Mr. H. C. Sampath Iyyengar, G.B.V.C., Circle Officer, Coimbatore, who was on leave, has been transferred to the Fourth Circle, Madras, vice Mr. D'Costa.

Five more circles have been sanctioned during the current year, out of which two have already been opened, one at Nellore and the other at Trichy.

Mr. A. L. N. Somayajulu, Veterinary Assistant Surgeon, Veterinary Hospital, Berhampore, has been appointed as acting Circle officer, Nellore Circle.

College News.

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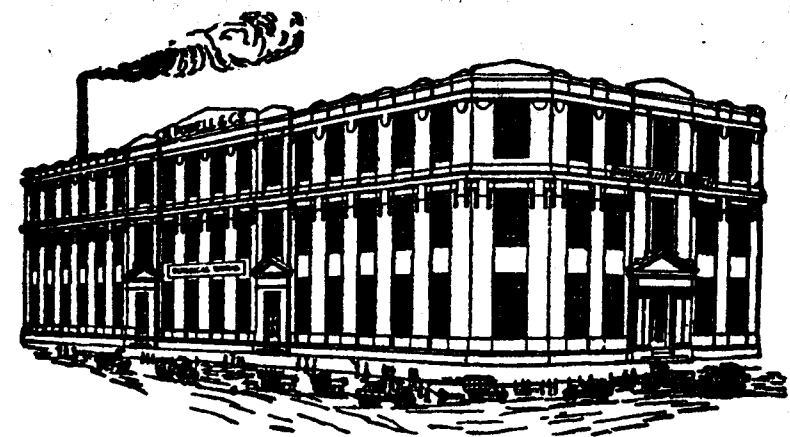
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