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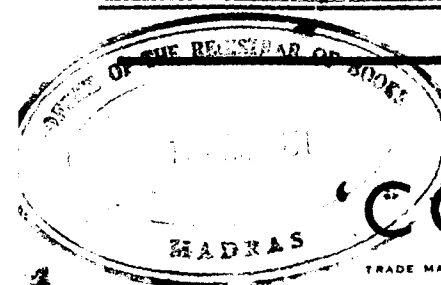
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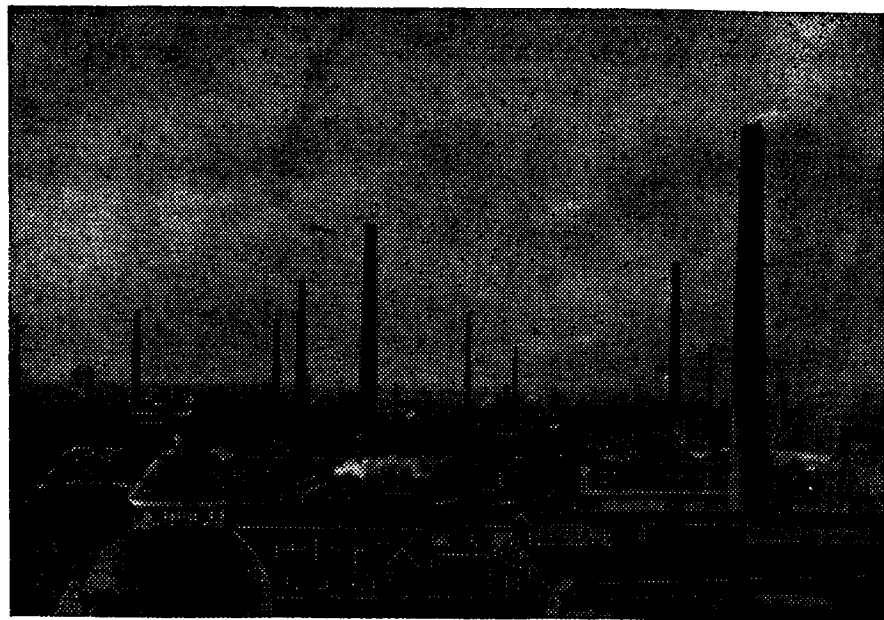
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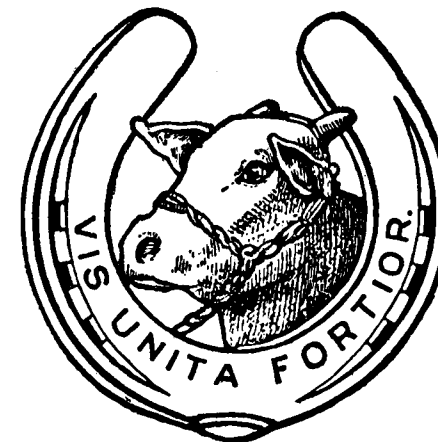
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(ESTD. 1924)

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SEPTEMBER 1950

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THE

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SEPTEMBER, 1950

No. 2

General Articles

STUDY OF THE SYMPTOMS AND POSTMORTEM LESIONS IN FOWLS EXPERIMENTALLY INFECTED WITH RANIKHET DISEASE VIRUS

BY

S. GUHA., AND S. N. CHATTERJEE,

*Animal Genetics Section, Indian Veterinary Research Institute,
Izatnagar U.P.*

Introduction

Ranikhet disease, a scourge of poultry, is variously known as Newcastle Disease, Doyle's Disease, Fowl Pest, Pseudo-Fowl Plague, Korean Disease, etc. It is a virus disease causing immense loss to poultry industry. It is known as Ranikhet disease in India because its occurrence in a farm at Ranikhet was for the first time reported by Dr. Edwards in the Annual report of the Imperial Institute of Veterinary Research, Mukteswar, for 1927-28. Later Cooper (1931) proved it to be immunologically indistinguishable from the Newcastle disease discovered by Doyle (1927). Natural outbreaks of the disease from various parts of India have since been reported by Kylasamier (1931), Sahai (1937) and other workers.

• Symptoms and lesions of the disease as observed in natural outbreaks in India have been studied and described in details by Kylasamier (1931), Sahai (1937), Kaura and Iyer (1937) and others. Cooper (1931) and Kylasamier (1931) have also described the symptoms and postmortem lesions observed in a small number of experimentally infected birds. Iyer (1943) has exhaustively dealt with the symptoms and postmortem lesions of Newcastle disease of over two thousand experimentally infected birds while working at Weybridge, England.

In connection with an experiment recently undertaken at the Animal Genetics Section, Indian Veterinary Research Institute, Izatnagar, for raising a Ranikhet-disease-resistant strain of fowls, a very large number of birds were experimentally infected with virulent Ranikhet-disease virus from a strain maintained at Mukteswar. This offered an unique opportunity of studying in details the symptoms and post-mortem lesions in artificially infected fowls.

Method and Material

1679 eight-week-old chickens, consisting of 826 Rhode Island Red (R.I.R.), 685 white Leghorns (W.L.H.) and 168 Desis were injected in three lots of 538, 553 and 588. The infecting material consisted of emulsion in plain distilled water of liver and spleen tissues removed under strict aseptic conditions from fowls suffering from the disease after slaughter. Fresh emulsion was used on one occasion whereas in two others, emulsions prepared in the previous evening and kept overnight in the refrigerator, were used the following morning. The mode of infection was by subcutaneous injection in doses varying from 0.3 to 1.0 ml. The site of injection in the majority of cases was on the breast and only in a few in other places. In the second lot 20 birds escaped inoculation getting mixed up with the infected flock accidentally. This, however, had no effect, whatsoever, on the course of the disease and all the birds in that group succumbed to infection.

Observations

The injected birds were carefully observed daily for the development of the symptoms of the disease. The manifestation of the symptoms was noticed in the evening of the second day of inoculation at the earliest and on the sixth day at the latest, the day of inoculation being considered as the "0" day. The symptoms observed did not differ from those reported in natural outbreaks in India. A number of birds appearing apparently healthy in the evening were found dead the following morning, representing peracute cases.

The common symptoms observed were: drowsiness; ruffled feathers; cyanosed comb and wattle; off feed; rise in temperature; increased thirst; dullness with a tendency to stand in a sleeping posture with the head drawn towards the body, turned toward the ground or hidden under the wings; tenacious mucous discharge from the beak and rarely from the nose; diarrhoea sometimes streaked with blood and mucus in later stages; soiling and matting of feathers around the vent; distressed heavy respiration and in some advanced cases gasping inhalation through half-open beak; lameness accompanied by paralysis of the legs and wings; nervous affection indicated by convulsive movements of the head and legs and in some cases the whole body. In advanced cases fowls lie on the floor with their beak turned

SYMPTOMS IN ARTIFICIALLY-INDUCED RANIKHET DISEASE



Fig. 1. (a) Fowl with advanced paralysis.
(b) Fowl standing in sleeping posture.

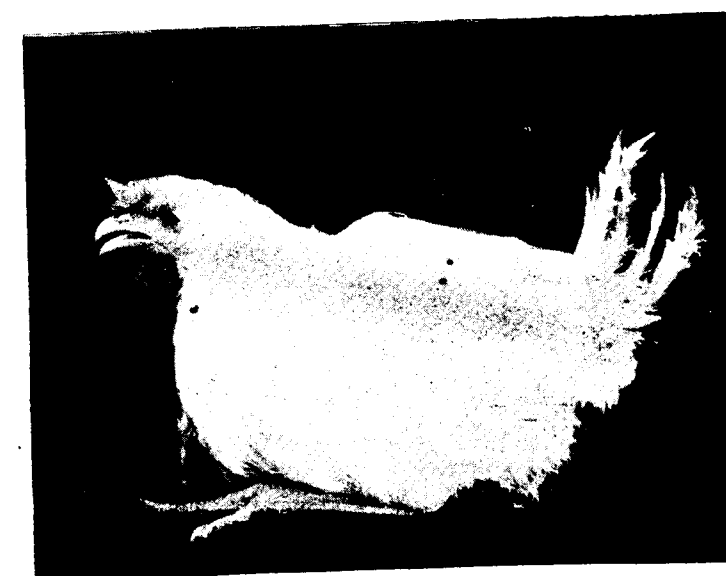


Fig. 2. Fowl showing paralysis of legs and distressed respiration through half-open beak.

POST-MORTEM LESIONS IN ARTIFICIALLY-INDUCED RANIKHET DISEASE

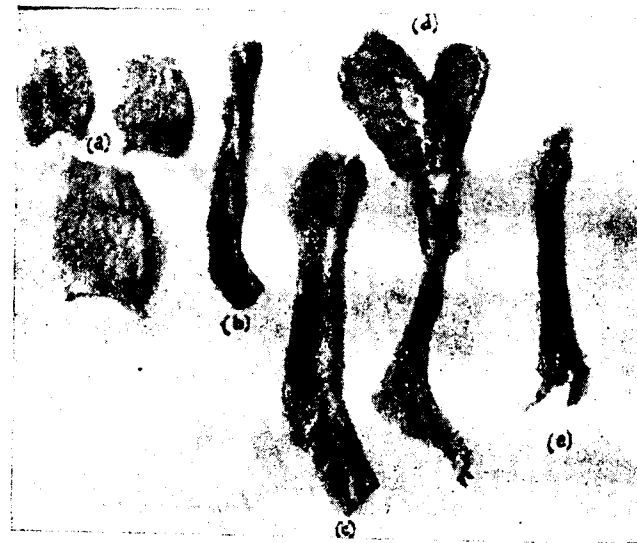


Fig. 3. (a) Proventriculi showing petechial haemorrhages.
(b) Part of intestine with ulcers.
(c) Duodenum with necrosed ulcers.
(d) Caeca, Rectum and Cloaca with ulceration and bran-like ulcers.
(e) Cloaca with extensive ulceration.



Fig. 4. Mottling of the proventricular wall.

down to one side and flutter vigorously just before death. In contradiction to our observation, Cooper (1931) noted distinct fall in temperature before the symptoms appeared in artificially infected fowls. A distinct rise in temperature at the onset of the disease was noted by us. Kylasamier (1931) reported discharge from the eyes in some cases of artificially infected birds but no such case was noticed in the present observation.

There was not a single survivor among 1091 birds inoculated in the first two lots excepting a grade W.L.H. cock which was obtained from Nagpur with a report of having survived a natural outbreak of Ranikhet disease and retested by us for immunity. In the third lot of 588 fowls only two survived (R.I.R.). Out of a total of 1679, there were only 3 survivors (including the immune cock) giving a mortality rate of 99.82%. The day-to-day mortality and the average survival period of the birds dying after inoculation have been shown in Table I. From the table it will be seen

TABLE I

Day-to-day mortality and average survival period of experimentally infected fowls.

Days after inoculation.	Number of fowls dead.	Average survival period.
1	6*	
2	3*	
3	374	
4	1045	
5	206	3.9 days
6	24	
7	12	
8	1	
9	0	
10	1	

* Death due to exhaustion or injury caused during transit.

that the average survival period was 3.9 days. Consistently in all the lots the peak of mortality was reached on the fourth day. The course of the disease was shortest in the first lot of birds, being only six days, and longest in the third lot covering a period of ten days.

Post-mortem examination was conducted in 1644 fowls and no lesions were observed which could be said to be characteristic of artificially induced infection. It was not possible to observe the postmortem lesions in the remaining fowls either due to advanced putrefaction or because of gross mutilation by other birds. Subcutaneous haemorrhages in various regions of the body and more frequently around the stifle joint were observed in a small number of cases. Distension of the crop with foul-smelling gas and

dirty fluid was a frequent finding. In very few cases gelatinous exudate under the skin in front of the crop and on the throat was noticed. In some fowls, trachea showed congestion and presence of small quantity of mucus. Congestion of the keel-bone was not an infrequent finding. Lungs, kidneys and liver showed a little congestion in some cases. In very small number of birds, accumulation of clear serous fluid in the pericardial sac or in the peritoneal cavity was noticed. Mottling of the serous surface of the proventricular wall was a very frequent finding and the villi of the mucous membrane showed petechial haemorrhage in a large number of cases. Many birds did not show any petechial haemorrhage on villi but congestion and presence of haemorrhagic areas on the mucous membrane of the proventriculus, more frequently at either ends, were quite common. Affection of the intestinal tract was a constant finding and the duodenum showed dark congestion and ulceration in the largest number of cases, presence of congestion, ulceration in various degrees with bran-like deposits and caseation on the mucous membrane of ileum, caeca, ileo-caecal valves and cloaca were also very frequently observed. In some cases the entire length of the intestine was badly congested and covered with ulceration and necrosed tissue. Congestion of the coronary vessels and petechial haemorrhages on cardiac fat were found in a number of cases. Pin-point haemorrhage on the gizzard fat was occasionally observed and similar lesions on intestinal fat and other areas were seen in a few birds. The frequency of incidence of some of the commonly observed lesions has been worked out (Table II). Mottling on the

TABLE II

Frequency of incidence of different post-mortem lesions:

Nature of lesions.	Number of fowls examined.	Number of fowls showing lesions.	Percentage
1. Mottling of the wall of the proventriculus.	1644	1473	89.60%
2. Petechial haemorrhage on the villi of the mucous membrane of the proventriculus.	1644	1146	69.64%
3. Petechial haemorrhage on the cardiac fat.	1644	604	36.74%
4. Petechial haemorrhage on gizzard fat.	1644	154	9.37%

wall of the proventriculus was seen in 89.60% of cases, 69.64% showed petechial haemorrhage on the villi of the mucous membrane of the proventriculus, 36.74% showed petechial haemorrhage on the cardiac fat and similar haemorrhage on the gizzard fat was noted in 9.37% of cases. The

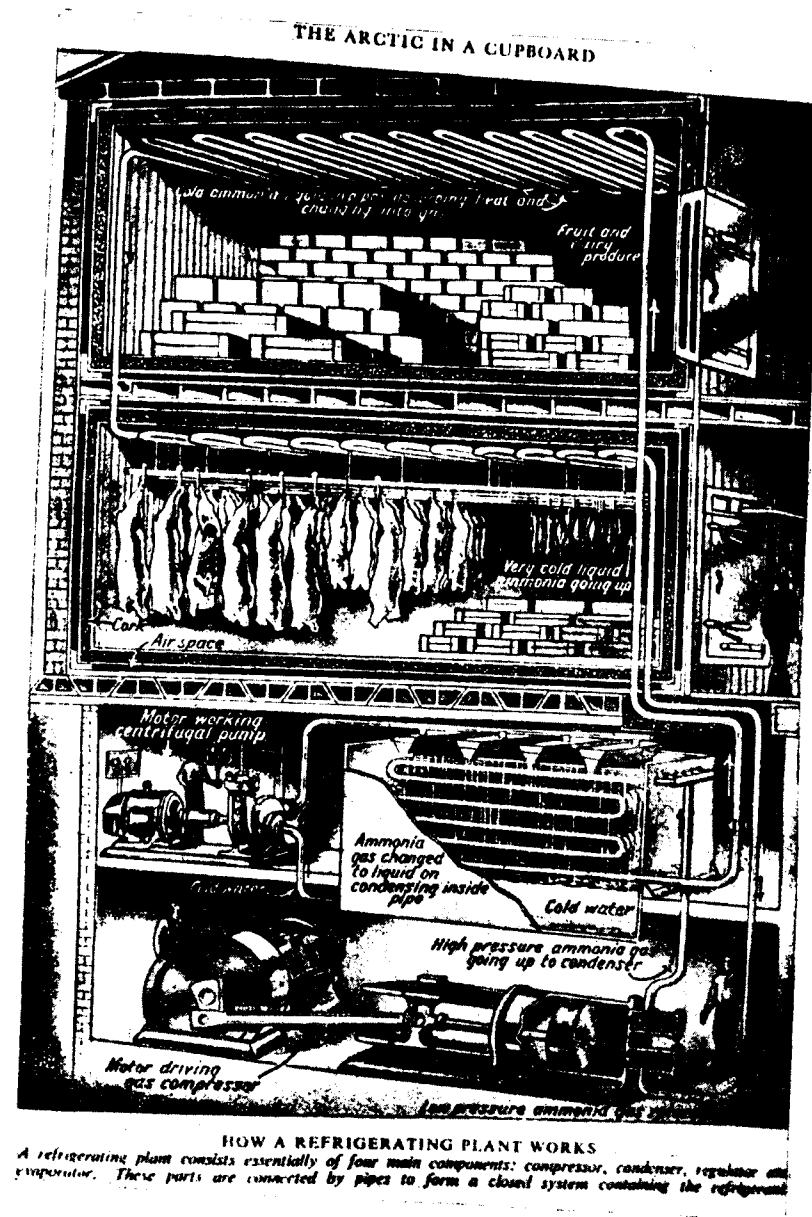
POST-MORTEM LESIONS IN ARTIFICIALLY-INDUCED RANIKHET DISEASE



Fig. 5. Heart and proventriculi showing petechial haemorrhages.



Fig. 6. Petechial haemorrhages on the gizzard fat.



THE ARCTIC IN A CUPBOARD

(To face article on page 95.)

incidence of these lesion breed-wise is shown in Table III. There is no marked variation in the incidences in the different breeds.

TABLE III
Showing the Breed-wise incidence of different post-mortem lesions.

S. No.	Breeds.	No of fowls examined.	Mottling of the wall of proventriculus.	Petechial haemorrhage on the villi of mucous membrane of proventriculus	Petechial haemorrhage on the cardiac fat.	Petechial haemorrhage on the gizzard fat.
1.	Rhode Island Red	802	689 (85.91%)	566 (70.57%)	272 (33.91%)	35 (4.36%)
2.	White Leghorn	674	625 (92.73%)	447 (66.32%)	291 (43.17%)	108 (16.02%)
3.	Desi	168	159 (94.64%)	132 (78.57%)	41 (24.40%)	11 (6.55%)

Summary

1. The symptoms of the disease in experimentally infected fowls were quite similar to those suffering from natural infection.
2. The symptoms were manifested late on the second day of inoculation at the earliest and on the sixth day at the latest.
3. A rise in temperature was observed at the onset of the disease.
4. The shortest course of the disease was six days and the longest ten days and the mortality rate was 99.82%.
5. The average survival period was 3.9 days and the peak of mortality was reached on the fourth day.
6. The frequency of incidence of some lesions has been noted.

Acknowledgment

We are thankful to Dr. P. Bhattacharya, Officer-in-Charge, Animal Genetics Section, and Mr. S. G. Iyer, Officer-in-Charge, Poultry Research Section, Indian Veterinary Research Institute, Izatnagar for encouragement and many helpful suggestions in conducting the observations.

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A NOTE ON BOVINE TRYPANOSOMIASIS IN MILITARY FARMS AND ITS CONTROL BY 'ANTRYPOL'

By

MAJOR SUNDER SINGH, R.V.F.C., D.A.D.R.V.F.,
(Army HQ, Simla)

It has been generally considered that, comparatively speaking, cattle are refractory to surra and that buffaloes act as reservoirs only of the disease-producing trypanosomes.

Outbreaks of surra in cattle, including buffaloes, with a high mortality rate in the latter, have often been reported from various places in India. Various workers have also reported acute forms of the disease both in cattle and buffaloes.

'Antrypol'—a chemical equivalent of Naganol—came into use during World War II when Naganol, the then best known successful chemotherapeutic agent against surra, was not available. During the years 1942 to 1945, 'Antrypol' was successfully employed both in the treatment and in the prevention of surra on the very large number of horses and mules used in military operations on the Indo-Chinese and Indo-Burmese frontiers.

'Antrypol' has also been successfully employed in the cure and control of surra outbreaks among cattle and buffaloes in the Military Farms, Kalyan, Namkum and Lucknow during 1947-48.

Diagnosis

Diagnosis in all cases was made by fresh blood microscopical examination. The main difficulty of surra diagnosis in bovines is the rare manifestation of clinical symptoms of the disease.

In the Military Farm, Kalyan, only the four initial buffaloes admitted in the farm veterinary hospital showed a rise of temperature of 2°-3°F, lachrymation, fall in milk yield and anorexia. None of the positive cases detected later by routine fresh blood microscopical examination showed any clinical manifestation whatsoever; in fact the great majority of cases were detected among animals in good condition.

In the Military Farm, Lucknow, a buffalo died within an hour after being noticed sick with a temperature of 104°F. The microscopical examination of the blood smear, made immediately after death, confirmed the diagnosis of surra. The rapid course of this case points to a peracute type of bovine surra.

Routine Blood Examination

It is now well known that in surra-infected bovines trypanosomes are present in the tissues for some months, and that they appear in relatively small numbers in the bloodstream at varying long intervals without causing any clinical syndrome.

In order, therefore, to produce effective control measures, it is most essential to detect further clinical cases as they arise by systemic blood examinations. A routine fresh blood microscopical examination of all the animals on the affected farms for ten consecutive days every month was instituted and continued for a period of three months until the outbreak was declared over.

Table I below shows the animal population of the affected Military Farms. Table II shows the monthly occurrence of cases of surra as detected during routine blood examination, and the number of deaths due to this disease.

TABLE I
Showing the animal population.

Military Farm.	Buffaloes & young stock.	Cows & young stock.	Bullocks.	Horse & Mules	Total Strength.
Kalyan	787	—	68	—	855
Namkum	449	50	41	—	540
Lucknow	634	177	237	13	1061

TABLE II
Showing the occurrence of surra cases and deaths from surra in affected Military farms

Routine blood examination.	No. of surra cases diagnosed.						No. of deaths from surra.					
	Buffaloes			Cows			Buffaloes			Cows		
	Kalyan	Namkum	Lucknow	Kalyan	Namkum	Lucknow	Kalyan	Namkum	Lucknow	Kalyan	Namkum	Lucknow
November 1947	4	—	—	—	—	—	—	—	—	—	—	—
December 1947	37	—	—	—	—	—	—	—	—	—	—	—
January 1948	8	—	—	—	—	—	—	—	—	—	—	—
February 1948	6	—	—	—	—	—	1	—	—	—	—	—
March 1948	—	—	—	—	—	—	—	—	—	—	—	—
April 1948	2	—	—	—	—	—	—	—	—	—	—	—
May 1948	—	—	—	—	—	—	—	—	—	—	—	—
June 1948	5	—	—	—	—	—	—	—	—	—	—	—
July 1948	—	—	—	—	—	—	—	—	—	—	—	—
August 1948	13	—	—	—	—	—	—	—	—	—	—	—
September 1948	—	—	—	—	—	—	—	—	—	—	—	—
October 1948	—	6	33	—	1	4	—	2	1	—	—	—
November 1948	—	1	15	—	—	1	—	—	—	—	—	—
December 1948	—	5	—	—	2	—	—	—	—	—	—	—
January 1949	—	1	—	—	—	—	—	—	—	—	—	—
February 1949	—	2	—	—	—	—	—	—	—	—	—	—
March 1949	—	—	—	—	1	—	—	—	—	—	—	—
Total	75	15	48	—	4	5	1	2	1	—	—	—

Treatment

All the positive animals were treated with 'Antrypol' intravenously at a dosage of 0.5 Gms./100 lbs. body-weight, followed by 0.25 Gm./100 lbs. body-weight fourteen days later.

The dosage in these Military Farms was facilitated by the presence of a weighbridge so that accurate weight/dosage calculations could be made. In some cases the body weight was estimated according to the formula $\frac{G \times L}{5} = \text{weight in lbs.}$, 'G' being the girth in inches and 'L' being the length in inches from the point of the shoulder to the point of the buttock.

Effects of 'Antrypol'

The milk yield of animals treated with 'Antrypol' was found to drop from one to two lbs., recovery being variable up to fourteen days with a small proportion of animals tending to dry off rather sooner than normal. It is difficult to attribute this drop in milk yield specifically to the use of 'Antrypol' since it is known that any medication of this nature may have a considerable, though transient, effect on animals in full milk.

Two cases of abortions were reported from cattle under treatment. The blood of these animals was negative to *B. abortus*. These abortions cannot, however, be attributed to 'Antrypol' medication as no abortions were reported from animals that were heavy in calf and were treated with 'Antrypol' in the Military Farms at Namkum and Lucknow.

'Antrypol' was found to be effective and harmless in newly calved animals and no relapses occurred in any class of animals treated.

Prophylactic Measures

The usual control measures of early detection and segregation of the positive cases, sterilisation of their blood by immediate treatment, and observance of strict anti-fly measures both by smoke-fires and the extensive use of D.D.T. were adopted.

In the military farms at Kalyan and Namkum, odd cases still occurred for a period of eight to ten months after the commencement of the outbreaks. It was, therefore, decided to try the value of 'Antrypol' as a prophylactic against surra. One prophylactic dose of 'Antrypol' intravenously at 0.5 Gm./100 lbs. body weight was administered to all animals, except those already treated for surra at the Military Farms, Kalyan and Nankum, during October 1948 and March 1949 respectively.

As no further cases of surra were detected for a period of three months after the administration of the prophylactic treatment, the outbreaks were declared over in these establishments.

'Antrypol' thus administered had no reaction other than a slight fall in milk yield in some cases. Approximately one-third of the number of animals treated showed no fall in the milk yield at all; one-third showed a slight fall in milk yield which recovered within ten days and the remainder showed a fall in milk yield by one to two lbs., recovering in most cases within fourteen days. A few cases tended to dry off rather earlier than normal. 'Antrypol' was used throughout on pregnant animals without ill effects as previously stated.

Summary

It is known that the use of many agents effective in sterilising the blood stream of pathogenic protozoa tends to cause a significant shift in the balance of body fluids. In the case of 'Antrypol' we know that it combines with the *alpha*-globulin of the blood whereby the slow excretion and prolonged action of the product is guaranteed.

We feel that 'Antrypol' has been shown to be the most useful agent in the cure and control of bovine surra, although some drop in milk yield in a portion of the animals treated is likely to occur. This fall in milk yield, in the great majority of cases, returns to normal within fourteen days of treatment.

The control measures adopted to detect the positive cases and to protect the remainder demonstrate very fully the value of routine fresh wet-smear blood examination since by this means apparently healthy animals were found to be infected.

It is particularly noted that the infection remained confined to cattle and buffaloes although in all the three farms ponies and mules were stabled throughout the outbreak in premises not far away from the cattle sheds where cases of surra were diagnosed.

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RECENT ADVANCES IN CHEMOTHERAPY AS APPLIED TO PRACTICE*

By

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Chemotherapy is the treatment of pathogenic infections by chemical substances which act specifically upon them. As a science it is comparatively new. Indeed, it may be said that it is only during the last 20 years or so that sufficient large-scale effort has been expended upon it to give appreciable results, but in that period progress has been rapid and at times spectacular. It is generally felt now that the solution to many if not all of our infectious disease problems lies in the hands of the organic chemist and the biologist, although, of course, much has yet to be done. Greatest success so far has been obtained against the larger and more highly organised invaders such as insects, helminths and protozoan parasites. Excellent progress has also been made against many of the bacteria, but with the virus diseases in general, chemotherapy as yet is only in the exploratory stages.

The practical advent of chemotherapy has not made easier the lot of the practitioner who wishes to keep abreast of modern knowledge. The literature on the subject has reached formidable proportions and is still increasing. Many of the publications involved are long, complicated and require detailed knowledge of pharmacology and chemistry for their full appreciation. Few practitioners in the rush and turmoil of presentday practice have the time or opportunity for reading them. It is felt, therefore, that even at the expense of detail and at the risk of merely producing a list of disjointed observations it may be of interest and perhaps of profit to discuss briefly a number of the chemotherapeutic advances of the last few years and to see how they could be applied to practice.

Antiseptics And Disinfectants

Acridines:—With the advent of penicillin and the sulphonamide drugs it was generally expected that interest in the acridine dyes would evaporate. Contrary to this, however, as noted in the Journal of the American Veterinary Medical Association (1944) and elsewhere, there has recently been renewed interest in them and critical re-examination has indicated that, especially in regard to staphylococcal infections and suppurating wounds, their value has tended to be underestimated. They are still particularly useful in the veterinary field since they are stable, non-irritant, easily applied, rapidly effective and

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economical in use. Considerable investigation has been made recently into the chemical aspects of the acridines, especially by Albert and co-workers (1946) in Australia but, by and large, no real advances on proflavine sulphate have been made.

The advent of proflavine hemisulphate in which only half a molecule of sulphuric acid is used has provided a salt whose neutrality ensures that its application will be free from any of the irritant effects associated with the acidity of solutions of other acridines. This product is now known as neutral proflavine sulphate. Under certain circumstances the staining properties of the well-known acridines are a disadvantage. In these cases 5-aminoacridine, which is colourless, is a good substitute although its overall efficiency is perhaps a little lower than some of the other compounds.

Quaternary Ammonium Compounds:—It has long been recognised that physical cleanliness, quite apart from the use of antiseptics, plays an important part in bringing about conditions of asepsis. The combination of cleansing and antiseptic properties in one substance or series of substances, therefore, makes them particularly valuable. Synthetic organic detergents with bland properties but powerful effect have been used in the textile, woollen and other industries for many years and the recent discovery (Barnes, 1942) of antiseptic properties in some of them has made available more effective substances for skin sterilisation, treatment of burns, etc. These substances, of which cetyltrimethyl-ammonium bromide is an example, are excellent detergents and remove grease, dirt and tissue debris most effectively. At the same time they remove the bacteria contained therein. In addition, they form a protective layer on the skin which is sterile for some time. Official recommendation has been given to the use of cetyltrimethyl-ammonium bromide as a treatment of choice for burns in man, and H. M. Stationary Office has issued a comprehensive report on the subject (1944). The potential veterinary uses of such products are obviously considerable. Their application is quite painless even on cuts or abrasions and they are almost completely non-toxic. Overseas their use is already well established in dairy hygiene. In Britain, so far, shortage of supplies has militated against their widespread use and generally their application has been restricted to small-animal use (Lauder & Stevenson, 1944).

Propamidine:—During the war years a series of drugs known as the aromatic diamidines were developed as specific chemotherapeutic agents against certain protozoan infections. Their range of effectiveness in this direction is limited by toxicity and other factors, but one of them, viz., 4:4-diamidino diphenoxypropane or propamidine, has proved to be a useful antiseptic for open wounds and burns, and also for intra-uterine application.

Crystal Violet:—Crystal violet, a dyestuff whose uses alone as an antiseptic and as an ingredient of the triple dye formula for eczema, burns, etc.,

are well established, has recently attained prominence through its action in attenuating viruses from which satisfactory vaccines can be prepared. Most interest in the veterinary field has centred around crystal violet swine fever vaccine which began in 1934 in America with the work of Dorset and was developed there by Cole & McBryde and in this country by Doyle (1942). Since then there has been almost world-wide use of this vaccine with, on the whole, satisfactory results. Among others there have now been reported crystal violet vaccines for fowl paralysis (1945), fowl plague, Spears, (1946) and vesicular stomatitis (Shahan, 1945). Some doubt, however, has been expressed as to the value of the last named.

The attenuating action of crystal violet on viruses is not yet fully understood. On bacteria in certain ranges of dilutions the drug acts strictly as a disinfectant, killing in proportion to its concentration. In lower ranges of dilutions, varying greatly with the test organism, it acts as a bacteriostatic. If the concentration of the drug is low enough to allow the bacteria time to bring about certain essential changes they may adapt themselves to it (Hoffman et al., 1944), and presumably this is what happens in regard to viruses.

Anthelmintics

Phenothiazine :—An outstanding advance during the war years was, of course, the development of phenothiazine as an anthelmintic. The advantages in efficiency which this product possesses are already well recognised. Moreover, its toxicity is extremely low. The general features of phenothiazine obviously do not require reiteration but one unique aspect of the drug does not appear to have been accorded the attention it deserves. Early in the development of phenothiazine, Shorb & Habermann in America (1940) and Taylor & Sanderson in Britain (1940) recorded the observation that small doses of the drug, while having no lethal effect on adult worms, almost entirely inhibited egg laying by the females and rendered non-viable the few eggs which were produced. These were fundamental observations of considerable practical importance, because on them rested, for the first time, the possibility of using an anthelmintic not only to control helminthiasis but to eliminate it. In America, the main utilisation of the finding was in connection with the feeding of small doses of phenothiazine in salt to sheep Shorb & Habermann, (1942). By medicating themselves it was found that sheep did not contaminate pastures, that there was little or no build-up of infection thereon, and that their worm burden remained minimal. In this country tests were first made in the horse in connection with redworm infestation. Some of the earliest work was done in collaboration with Mr. J. G. Hoban of Whitchurch, whose untimely death prevented its publication. As was well recognised at the time, strongylosis was rendering breeding operations in certain studs of thoroughbred horses almost impossible. It was argued that routine dosing of all animals on the premises with small doses of the drug should virtually eliminate pasture infestation and

that if the premises remained self-contained and dosing was continued throughout the spring and summer months for two or three seasons, infestations should virtually disappear. The actual doses of the drug to be given were at that time a matter of speculation but 3 grammes daily for ten consecutive days were employed. These were repeated after intervals of 28 days, administration being in the food. It was found that during the 28 days after dosing egg output in the faeces was negligible, and most excellent results were obtained. There was, of course, no risk of toxic effects and after only a few months marked improvement was noted in the animals under test. Complete control of the infestation appears to have been effected and the method is now being widely used in thoroughbreds with considerable success. With regard to dosage recommendations, Gibson (1945) has now shown that daily doses for horses as low as 1 gramme given for a few days will reduce the egg output to negligible proportions, and that it remains depressed for 30 to 35 days. It seems likely, therefore, that doses of 1 to 2 grammes daily for a week repeated at intervals of 30 days will suffice. Trials with phenothiazine salt mixtures for sheep have also recently been carried out in this country (Harbour et al., 1946) with promising results.

Sodium Fluoride :—The removal of large roundworms (*Ascaris*) from pigs has always presented something of a problem in its practical aspects. It was hoped at first with the advent of phenothiazine that this drug mixed with the food would provide the answer, but, unfortunately, its efficiency against this infestation is low. Oil of chenopodium is effective but must be given as a drench. Recently tests have been made with sodium fluoride with very promising results (Habermann et al 1945). One per cent. of the drug in dry feed appears to be the optimum dose, and with it up to 100 per cent. efficiency has been claimed. Larger amounts are toxic and it is recommended that care should be taken to ensure that no individual animal receives an excessive dose. Confirmatory tests have been made in Australia (Roberts, 1947). In these the drug was again given in the food at about the same level as in the American work. The average intake by the pigs was 0.1 to 0.25 gramme per lb. body weight and the drug removed 93 to 99 per cent of ascarids. The Australian experience was that any possibility of toxicity at a 1 per cent level in the food could be obviated by making sure that the food intake was well distributed over the day during which dosing was taking place.

Carbon Tetrachloride :—No certain method has yet been evolved of ensuring that toxic sequelae will not arise from the dosing of sheep with carbon tetrachloride although work on the toxicity of the drug is still proceeding. In this connection it has been demonstrated that rats fed on a carrot diet for seven to ten days before dosing are much more resistant to the toxic effects of the drug than those fed on an ordinary well-balanced diet or one low in vitamin A (Forbes & Taliaferro, 1945). This finding has yet to be confirmed in sheep. Apart from unpredictable toxic effects on a few susceptible sheep, difficulties

also still sometimes arise in practice through sheep being anaesthetised by the bursting of carbon tetrachloride capsules during administration. It has now been demonstrated that these dangers can be overcome by jelling the drug by admixture with aluminium stearate or other suitable substance (Scherer, 1945). Monnig (1945) has recently described a method of emulsifying both carbon tetrachloride and tetrachlorethylene which assists their practical use. This involves dissolving resin in the drug and saponifying by strong caustic soda to give a homogeneous mixture. When shaken with water an excellent emulsion is formed which can be administered without difficulty.

Hexachloroethane :—It has been recognised for some time that although carbon tetrachloride is generally satisfactory for use in sheep it is too toxic for widespread use in cattle. Hexachloroethane was tested to a limited extent by Continental workers before the war. The substance has been investigated in this country during the last few years and formulations of it have been evolved which make it easy and satisfactory to use. Tests in America, chiefly under the direction of Olson (1943, 1946) have confirmed previous observations regarding the efficiency of the drug in dealing with fluke infestations. There are indications that quite apart from its much lower toxicity than carbon tetrachloride, hexachloroethane may be intrinsically more active in that it will deal with immature as well as mature flukes and also with species other than *Fasciola hepatica*. Kaplan and Sakellariou (1947) have made comparative tests in Greece concerning these points and have confirmed both, although their work has so far been limited to a small number of animals. Further critical tests are proceeding in Britain some of which have already been reported (Lapage et al., 1947).

Lead Arsenate :—The desirability of obtaining satisfactory taenicides which avoid the use of arecoline is widely recognised. Recently prominence has been given to the potential usefulness of lead arsenate as a taenicide for ruminants (Radeleff, 1944; Habermann & Carlson, 1946; Ward & Scales, 1946). Doses of 0.5 gramme for sheep, 1 gramme for calves and 2 grammes for adult cattle have been used with excellent results and without toxic effect. Radeleff has now treated more than 8,000 animals with the drug without any fatalities.

Di-pentane :—In America a substance known as Di-pentane, which is dihydroxy-dichlorodiphenylmethane, has been advocated for the treatment of tapeworm infestation in dogs and cats (Kleckner, 1946). It is unique in that although it is taenicial it has no expulsive effect. The worms are killed in situ and digested by the host. For the successful use of such a substance in practice it is obvious that its efficiency must be known to be very early 100 per cent before its use can be advocated, since tapeworm infestation is largely an aesthetic problem. Unfortunately it would appear that the efficiency of Di-pentane does not at present approach that level.

Insecticides and Insect Repellents

DDT and 'Gammexane' :—The newer synthetic insecticides, DDT and 'Gammexane', were among the outstanding discoveries of the war years and their general use is now well established. Despite the subsequent discovery of a number of other synthetic compounds with marked insecticidal properties such as hexaethyltetraphosphate and tetra-ethylpyrophosphate, their position of pre-eminence is unchallenged. Because of the vast potential fields of usefulness of both these products, large-scale development of them is still proceeding and is likely to go on for a considerable time.

Of particular interest in the home veterinary field are comparisons between the toxicity of the two products in actual use and their usefulness against acarine infestations. By and large, both products when properly used are relatively non-toxic, but in certain circumstances DDT, especially, seems to give rise to toxic sequelae. A risk always attends the use of such compounds on animals since they may ingest considerable quantities by licking, but in general unless gross quantities are ingested no harm is done. Cats are recognised to be more susceptible to DDT poisoning than dogs, and in all species use of solutions of this drug in oil for overall application is best avoided because of the risk of toxicity from absorption. Very young animals are more susceptible than old ones and in this connection it is worth noting that DDT, at least, is excreted in the milk and can attain such milk levels as to be toxic to suckling young (Telford & Guthrie, 1945; Woodward et al., 1945; Telford, 1945). It is wise, therefore, to use these products with caution in breeding establishments.

Against acarine parasites 'Gammexane' is generally recognised as considerably more effective than DDT. Against the various mange mites of animals it is outstanding. Taylor (1945) has shown that against notoedric mange of rats two applications of the drug at a concentration of 0.1 per cent in liquid paraffin, rapidly effected a cure. Steward (1946) in confirming this, has demonstrated that one application of a watery suspension containing as little as 0.01 per cent of 'Gammexane' is effective. In the field various formulations have been on test and outstandingly successful results have been obtained against sarcoptic and allied types of mange. Early results based on somewhat crude samples of the drug have already been published (Lewis, 1946). With 'Gammexane' because of its persistence there are indications that a one-application treatment for mange might be evolved and tests are being made in this direction. Of all substances to date, 'Gammexane' appears to offer most chance of effectiveness against follicular mange since it certainly exerts a lethal effect on *Demodex*, but as with all other agents some variation in results has already been apparent.

An interesting recent development with 'Gammexane' has been the use of this product by feeding it to animals. In this way blood concentrations

can be obtained which are not toxic to the host but are lethal to various parasites. De Meillon (1946) has shown that when rabbits are fed with 'Gammexane' they rapidly become toxic to bed bugs and other blood-sucking arthropods. In East and South Africa early trials have been made with promising results. Cattle feeding on the drug have become lethal to ticks, tsetse flies, etc. It may be that some applications of this feeding method will be possible in Britain.

Dimethylphthalate:—The story of the war-time discovery and development of the synthetic insect repellents is a fascinating one. The early recognition that colourless, odourless substances were repellent was in itself a feat of considerable merit. Dimethylphthalate, dibutyl-phthalate and 2-ethylhexanediol-1, 3 (Rutgers 612) are all considerable advances over oil of citronella and give protection, varying with conditions, of up to several hours. Unfortunately, the re-applications required make their general veterinary use impracticable so far, except under special circumstances.

Acaricides

Tetraethylthiuram Monosulphide:—The only new drug introduced during the war years for the treatment of scabies in man and mange in animals, was tetra-ethylthiuram monosulphide or 'Tetmosol'. This product was largely developed by Gordon and co-workers (1941 et seq.) and has proved outstandingly successful. Excellent results with it in the veterinary field have been reported (Jennings, 1942). Gordon & Unsworth (1943) have compared it with benzyl benzoate and with dimethylthianthrene ('Mitigal', 'Odylen') in vitro tests. They found that tetraethylthiuram monosulphide had a superior lethal action to both of these products. In addition, the toxicity of the compound is probably lowest of all the acaricides and it is clean and simple to use. Unfortunately, difficulties in supplies of oils and fats have prevented the making available of soaps containing tetraethylthiuram monosulphide. It has been demonstrated that these are ideal vehicles for it and that soap tablets can be used virtually to eliminate scabies from communities (Mellanby, 1945).

Analgesics

The search for analgesics as effective as morphine but without some of its disadvantages has been proceeding for many years. Just before the war, in 1939, a new compound, pethidine hydrochloride, was introduced in Germany under the name of 'Dolantin'. Extensive tests in Britain, America and Canada established its suitability and effectiveness as an analgesic in childbirth in the human subject (Editorial, B. M. J., (1946). Its main advantage is its almost complete lack of toxicity to mother and foetus even in large doses. Trials have also been proceeding in the veterinary field, some of which have recently been reported upon (Archer, R. K. (1947) Vet. Rec. 59. 401). In

animals, pethidine is particularly suitable since it is free from exciting effects and other side issues. It has, however, no hypnotic effect. A particular field for it exists in cases of difficult and painful parturition. Its analgesic and antispasmodic properties make it possibly an effective treatment for simple spasmodic colic in the horse and other species and tests in this connection are in progress. If amnesia is required pethidine may be combined with hyoscine or scopolamine and such combinations are already being used in the human field.

Anaesthetics

Ether:—Ether is, of course, the oldest of the volatile anaesthetics and attained its centenary recently. Despite its antiquity it is, of course, still in general use and work is still proceeding in relation to derivatives and near relatives of it. Following successful animal tests which he has made with this agent, Krantz (1946) has recently advocated trials within-propyl methyl ether which is an isomer of ethyl ether. In dogs he found it excellent. It gave satisfactory anaesthesia, caused no functional damage, and was less toxic than ether itself.

Trilene:—'Trilene' or trichlorethylene is a new volatile anaesthetic which was first investigated by Hewer & Hadfield in 1941 and which since then has attained great popularity in human usage because of its high degree of safety and lack of undesirable side effects. In the veterinary field the drug was first investigated by Heney (1946) who described its successful use in some 300 cases. Subsequent usage has confirmed these findings. The drug is free from irritant effects, causes little salivation, no vomiting and is very safe. Unfortunately, it is not highly volatile and hence it cannot be used in an ordinary open type of mask. It requires a Boyle's or Wright's apparatus or a similar adaptation which can be used to pass a stream of oxygen or air thorough the liquid. The early indications are that it will be a useful addition to the anaesthetics available for small-animal practice.

Pentothal:—During the war years pentothal sodium was very widely used as an intravenous anaesthetic for battle casualties and for the victims of air raids. Many of these were severely shocked. The general conclusion was that in such cases pentothal was probably the safest of all anaesthetics. Many others were dangerous because of the enhanced risk associated with anoxia (Morgan, 1943). In shock cases only very small induction and maintenance doses compared with those for normal subjects are required.

Kemithal:—Kemithal, a new intravenous anaesthetic, which chemically is 5- $\wedge$ -23 cyclohexenyl 5-allyl 1-2-thiobarbituric acid and which has certain pharmacological advantages over pentothal, was introduced recently into medical practice (MacKintosh & Scott, 1946; Halton, 1946; Gordon, 1946); (Carrington & Raventos, 1946). Limited tests with it have taken place in the veterinary field with promising results.

Curare :—A development which has recently occurred in the medical field and has aroused considerable interest is the introduction of curare in the form of d-tubocurarine chloride as an adjunct to anaesthesia. This is the well-known South American arrow poison. Its controlled use produces profound muscular relaxation and lessens the amount of anaesthetic required so that post-anaesthetic recovery is rapid and complications are rare. Very recently synthetic substances similar in action to curare have been introduced.

Antituberculous Agents

Diaminodiphenylsulphone :—Persistent and comprehensive endeavour in many countries has been directed towards obtaining satisfactory means of dealing with tuberculosis on a chemotherapeutic basis. Because of the nature of the organism and its variations not only between species but even between individuals in the same species the work is of particular difficulty. Several years ago it was demonstrated that in experimental animals 4:4-diaminodiphenylsulphone was effective in controlling experimental infections of tuberculosis. This drug was too toxic for use in man but since then trials have been proceeding with its solubilised derivatives—Diasone and Promin. On the whole, clinical results have not been sufficiently promising to indicate that these drugs will become standard methods of treatment (Editorial, B. M. J., 1944). In the veterinary field the toxicity of 4:4-diaminodiphenylsulphone is not a hazard to most animals but in general, treatment of clinical cases of tuberculosis is, of course, unjustifiable until a substance totally effective against the disease is available. The treatment of animals, particularly cattle, with minimal infections shown by the tuberculin test will, however, perhaps be worthy of consideration as more effective substances are evolved. It has been shown that 4:4-diaminodiphenylsulphone and its derivatives are fully effective against other acid-fast bacteria such as the leprosy bacillus (Muir, 1947) and hence they may prove of value against Johne's disease infections.

Streptomycin :—The use of streptomycin against tuberculous meningitis in man has been given wide publicity in the popular Press. Streptomycin at present is probably the most active drug available against the tubercle bacillus but it falls far short of the ideal drug for its destruction. In general, its use has the effect of prolonging life without curing the disease, and there could be no justification for employing it in the veterinary field.

Calciferol :—Considerable interest has recently been aroused in the medical field by the success which has attended the use of massive doses of calciferol (synthetic vitamin D) in cases of lupus vulgaris, and tuberculous adenitis and sinuses in man. Many spectacular recoveries have been recorded and at one time it appeared as if all of these infections might respond to this line of treatment. Although a high proportion of them may do so, it is now clear that a proportion of glandular lesions certainly do not completely respond (Wallace, 1946).

Synthetic Oestrogens

Stilboestrol :—The emphasis which has been placed upon the importance of sterility, especially in the bovine subject, has led to widespread and sometimes indiscriminate use of the synthetic oestrogens in veterinary practice. Their more exact use has been dealt with at length in a copious literature. Considerable interest has been taken for several years now in the production of lactation by tablet implantation of oestrogens and by insunction, but these are unlikely to find practical utilisation because of the poor average yields obtained, the inconsistency of results, and the undesirable secondary effects of the drugs. Caponising of cockerels by tablet implantation or by intramuscular injections of oestrogens, and assisted fattening by oestrogen feeding are, however, quite practicable and may be widely used (Bayles, 1946; Sturkie, 1946). Other oestrogens in addition to stilboestrol have been introduced during the past few years but all are more expensive and not much more active. It appears likely therefore that for the present in the veterinary field stilboestrol will continue to be the drug of choice.

Antibacterials

Penicillin :—Penicillin was the first of the antibiotics which was found suitable for application as a chemotherapeutic agent. At the time of the discovery of its outstanding therapeutic properties it was thought that it might be the precursor of a whole series of useful compounds of this class. Very considerable effort in many parts of the world has been directed towards the investigation of such substances but although large numbers of compounds have been examined none has yet been found even to equal penicillin itself. Indeed, although such products as gramicidin, tyrothricin, strepto-thricin, penatin, subtilin, clavacin, and bacitracin have been taken as far as the clinical trial stage, no product except streptomycin has been shown to have any real advantage over penicillin in any field.

The veterinary uses of penicillin have been fully reviewed and need not be detailed here. Considerable advances have recently been made in the commercial manufacture of the product so that pure crystalline penicillin G, which is the most active type, is now available. Of outstanding assistance to the practitioner has been the increased stability of the product which has resulted from these improvements. This has meant that refrigeration of the pure types of penicillin is not necessary and that the user is insured against rapid loss of potency while handling the drug. Unfortunately, there is at the moment a world-wide shortage of penicillin but doubtless this will be overcome shortly.

Two practical points of considerable importance in connection with the clinical use of penicillin are still receiving attention. One concerns the setting up of depots of the drug subcutaneously or intramuscularly from which the drug is liberated slowly. The other relates to the use of massive single doses of the

drug in place of repeated small doses at frequent intervals. It is well recognised that the depot dose method is effective and cuts down greatly the necessity for frequent dosing but unfortunately oil-beeswax preparations are not easy to use in the field and the search for more suitable vehicles is still proceeding.

The massive single dose method of treatment has recently been receiving increasing attention. McAdam (1944) has shown that in man a penicillin blood level is given for one to two hours following a dose of 10,000 to 15,000 units; for two to three hours after 25,000 to 50,000 units, and for a little over three hours with 100,000 units. It has also been shown that a dose of 250,000 units gives a blood level for four to five hours (Editorial, B.M.J., 1946). Massive doses are also claimed to have the advantage of producing such high blood concentrations that diffusion is promoted into infected areas and at the same time susceptible organisms are rapidly overwhelmed. In support of the view that diffusion is materially assisted by massive single doses Florey and co-workers (1946) have shown that, after a single intramuscular dose of 100,000 units penicillin can be detected in wound exudates for eight to twelve hours. Whether doses given only twice or even once a day would therefore be sufficient, obviously requires study. In the veterinary field, where the establishment of single daily doses is obviously very desirable for practical reasons, Arnold in India (1947) has found that in horses small doses of penicillin at intervals of three hours were ineffective but that excellent results followed the use of 400,000 to 500,000 units given as a single daily dose.

Sulphonamides :—The sulphonamide drugs have been and still are of the greatest assistance in practice. They were the first chemotherapeutic substances which allowed specific treatment of various bacterial infections and the outstanding results obtained with them in the field have fully justified the enormous amount of chemical and biological research work which has been undertaken in connection with them. Although very large numbers of compounds have been examined, only a relatively small number have been sufficiently outstanding to be made available in the field. Despite this, the complexity of their actions and other factors has made the question of choice of a particular sulphonamide for any given condition a difficult one for the practitioner. This is even more so in the veterinary field since until recently no very critical examination of the behaviour of the various sulphonamides in the different animal species had been made. Usage has been based largely on the analogies drawn from observations in small experimental animals and man, and there is no doubt that wrong conclusions have often been reached. Francis (1947) has examined the whole position in domestic farm animals and his work forms a useful basis on which to determine which sulphonamides are likely to give best results in the various species. The main questions to be asked with any of these drugs are (a) what blood levels do they produce, (b) how persistent are they, and (c) how active are they against the organisms involved. To be successful, the given drug must be satisfactory in all three respects. Deficiency

in even one of them may completely invalidate its practical use. For example, sulphathiazole is very effective against Gram-negative organisms, which are the main invaders in the bovine, but it is of little or no practical value because it is excreted extremely rapidly by this species and would have to be re-administered every hour or two. Quite apart from the practical difficulties of so doing the economic aspect would make it impracticable except in the most valuable animals.

It is obvious that details cannot be entered into here but it may be useful to make some generalisations. The behaviour of the various drugs in the horse, cattle, sheep and pig is briefly as follows :—

1. Sulphamerazine and 'Sulphamezathine'—very good absorption and slow excretion.
2. Sulphanilamide—very good absorption and rapid excretion.
3. Sulphapyridine—poor absorption, moderate excretion.
4. Sulphapyridine—moderate absorption, rapid excretion.
5. Sulphathiazole—very poor absorption, very rapid excretion.

This in effect means that in practical use in the species mentioned sulphadiazine and sulphathiazole are not likely to prove acceptable and that whereas sulphamerazine and 'Sulphamezathine' need be given in many cases only once daily, sulphanilamide and sulphapyridine need to be given about three times daily. This, of course, is a practical point of some importance and is also of considerable moment from an economic viewpoint.

Considering the various bacterial diseases of the species involved we find that in the horse streptococci are the common invaders. Here where there is little difference in intrinsic activity sulphanilamide will doubtless continue to be used. In foals, however, enteric and septicaemic disorders are usually caused by Gram negative organisms against which sulphanilamide is virtually useless. The best compounds to use therefore are sulphamerazine or 'Sulphamezathine'. Against Gram-negative organisms sulphapyridine is considerably less potent. In cattle, sheep and pigs pneumonia and septicaemia are commonly associated with Gram-negative organisms and against these again the most effective compounds are sulphamerazine or 'Sulphamezathine'. For pneumonia in sheep, which is usually a pasteurella infection, both of these compounds are fully effective. Sulphapyridine and sulphathiazole give very poor blood levels in sheep and do not appear to be worth using in this species. Joint-ill in lambs is caused by streptococci and here sulphanilamide is indicated. In the pig 'Sulphamezathine' gives excellent levels and is outstanding. Sulphanilamide has only one use in the bovine and that is against *Streptococcus agalactiae* infection. Recently Francis and co-workers (1947) have shown that 4:4-diaminodiphenylsulphone is three to four times more potent than sulphanilamide against this organism and about ten times more persistent, hence its potential value in mastitis.

In short, therefore, current views are that the main field for sulphanilamide is for general infections in the horse and against *Str. agalactiae* infection in the bovine and joint-ill in lambs, while in cattle, sheep and pigs, where Gram-negative infections predominate, 'Sulphamezathine' and sulphamerazine are the drugs of choice. It should, of course, always be remembered that in these species *Corynebacterium pyogenes* is frequently associated with disease processes, and against this organism no sulphonamide is effective.

With regard to enteric infections generally, it is now well established that for the treatment of infections in the intestinal mucosa it is really the blood level of the drug being used which is of importance. This is quite contrary to previous views on the matter, which were to the effect that for bowel infections poorly absorbed compounds such as sulphaguanidine, phthalylsulphathiazole, etc., should be used in order to give a high concentration of the drug in the area. Because of this new view the best drugs for calf scours are probably sulphamerazine or 'Sulphamezathine'. Field trials have indicated that in most cases sulphaguanidine is virtually inactive.

A point of considerable interest which has been clarified lately has been the establishment of the sulphonamide drugs as efficient agents for dealing with *Actinomyces necrophorus* infections associated with foul-of-the-foot, calf diphtheria, etc. (Adams, E. *Vet. Med.* (1944) 39, 461; *J. Amer. Vet. Med. Ass.* (June, 1944); Kingman, H. E., & Stansbury, W. M. N. *Amer. Vet.* (1944) 25, 671-674). These infections were previously extremely troublesome but now yield rapidly, especially when treated parenterally with soluble derivatives such as solupyridine, sulphamezathine sodium, etc.

Miscellaneous

Finally, under this heading brief mention should perhaps be made of a number of drugs which have been recently introduced into fields of usage which do not lend themselves to easy classification.

Folic Acid:—Folic acid has lately attained prominence as an outstanding advance in haematology. It is effective in the treatment of macrocytic types of anaemia in man and can be used orally or parenterally as a replacement for liver extract. Possible Veterinary uses of the product have been envisaged (Editorial, *N. Amer. Vet.*, 1947).

Benadryl:—Benadryl, which is beta-dimethylaminoethyl benzhydryl ether hydrochloride, has been shown recently to inhibit the action of histamine (Wells et al., 1946). Tests on dogs have demonstrated that it is effective in dealing with various forms of anaphylaxis in this subject. Its use in diffuse itchiness and urticaria in dogs has been suggested (Editorial, *J. Amer. Vet. Med. Assn.*, 1946) and reports have been given of its value in dealing with penicillin allergy (B. M. J., 1947) and bovine stomatitis (Mosier, 1946). Recent

indications that bloat in cattle is an allergic reaction suggest the trial of the product in this connection.

Iodoprotein And Thiouracil:—The advent of two drugs which dramatically affect the metabolic rate has aroused interest in regard to their possible use in connection with the production of food animals. Iodoprotein speeds up and thiouracil slows down the metabolic rate and both can be administered in the food. It has popularly been suggested that with them cattle and pigs can be more or less "tailor made". While this appears somewhat unlikely they are obviously worth full exploration.

Urethane:—A recent development of considerable comparative interest has been the use of urethane in the treatment of leukaemia in man (Paterson et al., 1946). In a number of cases, results at least equal to those given by X-rays were obtained with drug. An account of a case of Hodgkin's disease in the dog treated with urethane has recently been published (Innes, J.R.M., & Parry, H. B., 1946). Spectacular improvement resulted but was not maintained and the animal succumbed.

Conclusion

The war years, as always, saw many advances in medicine, but in no branch of it more than in chemotherapy. Many of the discoveries have yet to be fully developed and brought into practical use. Many of the sister sciences through the war effort provided adjuncts to chemotherapeutic research such as the radio-active tracer elements, which will be invaluable. In the end, however, it is the practitioner who must put the new discoveries and new ideas to test and, if they are worthy, into practice, and it is on him that the responsibility for their proper application rests.

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COLD STORAGE PRACTICE IN THE PRESERVATION OF PERISHABLE FOOD-STUFFS

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The action of cold is of late years extensively made use of for the preservation of perishable food-stuffs. But for the inventive genius of the Refrigerating Engineer, it would have been difficult for the multitudes of people of different countries to obtain sufficient food. Through his triumph in the production of cold by machinery, millions of tons of meat, poultry, fish, fruits and vegetables and provisions are transported every year from distant parts of the world in a perfectly sound condition. At the present day frozen and refrigerated produce is imported into England in enormous and increasing quantities. Frozen mutton and beef are brought from Australia, New Zealand, and the Argentine and very large quantity of refrigerated or chilled beef from the United States to England.

Cold does not kill micro-organisms but merely renders them inactive. Thus when food is reduced to a low temperature the action of the putrefactive organisms which would otherwise cause it to go wrong in the course of few days is arrested, so that the food may be kept for an almost indefinite period provided the temperature maintained is sufficiently low.

But the use of cold is by no means restricted to meat, because advantage is also taken of it in many other directions. Butter is brought from Australia, Canada and other places; eggs can be stored for many months in cold rooms; fish, game and poultry are also preserved by this means; even large number of frozen rabbits are also imported from Australia into England by means of cold storage. In fact most of these commodities may be seen kept in 'Frigidaire' of some of the Provision Stores like the Empire Stores, John Bull Stores and Wilson Stores for sale in the Arthur Crawford Market which is the big shopping centre in Bombay.

In recent years refrigeration has been applied to the preservation of milk, the ripening of cheese and to many other purposes.

But apart from the application of cold for the preservation of perishable food-stuffs, the success of the Refrigeration specialist and his ability to cool all kinds of materials quickly and efficiently has made him invaluable to a host of industries. His cooling apparatus are to-day

found in operation in the great iron and steel works. By the side of the the big blast of furnace with its wide and blinding heat, we now find powerful refrigerating machines installed, whose object is to take most of the moisture out of the blast before it enters the furnace by cooling the air until the moisture contained in it is deposited as snow. By the use of those machines there is a saving of about fifteen per cent in the consumption of coke and an increase in the production of iron about ten per cent in proportion to the amount of coke burnt.

Then again powerful refrigerators are found necessary in mineral oil refineries where, out of the oil, the valuable solid paraffin which is largely used in industry is frozen. So also in Tea-factories, Sugar refineries, India-rubber works and in the manufacture of photographic materials, refrigeration is brought into use. The manufacture of dynamite has also been made safer by this wonderful agency.

In the fur trade also refrigeration is used for the preservation of imported skins; and attached to the laboratories in the leading industries and technical institutions there is invariably an equipment for observing the effect of temperature on lubricating oils and such like important matters. In fact it is difficult to name an industry today that has not been benefited by the development of mechanical refrigeration which by cooling the atmosphere or the materials, or both, enables work to proceed through out the year.

We now find in Bombay that in big establishments like the Banks, Insurance offices, Hotels, Cinemas, Theatres etc. electric fans have given way to air-conditioning by means of a Refrigerating apparatus to cool the rooms etc.

Meat preserved by cold is met with in two forms:—(1) frozen meat and (2) chilled or refrigerated meat.

Meat to be transported to long distances by sea is frozen, as is the case from Australia, New Zealand and South America. The meat is subjected to a temperature of ten degrees Fahrenheit and maintained at that temperature in ships, specially constructed for the purpose. Refrigerated or chilled meat imported into England chiefly from North America. It is merely chilled, not frozen, by being subjected to a temperature of thirty degrees Fahrenheit. Similarly fish may be preserved in cold storage under identical temperatures as meat.

Refrigeration is made use of in bringing fruits from abroad, thus rendering the supplies of the colonies and other places available for consumption in England. But great care is required in finding out the exact temperature best suited for the preservation of any kind of fruit,

Some fruits can withstand low temperature without detriment than others.

Fruit not only calls for special treatment when it comes to be preserved in cold storage, but different fruits demand different temperatures. Whereas meat is a dead substance, enabling it to be kept indefinitely, fruit is a living organism which must be kept alive because decay begins when death takes place. Fruit can be ruined by too high a temperature, or by too low a temperature and by suffocation, for fruit like all living things must breathe. It can, however, be kept alive for weeks and even months under conditions where it would otherwise perish by maintaining the requisite temperature and, more important still, by maintaining a proper circulation of air by means of power driven fans. This has the effect of delaying the ripening or growth of the fruit, thus prolonging the term of its natural life.

Even flowers, wreaths, garlands and bouquets can be preserved by means of cold storage. As Superintendent of the Victoria Gardens, Bombay (1927-36), I know of a young German Horticulturist employed on a tourist steamer, who, when he landed in Bombay before the 2nd World War, took me to his steamer at anchor in the Bombay Docks, where he showed me a number of plants of temperate region in full flowering bloom, particularly the Iris, which has its natural habitat in the snows of the Himalayas. All these plants of the temperate region he was able to preserve and grow in a small cold storage room on board the ship. He was not only able to supply flowers for table decoration, but all the palms, ferns, and other foliage plants which were grown in wooden tubs and earthen pots and kept for decorating the drawing rooms in the ship looked quite fresh and green.

As Superintendent of the Victoria Gardens I used to keep large doses of Anti-Rinderpest and Haemorrhagic Septicaemia serum, Anthrax and Black quarter vaccines in the Refrigeratory at the Crawford Market with the permission of the late Sir Arderhir Dalal I.C.S. who was then my Municipal Commissioner. All these stocks of Sera and Vaccines were obtained from the Imperial Institute of Veterinary Research, Mukteswar (now called the Indian Veterinary Research Institute). They remained in good condition, were quite handy for immediate use whenever there was an out-break of epidemic amongst the Zoo animals of the gardens.

About the year 1936-37, as the Superintendent of Crawford Market I was instructed by Sir Ivan H. Taunton I.C.S., the then Municipal Commissioner, at the request of the local authorities of the British India Steam Navigation Company to inspect the refrigerated pork brought as ration for the crew and passengers of their steamer, that had arrived from Durban and was at anchor in the Bombay Docks, and to

report on its quality and wholesomeness. On examination of the pork in the Refrigeratory of the ship, the African pork was found in perfectly wholesome condition. As to quality, it was as good as the pork slaughtered at the Municipal Pork slaughter house at Arthur Road in Bombay from the stock of animals, which are reared and home-fed by some Christian families of Andhri (now in Greater Bombay) and Bassein and Virar in the Bombay suburbs and free from *Cysticercus Cellulosae*, which is very common in pigs imported into Bombay for slaughter from Agra and Julgaon in Khandesh District of Bombay State, where they are found in semi-wild state and serve as scavengers.

Large quantities of foreign fruits reach the Crawford Market of Bombay in good condition under cold storage from England, Africa, Australia, California, Palestine and Japan by steamer and what will be more surprising was that they are sold at cheaper rates in the market than our own indigenous produce.

At the Ganesh.Khind Botanical gardens at Kirkee near Poona an experimental station has been established where experiments are carried out by the Horticulturist to the Bombay Government to find out the different temperatures required for preservation of different kinds of Indian fruits by means of cold. This artificial cold which ensures us fresh meat, fish, poultry, butter, eggs, provisions, fruit and vegetables and is also invaluable in many industries, is produced by a special machinery through the medium of any liquefiable gas. Different systems employ different gases or Refrigerants as they are termed. The two most commonly used are Carbon-dioxide and anhydrous ammonia. Other refrigerants that are also used are Methyl chloride, Freon and Sulphur-dioxide.

The Carbon dioxide (Co₂ or Carbonic Acid gas, as it is sometimes termed) is principally used on steamers. The machine is smaller than that required for the ammonia process; while, not the least important, Carbon dioxide is non-poisonous and non-corrosive and, should leakage occur, has no deleterious action on the food-stuffs. •

Ammonia is the refrigerant most widely employed on land—the machines using it operate on what is known as the Vapour-compression system.

A modern Refrigerating plant consists essentially of four main compartments, compressor, condensor, regulator and evaporator. All these compartments or parts are inter-connected by piping to form a closed system containing the refrigerant.

The compressor is simply a gas pump of special character and construction, according to the nature of the refrigerant to be used, of a type to suit various conditions of working and of a size according to the duty to

be performed. The condensor which receives the gas delivered from the Compressor by removing heat from the gas condenses it to a liquid. This compartment consists of pipe coils through which the gas from the compressor passes and is cooled during its passage by the circulation of water over the coils.

The gas enters the condensor at a fairly high temperature and is cooled by the temperature of condensation. The heat given out in the process of condensation is observed and removed by the circulating water and the liquefied gas is cooled to a few degrees above the temperature of the cooling water. From the condensor the gas passes to the Regulator, which is an adjustable needle valve, controlling the rate of the flow of the liquefied refrigerant and allowing it to pass into the Evaporator. This last compartment in which the liquefied refrigerant evaporates and again becomes gas usually takes one of two forms, either direct expansion grids in the roof and walls of the insulated spaces to be cooled or, more usually, in the case of marine installations and many on land also, coils of pipe in a tank containing a non-freezing solution of Calcium Chloride called Brine. This brine after being cooled in the evaporator is circulated through whatever cooling appliances are employed.

In either case the liquefied refrigerant evaporates under the reduced pressure caused by the compressor suction and in evaporating absorbs heat from the medium, whether air or brine, surrounding the pipes in which evaporation takes place. From the evaporator the gas passes again to the Compressor. Thus the cycle of operation which involves a change of state from gas to liquid and back again to gas, is accompanied by the liberation and absorption of a quantity of heat many times greater than due to the mere change of temperature of the refrigerant. This is known as the "latent heat". Furthermore as the circuit is closed the same gas goes through the cycle of operation repeatedly.

In 1922 a cold storage or refrigeration plant was installed in the Crawford Market of Bombay to store fish and fruits. The plant consists of four chambers. Each chamber has a floor space of six hundred square feet with a height of seven feet and with a capacity for storing 21 tons of fish or 33 tons of fruits. Two of these chambers are used for storing fish and mutton (beef and pork not permitted on account of religious objections of the traders of the market) and the temperature maintained therein is between twenty-eight to fifteen degrees Fahrenheit. The remaining two chambers are meant for storing fruits, vegetables and eggs. The temperature in them is maintained from forty-five degrees to thirty-five degrees Fahrenheit. The Ammonia system is employed with a light foot compressor and a sixty horse power electric engine. Three years' experiments in storing mangoes in this plant by Dr. Cheema, the Ex-Horticulturist to the Bombay Government proved

successful and made possible the many shipments to England in 1932-33. It will be thus seen that the commodities stored in the cold storage plant at the Crawford Market are merely kept at chilling temperature and not frozen.

Bombay had taken one step further in the enterprise of refrigeration by the establishment of a factory of the Dry Ice Corporation of India Ltd. at Cadell Road at Mahim in Bombay, where the company started to manufacture Carbon dioxide in solid blocks for the preservation of food-stuffs by producing the new product known commercially as Freezite or Dry Ice. Unfortunately this factory was closed, while the Sardar Carbonic Acid Gas factory at Sussex Road, Byculla, which also manufactured the product, stopped the manufacture probably on economic grounds.

Freezite, however, is considered to be the best and efficient means for the transport of preserved perishable food-stuffs and is vastly used in America. It is even better than ordinary Ice, which is commonly used for fish parcels in Railway transit etc. It is said that about 5 to 8 lbs. of Freezite is sufficient to keep fish weighing about 75 lbs. in suitable containers in fresh condition for 24 hrs. Similarly it can be used for preserving fruits, vegetables, meat, eggs and dairy products when in transit.

While on the subject of refrigeration it may be interesting to mention that a big Pasteurisation plant is being established at the Government Milk Colony at Aarey, which is about 25 miles from Bombay where buildings are being constructed for the location of its Dairy. When the delegates of the Joint Session of the 10th All India Veterinary Conference and 28th Conference of the Bombay Veterinary Medical Association visited this milk colony on the 28th April 1950, Mr. Khurody, the Milk Commissioner, took them round the colony and showed them some units where Milch cattle have been stabled under ideal conditions. He further explained about the Dairy and the Pasteurisation plant to be installed for pasteurising the milk in the colony before its final distribution. He stated that the plant will be worked on Ammonia-system of Refrigeration.

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PENICILLIN IN PASTEURELLA INFECTION IN SHEEP*

BY

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Introduction

Penicillin, the wonder drug, has not been extensively used in Veterinary practice. In fact, there are very few reports of its use in general practice, much less in diseases of sheep. It has been found to be of some use in Mastitis, Anthrax and Black-leg in cattle. Literature on the drug shows that, though it is not contraindicated, it is supposed to be of no effective value in the condition caused by pasteurilla group of organisms.

Peppe (America) is the only veterinarian who has successfully used this drug in *Haemorrhagic Septicaemia* in cattle (in 2 cases). The following report may therefore be interesting.

Forty-four rams from the Government Ram Rearing Centre, Mahud, Sholapur district, were transferred to Chalisgaon in East Khandesh district for being distributed as stud rams in villages around the Government Farm, Bhilakhed. One of them died on the next day and the local Veterinary Assistant Surgeon tentatively diagnosed the case as one of Anthrax.

On my visit to the place, I detected 4 rams and 2 ewes affected with the disease. 2 of these rams died within a few hours of my visit.

Symptoms

Inappetance, dullness, running from nose, laboured and sterterous breathing, T. 105. 2 to 106. 8 and death in 6 to 24 hours.

Post-mortem examination was held on the 2 cases that had died and the lesions were as follows:—Serofibrinous exudate subcutaneously, petechial haemorrhages and inflammatory lesions in the abomasum and intestines. Intestinal contents were blood stained (wherever such lesions were noticed). Haemorrhagic endocarditis and oedema and enlargement of the mediastinal lymph glands were also present.

Microscopical examination of the blood smears of the affected rams and ewes and of the blood smears from the heart of those after death revealed bipolar organisms indistinguishable from pasteurilla group of organisms.

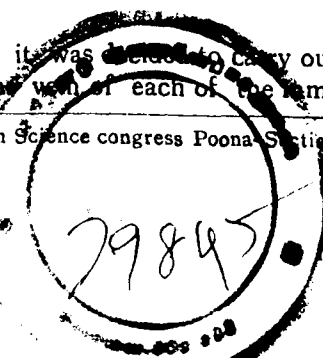
Biological Test

In order to confirm the above findings it was decided to carry out biological tests. 0.5 c.c. of blood from jugular vein of each of the rams

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showing 106. 2° F. and 106. 8° F. was injected into rabbits subcutaneously. The rabbits died within 18 hours.

Heart-blood smears from both the rabbits were positive for pasteurella organisms.

Cultural Test

Blood-agar tubes were sown with blood from jugular vein, from the heart of rams and from the heart of rabbits. Pasteurella organisms were isolated from all the culture tubes.

These findings were confirmed by the Officer-in-charge, Pathology and Bacteriology Section, Indian Veterinary Research Institute, who reported as follows:—

"II, III, IV, smears revealed bipolar organisms. Pasteurella culture was isolated from the heart blood. Serologically it is being typed".

Treatment

Two rams were treated with penicillin sodium G. salt (squibbs). Initial dose given to each ram was 50,000 units followed by 3 injections of 50,000 units every 4 hours, i.e. 2 lac units were administered in 4 injections in 12 hours' time. (The body weight of these rams was 45 and 48 lbs.).

Results

The temperature of both the rams came down within normal range, 2 hours after the 3rd injection of penicillin i.e. when 1,50,000 units were administered. At this stage blood smears from the tip of ear were made and examined; and were found to be negative for any pathogenic micro organisms. In order to verify this result, biological test was once again carried out and 0.5 c.c. of blood from both the rams was injected into 2 rabbits subcutaneously. This time the rabbits did not die.

These animals were kept under observation for 2 more days, and then discharged as cured. It is now a year since and the animals are healthy.

Discussion

From the results obtained in 2 positive cases of pasteurellosis, it is sufficiently clear that the use of penicillin will be useful in the treatment of Pasteurellosis.

Acknowledgments

My thanks are due to the Officer-in-charge, Pathology and Bacteriology, Indian Veterinary Research Institute, Mukteswar for confirming my findings and the Sheep Development Officer for supplying me penicillin in time for treatment.

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TRYPANOSOMIASIS IN GOATS—A PRELIMINARY NOTE

By

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Introduction

An undiagnosed disease in goats prevailing in villages around Kalwan in Nasik district for sometime past was brought to my notice by the Veterinary Assistant Surgeon, Kalwan, who had, on one occasion, noticed a good number of goats dying of this disease. On receipt of this information I hurried to the place to study and investigate the disease.

The villages where the disease was prevailing are situated at the foot of hills of Dangs Forest. The average rain fall of this area is between 60 and 80 inches per annum. Due to the density of the forest vegetations the places are marshy in nature and this is specially so during the rainy season. Consequently Malaria is very much rampant in that area. One of the squads of the Malaria organisation of the State of Bombay has been engaged in carrying out malaria survey in the locality. During the course of their routine examinations of mosquitoes they have been able to detect in the salivary glands of '*Anopheles culiciphalis*' (a malaria carrying mosquito) a *Trypanosome*, which ultimately turned out to be of a new species *Trypanosoma kalwanensis*—Vishwanathan et al, (1948.) They also observed that no unusual mortality was reported in men, animals and birds due to this infection.

Symptoms

The following symptoms were noticed amongst goats which were suspected to be suffering from this undiagnosed disease:—gradual emaciation and wasting followed by anaemia, appetite normal upto their very end, dung normal and death in 4 to 6 weeks. As an exception, 3 goats died quite suddenly after having been ill for 4 to 8 hours. Temperature, whenever recorded, ranged between 100. 2 to 102. 8.

Microscopic Examination

Blood of affected goats when examined under microscope revealed the presence of *T. evansi* in large numbers and this was confirmed by the Officer-in-charge, Veterinary-Zoology Section of the Indian Veterinary Research-Institute, Mukteswar.

Discussion

This is the first record of an acute infection of *T. evansi* in goats terminating fatally. It may be mentioned here in this connection that goats are ordinarily refractory to the infection of *T. evansi* under experimental conditions (Mudaliar). Natural infection of Trypanosoma in goats has not been reported in India, although it is known that, in South Africa, goats are susceptible to *Trypanosoma simiae* (Bruce et al 1912). Bruce has described similar symptoms viz. chronic wasting and emaciation in goats infected with *T. simiae* in natural state. This trypanosoma has a cyclical mode of transmission. But it seems of unusual interest to note that goats which are ordinarily quite refractory to artificial infection of *T. evansi* dying of it in natural outbreak. Perhaps repeated infection together with some other predisposing causes such as inter-current infections brings about fatal end.

The detection of *T. kalwanensis* in the same locality in the salivary glands of the *Anopheles culiciphalis* where all the developmental stages of the trypanosome could be demonstrated, will perhaps throw fresh light on the development of this trypanosome in the mosquito, although several other vectors viz. Tabanade, Haematopota and Stomoxys may actually be concerned in the transmission of this infection.

In this preliminary communication it is not intended to go into the vector problem, the mechanism of transmission of the Trypanosome and also the relation, if any, between *Trypanosoma evansi* and *Trypanosoma kalwanensis*.

It is also to be stated here that this infection is peculiar to this region and it is not encountered in any part of the State of Bombay although several hundreds of slides of blood-smears of goats have been examined. Perhaps it would be worth while to test the susceptibility of the goats of this region to artificial surra infection along with a few goats from areas where the disease does not exist.

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AN IMPROVED HAEMORRHAGIC SEPTICAEMIA VACCINE

BY

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1. History

The control of Haemorrhagic Septicaemia, unlike several other contagious diseases of cattle, presents a very complex problem due to the peculiar nature of its outbreaks. A study of cattle mortality figures shows that although this disease does not occur in waves of intensity at regular intervals as in the case of Rinderpest yet the ravages brought about by this disease are some times so great that the cultivator is put to a great economic loss, and the agricultural operations are at a stand still. As the outbreaks are not generally of a protracted nature, and the disease has a tendency to work itself out, any method for evaluating the efficacy of either serum or vaccine treatment to deal with the disease is not so very reliable. However, the possibility of using immunising agents cannot be overruled.

Vaccination against Haemorrhagic Septicaemia has not borne the desired results especially in India and it was rightly remarked in the editorial of August 1945 issue of the Indian Farming, that "some vaccines are very nearly perfect, at least for sometime to come, as Goat Tissue Virus, while other vaccines are not fully satisfactory e. g. the one in use against H. S. of cattle". It was also pointed out that "the results of vaccination are not uniform, for, instances of vaccinated animals having contracted the disease a few weeks or months after vaccination are on record, though, the check sample vaccine was issued after passing the safety and potency tests".

Comprehensive reviews of the literature on H. S. Vaccine will be found in publications by various workers. Gochenour (1924) describes that aggressins (candle filtered germ free inflammatory exudate) confer about one year's immunity tested against a challenge dose of 500 M. L. D.; but Buckley and Gochenour (1925) do not recommend its use on infected farms, and demerit its manufacture on a large scale. Delpy (1938) advocated the use of Saponin vaccine, but the high percentage of Saponin (5%) seems to be dangerous for buffalo-calves, as the drug is toxic in such amounts. Vaccine containing attenuated organisms in glycerine broth was advised by Hardenbergh, (1916) but their use is forbidden due to risk of flaring up of the organisms under more favourable conditions. The use of vaccine containing bacterial suspension in immune serum has been discouraged by Jacotot (1940) as it requires large quantity of immune serum, and has poor

keeping qualities under tropical conditions. An alternative vaccine suggested by the same author is prepared from the toxins of a good antigenic strain of *Pasteurella bovisseptica*, by lysing the culture with distilled water at 48°C for 26 hours. The lysed culture was held at the same temperature for a further period of 36 hours and this product constituted the vaccine. According to him the vaccine prepared from a good antigenic strain protected calves in doses of 1.2 c.c. and rabbits in doses of 0.5—1 c.c. against a test dose of virulent organisms, and the duration of immunity was noticed to be at least 2 to 3 months.

These adverse findings on the protective value of different Haemorrhagic Septicaemia Vaccine may be attributed to several factors which seem to exercise a great influence on the results of immunisation procedures, and the efficacy of a particular product. viz.

- (a) *Existence of different antigenic types within the species*:—A fact corroborated by Roberts (1948). He reported that a monovalent antigen or antiserum can have little value for general use in prophylaxis. There is ample evidence in literature regarding strain variation based on fermentation reactions [Jones. (1921)], cultural and biochemical reaction [Khalifa. (1935)], agglutination and agglutinin absorption method. [Cornelius (1929) & Battelli (1944)], preprecipitation test by Yusuf (1935), complement fixation test by Lal. (1927) etc. Bosworth (1948) emphasized that in all cases the selection of antigen to be used for immunisation is a matter of primary importance, the object being to confer as strong and lasting a protection as possible, compatible with safety.
- (b) *Technique of manufacture*:—While preparing H. S. Vaccine it has to be borne in mind that to obtain a potent dead vaccine, the structure of the essential parts of the germs, particularly their surface layers should not suffer by the treatment adopted to kill them. (Rajagopalan, 1944).
- (c) *Size of dose and interval*:—Parish (1942) remarked that “a good antigen may give unsatisfactory protection unless attention is directed to the proper size and spacing of doses”. Glenn (1942) advocated the principle of two stimuli for producing active immunity against any toxin. This observation may apply in a considerable measure to bacterial vaccines. Moreover, the seasonal occurrence of the outbreaks of the disease should always be taken into account while adopting any procedure of active immunisation against a particular disease. In case of prophylactic immunisation

against Haemorrhagic Septicaemia with adequate dosage of the vaccine, the time interval between the primary and secondary stimulus should be so adjusted that sufficient protection is established before the onset of monsoon or winter rains. This fact has been emphasized by Rajagopalan (1944) and Jastrzebski (1945) who advise that a second dose of the vaccine should be given one month later as this would considerably boost up the immunity.

- (d) *Other factors* which contribute to the efficacy of vaccine treatment are that the animals should be of proper age, in proper state of health and be duly looked after following vaccination.

2. Introduction

Different methods for the production of H. S. Vaccine are being adopted by various Government Institutions in India and the product is generally a killed broth culture. It is more or less difficult to assess the comparative immunising value of each product by laboratory tests. In foreign countries, manufacture of this particular vaccine is being done by various biological laboratories on a commercial basis.

For the last several years the Animal Husbandry Department, Uttar Pradesh, has been manufacturing two kinds of vaccines against Haemorrhagic Septicaemia. viz.

1. Haemorrhagic Septicaemia Broth Vaccine (H. S. B. Vaccine)
2. Haemorrhagic Septicaemia Agar Wash Vaccine (H. S. A. W. Vaccine).

The latter vaccine has been highly spoken of by the workers at the Indian Veterinary Research Institute, Mukteswar, but it is doubtful as far as we are aware, if any controlled immunity tests have been carried out so far on cattle and buffaloes. Consequent on the death of a few animals in 1946 at certain Government farms in U.P. which had been vaccinated before with a less concentrated H.S.A.W. Vaccine, Sir F. Ware, the then Director of Animal Husbandry reluctantly remarked “H. S. Vaccine is either dangerous or useless”. At about the same time Mr. T. J. Egan, Additional Director of Animal Husbandry, U. P. was of the opinion that H. S. B. Vaccine produced protein shock and as such some better product could be evolved. In pursuit of these remarks, some exploratory trials were conducted at the Biological Laboratories of the Department, for the last nearly three years in order to find out a suitable concentration of organisms in the H.S.A.W. Vaccine, which could confer a high degree of immunity, at least for the duration of the outbreak season, and thereby

protect the animals against the risk of infection to which they are exposed. The results of these trials are recorded in this paper.

3. Material

Three different strains of *Pasteurella bovisepctica* obtained from actual outbreaks in the field are being maintained at the laboratory in a state of virulence for the routine manufacture of H. S. Vaccines. They conform to the following cultural and biochemical characters.

Motility nil, gram negative, cocco-bacillary rod shaped organisms, production of Indol and H_2S , no growth on McConkey medium, litmus milk no change, nitrate reduced to nitrite, methylene blue reduction test positive, catalase test positive, M. R. and V. P. tests negative, acid no gas in sucrose, dextrose, mannite and laevulose, failure to ferment lactose and salicin. Gelatin not liquified. Colonies on blood agar are smooth, opaque and low. convex. M.L.D. of each culture was approximately for rabbits 1 c.c. of 10-7 dilution and for buffalo calves 1 c.c. of 10-4 dilution of 24 hours' broth culture.

Di-sodium hydrogen phosphate and potassium dihydrogen phosphate were the two buffer salts added to plain agar media in the proportion of 0.2 per cent. Roux flasks containing buffered agar (pH 7.6), incubated for 24 hours prior to inoculation with cultures, were used for H. S. A. W. Vaccine preparation. Distilled water buffered to 0.2 per cent with the same phosphates was used for washing, and as a fluid medium for the suspension of organisms in H. S. A. W. Vaccine. The concentration of organisms in the H. S. A. W. Vaccine was adjusted with the help of Browns' opacity tubes. Normal saline with 0.1 per cent bovine serum was used as a diluent for virulent broth cultures employed for immunity test as it had been seen that the organisms did not survive long in pure normal saline. Plain broth was used for the manufacture of H. S. B. Vaccine.

Immunity tests were carried out on buffalo calves purchased locally about one and a half years of age and approximately of the same size and weight. Parallel tests were also sometimes done on rabbits of approximately the same size and weight.

4. Methods

(a) H. S. Broth Vaccine

Twenty-four hours' growth of each culture in plain broth was mixed up in equal quantities and then formalised to 0.5 percent. This vaccine matched very nearly opacity tube No. 2 of the Brown's standard. Safety test was then done by injecting two rabbits subcutaneously each with 5 c.c. of the vaccine and their survival for 72 hours after injection was taken as an index of the safety of the vaccine. Cultures were made on

broth, plain agar and blood agar to determine the sterility of the vaccine. After 72 hours when the tests were taken to be complete the product was passed and stored for issue.

(b) H. S. Agar Wash Vaccine

The technique of preparation was according to a formula evolved by Rajagopalan (1944). The growth of each culture was obtained on buffered agar and washed with buffered distilled water. Suspension of each culture was then adjusted to the same concentration and an equal quantity of these standardised washings was then pooled. A certain quantity of the pooled product was killed by heating at 56°C for an hour, while the rest was formalised to 0.5 per cent. Safety and sterility tests were carried out with both the brews viz heat killed and formalised as in the case of H. S. Broth Vaccine. H. S. A. W. Vaccine ranging in opacity from tube No. 2 to double of tube No. 10 were prepared in this manner for study in the light of experience and results.

The infecting dose was prepared by diluting a mixture of equal quantities of 24 hours broth culture of each of the three strains. The dilutions were made x 10 in serum saline and three highest dilutions were plated on blood agar for viable organisms. The error in the preparation of each x 10 dilution was maintained at 1%.

All the animals which died during the course of immunity tests were subjected to post mortem examination and cultures were prepared from the organs and heart blood. Only when the inoculated organisms were isolated by culture and identified was the death of the animal in question attributed to infection. Death of the control animal and the survival of the vaccinated animals against the test dose of virulent culture was taken as the criterion to assess the degree of protection afforded by the vaccine.

5. Experiment

Buffalo calves and rabbits were vaccinated with the weak or concentrated H. S. A. W. Vaccine or with the H. S. B. Vaccine. The H. S. A. W. Vaccine was either heat killed or a formalized product, while H. S. B. Vaccine was only a formalised product. The animals were tested at varying intervals with varying quantities of the virulent culture along with controls which received a dose smaller than that used for vaccinated ones. The results are all shown in the table annexed.

6. Discussion

It is evident from these trials that H. S. Broth Vaccine did not prove of much value in protecting the animals when they were challenged with the infecting dose a month after vaccination (trial VII). H. S. A. W. Vaccine, of opacity less than 10, also did not afford sufficient protection

(trial I-IV) though slightly better than the H. S. B. Vaccine: but higher concentrations of this vaccine decidedly gave more hopeful results. Formalised and heat treated vaccine gave similar protection as is noticeable in trial V and VI. It was a sequence of change that control animal survived the infective dose in trial VII (b); but this may be due to the animal being possibly pre-immune (trial VI (b)). This does not affect materially, for, in subsequent tests for a long duration of immunity, the vaccinated animals survived and the control died which left no doubt that that was a mere chance and the immunity persisted for a longer period.

It is established that concentrated H. S. Agar Wash Vaccine particularly when given in two doses with an interval of one month produces a high grade immunity. In these trials, the immunity was found to last for at least 4 months, the longest interval at which it has so far been tested. The H. S. Broth Vaccine on the other hand did not produce the same degree of immunity.

In view of these results, the Animal Husbandry Department, Uttar Pradesh, has commenced the immunisation of livestock against this disease at the Government Farms with two doses of H. S. A. W. Vaccine at an interval of one month prior to outbreak seasons. The results are highly encouraging as no outbreak of H. S. amongst the vaccinated animals has been reported since their vaccination with the new vaccine.

Although the results of these few trials may not be statistically significant as the number of animals used was not sufficiently large, yet there is decidedly a clear indication that H. S. A. W. Vaccine of opacity 2 x 10 afforded a solid protection up to 4 months after vaccination when it appears to start waning.

7. Summary

1. H. S. Agar Wash Vaccine is better than H. S. Broth Vaccine.
2. The higher the concentration of agar wash vaccine, the stronger the immunity it confers.
3. H. S. Agar Wash Vaccine formalised and heat treated gave similar protection.
4. Immunity produced by H. S. Agar Wash Vaccine of opacity 2 x 10 persists upto 4 months after vaccination in the manner tried.

8. Acknowledgments.

The authors are grateful to Sir F. Ware, Mr. T. J. Egan and Shri R. L. Kaura, the successive Directors of Animal Husbandry, Uttar Pradesh, for their helpful suggestions from time to time and providing facilities to conduct these trials. We are also highly indebted to Shri R. L. Kaura for

kindly editing the paper. They are also grateful to Shri V. R. Rajagopalan for information regarding the technique of preparation of H. S. Agar Wash Vaccine.

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Trial Number	Type of Vaccine	Opacity Brown's tube	Species of Animals employed	Number of Animals	Size of dose	Number of doses and interval	Interval between vaccination & testing	Dose of virulent broth culture	Result
I	H.S.A.W. Vaccine (F)	2	Buff. Calves	2	5 cc	Single	One month	0.01 cc	0/2
			Control Buff. Calf	1	—	—	3 days	do	0/1
II	H.S.A.W. Vaccine (F)	5	Rabbits	5	1 cc	two at 12 days' interval	24 days	0.0001 cc	2/5
			Control rabbit	2	—	—	—	do	0/2
III (a)	H.S.A.W. Vaccine (F)	6	Rabbits	2	5 cc	two at 7 days' interval	16 days	do	2/2
			Control rabbit	1	—	—	—	do	0/1
	(b) do	6	Rabbits	2	5 cc	two at 7 days' interval	One month	do	1/2
			Control rabbit	1	—	—	—	do	0/1
IV (a)	H.S.A.W. Vaccine (F)	10	Rabbits	2	5 cc	two at 10 days' interval	15 days	do	2/2
			Control rabbit	2	—	—	—	do	0/1
	(b) do	10	Rabbits	2	5 cc	two at 10 days' interval	One month	do	1/2
			Control rabbit	1	—	—	—	do	0/1
V (a)	H.S.A.W. Vaccine (F)	2×10	Buff. Calf	1	5 cc	two at 10 days' interval	One month	0.001 cc	1/1
	H.S.A.W. Vaccine (H)	do	Buff. Calf	1	do	do	do	do	1/1
	do	do	Rabbits	2	do	do	do	0.0001 cc	2/2
			Control Buff. Calf	1	—	—	—	0.001 cc	0/1
			Control rabbit	1	—	—	—	0.0001 cc	0/1
	(b) H.S.A.W. Vaccine (F)	2×10	Buff. Calf	1	5 cc	two at 10 days' interval	one and half month	0.001 cc	1/1
			Buff. Calf	1	do	do	do	do	1/1
			Rabbit	1	do	do	do	0.0001 cc	1/1
	do	do	Control Buff. Calf	1	—	—	—	0.001 cc	0/1

MILESTONES IN VETERINARY PRACTICE

Progress in therapeutics during recent years has been marked by the introduction of numerous drugs, such as the sulphonamides and penicillin, which have proved to have valuable clinical applications. Notable contributions to this progress are to be found in the products which have been the subject of original chemical and biological investigations carried out by I.C.I. research workers in collaboration with veterinary clinicians. In this connection the following preparations are outstanding.

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Editorial

IMPORTANCE OF RESEARCH

"Perhaps one of the greatest single difficulties to be overcome in undertaking effective experimental and development work in the livestock field is that of convincing both practical farmers and Government administrators of the necessity for and advantages of such work". This observation of the Food and Agricultural Organisation of the United Nations on the livestock breeding under tropical and sub-tropical conditions gives, in a nut-shell, the main reason for the poor progress of Veterinary Research in the East. A further observation of the FAO, is still more pointed. "Often much money is wasted in establishing a Government Farm which is stocked with animals and operated very much as any good farm should be operated but which does not yield any returns for the money expended because no provisions were made for the carrying out of experimental work or for developing a field improvement programme based on such work". How true these observations are will become easily evident to those who are in the know of what is happening in the farms in this land! They are the results of what one should characterise as the absence of a proper perspective and correct approach to matters of vital interest. They are also due to lack of planning ahead. The importance of research is not adequately recognised by those in power and, when, as in the case of livestock research, results are not quickly obtained, dissatisfaction is expressed in no uncertain terms and the axe is laid on further work. As a result, we in this country, have to wait at the table of foreign research workers

for any crumbs that may fall. To put it very mildly, this is no credit either to the profession or to the country. In our issue for July 1950, a Medical Officer, deplored (and deplored rightly too) on the absence of information about the histology of the skin of the common domestic animal, the buffalo. And yet the buffalo is one of our important dairy animals! There are many other things concerning this animal about which our knowledge is defective. We have often wondered why this animal wallowing constantly as it does in mire and dirt, does not suffer from Mastitis to the extent it should from its environmental insanitation. Is there any difference between the anatomy and physiology of its udder and that of the cow? Again, how is this animal able to assimilate the coarse refuse fodders of the cow and convert them into milk? These and similar problems galore wait for us to solve. So also with regard to other farm livestock of our country. Information on very many elementary points are lacking and it is high time this highly unsatisfactory position is remedied and steps taken to put Veterinary Research on a firm footing and with a high priority in development work. It is true that a number of Research schemes are sponsored by the Indian Council of Agricultural Research and they are all producing very good results. But we plead for more and more schemes for the elucidation of some of the essential fundamentals of animals native to the soil of the land. We will then have more light thrown on many a problem peculiar to animals in the tropical and sub-tropical countries.

THE KEY VILLAGE SCHEME

During the last few years when public attention was being constantly drawn to the importance of our livestock to the agricultural prosperity of the country, various suggestions and measures have been put forward towards the development of our cattle and other farm animals. The most important of these measures has been the distribution of approved bulls in the rural areas with the object of upgrading the stock there. This has been a very good scheme, indeed, and it has gone a long way

in improving the stock. There has been a definite improvement in the standard of animals in the areas or localities where such breeding animals have been stationed. But, unfortunately, this scheme, like many other good schemes, has got its own limitations. The animals, being privately owned, were not quite freely available to the people and their (the animals') usefulness was to a certain extent circumscribed by the whims and fancies of the owners. More important than this was the mischief that was being done by the scrub bulls in the same locality. These animals continued to have an un-restricted sway and the good results of the approved bulls were thus being thwarted to a very great extent. There was no legislation to prevent this damage. A better method had therefore to be devised to improve our cattle and a plan known as KEY VILLAGE SCHEME has been prepared by the Animal Husbandry Wing of the Board of Agriculture and Animal Husbandry in India. This is an exceedingly valuable scheme for cattle improvement with very little defects and should be taken up by each and every State of the country with zest and enthusiasm. It has got very many advantages. Firstly, it involves very little capital expenditure to the State. This is of great importance at present because practically all the States are in financial difficulties. Secondly, it makes the rural area animal-minded and makes the villagers themselves take a live interest in the scheme and work it. Thirdly, the village or group of villages wherein this scheme is to be worked will act as a livestock breeding centre, the effects of which will radiate further and further as years pass by.

Briefly, the Key Village Scheme is a livestock breeding farm, worked in villages by the villagers for the benefit of the villagers. It is a real rural rehabilitation work run by the people themselves with the advice and guidance of the Veterinary Surgeons. The scheme is very simple and effective. A village or group of villages is selected preferably in an area where people evince at least some interest in livestock and a census of the cattle is taken. All the scrub bulls in that area are castrated and put out of mischief. This can be done ordinarily by persuasion but legislative sanction for compulsory castration

should be readily available to tackle any recalcitrant individuals. Then an approved bull suited to that locality—this is important—is introduced in the area and allowed to serve the cows there. After 3 or 4 years of work in that area, this bull will be withdrawn and introduced into another locality where a similar scheme is at work. A fresh bull of the same breed will be introduced in the first area. In this way, the breeding operations are concentrated and intensified in a definite area and consequently the results would become apparent in a comparatively short period. As we said before, the great advantage of this scheme is that it mobilises the latent enthusiasm of the ryot to livestock work and that it costs very little to the Government. There are no initial heavy costs for the acquisition of sites, construction of buildings, etc., required for the opening of Government Livestock breeding farms. The recurring expenditure also is comparatively very little and will not exceed the amounts that are at present incurred for the purchase of stock. And, therefore, it should be very easily possible for all the State Governments to launch the scheme forthwith in select areas. It is to be hoped they will take up this subject without any delay.

PERMANENT NATIONAL COMMITTEE

We are very gratified to learn that the All-India Veterinary Association has been asked by the Government of India to take up the subject of setting up a Permanent National Committee for the International Veterinary Congress and that the Association has already initiated a move in that direction. This is very good news indeed. The seed that was sown when the All-India Association was first formed nearly three decades ago is showing signs of bearing fruit. A golden opportunity for International collaboration has come to our profession and that too under Government auspices. This should be made good use of for raising the status of our profession. The object of the Permanent National Committee will be 'to place the view point of Veterinarians before the Government and the International

bodies' and this will be possible only if there is a whole-hearted and unstinted support to the Central Association from the States' affiliated branches and we do hope that this will be forthcoming in an abundant measure.

PERSONAL APPOINTMENT

Dr. I. M. Azizuddin, B.A. G.M.V.C. B.V.Sc. (Madras) Ph.D. (Edin.)

We congratulate Dr. I. M. Azizuddin, Superintendent of the Veterinary Biological and Research Institute, Kanipet, on his appointment as Principal of the Madras Veterinary College. We gave a short sketch of his career in our issue for May 1949 (Vol. XXV, No. 6) when he returned from abroad after his Post-graduate studies. A great opportunity has come to him very early in his career and we do hope he will put forth his best in maintaining and improving upon the great tradition of his *alma mater* which has been built up by the selfless and devoted labours of the pioneers of the profession.

We wish him all success.

RETIREMENT

Sri S. Vaidyanatha Mudaliar, G.M.V.C.

We learn that Sri S. Vaidyanatha Mudaliar, Principal of the Madras Veterinary College, has gone on leave preparatory to retirement after nearly 30 years of service in the Animal Husbandry Department of the Government of Madras.

Sri S. V. Mudaliar, who was one of the earliest batch of students of the Madras Veterinary College, took his diploma of Veterinary Science from that College in 1920. Entering Government service soon after, he served in the mofussil districts for some time and then joined the staff of his *alma mater* in the Parasitological Section. Working under that great Parasitologist, Dr. M. Anant Narayan Rao, for a number of years, he collaborated with him in some of his publications and, when he retired, succeeded him as Lecturer of Parasitology at the Madras Veterinary College. A few years later, he became the Principal of that institution for a short period before retiring on superannuation.

Sri S. V. Mudaliar has published some papers on his findings and has always taken keen interest in Parasitological study. We wish him a long period of healthy retired life.

THE THIRD ANNIVERSARY OF OUR INDEPENDENCE

THE PRESIDENT'S APPEAL

"Build a new and better India"

"The third anniversary of our national emancipation comes to us not only as a day of rejoicing but also of challenge. We may legitimately rejoice over the progress that has been made during the last three years in the political and administrative integration of the country, the nationalisation of its army, the reorganisation of its administration and the establishment of a planning machinery. But while we have made this progress in forging the powerful instrument of the political dynamo with which we hope to transform our economic and cultural life, we may not feel much satisfaction with our record in the sphere of overcoming shortages and economic difficulties that have been plaguing us all these years.

Slow Progress in Economic Sphere

"Our progress in this sphere has been rather slow and small. We have no doubt overcome the transport bottleneck and the flow of goods has become freer. We have made progress in the rehabilitation of refugees but much remains to be done and recent events in Bengal have added to the magnitude and complexity of the problem. We have perhaps brought more land under the plough though even in this sphere the progress has not been such as to free us from anxiety and the food problem continues to be one of our headaches. Within the last few weeks the food position in some parts of the country has been serious. Steps have, however, been taken to bring immediate relief. We have undertaken multi-purpose projects which when completed would not only place more power at our disposal but would also free us from the curse of floods. Here also however, the progress is rather slow and tardy. But we must realise that progress in this sphere could not but be slow as the situation facing us is being shaped not only by ourselves but also by factors and forces—both elemental and international—over which we do not and cannot have any control whatever. Our present difficulties are great and pressing but they need not deject or depress us. On the other hand we should recognise them to be what they really are—a challenge to our moral, mental and physical fibre. We must recognise once for all that we can meet this challenge only if we firmly pursue the path of right.

"Hold fast to Moral Code"

"The fact is that man can escape his misery if he remains loyal to the moral values even in the hour of his greatest adversity and trial—a truth illustrated by a thousand stories in the sacred scriptures and secular

history. This is the essence of the teachings of the Father of the Nation add more than ever should we hold firmly to the moral code which he had placed before us—the ideal of the world above self, service above gratification, love above violence and creation above destruction.

"Adherence to this faith", the President added, "implies in the present historic epoch that each one of us should be ready and willing to perform his duty even at some sacrifice of what he considers to be his rights. So long as the problem confronting us was to win power from the British, we could not but carry on our struggle and activities in the name of our rights—national and individual. But now the problem before us is not the acquisition of rights but of making such use of the power we already possess as would best subserve the interests of our country as a whole. Naturally emphasis shifts from acquisition to contribution, from individual rights to group obligations.

"This shift of emphasis becomes all the more urgent in view of the complex problems that have been accumulating during centuries. We have practically nothing to share except this burden of history. Our people can successfully bear it only when each one of us, whether rich or poor, educated or uneducated, city dweller or villager, aged or young, man or woman, becomes ready and willing to share it. This means that at the present moment no individual may legitimately insist on his own privileges and profits, comforts and conveniences, claims and rights. On the other hand, each citizen should bend all his energies and devote all his resources to meeting the challenge of the past and the promise of the future, and should be ready to work day and night for carrying light and life to every one of the cottages in the myriad villages and towns of our motherland. It is only when such dedication to duty will be the distinguishing feature of our individual and collective life that we shall triumph over all the difficulties that beset us and would be able to give our freedom a content and a substance. Once we grasp this central truth of service before enjoyment, of world before self, all such problems as have been poisoning the atmosphere and paralysing our limbs would simply fade away. Communalism, regionalism, class rivalry, political, administrative or business corruption—all are but acute symptoms of a lack of faith in this great and basic principle of group action.

Call for Re-dedication

"What we need most is a closer understanding of the problems, a deeper insight into it and a searching introspection and self-examination. We must not only recover and recapture as individuals and as a nation the high ideals but also establish among ourselves a form of conduct which is based on an appreciation of moral values. The only way out for us is to re-dedicate ourselves—each one of us—to this moral faith.

"The temptations to which attainment of power has exposed us should be resisted. The allurements of becoming rich in material wealth at the expense of others and our own morals should be overcome. The false and easy notion that the time for work and sacrifice is over and for enjoying the fruits thereof has come, should be suppressed.

"The paramount importance of this dedication becomes all the greater in the context of the threatening international situation. The world is to-day on the brink of an abyss and the least tilting of the balance may send it headlong into the bottomless pit of destruction and cruel conflict. I, therefore, hope that our common people, our peasants and workers, our clerks and administrators, our thinkers and writers—all would rise to the occasion and discarding all selfish considerations would throw themselves into the noble task of building a new and better India. Capital, trade, labour, services and professions—all have their contribution to make and their burdens to bear and let me hope that they will fulfil their obligations to the full. We are heirs to a great past and the architects of a better and braver future. We have to accept and master this challenge of our destiny. With the grace of God and the active co-operation of all sections of our people we shall master the difficulties that straddle our path and march forward to the glorious temple of peace, prosperity and progress. Jai Hind."—PTI.

PRIME MINISTER'S CALL TO THE NATION

INDIA'S HOUR OF NEED

"Recapture spirit of Sacrifice"

The Prime Minister, Pandit Jawaharlal Nehru, called upon every man and woman in the country here to-day to realise the responsibility that freedom had brought and to live upto to it.

"If the people do not realise this responsibility, then they will not have understood the meaning of freedom, and shall not be able to defend it against dangers which might threaten it internally or from outside".

Pandit Nehru was addressing a mammoth gathering from the lofty ramparts of the historic Red Fort, where earlier he unfurled the National Flag in celebration of the third anniversary of Independence Day. As the flag was unfurled to the booming of a 31-gun salute a tremendous cheer went up from the vast multitude, estimated at about a million people, that had gathered there.

In a thirty-three minute speech surcharged with emotion Pandit Nehru referred to the basic problems of food and rehabilitation of the

refugees facing the country, the world situation, the unsocial elements in the country who were bent upon, through their insane ways, to undermine freedom and public enemies like hoarders and profiteers.

Pandit Nehru reminded the people that they could not forget their own role in solving the problems facing the country. They could not, he said, look to the Government alone to do everything for them. No Government in the world could do this without the active and willing co-operation of the people. Pandit Nehru asked them to face those problems with courage.

"In the coming year we shall face those difficulties in a determined way. We shall even welcome them, and eventually destroy them," declared the Prime Minister.

Unlike former years, Pandit Nehru began his speech instead of concluding it, with the salutation "Jai Hind". Congratulating the people at the outset on all their "achievements or failures" during the last three years of independence, Pandit Nehru said that they often stumbled during this period, fell many a time, but got up and then moved forward. Why was he congratulating them for their failures? Why should he have on this happy occasion talked of them? Perhaps it was not right to mention them. Even so, he referred to their failures because in the history of a nation, both achievements and failures had their place. No nation could go forward which did not know how to bear trouble cheerfully. If a nation gave way to despair in face of odds, then it became a weak nation. They had, during the last three years, been put to severe tests often, and if they had failed at times they had never given in.

Must Face Problem with Courage

Before the country became free, said Pandit Nehru, the people were put to severe tests. They achieved freedom because they had faced these tests successfully. Now also the whole country was faced with still more difficult tests which they had to grapple with. They could succeed provided they faced them with courage and steadfastness. So it was inevitable that a nation must have both happiness and troubles, for eventually happiness was achieved after treading on a rough hard path. There was no place here for cowardice or any weakness or parochialism or petty squabbles, which all weakened a nation.

Recapitulating their achievements during the last three years, Pandit Nehru said that on January 26 they fulfilled a long cherished "dream". On that day the Republic was inaugurated and the country got its first free constitution. They saw other "dreams" being fulfilled during this period but many remained yet to be realised. In a few months from

now, the people would have the opportunity to elect their future leaders under the new constitution. That would be a momentous step to which they had looked forward for years. So they went forward step by step not, however, without facing difficulties and troubles.

Referring to the world situation, the Prime Minister said that the world was in the grip of a war psychosis. There was talk of a world war breaking out in the near future. Fear gripped the minds of millions of people. In these circumstances when the world was being shaken by "violent political earthquakes", what was their duty in India? It was futile, said Pandit Nehru, to hope for any aid from outside in the event of danger or aggression. No one at the time of trouble could help other countries. They had to depend upon themselves, upon their own strength and courage and initiative. It was with those very "weapons" that they fought their freedom battle, without arms, and faced a mighty imperialist power.

"We want to befriend all nations," said Pandit Nehru, "But ultimately we shall have to depend upon ourselves to defend this country."

Warning Against Unsocial Elements

Pandit Nehru warned the people to beware of unsocial elements that sought to destroy freedom. In the name of freedom of thought and action, which were sacred principles, they wanted, he said, to tear away the roots of the very freedom that guaranteed them these rights. Freedom of thought and action for them was licence to indulge in anything they liked.

In a free country, said Pandit Nehru, full freedom of thought and action was a prerequisite. People had a right to follow any political path or political party. For if this right was not there, there would be no freedom but a sort of totalitarianism. But the people had clearly to differentiate between freedom of action and licence. The fundamental thing was how this freedom was used and to what end. If it was used to destroy the nation's independence, then it could not be tolerated. Such action became simply treachery against the country. There were people in the country who wanted to undermine freedom through their unsocial tactics; their challenge had to be met and would be met by the Government, declared Pandit Nehru.

At this juncture, said Pandit Nehru, when the world was passing through a crisis, it was the duty of every Indian to stand united by his country. If any Indian did not believe in this unity, then he had no business to remain in India. It was incumbent on the people, therefore, not to allow themselves to be affected by "voice" raised to disunite them. That was the work of insane men whose minds had been deranged.

There were certain parties which wanted to divide the people on communal lines. Theirs was not so much a religious approach as a political one to exploit the religious sentiments of the people. Disunity was also sought to be encouraged by elements which fostered provincialism. These things did not strengthen a country, but only weakened it. Now it was another matter to have two political opinions or different political parties. But no Indian could close his eyes and ears to people who raised their voice against freedom and were against the very fundamentals like unity on which it rested. They were traitors and had to be put down if the country was to progress and prosper.

Pandit Nehru said that the biggest question that the country faced to-day was that of food. They had said lots of things about the food situation in the past. What was the position now? There were some provinces like Madras and Bihar where food scarcity was being experienced. Heartrending reports of human suffering were coming from those areas and being published in newspapers. It was a matter which gave rise to anxiety. But there was exaggeration also in these reports which caused panic in the minds of people.

Giving reasons for the continuing food scarcity in the country, Pandit Nehru said the last world war, division of India and the increase in population were responsible to a great degree for the food shortage. Large food-producing areas had been cut off and now formed part of Pakistan. But whatever that might be, one thing was clear that India had to produce all the food that he needed. She could not depend on outside imports. For it not only involved heavy expenditure, but made the country dependent on others. The country was thus weakened and even had to succumb to outside pressure. Moreover, in times of emergency, as the world faced now, imports were impossible. They had, therefore, to produce all the food they needed in the country itself. People had to realise this fact and to adapt their food habits accordingly. It was no longer a question of their selecting particular foodstuffs or foodgrains of their choice. They had to do with what was available. People had to realise this fundamental thing and resolve not to waste "even a particle of food".

Pandit Nehru declared that the Government was committed to the decision, taken earlier that after 1951 there would be no food imports. That decision, he said, still stood and there would be no going back on it. The deadline would be adhered to even if there was a shortage of food and people had to tighten their belts. Although every effort would be made to increase food production and make the country self-sufficient in food, people would have to bear any shortage that might exist.

Referring to Government's grow more food campaign, Pandit Nehru said that it had two curious aspects. On the one side they were achieving

without doubt steady progress in their campaign to grow more food and on the other, they were having setbacks. Floods in some parts and failure of rain in others had affected crops. This was the case particularly in the States of Bihar and Madras and to some extent Bengal. The result was that the position on the food front could not be made steady. But enough food had been despatched to the affected parts. In fact, supplies for the next three months had been sent.

Pandit Nehru said that Government did not want to hide any inefficiency in the food administration of certain States. If inefficiency existed anywhere, they had to admit it and take lesson for future guidance.

Condemning hoarders and profiteers as public enemies, Pandit Nehru said that in their selfishness and personal greed they traded on the suffering of the people. Whenever an opportunity came, they tried to profit by raising prices. No one could bear this. "You may say that Jawaharlal Nehru strongly condemns blackmarketeers and calls for severe steps to be taken against them, but in actual practice nothing much is done. I am ashamed to admit that this has been so at times. Such a situation, however, can no longer be tolerated. But the Government cannot curb blackmarketing all by itself. The people must come forward and lend their support to it. If the Government and the people join hands and tackle this problem in a determined way, I am certain that we shall succeed in wiping out the blackmarketeers".

Tackling rising prices

People might have heard or read in papers, said Pandit Nehru, that this question of rising prices came up in Parliament. A resolution was passed which empowered the Central Government to legislate in regard to certain subjects in the State list. This was done to have a uniform policy all over India relating to essential supplies. A bill was also passed for which Parliament sat till late in the evening yesterday. Under this new enactment, rules would be framed with a view to bringing down prices. But in all these measures public co-operation was needed. Often there was public criticism of Government servants and complaints were made against them. If they were inefficient then the Government's administration was impaired to that extent. But Government servants who were found to be inefficient would be removed and replaced by others.

Pandit Nehru then referred to the other "big question" of rehabilitation of refugees and that the Government was gradually succeeding in solving it. But it was a matter of sorrow that as yet many refugees had not been resettled. But here also, he would say, that Governmental effort alone could not solve a vast problem. The people all over the country and the refugees themselves had also to help in solving it.

The refugee problem was developing in a "terrible form" in the east, said Pandit Nehru. Four months ago an Indo-Pakistan Pact was

signed to tackle this problem. Some critics of the Pact had forecast that it would completely fail, while others said that it was a waste of time and a mistake to have drawn up the Pact. But the question could be solved, if they were determined to solve it.

Striking a personal note, Pandit Nehru said that he felt in his mind that the Bengal question, although very difficult, had to be resolved. He could not say what might happen or be done in the future. That depended on their strength. But he would not accept it for even a minute that nothing could be done and for that reason they should stand still. That was a defeatist approach, an approach of despair.

Referring to the people's right to criticise the Government, Pandit Nehru said that there was no barrier to stop them from doing so. After all, the Government was formed by the people themselves and they had every right to remove those holding the reins of power if they forfeited their confidence and proved unfit.

People's responsibility

"Governments come and go and so do those who run them. Ultimately, the people remain to decide who is to represent them. But they should beware that in doing so or in criticising the Government they do not undermine the very basis of freedom". The inherent strength of a nation, he said, lay not in her armies alone but in the capacity and stamina of the people. They had to understand their responsibility which freedom had brought, towards their country. In the hour of need they must stand by her. That was the attitude they adopted when they fought freedom's battle. They did not don a soldier's dress then but the spirit to free the country from foreign yoke was there, the sense of responsibility was there and with it the zeal to undertake sacrifices for the cause.

To-day the need of the hour in the country was to revive that zeal, recapture that spirit and recreate that atmosphere of national fervour. In doing so, they had to keep away from petty squabbles and all that stood in the way of establishing complete unity in the country. All the people had equal right of opportunity and all doors for progress were open to them. If people co-operated with each other, they could strengthen their country. But if they failed to do so, and entered into petty squabbles they would weaken it.

Pandit Nehru concluded, amidst cheers, by calling upon the people to face the future fearlessly and courageously for he was hopeful that in the years to come they would be able to face successfully all difficulties and get over them.

"The Hindu"

Clinical Articles

SARCOPTIC MANGE IN GOATS

By

BALBIR SINGH,

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Sarcoptic Mange in goats is well known to local shepherds and gadarias. They are very much afraid of this disease and call it a pest in goats because, according to them, 60 to 90 per cent of their goats die of this disease. They had found it obstinate and difficult to cure or control. It did not, however, spread to sheep. Even attendants were affected, but it did not spread to sheep they said. During such outbreaks, they sell away their herds to butchers. The following record of a successful combating of an outbreak of the disease would therefore be found interesting:—

During the year 1949, three flocks of Jamnapari goats were purchased and kept in Orai, Ata, and Bharari Farms and this disease appeared in all the three places probably due to one or two new purchases.

Symptoms:—Scratching, rubbing against the wall and shedding of hair, entire skin of the body hard to touch and full of scabs and dandruff. The animals when sent to grazing always engaged themselves in scratching and biting and thereby lost condition. The diseases spread to the whole flock during the rainy season.

Diagnosis:—The scabs were examined under microscope by the Veterinary Investigation Officer, Mathura, and found to be Sarcoptic Mange.

Treatment:—Sulphur dressings in oil or vaseline, mercury lotion wash, intramuscular injection of milk and Soamine, monthly dips in Cooper's Arsenical Dip gave only temporary relief as the disease re-appeared after a week. Finally, the disease was eradicated by use of Gammexane 520, a product of I. C. I. (India) Ltd., which was used in the following ways:—

- (i) Gammexane, about 6 ounces for each animal, was rubbed on the body of goats and repeated after a fortnight.
- (ii) In badly affected areas such as ears and muzzle, Gammexane powder one part mixed in 16 parts of Mustard oil was applied once in the first week of October 1949. On the 3rd day, the skin became free of scabs and soft.

(iii) The animals were dipped in a watery suspension of Gammexane 520, one part in 100 parts of water for 5 minutes each, and repeated after a fortnight during October 1949. The disease persisted and appeared after ten days of the dip.

(iv) In November 1949, a 2 per cent suspension dip of Gammexane in water was used for five minutes for each animal and repeated after a fortnight. The solution was a bit irritant to the hands of the attendant but soap wash and application of vaseline gave relief. The disease was completely cured and eradicated after this application.

The goat house was disinfected by burning hay on floor and walls.

Mortality:—Out of 43 goats, 2 bucks and 40 kids, the number of deaths was 3 goats and 39 kids due to mange before this line of treatment was adopted. After this treatment, no deaths occurred and all the units were cured.

I am thankful to Sri R. L. Kaura, Director of Animal Husbandry, Uttar Pradesh, Lucknow, for encouraging me to write this article and Sri P. N. Bhal, Deputy Director of Animal Husbandry, Lucknow and Sri R. N. Mohan, Veterinary Investigation Officer, Mathura, for providing all facilities and guidance and instructions to carry on this experiment.

AN EXTRA-ORDINARY CASE OF CHOKING IN A BULL

By

P. K. DAKSHINKAR, G.B.V.C.,

Veterinary Assistant Surgeon, Wani, Berar, Madhya Pradesh

On the night of 6-2-50, I received an urgent call from a landlord of a village to attend on a bull with choking. The history was that it had swallowed a piece of bone and that it was stuck up in the throat.

I attended on the case immediately during the night and found that the villagers had tried all sorts of quackery, as is usually the case with them, to take out the foreign body out and that in their efforts they had pushed it still further downwards. There was a 'bulge' in the middle of the neck in the region of the gullet and something hard was felt.

The animal was in great distress and was unable either to sit down or lower its head. It was therefore decided to remove the foreign body by performing Oesophagotomy immediately.

Treatment:—The site of operation on the left side was shaved and cleaned thoroughly with antiseptics.

10 c.c. Dentocain was injected subcutaneously at the seat of operation as a local anaesthetic. An incision about 4 inches long was made over the seat of obstruction and, cutting through the superficial muscles, the part of the oesophagus was exposed. This was incised lengthwise and the foreign body brought into view. I tried to take out the foreign body by the forceps but could not. I then used my hand and removed it with a great effort. To my surprise, it was a solid bamboo stick, about 2 feet in length and about half an inch in diameter. Evidently it had been used by the attendants to push the obstruction in and itself became the obstruction.

The part was thoroughly cleaned antiseptically and sutured up. Tr. Benzoin Co was painted over the sutures. Adrenalin Chloride 10 c.c. was injected after the operation was over.

The owner was advised to feed the animal with milk and eggs till the wound healed up. He was further advised to see that the surgical wound was daily attended to.

7-2-50. The animal was found to have been greatly relieved. It could lie down freely and take the feed of its own accord. 50 c.c. of 20 per cent Soluseptasine was injected intravenously.

The owner failed to bring the animal for about a week. When he brought it on 14-2-50 the operated wound was full of maggots. The maggots were removed and the wound was washed antiseptically. On examination it was found that the oesophageal wound had healed up. The superficial wound was dressed with 01. Turpentine. Soluceptasine injection was repeated.

From 15-2-50 to 22-2-50 the wound was dressed antiseptically and the case was discharged completely cured. The animal is now in a state of good health.

UMBILICAL HERNIA IN A BULL

By

B. H. V. DHARMA RAO, G.B.V.C.,

Veterinary Assistant Surgeon, Bobbili, Madras.

Subject:—A white Ongole cross-bred bull, aged about four years, admitted on 5-4-50.

History and diagnosis:—From the time of its birth the bull had a small swelling at the umbilical region which grew gradually to the size of a tennis ball by the time the animal completed two years of age. It

continued to increase in size and, when it was brought to the hospital, it had attained the size of a human head.

On examination, it was found that the swelling was that of a reducible umbilical hernia. The hernial ring was detectable and it was about 2 inches in diameter. It was evident that the ordinary simple methods of treating hernia would be of no avail and that only a radical operation was indicated.

Treatment:—The animal was prepared for operation on 6-4-50. On that day, half an ounce of Chloral Hydras was given as a drench in rice gruel and the bull was secured on its back. The skin over the hernial swelling was shaved and thoroughly cleaned with hot water and soap and then with alcohol. A clean straight linear incision was made by the side of the linea alba and the hernial sac was opened out. By digital manipulation the adhesions between the intestines and the hernial ring were broken down, the herniated intestines were mopped out with normal saline and pushed into the abdomen. The edges of the hernial ring were scraped and then approximated by sutures with twine. The incised skin was stitched separately with twine, a pressure bandage was put on and the animal was allowed to get up. In the evening a dose of Sulphanilamide-4 drams—was given mixed with jaggery.

7-4-50. Repeated Sulphanilamide B. D. Only rice gruel and bran were given as feed.

8-4-50 to 12-4-50. Repeated treatment with Sulphanilamide and painted Tr. Iodine over the operated area.

13-4-50. Signs of suppuration under the skin were noticed. The skin sutures were removed and the part treated antiseptically. The abdominal sutures were intact and there was already union of the hernial ring.

14-4-50 to 29-4-50. Treated the wound antiseptically.

30-4-50. The bull was discharged cured.

This case is recorded only* to show that this radical operation for umbilical hernia in bovines can be undertaken with safety provided ordinary care and attention to surgical technique is observed.

A CASE OF SNAKE BITE (?) IN A DOG

By

IFTIKHARUDDIN AHMED, G.B.V.C.,
Veterinary Surgeon, Gulbarga, Hyderabad-Dn.

On 8th January 1950 at 7-30 P.M. a bitch was brought to this hospital with the history that, while roaming about in the house compound in the evening, it suddenly ran to the owner crying in agony and lifting her near fore paw. After a search, the owner found two small pin-point holes in the interdigital pad, from which blood was oozing. In the meanwhile, the bitch vomitted twice and a flow of froth started from her mouth. The owner suspecting snake bite, put a ligature above the bite and brought the animal at once to the hospital for treatment. The bitch had an anxious look, appeared nervous and a stream of froth was still running from the mouth. Immediately, the suspected wound was scarified and rubbed with Pot. Permanganate. Then a dose of Lyophilised Anti-snake venom Serum Poly Valent (Haffkine Institute) was mixed with 10 c.c. of distilled water and injected intravenously. A dose of stimulant mixture also was administered internally.

Next morning when the bitch was brought to the hospital, it was found to be normal.

HAEMOTHERAPY IN CORNEAL OPACITY

By

K. V. DIVEKAR, G.B.V.C.,
Veterinary Assistant Surgeon, Nasik

The following cases of corneal opacity were successfully treated by haemotherapy and they may be found interesting by the members of the profession.

Case No. 1:—A local-bred bullock, six years of age, admitted on 25-1-49.

Symptoms:—The animal was totally blind of both eyes. When let loose, it hit against the walls and stumbled over obstacles. There was muco-purulent discharge from both the eyes with congestion and slight opacity in them.

Treatment:—On the first day, the eyes were washed with boric lotion and dusted with calomel powder. Boric fomentation was advised. Internally an opening dose was given. The blood of the animal was examined for Trypanosomes but found negative. On the third day 2 c.c.

of milk was given subconjunctivally and 60 c.c. of milk subcutaneously. On the 5th and 8th day, the same injections were repeated. Sulphanilamide with castor oil was put into the eye. The eyes were examined on the 12th day. There was no improvement. Then 60 c.c. of blood was drawn from the animal and injected intramuscularly, and the treatment for the eye was continued. On the 14th day the owner reported that the animal could see slightly. On the 16th day, 80 c.c. of blood was given as above. This injection gave a good result and the animal was brought to the hospital carefully without being led. Again on the 18th day, the animal was given 100 c.c. of blood as above. The animal was examined on the 24th day and found it had got back its vision completely.

Case No. 11:—A local-bred bullock, admitted on 21-1-49 for corneal opacity and ulcer at the outer canthus with muco-purulent discharge for the past four months. There was also a non-malignant growth on the external side of the cornea.

Treatment:—On the 1st day the eye was anaesthetised and the overgrowth was operated on and removed. The part was cauterised with Silver Nitrate and neutralised with normal saline and dusted with Sulphanilamide. An opening dose was given. On the 8th day, the animal was given 2 c.c. of milk sub-conjunctivally and 60 c.c. subcutaneously to relieve the opacity. On the 12th day the wound was cauterised again and washed with saline as before. On the 15th day milk injection was repeated. Even after 18th day's treatment, there was no improvement in the corneal opacity. Then haemotherapy was adopted and 60 c.c. of blood was given intramuscularly as in case No. 1, and this was repeated on the 23rd day and on the 36th day in doses of 60 c.c. and 90 c.c. respectively. The treatment for the operated wound was continued. The corneal opacity cleared completely and the discharge from the eye also ceased by the time the 3rd injection of blood was given. There was however, no improvement in the operated area. On the 42nd day 100 c.c. of blood was given again as before. The bullock regained its sight, but the overgrowth on the outer canthus persisted. The bullock was discharged on the 42nd day.

Case No. 111:—A local bred bullock, about 8 years old, with mucopurulent discharge from both eyes and with a history that it had lost its sight suddenly was admitted at Ghoti dispensary on 15-2-49. There was corneal opacity and the animal was debilitated.

Treatment:—The eyes were washed with boric lotion and dusted with Sulphanilamide powder. An injection of 50 c.c. of blood at body temperature was given as in previous cases at the residence of the owner as the animal was not able to come to the hospital. The daily treatment of washing with boric lotion and dusting of Sulphanilamide with castor oil was continued.

A second injection of 70 c.c. was given after 8 days of the first at the hospital, as the animal was able to see, to some extent. The discharge from the eye had ceased.

For the third injection when 90 c.c. of blood was given the animal was brought without trouble from a distance of about one mile, as it was able to see clearly and run here and there. The animal was re-examined after 8 days and found to be quite alright.

Three more cases have been treated in the above manner but the results of the same could not be studied as the animals were far away from the hospital.

Mail Bag

Sri S. P. Beri, B.A., L.V.P., Poultry Development Officer, Ajmer. Merwara, Ajmer, writes of the use of Vitamins B and C in acute Eczema in dogs and records the result of treating a case with those vitamins. He says "treatment was started by giving daily two tablets of Vitamin B Complex in the morning and two tablets of Vitamin C in the evening (T. C. F. Vitamins). Each tablet of Vitamin B is reported to contain Thiamine Hydrochlor. Riboflavin, Nicotinic Acid Amide, Pyridoxine and Cal. Pantothenate in suitable proportions. No other drug was given except the two vitamins. After thirteen days of treatment the animal was completely cured."

Sri Purna Chandra Pathak, G.B.V.C., Veterinary Assistant Surgeon, Abhayapuri, Assam, reports about the successful treatment of "Gas-gangrene" in cattle by the use of Soluseptasine intravenously supplemented by 15 gm of Sulphanilamide divided into five doses and given for 60 hours following the injection. Six cases were treated in this way and all of them recovered. Surgical treatment also was adopted in these cases and the lesions were opened out with a view to effective drainages.

New remedy for blood pressure is the discovery of oil extracted from the Indian Shark fish (*Galeocerdo tigrinis*) as the result of research carried out by Dr. S. Nyogi, Professor of Pharmacy, Calcutta University at the instance of the Government of India in the Research Institute at Dallas, Texas, for the last 14 months. On his return from London to Bombay on Friday the 24th February 1950, Dr. Nyogi stated to the Press Representatives that as the result of the experiments he carried out in patients through the use of his oil the blood pressure was brought down from 220 degrees to 160 degrees in fish. The sample of oil extracted from the liver of the above mentioned Indian shark

found in the sea on the South Coast of Madras was made available to him by the Madras Government Fisheries Department. Dr. Nyogi is expected to submit his report shortly.

National Standard.
Bombay, 25-2-50.

Association News

THE MADRAS VETERINARY ASSISTANT SURGEONS' SERVICE ASSOCIATION

"Dr. P. Srinivasan, G.M.V.C. B.V.Sc. M.Sc. has been elected a member of the Managing Committee of the above association in the place of Dr. D. Krishna Murthy, G.M.V.C., B.V.Sc. who has joined the Uttar Pradesh Veterinary Service as Assistant Professor of Bacteriology in Mathura Veterinary College."

CAPT. G. A. SASTRY,
Secretary.

SIND VETERINARY MEDICAL ASSOCIATION

The Annual General Meeting of the Sind Veterinary Medical Association was held at Karachi on 13th August 1950.

The following office bearers were elected:—

<i>President</i>	... M. Mohey Deen, M.R.C.V.S.
<i>Vice-Presidents</i>	... } Khan Saheb J. R. Banna. ... } S. W. H. Rizvi.
<i>General Secretary</i>	... M. Azhar Hussain, G.B.V.C. (Pat).
<i>Joint Secretaries</i>	... } Sayed Mohammed Abbas. ... } K. M. I. Khan.
<i>Treasurer</i>	... Abdul Majid Siddigi
<i>Auditor</i>	... Imtiaz Ali Khilji.
<i>Members of the Executive Council...</i>	... } K. M. Sulaiman. ... } Mohammed Baksh. ... } F. K. Solangi. ... } Tayyab Usmani ... } Malibuddin.
<i>Editor</i>	... Lieut. M. A. Siddiqi

Veterinary Medical Journal—organ of Sind Vety. Medical Association.

Tatta, Sind, }
20th Aug. 1950 }

M. A. HUSSAIN,
Secretary.

The following resolutions were passed:—

1. This Annual General Meeting of the Sind Veterinary Medical Association records with profound sorrow the sad demise of Mr. M. W. Mirza, late Officer incharge Veterinary Laboratory Karachi and conveys its deep sympathies to the bereaved.—

2. Resolved to request the Central Government through the Sind Government to expedite the formation of All Pakistan Veterinary Council a statutory body—similar to the Pakistan Medical Council to safeguard the interests and integrity of Veterinary profession and to promote a high standard of ethics and efficiency.

3. Resolved to approach the Sind Government to remove the Veterinary institutions from the dual control of the Local Bodies, and put all the Dispensaries and Hospitals in Sind under the direct control of Civil Veterinary Department for efficient working as the dual control has not proved to be satisfactory.

4. Resolved to approach the Sind Government to stop the indiscriminate slaughter of cattle throughout the province of Sind by imposing some age restrictions in the general interest of the Livestock.

5. Resolved to move the D.R.V.F.P., Rawalpindi, & G.H.Q. Pakistan Army to remove the distinction between the Licenciates, Diploma holders and Degree holders in awarding temporary and permanent Commission as was done during the last war.

6. Resolved to move the Sind Government to accord permanent sanction to the post of Assistant Directors A.D.I.O., (P) and also to the five Dispensaries of Mirpur Sakroo, Jati, Shadadpur, Nagarparkar and Tando Ghulam Ali.

7. Resolved to move the D.V.S. Sind to approach the Government of Sind to issue orders to treat the affected animal and carry on preventive treatment of all animals against H. S. Anthrax, B.Q., Liver Fluke and Surra (Curative only), free of cost in order to have a uniformity.

8. Where as it is the considered opinion of this meeting of the Veterinarians that the Livestock rightly and deservedly falls under the domain of Veterinary profession it is hereby resolved to urge upon the Sind Government to hand over the Livestock Department to the Civil Veterinary Department without any further delay in the best interest of the national, Agricultural cattle wealth of the Country.

9. Considering the national health at a stake, Municipalities and Notified area Committees all over the province be moved to appoint their own Veterinarians for Meat and Milk inspection or alternatively the services of Local Veterinary Surgeons be utilised on suitable Honararia.

10 "Where as in the present lower standard of Sindhi Examination" it is difficult to enable the "New Sindhi Veterinarians" of the Civil Veterinary Department Sind, to pass out the examination, which is a condition precedent to confirmation, it is resolved to request the Sind Government to lower the standard down to simple Sindhi Examination.

11. Resolved to approach the Sind Government for creation of two posts of personal Assistants (One technical, one administrative) for the Veterinary Directorate on Class II. services of the Sind Government.

12. Being alive to the cruelty perpetuated on the dumb creatures, this meeting of the Veterinarians is of the opinion that the Government be moved to issue proper direction to the police Department to co-ordinate and co-operate with the Veterinary Department to check, act of Cruelty in such towns where services of S.P.C.A. are not available, further it is resolved to have the cattle pounds inspected by the Veterinary Surgeon of the respective areas and also by the visiting officers of the Department as there are reasons to believe that animals in ponds are neglected.

13. With the advent of Pakistan it is necessary to have more technically qualified persons in the interests of the state, it is therefore resolved to request the Sind Government to revive sending up of Veterinarians for advance training and specialization in different branches of Veterinary Science.

14. Resolved to thank the Government of Sind for their actions taken by them by granting concessions to the displaced officers regarding their refixation of their pay.

15. This Meeting of the Veterinarians request the Sind Government to count the previous services of all the displaced officers under them and give increment on their merit.

College News

BIHAR VETERINARY COLLEGE

The following students are declared to have passed the Diploma Examination (Supplementary) held in July 1950.

(In order of merit)

- | | | |
|-----------------------------------|-----|--------------------------|
| 1. Bishnu Shankar Prasad | ... | Saharsa District Board. |
| 2. Bansidhar Sharma | ... | Shahabad District Board. |
| 3. Paschal Lakra | ... | Bihar Government. |
| (Compartmental) | | |
| 4. Naba Kishore Das | ... | Orissa Government. |
| 5. Kashi Mahesh Narain Srivastava | ... | U. P. Government. |
| 6. Narendra Prasad Verma | ... | Bihar Private. |
| 7. Maheshwar Prasad Singh | ... | Bihar Private. |

H. R. KAPUR, M.R.C.V.S.,
Principal.

Correspondence

[The views expressed in letters addressed to the Editor represent the personal views of the writer and must not be taken as expressing the opinion or having received the approval of the A.I.V.A.]

Perandron for sexual inactivity

Sir,

A medium sized Murrah breeding bull was included in the premium scheme in the month of October 1949 in Divi Taluk. The next month the owner complained that the animal was not serving and that he found great sexual inactivity in the animal.

I gave 20 mg. of Perandren, a synthetic male Hormone (Ciba), intramuscularly. In addition to it, the animal was given 6 tablets of 'Sex Vigour' of Continental Drug Co., Bombay, orally for seven days in food. Each tablet contains dried testes 2 Gr., anti-pituitary 1 gr. Suprarenal Cortex 1/4 gr., Prostate 2 gr., Thymus 2 gr., Thyroid 1/10 gr.

After ten days there was a very decided improvement and the animal began to serve the cows well.

Avanigadda,
Krishna Dt., Madras,
15-4-50.

K. NARAYANA RAO, G.M.V.C.,
Touring Veterinary Asst. Surgeon.

Trypanosoma Evansi

Sir,

I would like to inform the readers of your esteemed journal that *Trypanosoma evansi* has been successfully grown in the developing chick embryo. The method used was by inoculating fertilised hen's eggs incubated for 14 days with the blood of the rabbit artificially infected with the parasite. The standard technique of egg culture was adopted and the eggs were opened on the fourth day after incubation. The Trypanosomes were found to have multiplied in the body of the chick just as in larger animals which fact was proved by the presence of the parasite in all organs and blood of the chick in large numbers. The trypanosomes cultivated in the chick embryo was virulent to white mice. This is the first time that *T. evansi* has been grown in the developing chick embryo in India.

R. N. NAIK,
Vice Principal & Bacteriologist,
Bombay Veterinary College Parel.

Synopsis of observation on "ALTAN".

Sir,

I have, in my practice in his Highness the Maharaja's Body Guard, Trivandrum, and outside, widely used "Istizin" (Bayer Veterinary product) as a purgative for horses and cattle with great success. When that drug was not available anywhere in the market, the want of a purgative medicine of its kind was very keenly felt.

When Altan (1:8 Dihydroxyanthraquinone May & Baker Veterinary product) was introduced to the profession, it was greatly welcomed. I have used it in my practice and am still using it for the horses in His Highness the Maharaja's Garage and Stables. I have noted its effect to be very efficacious. The animals readily take it, as it is odourless and tasteless. The latter features are particularly welcome to persons engaged in equine practice.

Every time new horses arrive here they are given a dose of physic with 'Altan' before commencing training. By the observance of this simple precautionary measure, I have been invariably avoiding complaints like 'Azoturia', 'Lymphangitis', 'Filled legs', 'Dark coloured urine' etc.

The maximum dose of 'Altan' (fresh) which I have given to my equine patients is 3 drachms in food, and the minimum dose is 2 to 2½ drachms, according to the size of the animal. The effect produced is very satisfactory.

A horse thus purged is generally put to work in about 5 days after the physic has set.

'Altan' is in my opinion, a sure, safe, reliable, convenient and harmless purgative for horses and cattle.

S. RAMASWAMY PILLAI, G.M.V.C.,
H. H. The Maharaja's Garage & Bodyguards,
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OPERATION ON THE HEART

Bombay Surgeon's Success

The first heart operation in this country has been successfully performed by surgeons in the J. J. Hospital Bombay. The patient was an eight-year old girl and her examination showed hardening and adhesion of the pericardium (layer covering the heart), a disease known as constructive Pericarditis.

In one of the most extremely delicate operations, surgeons opened the patient's chest, took out the heart, scraped the pericardium and put back the heart in its original place. The operation took an hour and a half and the patient stood the ordeal well. The girl is reported to be progressing well. U.P.I., Hindu.

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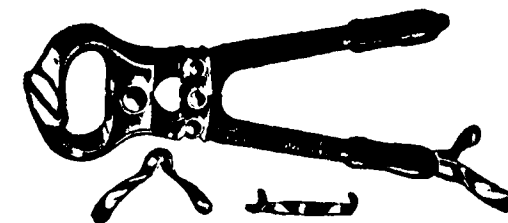
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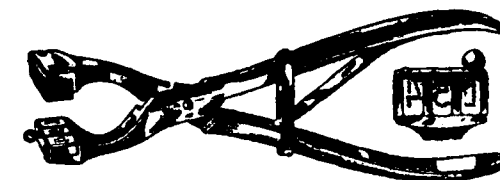
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