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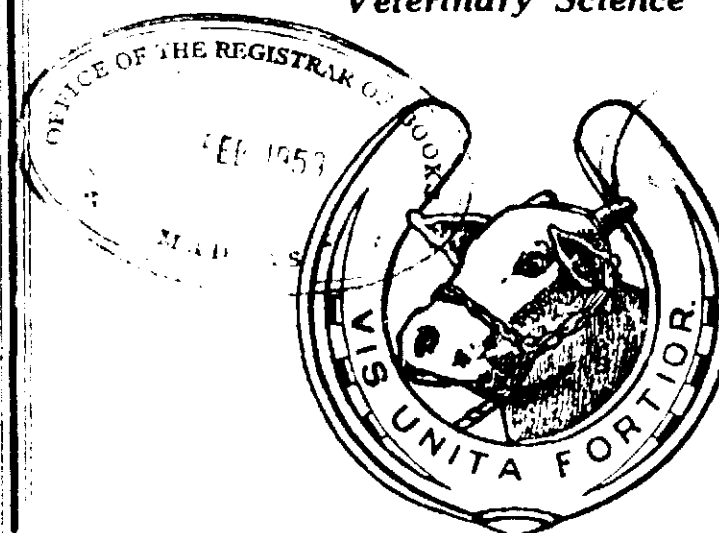
Vol. 36, No. 1

JANUARY, 1959

THE INDIAN VETERINARY JOURNAL

(The Journal of the All-India Veterinary Association)

*A Monthly Record of
Veterinary Science*



(ESTD. 1924)

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Vol. 36

January, 1959

No. 1

THE INDIAN VETERINARY JOURNAL

[THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION]

PUBLISHED MONTHLY

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A Monthly Record of Veterinary Science

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EDITOR

Rao Sahib T. VINAYAKA MUDALIAR, G.M.V.C.,

Office:—23, First Street, Vidyodaya East, T'Nagar,
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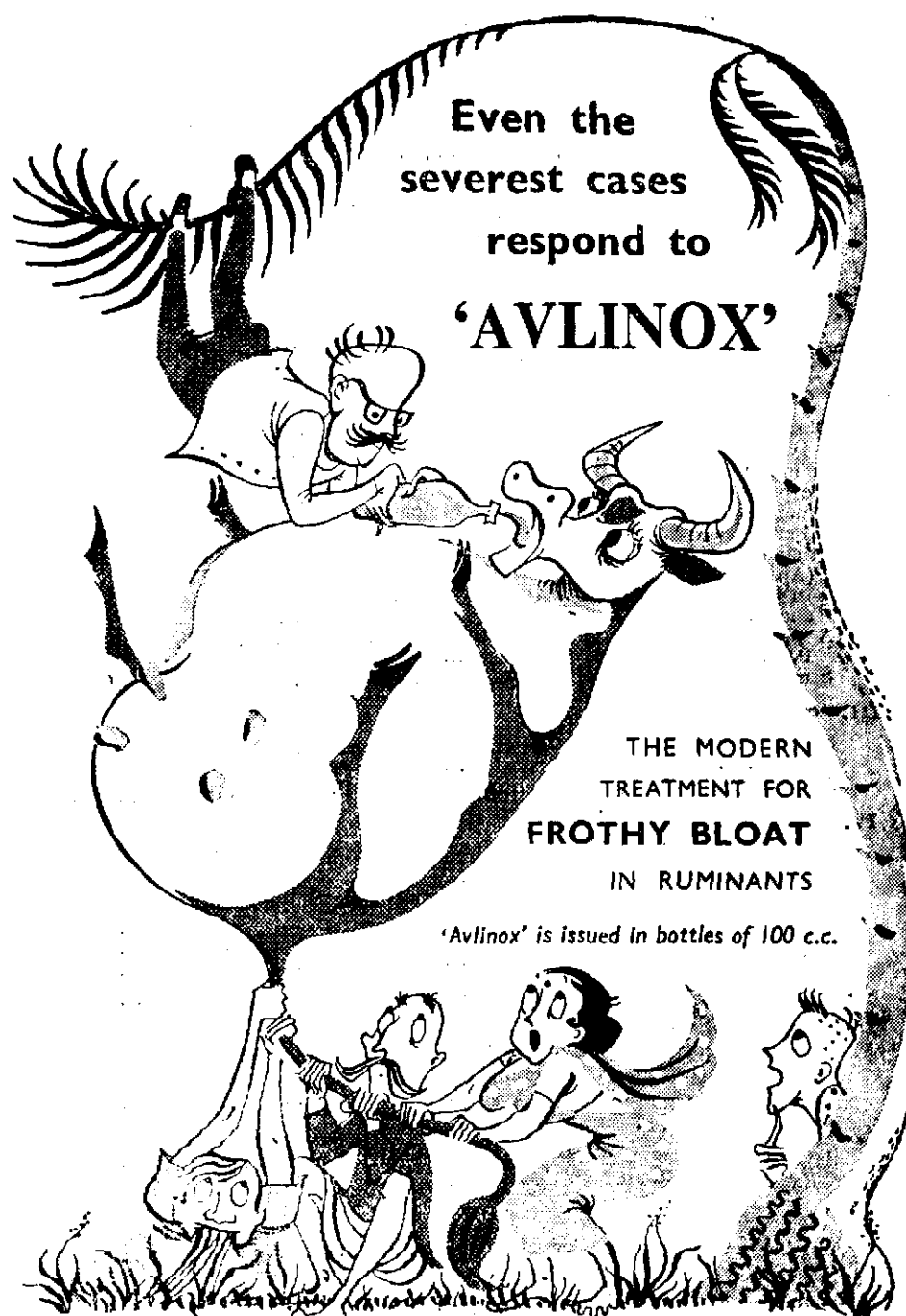
Vol. 36

JANUARY, 1959

No. 1

CONTENTS

	PAGE
I. Editorial	
A New Year Appeal	E-1
Soviet Academician Konstantin Skryabin	E-3
II. General Articles	
Observations on Round Heart Disease in Fowls.—By P. K. Ramachandra Iyer, R. C. Pathak and Amreek Singh	1
Immunisation of cattle against Haemorrhagic Septicaemia with purified capsular antigens (A Preliminary communication) by M. R. Dhanda	6
Studies on the Utility of various biological stains as semen stains Part 1.—By Dr. C. Krishna Rao	9
Studies on the Bacterial Flora of the intestinal tract of the honey bee (<i>Apis Indica</i>)—II On the occurrence of <i>Bacillus thuringiensis</i> , Berliner in the Foulbrood of Honeybees in India.—By P. Chandra Sekariah and R. N. Seth	19
A preliminary study of the camel's urine.—By D. B. Kalra and P. L. Arya	24
Studies on some aspects of Johne's disease.—By Dr. P. C. Nag	27
III. Clinical Articles	
Spirochaetosis in Poultry (A clinical observation).—By P. L. Arya and M. B. Chhabra	32
An Abnormal case of parturition in a goat.—By P. C. Taneja	34
IV. Abstracts	
Bovine Brucellosis with special reference to the duration of immunity following strain 19 vaccination	36
Comparative trials with Ammonium sulphate, Sulphonamides and Antibiotics in natural Bovine Coccidiosis	36
A Method of treating vaginal and uterine prolapse in the Ewe	37
Lungworm Infestation	37
V. News and Views	38
VI. Block Development Corner	
How an Extension Block can be utilised by the Agriculture and Veterinary Colleges in teaching and research.—By G. Biswal and L. D. Panda	41
VII. College News	
Rajasthan College of Veterinary Science and Animal Husbandry—Examination Result May 1958	45
VIII. Association News	
The All-India Veterinary Association.—The I.V.J. Reserve Fund	45
IX. Reviews	
Evolution of the Veterinary Art.—By J. F. Smithcoors	47
Statistical Information of Department of Animal Husbandry, Madras—By Dr. D. Pattabhiraman	48
X. Errata	48



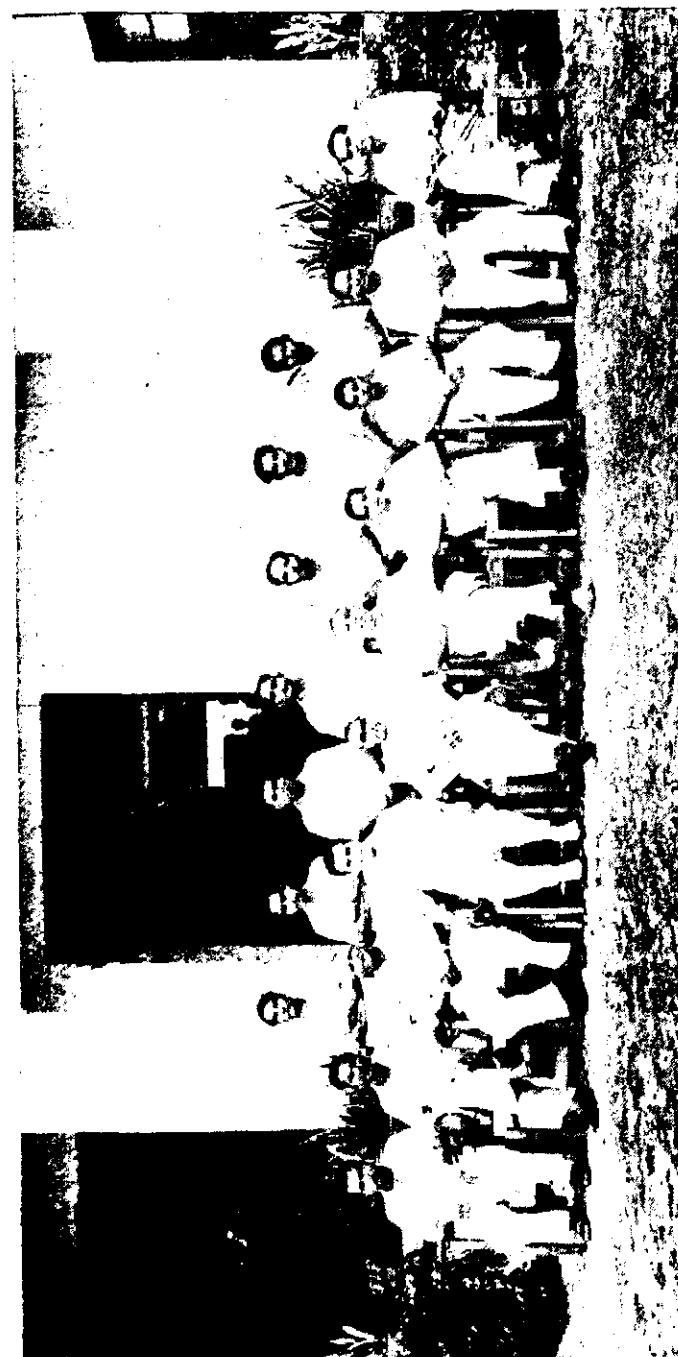
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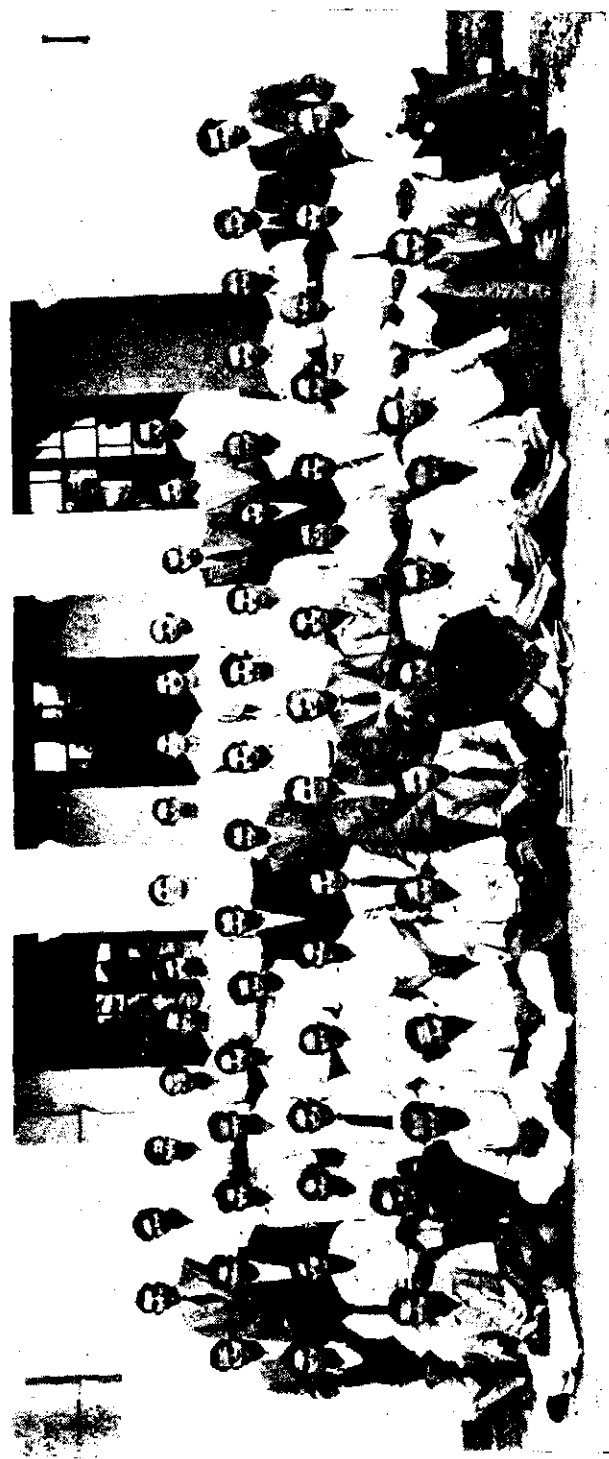
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THE Indian Veterinary Journal

(The Journal of the All-India Veterinary Association)

Vol. 36

JANUARY, 1959

No. 1

We Wish our Readers
A Happy and Prosperous
New Year!

Editorial

A NEW YEAR APPEAL

It was in January 1958 that we took the momentous step of converting the *I.V.J.* into a monthly and she went out into the world, chirruping the good old song "Ring out the old and ring in the new.....Ring out the false and ring in the true". But it was not without great trepidation that we took that venturesome step; for we knew fully well that it involved the vital question of survival or otherwise of this great journalistic endeavour in our land. And now at the end of the first year and on the threshold of the second, we have sufficient reason to feel grateful to Providence that that step has not proved harmful in any way.

Lacking all the facilities and resources which similar publications enjoy in other lands, it is nothing short of a marvel how the *I.V.J.* is being run here. To those who know the inside story it is awe inspiring. And yet the work goes on somehow. We are happy we have survived the first year as a monthly and (D.V.) we are determined to do everything possible to ensure the safety of this Journal in the future as well.

As a first step we want to make it free from financial worries. From our published accounts in December 1958, it would be apparent that the journal is just able to manage its existence, on a 'turn-over' capital derived mainly from subscriptions, leaving very little by way of margin, which if scrutinised, will be found not to be sufficient even for the next two issues. Such 'turn-over' capital is so elusive, so deceptive,

so un-dependable and so slow some times, that it causes a good deal of financial nightmare from time to time. This frightful existence must cease and it can cease only if we take the profession into our confidence and tell them plainly that we need their help, if they want this pet-child of the profession to live and grow. We have endless ideas to place this Journal on a par with some of the leading journals of the world. But this low finance does not permit of any expansion or advance. We are doing our utmost under the existing circumstances and can do no more.

We have therefore issued an appeal for building up a Reserve Fund, after deep consideration. It is upto every one in the profession to respond and respond with a good cheer. We appeal to the top-men in the profession to give the necessary lead. But we appeal to the rank and file of the profession even more earnestly. It is they who make or mar a profession. We know they never fail at times of crises. That has been our experience. If the 'un-forgettable scene' (described under Conference proceedings in December 1958 issue) has any message to convey, it is the message of hope and good cheer that we have always been getting from the profession at all times of our distress. That is a clear indication that the heart of the profession is quite sound.

On a rough estimate it is said, that there are 4000 Veterinary Surgeons in our land. If every one of them subscribes Rs. 10/- each, we should be able to raise a decent capital to run this journal and even attempt to own a building. But it is a big 'if'. Just pause and consider. Is it too much that is asked of you? The *I. V. J.* is the only National Journal of its kind in our field of work and we expect it to continue to play a vital role in the future as well.

Dr. K. S. Shetty, as Chairman of the Reception Committee of the last Conference enumerated *a few* of the achievements of the All-India Veterinary Association. Even those, are quite striking. "The re-organisation of Veterinary Education and affiliation of the Veterinary Colleges to their respective Universities; the institution of Post-graduate courses recently in four of the Veterinary Colleges in India; the transfer of the Livestock development work to the Veterinary Department; the formation of Interim Indian Veterinary Council to watch and regulate the code and conduct of Veterinary Surgeons and guard their interests, are some of the achievements of the Association of which we may well be proud". The magnificent role played by the *I. V. J.* to achieve these objects is too well known to the profession to need any repetition here.

We therefore make this New Year Appeal to one and all of our profession in India. **"Rally round this symbol of our brotherhood — the Indian Veterinary Journal — and subscribe liberally to its Reserve Fund"**. Devoted workers there are but they cannot make bricks without straw. Let the profession realise it in time and rise equal to the occasion. Let not posterity have a cause for complaint and point the finger of scorn at us. Leave alone posterity; it is the present generation of professional men who will be worst hit. We have attained Independence and let us be worthy of it in our own walk of life. Let the world know that the profession in India is fully conscious of its own responsibility in the matter of advancement of science, by keeping its only Journal going on sound lines. We can say no more.

Wake up then, Members of the profession in Bengal, Bombay, Uttar Pradesh, Madhya Pradesh, Bihar, Orissa, Madras, Mysore, Kerala, Andhrapradesh, Punjab, Rajasthan, Assam and elsewhere! (What an array of States!) Surely it is not beyond your capacity to make this Reserve Fund the success it deserves so as to enable the *I. V. J.* to serve you better and for ever.

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He is an author of several books and hundreds of papers, articles and brochures. Some of his outstanding works are:—"Symbiosis and Parasitism" (1925), "Ascarids and their pathogenic significance" (1925), "Helminthiasis in Man" (1929-1931), etc. His multi-volumed monograph "Trematodes in Animal and Man" got him the Lenin prize in 1957. What is of interest is the fact that he is still continuing his fruitful work, even in his eighties! We wish the learned Doctor many more years of useful life to benefit the humanity at large!

(From an article by Professor I. V. Orlov).

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Vol. 36

No. 1



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By P. K. Ramachandra Iyer, R. C. Pathak & Amreek Singh.

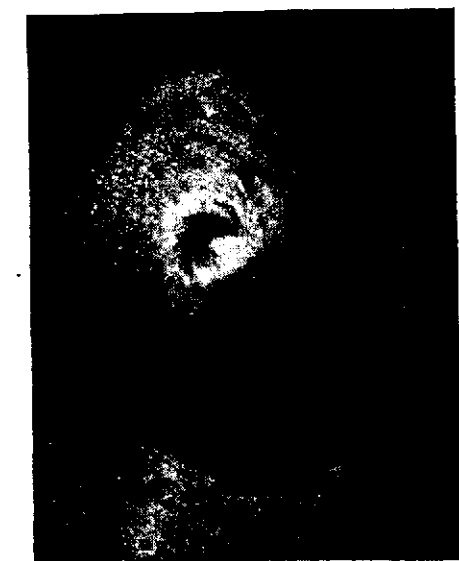


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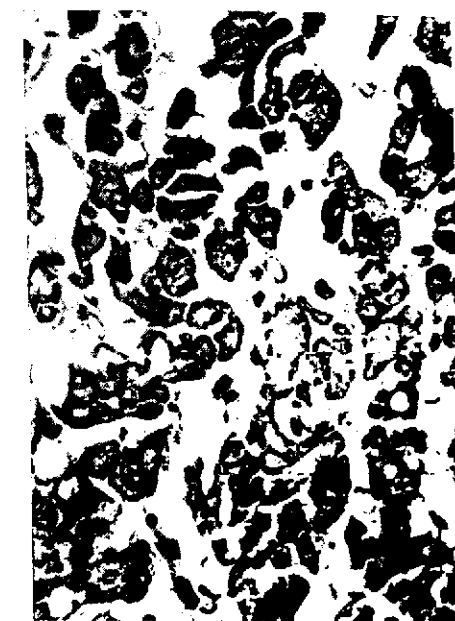


Fig. 3



Fig. 4

General Articles

OBSERVATIONS ON ROUND HEART DISEASE IN FOWLS

By

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An abnormal heart condition has been noticed in fowls submitted for post-mortem examination to this Section by the Poultry Farm attached to the College; this abnormality, however, is not widespread.

The few cases resemble those described by Matzke (1942) cited by Luke (1948) as 'Eierherzen' or 'Egg Heart' in fowls in Germany. Fischel (1946) described a similar condition in New Zealand under the name of 'Enzootic Fatal Syncope'. As a result of the negative bacteriological findings, he was of the opinion that the malady had a toxic origin. Luke (1947) mentioned from Ireland in yet another name, 'Round Heart Disease' this affection, after noting the gross alterations in the appearance of the heart of affected birds. Blaxland and Markson (1947) reporting this entity from North of England attributed the changes in the heart due to an anatomical abnormality present from the time of hatching. According to Adersen (1948) the disease has been prevalent in Denmark since 1936 where it is known by the name of 'Yellow Heart Degeneration'. Wilson (1948) described, 'Round Heart Disease', in Scotland and discussed the possibility of a hereditary basis. This disease has not yet been recorded from India. (See Table *infra*.)

Table showing details of recorded cases with regard to the size of flock and breed, age and sex of the dead fowls.

Date of death	Number of birds in the flock	No. of deaths due to R.H.D.	Breed	Age	Sex
				of the dead fowls	
19-10-56	171	1	W.L.	5 months	male
19-9-57	602	1	W.L.	5 months	female
20-9-57	601	1	W.L.	12 months	female
1-12-57	129	1	W.L.	1 week	chick

W.L.—White Leghorn.

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The birds are kept on a semi-intensive system of husbandry and there has been addition of birds from outside only lately into the flock which otherwise is practically closed. There is no litter but river-sand is provided instead, which is changed from time to time. No deaths from Round Heart Disease have been recorded to date from Australorps, Rhode Island Red, New Hampshire or Barred Plymouth Rocks though they were kept in close proximity to and in the same environmental conditions as White Leghorn birds. There was no evidence to show that the disease is of infectious nature; deaths have been recorded from different pens at different times.

Symptoms:—No premonitory symptoms were observed in the birds before death; death took place with dramatic suddenness, and often the accompanying history was that the affected bird was quite normal in the morning but was found dead a little time afterwards. Listlessness and inactivity were the first symptoms usually noticed, the affected bird tending to separate from the flock. In one case it was noticed that while perching, the bird came down and lay still in a crumpled heap and then died. Probably some stress and/or unusual excitement like running at the sight of feed, jostling around the watering trough, when being driven into the pens, perching on shrubs etc. may act as trigger mechanism and cause sudden deaths in the birds. The comb and wattles in two cases became cyanosed followed by the loss of their sheen; subsequently the comb and wattles appeared shrivelled. Two of the birds showed lameness and this may be attributed to the development of ascites due to imperfect heart action in the affected birds. The pullets, with the exception of one, had never laid.

P.M. Appearances:—Post-mortem findings were uniform. Bodily condition of the birds was invariably good and the carcass had the appearance of a well nourished bird. The most striking changes were noticed in the heart, which was enlarged in volume, sometimes more than double and increased in weight. The weight varied from 20 to 24 g. The heart appeared bluish pink in colour with the superficial coronary vessels markedly congested. The typical tapering contour of the organ was lost due to alteration in ventricles, making it barrel-shaped. The apex was blunt and was invaginated showing a 'dimple' of varying depth in the centre. The muscle fibres around the 'dimple' had a whorl-like appearance, (Fig. 1). The heart muscles appeared degenerated and pale in colour exhibiting parboiled appearance. The heart valves were normal and there was no evidence of any endocarditis.

A few scattered haemorrhages were seen in the pericardium. In all the cases the pericardium was distended with a clear straw coloured

effusion which varied in amount. This fluid was also seen in the abdominal cavity causing the distension of the abdomen. This fluid usually set to form a semisolid gelatinous mass when left undisturbed for some time or when post-mortem examination of the birds was done a few hours after the death.

The other changes were those usually associated with cardiac failure as oedema of the lungs, passive congestion of liver, spleen and kidney. Leaving apart the cardiac lesions, the other changes in the internal organs seemed to be secondary due to the faltering heart.

Histopathological Examination:—Heart and other organs like liver, spleen, breast muscles and adrenals were selected for histopathological examination. The tissues were fixed in 10% formal saline and embedded in paraffin. The sections were cut at 3 microns and stained by Haematoxylin and Eosin.

The affected hearts showing the typical 'dimpling' were subjected to histopathological examination, the portions selected for examination being from the ventricles where the changes were conspicuous. The most constant changes seen in the hearts were a granular and hydropic degeneration of the myocardial fibres with partial loss of fibrils, (Fig. 2). The fibres in cross sections showed the characteristic 'ring formation' i.e., the concentration of the cytoplasm of the myocardial fibres around the periphery showing a dense peripheral region and a sparse central region, (Fig. 3). Due to this degeneration in the heart muscles, muscle fibres in other areas of the affected heart showed a compensatory hypertrophy. The endocardium was found normal in every case. No evidence of fatty changes as described by Adersen (1948) and Wilson (1948) was seen.

In addition to the above changes in the musculature of the heart, changes were also noticed in the nuclei of the heart muscles. The nuclei were more spherical than the usual elongated appearance, ballooned and stained less intensely with haematoxylin. The nucleoli were enlarged and clearly visible which in the normal heart are small and indistinct, (Fig. 2). In one case intra-nuclear "inclusion bodies" were seen occupying most of the nuclear space surrounded by a halo and the chromatin material had margined round the nuclear membrane, (Fig. 4). The intra-nuclear inclusions are believed to be pathognomonic by Siller (1958) who has never encountered them in hearts other than those of birds with Round Heart Disease.

Liver, lungs, spleen and kidney invariably showed evidence of an acute passive congestion. In one case liver showed evidence of fatty degeneration. Adrenals examined from three birds showed only a

hyperaemia and the skeletal muscles selected from the breast region did not reveal any abnormality.

Discussion

Wilson and Siller (1954) have described the presence of intra-nuclear "inclusion bodies in the hearts which were Feulgen negative whereas other chromatin material were Feulgen positive, which led them to suspect that the disease may be caused by a virus. These intra-nuclear "inclusion bodies" were seen in our case.

Heart showing typical intra-nuclear 'inclusion bodies' and showing typical lesions of Round Heart Disease as discussed in histopathology was recovered from the bird which died of ascites. The other internal organs were normal on histopathological examination except for the passive congestion and it is difficult to say whether there is any correlation between the accumulation of the fluid in the abdominal cavity and the changes in the heart. However, it is understandable that whenever a deficiency of the normal function of the heart takes place it leads to hpdropericardium, hydrothorax or ascites. Perhaps the enlarged heart is sufficient for maintaining the body at rest but insufficient in conditions like running etc. which demand extra work of the heart. This may probably account for the sudden deaths in apparently healthy birds in the flock.

There was a heavy incidence of ascarids in the fowls in the farm and it was suspected that the anthelmintics like carbon tetrachloride used in the control of the worms might have played a possible role in the production of the disease. On the post-mortem examination, one of the birds also showed evidence of fatty changes in the liver in addition to the changes associated with Round Heart Disease. Though it is possible to produce fatty changes in the liver after prolonged medication with Carbon tetrachloride along with necrosis of liver, it was not found possible to produce any changes in the heart. Thus this agent is excluded from the causation of the disease.

Gerriets (1955) had discussed the possible role of zinc as the cause of the disease but in the present report there was no evidence that the food materials were either stored or processed in zinc-coated vessels.

Summary

The occurrence of Round Heart Disease among fowls has been recorded for the first time in India. The symptoms, pathology and histopathology have been described in some detail and the probable factors in the etiology of the condition have been discussed.

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Legends to illustrations

- Fig. 1. Flattened apex of an affected heart showing the 'dimple'. Note the whorl-like formation of the muscle fibres around the indentation.
- Fig. 2. Heart muscle-fibres in longitudinal section showing striations with granular degeneration. The nuclei are spherical with distinct nucleoli. H & E.
- Fig. 3. Fibres in cross-section with the concentration of cytoplasm round the periphery and a sparse central region in the fibres. H & E.
- Fig. 4. Two intra-nuclear 'inclusions' in fibres cut longitudinally. H & E.

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IMMUNISATION OF CATTLE AGAINST HAEMORRHAGIC SEPTICAEMIA WITH PURIFIED CAPSULAR ANTIGENS

(A Preliminary Communication)

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The evolution of the new oil-adjuvant vaccine against haemorrhagic septicaemia and the extensive laboratory and field trials undertaken in order to assess its value as a prophylactic were reported earlier (Dhanda *et al.*, 1956; 1958a). Animal experiments (Dhanda *et al.*, 1958b) in mice and rabbits as well as a serological survey carried out in vaccinated cattle and buffaloes both under laboratory and field conditions (Dhanda, 1958a) supported the concept that the capsular antigen of *P. septica* was the chemical moiety that stimulated phase-I agglutinating and mouse-protective antibody response and in all probability conferred resistance to infection with this organism. This note is a report of the work undertaken on the isolation and characterisation of a soluble antigen of *P. septica* of high antigenic value which could be employed as a purified substitute for adjuvant vaccine.

After extensive preliminary trials with as many as 25 different solvents with a view to ascertain their efficacy to extract the serologically active and immunogenic soluble antigen(s), yeast-extract-agar-grown cells of *P. septica*, I.V.R.I. stock strain 52 (accredited Roberts' type I) were treated with solvents like 2.5% sodium chloride (Baker *et al.*, 1952), 45% phenol (Davies, 1956), 0.5M potassium thiocyanate (Amies, 1951) and 75% trichlorotrifluoroethane (Gessler *et al.*, 1956) and the cell-free supernatant so obtained fractionated with ethanol in cold or ammonium sulphate solution. The five different antigenic fractions that became available in this way for detailed serological and immunological tests were (1) Fraction IA, a carbohydrate-protein; (2) Fraction IB, a protein; (3) Fraction II a "toxin" (Dhanda, 1958b); (4) Fraction III, a lipopolysaccharide; (5) Fraction IV, a capsular polysaccharide devoid of protein initially present. These studies indicated that contrary to the findings of Bain (1958) fractions III and IV were only haptens *per se*, being not immunogenic in mice, rabbits or hill cattle. The protein fractions were very good immunogens for mice, rabbits, guinea pigs and cattle. The PD50 for mice and rabbits of fraction IA was of the order of 50 micrograms, while that of fraction IB was only 12 micrograms. For the guineapig, the PD50 of the fraction IB was found to be 25-30

micrograms. An interesting phenomenon of immunoparalysis was observed in guinea-pigs injected with fraction IB in doses of 1 mg. or higher. Similar observations have been made by Spivaek *et al.* (1958) in the case of *P. pestis*.

On the basis of these preliminary results, 14 hill cattle were each given 1 mg. of fraction IB in aqueous solution subcutaneously while another group of 16 cattle each received a dose of 500 micrograms of the same fraction. Only animals shown by various indirect tests (Dhanda *et al.*, 1958b) to be not naturally immune to haemorrhagic septicaemia were selected for the experiment. A study of the antibody response of these animals by various indirect tests, revealed that phase I agglutinating, complement-fixing and mouse-protective antibodies appeared in the circulation between first and second week following vaccination. After a lapse of a period of 4 weeks, 8 weeks, 4 months and 6 months and 14 days following vaccination, these animals were challenged in groups respectively of 7, 7, 7 and 9, each animal receiving a dose of 1 ml. of 10⁻¹ dilution of an 18 hour-old broth culture of virulent *P. septica*, I. V. R. I. stock strain 25, estimated to contain as many as 1,000 million mouse lethal doses with two fully susceptible hill cattle to serve as controls at each immunity test. The results of the challenge showed a survival of 7/7 (1 mg.) at each of the two tests conducted at 4 and 8 weeks; 7/7 (500 micrograms) at 4 months and a survival rate of 8/9 (500 micrograms) in the last immunity test carried out after a period of 6 months and 14 days. All the controls included in each of the immunity tests succumbed to the challenge dose of the culture. These observations were considered sufficient to indicate that fraction IB was an effective immunising agent against haemorrhagic septicaemia.

Since the yield of fraction IB was found to be in the range of 30-32% of the dry weight of bacterial cells and since 2 mg., dry weight of the cells was the absolute minimum found to be necessary for effective immunisation of cattle (Bain, 1957), the dose of 500 micrograms of the soluble fraction IB antigen would be economical to use as a prophylactic against H.S. as well as easy to prepare. Since aqueous preparations of capsular protein antigens provoked antibody response in cattle and conferred a strong immunity, it would be reasonable to expect this antigen to be even more effective when administered in combination with adjuvants. Moreover, there was every justification to expect that, by employing mixtures of fraction IB with fractions III and IV along with oil-adjuvants it would be possible to produce an excellent immunity response in cattle with considerably less than the amount of 500 micrograms now given in aqueous preparations and that such minute amounts could be given in one basic dose. Extensive field and labora-

tory trials are being carried out to find out the duration of immunity resulting from the use of fraction IB and for developing extraction procedure for its large-scale manufacture.

This work will be reported more comprehensively in a future publication.

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STUDIES ON THE UTILITY OF VARIOUS BIOLOGICAL STAINS AS SEMEN STAINS

Part I

By

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Several Biological stains were used in the past for the staining of semen smears and a wide variety of formulae and techniques were introduced for this staining process. Some of these techniques are very simple involving a few seconds while others take as long as two days for completing the staining process (Hancock) 1952 a). Most of the stains that are employed in semen studies are those that find wide application in bacteriological and histo-pathological techniques like carbol fuchsin, gentian violet, eosin, haematoxylin, safranin etc.

The literature on the subject of staining of semen smears is very extensive. Various stains and formulae were used with reference to the spermatozoa of several species of animals. Cary and Hotchkiss, (1935), Gelarie (1936), Holbert (1936), Pollak and Joel (1939), Fetterman (1942), Greenberg *et al* (1943), Hotchkiss (1944), Keaty and Hamblen (1945), Lane-Roberts *et al* (1948) and Isenberg (1949) proposed different methods for staining smears of human semen. Certain techniques were proposed for the staining of avian sperm (Munro, 1936; Sampson and Warren, 1939; Wakely and Kosin, 1951 and Van Drimmelin 1951). A very large number of workers reported several formulae for the staining of the spermatozoa of farm animals. Crystal violet, gentian violet and methyl violet were employed by certain workers (Williams, 1934; Williams and Co-workers 1937; Lambert and Mckenzie, 1940) Frank 1940; Salisbury, Willett and Seligman, 1942; Blom, 1943 and Rao & Berry, 1950). Eosin was also widely used in the past for staining of spermatozoa of farm animals (Phillips *et al*, 1942; Anderson, 1945 and Rao & Berry, 1950). Mckenzie and Berliner (1937), Phillips and Andrews (1937) Lambert and Mckenzie (1940), Salisbury, Willett and Seligman (1942), Mercier (1944) and Anderson (1945) recommended the use of fuchsin for staining the spermatozoa of livestock. Carmine (Green, 1940), Methyl Green (Rao & Berry, 1950) Safranin (Rao & Berry, 1950) Rose bengal (Herman & Swanson, 1941) and Mercurochrome (Rao, 1952) were also employed as semen stains.

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Lagerlof (1934) introduced opal blue for the negative staining of bull sperm. Rao (1951) and Hancock (1952 b) used Indian Ink for the same purpose. Rao (1953) reported the suitability of several stains for the negative demonstration of the morphology of bull sperm.

A systematic study of the comparative value of the various biological stains for staining of semen smears of farm animals is of the utmost importance in view of the intensification of artificial insemination work in all countries. Simple techniques of staining have to be evolved to popularise morphological studies of sperm in the evaluation of semen quality. Recently Rao (1957 a) reported the results of staining sperm using for different techniques. For any technique to be really useful and popular for the routine staining of semen smears, simplicity of the technique combined with the rapidity of the staining process is considered the most important and essential pre-requisites.

Materials and Methods

The semen of the bull and the buffalo-bull were used in this study. As a rule only freshly prepared smears were used and simple air-drying was used for fixation of smears. Aqueous solutions of various biological stains of concentrations ranging from 1 to 10 per cent depending on their solubility in water were employed to determine the optimum concentration at which the best results are obtained. When the stain solutions had to be made in isotonic solutions, one of the following solutions was employed—Normal saline, M/8 phosphate buffer (Mayer *et al* 1951) and 3 per cent Sodium citrate (dihydrate) (Swanson and Bearden, 1951). One per cent of the stain in 90 per cent ethyl alcohol or a saturated alcoholic solution of the same when its solubility is below one per cent was also used. When clearing of smears was indicated to avoid intense background staining one of the clearing agents previously reported (Rao, 1957 b) was used. Staining techniques employed were those already reported (Rao, 1957 a) as follows:

1. Conventional method—hereafter to be called Cv. method for sake of brevity, in which the stain solution is poured over the smear, allowed to act for sometime and smears washed in water and later dried.

2. Direct mixing method—hereafter to be called D. M. method in which a drop of the fresh semen and a couple of drops of the stain solution made in isotonic solution are mixed for a few seconds and smears made from this semen-stain mixture.

3. Dipping and blotting method—hereafter to be called D & B method, in which the smear is dipped in an aqueous or alcoholic solution of the stain held in a coplin jar and immediately taken out and at once carefully blotted dry.

4. Ignition technique hereafter to be called Ig. method in which the smear is flooded with the alcoholic stain, ignited with a burning match stick and the slide flooded with water before the flame is extinguished and the slide washed thoroughly and later dried.

Smears were stained by the conventional method for periods ranging from 5 seconds to 15 minutes as a rule after which they were washed in running tap water and carefully blotted dry. In presenting the results involving the very large number of stains studied it was felt that the most convenient method would be to present the stains in an alphabetical order. The type of staining results were classified into excellent, good, fair, poor and unsatisfactory.

Results

1. *Acid green*:—This gave the same general type of staining as light green and proved satisfactory as a semen stain. 1 per cent aq. solution for 3 to 5 minutes by the conventional method, 5 per cent solution by the D. M. method and 1 per cent alcoholic solution by the ignition technique, all gave uniformly good results. The sperm took a bright green colour and morphology was quite clear. Clearing of smears was essential before staining by the Cv. and Ig. methods. D. M. technique gave negative preparations in which the live sperm appeared as unstained, whitish-looking structures against a greenish background, while the dead sperm took the stain (Rao, 1956).

2. *Acriflavine*:—This stain was generally unsatisfactory but with the D & B method the sperm took a deep yellow colour with the morphology being quite clear against the unstained background. Insertion of a blue filter in the microscope lamp or in the microscope relieves strain on the eye and presents a better picture. There was live and dead differentiation of sperm by the direct mixing method.

3. *Alizarin*:—This stain proved uniformly unsatisfactory by all methods.

4. *Aniline blue (w. s.)*:—This stain gave uniformly excellent results by all methods. 1 per cent aq. solution for 1 to 2 minutes by the D & B method, 3 to 5 per cent solution in isotonic solvent by the D. M. method and 1 per cent alcoholic solution by the ignition method, all gave excellent results. The sperm took a deep blue colour, the tails taking a much deeper shade than the heads and sperm morphology was clearly delineated. Direct mixing technique gave negative preparations with live and dead differentiation of sperm. (Rao, 1956).

Auramine :—This not a good semen stain. 1 per cent aq. solution by the D & B method followed by 1 percent alcoholic stain by the Ig. method and 1 percent aq. solution for 3 to 5 minutes by the Cv. method gave satisfactory results with deep yellow staining of sperm. Insertion of a blue filter in the microscope lamp facilitates examination and relieves strain on the eyes.

6. *Aurantia* : This is considered generally unsuitable as a semen stain.

7. *Azoblaue* :—The only technique by which satisfactory results could be obtained with this stain was by the Cv. method using 5 per cent aq. solution for 1 to 2 minutes or 1 per cent aq. solution for 5 minutes. The sperm took a dull reddish brown colour.

8. *Azocarmine* :—This proved unsatisfactory as a semen stain.

9. *Azur* :—1 per cent aq. solution for 3 to 5 minutes by the Cv. method gave bright bluish sperm staining with clear morphology. Clearing of smears was essential to avoid background staining. Slightly better staining was obtained by the D & B method using cleared smears and 1 per cent aqueous stain.

10. *Azur II* :—This was uniformly unsatisfactory with all methods of staining.

11. *Benzopurpurine 4 B* :—This stain was found to be very good as a semen stain. 1 percent aq. solution for $\frac{1}{2}$ to 1 minute by the Cv. method and 1 per cent alcoholic solution by the Ig. method gave the best results, the latter method giving superior preparations. The sperm took a bright safron colour. 1 per cent aq. stain also gave satisfactory preparations by the D & B method.

12. *Biebrick scarlet* :—Only the D & B method using 5 per cent aq. stain gave good results, the back-ground taking a deep mahogany brown colour against which the very lightly stained sperm stood out clearly as in negative preparations. The cytoplasmic cap was exceptionally well brought out by this technique.

13. *Bleu de Lyon* :—3 to 5 per cent stain in isotonic solution gave excellent negative preparations (Rao, 1957 c). 5 per cent aq. solution for 2 to 3 minutes and 1 per cent stain for 5 to 7 minutes by the conventional methods gave satisfactory results, the sperm taking a light blue colour. There was live and dead differentiation of sperm by the D. M. method.

14. *Bonney's blue B. P. C. 49* :—1 : 10 aqueous dilution of the stock stain gave excellent staining at $\frac{1}{2}$ to 1 minute exposure by the Cv. method and 1 : 5 to 1 : 10 dilutions gave very good results by the

D & B method. The 1 : 6 dilution with ethyl alcohol also gave excellent results by the Ig. technique. Clearing of smears was essential with the Cv. method and while this was not essential with the other methods it greatly improved the background. The sperm took a deep blue colour the heads taking a much deeper colour than the tails.

15. *Brilliant cresyl blue* :—This is an excellent semen stain. Clearing of smears was essential to avoid intense background staining. 1 per cent aq. solution for $\frac{1}{2}$ to $\frac{1}{2}$ minute by the Cv. method and by D & B method and 1 per cent alcoholic stain by the Ig. method, all gave excellent results. The sperm took a deep blue colour with remarkable clarity of sperm morphology.

16. *Brilliant green* :—5 per cent stain in isotonic solution gave negative preparations by the D. M. method, the background taking a deep green colour against which the very lightly stained sperm head was clearly visible. The tails took a deeper colour. 1 per cent aq. solution gave the best results by the D & B method the sperm taking a bright green colour.

17. *Carmin* :—Carmin was not a good semen stain when used alone. Aceto-carmin in 45 percent glacial acetic acid gave the best results at 5 minutes exposure by the Cv. method, the sperm taking a bright pink colour. Alum carmin and Best's carmin were also fairly satisfactory at 15 minutes exposure. These formulae were found to give very good differential staining in combination with other stains (Rao 1957 c).

18. *Carminic acid* :—This was found to be unsatisfactory as a semen stain.

19. *Cochineal* :—Alum cochineal gave fairly satisfactory results at 15 minutes exposure by the Cv. method. It was also satisfactory for the differential staining of sperm in combination with other stains.

20. *Celestine blue* :—This was unsatisfactory as a semen stain.

21. *China blue* :—This is one of the best blue stains and gave uniformly excellent results by all the four staining techniques. 1 per cent aq. solution for $\frac{1}{2}$ to 1 minute by the Cv. method and by D & B method and saturated alcoholic stain by the Ig. method gave deep blue staining of sperm with excellent delineation of sperm morphology. 3 to 5 per cent stain in isotonic solution gave live and dead differentiation of sperm and negative staining (Rao 1956).

22. *China green* :—1 per cent stain in isotonic solution gave excellent results by the D. M. method as well as by the D & B method, the sperm taking an intense green colour.

23. *Chlorazol azurine*:—This was not satisfactory as a semen stain. 10 per cent aqueous solution for 5 minutes by the Cv. method gave light pink staining.

24. *Chlorazol black E*:—This is an excellent semen stain. 1 per cent aq. solution for $\frac{1}{2}$ to 2 minutes by the Cv. method and by D & B method and saturated alcoholic stain by D & B method and saturated alcoholic stain by the Ig. method gave excellent results, the sperm taking a dull black colour with clear delineation of sperm morphology. 1 per cent and saturated aq. solution in isotonic solvent gave negative preparations by the D. M. technique and there was also live and dead differentiation of sperm.

25. *Chromotrope 2 R*:—1 per cent aq. solution by the D & B method gave satisfactory results, the sperm taking a bright pink colour. The D. M. technique gave live and dead differentiation of sperm with fresh semen.

26. *Chrysoidin Y*:—1 per cent aq. solution by D & B method and 1 per cent alcoholic stain by Ig. method gave satisfactory results, the sperm taking a bright yellow to an intense yellow colour. The use of a blue filter in the microscope lamp gives a better picture.

27. *Congo red*:—This proved satisfactory as a semen stain. The best results were obtained by the Ig. method using the saturated alcoholic solution. 2 per cent aq. solution for $\frac{1}{2}$ to 1 minute by the Cv. method gave a bright saffron staining of sperm. 2 per cent stain in isotonic solvent gave negative preparations by the D.M. method with live and dead differentiation of sperm (Rao 1956). Treatment of smears with HCl turns the preparations blue which colour fades after some days, but can be restored by repeating the treatment.

28. *Congo rubin*:—This gave satisfactory results as a semen stain. 5 per cent aq. solution for 1 to 2 minutes by the Cv. method, 1 per cent aq. solution by the D & B method and saturated alcoholic solution by Ig. method all gave excellent preparations, the sperm taking a reddish saffron colour. 5 per cent stain in isotonic solvent gave excellent negative staining results (Rao, 1956) and there was live and dead differentiation of sperm. The smears turn blue after HCl treatment, which colour fades after some days but can be restored by repeating the treatment. 1 per cent aq. solution by the D & B method gave the best results, the sperm taking a deep saffron colour. The cytoplasmic cap as well as the anterior and posterior centrioles and the terminal filament were all clearly visible.

29. *Cotton blue*:—This is one of the best blue stains and gave uniformly excellent results by all the four techniques. 1 per cent aq. stain for $\frac{1}{2}$ to 1 minute by the Cv. method and by D & B method, 3 to 5

per cent solution by D. M. method and 1 per cent alcoholic stain by the Ig. method, all gave excellent preparations. The Ig. method gave the best results of all, the sperm taking a deep blue colour. The D. M. technique gave excellent negative preparations with live and dead differentiation of sperm.

30. *Crystal violet*:—This stain is one of the best and most powerful semen stains and gave excellent results with a variety of formulae. Clearing of smears was essential to avoid intense background staining. Cleared smears gave excellent results with 1 per cent aqueous or alcoholic stain by the D & B method the sperm taking a deep bluish-violet colour. The carbol crystal violet and aniline crystal violet formulae gave very intense staining and it is important that smears are not exposed to these stains for more than a couple of seconds and immediately blotted dry. 1 per cent alcoholic stain also gave excellent preparations by the Ig. technique. It is essential to run water on to the slide before the flame goes out to avoid stain deposition which is difficult to wash off completely later.

The following crystal violet formulae were studied by the cv-method:

- (1) 0.5 to 3 per cent aq. solution of crystal violet.
- (2) 0.5 to 5 per cent solution of crystal violet in 95 per cent ethyl alcohol.
- (3) Hucker's crystal violet (after Hucker 1922)—in this formula crystal violet was substituted in place of gentian violet.
- (4) Carbo crystal violet (after Nicolle, 1895)—in this formula crystal violet was substituted for gentian violet.
- (5) Carbol crystal violet (Conn, 1946).
- (6) Aniline crystal violet (Koch-Ehrlich) (cited by Guyer, 1936).
- (7) Aniline crystal violet (Society of American Bacteriologists) (cited by Cowdry, 1948).
- (8) Ehrlich's aniline crystal violet (Mallory, 1938)—in this formula crystal violet was substituted for gentian violet.
- (9) Stirling's aniline crystal violet (Stirling, 1890)—in this formula crystal violet was substituted for gentian violet.
- (10) Aniline crystal violet — This formula was computed by the author as follows: Crystal Violet 1.0 gm; Aniline water 80 cc; 95 per cent ethyl alcohol 20 cc; (Aniline water was made by vigorously shaking 2 cc of aniline oil with 98 cc of distilled water.)

Of all the crystal violet formulae, Hucker's crystal violet gave by far the best results. With all these formulae, excellent results were obtained at 10 to 15 seconds exposure, the sperm taking a bright bluish-violet colour, the tails taking a deeper tint than the heads while the connecting pieces stained deepest. Longer exposures upto 1 minute increased the depth of staining but beyond this limit there was the danger of overstaining. However, with Hucker's crystal violet there was no danger of overstaining even after 5 minutes but staining beyond one minute is wasteful.

The two carbol crystal violet formulae gave about the same type of results but Conn's formula was slightly superior. Further, with Nicolle's formula, there was the formation of a gelatinous mass when the saturated alcoholic solution of crystal violet was mixed with 5 per cent carbolic acid water. This difficulty was not experienced with Conn's formula.

The aniline crystal violet formulae gave the next best results and 15 to 20 seconds staining was sufficient. Exposure beyond 1 to 2 minutes caused overstaining. There was little to choose among the various aniline formulae. However, the formula suggested by the Society of American Bacteriologists (cited by Cowdry, 1948) is recommended for adoption in view of the recent nature of the formula and also for the sake of uniformity.

1 per cent aqueous solution of crystal violet gave excellent preparations at $\frac{1}{4}$ to $\frac{1}{2}$ minute exposure and beyond 2 to 3 minutes, overstaining occurred. 1 per cent alcoholic solution gave similar results and there was no danger of overstaining even after 5 minutes with this formula.

Dahlia violet.—The following formulae of dahlia violet were tried to determine their suitability for staining semen smears.

1. 0.5 to 3 per cent aqueous solution.
2. 0.5 to 5 per cent alcoholic solution.
3. Carbol dahlia violet (after Conn, 1946 — dahlia violet was substituted for crystal violet in the original formula).
4. Aniline dahlia violet (after Soc. Am. Bact., Cowdry, 1948) — dahlia violet was substituted for crystal violet in the original formula.
5. Hucker's dahlia violet (after Hucker, 1922) — dahlia violet was substituted for gentian violet in the original formula.

Dahlia violet was found to be a powerful stain and gave excellent preparations, results being of the same general nature as with crystal violet. Clearing of smears was essential with all techniques, to avoid

intense background staining. With the Cv. method the best results were obtained with Hucker's dahlia violet followed by carbol dahlia violet and aniline dahlia. 10 to 15 seconds exposure gave excellent preparations, the sperm taking a bright reddish violet colour, the tails staining deeper than the heads. Staining for a maximum period of one minute may be employed, if required, beyond which there is danger of over-staining. 1 per cent aqueous and alcoholic solutions also gave excellent preparations at 15 to 30 seconds exposure. Exposure beyond 2 to 3 minutes with the aqueous formula is wasteful. With the alcoholic stain there was no danger of over-staining even after 5 minutes.

With cleared smears excellent results were obtained by the D & B method with 1 per cent alcoholic stain. The other formulae also gave excellent results by this technique but the entire staining process should be completed in a matter of a couple of seconds to avoid intense sperm staining. 1 per cent alcoholic dahlia violet gave very pretty preparations with cleared smears by the Ig. method.

Conclusions

Of the various biological stains studied from acid green to dahlia violet in an alphabetical order, aniline blue w.s., benzopurpurine 4 B, Bonney's Blue B.P.C. 49, brilliant cresyl blue, china blue, china green, chlorazol black E, congo red, congo rubin, cotton blue, crystal violet and dahlia violet gave the best results.

Carmin and cochineal formulae were not quite satisfactory when used alone but were extremely useful for the differential staining of sperm.

Acid green, aniline blue w.s., Bleu de Lyon, brilliant green, china blue, chlorazol black E, congo red, congo rubin and cotton blue gave negative preparations by the direct mixing techniques with fresh semen.

5 per cent aqueous solution of Bismark brown gave negative preparations by the dipping and blotting method and in these preparations the cytoplasmic cap was brought out with remarkable clarity.

The ignition technique of staining did not produce any harmful effects on sperm morphology. The dipping and blotting method proved very satisfactory with many stains and gave stained preparations in a matter of seconds.

Acid green, acriflavine, aniline blue, biebrick scarlet, Bleu de Lyon, China blue, chlorazol black E, chromotrope 2 R, congo red, congo rubin and cotton blue gave live and dead differentiations of sperm in fresh semen by the direct mixing technique.

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STUDIES ON THE BACTERIAL FLORA OF THE INTESTINAL TRACT OF THE HONEY BEE (APIS INDICA)

II. On the occurrence of *Bacillus thuringiensis*, Berliner, in the Foulbrood of Honeybees in India.

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The aetiology of the foulbrood of honey bees is intricate and interesting. Studies by White (1919), Sturtevant (1924, 1932), Berchert (1926), Hitchcock (1936), Stoilowa (1938), Tarr (1938), and Holst and Sturtevant (1940) showed that the causal organism of the American foulbrood of honeybees was *Bacillus larvae*. *Bacillus alvei* has been associated with European foulbrood on indirect evidence since the organism was not cultivated. Lochhead (1928) suggested that *Bacillus pluton* and *Streptococcus apis* were variants or stages in the life history of *Bacillus alvei*, a hypothesis supported by Burnside (1934) who included *Achromobacter eurydice* also as such. According to Burri (1941) rod forms identical with *A. eurydice* gave rise to *B. pluton* which was not directly cultivable. Tarr (1935) considered European foulbrood to be caused by *B. pluton*, a strict parasite able to multiply only in the intestines of young larvae. Meussen (1908) and Cowan (1911) isolated and described *Streptococcus apis* and *Bacillus guntheri* from foulbrood. *Streptococcus apis* was shown by Hucker (1928) and Sherman (1938) as *Streptococcus liquefaciens*, belonging to Lancefield's group D. Trevisan (1889) isolated *Streptococcus alvearis* from an infection, presumably foulbrood in bees. Mattes (1927) incriminated *Bacillus lanceolatus* as the cause of benign foulbrood of bees. Toumanoff (1927) described *Micrococcus luteus liquefaciens var alvei*, which was classified later by Handuroy et al (1937) as *Micrococcus luteus var larvae*, as pathogenic for

in cases of foulbrood in honey bees anywhere in the world and hence is deserving of report. The toxic principle(s) responsible for the marked pathogenicity of *B. thuringiensis* for certain insects including the honey bee was found by Hannay, Angus and Steinhaus and Jerrel to be the protein crystals which were soluble in the alkaline gut juice of these insects. Though the formation of protein crystals has been conclusively demonstrated by the authors, we are yet to test and confirm the toxicity of these crystals to the various developmental stages of the honey bee. Detailed studies on the pathogenicity of *B. thuringiensis* for *Apis indica* in the various stages of its life cycle are in progress and will form the subject of a future report.

Summary

B. thuringiensis has been recognised by several workers as responsible for diseases in insects, but it has so far not been recognised as occurring in honey bees. Its occurrence in dead pupae of honey bees suspected to have died of foulbrood is reported in this article. The identity of the organism with *B. thuringiensis* has been established on the basis of morphological, cultural, and biochemical tests. The probability of its being an aetiological agent of foulbrood of honey bees in India is discussed.

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A PRELIMINARY STUDY OF THE CAMEL'S URINE

BY

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Camel, commonly known as the 'Ship of the Desert' is a very useful means of transport in the desert areas where no vehicle, machinery or animal could be used for travelling on sand. No animal can live without water for many days except this. Bodil Schmidt-Neilsen and co-workers (a) state that a camel can live for 17 days on dry food in summer season, of course, without work. Camel loses water to the extent of 30% of its body weight, even when exposed to desert heat, whereas other animals may die of circulatory failure when the water loss reaches 12% of the body weight. Survey of the available literature shows that no study has so far been made in India on the examination of the urine of camel, such an indispensable transport which goes for nights together on its path in the desert tract belt around the world extending in India, Pakistan, China, Africa and countries of Middle-East. The study of the Urine, faeces and blood in relation to their normal constituents can be an useful index to determine diseased conditions. The work on Blood of the camel has been reported by Soni and Aggarwala (a). The present note deals with a preliminary study made by the authors to analyse the urine samples of the apparently and clinically healthy camels of Ganga-Jaisalmer Camel Corps, Bikaner. In all, the authors have been able to test urine samples of 40 camels upto the time of writing this report. No pathological constituents could be detected except traces of glucose in about 3% samples.

Materials and Methods

The urine samples were collected from the animals during the normal act of micturition in clean sterilized bowls. All the samples were examined within 12 hours of collection. Thymol as a preservative was added to some of the samples, which could not be examined immediately after collection. However the colour, odour, transparency, reaction to the litmus and specific gravity were noted before the addition of thymol in the urine.

Results and Discussion

The colour of the samples varied from pale-yellow to dark-yellow. The samples at the time of collection were clear, but became turbid

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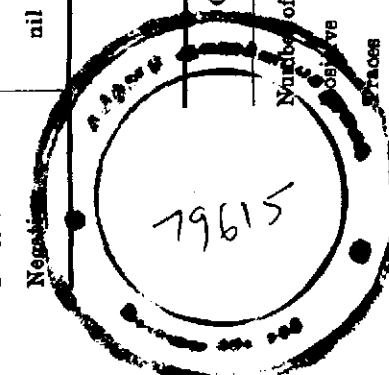
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TABLE I
Showing observations on qualitative tests for Physiological Constituents of Camel's Urine.

Constituents	Urea	Uric acid	Creatine	Indican	Ammonia	Chlorides	Sulphates	Phosphates	Hippuric acid
Tests	Urease test	Phosphotungstic acid test	Jaffe's test	Obermayer's test	Cole's Expt. 169	Cole's Expt. 155 (a)	Cole's Expt. 155 (a) & (d)	Cole's Expt. 155 (b)	Cole's Expt. 170 (b)
Number of samples examined	40	40	40	40	40	40	40	40	40
Positive	40	40	40	nil	40	40	40	40	40
Negative	nil	nil	nil	40	nil	nil	nil	nil	nil

TABLE II
Showing observations on qualitative tests for Pathological Constituents.

Constituents	Sugar	Albumin	Acetone	Blood	Bile salts	Bile pigments
Number of samples examined	40	40	40	40	40	40
Positive	nil	nil	nil	nil	nil	nil
Traces	2	nil	nil	nil	nil	nil
Negative	38	40	40	40	40	40



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after keeping for some time. The specific gravity of the samples ranged from 1.010 to 1.065. The reaction of all the samples examined was highly alkaline.

The procedure adopted in the analysis has been on the lines suggested by Cole (2) & Hawk (3). The Hay's test for bile salts was performed before the addition of thymol as preservative (1).

Table I shows the details of qualitative tests for the presence of normal constituents. Table II indicates the presence of traces of sugar in only two samples out of 40 examined, and the absence of other pathological constituents normally not present in the urine of healthy animals. The reduction showing the traces of sugar in the two cases may be due to some other substances (1). The fermentation test could not however be carried out to substantiate the findings.

Conclusion

Urea, uric acid, creatinine, ammonia, chlorides, sulphates, phosphates and hippuric acid—the normal constituents of the herbivorous urine are also present in the camel's urine.

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STUDIES ON SOME ASPECTS OF JOHNE'S DISEASE

By

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Johne's disease or para-tuberculosis, as it is popularly known, has been studied by many research workers in the Laboratory and field, but certain aspects of the disease require further investigation and careful study for purposes of diagnosis and control of the disease. Johne's disease is now spreading rapidly among cattle and sheep in India without any suitable method to prevent and control the disease at its early stage. The insidious nature of the disease, its prolonged incubation period and unnoticed symptoms make it difficult for us to diagnose the disease at its early or pre-clinic stage. Though Johnin test of the herd makes it possible to detect the disease at an early stage, yet the field workers know it quite well that a single method namely allergic test, is not enough to diagnose the disease correctly in all its stages.

In the course of the investigation of the disease among several hundreds of affected cattle, and systematic studies made on various diagnostic methods the following conclusions were arrived at:—

- (1) There are animals which are negative to all tests and examinations - allergically, clinically, bacteriologically and are, therefore, considered to be free from Johne's disease.
- (2) There are animals which are allergically positive but are negative to all other tests.
- (3) Thirdly, there are animals which are positive to some tests but are negative to other tests.

In all such investigation of Johne's disease both in India and abroad, the diagnosis was not based on Johnin test alone. Concurrently with Johnin test, serological test of the serum of the positive reactors was undertaken and a comparative study of the results of this test with other tests was made. Similarly bacteriological examination of the faeces of all the positive reactors was made and the result was compared with aforesaid tests.

It is needless to say that in advanced or open cases of Johne's disease, Johnin test, if not useless, is not very important for diagnosis as the clinical picture and the symptoms as well as the presence of

bacilli in conglomeration in the infected faeces are unmistakable evidence of the disease. It has already been discussed that the Johne's disease is very chronic and insidious in nature and the symptoms may appear after months or even after years. Apparently there is no fever but loss of health and gradual emaciation continue to progress with the advance of the disease.

Thus in majority of cases symptoms pass unnoticed for a long time. It is only after involvement of some important organs, such as intestines, mesenteric lymph glands, caecum, rectum etc., that the clinical symptoms manifest themselves which are characterised by shooting diarrhoea with very offensive smell, containing gas bubbles and the flakes of intestinal mucus. This soils the tail and hind quarters of the animals as well as wall, the floor of the stalls etc. Sometimes diarrhoea ceases for a period of short duration but it sets in again. Between such attacks of diarrhoea the animal shows improved appetite but emaciation and anaemia continue to progress. At the later stage animal becomes extremely emaciated and almost hide bound. Oedematous swelling develops in the submaxillary regions and at last the animal dies due to total exhaustion and debility.

The above symptoms have been observed during the present study in many clinical cases of Johne's disease. Once the disease becomes clinical or open it is difficult to check the dissemination of bacilli and the spread of infection to other animals, because the infected animal will contaminate the cow-shed, pastures, water troughs and fodder with its bacilli-containing faeces particularly during the attacks of diarrhoea. Therefore, it is of paramount importance to detect the disease in its pre-clinic stage.

Diagnosis

1. *Intradermal Test of Johnin or Paratubercullin*:—In many cattle in the continent and in this country tested by allergins, such as Johnin, Tuberculin and avian Tuberculin for the detection of Johne's disease and Tuberculosis in the infected herds, it was seen that the Johne's disease and Tuberculosis were co-existent in the same animal and gave positive reaction to both the tests. The author had opportunity to test hundreds of cattle both on the Continent and in this country and as such feels a detailed description of methods adopted may be helpful to field-workers.

The two sites that were generally preferred were:—

- (1) The side of the neck or the space before the spine of scapula.
- (2) Caudal-Anal fold.

Generally the former is the convenient site where an area of 4 sq. inch was shaved with a hair clipper and exactly in the middle of the

shaved area, the measurement of the skinfold (in millimeter) was taken with the help of a pair of callipers before the injection was made. With paratuberculin or Johnin, the intracutaneous injection was made in the middle of the shaved area by raising the skinfold with the thumb and forefinger of the left hand. An oblique moderate penetration of the needle was made in the loose skin-fold from the lower edge of the fold. The injection was considered correct when a lentil-shaped or pea-sized pimple was felt over the injected part. The dose of Johnin used was 0.2 c.c. which was repeated at the end of 48 hours. The final reading was observed 24 hours after second injection.

In the case of caudo-anal-fold test either right or left anal-fold was injected with paratuberculin in a similar manner as described above and the other anal-fold remained un-injected as control to compare with reaction of injected one. No measurement of anal-fold was needed.

Character of Swelling:—Generally the character of swelling constitutes its nature whether the resultant swelling is hot, painful, tender, diffused or oedematous. This can be ascertained by palpation. A bullet-like structure adhering to the sub-cutaneous tissue which can be easily picked up by fingers constitutes a negative reaction which is neither hot nor painful. In no case, the interpretation of the result was based on skin-measurement alone without noticing the character of the swelling as described above.

2. *The bacteriological Examination of the faeces of the reactors*:—Extensive work has been done in this line by numerous workers in India, and therefore it is not necessary for me to give the details of the method of examination of faeces containing flakes of mucous or bowel-wash or the scraping of rectal mucous membrane. The popular method of examination of the rectal mucosa was not found to be satisfactory by me in all cases. Because if the lesion is confined to the wall of the ileum and caecum it cannot be easily reached by hand. Therefore, it may lead to a wrong diagnosis if the examinations were confined to the mucous membrane of the rectum alone. Besides it has been found by me and other workers (K. F. Mayer) that only in 62% of the observed cases of Johne's disease, the presence of paratubercle bacilli can be demonstrated in the faeces.

3. *Complement-Fixation Test of the Serum of the Reactors*:—The serum of the positive reactors to Johnin was put to complement-fixation test in order to make a comparative study of both the reactions. The latter work was carried out in the Institute of Animal Pathology, Cambridge and field laboratory, Mill Hill, London. In an experiment conducted in the above mentioned laboratories, 28 samples of serum

from positive reactors were put to complement-fixation test, and 20 samples were found positive. In other words, 71.43% were positive as compared to Johnin Test. For antigens, tubercle antigen obtained from I. G. Farban Industries, Aktien Gesellschafts, was used and in the rest of the cases paratubercle antigens prepared in a special way after the method of Dunkin. The preparation of paratubercle antigens was made in the following way:—

Paratubercle bacilli from the culture media were filtered through filter paper and distilled water was poured through the organisms and was allowed to be drained 2 or 3 times. This was now collected and placed in an evaporating dish which was then placed in the dessicator and was thoroughly dried. It was then transferred to a ball mill and ground for 14 days. The powder was then filled in ampoules approximately 0.5 gm. and was stored for using as antigen for complement-fixation test. The powdered organisms were suspended in water. The suspension was heated at 65° C. for half an hour and it was allowed to stand for sometime. The suspended fluid was used as antigen.

4. *Vaccination or Premunition against Johnne's Disease*:—It has been already discussed that it is difficult to eradicate Johnne's disease from a herd by the singular use of Johnin as the diagnostic test unless the healthy animals are protected from infection by some suitable vaccine. This induced the author to practise a method of vaccination against this fatal disease in a manner as B. C. G. against Tuberculosis. France is now armed with a prophylactic vaccine to check this disease. Vaccination against Johnne's disease by premunition has not yet been thought of in India. Hundreds of cattle have been immunised in France by Dr. Ringard. The result was found to be quite satisfactory. Out of every ten animals vaccinated, eight remained protected against Johnne's disease. Combined with hygienic measures, premunised vaccine rapidly diminished the incidence of the disease in those cattle farms where the infection was previously very high.

The author prepared a modified vaccine against Johnne's disease in collaboration with Dr. Ringard, the Director of the National Laboratory for Research, Alfort, and tested its immunising value on 216 animals in some infected farms in France. After vaccination, 174 animals produced premunised nodules, thereby showing active immunisation against the disease. Before field use, the innocuousness of vaccine, was confirmed in the laboratory, both on large and small animals. The guinea-pigs inoculated with the vaccine remained unaffected. Repeated examinations of the excreta of the vaccinated animals did not reveal the presence of any Johnne's bacilli. The subcutaneous injection of the vaccine produced some characteristic active nodule which state, according to Dr. Ringard, was premunition—a state of inaptitude to super-infection. The details

of work may be seen in the vaccination chapter of doctorate thesis of the author entitled "Investigation of Johnne's disease with special reference to culture-study, allergy, sero-diagnosis and immunity."

Premunised vaccine which was prepared by the author is an adjuvant vaccine prepared from Johnne's bacilli in combination with lanolin and Paraffin etc., as adjuvants. This vaccine when injected to healthy cattle, produced a hyper-sensitivity against these microbes in a manner comparable to that obtained after the injection of Koch's bacilli. The only difference in the case of Johnne's vaccine is that the reactional phenomenon is less intensive than that of B.C.G., (in case of tuberculosis). This hyper-sensitivity expresses itself in a state of inaptitude to superinfection which is observed in the Koch's phenomenon—test with tubercle bacilli.

The vaccinal nodule which results after inoculation of premunised vaccine serves as a stimulating antigenic centre to resist superinfection coming from external sources. As described above premunition of cattle consists in subcutaneous injection of Para-tubercle or Johnne's bacilli in a mixture of oil and insoluble substance as adjuvants.

1. It is a valuable means to produce in healthy animals a longer period of resistance against Johnne's disease.

2. It is a means to detect whether the cattle are already infected or not. The vaccine produces specific reaction which is limited to the place of inoculation and the lymphatics corresponding to the place of injection. After repeated experiments, Vallee and Ringard notified the impossibility of the experimental production of disease by subcutaneous method. After having been confirmed of this effect, it was possible for them to introduce prophylactic method based on premunition. (See-Valles and Ringard-sendes sur L, Enteritis para-tuberculosis-Revue Generale de Medicine Veterinaire XXXV, 15, 1, 1926").

Bain of Australia has recently made similar studies with adjuvant vaccines prepared from pasteurilla. This adjuvant vaccine has proved superior in its immunising value to other bacterins, such as Formalin-killed broth vaccine or Alum Precipitating broth bacterin. Similarly the premunising value of Johnne's vaccine prepared from paraffin and lanolin etc. as adjuvant, is centred to its nodule which retains the vaccinal mass in concentrated form for a longer period, thereby creating an antigenic stimuli for the formation of antibodies. So long as the nodule is active, the formation of antibodies never diminishes. It is only when nodule diminishes in size, consistency and volume that it results in total absorption or abscess-formation and the premunity breaks down. Therefore, the nodule should be examined frequently (at least once in a month) and if necessary the animal may be revaccinated.

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Clinical Articles

SPIROCHAETOSIS IN POULTRY

(A Clinical Observation)

By

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At the Rajasthan College of Veterinary Science & Animal Husbandry, an experimental flock of about 150 birds (RIR & WLH) is being maintained. The birds kept extremely well for the first six months of their stay at the college premises, i.e., upto the last week of May last when suddenly they started dying in rather alarming numbers. There were no pathognomonic clinical syndromes to suggest any disease and yet the flock lost five to six birds daily.

The carcasses of the birds were referred to this department for P. M. examination and necessary investigation. Five out of the six carcasses examined on one single day revealed identical lesions, like enlargement of the spleen (in one or two cases up to six or eight times the normal size), enlargement of the liver with light coloured patches on its surface, pale and anaemic internal organs and slight congestion of the upper respiratory tract and whole of the digestive tract. Some birds were found to have heavy infestation of *Argas persicus* under the wings and around the breast region. The birds were all extremely emaciated. In short, there was everything suggesting spirochaetosis.

Birds with symptoms of dullness were immediately segregated, but only one or two of them had high temperature of 107 to 109 degree F, and blood smears referred to for parasitological examination were reported negative for any protozoan infection. Consequent upon the situation becoming grave, the senior author was entrusted with the complete check up and control of the malady about the end of first week of June, '58. As a first step thorough hygienic measures like scrupulous disinfection of the poultry pens, perches and runs, cleansing of feeding and watering troughs and burning of all soil, droppings and litter, were immediately adopted. The entire stock was subjected to a careful clinical examination. Ten birds which showed a high rise of temperature (108—110 degree F) and dullness were removed to separate premises. Six out of these were found to have a teeming infection of spirochaetes in their blood. This settled the diagnosis authentically and treatment was taken up immediately. Novoarsenobillon which was the only relevant drug immediately available in the college clinics and local markets, was given in deep s/c injections to all the birds in a dose of one mgm. dissolved in a c.c. of distilled water. Dusting with gammaxane powder was also resorted to for the entire flock and was repeated after every three or four days subsequently. Within two to three days the mortality rate dropped down and was completely stemmed in the second week of June, '58. Since NAB stocks were depleted reinjection after one week of the first injection was done with sulpharsenol at the rate of two mgm. each bird by deep s/c route (none of the birds in question was more than three lb. in body wt. or six months of age). A strong vigilance was kept to ensure maintenance under rigid hygienic measures including a balanced ration, dieting with liberal amounts of green and clean water. Out of the ten sick birds two died later on while others were kept on restoratives and tonics and were administered a course of Atoxyl (Bayers) at the rate of one c.c. each bird three to four times at intervals of 2 to 3 days, as also glucose saline 5 to 10 c.c. i/v each time. The flock which now comprises a total of 110 birds are all bright and normal, absolutely free from ticks and have remarkably

picked up condition. There has been no mortality amongst them upto the time of recording this.

Acknowledgment

The authors are indebted to Shri B. N. Handa, B.Sc., M.B.C.V.S., the Principal for the facilities afforded as also to Dr. M. S. Purohit, and Professor P. N. Mehrotra for their invaluable suggestions and guidance.

AN ABNORMAL CASE OF PARTURITION IN A GOAT

By

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Goats are prolific breeders generally giving birth to more than one kid at a time. Shanmugasundaram (1957) assigns the incidence of multiple births amongst goats to the sound reproductive physiological state of health, early maturity in the first kidder and early breeding quality of the second kidders. Anomalies of the foetuses such as monsters and giants are not uncommon. Ayyar (1944) and Kadushkar (1956) recorded ectopic pregnancy in goats. The mummified foetuses were found in the abdominal region encased in the peritoneal sac without resulting in the death of mothers. Normally we see goats giving birth to one or more kids, all of which may be alive or one or two may be dead, but they are all of equal size. This interesting case is that of a goat which gave birth to two normal and one atrophied kids. The peculiarity of the case is that the dead foetus is very small in comparison to the live kids and remained inside the womb without causing abortion.

The subject was a goat aged 3 years brought to the hospital on 20-10-57 for the removal of placenta. The owner stated the goat gave birth to two live kids about 36 hours back but had not thrown the placenta. On external examination the placenta was seen hanging. While the manual extraction of the placenta was being done, the goat strained and expelled out a matured but atrophied foetus. The uterus was douched and no remanent of placenta was found left inside.

On 21-10-1957 the goat was brought again with the complaint that she was bleeding and having some discharge. A douche with condy's fluid was given. Saline mixture was given internally. The goat continued coming for 4 more days for douche, after with the bleeding and discharge completely stopped.

The goat is normal now with two kids alive.

Discussion

A close examination of the atrophied foetus showed that its umbilical cord at the navel end was constricted and obliterated. This probably affected the circulation of blood to the foetus resulting in its atrophy. How the constriction of the cord took place is not known. The foetus was a mature one having head, neck, chest, abdomen, legs and hooves but no hair. The size of the foetus was 10 x 6".



Conclusion

The birth of an atrophied foetus along with two other normal live kids, shows that the dead foetus can remain inside the sterile fluid of foetal membranes without causing death of the mother. Recording of similar cases will be of great interest to the profession.

Acknowledgment

The author wishes to thank Dr. R. M. Sharma, Disease Investigation Officer, Punjab, and Dr. S. N. Bhatia, District Animal Husbandry Officers, Gurgaon for the guidance and encouragement received.

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Abstracts

Bovine Brucellosis, with Special Reference to the Duration of Immunity Following strain 19 Vaccination.—By T. S. GREGORY, *Aust. vet. j.*, Vol. 34, No. 10, Pp. 327—331.

In Australia, calfhood vaccination with Strain 19 has reduced abortion due to Brucellosis to a low level. Immunity may last for nearly 7 years. But in upto 30% of animals it may not be sufficient to withstand infection.

A suspicious or positive agglutination titre after vaccination may also be due to a subsequent infection where vaccine had failed to confer immunity. Any significant and persistent rise from the titre after vaccination is invariably due to an established infection due to break down of immunity.

Some infected animals fail to give positive agglutination test at the time of abortion or calving. Where udder is infected, organisms could be recovered from this site long before there is serological evidence of infection. Where infection is confined to udder and uterus is not infected at any time, titres may continue to be low even after parturition.

Presence of incomplete anti-bodies in serum may fail to produce agglutination. Such samples require employment of 5% NaCl in tests instead of physiological saline.

A mixture of complete and incomplete anti-bodies in serum may give rise to 'Zoning' phenomenon in agglutination tests. For proper evaluation of tests, dilutions should be continued to get complete agglutination.

These atypical anti-bodies may be a source of unsatisfactory results in milk ring tests.

Many of the above observations may prove serious hazard in the control of disease based mainly on agglutination tests.

M.S.J.

Comparative Trials with Ammonium Sulphate, Sulphonamides and Antibiotics in Natural Bovine Coccidiosis.—By G. GASPARINI, R. RONCALLI and G. F. RUFFINI. *The Vet. Rec.* Vol. 70 No. 39, Ps. 787-789.

The authors employed the following drugs by the oral route in the study of their comparative efficacy in the control of Coccidiosis involving 46 cattle:—

1. Ammonium Sulphate (4 g per 100 kg. of body weight twice a day for 4 days in milk. 2 c.c. of lactic acid was added to prevent precocious decomposition of drug in stomach).

2. Sulphaguanidine (200 mg. per kg. on the 1st day and 150 mg. per kg. on the following three days).
3. Sulphamethazine (160 mg. per kg for 3 days and 80 mg per kg. for next three days).
4. Sulphanamide mixture containing Sulphadiazine, Sulphamerazine, Sulphamethazine and Sulphathiazole (150 mg. per kg. on 1st day and 100 mg. on next three days).
5. Ferramycetin - 5 mg. per kg for 3 days.
6. Tetracycline - mg. per kg. for 3 days.

Sulpha drugs gave the best results irrespective of the condition of animal. Ammonium Sulphate administered in the beginning of the disease produced positive results in animals in good condition. Its cheap cost is a factor to be reckoned with. Antibiotics although causing disappearance of oocysts and blood from faeces did not suppress diarrhoea.

M.S.J.

A Method of Treating Vaginal and Uterine Prolapse in the Ewe.—By O. Y. MAYOR, (1958). *The Vet. Rec* Vol. 70, No. 42, P. 852.

In ewes, placing of an inner rubber casing (size 2 or 3) of boy's football in vagina, inflating it with a bicycle pump to a proper size in between the pelvic inlet and cervix held *in situ* and leaving it tied up for 24-72 hours has been found to be highly effective in the control of straining by the animal and thus prevent re-prolapse of vagina or uterus after reduction. Use of sutures can be dispensed with.

M. S. J.

Lungworm infestation:—Published by the Veterinary Services Department, Pharmaceuticals Division, Imperial Chemical Industries, Ltd., Wilmslow, Cheshire, England (21 pages).

On the eve of the introduction of Cyanacethydrazide as an effective drug for the treatment of lungworm disease, Imperial Chemical Industries has brought out this booklet. The review contains useful information on the life-histories of the different species of lungworms of domestic mammals, the disease and its chemotherapy. The list of the various medicaments employed hitherto in lungworm disease points out the nonavailability of a drug efficacious in the treatment till the discovery of the usefulness of Cyanacethydrazide. This drug is marketed under the trade names of 'DICTYCID'—a sterile powder for injection and 'HELMOX'—a soluble powder for oral administration. It acts only on the worms present in the bronchial tree and hence treatment has to be repeated after sometime against the worms which have not arrived at this location during the initial treatment. The helminths are

not killed in the lungs but they move up to the pharynx to be swallowed and digested. Such a mode of action makes its use safe even in heavy infections as the dead worms will not block the respiratory passage. For a better effect the treatment has to be commenced immediately the disease is diagnosed. A schedule for the use of Cyanacethydrazide as a prophylactic agent is also suggested. The margin of safety of the drug is stated as very satisfactory. At the end of the booklet Dougherty's classification of the family Metastrongylidae is furnished.

V. S. ALWAR.

News and Views

Capt. Judy retires from 'Dogs World' after 36 years :—"Chicago, 10, September 1958. On this date, Capt. Will Judy ended thirty-six years as Editor of Dog World Magazine. The Judy Publishing Company purchased it as a seven-year old publication from the founder Dr. Fred Formanek and Capt. Judy edited the first issue in January 1923 under the new ownership. With his last issue, October 1958, his editing career embraced 426 issues of the magazine".

"He resigned also as President and Director of the Judy-Berner Publishing Co., which now owns all interest in Dog World, the Judy Publishing Co., having sold its half interest to this corporation, whose entire stock is now owned by George Berner, the new President and Publisher of Dog World".

"Capt. Judy continues as President and Director of the Judy Publishing Co., now located at 2517 So. Michigan Av., Chicago 16, which carries on with its book publishing business and also its publishing of the 17 year old magazine *American Spectator*." Capt. Judy was an institution by himself and the world of dog-owners will ever remember him.

Gateway to World Knowledge :—Mr. C. D. Deshmukh said at Rajkot recently "that major part of the output of knowledge in literature, science and technology is contained in books in the English language." Referring to Research in particular, he drew pointed attention to the fact "that the theory of individual research has long been given up. Research is now considered a team work and therefore it will be necessary to look for the results achieved out of India in the various fields of knowledge. It is only English, at present, that makes such knowledge easily accessible." Surely, English is the Gateway to world knowledge. Let us not lose the grip we have on that language.

Television or Food? Food of course! "In Britain over 8 million homes have television sets; it is estimated that nearly 25 million people every day view programmes ranging from politics and science to sport and drama. Ten years ago, there was only one television transmitter in Britain; to-day, there are 20 throughout the country. With this coverage, 98 per cent of the population could receive B. B. C. television if they had the sets - and the sale of these is increasing at the rate of one and a half million a year." says the *Reader's Digest*, November 1958. "But in India such television is still part of a long-term project". Quite rightly too. India's immediate need is Food and not television. Veterinarians! Play your part truly and well in the production of food.

Words of Wisdom :—Prof. M. S. Thacker, —Secretary of the Union Ministry of Education and Scientific Research, said recently in his convocation address at Annamalai University "No measure which has been conceived to meet an expediency can be satisfactory or beneficial in the long run". Words of wisdom these are. It is just what we say of the two years course of studies in Veterinary Education. The All-India Veterinary Conference which met at Bangalore recently, has also passed a resolution requesting the Government to re-consider this question. The sooner it is done the better it would be to all concerned.

Yet Another Discovery :—This time by Dr. Sampurnanand, Chief Minister of Uttar Pradesh! He said "Public Schools produced snobs and were therefore, foreign to our genius". We get a plethora of such *obiter-dicta* from our Ministers these days! You may take them with or without a grain of salt as per your taste!

Dr. Jagadish Chandra Bose :—India has been celebrating the birthday centenary of this savant of Science. He was a prince amongst Scientist in his days. He raised the name of India in the eyes of the world as no other person did in her long history. What is noteworthy is the fact that he achieved his triumphs "in the face of public apathy, lack of money and total absence of facilities for research". His discoveries and inventions held the world spell-bound in his days. We pay our reverential homage to the memory of this great Indian.

Leadership that does not lead :—*The Modern Veterinary Practice* (Formerly the *North American Veterinarian*) writes as follows editorially in its 15th October 1958 issue :—

"The future of the Veterinary practitioner in agriculture may well be decided by the long-range planning we do, or fail to do, from now on, and the ability of the profession to adjust to new ideas as to the

future role of the Veterinarian in livestock production. (Italics are ours). In the 1920's the growth of small-animal practice was able to gradually overcome the penalty of leadership *that did not lead*. There is no comparable panacea in view for 1960's. If those chosen leaders of the profession fail to recognise the danger signals and take no protective measures based on sound long-range plans our huge stake in agricultural practice will be jeopardized with possible catastrophic consequences. Can we again survive the penalty of leadership *that does not lead?* There is a ring of pathos in those lines. Let the Veterinarians in India realise in time what fine leadership the All-India Veterinary Association has been giving in all matters of importance in this country.

* * * *

1945 Models vs 1960 Models :—Again the same Journal writes in another editorial dated 1st October 1958 "This calls for the development in our schools of specialists in livestock production and herd-health management who can mesh veterinary science into the processes of livestock production and make a necessary and desirable part of the over-all operation. This need is not new." The journal says that necessary changes in the Colleges have not been brought about by the old "pros" "who insist on producing 1945 models when the demand and need is for improved 1960 models." How fortunate India has been in this matter! She has developed a pattern of her own, a unified course of studies in Animal Husbandry and Veterinary Science in her Colleges, leaving it open to people to specialise in Dairying, Animal Genetics, Animal Nutrition and in Veterinary Medicine and Surgery. Times without number we have been insisting in these pages that we should not copy others in the matter of our education in Agriculture and Veterinary Science. Let each one Specialise in all aspects of his own sphere of work. This is the pattern that India has followed from the days of Salihotra. We shall return to this subject editorially later.

* * * *

A Death Trap.—Discussing the foreign aid programme in a recent communication to the Press, Sri C. Rajagopalachari, who may well be described as the 'wise-man of the east' says "It will increase our foreign obligations beyond the limit of tolerance. It would indeed be a death trap". He concludes by saying "One wishes by some miracle of courage and re-adjustment we could dispense with aids from abroad, which would give us full freedom of policy". This is what we said, editorially so early as February 1958 under the caption "Beware of Aid-programmes".

Block Development Corner

[Articles under this section, should be more in the nature of simple 'talks' to rural folks and village level workers, on Animal Husbandry matters and not loaded with scientific terms and theories.]

HOW AN EXTENSION BLOCK CAN BE UTILIZED BY THE AGRICULTURE AND VETERINARY COLLEGES IN TEACHING AND RESEARCH

By

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Community Projects, National Extension Service Schemes and Extension Blocks are aimed at enhancing our rural economy. Eighty-five percent of the Indian population live in villages. Improvement of economic status of Indian population as a whole actually rests on the welfare of rural community. The prosperity of the village folk is largely dependent upon the condition and productivity of their soil and live-stock. Human and bovine are inter-dependent, deterioration of one leads to deterioration of the other. Similar inter-dependencies exist between land and animals. The deterioration of cattle has a far reaching effect on agricultural produce and human nutrition and thus breaking down the backbone of the nation. Therefore, blocks have been formed in groups of contiguous villages for extension work, in which the sphere of activities of Agriculture, Veterinary and Animal Husbandry, Co-operation and Public Health are all concentrated. Besides, these blocks are nothing but little republics within themselves. Dynasty after dynasty crumbles down, revolution succeeds revolution, various nations master the land in turn, but the villages remain the same ever against unprovoked-aggression, devastation, plunder and natural calamity.

Here the Agriculture and Veterinary students and staff have got an ideal field to work intensively in way of educating the rural folk and conducting researches in various problems that are confronted while coming in contact with them. Veterinary Science & Animal Husbandry and Agriculture in India have made considerable strides in the past few decades and some achievements have been remarkably made, but we have not reached our goal yet. Much has yet to be done in a missionary spirit for the advancement of livestock industry and agricultural economy in our country. A general level of education of livestock matters among the people to be raised and the significance of land and animals in the economy of our country should be continuously emphasized.

A well defined objective has to be laid down before the people and the period within which a specialised target will be achieved have to be indicated. The responsibility of the Agricultural and Veterinary personnel in this connection is obvious. We have big problems before us in regard to implementation of any kind of developmental work in a country. The extension block should form the nucleus of all the Agricultural and Veterinary activities to start with.

In the First Five Year Plan greater stress was laid on Agriculture. Animal Husbandry and Veterinary work deserve greater emphasis than what has been obtained in 1st. Five Year Plan. The Planning commission have rightly placed greater emphasis on this in Second Five-Year Plan. For manning various schemes the workers should be skilled, enthusiastic and able to win the confidence of the rural public. In villages, truly speaking, we face varied problems of very intricate nature in the up-liftment of livestock industry and agricultural economy. Majority of the cattle continue to be practically as non-descript as ever without any appreciable improvement in their performances. The villagers are short of bullock power to the required extent, milk and milk products, meat, fish and eggs and average quality of work is very inferior. Similarly the yield of land is very poor. The depletion of soil in minerals is the crying need of the village folk. In spite of villagers' ceaseless toil for days in and days out the out-turn from the field is hardly enough to feed their family members. Roughly not less than 10 per cent of their cattle are unproductive and unserviceable, over half of which are moving carcasses for which we profess profound respect and devotion. About 15 to 20 per cent are affected with brucellosis and the per capita consumption of milk is about half an ounce. The pity is, we are maintaining much larger number of cattle than we would actually require if there quality could be improved. The feeds and fodder available in the area can hardly suffice the needs of half the cattle population. Villagers are very less livestock minded. They are much interested in cultivation of cash crops, they are far less inclined to cultivate fodder crops and grasses for the maintenance of their cattle on whose shoulder their tilling of land rests. Due to lack of educative propaganda on cow keeping, progressive neglect towards calf rearing, it has created a vicious circle towards degenerating the future cattle population. Brahmini-bull and scrub-bull-pests have brought about a serious set back on regularising breeding problem. We have no doubt made considerable progress in the control of diseases but a large number of our animals still die annually as a result of disease not diagnosed properly and advice not received timely due to lack of skilled and enthusiastic personnel. We do admit that development of livestock is a slow and continuous process but at the same time is of vital interest

to the country. Due to ignorance the cattle excreta is not properly conserved for manure purposes but is used as fuel due to non-cultivation of drought-resisting fuel trees.

It is admitted that primary producers of cereals, milk and meat will remain with villagers, while the profession will assist and guide them to utilise to the best advantage of their resources and obtain increasing economic return in raising the standard of the living of the village folk in block areas. These are problems we face in the Extension Blocks which demand educating village people to make them cattle minded and compel us to conduct research work to eradicate these problems which are breaking the backbone of rural economy since a pretty long time.

The varied works that are awaiting the teachers and students of Agriculture and Veterinary Colleges in Extension Block area are first to carry out educative propaganda to make the people of the block livestock minded, to cultivate fodder crops and grasses, to feed their animals on balanced diet, to feed their cattle either with washed straw or treated straw, help the veterinarians in conducting mass inoculation against infectious diseases and to look after calf rearing. The teachers should teach the students, to treat the cases keeping in view the financial condition of the owners of cattle. The process of conservation of fodder and solid and liquid excreta, should be taught to them. Research work should be carried on to study the potentiality of the local bulls and grading-up the indigenous stock with improved pedigreed bulls. Obscure diseases should be diagnosed and treated after thorough investigation. The nutritive value of local feeds should be determined.

The Agricultural students and teachers have also great field here to teach the local folk and conduct research in various problems, viz., soil study, improvement of soil-texture, seasonal cropping system, rotational cropping, improvement of land to remove mineral deficiency and preventive measures against soil erosion and plant pests should be taught to the villagers. Research on anti-erosion methods of soil and improved variety of seeds, rotational cropping should be done. Examination of water available and to remove scarcity of water supply in all seasons, various irrigation facilities during drought period should also be taught to villagers. Supply of seeds as per their requirement, artificial manure to raise soil fertility and its scientific application should be inculcated in them.

Researches may be carried in making demonstration plots in which seedlings should be raised in improved soil, side by side, the same in control plots of the locality to determine the percentage of germination capacity of seeds and growth rate of plants. Similarly growth rate

and yield of crops per acre may be determined in soil treated with farm-yard-manure, or by artificial fertilizers or with green manuring and in local soils without manure.

Again, researches may be conducted in improving pasture-land by shallow ploughing, harrowing, manuring, fencing and irrigation and advocating rotational grazing of animals in them, and the performances of these animals may be recorded and compared with those of stud-fed animals (fed on concentrates, dry fodder) to give new light on this.

From Veterinary aspects also demonstration may be made to carry on researches on growth rate and maturity of calves fed on washed straw or treated straw and green and balanced diet in comparison to calves fed on ordinary straw and maintained on low plane of nutrition. Similarly the condition of animals as to resistance to diseases, metabolic activities of the body, milk yield and draught capacity may be determined if they are housed in sanitary byres in comparison to animals exposed to extreme climatic rigours.

Further the performances of calves sired by improved pedigree bulls either by natural service or subjected to Artificial Insemination technique may be observed and recorded and the same may be compared with those of calves sired by scrub bulls.

Verily, all these researches on the above subjects will not only create good impression in the mind of the rural mass but also will bring about definitely an appreciable improvement in their economic status, and will open a new era of activity in the domain of Veterinary and Animal Husbandry and Agricultural Sciences.

In short, agriculture and veterinary are inter-dependent as stated before. If one side is neglected the other will be seriously affected. Every villager is a mixed farmer. Both the Agriculturists and Veterinarians should aim at educating the villager to be a mixed farmer in the interest of himself, in the interest of the teeming millions of dumb creatures and in the interest of better agricultural operation in raising the economic standard of the villager to a high level and thereby the country at large. The Extension Block provides an ideal place for such work.

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College News

RAJASTHAN COLLEGE OF VETERINARY SCIENCE & ANIMAL HUSBANDRY, BIKANER

List of 1st Batch of students who passed the final B.V.Sc., & A.H. Examination of Rajasthan University in May, 1958 from the Rajasthan College of Veterinary Science & Animal Husbandry, Bikaner.

- | | |
|------------------------------|--------------------------------|
| 1. Shri Amar Lal Vyas | 15. Shri Pratap Singh Mandawat |
| 2. " Amrit Lal Choudhary | 16. " Prem Singh Poonia |
| 3. " Anand Prakash | 17. " Purushottam Lal Bhatt |
| 4. " Anand Prakash Gupta | 18. " Raghunath Kohli |
| 5. " Bhanwar Singh Tanwar | 19. " Ram Sahai Karwasra |
| 6. " Bhagwan Swaroop Gaur | 20. " Rajvir Singh Sisodia |
| 7. " Ganpat Lai | 21. " Shailesh Ranjan |
| 8. " Gopal Krishan Rastogi | 22. " Satish Chandra Jain |
| 9. " Ishwar Dayal Mathur | 23. " Shamboo Lal Bohra |
| 10. " Jayant Kumar Varma | 24. " Sohan-Singh Rathor |
| 11. " Jugal Lal Mathur | 25. " Surendra Mohan Saxena |
| 12. " Kanti Chandra Kaushik | 26. " Vijay Prakash Bhargava |
| 13. " Kranti Chandra Purohit | 27. " Virdba Ram Chowdhary |
| 14. " Narendra Dass Khanna | 28. " Vishin R. Ambwani |

MOHAN SINGH,
Principal.

The photograph which appeared in our November 1958 issue, is that of the entire batch of final year students before they sat for the examination and was taken on the occasion of the departure of Dr. J. M. Solanki (garlanded) to U.S.A. The caption furnished to us did not make this point clear.—*Ed. I.V.J.*

Association News

The All-India Veterinary Association THE RESERVE FUND

An event of great importance to the Veterinary profession in India, took place in August 1924. It was the birth of the *Indian Veterinary Journal*. Circumstances were positively hostile and yet the profession took that bold step and the lion-heartedness of the early pioneers cannot be too highly praised. Ever since then, the *I.V.J.* has toiled hard under very adverse circumstances. The *I.V.J.* lives to-day so that the profession could prosper and science advance.

And now the hat is sent round so as to place this journalistic venture on a sounder and firmer basis. The *I.V.J.* is a priceless possession of our profession. It has placed the Indian Veterinary Surgeon, on the map of the scientific world. Just pause and ponder over, how much we owe to the Journal both individually and collectively. Is it too much then to expect the profession to respond to the appeal issued for a Reserve Fund? We hope not.

Some enquiries have come to us asking us to indicate the extent of help expected. We do not want to put the members of the profession

to any undue financial strain in these hard days. At the same time, a certain amount of sacrifice is needed to make this fund a great success, so as to make it worthy of our profession. So we feel that the following scale of contribution will be quite reasonable. It could even be paid in two or three instalments.

Class I Officers	...	Rs. 100/- and above.
Class II Officers	...	Rs. 50/- and above.
All others	...	Rs. 25/- and above.

It is our ambition that no Veterinary Surgeon in this land should remain without contributing to this fund. Brick by brick, this great edifice of our's should begin to rise higher and higher. On the success or otherwise of this venture, the solidarity of our profession depends. "Pay and Prosper" is the slogan we pass on to the members of our profession.

Jai Hind!

T. VINAYAKA MUDALIAR,
Editor, *The Indian Veterinary Journal*.

THE I. V. J. RESERVE FUND

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	Amount acknowledged in December 1958 issue	Rs. nP.
Dr. Ravi Verma Hegde, Vety. College, Bangalore	...	3,295-81
.. G. C. Taneja Vety. College, Mhow, M.P.	...	25-00
The Madras Veterinary Assistant Surgeons' Service Association, Madras	...	15-00
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Hallo Friends!

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will greatly oblige.

Thank you!

Editor, I. V. J.

Reviews

Evolution of the Veterinary Art.—By J. F. Smithcors, D.V.M., Ph. D., Associate Professor of Anatomy, College of Veterinary Medicine, Michigan State University, East Lansing, U.S.A. xvii 408 pages, 42 plates. Price 55 sh. Bailliere, Tindall & Cox, Ltd., London, W.C. 2.

This book is a great labour of love and is a remarkable contribution to the history of the Veterinary Profession, not of any one country but of the whole world! That the author should have set for himself such an omnibus task, excites our admiration. He has dived deep into the ancient literature of several countries from the dawn of time and has given us this splendid record of a cogent and continuous history, which holds one deeply interested from cover to cover. The author takes us across the ages and portrays both the heights to which the Veterinary art rose in some countries and the depths to which it sank in a few others. There is a balanced beauty in the treatment of this difficult subject. The author virtually blows life into the dead bones of the past. It is a creative art that he exhibits in the assembling of matter, which both for substance and style will endure with times.

Commencing from pre-historic times, he takes us through the ancient civilisations of India, China, Japan, Egypt, Babylonia, Persia, Rome and Byzantium (Constantinople). This roughly covers the period from 2200 B.C. to 350 A.D. Next he takes us on through the medieval period, 500 A.D., to 1500 A.D., and finally to the seventeenth, eighteenth and first half of the nineteenth centuries. Why he has stopped there and not brought his work more up-to-date, is beyond our comprehension. He adduces a reason in his closing chapter, which we are not able to fully appreciate. He says "Much more could be written on the Veterinary history of Britain and the continent during this period and later, but we have reached the point where national interest supervenes." True it is there are other such works of history both in Great Britain and America for the later period he refers to. But this book covers an international field and the value of the book would have been enhanced manifold. Perhaps it may yet form the subject of a second volume.

It is chastening to our pride, when he pays the highest possible compliment to ancient Hindu knowledge of Veterinary Art. It is with great restraint, that we refrain from quoting extensively from this admirable book. It is a book to be read by every Veterinarian whether in the East or the West and no student of Veterinary Science could get a better start than by going through this highly informative book. We even venture to suggest that no library, professional or general, should miss to get a copy of this book.

The get up of the book is in keeping with the reputation of Messrs. Bailliere, Tindall & Cox, London.

T. V. M.

Statistical Information of Department of Animal Husbandry, Madras.—By Dr. D. Pattabhiraman, G.M.V.C., A.I.D.I., 1958.

This is a useful compendium of all available data regarding the livestock population, various schemes on livestock development, centres of animal health service, staff position and national extension centres, in each one of the thirteen districts of the Madras State. The book is bound to serve as a ready reference book not only to Animal Husbandry workers, but also to politicians, members of Legislatures, Secretarial staff and other National Extension workers.

The book opens with figures for the entire State of Madras and then district-wise figures are given. These are again implemented with three illustrated maps for each district, showing the position with regard to Animal Health Service, Livestock Improvement work and Community Development work. The usefulness of the book would have been enhanced, if figures with regard to the industry in livestock and their products, have also been included. But perhaps, it is beyond the scope of the Animal Husbandry Department, as it exists to-day. As in the case of Agriculture, the marketing of livestock and their products should come under the legitimate sphere of work of the Animal Husbandry Department. Only then, one unit of service, will be responsible for the entire field of Animal Science and allied matters. The problems are all inter-allied and there will be a greater appreciation on the part of the staff, of every aspect of livestock development work in the State.

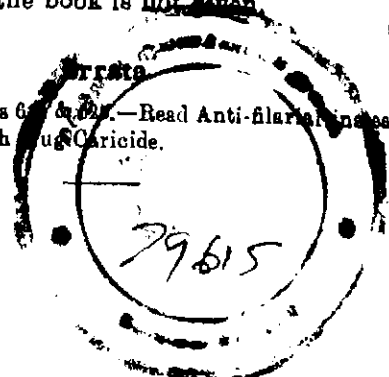
The statistics given in this remarkably compact book of 155 pages, perhaps lie buried in the archives of the Government and this book serves as an excellent 'show-case' as far as the Animal Husbandry Department is concerned.

The author has done a distinct piece of 'social service' to the community at large by placing all his cards on the table for their inspection and helpful criticism, if any.

There are some minor errors in printing here and there and these, we are sure, will be rectified in a subsequent edition. It is a Government publication and the cost of the book is not given.

T. V. M.

I.V.J. Vol. 35, No. 12, pages 6 & 7. — Read Anti-flarial instead of anti-flari-cidal occurring in connection with *Caricide*.



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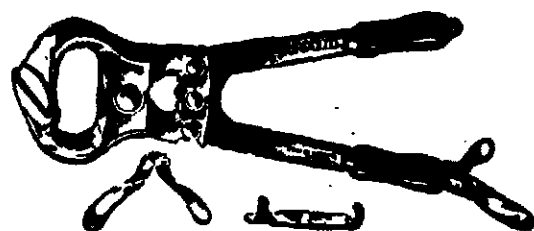
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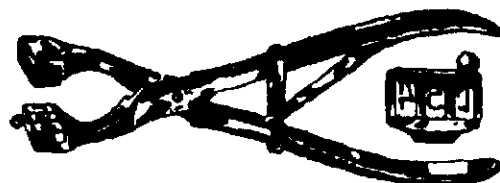
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