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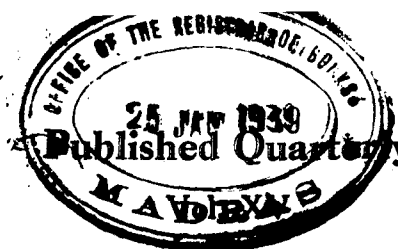
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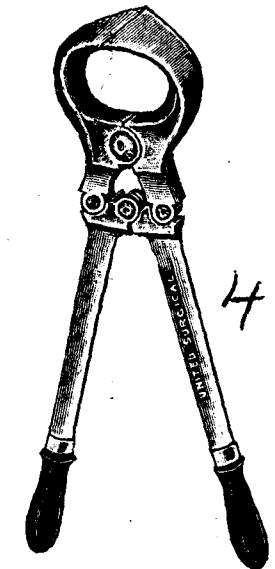
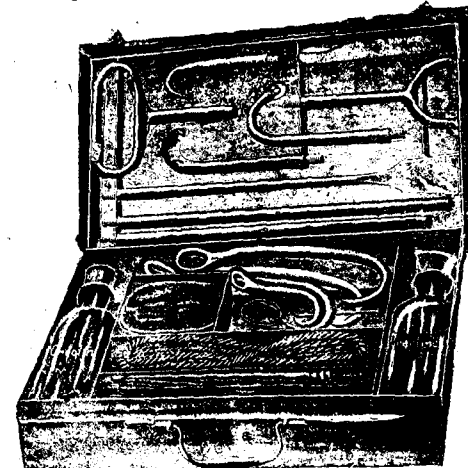
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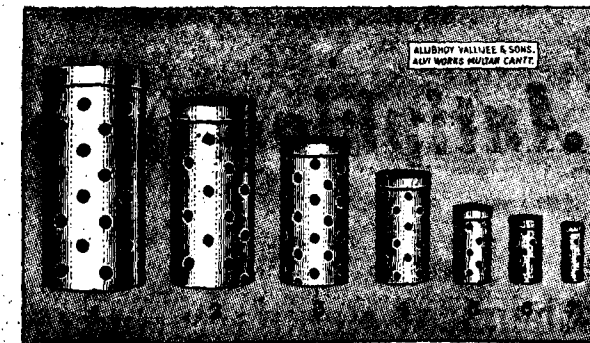


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Rai Sahib N. N. MAJUMDAR, G.B.V.C.,
Assistant Director, Civil Veterinary Department, Bengal
Who Retired on the 1st of July 1938.

THE
INDIAN VETERINARY JOURNAL

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JANUARY 1939.

No. 3.

General Articles.

**TO REVIEW THE POSITION OF BOVINE MASTITIS
IN INDIA, AND TO SUGGEST EFFECTIVE METHODS
FOR ITS DIAGNOSIS AND CONTROL.***

BY

CAPTAIN S. C. A. DATTA, B.Sc., M.R.C.V.S.,
Imperial Veterinary Research Institute, Muktesar.

Introduction.

IN addition to its natural function of supplying a sufficient quantity of milk for its own young, the mammary gland of domesticated milch animals is expected to provide considerable amounts for the use of man. In order that the Dairy Industry of a country may be a commercial success, it is essential that the mammary gland of its milch cattle be maintained in a state of complete health, and be capable of functioning at the highest possible pitch. Experience shows that as methods of selective breeding of the high yielding strains of dairy cattle are increasingly adopted the incidence of, and the liability to udder affections have become greater. The problem of udder diseases of the cow, goat and the ewe has therefore received attention for a long time in the foremost dairying countries of Europe and the predominant and widely distributed form of chronic streptococcal mastitis, in particular, has formed a major subject of research in England and elsewhere.

* Paper read at the Second Animal Husbandry Wing Meeting, 1936.

What with the serious economic losses suffered by dairy farmers, in having to maintain animals which have been rendered progressively uneconomical due to the partial or complete destruction of the functional tissue during one or more lactations, the deterioration of the quality of milk for nutritional purpose, the occurrence of epidemics of severe illness and even death among human subjects ingesting milk-borne infections of udder origin (Scarlatina, Sore throat, etc.), the subject of the milk supply to any given area—causes constant anxiety in public health work. The necessity for the universal adoption of measures for rapidly diagnosing and efficiently combating udder infections, and the justification for increasing the technical supervision of dairy cattle for detecting infections during the incubative period, have been stressed in a resolution passed by the last session of the World's Dairy Congress held in Rome-Milan in 1934, and other international bodies have given a place of precedence to the formidable udder complaints threatening the Dairy Industry. For the above reasons, and the remarkable fact that in this country the subject of mastitis of cattle and buffaloes does not appear to have been discussed at any previous meeting of this kind, it is considered opportune to bring it to your attention.

Existing Knowledge.

What is popularly known as *garget* refers obviously to diseased udders containing milk showing well-marked changes, but the comprehensive term *mastitis* includes all types of inflammation and disorders, irrespective of severity, and even cases where superficial and deep palpation fails to show any appreciable udder changes or where the milk may not reveal much abnormality, excepting what is disclosed by the use of special laboratory methods. Leaving aside secondary udder changes due to tuberculosis, anthrax, brucella or other infections and tumour formation, we must mention the specific and primary forms of mastitis, which are caused by species of streptococci (usually chronic), staphylococci (acute form often leading to gangrene), *E. coli*, affecting lactating glands, and Summer Mastitis caused by *B. pyogenes*, appearing in dry cows and maiden heifers. Besides these, rare cases of mastitis due to yeasts, ectinomyces, organisms belonging to *Bact. Lactis aerogenes* group, *Necrosis bacillus*

and *Pseudomonas aeruginosa* have been recorded from different countries. Of these different infections, streptococcal mastitis has formed the subject of numerous articles. A more or less general agreement has now been reached on the vexed question as to what constitute the characters of mastitis streptococci, whether streptococci of animal origin are distinct from human parasites, and whether saprophytic streptococci can assume a pathogenic role in the udder. The exact economic loss resulting from mastitis, believed to be very great in most countries, is now being estimated statistically by Minett and collaborators, who have dispelled confusion by effecting broad groupings of the udder parasites on serological and biochemical grounds, and by pointing out that while strains indistinguishable from the human types, *Strep. progenes* and *S. epidemicus* do occasionally produce bovine mastitis the Sorbite-positive strains (animal) seldom, if ever, affect man. Without going into detailed bacteriology recent knowledge on methods of infection and spread of disease must need be recounted. Although attempts have been made to question the pathogenicity of the bacterial exciting causes mentioned above, failures to infect the udder with massive doses of these organisms experimentally by oral, subcutaneous and intravenous administrations and in other ways have impressed workers repeatedly as to the presence of predisposing factors. The much blamed milking machines have been exonerated as a result of experiments in Germany, and it is apparent that if these machines are efficiently used they do not set up disease. Artificial infections have been produced by injecting numerous streptococci through the teat canal, but experiments on many cows in different stages of lactation have shown how extremely difficult it is for even highly virulent streptococci to gain entrance through the normal sphincters (Seeleman), though in the presence of a recent injury to the teat canal mastitis readily results. Researches show that overstocking, incomplete milking, wet milking, lack of carbohydrate diet, and overcrowding in the stall are potent predisposing factors. The incriminated cold floors and chills have under experimental conditions failed to lower the resistance of udder tissue. The difficulty generally experienced in producing infection artificially by means of the contaminated hands of

milkers, and in transmission experiments designed to approximate natural conditions, has been explained by the American workers, Jones and Little, experimentally by showing that the udder must first be sensitised to streptococci before the organisms can establish themselves. Mastitis has now been produced through infection of the bedding straw by Seeleman, and the commonest natural route of infection appears to be through the teat, but the occurrence of summer mastitis in heifers and dry cows remains unexplained, though the agency of insect vectors has been suggested. Explanation is also required as to why mastitis remains localised in one or two quarters even in prolonged infections, and it is believed that mastitis may result from an earlier infection in calfhood or a previous attack of metritis and retained placenta. Record exists of a Holstein-Galloway herd in which a cow, her daughter and a grand-daughter—all contracted mastitis but, as the observation could not be continued, a hereditary predisposition was not proved.

Position in India.

Turning to India, cases of mastitis of various kinds have no doubt been encountered from time to time, occurring either sporadically or in series. In the absence of any comprehensive Indian data regarding the various micro-organisms present in the secretions of the udder in cases of mastitis, it is not possible to attempt an indication of their relative incidence in different parts of the country. In the only reference available, Edwards (1928) makes the statement that inflammation of the udder is a very common disease among cows, including buffalo-cows, usually occurring sporadically (due to *Bacillus pyogenes*), though sometimes several cases may be seen in a herd, and that the most frequent predisposing cause is goring of the udder by other animals, which is especially frequent in buffaloes.

Coming to our own experience we have had the opportunity during the last 18 months or so of examining milk samples from over 20 cases of mastitis in the cow and the buffalo from the Punjab, Bombay, Jaipur, Central Provinces and also from the local dairy at this Institute. Hæmolytic and non-hæmolytic strains of *Staphylococcus aureus* have been recovered from the majority of cases and a highly hæmolytic coliform organism has been isolated

from several cases, whereas in two instances only a hæmolytic streptococcus has been cultivated. Of the cases encountered at Muktesar, it was observed that a mother and a daughter and two direct sisters were affected with mastitis at different times but a definite genetic predisposition was not clear. Again a number of first calf heifers have been found to carry their calf overtime, with marked œdema of the udder, while signs of a mild mastitis often accompanied with the passage of blood in the milk were exhibited at the time of parturition. The rush of blood to the udder preceding secretion of milk may have been very great in these cases and, as suggested in human medicine recently, the mechanism of endocrine balance between the ovarian hormones, and the lactogenic hormone, *prolactin* of the ant. pituitary, may have been disturbed to precipitate these acute attacks.

Diagnosis.

The recent advances in our knowledge upon mastitis, briefly reviewed above, have made diagnosis easier, particularly of suppressed and latent cases. The first desideratum is a complete survey of the herd to determine the presence and extent of the disease in the herd and in affected cows. Diagnosis is obvious in clinical cases, but in the more insidious cases special methods are required, such as systematic clinical inspection, detection of minute clots in the milk by straining samples through a black cloth or by the use of a dish with a blackened surface, by the use of yellow brom-cresol paper which turns purple with mastitis milk but grey with normal samples, and the use of special tubes for reading off the presence of excessive deposits in abnormal milk. In healthy cases the pH, chlorine, catalose and lactose values are very constant, but in the case of a deranged udder variations from the normal are present. Smears from milk deposit and cream reveal, on microscopic examination, numerous chained streptococci or *B. pyogenes*. Pooled samples from all quarters may be examined first, and in negative cases individual quarter samples may be tested. In the absence of positive results in a single examination, periodical tests are indicated. But the most reliable method appears to be cultural examination of the foremilk, after rejecting the first few jets. By the use of blood agar plates, a selective medium containing crystal violet and æsculin, or an

enrichment medium including 1 per cent glucose broth, valuable results are obtained. Field workers can forward samples of milk in one ounce bottles for the purpose of obtaining laboratory diagnosis.

Control.

Predisposing factors or pathogenic bacteria are not capable by themselves of producing the disease, but can do so in association only. While indications are that Group I Streptococcal infections are spread by milkers' hands and can be controlled efficiently by milking infected cows last, the procedure is not applicable to infections with other groups of streptococci (Minett). By segregation alone herds have been freed of streptococcal mastitis (agalactiosis) in England. The value of correct diagnosis is therefore obvious. Generally segregation is convenient; frequent, thorough and dry milking reduce chances of spread to healthy animals. Separate accommodation for heifers and infected cows lessens the risk of unsystematic milking, and cows with injured teats should immediately be separated. Prevention by relatively simple hygienic measures undoubtedly is better than attempts at problematical cures. No artificial or natural immunity has been demonstrated so far. Of the chemotherapeutic measures, Iodine therapy ("Selectan"), Rivanol and its derivatives, Trypaflavine, Entozon (Sodium baborate and dextrose), Azamine, and Turpentine (subcutaneously 8 c.c.) have produced apparently satisfactory recoveries. In the experience of Steck in Switzerland, Trypaflavine (0.1 to 0.15 in 1,000 c.c. of water) excelled in slightly altered udder secretions, and Entozon (0.4 in 1,000 c.c. of water) in completely pus-like secretions. Intermammary injections of crystal violet (1:10,000) may be tried, and for preventing summer mastitis a non-absorbable seal within the teat consisting of vaselin, paraffin and entozon has been successful. To inhibit lactation, already started, oestrin may be tried.

BABESIA BOVIS STARCOVICI, 1893, AS THE CAUSE OF RED-WATER IN AN INDIAN BUFFALO.*

BY

J. A. IDNANI, G.B.V.C.,

Imperial Veterinary Research Institute, Muktesar.

THE purpose of this article is to record, for the first time in India, the occurrence of *Babesia bovis* Starcovici, 1893, in the blood of a buffalo.

Bovine Red-water in this country implies the invasion of red cells of the blood with *Babesia bigemina* (Smith and Kilbourne, 1893) which is so widespread that indigenous cattle, being in a state of 'Carrier' immunity, generally bear the effects caused by this parasite with impunity.

Babesia bigemina, as it occurs in India, has always been observed to conform with the usual morphological picture ascribed to it in literature from other parts of the world. It is fairly large in size, the dimensions generally conforming with those described originally by Smith and Kilbourne (1893) and subsequently by other systematists (Wenyon, 1926), viz., 2 μ to 4 μ in length and 1.5 μ to 2 μ in width at the broadest part. It usually occurs in double pear-shaped forms which converge at their pointed ends forming a very acute angle, with the result that the bulbous ends lie fairly closely together. The parasite almost always occupies the centre of the red cell and consists of a cytoplasm easily stained with basic dyes, and of a fairly big chromatin mass staining deeply with acid dyes. It is not quite uncommon for one, specially in those cases where an active multiplication of the parasite is going on, to come across a number of red blood cells invaded by a variety of forms resulting from the amoeboid activities of the parasite. In such cases the form most commonly met with is that where the parasite is observed to be almost circular, the cytoplasm appearing to be condensed towards the periphery

*Reprinted from *The Indian Journal of Veterinary Science and Animal Husbandry*, Vol. VIII, Part 2, June 1938.

with quite a big clear central area. The clinical manifestations (fever, hæmoglobinuria) caused by the acute effects of the parasite can usually be relieved by one or two injections of a suitable dose of the dye, trypanblue, which is extensively employed against infection with *B. bigemina*.

Cattle in this country commonly harbour another variety of piroplasm, viz., *Theileria mutans*, which is of an even more widespread occurrence than *B. bigemina*. The morphological features of this parasite, however, are too familiar to give rise to any confusion between these two different families of Piroplasmidea.

History of the Case under Report.

The parasite which is the subject of the present article was encountered in the blood smears from an indigenous buffalo, Sita, of the Military Dairy Farm, Belgaum, which were forwarded to this Institute on 7th August, 1936, for microscopical examination with the following history :—

The animal was found to be ailing on the 4th August with a temperature of 104° F. On the following day its temperature rose to 105° F. in the morning, and to 105·2° F. in the evening. The next day (*i.e.*, on 6th August), the animal is said to have passed 'blood' in the urine (hæmoglobinuria?) and to have showed a further rise in temperature to 105·6° F. One hundred and twenty cubic centimetres of a one-per cent solution of trypanblue were administered intravenously on that day at 11 A.M. At noon the temperature further rose to 106·2° F., but dropped to 103·4° F. in the evening. Another injection of 100 c.c. of one-per cent trypanblue solution was given on the subsequent day in the same manner, as the temperature again rose to 105·2° F. It was on this day that blood films were made and sent to this Institute for diagnosis.

Description of the Parasite and Diagnosis.

The smears, on microscopic examination after staining with Giemsa, presented marked anæmic changes in the shape of anisocytosis, poikilocytosis and punctate basophilia. About twenty-five per cent of the red cells were found to have been invaded by an unusually small and slender parasite. The parasite was observed, on merits of its morphological features, to fall under the generic

head *Babesia*. The criteria which led to its differentiation from *B. bigemina* were as follows:—

(1) *The Very Small Size of the Parasite.*—Its longest diameter ranged between 0.5 μ in the smallest individuals and 2 μ in the biggest parasites. Similar dimensions for *B. bigemina* as stated above are 2 μ to 4 μ .

(2) *The Arrangement of the Double Pears.*—The twin parasites, when they occurred in pairs, were observed to be widely divergent at their blunt extremities, so much so that in some cases they appeared to lie in one straight line. Such an arrangement is extremely rare with *B. bigemina*.

(3) *The Position of the Parasite in the Red Cell.*—It was observed that the parasite had a remarkable tendency to lie towards the periphery of the invaded cells. It has already been stated that *B. bigemina*, as a rule, occupies the centre of the cell. Further, two injections of trypanblue failed to bring about ameliorations of the infection. All these factors, taken into consideration together, left no doubt about the parasite concerned being a species different from *B. bigemina*, and resembling the parasite (*Babesia bovis*) described by MacFadyean and Stockman (1911) as *Babesia divergens*. The writer's diagnosis was confirmed by Mr. F. Ware, Director, and later by Dr. H. N. Ray, Systemetic Protozoologist at this Institute, both of whom possess personal acquaintance with *Babesia bovis* as it occurs in English cattle. It is worthy of note that the buffalo in question was housed alongside some European cattle at the Belgaum Dairy Farm.

It may be mentioned that an attempt was made to transmit the disease in buffaloes and hill bulls with the blood obtained from the infected buffalo but this failed. This failure may be attributed to the hæmolysed and decomposed state in which the sample of infective blood employed in the transmission experiment was received.

The annexed *camera lucida* drawing (Plate XVIII) represents the morphological characters of most of the *Babesia* parasites as seen in the blood smears from the Belgaum buffalo.

Summary.

(1) *Babesia bigemina* has been the only parasite so far known to cause bovine red-water in India.

(2) The paper records the occurrence in an indigenous buffalo, of another species of *Babesia*.

(3) The parasite is observed to be different from *Babesia bigemina*, but resembling *Babesia bovis*.

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SOME OBSERVATIONS ON THE INCIDENCE AND INHERITANCE OF IMPERFORATE ANUS IN GANJAM CALVES.*

BY

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Introduction.

THE importance of the existence of lethal and sub-lethal factors in the economy of live-stock breeding deserves to be widely recognised. Numerous hereditary defects as a result of the above factors have been recorded among live-stock. The incidence of such lethal factors results in the death of the individual some time between conception and a few days after birth.

Crew (1924) has given a detailed description of the condition (*Achondroplasia congenita*) or what is popularly known as the "Bulldog" calf of the Dexter breed of cattle which results in the birth of about twenty-five per cent of calves in a dead condition and with a monstrous appearance, their heads, limbs and vertebral columns being much foreshortened. Similar lethal factors operating in certain strains of the Scandinavian Telemark breed have been studied by Wriedt and Mohr (1925-26).

A lethal factor giving the calf the appearance of being devoid of skin and hair particularly on the muzzle and feet has been discovered by Hadley and Warwick (1927). A lethal factor causing the large intestine to be completely cut off in the region of pelvic fixture of certain foals in Japan (*Atresia coli*) has been described by Yamane (1925 and 1927).

Various other hereditary defects, lethal or sub-lethal in character, have been recorded by a host of workers in live-stock breeding—Loje (1930) in Red Danish cattle; Roberts (1926 and 1929) in Welsh mountain sheep; Mohr (1929) in pigs; Kislovsky (1928) in rabbits, etc.

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Imperforate Anus.

A review of the literature on the numerous abnormalities in cattle reveals that the incidence of imperforate anus is one of rare occurrence. Kinzelbach (1932) has recorded its incidence in pigs of the "Swabian Halle breed". Although they are isolated records of this abnormality in other places, its occurrence *in extenso* has been found only in the Ganjam Tract which now forms a part of the new Orissa Province.

In the administration reports of the Civil Veterinary Department, Madras, mention is made of the prevalence of this abnormality in the Ganjam District and of the operations carried out. In the following paragraphs, a record is made of the observations of the author which came to his notice in 1936-37 when he was in charge of the Veterinary Hospital at Berhampur (Ganjam District).

Observations.

In the year 1936-37, 105 cases of imperforate anus were recorded. Of these, thirty-three were first calvings, twenty-one second, twenty-seven third, and twenty-four fourth calvings. The enquiry further elicited that in the case of cows which calved second, third or the fourth time, the preceding calves were normal. Thus it is obvious that most of the calves are produced in a normal condition and therefore the character of 'perforate anus' appears to be a dominant one.

The ryots of this tract, in cases of this abnormality, normally pierce the anus with a pointed red-hot iron and artificially create a faecal outlet. When veterinary aid is available, a surgical operation is performed. Most of the treated cases have been reported not to thrive well, but lead a lingering existence often resulting in early death. There is no authentic record to show that operated calves survive long enough to reach maturity. The possibility of utilising the recessive character 'imperforate' in crossing experiments may, therefore, be ruled out.

Accurate progeny records would be of great use in analysing the mode of inheritance of this interesting and widely prevalent

character. It seems to the writer that a fair percentage of the cattle population of the tract may be tainted in this respect. Of the 105 cases, seventy-two were bull calves and thirty-three heifer calves. The higher incidence of this normality in bull calves is noteworthy and whether this is merely a chance or a phenomenon of normal occurrence remain to be ascertained.

Certain abnormalities such as congenital scrotol hernia, a small extra appendage of the skin just above or below the anal region, absence of prepuce in bull calves and hermaphroditism are found to be associated with some of the cases having imperforate anus.

Many of the breeding bulls and some of the cows in the tract have also been noted to possess the extra appendage of the skin in any part of the vertebral region; but the writer has not observed this near about the anal region as is found in some of the calves having imperforate anus.

It cannot be definitely stated whether the progeny of cattle having extra appendage of the skin in the vertebral region always exhibit greater incidence of imperforate anus and this is one of the questions, which requires to be pursued.

The fact seems to be that, in the opinion of the ryots, the extra appendage of the skin present in a bull enhances the breeding bull appearance of the animal and the possibility of a lurking danger in perpetuating this abnormality (imperforate anus) does not appear to be realised.

Conclusions.

It is obvious that the ultimate remedy lies in the elimination of this character from the Ganjam stock and the study of inheritance of this character is a necessary preliminary.

Acknowledgment.

The observations made and recorded in this note are due to the incentive derived from the lectures of Professor William C. Miller, M.R.C.V.S., F.R.S.E., at the Institute of Animal Genetics, Edinburgh University, while working under him and the author's thanks are due to him.

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ANIMAL DISEASES IN RELATION TO THE ECONOMY OF MAN, AND INDIA.*

BY

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"For that which befallerth the sons of men befallerth beasts; even one thing befallerth them: as the one dieth, so dieth the other; yea, they have all one breath. . . ."
—SOLOMON (970-933 B.C.).

The Evolution of the Conception of Disease.

THE significance and truth of these philosophical words of generalisation regarding life and death of man and his animals could scarcely have been appreciated in the days of Solomon the wise. Science as we know it to-day did not exist, but it is obvious that the instinct of self-preservation and the longing to relieve suffering in fellowmen had been there, and that the intriguing problem of disease (pain, suffering) causation had started to engross the human intellect. The pestilential calamities that befell men were sufficiently dreadful, and their animal possessions, providing several essential services, were being swept away equally ruthlessly. Diseases of man and animals alike thus came to be looked upon as supernatural visitations, meted out as punishment by invisible gods, demons or spirits of the dead, or as even caused by the 'evil eye'. Invocation of the benign, and the propitiation of the malign influences with the aid of amulets, charms, incantations and sacrifices were practised as remedial measures. These notions were not by any means characteristic of any one country.

Then came the Father of Greek Medicine, Hippocrates, born about 460 B.C. He deserves credit for recognising for the first time that diseases are only processes of Nature, and that there is nothing divine or supernatural in them. He declared that the body of man in health contains four fluids or humours—blood, phlegm, yellow bile and black bile—in proper proportion and mixture; sickness is produced when one of these fluids is either

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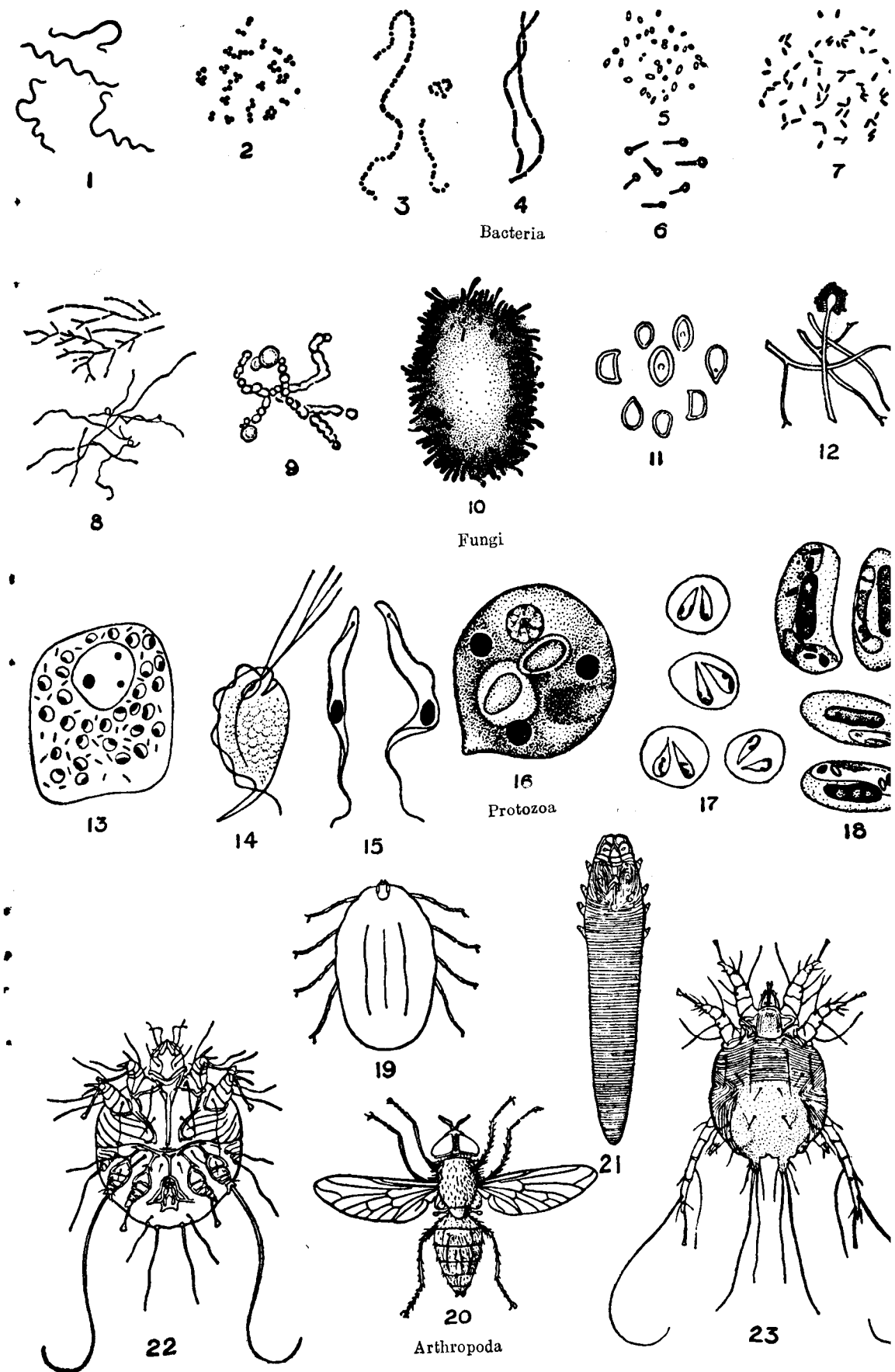
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increased or decreased and is no longer properly mingled with the other. Nearly two thousand years later Paracelsus urged an impartial observation of Nature as the fountain of knowledge, in place of blind belief, and with the appreciation by Morgagni of what organic alterations in the structure of the body (lesions) co-existed most frequently with changes in the bodily functions (symptoms) under the general law of cause and effect, scientific medicine was born. Bichat made the discovery that organs consisted of general and special tissues and that, corresponding to these, diseases produced general and special tissue changes, and this was the inception of pathological histology (systematic study of the minute structural or morphological elements characterising each disease).

The greatest advance of this early period was, however, yet to be made by Virchow by demonstrating the full significance and the mechanism of cell activity. He showed that there is no essential difference in the laws that govern health and disease. Physiological (health) and pathological (disease) processes differ only in relation to stimuli to cells, for abnormal stimuli lead to exaggerated responses and more lasting disturbances in cell-life. He showed that pathological lesions are therefore only gross anatomical (structural) expressions of disproportions in the relative values of stimuli and cell reactions. This contribution on cellular pathology gave the right direction to the concept of disease in its progressive evolution through the ages, and in addition has had the important bearings upon all biological sciences of to-day.

In this manner, was medicine of man and animals born almost contemporaneously of the common parentage of credulity and empiricism, and nurtured together with the milk of rationalism through the difficult years of early childhood, full of trials and errors. In surveying the progress of the healing science through the later stages of youth and adulthood, one observes the pioneers approaching the problem of disease of the human race or animal species as a single study.

The early and subsequent knowledge of anatomy, physiology and disease processes of man was largely obtained with the aid of studies upon animals, and in this connection it is of interest to



SOME CHRONIC DISEASES OF ANIMALS IN INDIA



(By the courtesy of the I.C.A.R.)

note that the earliest anatomical model known is a clay model of a sheep's liver in Babylonia dated 2000 B.C., and the earliest recorded surgical operation is the trephining (perforating the skull) of sheep for staggers. With the commencement of specialisation in individual branches this broad perspective was lost for a time and the human physicians suffered unmistakably from the depressing influence of isolation. Any pioneering work, whether on microscopy by Leeuwenhoek, or that on bacteriology and immunology by Pasteur, or Lister's work on antisepsis, or similar advances, being applicable equally to man and animals, established the essential unity of medicine. Principles of general pathology thus emerged, providing a clear insight into the complex mechanism by which predisposing factors and exciting causes of disease interfered with the normal structure and function of living tissues (disease), and as to how factors founded in the organisation of an individual reacted to external organised agents, whether animal or vegetable parasites. An organism which derives its nourishment from the tissues of its host is a parasite, and different classes of disease agents, bacteria, fungi, protozoa (smallest and single-celled animals) and arthropods (members of the animal kingdom with segmented body and jointed limbs) are illustrated in Plate XIX. All bacteria, fungi or insects are not harmful, and it is remarkable that some of them affect particular animal species only to the exclusion of others, e.g., anthrax resistance possessed by poultry, glanders in equines but not in cattle, and rinderpest in cattle but not in horses. Regarding arthropods, some can set up disease by themselves (Plate XIX, Figs. 21-23), others act either as mechanical transmitters of parasites or may even provide favourable ground for the cyclical development of the parasite concerned (Plate XIX, Figs. 19 and 20). While the abovementioned disease agents can be seen under the microscope, there is yet another important group—viruses—which are capable of setting up disease in healthy animals without being visible under the highest powers of the microscope. Their exact nature is not yet clearly known but the largest of the viruses have been seen in microphotographic preparations. The work on animal viruses has thrown considerable light on some of the baffling problems of this group. In the study of cancer, transmissible growths of animals have opened up

a new line of approach, and the current hypothesis that the so-called gin-drinker's liver (cirrhotic) of man was the result of alcoholism receives no support from the finding in old animals of similarly affected livers. Against Robert Koch's memorable work on anthrax, common to man and animals, did not only reveal for the first time, a specific microbe as the cause of a disease, but what is more important, certain general principles of wide applicability as a new method of approach for ascertaining if any suspected micro-organism is the cause of a disease, emerged, and are now known as Koch's postulates. These postulates require the constant finding of the microbe in diseased tissue, its isolation in pure culture therefrom, production of the disease artificially in healthy animals with the culture and then recovery of the organism from the experimentally infected animals.

The above remarks have been made to illustrate how with the elaboration of a new method of research, or with the acquisition of any new knowledge, our everyday armoury against the numerous harbingers of destruction (pathogens), whether affecting man or animals, has been equally strengthened. To take one or two instances, one remembers how nutritional diseases of animals (Plate XX Figs. 12 and 13, rickets in a dog and osteoporosis in a horse) have been studied by Mellanby and others to solve the problem of similar diseases in man. Again in the comparatively new branch, protozoology, the demonstration by workers in the veterinary field that certain infectious diseases can be carried from animal to man only through certain insects acting as intermediary agents (Plate XIX Figs. 19 and 20) has had even more far-reaching effect in the elucidation and control of some of the most dreaded of human scourges like sleeping sickness, malaria or yellow fever. The specific instances referred to are: Theobald Smith and Kilborne in 1893 showed that Texas fever of cattle was a tick-transmitted piroplasmiasis, and Bruce showed the transmissibility of trypanosomiasis of domestic stock through *Glossina* flies, while Ronald Ross's discovery of the transmission of bird malaria through *Culex* mosquitoes led to the discovery of the role of anopheline mosquitoes in human malaria. Did not the celebrated biologist John Hunter say that in the course of a variety of experiments on

animals and vegetables he had frequently observed that the results of experiments in the one explained the economy of the other and pointed out some principle common to both? It appears that the demonstration of the nature of the virus causing mosaic disease of tobacco plants as a crystalline protein has already led to the finding of at least one animal virus, that relating to Shope rabbit papilloma to be a heavy protein, and it is not unlikely that the precise nature of the viruses of animal and human diseases will be revealed along the line indicated by plant pathology. Disease processes in man and animals have thus been mutually elucidative by throwing cross lights and analogies, and difficulties and obstacles in the understanding of the conditions, which previously appeared to be insuperable, have repeatedly been surmounted with the aid of the comparative method of studies, thanks to the work of Theobald Smith, Manson and Osler in this connection.

Importance of Animal Diseases.

In the days of the primitive herdsman and since, animals have been reared and maintained primarily from the utilitarian aspect. Animals have provided meat and milk for human sustenance, clothing for protection, and motive power for tilling land and transporting produce, besides supplying fertilisers and even therapeutic agents. (In China and Egypt organotherapy was practised in ancient times.) With the progress of time and civilisation, this utilitarian aspect has extended enormously, and one finds that animals or animal products are being put to many new uses in commerce and industry. Like other aspects of animal husbandry the study of animal diseases has therefore come to occupy the status of a major problem of human welfare. To recount the reasons briefly:—

(a) The mutually interdependent relationship that medicine of the lower creation bears to that of the human species, and the extent to which animal experiments and the analogies provided by animal disease have influenced the progress of human medicine in the past have been already mentioned. Of equally far-reaching importance has been the elaboration from animals of more and more of biological products of advanced efficiency for the relief of

myriad human ills, *e.g.*, calf lymph vaccine against smallpox, horse serum for diphtheria, tetanus, streptococcal infection and hæmorrhage, rabbits and sheep brain vaccine for hydrophobia, etc. Further, such valuable gland products of animals as pepsin, insulin, adrenalin, pituitrin and prolan are of constant use in human therapeutics. Besides, the standardisation of the doses and potency of the preventive sera and vaccines has also been achieved by animal tests. A novel method of controlling the serious blood-fluke disease of man in the Far East and Egypt (schistosomiasis) has been by the rearing of ducks and geese.

(b) Animal husbandry by itself, and along with arable agriculture, has served as the means of livelihood to an increasing number of people, or as a healthy diversion to many. It requires to be protected from the danger and loss attendant upon the onset of animal diseases, as otherwise the whole structure of agriculture is undermined. Further exact information is available to show that with modern methods of feeding, hygiene and general herd management, not only can a reduction in the incidence of animal diseases be achieved, but a shaky agriculture can be made to see prosperity.

The exact monetary value of losses inflicted at present by animal diseases on agriculture and animal industry has not been calculated recently. In Plate XX illustrations of some chronic diseases of animals of this country have been given, and epizootic diseases like rinderpest, hæmorrhagic septicæmia, blackquarter, etc., are still taking heavy toll. The cattle population has increased, and the prices of live-stock have gone up considerably since 1892 when Burke made the statement: "It has been estimated after the most careful investigation, that the annual money loss to India alone from preventible contagious disease among agricultural animals, cannot be less than £6,000,000 sterling." As a concrete instance—it may be mentioned that as a result of one disease alone—the Warble fly infection, the depreciation in the value of hides in this country has been estimated to be 1·5 crores of rupees annually. These figures indicate the magnitude of the problem of animal diseases in this poor country. Nor is this the total extent of the loss.

At one time, India used to enjoy a substantially large export trade in live-stock. Year after year this trade dwindles since the importing countries, one after another, have refused to run the risk of re-introducing diseases, which they have already eradicated from their respective countries, while the epizootic diseases continue within the Indian continent. The loss sustained by India may be appreciated from the figures of two successive years, for instance, the return from export trade in live-stock and live-stock products in 1933-34 was 13·2 crores of rupees, while in the following year the figure was only 12·1 crores. In considering these figures, one must remember this rapid and large fall in live-stock export has taken place notwithstanding the fact that Indian cattle have been found to be very suitable for rearing in different parts of the world, *viz.*, Zebu cattle in Australia and British Guiana, Krishna Valley cattle in Dar-es-Salaam, and Indian buffaloes in Tanganyika. Further a well-known expert who has surveyed the subject of animal breeding in the British Empire, has rightly pointed out the prospect before India. To quote his own words: "If animal breeding in the tropical Empire followed a more closely unified policy and there were greater contacts between India and the Colonies, it should be possible for India to be the stud farm of the 'Tropics.'" In order that India may avail of the large and potential overseas market that awaits her, as a means of regaining the economic prosperity of her people, she must put her own house in order, and no longer lag behind the world developments pertaining to the campaign against animal plagues. In a country like ours, which maintains the largest live-stock population in the world, and where the annual cash value of live-stock and products has been estimated at 2,000 crores of rupees, the necessity of concentrated attention being devoted to live-stock diseases is obvious.

(c) Besides forming the wealth of the nation, animals are to a great extent connected with the health of the community. How profoundly the progress of medical research has been influenced by the study of animals and their disease has been surveyed already. It remains now to emphasise that the bearing of animals as reservoirs of infection for man, and the transmissibility of animal

disease to man either directly or by handling or consuming animal foods have presented a public health problem of no mean magnitude. The part that live-stock play in determining the health of the people may be considered in two parts: (i) nutrition and (ii) disease.

Firstly, foodstuffs of animal origin are indispensable for the maintenance of health and physical development of men, for foods of plant origin do not supply proteins of such high nutritive value. In India, milk, ghee and other dairy products have even a greater importance as essential constituents of a complete dietary, than in other countries, particularly as a considerable proportion of Indians are non-meat-eaters and live on an exclusively vegetarian diet. Moreover, milk contains growth-promoting factors and accessory principles, like vitamins and mineral salts, which consolidate the resistive powers of the bodily system against diseases. The importance of milk as an essential food, producing an all-round well-being of man, is being increasingly realised all over the world, and concerted action is being taken to increase the average consumption of milk *per capita* by various methods, including the lowering of the price of the commodity in relation to the purchasing power of individuals. It may be noted here that one of the main findings of the Advisory Committee on Nutrition in the British Isles runs thus: "From the health standpoint there is no other single measure which would do more to improve the health, development and resistance to disease of the rising generation than a largely increased consumption of safe milk by mothers, children and adolescents." Similarly meat and eggs form a very important part of the human dietary, as they are comparatively easily digestible, and supply in small bulk considerable amounts of nutritive and body-building materials, being particularly beneficial to invalids and convalescents. The necessity of foodstuffs of animal origin as a means of securing and ensuring human health is obvious, and the production of safe animal food is quite within human power.

Turning to the other aspect of public health, *viz.*, that relating to animal diseases communicable to man, one finds frequent reports

of the occurrence of outbreaks among human beings, in some of which very drastic results followed. Evidence exists of several cases, where the peculiar and novel features of animal diseases as exhibited in human beings could not be appreciated till collaboration or helpful suggestion of the veterinarian dealing with the disease entity as affecting his animals came forth.

Diseases Communicable to Man.

Of the many communicable diseases whose only source is one or other species of animal, the most important would appear to be glanders, anthrax, rabies, foot-and-mouth disease and certain forms of tuberculosis. This statement is tantamount to saying that if these diseases could be eradicated completely from the live-stock, the infection in human beings would automatically cease, and mankind would be relieved from the ravages of so many terrifying maladies. Again there are a number of diseases, the causative parasites of which require an animal host in order to complete their life-cycle before becoming infective to man. For example, *Echinococcus*, *Trichina spiralis* of the pig, the parasites of measly beef and measly pork (*Cysticercus cellulosæ*, the larval stage of *Tænia solium*, and *Cysticercus bovis*, the larval stage of *Tænia saginata* of man). In these parasitic diseases as well, control of disease in animals will necessarily produce the disappearance of the human conditions. A somewhat comprehensive list of disease of animals and man transmissible by direct contact with animals or through the agency of animal foods has been given below for reference. It will not be necessary for the purpose of the article to consider more than briefly some of the typical diseases from the list.

Rabies.—As one of the most dreadful scourges of man, and as one which necessitates the maintenance of several Pasteur institutes and anti-rabic treatment centres, thereby causing a heavy drain on the Indian Exchequer, rabies stands pre-eminent. If the treatment of hydrophobia, as the human affection is called, be not undertaken early, and the symptoms have had time to develop, a most painful death is the invariable result. The disease has been known for over 2,000 years, and its transmissibility to

man and animals through the bite of a rabid dog has been recognised since the days of Aristotle (322 B.C.), but appropriate measures for the eradication of the disease have unfortunately not been adopted in many countries including our own. That the disease can be completely eradicated by stringent quarantine measures against newly imported dogs, together with muzzling order and the destruction of stray dogs, has been amply demonstrated by certain progressive countries, where adequate vigilance over this disease has been maintained.

The disease is caused by a virus, which is discharged in all the natural excretions from a rabid animal. The fact that the virus is present in the saliva at least a fortnight before the development of any symptoms makes the disease highly dangerous. The topographical peculiarities of the Indian continent, notably the absence of natural barriers between one province and another, provide a particularly favourable field for the spread of the disease. The Pasteur method of anti-rabic vaccination stands out as one of the monuments of research, and has minimised substantially the rate of mortality from this disease. If appropriate measures for the suppression of the disease in dogs, the natural reservoirs, are systematically adopted, humanity will be saved from the risks of one of the most excruciating forms of death, and it is of paramount importance that a wide recognition of the well-known facts in this connection is brought about.

Glanders.—An equally malignant disease but of a slower course is glanders. Though mainly of equines, it is communicable to man by the discharge from the nose, eyes and skin of the diseased horses and mules. The causative organism is a bacillus (rod-shaped bacteria) with rounded ends, which finds its way into susceptible hosts through some trifling scratch or abrasion or, as generally happens, through the oral route. Notwithstanding all the scientific advancements of to-day, this is one of those diseases for which no satisfactory palliative or curative drugs have been evolved. As far as India is concerned, one may mention here that the life of one of the most promising research workers of this country—Shilston's—was nipped in the bud as a result of glanders contracted at Muktesar, and that another worker manifested

great presence of mind and fortitude in maintaining complete records of the disease in himself.

Efficient methods for the diagnosis of the disease exist. Certain countries have already got rid of the disease, and those countries, where requisite measures for its eradication have not been adopted, are standing menaces not only to themselves but to others.

Anthrax.—This disease has a world-wide distribution and affects animals of all species, but the chief sufferers appear to be cattle and sheep. The causative organism is one of the largest bacillus known, and although it had been seen earlier the pathogenic significance of the organism was established by Robert Koch in 1876. When in the blood, several organisms are found attached to each other end to end (Plate XIX, Fig. 4), a very well-marked capsule characterises the organism, and this fact is of value in making rapid diagnosis with blood smears made soon after death. Since the anthrax bacilli rapidly multiply in the blood-stream, and are readily disseminated throughout the body, a rapidly fatal septicæmic (blood poisoning) condition is produced, and the affected animals often do not develop any symptoms before their sudden death.

The affection is primarily one of animals but human beings are affected directly or indirectly from infective materials of animal origin. The fact that the anthrax organism readily assumes the most resistant sporulating forms, whenever it has access to a free supply of oxygen, makes the control of the disease a difficult matter. Since the carcasses may be opened without the least suspicion of the disease being present and because blood or discharges from diseased animals may be spilt, spreading the infective principle to such places as may not readily attract notice, the difficulty of control is further accentuated. If the carcass be not allowed to be opened and is suitably disposed of, the sporulation of the bacilli is obviated. The bacilli can multiply in the surface soil, and the infection generally spreads from animal products such as hides and wool, or even from feeding stuffs containing anthrax spores. Anthrax may also be carried in the

drinking water and, if diseased carcasses are not incinerated, or buried deep enough, the bacterial spores may be brought to surface soil by earth-worms. It is believed that occasionally biting flies also transmit the disease, for an authority has found the infective spores present in the flies for about twenty days.

In man the disease usually takes a cutaneous form, and one or more carbuncles (malignant pustule) may develop on the head, neck or upper extremities. When the dried spores are inhaled with impure air, the lungs are affected and what is called "Wool-sorter's disease" is produced. Through the ingestion of improperly cooked meat an intestinal form of the disease may also be set up. The disease is largely an occupational malady, being contracted by people engaged in industrial concerns dealing with hair, wool or leather, but anthrax contracted from shaving brushes has also repeatedly occurred.

From the above remarks it will be clear that the human affection can be prevented and controlled by arranging to eradicate the condition in animals. By complete disinfection of animal products used in industry, and by timely use of preventive antisera and vaccines, the disease can be controlled.

Foot-and-Mouth Disease.—As the name indicates this disease is characterised by the occurrence of foot and mouth lesions, not necessarily in the same animal and simultaneously. Eruptive blisters arise on the mucous membrane of the mouth, and at the junction of the skin and digits in cloven-footed animals. Most animals are susceptible, including guinea-pigs, and human beings are also affected. The cause of the disease is a virus capable of passing through fine clay filters, which would hold back all ordinary bacteria. The virus of this disease has the distinction of being the first one among human and animal viruses, to be shown to be filtrable. This would appear to be one of the most contagious of animal diseases, and may be carried by infected litter, human clothes or water. The disease is enzootic (prevalent or regularly found) in India, and although the mortality may not be high, the affected animals are rendered unproductive for long periods. Infection by direct contact with infected animals also takes place.

In man, the disease is usually caused by the ingestion of infected milk products, and though mortality is rare in adults, drastic results in children have been seen, fever and vesicular eruptions in the mouth, and even an intestinal catarrh may be produced. The disease may be eradicated by the wholesale destruction of infected and in-contact animals, but it is such an expensive procedure that few countries can undertake to do so.

Pasteurisation of milk is an effective safeguard against the human infection, but for those, who come in contact with infected animals, particular attention to personal hygiene should certainly be paid.

Tuberculosis.—This specific contagious disease of man, animals and birds has been known to the Hindus of the *Veda* in the 15th century B.C. and also to the Parsees of the same time.* The disease receives its name from the word tubercle, meaning a nodule, and is caused by a highly resistant rod-shaped germ. In ordinary parlance, the human disease is called consumption, and when the lungs are affected, phthisis. That human beings can contract the disease by eating diseased meat has been recognised since the promulgation of the Mosaic law. With the congregation of human beings into social groups, and the crowding of animals, in cities and zoological gardens, the incidence of the disease has largely increased as one of the penalties of civilisation.

The transmissibility of the disease, and its essential unity as affecting man and the lower creation was established by the celebrated Frenchman Villemin in 1865. That rabbits inoculated with material from diseased cattle developed a more rapid and severe infection than when subjected to infective materials from human cases was a very noteworthy observation made by him. Seventeen years later, the specific bacilli (Plate XIX, Fig. 7) of the disease were recovered by the great German, Robert Koch. Later workers discovered some differential features in the strains of the organism responsible for the human, bovine and avian disease.

* Since this article went to press Krishnaswami Iyer has produced extracts from the ancient Hindu treatise, *Hastayurveda*, or Elephantology, dating back to the period of the *Ramayana* epic, relating to tuberculosis in elephants (*Agric. and Live-stock in Ind.*, 7, 722-23).

It is possible by a study of these features and from other facts which have emerged since, to determine whether the infection in an individual has originated from either one source or other. The disease is widely spread to-day all over the world, and as far as men and animals in this country are concerned, the disease exists not only in cities and towns but has reached the interior as well. The public health problem connected with the disease has consequently become an enormous one, and sanatoria for tuberculous patients have become a vital necessity. Preventive measures of this kind have not so generally been adopted in this country though the urgency of intensifying combative measures against tuberculosis to meet the requirements of the situation has been repeatedly urged by both medical and veterinary workers in this country.

Regarding the veterinary aspect in India, numerous cases of the disease have now been detected among animals of all species, and the organisms isolated from the natural bovine lesions have been found to be as virulent as those in other countries. Further evidence exists to show that after the introduction of infection in crowded dairy farms a high incidence of clinical tuberculosis may develop. The usual mode of life of the stock in this country, which is largely in the open air, accounts for the relatively low incidence of the disease so far. Recent statistics have, however, revealed as many as 21·3 per cent cows, 23·6 per cent buffaloes, and 31·6 per cent bullocks as affected with gross lesions. These statistics probably do not apply throughout the country, but the record of a number of definite cases of tuberculosis of the udder in milch animals including buffaloes and cows, and the demonstration of the occurrence of the specific bacilli in milk are sufficient to indicate the risk of infection to man from milk, that already exists. In a few human cases the disease has been traced to bovine infection, and it appears that one of the probable reasons why human cases of bovine origin are not more frequent is due to the practice of milk being thoroughly boiled before drinking.

A few cases of naturally acquired tuberculosis in cows caused by the human strain of the bacillus have also been recorded. The diagnosis of the disease presents no difficulty in advanced stages

and in the pre-clinical stages the use of the tuberculin test is of value. A general tuberculin testing of all cattle in selected farms should be carried out at regular intervals, followed by the elimination of reactors. The isolation of reactors and building up and maintaining of herds free from tuberculosis has been successfully tried in some countries, notably Denmark, and the same will have to be carried out in this country, where slaughter of cattle cannot generally be recommended. Promising results with methods of preventive vaccination have been obtained abroad but this work still remains to be undertaken here.

In view of the existing experience that when this disease is introduced into an area, which had previously been altogether free from it, the disease spreads rapidly and assumes a very severe form, it needs to be emphasised that parts of India are still relatively free from the disease, and if untold misery and death are to be prevented, more than ordinary attention deserves to be paid to anti-tuberculosis measures in India, which forms a somewhat virgin field for the disease.

Cow-pox.—Pocks or Variola are a group of eruptive fevers affecting different animals and are caused by viruses. Cow-pox and smallpox of man appear to be closely related as they are transmissible to man and bovines respectively. Contrary to the other animal diseases communicable to man, which are invariably detrimental, the transmissibility of cow-pox (*Variola vaccinia* so-called) to man has been a great boon in alleviating human suffering and in preventing death from smallpox. The occurrence of smallpox in man dates from antiquity, and a rough and ready method of preventive vaccination (the word "vaccination" has originated from *Variola vaccinia*, meaning cow-pox) though somewhat risky was practised by the Chinese as early as the third century B.C., and the method appears to have originated in India even earlier. Experience existed among milkmaids that if they passed through an attack of the mild cow-pox contracted during milking the udders of affected cows, they were resistant to smallpox. The present day method of smallpox vaccination with the use of calf-lymph was perfected by Edward Jenner in 1796,

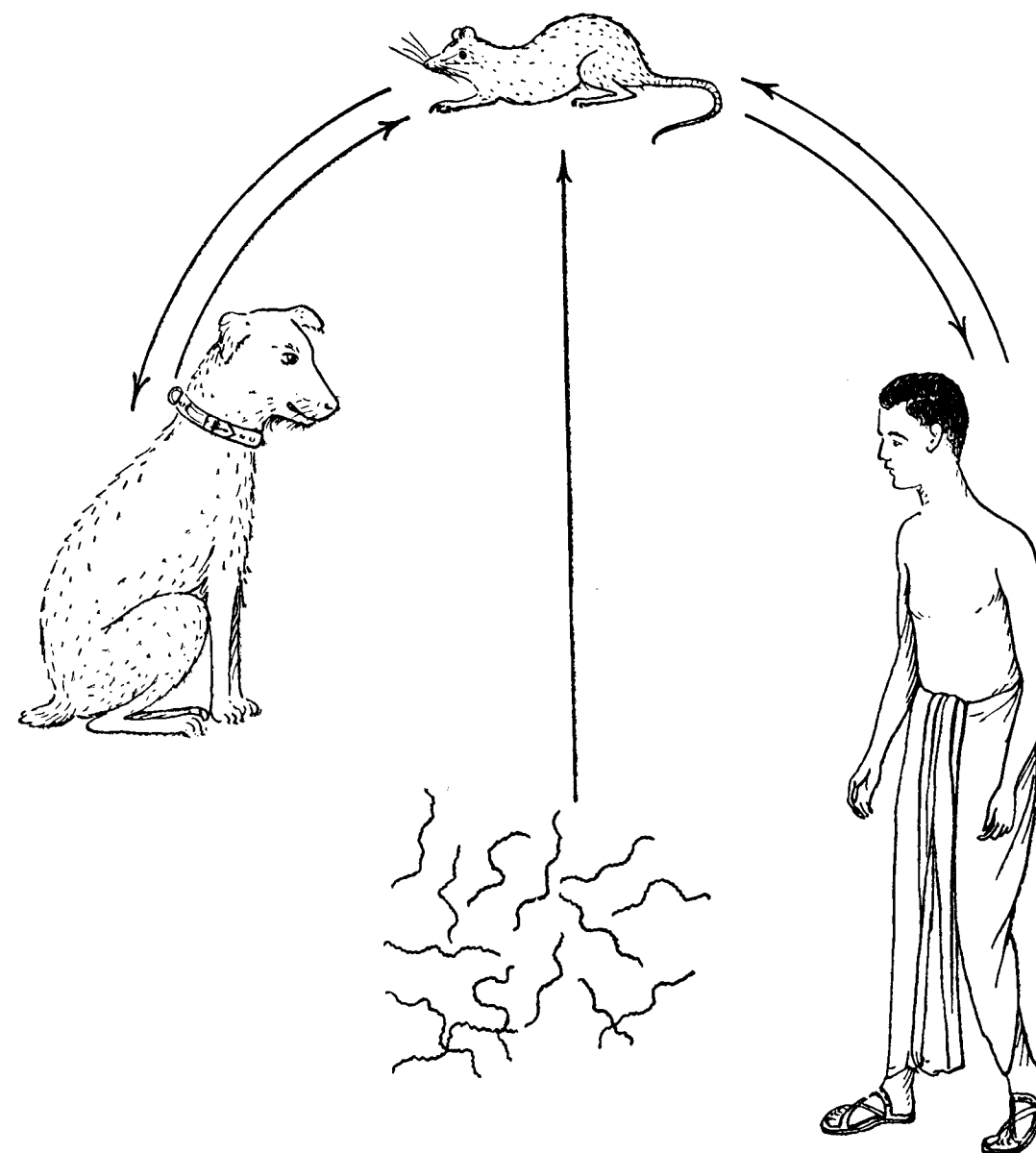
following the statement made by a milkmaid that she could not contract smallpox.

Undulant Fever.—This human affection is caused by the ingestion of cow's or goat's milk containing either one or other of the closely related organisms (*Brucella abortus* and *melitensis*) which cause abortion in cattle and Malta fever in goats. In the human disease, the fever shows irregular undulations. The prolonged duration and the complications which follow an attack make the disease a serious one. Pasteurisation of milk is an effective method of reducing risks to man.

Weil's Disease or 'Yellows'.—This condition affects rats primarily, but human beings and dogs are also affected. The disease is a form of infectious jaundice, and is caused by a spiral-shaped organism—*Leptospira icterohæmorrhagiae*. Soldiers, sewer workers and ditch diggers are known to be affected, and the organisms probably infect them through the unbroken skin. The usual mode of infection is however through food or water being contaminated by rats. The organisms are found in large numbers in the kidneys and other organs of an affected animal, and they are excreted in the urine (Plate XXI).

To mention a few of the other affections communicated to man by rodents, Plague tularæmia, Rat-bite fever and Rocky mountain spotted fever are examples.

Milk-Borne Diseases.—Of the diseases dealt with already, tuberculosis, foot-and-mouth disease, anthrax, rabies, cow-pox and undulant fever are some of the entities which are transmissible to man through the milk of diseased animals. In the same manner certain forms of plant poisoning (milk sickness), bacterial toxæmias (blood poisoning with bacterial poisons), and ptomain or food poisoning due to the Salmonella group of bacteria, or some septic and pyæmic diseases, may be communicated through the milk of affected cows. There is again another group of diseases, which are primarily human affections but can be carried passively by cows, or by milk contaminated by milkers or milk vendors who carry the infective germs of the disease in their body though apparently in good health (human carriers). Numerous records of



Weil's disease or "Yellows" in dog and man

(By the courtesy of the I.C.A.)

serious outbreaks due to these milk-borne infections, as opposed to animal diseases communicated through milk, have been published, and the diseases implicated are: diphtheria, septic sore throat, scarlet fever, smallpox, tuberculosis (human), enteric, typhoid and paratyphoid fevers and mumps. Proper pasteurisation of milk, employment of healthy milkers and milk vendors, and a systematic examination of milk are some of the preventive measures which should be adopted. In addition to the risk of the above diseases being contracted by man, the existence of these infections in many cases produces a marked deterioration of the nutritive values of milk.

Worm Infections.—Human beings contract a number of helminthic infections directly or indirectly from animals, and *Echinococcus*, *Trichina spiralis* and the parasite of measly beef and measly pork have been mentioned earlier.

Tapeworms are ribbon-like worms, which in the adult stage consist of a head and a number of semi-independent segments or proglottids. The dog tapeworm, *Tænia echinococcus*, resides in the intestine of carnivora and consists of four segments each containing several hundred eggs. The segments on being passed contaminate food and water and thus infect man and other animals. Dogs are again infected by eating infected meat. The beef tapeworm, *Tænia saginata*, and the pig tapeworm, *Tænia solium*, affect man due to eating improperly cooked meat. Another important pig parasite transmitted from infected meat is a round-worm, *Trichina spiralis*. Salting and other methods of meat preservation are not dependable in destroying the *Trichina* parasite, and the parasite may live inside calcified cysts for several years. Further, as the serum from affected pigs has been found to be poisonous to susceptible animals, a toxin is probably elaborated by the parasite. It is believed that due to the risk of contracting trichinosis and infection with the pig tapeworm, the eating of pork was prohibited by Moses as early as 1500 B.C.

Round-worms of the pig, *Ascaris lumbricoides*, and the tapeworm of the dog and cats, *Dipylidium caninum*, affect children.

Of the leaf-shaped worms, flukes, *Fasciola hepatica*, *Clonorchis sinensis*, *Opisthorchis felinus* and a few others affect both animals and man, and infected animals are therefore a source of danger to human health.

In India, *Dracunculus medinensis*, the common 'Guinea-worm' affects man, and dogs in particular. The adult females produce nodular swellings and ulcers, and when these lesions are brought in contact with water, a mass of larvæ is discharged by the man. The larvæ infect a species of Cyclops and after developing inside them become infective to man and other animals. A most interesting method of controlling the disease biologically has been evolved, and consists of the rearing of the fish *Barbus puckerli* to feed upon Cyclops and the Guinea worm larvæ.

Mycotic Diseases.—Moulds and fungi belong to the vegetable kingdom, and are responsible for producing a number of skin diseases and internal infections in mammals and birds. Most animal ringworms (trichophytosis, favus, etc.) are transmissible to man producing intense irritation on the skin, scalp or the beard. The commonest is the calf ringworm which produces large circinate lesions in man (Plate XX, Fig. 4). Actinomycosis is another infective disease being contracted from diseased cattle directly or through their milk or meat (Plate XIX, Fig. 10 and Plate XX, Figs. 6 and 7).

Insect Rashes.—The common Mange mites, Sarcopt, Psoropt of animals, have been known to affect human beings coming in contact with diseased horses, kittens, etc. Although these acarine parasites usually produce a cutaneous disease, occasionally very drastic results may follow, as outbreaks of death among rabbits have been seen (Plate XX, Fig. 5). The bird mite *Dermanyssus avium* and *gallinæ* may provoke intense erythematous and papular irritation. Most of the manges are aggravated by scratching.

The role of insects in the transmission of diseases has already been referred to, and the ticks, fleas lice, bugs which are involved, are a legion.

Protozoan Infections.—A number of protozoan infections are common to man and animals, and of these *Balantidium coli*, Giardia,

Entamoeba histolytica, *Leishmania tropica* and *donovani* and *Trypanosoma cruzi* may be mentioned.

To conclude, it has been customary to consider the subject of animal diseases in a narrow and restricted manner, as relating to either agriculture or in relation to communicable diseases of man. Sufficient has been said about to show that the subject is deserving of being treated from a broader perspective of national health and wealth, as greater human activity to-day is concerned with animals and their products; and the contacts between man and animals are likely to increase. In order that human health be not undermined, and the growth of our live-stock wealth be not jeopardised, the progress of the pastoral industries be ensured, and the general development of trade and commerce be not interfered with, it is our duty to create that degree of enthusiasm and conscience in our people in this problem of animal diseases as will eventually produce the desired determination for better things, greater prosperity and more satisfying happiness.

List of Diseases Transmissible to Man.

Nature of diseases and their names.	Cause.	Animals affected.	Mode of infection.
<i>Bacterial Diseases.</i>			
(a) Tuberculosis ...	Tubercle bacilli ...	Bovines, cat, hog, apes, monkeys, fowls and other birds and guinea-pigs	Through ingestion and inhalation.
(b) Anthrax ...	<i>Bacillus anthracis</i>	Almost all animals.	Inoculation, ingestion and inhalation.
(c) Glanders ...	<i>Bacillus mallei</i> ...	Equines, guinea-pigs, rabbits and goats are also susceptible.	Through abraded skin. Also by ingestion and inhalation.
(d) Tetanus ...	<i>Clostridium tetani</i>	All herbivorous animals.	Through deep punctured wounds.
(e) Gas gangrene ...	Welch bacillus group	Horse, sheep, guinea-pigs, rabbits, and mice	By way of wounded tissue.
(f) Undulant fever.	(1) <i>Brucella melitensis</i> (2) <i>Brucella abortus</i> .	Goats ... Cattle and hogs ...	} Through infected milk

Nature of diseases and their names.	Cause.	Animals affected.	Mode of infection.
<i>Bacterial Diseases—contd.</i>			
(g) Botulism ...	Organism of Salmonella group. <i>S. artrycke</i> , <i>S. enteriditis</i> , <i>S. suifester</i> .	Hogs, cattle, sheep, goats and wild animals and rodents.	Through eating infected unboiled meat, eggs, etc.
(h) Swine Erysipelus.	<i>Bacillus erysipelatis suis</i> .	Pigs	Through abrasion of the skin.
(i) Tularæmia ...	<i>Bacterium tularensis</i> .	Rabbits and hares...	By blood sucking insects and through contact with infected animals.
(j) Impetigo ...	Streptococcus ...	Horse	Direct contact.
(k) Butcher's pemphigus.	Coccal infection ...	Meat	Wound infection in butchers and purveyors.
(l) Plague ...	<i>Bacillus pestis</i> ...	Rodents, rats and ground squirrels.	Through the bite of an infected flea.
<i>Virus Diseases.</i>			
(a) Foot-and-mouth disease.	Filtrable virus ...	Cattle and other cloven footed animals.	By eating or drinking raw milk products from infected cows and also by infected saliva entering the mouth through some source particularly finger.
(b) Rabies ...	Ditto ...	Dogs and jackals and other warm-blooded animals.	Through bite of rabid animals or inoculation of infected saliva through abrasions in the skin.
(c) Cow-pox ...	Ditto ...	Cattle, specially cows in milk.	By inoculation through broken skin and inhalation.
(d) Psittacosis ...	Ditto ... Probably in association with <i>B. psittacosis</i> ...	Parrots	Through actual contact with sick parrots.
(e) Warts ...	Virus ...	Dogs and cattle	Direct contact.
(f) Rocky Mountain spotted fever.	Ditto ...	Rodents	Bite of ticks.
<i>Diseases of Human Origin.</i>			
(a) Septic sore throat.	<i>Streptococcus epidemicus</i> ...	Milch cows	Through drinking infected milk.
(b) Diphtheria ...	<i>Corynebacterium diphtheria</i> , ...	Cats, fowls and cows.	Through direct contact and drinking infected milk.
(c) Scarlet fever ...	<i>Streptococcus scarlatina</i> .	Cows	Through drinking infected milk.

Nature of diseases and their names.	Cause.	Animals affected.	Mode of infection.
<i>Diseases of Human Origin—contd.</i>			
(d) Typhoid ...	Bacillus of typhoid.	Apes, Chimpanzee.	Through contact and ingestion of material infected with bacillus.
(e) Paratyphoid fever	<i>Salmonella</i> sp. ...	Young calves	Food poisoning due to infected meat.
<i>Helminthic infection</i>			
(a) Tapeworm infection—			
(1) <i>Tænia solium</i> .	<i>Cysticercus cellulosæ</i> .	Pigs	Through eating improperly-boiled meat.
(2) <i>Tænia saginata</i> .	<i>Cysticercus bovis</i> ...	Cattle	Ditto.
(3) Hydatid ...	<i>Echinococcus granulosus</i> .	Dogs	Ingestion of material contaminated with the droppings of infected dogs.
(b) Round-worm infection—			
(1) Trichinellosis.	<i>Trichina spiralis</i> ...	Pigs	Through eating improperly-boiled infected meat.
(2) Guinea worm infection.	<i>Dracunculus medinensis</i> .	Horse, cattle and dogs.	Through cyclops.
<i>Fungus Infection.</i>			
(a) Actinomycosis ...	<i>Actinomyces bovis</i>	Almost all animals	Through ingestion by eating or drinking infected meat, or milk.
(b) Ringworm ...	<i>Tinea tonsurans</i> ...	Cattle, horse, cat and dogs.	Through abraded skin
(c) Large spored ringworm.	<i>Trichophyton tonsurans</i> .	Horse and cat	Ditto.
(d) Favus ...	<i>Achorion Schonleini</i> .	Dogs, mouse	Ditto.
<i>Anthropod Infection.</i>			
(a) Acariasis ...	<i>Dermanyssus gallinae</i> .	Chickens	Through biting of mites.
(b) Mange ...	<i>Sarcoptes scabiei</i> ...	All domesticated animals except cat.	Through contact.
<i>Protozoan Infection.</i>			
(a) Syphilis ...	<i>Spirochaeta pallida</i> .	Llamas	Through copulation.
(b) <i>Balantidium coli</i>	Living cysts ...	Hogs	Through ingestion of contaminated material.

Nature of diseases and their names.	Cause.	Animals affected.	Mode of infection.
<i>Protozoan Infection—contd.</i>			
(c) Giardiasis ...	Living cysts ...	Mice and rats ...	Ditto.
(d) Amoebiasis ...	<i>Entamoeba histolytica</i>	Dogs and cats ...	Through ingestion of material containing cysts.
(e) Leishmaniasis ...	<i>Leishmania donovani</i>	Dogs ...	Through the bite of infected fleas.
(f) Spirochaetal jaundice.	<i>Leptospira icterohaemorrhagiae</i> .	Rats	Contact of abraded surface with materials contaminated with urine or faeces and infected rats and through the bite of infected mosquitoes.
(g) Rat-bite fever ...	<i>Leptospira morsus muris</i> .	Rats ...	Contact of abraded surface with materials soiled with rats urine or following the bites of infected rats.
(h) Trypanosomiasis "Chaga's disease."	<i>Trepanosoma cruzi</i> .	Small laboratory animals.	Bed bugs.

EXPLANATION OF PLATES.

PLATE XIX.

Disease Producing Agents.

1. Spirochaetes cause severe disease in poultry.
2. Staphylococci } Pus producing organisms set up a number of diseases in man and animals.
3. Streptococci }
4. Anthrax bacillus causes anthrax in man and animals.
5. Bipolar organisms produce human plague and also animal disease.
6. Tetanus bacilli produce tetanus in man and animals.
7. Tubercle bacilli produce tuberculosis.
8. Fungus mycelia }
9. Budding fungus } Skin diseases and also diseases of internal organs.
10. Actinomyces causes lumpy jaw in cattle.
11. Cryptococcus causes empizootic lymphangitis of horse.
12. Aspergillus causes pneumonia in birds and sometimes in cattle.
13. Leishmania affects man and dogs.
14. Trichomonas produces sterility and abortion.
15. Trypanosomes causes surra in animals and sleeping sickness in man.
16. Amoeba causes dysentery in man and dogs.
17. *Babesia bigemina* causes red-water in cattle.

18. *Haemoproteus columbae* occurs in birds.
19. Boophilus (tick) is a vector of red-water in cattle.
20. Tabanus—a fly—believed to be the carrier of surra (trypanosomiasis).
21. Demodex causes persistent mange in dogs.
22. Scarcoptes }
23. Psoroptes } Produce scab in man and animals.

PLATE XX.

Some Chronic Diseases of Animals in India.

1. Hill calf showing generalised ringworm patches (trichophyton infection).
2. Infected hair from the above calf treated with hot caustic potash for microscopic examination. Fungus mycelia and spores seen.
3. Ditto. Hair in tact showing beaded spores.
4. Cow-boy infected on the cheek by a large circinate ringworm from an infected calf.
5. Rabbit in a moribund condition due to extensive infection with acarine parasite mange.
6. Hill bull affected with actinomycosis of the upper jaw bone.
7. The causative fungus of the same in microscopic preparation.
8. Horse affected with lichen tropicus, so-called *khoo jlee*, caused by a microfilaria shown at 9.
10. Cattle showing yoke gall complicated with "Calcutta sore", due to a microfilaria seen coiled up in section of the tissue at 11.
12. Rickets in dog—a nutritional deficiency disease. Left dog shows bony enlargement in the limb joint. Right dog shows a normal pup of the same litter.
13. Osteoporosis or 'big head' in a pony—another nutritional disease due to imbalance of phosphorus in relation to calcium.
14. Leucoderma in a pony—Depigmentation around the eye and extending on the side of the face in a symmetrically bilateral manner—believed to be of disturbed metabolic origin, similar to the human disease.

PLATE XXI.

This plate illustrates how Weil's disease of man produces Yellows or infectious Jaundice in dogs, and *vice versa* through the intermediate agency of rats.

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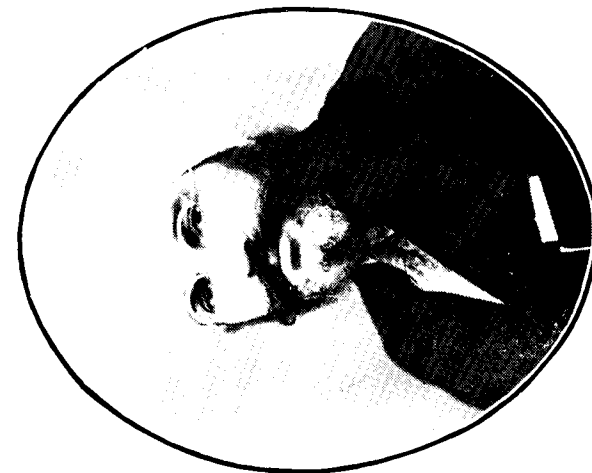
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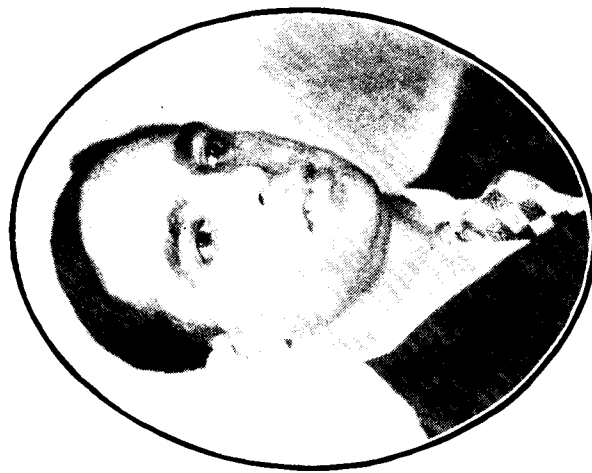


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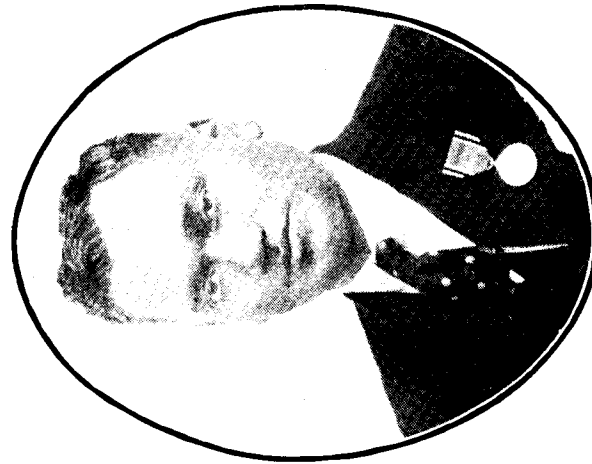


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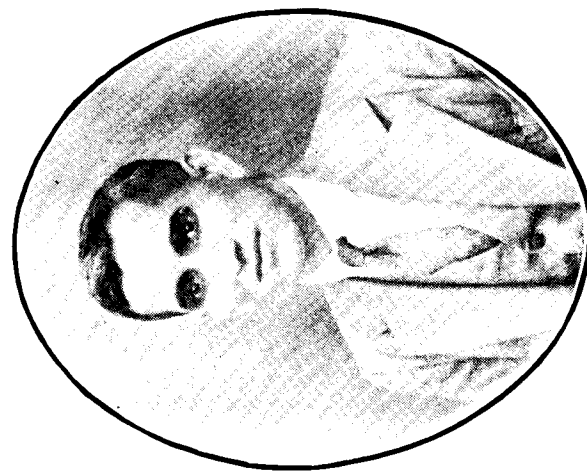
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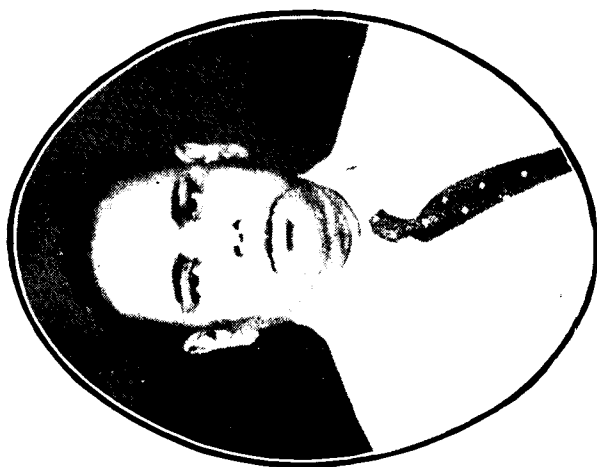
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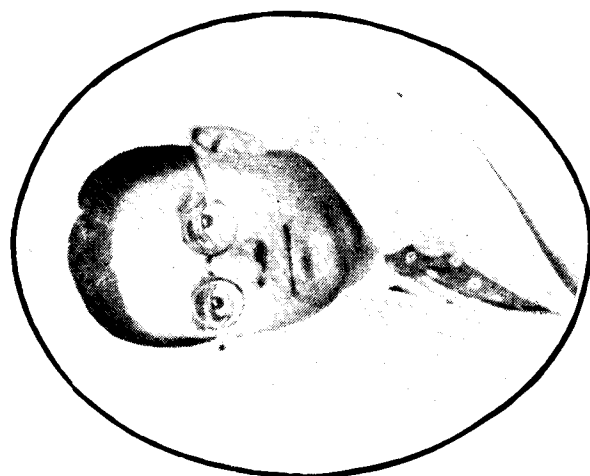
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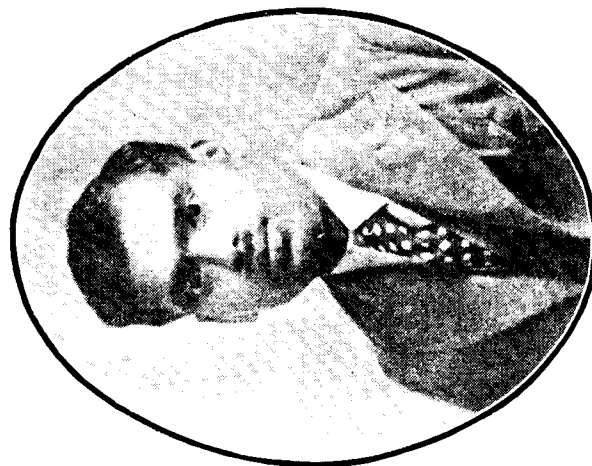
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Editorials.

THE MADRAS PUBLIC HEALTH BILL.

FOR the first time in the annals of the administration of this country, a comprehensive Public Health legislation has just been introduced in a Provincial Assembly and we are very glad that Madras has had the proud privilege of leading the way in this matter. A bill to make provision for advancing the Public Health of the Presidency of Madras was introduced by the Government in the November session of the Legislative Assembly and has since been scrutinised by a Select Committee. It will finally come up for discussion in the January session of the Assembly.

The bill has been received well in the country and we hasten to add our support to it. It has been introduced not a day too soon. And, although some of its provisions may appear to be giving too much powers to the Health Officers, past experience has amply shown that, without such powers, it is a practical impossibility to rouse the sanitary conscience of the public at large. As the Honourable the Minister for Public Health has admirably put it, his anxiety to put the Law into force was not to arm any of the Health Officers with more powers but only to protect the lives of the innocent and poor people who are placed in circumstances wherein they will become the victims of every known disease. Himself a medical man, the Honourable Minister has realised the value of preventive measures and has stressed them. We, therefore, agree with him when he said: "This measure is of first rate importance, no less important than the Prohibition Act and the Debt Relief Act. This, in fact, is a Death Relief Act."

There is, however, one lacuna in the bill to which we desire to draw attention so that it can be filled up before the bill is finally passed into Law. We refer to the absence of any provision in the bill for enlisting the co-operation of the Veterinarian.

In the statement of objects and reasons of the bill, it is stated that provision has been made for prohibiting the sale or the keeping for sale of animals intended for human consumption which are diseased; also for the prohibition of the consumption of the flesh of animals which have died on account of natural causes or on account of disease. It is also stated that adequate powers are given for investigating into the outbreaks of epidemics caused through milk or dairy produce and for the inspection of dairies. These provisions are, it need hardly be said, very necessary in the interest of the Public Health. But, then, who are the Officers entrusted with the carrying out of these provisions? According to the bill, it is the Health Officers. This, as every one will readily realise, is an impracticable thing. The Health Officer, may detect cases of infectious diseases in human-beings, he may even trace the incidence of these diseases to the consumption of infected or diseased animal foods; he may thereupon set the Law into motion against the supplier of those foods. But all these procedures would be what the Tamilians would say 'Suryanamaskar after the eye is lost'. The mischief would have been done and the seeds of disease would have been broadcast before these actions are taken. And, therefore, the preventive measures must be taken a step higher up and they must aim at correcting or rectifying the very source of infection. There are a number of diseases which are communicable from animals to man. To name only a few, there are the diseases like Anthrax, Rabies, Tuberculosis, Paratyphus and Streptococcal infections. And, unless these diseases are detected in the first instance in the animals themselves, they cannot be prevented amongst human-beings.

The study of animals both in health and in disease is primarily the work of a Veterinarian and it is only he who, by his professional qualifications, can pronounce an authoritative opinion whether an animal is healthy or diseased. It is only the

Veterinarian who is competent to inspect and declare whether the products of an animal are fit for human consumption or not. And, therefore, the duty of inspecting animals whose products are intended for human consumption should be entrusted to a Veterinary Officer and not to a Health Officer as proposed in the bill.

Again, apart from the aspect of preventing the communicability of diseases from animals to man, there is also the aspect of looking to the hygienic up-keep and correct feeding of animals. It is now more and more recognised that these two factors play a large part in the proper maintenance of animals either for meat production or for milking purposes. Keeping animals in insanitary surroundings give rise to various diseases which are liable to be communicated to human-beings. Measly beef and measly pork are two such conditions. Similarly, the food given to the animals controls to a very great extent the quality of the milk obtained from them. It might not have been realised by many, but all the same, it is a fact which has been amply demonstrated that the milk from animals fed on a scientific basis is far richer in quality and contains more vitamins than that from an animal fed on a poor quality food. It naturally follows that the milk from the latter animals cannot, when consumed, be conducive to the health of human-beings.

In these and other kindred matters, the importance of the Veterinarian to the Public Health Organisation becomes quite apparent. It is only he who can, with a competence, inspect food-stuffs of animal origin and advance Public Health. In fact, his usefulness as a guardian of Public Health cannot be too much emphasised and it would be a great pity if his services are not utilised in the way they ought to.

This takes us on to almost the very first provision in the bill, *viz.*, the constitution of a Public Health Board. This Board which is intended to give a guide to the general policy of Public Health administration in this Presidency has been constituted with members drawn from officials and non-officials. It is essential from what we have explained above, there is a representation of the Veterinary profession on it to advise Government on matters

relating to the prevention of diseases communicable from animals to man and to the control of food-stuffs of animal origin. At present, there is no such representative on the Board.

In this connection we draw the attention of our readers to an exhaustive paper on "**Animal Diseases in Relation to the Economy of man, and India**" by Capt. S. C. A. Datta, B.Sc., M.R.C.V.S., Veterinary Research Officer, Imperial Veterinary Research Institute, Muktesar, India, reprinted in this issue, which, we are sure, will amply pay a close perusal and which will show the necessity for a Veterinarian in each and every Public Health Organisation.

"MODERN TRENDS IN VETERINARY EDUCATION."

IN an Editorial on the above subject, *Agriculture and Live-stock in India*, one of the organs of the Imperial Council of Agricultural Research, has, in its issue of September 1938, a thought-provoking article. It is suggested therein that, on the analogy of the German Veterinary Colleges, the curriculum of studies in the Veterinary Colleges in other countries should be so revised as to "pay more attention to the subjects of Genetics and Nutrition and their application to Animal Health." This suggestion is very timely and has been thrown in at a very opportune moment. The conditions of life in all countries, India not excluded, are moving very fast "on account of economic and social evolutions of human populations" and, therefore, it has become necessary for the Veterinarian also to adopt himself to the changed conditions and equip himself to suit the modern requirements. Till now, he has been confining his activities to the practice of Medicine and Surgery and had to a very great extent neglected the equally important other branch of his profession, *viz.*, Animal Husbandry. And, similarly, the colleges which were engaged in imparting Veterinary Education had laid greater emphasis on the principles of the treatment of the various diseases affecting the live-stock, attaching a role of only a lesser importance to the equally important subjects of Animal breeding and rearing. There might

have been some excuse for such a state of affairs in this country because the majority of the Veterinary Colleges here are of comparatively recent origin and they had drawn up their course of studies according to the then immediate requirements of the country. Further, the true sphere of the activities of the Veterinary profession, *viz.*, the improvement of the live-stock had not then received any attention worth the name at the hands of the Government. But now conditions have rapidly changed. It is being realised, although not to the full extent which it ought to, that the salvation of the rural parts lies in the improvement of the live-stock and that the Animal Husbandry work should be entrusted to that Department which is best fitted for it, *viz.*, the Veterinary Department. It is also being realised that, as in human medicine, so in Veterinary, the true scientific approach to the combating of diseases is more from the preventive aspect than from the curative side. Disease is generally defined as deviation from health and, therefore, a study and knowledge of the conditions of health *in all its aspects* has become a *sine qua non* for a Veterinarian of the present day. Such a study should nowadays include a thorough knowledge of Genetics and Nutrition and also of basic sciences and Animal Husbandry; because, as Professor E. Leclainche says, Husbandry is Animal Hygiene in action, and Hygiene, preventive medicine and curative medicine form a combination which cannot be dissociated. Equipped thus, the Veterinarian will be enabled to undertake researches into the various problems confronting the Veterinary Profession. In the words of the *Agriculture and Live-stock in India*, "A vast field awaits investigation on the Veterinary side of such subjects as Protozoology, Helminthology, Entomology, and Biochemistry and also in Animal Physiology, Animal Nutrition and Animal Genetics, and while we must express gratitude for the help received in these subjects in the past from pure scientists and others, there can be no doubt that, given equal intellectual equipment, a Veterinarian working in one of these branches of Science should produce the more practical results."

There is another suggestion made by the *Agriculture and Live-stock in India* for improving "the flow of suitable recruits

to the research side of the Profession" which does not at all appeal to us. It is evidently based on the recommendations of the Loveday Report on the Veterinary Education in England. The recommendation is that the students should spend the first three years at Cambridge University taking the Natural Science Tripos and the two final years at the Royal Veterinary College, London. This will work adversely to the interest of the Profession and we are not, therefore, surprised that it has been rejected by the Royal College of Veterinary Surgeons. In the following quotation from the *Veterinary Journal* for November 1938, edited by Sir Frederic Hobday, will clearly show how this suggestion is detrimental to the Profession:—

"The second important recommendation, that a degree should be instituted which candidates could take at the end of their third year, is also rejected by the Council, on the ground that such a degree would degrade the present high status attaching to the existing veterinary degrees, without any compensating advantage. The Council are of opinion that students trained in a University away from a Veterinary School would not gain the full advantages of a University education and would lose, what is much more important to them, the benefit of association with veterinary students and veterinary teachers, and the benefit of daily contact with animal patients. It is contended that, with all the precautions suggested by the Committee, a student who left the University with a degree after passing in the subjects of the first three years of the curriculum would be at a serious disadvantage in beginning his clinical studies in his fourth and fifth years, and that he could find it extremely difficult to fit himself into the new conditions. There is also the grave risk that a degree of this kind, gained by instruction in (or officially acknowledged by) a Veterinary College might be utilised by the unscrupulous as a license to practise, and thus add to our already large army of quacks. Such degree-holders could not, it is true, call themselves by the title of "Veterinary Surgeon," but every practitioner knows only too well that this is the only

privilege the Veterinary Surgeons' Act confers; and that the charlatan, whether his fancy lies in doctoring dogs, cattle or horses, knows full well how far he can go without placing himself with reach of the arm of the law."

RETIREMENTS.

Rai Sahib N. N. MAJUMDAR, G.B.V.C.,

Assistant Director, Civil Veterinary Department, Bengal.

RAI SAHIB N. N. MAJUMDAR belongs to the well-known Majumdar family of Coomertooly, Calcutta. Born in August 1883, he passed the Entrance Examination of the Calcutta University in 1900. He entered the Bengal Veterinary College in 1903, graduating himself in 1906 and standing second in order of merit and getting several prizes. He joined the Department in October in the same year and was appointed as the Staff Veterinary Assistant and worked as Laboratory Assistant in the Raymond Research Laboratory under Col. Raymond. He was promoted to the grade of Inspector in June 1908 and was the House Surgeon of the Bengal Veterinary College till April 1909, when he was transferred to the Department as Circle Inspector and worked as such till 1920. During this period, he did extensive glanders work at Burdwan, Murshidabad, etc. He was promoted to the Bengal Veterinary Provincial Service in 1920. He was the first to receive training in the Simultaneous Method of Inoculation against Rinderpest and introduced it in Bengal, first in the Government Cattle Farm, Rangpur, and then in the Districts. The first experiment that the Rinderpest Virus (Blood) can be used as Vaccine was carried out by Mr. Majumdar with animals purchased from the money supplied by Dr. Cooper of the Imperial Institute of Veterinary Research. Along with Rai Sahib M. P. Ghosh, Mr. Majumdar rendered distinct service to the Veterinary Inspectors in respect of enhancing their salary.

In recognition of the services rendered by him to the profession, the title of Rai Sahib was conferred on Mr. Majumdar in 1931, when he was appointed as the Assistant Director of the

Civil Veterinary Department, Bengal, which post he held till he retired from service on 1st July 1938, after about 32 years of service.

His one hobby in life is to collect ancient Veterinary literature in Sanskrit and translate them for the benefit of the profession. Readers of this *Journal* are familiar with his contribution of the translation of *Aswavaidyakam* by Sri Mahasamanta Jayadatta which he undertook some years ago and which he intends to continue now in his retirement.

We wish Rai Sahib N. N. Majumdar long life and happiness in his retirement.

Mr. A. S. VISWANATHA MUDALIAR, G.B.V.C.,
Deputy Superintendent,
Civil Veterinary Department, Hyderabad, Deccan.

MR. A. S. VISWANATHA MUDALIAR, Deputy Superintendent, a member of a well-known Mudaliar family of Mysore, retired recently after serving for nearly 26 years in H. E. H. the Nizam's Civil Veterinary Department. Graduating from the Bombay Veterinary College in the year 1910, he entered the Nizam's service as an Inspector and was stationed at Subah. He was first posted to Gulberga and then to Warangal. He was then transferred to the Stud Farm, Hingoli, as Officer-in-charge in the year 1921 and after serving for about eight years was promoted as Deputy Superintendent-in-charge of the Stud Farm, Hingoli, where he put in a good deal of work. The Stud Farm as well as the Cattle Farm attached to the Stud Farm have been very much appreciated by the Government and notable people connected with horse industry in India have visited the Stud Farm.

On the eve of his retirement the Hyderabad Veterinary Department Recreation Club gave an 'At Home' in his honour and members of the profession joined heartily in wishing him a happy and contented life in his retirement.

We wish Mr. Mudaliar a long and happy retired life.

Clinical Articles.

ANTIMOSAN IN THE TREATMENT OF GRANULOMA VENEREUM IN DOGS.

BY

G. S. BANERJEE, G.B.V.C.,

AND

P. C. SEN GUPTA, G.B.V.C.,

Bengal Veterinary College, Calcutta.

In the first place the writers wish to point out that these notes are only of a preliminary nature, but little has been published in Veterinary literature regarding the use of Antimosan in Canine Granuloma. Preliminary reports of such a nature sometimes ultimately prove to be of great help in finding out a specific treatment and the writers feel that their favourable experience with this drug may be of some assistance to other members of the profession.

Like human Venereal Granuloma a similar condition occurs in dogs affecting the inguinal or genital regions. The condition in men is described as follows:—"The process commences from a small nodule which ultimately bursts and leaves a raw area. This spreads in an annular way particularly in the groin which may encircle the genetalia extending across the mons and behind the perineum. On the genetalia, extension may occur in any direction, but more frequently the folds of the skin such as penoscrotal angle, or the outer or inner edge of the labia may be affected. With advancement of the process of healing, dense cicatrization may occur, giving rise to extreme deformity. Extra-genital granuloma is rare, but, occasionally, cases may be met with in the axilla and lower abdominal wall. Ulceration around the anus is frequent without lesions on the genetalia.

In dogs the condition takes an almost similar course.

Treatment of Venereal Granuloma in human-beings by intravenous injections of Tartar Emetic was introduced by Arago and

Vianna in 1913 and has proved remarkably successful. In veterinary practice, however, the drug has not received much enthusiasm, although Muller and Alexander Glass in their text-book on "Diseases of the Dog and Their Treatment" (page 637, para. 3) mention: "The recent treatment used in infectious Granuloma in man, that of certain intavenous injections of Tartar Emetic, has up to the present time not had the test of time, although several cases have been reported that seem to have responded to treatment but the only suggestion would be to try it, based on the value it has had in man."

Judging from the usefulness of the drug in human Granuloma the writers used Antimosan (Bayer) in a number of cases in the dog ward of the Bengal Veterinary College, with encouraging results.

Antimosan Solution (Bayer) is a trivalent antimony compound. The solution is clear, having a neutral reaction which is isotonic with the tissues and free from unpleasant effects of Tartar Emetic.

The following case notes might be of interest to the readers:—

CASE 1. A Poodle dog, about 3 years old, was admitted to this Hospital on 29th July 1937. On clinical examination it was found that the animal had a cancer-like growth round the root of the penis. On enquiring we came to learn that the animal was suffering for some two months.

Treatment. Most of the growth was removed with a pair of scissors and the site later curetted under a Local Anæsthetic. Then the part was thoroughly cleansed with a saturated solution of Soda Bicarb, and dried. Then a compress soaked with Antimosan was locally applied to the part. The Antimosan compress was continued for three days and applied only twice daily. The wound healed up very quickly and satisfactorily and the case was discharged on 11th August 1937 within seven days. No injections were given in this case, as the results were sufficiently satisfactory without them and recurrence did not apparently transpire as the case was not returned to the Hospital.

CASE 2. A Cross Tr. dog, aged about two years old, was admitted on 8th August 1937. The dog was suffering from a Granulomatous growth at the root of the penis and over the prepuce. The owner was advised to put it to sleep as the growth was thought to be incurable, but he did not agree to this and brought his dog to this Hospital for treatment.

Treatment. The dog was first treated by local compresses in the same way as described in Case No. 1, but in addition three injections—one daily—of Antimosan were given, the case being more advanced (dose of Antimosan subcutaneously given was 2 c.c. on alternate days). The case was discharged cured on the 16th day of treatment, 24th August 1937.

CASE 3. A Cocker-Spaniel dog two-and-a-half years old. The animal was admitted to this Hospital on 9th August 1937. The dog had a Granuloma-like growth (Cauli flower) which was bleeding, on the inner aspect of the right thigh. The tumour was excised and the resultant wound treated exactly as in Case No. 2. The wound healed most readily under Antimosan compress treatment and the animal was discharged cured from the Hospital on the 28th August 1937.

CASE 4. A Cross Tr. bitch aged about two years. She was admitted to this Hospital on 14th August 1937, with a Granuloma-like growth on the vulva involving the floor of the vagina. This case was reported previously, as incurable. However, the bitch was treated both locally and by injection as in Case No. 2 with Antimosan and was cured. The animal was discharged on 23rd August 1937.

Conclusions.—(1) An account of the success achieved so far by Antimosan in the treatment of Venereal Granuloma in dogs is given.

(2) The drug proved equally efficacious both by local application after excision and by injection.

(3) Unlike Tartar Emetic, side-effects with Antimosan were absent.

(4) Short duration of a course of treatment.

(5) As far as informations could be obtained no relapse occurred.

The writers desire to express their grateful thanks to Mr. A. D. MacGregor, I.V.S., Principal, Bengal Veterinary College, for kind advice and permission to publish the notes of the cases.

ANTIMOSAN IN THE TREATMENT OF HEPATOZOON CANIS.

BY

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Four well-fed and well-cared-for dogs (mixedbred Kodaikanal and Rajapalayam), suffering from progressive anæmia and wasting, were diagnosed to be cases of Hepatozoon Canis by me in February 1937. This diagnosis was subsequently confirmed by the Principal, Madras Veterinary College. Engorged ticks from the affected animals were sent to the Principal and were identified as *Rhipicephalus Sanguinem*. Taking advantage of the success attained by Mr. R. Swaminatha Iyer, District Veterinary Officer, with Antimosan injection for a dog with Hepatozoon Canis in Trichinopoly, I tried this drug with success and the details are given below:—

Treatment.

CASE 1.—Dog, out-patient No. 1356. Date of admission 16th February 1937. Result of blood examination—Hepatozoon Canis present.

Till the receipt of Antimosan from the Head Office on 5th March 1937, this dog was given Soda Salicylas mixture and four injections of Sodium Cacodylate (1 gr. in 2 c.c. of sterile water subcutaneously every alternate day).

5th March 1937. 3 c.c. of Antimosan was given intramuscularly in the region of the thigh.

8th March 1937. 4 c.c. was given in the same region.

11th March 1937. Do. do.

17th March 1937. Do. do.

22nd March 1937. 5 c.c. of Antimosan was given intravenously (external saphena vein chosen).

30th March 1937. Do. do.

4th April 1937. Do. do.

No treatment was adopted after this date. Blood was examined on all the days noted above and a very few parasites were found in the blood, but the condition of the dog had greatly improved by then by the treatment. The dog's blood was again examined on 5th May 1937, and yet there were still a few parasites in the blood, but there has been no decline in the health of the dog.

CASE 2. Dog, out-patient No. 1361. Date of admission 17th February 1937. Result of blood examination—Hepatozoon Canis present.

Till the 24th February 1937, this dog was given Soda Salicylas mixture and two or three injections of Sodium Cacodylate. There was no opportunity to try Antimosan treatment on this dog as this was presented to one of his friends in Tanjore District. Blood was examined on all the days on which it attended the dispensary. Result—positive for Hepatozoon Canis. Nothing is known about the health of the dog at present.

CASE 3. Dog, out-patient No. 1360. Date of admission 17th February 1937.

Since this dog was in company with other dogs (Case Nos. 1 and 2) infected with ticks and was also ailing with progressive anæmia and wasting, the same treatment, viz., Soda Salicylas mixture and four injections of Sodium Cacodylate were given though no Hepatozoon Canis parasites were present in the blood till 4th March 1937. On the

5th March 1937 blood examination revealed the presence of Hepatozoon Canis.

Like the dog Case No. 1, out-patient No. 1356, four intramuscular injections of Antimosan (3 c.c., 4 c.c., 4 c.c., and 4 c.c.) were given on 5th, 6th, 11th and 17th March 1937 respectively and four intravenous injections at the rate of 5 c.c. per day were given on 22nd, 26th and 30th March and 4th April 1937. The parasite disappeared from the blood on 26th 1937. There was great improvement in condition after the treatment. No Hepatozoon Canis organism were found in the blood when examined on 5th May 1937. The dog is hale and healthy up to the time of writing this paper.

CASE 4.—Dog, out-patient No. 1362. Date of admission 17th February 1937.

Since this dog was in company with other dogs (Case Nos. 1, 2 and 3) and was ailing with progressive anæmia and wasting, same Antimosan treatment was given without any change. Hepatozoon Canis organisms were found only on 12th, 13th and 18th March 1937, and afterwards no Hepatozoon Canis organisms were present in the blood. There was great improvement in the health of the dog and its blood was once again examined on 5th May 1937. Few organisms (Hepatozoon Canis) were found in the blood. But the dog is hale and healthy.

Remarks.

I had ample opportunities to observe the temperature of these dogs and it varied between 102° F. to 105° F. All dogs were between one and two years old. It is not quite correct to say that ill-cared-for pariah dogs and pups will get the disease. The dose of Antimosan suggested and tried by Mr. R. Swaminatha Iyer was 1 to 2 c.c., twice a week intravenously and total number—five or six injections. There is no harm in giving each dog up to 8 c.c. provided that one starts with a small dose at the beginning and this may be carried to 8 or 10 injections. In one dog I found slight swelling and limping of the leg for two or three days after intravenous injection in the external saphena vein and this

disappeared without any treatment. I am inclined to think that Antimosan injection checked the progress and pathogenicity of the parasites. The health of these three dogs is being watched.

I examined the three dogs (Case Nos. 1, 3 and 4) on 26th August 1937 after the lapse of six months. They were found healthy. Very few parasites of Hepatozoon Canis were found in the blood of Case Nos. 1 and 3 only.

I cannot close this paper without expressing my thanks to Mr. R. Swaminatha Iyer for the valuable information he gave me when I started this treatment.

HEPATOZOON CANIS AND TREATMENT WITH ANTIMOSAN.

BY

A. RAMAMURTHI,

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Madura City.*

An Airedale dog aged about nine months was found to be infested with Hepatozoon Canis. It was put under Antimosan (Bayer) treatment, the drug having been claimed to have some effects for this complaint.

The dog was running a temperature of 103.4°F., to start with, and its condition was fair but it was not taking its food properly. As an initial dose 1 c.c. of Antimosan was given intramuscularly, on the third day the dose was increased to 2 c.c. and on the seventh day, another 2 c.c. was repeated. The temperature continued to be above 103°F. with slight variations. One week was allowed to pass by before treatment was started again. This time, the dose was increased to 3 c.c., and three injections were given every third day. Though the temperature continued to vary between 103 and 104.6°F., the dog had started taking its food properly, and its condition had improved. Microscopical examination of the blood smears throughout the period of

treatment showed the organisms in the blood. After three injections of 3 c.c. each, the treatment was discontinued.

After an interval of nearly two weeks, I tried 1 c.c. of Acaprin (Bayer) intramuscularly, but the temperature shot up to 105.2°F., and examination of blood after this injection still revealed the organisms.

The dog is quite hale and healthy for all appearance but runs a chronic high temperature, feeds quite normally and maintains its condition.

I am of opinion that Antimosan is not successful in *Hepatozoon Canis* as far as eradication of the parasite is concerned. It is true something is done to discover a radical cure for this disease which seems to be on the increase.

HÆMOPROTEUS SP. IN INDIAN PEACOCKS.

BY

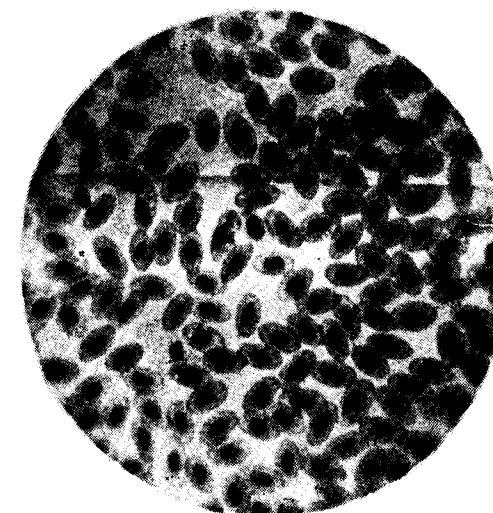
K. R. S. AIYAR, G.B.V.C.,

AND

M. K. GARUDACHAR, G.B.V.C.,

Bombay Veterinary College.

In June 1934, the authors found a *Hæmoproteus* sp. in a blood smear of a peacock (*Pavo Cristatus*) which came for treatment at the Bai Sakarbai Dinshaw Petit Hospital for animals. The authors did not publish its occurrence in that bird for two reasons. Firstly, *Hæmoproteus* is of common occurrence in the blood of various kinds of birds, and secondly, they wanted more opportunities to prove by experimental evidence whether it is *H. Columbæ* or otherwise. Regarding *H. Columbæ*, Wenyon (1926) says that it may have a very wide distribution and that it may occur in many other birds than the common pigeon. We now hasten to confirm Malkani's (1936) findings from this part of India, but we consider that it is premature to say that it is a new species till it is proved to be so by experimental evidence.



Hæmoproteus in Indian Peacocks.

We give below the history of the case we observed :—

The peacock was admitted into the Hospital (Case No. 244/14, dated 6th June 1934) for wounds on the neck and one of the limbs caused in a fight with another bird (?) and with a history (from the owner) of having lost two peacocks at his bungalow situated in the compound of a Spinning and Weaving Mill, Bombay.

Temperature Chart while in the Hospital.

Date.	Temperature in °F.
6-6-1934	... 106·2
7-6-1934	... 105·6
8-6-1934	... 104·4
9-6-1934	... 104·2
10-6-1934	... 102·4
11-6-1934	... 103·6
12-6-1934	... 106·0
13-6-1934	... 105·4
14-6-1934	... 104·0
15-6-1934	... 104·4
16-6-1934	... 103·8
17-6-1934	... 105·0
18-6-1934	... 103·8

From the history of the case it is evident that two other birds in the same house had died. This bird did not show any untoward symptoms though the blood corpuscles were fairly heavily infected. It is very doubtful if birds normally succumb to Hæmoproteus since they seem to have either partial immunity or tolerance. It is only rarely that pigeons die of Hæmoproteus causing disease *per se*, but any inter-current disease may hasten their death. The cause of death among the pea-fowls referred to by us and Malkani being Pseudo-Fowl-pest has also to be considered. In the absence of such data, the presumption that Hæmoproteus was the cause of fatal termination may not be correct.

DERMATITIS OF CATTLE—MICROFILARIAL (?)

BY

V. SRINIVASAN, B.A., DIP.ECON., G.M.V.C.,

Veterinary Investigation Officer, Alwar (State).

Captain S. C. Datta, B.Sc., M.R.C.V.S., in his paper on new Research on some Helminthic Diseases of India writes of a new Microfilarial Dermatitis of Cattle. He mentions the case of an old bullock, "whose cutaneous covering presented strikingly patterned appearance due to numerous arrow-shaped scars of the healed lesions. The animal was in good bodily condition and fed normally but the apparently healthy skin peeled off on the slightest injury or abrasion, etc." Similar cases were observed by me in April 1935, when I was working in the Goat Virus Research Scheme in Saugar District of the Central Province.

CASE 1. A white bullock aged about 12 years belonging to one Ghasita in village Narioli in Saugar Tahsil; the animal has been having the lesions for the past six years. The bullock was working quite well; but on the slightest injury it used to bleed. The lesions were very prominent on both the shoulders and were just like wax models of India with Calcified protruberances, ulcerating ravines and stratified plateaus. The skin in the affected portions was found to be crumbling and could be peeled off layer after layer till you could reach the flesh. I showed this case, which was very interesting, to Captain Bachansingh, M.R.C.V.S., Veterinary Investigation Officer, C. P. and Berar, who was camping there at that time.

CASE 2. A black bullock with white patches aged about ten years belonging to one Girdhari in village Kakron in Saugar Tahsil. Lesions were similar to Case No 1.

CASE 3. A black heifer aged about six years in village Dhana in Saugar Tahsil. The lesions were identical but were more prominent on the gluteal and cervical regions. I mentioned these three cases to the Veterinary Investigation Officer, C. P. and Berar, in my letter to him dated 4th May 1935.

No treatment was tried nor any blood examination was carried out. The fact that these cases belong to adjacent villages gives room for suspicion that they may have a common origin, possibly Microfilarial.

I am greatly indebted to the Army Minister to His Highness' Government and the Director of Veterinary Services, Alwar, for allowing me to publish the above.

LUGOL'S SOLUTION IN HÆMORRHAGIC SEPTICÆMIA AND BLACK QUARTER (?)

BY

S. S. VENKATESAN, G.M.V.C.,

Veterinary Assistant Surgeon, Basin, Berar.

I wish to point out the efficacy of Lugol's Solution of Iodine as a curative agent in the treatment of clinical cases of Black Quarter and Hæmorrhagic Septicæmia.

CASE 1. On the morning of the 9th August last, I was called upon to attend on a local-bred bull, aged about two years, said to have taken ill, all on a sudden, the previous evening. The animal was found standing on three limbs, the right hind being completely off ground. The head was lowered and the ears drooping. There was some lachrymation and the temperature was 103.4°F. Rigors were also noticed. The animal when forced to move had a tendency to fall down. A careful examination of the limb was made. There was an œdematous swelling over the region of the right quarter and thigh which was extremely tender. Percussion did not reveal the presence of any gas, nor was there any trace of wound or injury near about the lesion. However the case was provisionally diagnosed as one of Black Quarter.

Half-a-drachm of Acid Carbolic in a pint of gingely oil was administered orally and an injection of 10 c.c. of Lugol's Iodine was given intravenously. The swelling on the thigh

was massaged with stimulating liniment and fomentation of the part was also advised. Eight ounces of Sodium Chloride in rice gruel was administered thrice in the course of the day. By that evening the animal showed distinct signs of improvement, it could move about unaided within the shed and the affected limb too could be used to some extent. The next morning the temperature had come down to 102°F., the general condition much improved and the animal appeared to feel greatly relieved. Sodium Chloride was repeated, as well as the application of liniment to the limb. It took some feed also in the day and by that evening the swelling and lameness had completely disappeared. On the third morning I found that the animal had fully recovered and there was no need for further treatment.

CASE 2. By this time, another bull about 2½ years old, belonging to the same owner, was noticed to show exactly the same symptoms as those of its fellow. The onset was quite as sudden as before and when I examined the animal on the morning of the 12th August, I found the condition quite indistinguishable from that presented by the first patient. The temperature was 104°F. and the animal passed three or four pellets of mucous-coated faeces. The right fore-limb was highly swollen right from the shoulder down to the knee. The animal did not like the approach of any one, still less its limb being handled. However, with some difficulty, a careful examination of the affected limb was made, and this time the presence of some amount of gas could be detected in the sub-cutis. The animal was lying down with all the limbs fully stretched, and a few attempts to make it stand only proved futile. Treatment was adopted exactly on similar lines as in the previous case, namely, massage and fomentation to the part, intravenous injection of 10 c.c. of Lugol's Iodine Solution and oral administration of half-a-drachm of Acid Carbolie in a pint of oil. Common salt in eight-ounce doses was also given with rice-gruel. The animal could stand of its own accord by that evening. On the following day the temperature was 101.4°F. and the

limb less painful though there was no improvement in the swelling. But before that evening, the swelling had subsided, and the animal though lame was able to walk.

Common salt had had the desired effect on the bowels and was therefore repeated. On the third day the animal was found quite normal but for a small degree of lameness. The general conditions were good and no further treatment was given.

A change of pasture was advised to the herd and no more case was reported afterwards.

Note.—Considering the gravity of the symptoms presented by the two animals, I am of opinion that Black Quarter was not a wrong diagnosis, although unfortunately, no material was available for a microscopical examination.

CASE. 3. A bull-calf, aged about a year, was brought to the dispensary on 13th August 1938, with the history that the animal had been off-feed and dull and was having an occasional cough since the previous night. Temperature was 101.4°F. and there was slight nasal discharge. An electuary containing Sodium Chloride, Black Pepper and Liquorice was administered. The animal was again brought to the dispensary in the evening in the following condition: staring coat, hurried respiration, tongue swollen and protruded from the mouth. There was an oedematous swelling on the throat. Temperature 107°F.

The animal was given 8 grains of Potassium Permanganate in 8 ounces of water per mouth and 8 c.c. of Lugol's solution intravenously. Linimentum Ammonia was rubbed over the throat-swelling.

14th August 1938. Temperature 100°F. and there was great improvement over the other conditions. The throat-swelling had almost disappeared and the tongue was well within the mouth. Potassium Permanganate was repeated and the animal was perfectly all right afterwards, and is quite healthy even to-day.

CASE 4. A bullock about 3½ years old with the following symptoms was brought for treatment on 14th August 1938: Temperature 105°F., staring coat, tongue swollen and protruded, oedematous swelling on the region of the throat

A drench containing 10 grains of Pot. Permanganate was administered per mouth and an intravenous injection of 10 c.c. of Lugol's Iodine was also given.

On the following day, the temperature was 104°F. and the other conditions were almost the same. The following drench was given:—

Soda Bicarb.	2 drachms.
Soda Salicylas.	2 "
Spts. Amm. Aromat.	1 "
Aqua ad.	1 pint

Mft. Hanst. Sig. at once.

By that evening the temperature had come down to 101°F. and the animal showed great improvement. The throat swelling too had disappeared. The same drench was repeated.

Third day.—Temperature 101.4°F. An electuary containing one drachm each of Ferri Sulph., Pulvis Gentian, Pulvis Zingiberis, and Pulvis Nux Vomica was administered.

Fourth day.—Temperature 101°F. The same electuary was repeated. No further treatment was necessary afterwards and the animal is reported to be in excellent condition now.

CASE 5. A local-bred bullock, about 5 years old, was brought to the dispensary on the morning of the 9th August 1938, in very bad condition. There was a big swelling between the jaws and the tongue highly swollen and protruded. There was profuse lachrymation. The breathing was so laboured and noisy that it could be heard a few yards off. The animal was in very great distress and presented a pitiable sight. The temperature was 105.4°F.

The treatment on the same lines as adopted in Cases 3 and 4 was resorted to. Intravenous injection of Lugol's Solution

A Case of Salivary Fistulæ in a Horse

was at that stage only an off-chance. Absolutely no improvement could be noticed and in the evening the poor animal died.

CASE 6. A she-buffalo aged about 5 years was brought to the dispensary with the following history:—Off-feed and dull since the previous day. Temperature 106°F. Breathing was hurried, laboured and stertorous. Large tense swelling at the throat, extending down to the dew-lap.

Oral administration of Potassium Permanganate in water and intravenous injection of 10 c.c. of Lugol's Solution were resorted to in this case also. But the animal succumbed after eight hours.

In all the above four cases, blood-smears were examined microscopically at the Central Veterinary Laboratory, Nagpur, and the ailment in each case was confirmed as Hæmorrhagic Septicæmia.

It is to be noted that the treatment with Lugol's Solution was absolutely of no avail in the last two cases, perhaps because the disease had advanced to such a stage as to seriously interfere with the respiration.

The result of treatment of these two particular diseases with Lugol's Solution is so gratifying that I am sure this line of treatment will find the favour of my professional colleagues, and I hope they will communicate their experiences through this valuable *Journal*.

I must here express my hearty thanks to Mr. M. W. Rahalkar, G.B.V.C., Veterinary Inspector, Akola District, for suggesting to me this valuable line of treatment.

A CASE OF SALIVARY FISTULÆ IN A HORSE

BY

H. V. KULKARNI, G.B.V.C., P.G.,
Acting Chief Veterinary Surgeon, Baroda.

Subject.—Chestnut Indian bred, gelding, 8 years old.

History.—On the 18th December 1937, the animal was admitted in the General Veterinary Hospital, Baroda, for inflammation.

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of the sub-maxillary region. On examination the case was found to be of maxillary adenitis. A few days' general treatment brought the abscess to a head and was opened and dressed antiseptically.

Symptoms.—The next day the following symptoms were noticed. There was copious discharge of a clear, slightly glary liquid during feeding. The chewing was slow and difficult, and carried on the opposite side of the mouth.

On examining, Stenson's duct of the parotid gland was found penetrated at the posterior edge of the sub-maxillary gland, where it passes downwards on the internal pterygoid muscle placing itself in contact with the sub-maxillary vein which turns round the bone to reach the face.

Treatment.—The edges being ragged had to be freshened and brought accurately together. Interrupted sutures were used and sealed with collodium and idoform, with a small blister surrounding the part.

In spite of the various attempts to close the duct even by surgical means, the wound persisted. As a result the horse was gradually losing his condition due to digestive troubles. Destruction of the parotid gland was therefore decided upon.

Two injections of 10 c.c. sterilised pure vaseline, with a melting point of 40 c.c. were given right through the parotid gland at an interval of 8 days but showed no satisfactory progress. The difficulty in feeding was felt more and more. Therefore four injections of 10 c.c. of sterilised dilute Carbolic acid (10 per cent) was given in different places over the gland at an interval of eight days.

These injections produced swelling which yielded to ordinary treatment. The flow of saliva stopped and the wound healed up quickly. On administration of condition powder for a short period, the animal showed improvement and was feeding well at the time of discharge from the Hospital.

GLYCERINE IN THE TREATMENT OF DEEP WOUNDS.

BY

H. V. KULKARNI, G.B.V.C., P.G.,

Acting Chief Veterinary Surgeon, Baroda.

I have great pleasure in recording rapid healing of a deep wound in a horse by using Glycerine. The animal in question, an Australian gelding, was undergoing treatment in the Hospital for a wound, about 5 inches deep, over the left region of the jugular vein. There was great difficulty in making a counter-opening on account of the nearness of the structures of the Oesophagus and Trachea. No progress was seen in healing up of the wound though different dressings were used for a fairly long time; but on reading the comment on Glycerine and its uses in surgery by P. N. Kak, L.V.P. (Hons.), B. G. Cavalry, Srinagar, in the *Indian Veterinary Journal*, page 139 of October 1932, it was tried. Glycerine and luke-warm dist. water (1 in 4) was injected twice a day into the wound and it completely healed up in six weeks' time. During the progress of the healing, discharge of serum was noticed from the wound.

In my opinion, Glycerine proves a very good agent in treating deep wounds of above type.

THREE DAYS CATTLE FEVER.

BY

RAM SWARUP KAUSHAL, G.B.V.C. (Pat.),

Veterinary Assistant Surgeon, Purwa, U. P.

Synonyms.—Stiff-sickness; Ephemeral fever.

Local Name.—"Chaukhra."

This is an acute, infectious and transient fever of cattle, characterised by sudden onset of symptoms, high temperature, muscular pains and lameness. The symptoms develop and disappear within three days or the disease may terminate in death.

The outbreak of this disease is often seen prevailing in the villages especially in the rainy season. Sometimes the disease takes an acute epizootic form and large number of animals become affected and often reports of this disease are received and it is often confused with other contagious diseases.

Susceptibility.—Ox, cows, calves are more susceptible. Age has no consideration. Horses and camels are immune. It is doubtful if buffaloes are affected. In actual outbreak buffaloes are not found affected.

Cause of the Disease.—The cause is so far unknown, but Robertson and Theiler showed that the disease may be transmitted with the blood of the affected animals after an incubation of two to three days. It is possible that the infection is spread by insects and mosquitoes. Recovered animals acquire an immunity lasting up to six months. Nothing can be seen in the blood even on careful examination microscopically.

Method of Spread.—Due to seasonal distribution, mosquitoes and flies can be held responsible for the spread of the disease. Definite proofs are still lacking. Fodder and grass may also be said to be connected.

Symptoms.—The animal is found suddenly sick. The owner describes that the animal was all right the previous night. There is rise of temperature. It is very high sometimes. I found in a few animals temperature to be from 105°F. to 106°F. The animal is off-feed with a staring coat and stoppage of rumination. The muzzle is dry. There is discharge of roapy saliva from the mouth. The most important symptom diagnostic of the disease is that the animal is very stiff, showing disinclination to move. All the four legs are placed well under the body like a horse suffering from laminitis. There is stiffness of the muscles of one or all the extremities, extending to neck or even over the entire body. As a result of this condition the animals are lame, and later they are hardly able to move and seen lying helplessly on the ground on their chest. (The above conditions give an idea of Foot-and-Mouth disease.) There is seen conjunctivitis in a few animals. Constipation may be followed by blood and mucus in the fæces.

It is important to note that the neck of the animal is stiff and there is difficulty in walking and swallowing and as a result there is dribbling of saliva. This fact should be noted when administering medicine.

The symptoms continue for two to three days, sometimes even from six to seven days due to lack of care. The animal loses in condition. As temperature falls, the animal looks brighter, eats its food and within a week assumes its normal condition.

A small percentage of cattle may die. The cause of death in such animals is Gastro-enteritis or heart failure. But I found the death percentage increased due to traumatic pneumonia and congestion of lungs, which was brought about only due to lack of knowledge of the disease.

The 'First Aid' treatment that the villagers carry out before they inform the Veterinary Assistant Surgeon, is that they administer 'ghee and black pepper': and this treatment is always given in every disease. As the animal is unable to swallow, the 'ghee' enters the trachea and thus mechanical pneumonia develops.

The disease is of some importance due to the fact that a similar kind of disease with similar symptoms is said to occur in human-beings. The disease is known as '*Dingu* Fever.' It is characterised by suddenly appearing chills, pains in the joints and muscles, a peculiar stiff gait as a result of pain in the knee joint, followed by exanthema of the skin. According to some observers the same disease occurs in domestic animals.

This disease in animals can be confused with other contagious diseases occurring in the same season, *e.g.*, Foot-and-Mouth Disease, Anthrax, Rheumatism.

Differential Diagnosis.—*Foot-and-Mouth.*—There are ulcers on the foot and inside the mouth. The onset is not so sudden. There is roapy salivation. Duration of the disease is much more longer.

Anthrax.—Early signs are similar, but there is no lameness. Anthrax does not attack so many animals at a time. But large number of deaths enables Anthrax to be differentiated.

Acute Rheumatism.—Does not attack many animals. Runs a longer course.

Treatment.—The animals suffering from stiff-sickness should never be drenched. Due to difficulty in swallowing the animal cannot take anything easily. The owners of the animals insist for medicine. What is most necessary is to keep the animal at an open place and save him from extremes of heat and cold. Give some salines like Magsulph, Pot. Nitrates in drinking water. Care should be concentrated more towards the general comforts of the animals, giving him fresh green and succulent grass. If properly cared, the disease runs its usual course without any complication.

[*Note.*—It is our experience that an intravenous injection of Sodii Salicylas (20 to 40 grs. in 15 to 20 c.c. of Aqua distilata) aborts the course of the disease considerably.—EDITOR, *I. V. J.*]

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	75 0 0	60 0 0			
		8 12 0			
		26 2 0			
		14 8 0			
		79 8 0			
		5 0 0			
303 8 0	544 13 6	569 0 0	600 11 3	487 8 0	744 8 0

Statement of

RECEIPTS.

	Rs. A. P.
Donations from Veterinary Graduates and others (as per receipts)	... 6,001 1 0

6,001 1 0

Certified that we have this day examined and audited the accounts

M. G. KULKARNI,
J. P. DANIEL,
Auditors.

3rd January 1938.

Expenditure.

Illumina- tion.	Postage.	Coolies, Servants.	Bombay Veterinary College for Scholarships and Jubilee Gold Medal	Total of miscellane- ous expenses.	TOTAL.
Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
165 0 0	40 9 6	45 8 0	2,000 0 0	5 2 9	
25 0 0	1 10 0		100 0 0	1 0 6	
7 14 0	0 1 0		124 8 6	12 4 0	
5 2 6				85 4 9	
				10 0 0	
				85 8 0	
				20 0 0	
				10 0 0	
				6 6 9	
203 0 6	42 4 6	45 8 0	2,224 8 6	235 10 9	6,001 1 0

Accounts.

EXPENDITURE.

	Rs. A. P.
Photos, Blocks for Souvenir Booklets	... 303 8 0
Printing, Stationery and Typing	... 569 0 0
Gold Medals	... 544 13 6
Boarding and Lodging, Etc., of Delegates	... 600 11 3
Garden Party (Vegetarian)	... 487 8 0
Furniture, Decoration, Band, Etc.	... 744 8 0
Illuminations, Etc.	... 203 0 6
Postage Stamps, Etc.	... 42 4 6
Coolies, Servants	... 45 8 0
Principal, Bombay Veterinary College, for Scholarships	... 2,224 8 6
Miscellaneous Sundry Expenses	... 235 10 9
	6,001 1 0

with the book and vouchers, and found correct.

1st January 1938.

D. S. LAUD,
Honorary Treasurer.

Statement of Accounts (Vide Expense File).

	Rs.	A.	P.
Photos—R. D. Panwalkar	...	76	8 0
Blocks for Souvenir Booklets	...	156	0 0
Gold Medals, J. J. Press	...	310	13 3
"	...	105	8 3
"	...	53	8 0
Printing Cards—Marzban	...	326	8 0
Flowers—Sawlaram Mahadji	...	18	0 0
Printing—Kamat Press	...	3	4 0
Printing—Shastri's Account	...	45	6 0
Photographs—Katrak	...	71	0 0
Electric Energy—B. E. S. T.	...	7	14 0
Illumination—Khilji	...	165	0 0
Meter for Illuminations	...	25	0 0
Vegetarian Party (at Jubilee)—Purohit Hotel	...	487	8 0
Furniture, Decorations, Band (at Jubilee)—Rabadi, Etc.	...	724	0 0
Lodging & Boarding of Delegates (For Details see Statement)	...	510	0 3
Expenses as per Statement:—			
Lodging, Lunch, Etc.—Moheydin	...	89	6 0
Electric fittings	...	5	2 6
Stationery	...	8	12 0
Coolies, Servants, Etc.	...	45	8 0
Ribbons, Etc.	...	5	2 9
Stamps	...	1	10 0
Exhibits	...	1	0 6
Meals	...	1	5 0
Miscellaneous	...	12	4 0
Printing Bills—Bharat Press	...	170	2 9
"	...	16	0 0
"	...	2	8 0
Typing Work	...	7	10 0
Printing Bills	...	60	0 0
Printing—Muktagiri	...	14	8 0
" Advocate Press	...	45	0 0
"	...	4	8 0
"	...	30	0 0
Postage as per Expense Book	...	21	1 6
" Statement	...	20	8 0
Miscellaneous Expenses—Drama Decorations, Refreshments, all and sundry	...	55	0 0
"	...	8	0 0
"	...	6	8 0
"	...	3	4 0
"	...	1	12 0
"	...	2	7 0
"	...	8	5 9
Principal, Bombay Veterinary College, for Jubilee Medal	...	85	4 9
R. T. Khote (for preparing the final account)	...	2,000	0 0
Principal, Bombay Veterinary College, for the cost of the Gold Medal for the current year	...	10	0 0
Principal, Bombay Veterinary College	...	75	0 0
New Die for Gold Medal	...	100	0 0
For placing cover on the cocoanut tree	...	85	8 0
Pugree	...	20	0 0
Veterinary College Principal for Scholarships	...	2	8 0
Contingencies	...	124	8 6
"	...	10	0 0
Typing work (Statement of Accounts)	...	5	0 0
Stamp for Receipt No. 584	...	0	1 0
Contingencies	...	6	6 9
		11	7 9
		6,001	1 0

1st January 1938.

D. S. LAUD, Honorary Treasurer.

NEW YEAR HONOUR.

"Rai Bahadur" on BABU NILMONEY CHATTERJI, G.B.V.C.,
Assistant Director of Veterinary Services, Orissa, Cuttack.

We are glad to note that the Government have been pleased to award the title of *Rai Bahadur* to Babu Nilmoney Chatterji, G.B.V.C., Assistant Director of Veterinary Services, Orissa, Cuttack, in recognition of his valuable services. We congratulate him on his well-merited distinction and wish him long life to enjoy the honour bestowed on him.

—The Editor.

Communications.

To

THE EDITOR.

*The Indian Veterinary Journal, Madras.*METHODS EMPLOYED TO DETERMINE MILK YIELD,
FAT PERCENTAGE, DRY PERIOD, ETC., IN EXPERIMENTS
ON MILCH CATTLE.

DEAR SIR,

As certain enquires have come to me regarding the tabulated figures of my article, "Cross-bred Cows, Scindi Cows and Buffaloes—A Comparison of Their Efficiency as Dairy Animals," published in July 1938 issue of your *Journal*, I consider it my duty to give full explanation of the figures given therein. I shall feel obliged if you would be kind enough to publish this in your valuable *Journal*.

At the outset, I must say that the figures in the respective tables should be looked upon more as comparative than as actuals although they were actually arrived at.

The test was done when the Animal Nutrition Section was at Bangalore, under instructions of Dr. F. J. Warth, the late Physiological Chemist, in collaboration with Col. Matson of the Military Dairy Department. It was solely a nutrition experiment for the determination of S. E. requirements of Indian cattle. This paper was the outcome of the records so far obtained. After necessary computation for the article, the major portion of the records was left behind when the Nutrition Section was transferred under the Imperial Veterinary Department at Izatnagar, hence, I am sorry I am not able to give now figures other than those already appeared in the article. Perhaps Dr. Warth may be able to give further suggestions on the various methods.

To get an idea of the average dairy animal, it is always necessary to get results from as many animals as possible which fact is known to your readers. So, the whole herd of the Kirkee Dairy Farm was placed under the test. The herd, both dry and milking, as far as this test is concerned, consisted of 141 buffaloes, 60 cross-bred cows and 50 Scindi cows. More or less every week some animals were dried and taken from the experiment and some others calved and they were placed under the test, just as it would happen in the ordinary running of a farm. But the total number of animals was never below 95 as per Table 8 and the minimum number of animals given therein under each herd does not mean that the animals of each herd were in their minimum at the same time. The following method of calculation was adopted to arrive at the milking and dry periods for the average animal.

The number of days of every animal in milk (under the test) was counted and added up; this sum was taken as the total number of days in milk for the average animal to produce the total quantity of milk produced by the herd. Supposing that the test was started with all the animals in the herd just calved, then all the animals would have continued throughout the test and the total number of days for the average animal would have been then, the number of animals multiplied by the days of test, applying the 'Time and work' principle. But, the total number of days actually got by counting is less, because some of the animals were dry and not in the experiment. So, the days would have been, *minus* the days actually got was taken as the dry period for the herd during the course of 266 days.

Coming to milk and fat determination, I may state here that individual milk record was maintained as is generally done in a farm. No other method is accurate in the determination of milk yield as the actual weighing and recording daily. But it is not practicable, in my opinion, to make individual fat tests every day with such a big herd. So the animals were divided into five groups, two groups of buffaloes, two groups of cross-bred cows and one group of Scindis. Individual fat tests were made for three consecutive days for each group, thereby finishing the herd in 15 days, hence the 15 days' period is given in Table 3 of the article. Every day about 50 fat tests were done by a special hand engaged for this work. The figures given in Table 3 is the average or the weighted means of the individual tests. For the purpose of this article it would have been enough and also easier to mix the whole milk of each herd and take a composite sample and fat determined on the composite sample. But the routine of the farm was not disturbed and the fact that the farm was commercially run was always kept in view.

In Bangalore what was being done in such experiments is as follows:—When the milk of each animal was weighed, a sample was taken and kept in a bottle with a preservative say K, er, o. From a week's sample so kept, a composite sample was taken and fat estimated. There again, in order to avoid all such samples coming in a single day for estimation, week-days for animals were so adjusted that daily some 30 to 50 samples were easily dealt with as weekly

samples. If proper sampling is done this was found to be quite accurate. The following procedure gives generally a good representative sample of milk. Before emptying the milk into the scale pan, the milk bucket is rotated vigorously and a spoon with a long vertical handle is dipped deep into the bucket and the sample is drawn. The measure used by oil-mongers in bazzars will do quite well for the purpose.

There are three agents contributing to the fat content of milk, *viz.*, ration, breed and stage of lactation and the period in the particular lactation. Ration could be eliminated by adopting a scientific method of breeding and the fact that identical rationing to be adopted should not be lost sight of. In our test, the animals were getting ration according to the requirement of starch equivalent to meet the demand for milk yield and fat in milk. There are other methods of rationing as supplying nutritive ratio, protein equivalent, etc., which are known to your readers.

As regards the stage of lactation, I may say that in an experiment on the whole herd without any selection of animals for experiments one will necessarily meet with cows in all stages of lactation if the test is to be done on a large number of animals. In my opinion such figures alone should be considered representing that of the average animals. I quite see the importance of the stage of lactation and the period in the lactation when composition of milk is determined. The figures collected so far gives only the periods in that particular lactation. However, in the test we had animals of first lactation, second lactation and so on. For consideration of stage of lactation, grouping again of animals for fat test might solve the difficulty. Newly calved animals could be grouped together, animals with a month's lactation could form another group. I would suggest here when such grouping is made, all difference as breed, period in the lactation, etc., may be considered and groups formed accordingly. Under each group so formed individual or collective fat determination could be done. For animals of the same breed getting the same ration and of the same lactation it is enough I should think to have a composite sample tested. No doubt individual fat determination is more accurate which is feasible only if extra labour as a Tester is employed.

I hope, I have given full explanation as to how the figures in their respective tables of my articles referred to were arrived at. I may add I am always at the command of your readers to place through your valuable Journal whatever little experience I have gained in the same subject.

Yours faithfully,

N. S. SANKARANARAYANAN.

To

THE EDITOR,

The Indian Veterinary Journal, Madras.

DEAR SIR,

Regarding my article on "Gastro Enteritis among Cats" published in your *Journal*, Vol. XV, No 2, I am very sorry, I had stated that

Dr. P.M. Narainswamy Naidu, Research Officer with the Government of Mysore, said that this epidemic disease is a common occurrence among cats in England and Germany due to some Streptococcal infection. It is not a correct statement and I am sorry I have unwittingly caused offence to Dr. P.M. Naidu by those observations without consulting him. I therefore hasten to tender my sincere regret to him and I request you to be kind enough to publish this."

Bangalore,
13th December 1938.

Yours faithfully,
M. R. CHENGRI.

To

THE EDITOR,
The Indian Veterinary Journal, Madras.

NATIONAL GROUPS TO WELCOME DELEGATES AT POULTRY CONGRESS.

DEAR SIR,

Foreign delegations to the Seventh World's Poultry Congress, to be held in Cleveland July 28 to August 7, 1939, will be welcomed by more than 30 Nationality Groups made up of Cleveland residents of foreign descent. W. D. Termohlen, Secretary-General of the Congress, announced to-day.

The second day of the Congress has been designated Home Country Day and will be featured by special entertainments put on by the Nationality Groups for delegations from their respective homelands.

Sunday, July 30, will be International Peace Day. Cleveland's twenty cultural gardens, sponsored by the organized Nationality Groups, will be dedicated as a unit of the City's park system. Soil from shrines in foreign countries will be used in planting trees in the American Legion Nations' Peace Garden, one of the gardens to be dedicated.

As a part of the ceremonies, soil from additional foreign countries will be placed at the base of the monument in the Nations' Peace Garden. The National Poultry Congress Committee in England has promised to bring soil from Westminster Abbey in England, from Wales, from Northern Ireland, and from Scotland. Twenty-six countries already are represented.

Federal participation in the Poultry Congress was authorized by a special act of Congress at the last session. Ten Government Departments, including the Department of Agriculture, are co-operating in the preparation of educational exhibits for the Congress. Dr. C. W. Warburton, Director of Extension Work in the Department, is Chairman

of the Federal Government Committee. Invitations have been extended to more than seventy countries to participate in the Congress and already more than half of them have accepted.

Countries which have indicated their intention to take part in the Congress are: Argentina, Belgium, Brazil, Canada, Chile, Columbia, Costa Rica, Cuba, Czechoslovakia, Denmark, El Salvador, England, Estonia, Finland, France, Germany, Guatemala, Hungary, India, Ireland, Italy, Latvia, Lithuania, Mexico, The Netherlands, Nicaragua, New Zealand, Norway, Panama, Paraguay, Peru, Poland, Sweden, Switzerland, Trinidad, Uruguay, Venezuela and Yugoslavia.

UNITED STATES DEPARTMENT OF AGRICULTURE.

WASHINGTON, D.C.,
November 21, 1938.

Extract.

THE ADAPTATION OF VETERINARY EDUCATION TO MODERN REQUIREMENTS.*

By Professor E. Leclainche,
Director of the Office International des Epizootics,
Paris, France.

In view of its purposes, which are essentially utilitarian, veterinary medicine must adapt itself to the variable conditions that are brought about by the economic and social evolution of human populations.

For centuries it has restricted its attention to the individual treatment of sick animals, and public authorities have shown only a relative and intermittent interest in it. It was not until the idea was conceived that it was possible to take action against the prevailing epizootics that States became concerned with the formation of professional men to combat them, and it is a remarkable thing that it was this consideration alone that urged them. As M'Fadyean has said, veterinary teaching in Europe has its origin in the invasions of rinderpest.

The systems of veterinary teaching had scarcely been instituted when they were called upon to provide without delay the thousands of practitioners who were to replace the "quacks" of the countryside. In order to secure them, Governments were ready to allow great indulgence in the matter of recruiting students. Satisfaction had to be given to the rural masses and it was feared, with good reason, that the requirements, although very reduced, were an added deterrent to students to whom the prospects of the rough calling were already unattractive.

* Translated from a paper presented at the Thirteenth International Veterinary Congress, held at Zurich and Interlaken, August, 1938.

The guiding counsels of Lafosse and Bourgelat could not be followed. The small numbers of practitioners emerging from the schools were absorbed in part by the armies for attendance upon cavalry regiments and the remainder set up in the towns. The first teachers at the schools understood at once that veterinary education could not be undertaken simply as an apprenticeship; it must possess a scientific character and could not be usefully taken up except by students prepared to receive it. If it had been otherwise, veterinary medicine would only have continued the gross empiricism which made up what had been called "farriery," and the profession would have continued to live in a "state of degradation" as it had done in the preceding centuries.

The struggles, lasting for over half a century and occurring in France and Germany especially, to impose more and more exacting scholastic requirements upon candidates are well known, and finally the diploma showing completion of secondary school studies was required. The progress made in veterinary medicine and the improved social standing of the profession are also well known as having coincided exactly with the rigour of the conditions imposed for the recruitment of students.

This condition is not less essential to the success of veterinary education to-day than formerly. The standard demanded ought to guarantee a scientific and philosophical equipment sufficient to enable the candidates to follow the superior education confronting them.

In a few countries only, veterinary education has been abandoned to private initiative. The history of these independent schools completes the demonstration of the need for effective control over professional training. In Great Britain, the United States of America and Canada, it has been the organised profession which has had perforce to replace the defaulting State in this role. Boards of examiners constituted by the great professional organisations have subjected candidates issuing from the free schools to tests, and their requirements are revealed as being as efficient as those of the State boards. It is not impossible, moreover, that a similar procedure might be utilised where State boards prove to lax in their requirements. The rigour of selection operating at entrance and passing out of our schools is the guarantee of our social status and any sign of weakness would immediately be betrayed by regression.

The programme of instruction is obviously subordinated to the social mission of the veterinarian, that is to say to the objects of his activity as discerned by the founders of the French schools. It was no mere question of continuing the tradition of the old-time "farriery". The schools of "rural economy and veterinary art" came to teach everything concerning the "governance of animals" according to the very picturesque expression of the time, and specialised chairs were created in the "governance" of each of the domesticated species.

Therein lay the true doctrine. Medicine and surgery constitute only a part of the programme which comprises essentially the production,

maintenance and utilisation of animals; that is to say, the whole science of animal husbandry. How this conception came to be neglected, if not abandoned, during the first half of the nineteenth century, both in France under the influence of Renault, and also in most other European countries, is known. It seemed that by confining his role to medicine and surgery the veterinarian fulfilled his whole mission and became the equal of the human doctor. The naive slogan of the two sister medicines has not yet in any way disappeared.

At this precise juncture, an agricultural education was created in all countries, and it eagerly appropriated the magnificent field that had been abandoned. Zootechny, born in the veterinary schools, was filched by the agricultural schools, and very often it was veterinarians who taught it in them.

And so it has come about to-day, in the most favourable circumstances, that agricultural officers only unwillingly consent to share with veterinarians the direction of breeding, whilst elsewhere they are in tacit agreement to restrict veterinarians to their medical role, and sometimes only to the treatment of sick animals.

It is incumbent upon veterinary education to prepare a revision which is imposed by good sense. Husbandry is animal hygiene in action, and hygiene, preventive medicine and curative medicine from a combination which cannot be dissociated. There must be a return to the logical conception of former times; veterinary education must comprise, for each animal species, all that concerns genetics, the hygiene of gestation, of the new born, of feeding, of housing, etc., as well as preventive and curative medicine. If one reflects well upon it, one will perceive that all these items of knowledge are complimentary and that they are inseparable. In a very general fashion, the notion of species ought to determine the division of subjects: in the same way as he studies the anatomy of different animals, the veterinarian must study their pathology. The comparative system, which has been excessively abused, causes the objective nature of the studies to be lost sight of; it tends towards a methodology which is most often in opposition to practical realities. Applied to the study of anatomy, it may constitute the basis of a zoological classification or of certain diagnoses (meat inspection), but it is without interest and often harmful in its application to clinical practice and to medical and surgical techniques. In the study of pathology, it is only in part defensible for the study of specific, infectious and parasitic diseases, and it ends up in the case of all other diseases in irremediable confusion.

A general education in anatomy, biology, physiology, pathology, therapeutics, etc., is certainly indispensable, but it ought to remain independent of the objective professional education. Its end is to the philosophic equipment of the student, which is not less indispensable than the technical instruction. It is destined to form the judgment, to suggest comparisons, to awaken the curiosity of the spirit and the taste for research and the love of the science.

If the objects of veterinary medicine and surgery as thus defined remain constant, the relative importance of its several parts varies by reason of the numerical importance, absolute and relative, of its objects, that is to say, of the several domestic species.

The horse was the only animal taken into consideration by the ancient "farriery" and by the first teachers in veterinary education. In fact, its economic role did not cease to grow in the course of the nineteenth century and the advent of railways was in no way prejudicial to it. On the other hand, mechanical traction dealt it a terrible blow, the full severity of which is not yet measurable by statistics. Already sheep rearing has suffered a similar regression in some European countries and the production of artificial wool threatens the future. Thus the maintenance of stock with a view to meat and milk production has become the principal object of breeding and of veterinary practice. Doubtless it is only a question of variations in the relative importance of the several subjects of veterinary practice, but they imply an adaptation of the education to a new hierarchy of the treated subjects. One knows, moreover, of the trouble brought into the clinical instruction of most schools by the diminution of the numbers of horses in large towns, which is in no wise compensated for by the abundance of patients in small-animal clinics for dogs and cats.

Under the pressure of circumstances, education has become orientated in this direction. The pathology of gestation, obstetrics, diseases of the new-born, etc., has passed into the foremost place in the programmes. A grouping of "breeding diseases" has been constituted, based no longer upon the notion of ætiology, but upon the economic destination of the animals. The criterion of "contagiousness" no longer preserves its absolute value except for a small number of affections, in process of disappearance for the most part, while consideration of susceptibility and the influences which predispose towards it acquires each day more importance.

It is towards the building up of a "preventive medicine" that all research must be directed. Methods of immunisation which have occupied the whole stage for 50 years have been far from satisfying all needs, and this conclusion would remain true even though, as we all hope, the problem of vaccination against foot-and-mouth disease will become completely resolved. We know now that the organic medium is profoundly modified by multiple influences and ætiological factors retained by the ancient general pathology exert a much more efficient action than one had hitherto suspected.

These influences are so much the more important to discuss in so far as man can impose upon animals all the conditions capable of ensuring for them, with perfect health, the maximum economic return. It is this preventive medicine which calls for study and teaching everywhere. Based upon general and special ætiology, it utilises all the resources of general and applied hygiene, within the limit of economic possibilities.

In certain countries agricultural groups already proclaim their intention to assure themselves by advice to owners, of the work of prevention

of disease, the veterinarians being called upon to intervene only in the treatment of diseased animals.

A complete education in this "preventive medicine" must be given in the veterinary schools, in liaison with the other disciplinary studies. It ought not to be prejudicial to future professional practice and one must proclaim that everywhere and always veterinarians have spread the precepts of hygiene, with the frequent consequence of bringing about the complete disappearance of certain diseases in their practices. It is a question only of completing the doctrine and of systematising its application.

This extension of programme has the additional consequence of combining the essential items of knowledge which one is obliged to group as constituting the "science of animal husbandry".

Among the tasks that fall upon the veterinarian, control of the wholesomeness of meat figures among the most important, and theoretical and practical instruction is assured everywhere.

If this professional intervention is scarcely disputed—simply perhaps because the methods imposed debar certain candidates—the control of milk by veterinarians, on the other hand, is bitterly disputed; however, the chemistry of milk is inseparable from the physiology and pathology of the udder and the latter are within the field of veterinary science as is bacteriological examination. It would probably have been possible to retain or usefully demand the subject of milk hygiene if a complete education had been given at the appropriate time. This failure admits of a permanent indication; it is the duty of the schools to foresee the tasks which may be entrusted to their pupils and prepare them for these tasks even before they are assigned to them. The example of milk control is, moreover, not the only one which could be cited.

The programme of normal instruction in the schools extends over a scholastic period of eight to ten sessions. (On the Continent the academic year usually comprises two sessions.) It seems that the duration cannot be extended without prejudicing recruitment, and it would appear to be sufficient if a rigorous grouping of examinations guarantees its efficacy.

However, a problem is raised by the recognised need for periods of apprenticeship, which cannot be carried over without inconvenience to the end of the studies.

These periods apply to the practice of meat inspection, to rural practice (farming) and breeding (animal husbandry), and professional practice. A solution which seems to commend itself has recently been adopted in Germany. The periods, which are all obligatory, are divided as follows:—Two months on a farm, with selected agriculturists, during the first summer vacation; three months on an establishment relating to veterinary administration (estates of Adendorf, Klein-Ziethen and Zargenthin); three months at a designated abattoir, during the summer vacation preceding the final examination; six months with an approved practitioner (*Praktikantenzeit*) at the close of studies.

This system has the inconvenience of sacrificing a large part of the vacations, but the nature of the studies imposed is such that it can be regarded, if not as a rest, at least as an appreciable relaxation, and it answers perfectly the recognised needs of practical instruction.

The preparation of these, whether they constitute the professional diploma or an optional university title, could be undertaken to some extent during these periods of probation.

Courses of instruction are provided for the application of certain specialised duties (military career, colonial service) and for the acquirement of certificates necessary for State medicine. These are given either in special schools or in the veterinary schools, according to the particular requirements of each country.

Finally, a course of post-graduate instruction, the importance and advantages of which cannot be over-estimated, is becoming the general rule. The oldest form of this initiative is represented by the old local societies, which have disappeared to a great extent, but the tradition of which is preserved in Great Britain where provincial meetings remain very active. The National Veterinary Medical Association of Great Britain and Ireland, the American Veterinary Medical Association, the Association of Swiss Veterinarians, etc., discuss at their annual meetings questions on the agenda, and these are followed by practical demonstrations. France has inaugurated for some years past *journées vétérinaires* at which new questions are treated by specialists and where various demonstrations are also given; Belgium has followed this example. A much more interesting undertaking has been achieved by *Deutscher Veterinarat*, with its classes given throughout the country by qualified teachers on subjects selected by reason of their topical interest or local or general application; this task is continued by the present *Reichsverband der Deutschen Tierärzte*. Thus, terms of applied study have been envisaged, at least for veterinary officials (meat inspectors, sanitary veterinarians, State veterinarians, etc.) and for the reserve military veterinarians. It is certain that the book and the journal do not at all suffice to enlighten every practitioner and we must look forward to the extension, under these less onerous forms, of opportunities for collective instruction.

Summary.

A careful selection of students is the best guarantee for the future of our profession; it is essential that the present standard of exacting the diploma of having successfully completed secondary school studies (School Leaving Certificate) be maintained.

The programme of teaching must comprise everything that concerns the production, care and utilisation of animals. Hygiene, preventive medicine and curative medicine form a complex that cannot be dissociated. The science of breeding (animal husbandry) is nothing but hygiene put into practice and it is entirely comprised within our programme of studies.

The programme of collegiate teaching, theoretical or practical, must be adapted incessantly to the varying importance of the diverse objectives of professional work. It must be supplemented by periods of practical work initiating the future practitioner to rural life, to the practical methods of animal husbandry, to professional exercise in clinical medicine and meat inspection.

Post-graduate instruction and the extension of facilities for such instruction to all practitioners must be given full attention.

—*Veterinary Record*, Vol. 50, No. 42.

Reviews.

Annual Report of the Imperial Council of Agricultural Research, for 1936-37.

This is the seventh annual report of the Council. Col. Sir Arthur Oliver was the Animal Husbandry Expert till March 1937 when he went on four months' leave and Mr. F. Ware officiated for him. There was no accession to the strength of the Council from the Indian States during the year by way of new members. One of the noteworthy events of the year was the scientific stock-taking of the research activities of the Council since its inception, referred to in the previous report. This was carried out by two Experts brought out from the United Kingdom, *viz.*, Sir John Russel and Sir Norman Wright. Their reports were awaited at the time of writing of the report under review and have been since received and reviewed. Another event was the assembling of the British Commonwealth Scientific Conference in London in September 1936 which "provided valuable opportunities to the representatives of India for making, renewing and cementing valuable contacts with those engaged in comparable work throughout the Commonwealth", where among other subjects, the following of interest and value to the Veterinary workers were also considered:—The work, finance, direction and possible extension of usefulness of the Imperial Bureau of Animal Health, of Animal Nutrition, of Animal Genetics; the future arrangements for the Journal of Dairy Research, fuller co-operation in scientific research, etc. India was represented at the Conference by three delegates not even one of them being a member of the Veterinary profession. The greatest event of the year, however, was the stimulus given to the Animal Husbandry and Animal Health by His Excellency the Viceroy's presenting three Pedigree Breeding Bulls with funds for their maintenance, addressing the Members of the Advisory Board and of the Governing Body of the Council, giving them valuable practical hints for formulating a sound breeding policy to secure better working and milch cattle and above all the crowning act of His Excellency's was his purchasing from the City Dairies of Calcutta and Bombay half a dozen "Dry" cows and one buffalo—which were normally doomed for sale to the butcher—and bringing and presenting them to the

Pinjrapole at Delhi for breeding purpose during the year. One can never over-estimate the moral and economic value of these thoughtful acts of His Excellency the Viceroy, towards the improvement of the live-stock industry in this country.

The Second Meeting of the Animal Husbandry Wing of the Board of Agriculture, and Animal Husbandry which met in Madras on the invitation of the Government of Madras was opened by His Excellency the Governor. The two Experts from the United Kingdom, also attended this meeting and participated in its proceedings. The discussions embraced several important matters, such as Veterinary Education, Animal Health, Animal Breeding, Animal Industry, Animal Nutrition and Dairying, combating of such diseases as Rinderpest, measures to give effect to His Excellency the Viceroy's Cattle Improvement Scheme, marketing of Animal products such as hides and skins and dairy legislation and international conventions relating to the trade in live-stock products. Some of these matters have been separately dealt with in the Report. The decisions reached on some other subjects are the following:—

(a) For carrying out castration, vaccination and other live-stock improvement work, properly trained stockmen working under Veterinary supervision should be employed to supplement the work of the Provincial Veterinary Departments. We may mention here that Mysore has been already a pioneer in training and employing villagers to do castration work in the villages. This may be conveniently extended to the rest of the country. Regarding vaccinations, time has not yet come in our opinion to entrust this work to the "stockmen." It may come later on, when simple, safe and reliable products will become available for prophylaxis in the several epizootics prevalent in the country. (b) The forms and tables for collecting all-India statistics relating to live-stock were revised. (c) For the control of Rinderpest outbreaks, Goat-virus or vaccine may be adopted in cattle and sero-virus in buffaloes. India should be mapped to show Rinderpest enzootic areas. Other problems on Rinderpest were reserved for further consideration. (d) Regarding Black-Quarter, an Officer with special knowledge of the pathogenic anaerobes affecting domestic animals should be appointed and he should confirm the diagnosis of outbreaks which will be carried out in the provincial Laboratories; mapping out enzootic areas in provinces, according to the causal organism, should be carried out. (e) Sheep and goats are important animals of export. Owing to diseases in them, the country's export trade in these has been adversely affected. It is, therefore, a wise step that the meeting decided to instruct the Veterinary Investigation Officers in the Provinces to further investigate the incidence and control of diseases in sheep and goats contemplating special study of the problem in the Central Institute. (f) The note on the proposed Quarantine station at ports was left for the consideration of the Committee which dealt with the Contagious Diseases of Animals (India) Draft Bill and thereafter to be circulated for opinion. (g) A portion of the village uplift funds could be justifiably expended on improving the sheep breeding industry on a large scale by means of demonstration flocks of select breeds of about 50 ewes and 2 rams in each group under suitable conditions of

control. This is a good decision indeed. (h) It was considered necessary to establish cattle dips in the Government Cattle Breeding Farms for propaganda purpose. In view of the huge and insidious loss due to tick infestation, we consider it necessary to provide cattle dips in all the Government Farms and Veterinary Hospitals which may levy a nominal fee per animal if the results obtained in the Military Dairy Farms, etc., prove satisfactory. (i) Branding of animals with a specific mark should be done on the cheek of approved cattle of the category of selected improved stock and tattooing the ear may be adopted for a further mark of individual identification if necessary. If however branding is to be done on the hides, it should be done only on the neck. This is a helpful and wise suggestion. (j) Artificial insemination so successful in other countries, may be studied with the establishment of Animal Genetic's Institute. (k) Consideration of classifying working animals into light, medium and heavy, according to measurements, age, etc., was postponed until the completion of survey by the Agricultural Marketing Adviser to the Government of India. It was decided to examine the question of licensing brokers in recognised cattle fairs and markets. This licensing will be very helpful to honest dealers. (l) A simple system of grading wool was found necessary to develop the industry and also facilities for washing sheep in shearing centres, were suggested. (m) It was decided that the questionnaire by the Animal Nutrition Committee for obtaining information regarding the fodder crops, should be referred to a Sub-committee of the Advisory Board for examination, before its circulation. (n) The Central Institute of Animal Nutrition should investigate scientifically into the causes of equine abortion in Indian studs. Further investigation regarding the appearance of it, undertaken, from nutritional point of view and results obtained should be collated. (o) The Central Institute was also required to investigate the mineral requirements of dairy animals up to the fourth lactation, in health and malnutrition due to mineral deficiencies and render assistance to the provinces. (p) The meeting recommended that the necessary facilities should be provided towards the improvement of the dairy industry, educating the public on the advantages of using pedigree stock, forming breed and milk recording societies. (q) The Central Pedigree Herd Books should be started to register the seven milch breeds of cattle of all-India importance laying down forms, methods, rules, etc., for registration guidance in the provinces which should receive the applications and pass them on to the Central Committee with recommendation. To accelerate the movement, registration should be free of charge for the first 18 months after the start and thereafter a fee of Rs. 2 per animal should be levied. (r) It was recognised that time has come for paying attention to the development of various breeds of buffaloes in the Dairy Industry. (s) The use of the Burdizzo Emasculator should be extended and the villagers should be trained to use this under the veterinary supervision. This was long ago advocated and put into practice in Mysore. (t) The importance of statistics in Research and Animal Husbandry was duly recognised and emphasised and the Statistician was required to prepare a note dealing with the elementary aspect and help the research work in laying out the particulars of experiments, advising on the statistical interpretation of results of research work. The statistician should also lecture to the Post-graduate class annually at Muktesar. These are all, no doubt, very important

and useful decisions which should be given effect to without much unnecessary delay.

The meeting also reached the conclusion that there was scope for the improvement of grazing in certain types of forest scrub and waste lands outside the reserve forests. Setting up of fodder and grazing committees in the provinces was recommended to attend to the several matters concerning the fodder problem. Conveners with necessary funds were appointed to assemble breeders, to draw up schedules of breed points of the seven of the most important breeds of Indian Dairy Cattle and to submit their reports early. A small Committee was also appointed to examine the question of salvage of dry cows and buffaloes from the big cities of Calcutta, Bombay and Madras, a problem which had been thoroughly studied by Sir Arthur Oliver. The measures recommended by the Committee to check the alleged cruel practices and to improve the general condition, are thus summarised:— (a) Control of milk supplies in cities, *e.g.*, by issuing licences to sell milk only to men of substance and discontinuing the issue of such licences to hawkers. (b) Production of milk outside city limits and tightening up the administration of the Food and Drugs Act. (c) Railway facilities for transport of dairy produce and the establishment by Municipalities of milk-selling centres. (d) The development of such special dairy areas as that recently established at Palghar for the supply of milk to Bombay City. (e) Breeding in gowshalas and pinjrapoles, of improved cattle on approved lines. (f) The registration of cattle imported into cities. (g) And deterrent punishment for such malpractices as phuka and the starvation of calves. With the co-operation of Provincial Governments, constituent States, local boards and Railway companies, it is hoped that the long standing evils will be gradually eradicated if they take up the recommendations of the Committee.

The draft syllabus for both elementary and higher courses in dairying was scrutinised by a sub-committee and the decision was postponed pending the receipt of the expert views of Dr. Wright.

Regarding the adulteration of dairy products, it was proposed to draw up a code of instruction for the guidance of the Provincial Governments who are competent to further legislate in the matter. It was, however, pointed out that the principal need is not an addition to existing legislation so much as better administration of the law. Certain areas mentioned in the report were selected to conduct economic enquiry in the villages, on the production and consumption of milk with the object of collecting and collating information regarding the number of cows, buffaloes and other working animals in each house, production and consumption of milk, butter, ghee and other milk products and proportionate relationship between the production of milk and its products and the quantities consumed by the family and otherwise disposed. We remember a similar enquiry, among others, was conducted and information gathered by a colleague of ours in this presidency in 1934 when he conducted the Live-stock Survey in the Rural Development area of Trivellore in Chingleput District. We may parenthetically ask here as to what has happened to his valuable report containing elaborate useful information on various aspects of the Live-stock Industry in the area.

The Bill for the control of diseases among live-stock was undergoing further drafting. We have in these columns fully expressed, on the decision of the meeting to start a Central Veterinary College, as an ill-considered and wasteful step. This view has been also reiterated by the entire Indian Veterinary Profession. It is wise to give up this scheme.

A sub-committee of the Dairy Legislation Committee drew up a set of model rules to apply to slaughter houses generally as the present method in this respect is deplorable and these rules were circulated to the provinces. Sanction was obtained to continue and extend the scheme of disease investigation in the provinces and constituent States and a recommendation was made to approach the Government of India for making permanent provision for the officers engaged in the scheme to ensure continuity of work and progress and to give security of tenure of office to the staff, the absence of which will, the Council apprehends, be derogatory to the value and usefulness of the research work at present being done. This is quite so, especially in the case of Indian workers not placed on the same scale as their *confreres* engaged in similar work.

The report also deals with the goat-virus vaccination in the Central Provinces, John's disease investigation in Mysore, appointment of a systematic Protozoologist at the Imperial Veterinary Research Institute, Muktesar, Pharmacological Research in the Punjab, Animal Nutrition work in Coimbatore and Dacca, Analysis of the composition of milk at the Allahabad Agricultural Institute, Goat Breeding at Etah, and Research work in Warble Flies at Muktesar. Much work in the way of investigations, surveys, meetings, discussions and drafting bills, reports and recommendations has been done during the seven years of its existence by the Council, but it should hasten its speed of work and show more tangible benefit of its activities, to the country commensurate with her needs and also time and funds spent so far, specially in view of rapid progress taking place in civilised countries.

We are sure a perusal of the report will benefit our readers much.

Annual Administration Report of the Madras Civil Veterinary Department for the year 1936-37.

The Gazetted staff consisted of one Director of Veterinary Services and a Principal of the Madras Veterinary College in the I.V.S. Cadre; 12 District Veterinary Officers, six Lecturers, one Superintendent, Serum Institute, one Inspector of Live-stock and a Veterinary Investigation Officer (temporary addition)—all in the Provincial cadre and one Lecturer in Pathology and Bacteriology, on contract basis. The subordinate staff consisted of 309 Veterinary Assistant surgeons including 62 temporary posts and 32 leave reserves.

Out of 33,199 deaths from all contagious diseases among cattle, 5,102 (2,752) were from Rinderpest in 713 (443) outbreaks; 3,339 (2,383) from Anthrax in 442 (382) outbreaks; 6,653 (5,664) from Hæmorrhagic Septicæmia in 1,722 (924) outbreaks; 7,929 (5,854) from Black-Quarter in 1,451

(986) outbreaks and 2,965 (976) from Foot and-Mouth Disease in 1,456 (933) outbreaks. The figures in parentheses indicate the corresponding figures in the previous year. It is thus seen there was a general rise in the number of outbreaks and mortality from contagious diseases which was on the steady decline in the previous years. In 1,821 villages out of 1,894 affected, with a bovine population of 1,264,617, inoculations done totalled 474,559 in bovines and 21,794 in others as follows:—Serum-simultaneous 137,339, Goat-virus 62,907 and Serum-alone 3,230 against Rinderpest; 116,037 against Hæmorrhagic Septicæmia by Serum-alone; Serum-alone 37,373, Vaccine-alone 24,560 and Sero-vaccine 81,308 against Black-quarter; Serum-alone 14,494 against Anthrax; Ovination 7,878 against Sheep-pox; Sero-vaccine 325, Vaccine-alone 126 and Serum-alone 100 against Fowl-cholera; Vaccination 8,830 against Fowl-pox; Vaccine 1,477 against contagious Pleuro-Pneumonia and Vaccine 149 against Pseudo-fowl-pest and others 250.

Bovine Trypanosomiasis prevailed in a virulent form in North Arcot and Chingleput. Eleven cases were detected and confirmed for John's disease; one bull in Madura district, one in Rajahmundry and one in Coimbatore were confirmed for Tuberculosis. Sodii Salycilas proved successful in treating Ephemeral Fever cases. Fifty-four Bovine Lymphangitis cases were treated with a vaccine from the Madras Veterinary College. Fifteen brains from bovines were confirmed for rabies and seven bovines were protected with vaccine from Coonoor against it. A successfully treated case of Tetanus is recorded. Nasal Schistosomiasis and Coccidiosis in bovines, Anthrax, Hæmorrhagic Septicæmia, Pleuro-Pneumonia and Sheep-pox, Cholera and Pseudo-pest in Poultry, cases of Surra, Rabies and Strangles in equines, Tuberculosis and Rabies in dogs are all recorded in the report.

Two Government institutions and one private institution were transferred to the newly formed Orissa Province. There were therefore 111 Government and five private institutions (including the newly opened one Government and one private institution). Total number of in- and out-patients treated increased from 253,230 to 262,774, and cases supplied with medicines from 4,582 to 6,261 in these institutions. Touring billets increased from 109 to 133 including 30 new ones sanctioned in the year but excluding 6 handed over to the newly formed Orissa Province. Cases treated on tours increased from 115,316 to 137,454, *i.e.*, 64,097 contagious and 73,357 non-contagious. Total castration rose from 70,576 to 72,862.

Nine cases of criminal poisoning confirmed, ended in convictions and two in acquittals. Only 2,786 cases were remanded for treatment by the Magistrates to the infirmaries under the S.P.C.A. Act, as against 3,780 in the previous year, though the conviction under the Act were 12,418 against 12,551 in the previous year. No mention is made of the number of Municipalities which maintain Lethal Chambers for the destruction of unclaimed stray dogs and also if any good results were obtained from the departmental inspection of these. Similarly the number is not mentioned of the Municipalities engaging the services of the departmental staff for their meat inspection. Propaganda was carried on by the staff on tours, in the Health and Baby Week Celebrations, Fairs and

Shows and also by the two Motor Exhibition Vans of the Department. The scheme for the Model Dairy was still under consideration of the Government during the year

The B.V.Sc. course was introduced in the Madras Veterinary College from July 1936. New admissions from the province were fixed up at 15 for the Degree and 15 for the Diploma course and 20 from outside for both courses, total being 50. Total strength of students in all the classes was 101, *i.e.*, 50 in A, 27 in B and 24 in C. Fifteen passed out from the Class C, 18 from B and 22 from A in the annual examinations and six four and four respectively in the supplemental examination.

Nine underwent post-graduate course. The X-ray Department, continued to do useful work. 11,063 specimens were examined in the several sections of the College Laboratory. John's disease in 11 cows, Tuberculosis in two dogs and in a cow, Rabies in 73 cases and Actinomycosis in four bovines, were confirmed. Autogenous vaccine for 40 cases and urine hormones for 16 bovines were prepared and supplied. Biological tests were conducted in 206 cases, with positive results in 81 cases for various diseases. *T. Evansi* in a circus tiger, existence of *Setaria digitata* and *Jhelaza rhodesi* in a bullock's eye, oocysts *simeria faurei* from goats, a species of leucocytozoon in a fowl and a species of microfilaria in a fowl's blood were also confirmed. The Clinical Laboratory did useful work for the hospital and students. The much useful work done in the other sections has been briefly mentioned in the report.

The Serum Institute continued to manufacture and supply anti-hæmorrhagic Septicæmia and rinderpest sera and rinderpest virus (goat and bull). Trials in the development of goat tissue-virus were made. The routine Laboratory work of examining specimens was continued.

Under Research, many experiments have been recorded to find out a safe product of sufficient antigenic value for immediate field use against Rinderpest and they were in progress during the year.

The Veterinary Investigation Officer continued his work on the incidence of sheep and goat diseases and Trypanosomiasis in cattle. He also conducted tests on John's disease. Much interesting information is given under Research in the Madras Veterinary College Laboratories.

The total receipts and charges of the department were Rs. 54009-15-11 and Rs. 10,12,616-0-5 against Rs. 49,829-5-9 and Rs. 9,79,271-10-5 in the previous year.

The report is an interesting record of good work done during the year.

Annual Report of the Veterinary Department, S. S. and F. M. S., for the year 1936.

(1) Administration of Quarantine Laws for the prevention and control of diseases, (2) improvement and development of the live-stock industry, (3) investigation of less demonstrable disease problems, (4) enforcing the laws relating to cruelty to animals, and (5) supervision and inspection of abattoirs and meat for human consumption are among the important activities of the Department in S. S. and F. M. S. The staff for this purpose consists of one Director of Veterinary Research and Veterinary Adviser, seven Government Veterinary Surgeons, nine Assistant Veterinary Surgeons, 18 Veterinary Inspectors, ten unqualified but locally trained assistants and two Live-stock Inspectors. Besides these, there were 65 Veterinary Police constables and watchmen to help in enforcing the laws relating to animals. Effect was given to the proposal of the previous year and a locally trained Chinese speaking officer was appointed as Live-stock Inspector, to be an effective link between the existing technical officers and the Chinese engaged in pig and poultry farming. Improvement of dairy stock, ghee production from the milk of Malayan buffaloes and live-stock shows were also carried out during the year. The revenue, derived mainly from imports, exports, transshipments, landing and quarantine fees and treatment charges, was \$ 10,766 in F. M. S. and \$ 78,173 in S. S. There is a decrease in these over the previous year's figures due to the fall in the number of animals for slaughter, imported during the year. Singapore Municipality gives free treatment for sick animals. The expenditure was \$ 129,891 in F. M. S. and \$ 73,080 in S. S., an increase in both cases due to the salary of new appointments and other charges.

19,476 oxen, 3,737 buffaloes, 60,419 sheep, 8,584 goats, and 127,257 swines were imported, mainly for slaughter. Also 54 horses from the United Kingdom and 77 from Australia, 61 dogs from the United Kingdom, 63 from Australia, three from U.S.A., four from Germany and two from Holland were imported. Restrictions placed on the importation of goats from India due to diseases, resulted in the loss of that valuable market for Indian goats and helped in the increase of imports of goats from the Netherlands to Singapore. For the same reason, there has been a considerable shrinkage in the import of live-stock into Ceylon from India in the recent years. If India should get back these markets for her live-stock and live-stock products, the Veterinary Departments in India should pay more attention to the diseases among goats and sheep also.

Out of 33,054 oxen, 9,431 buffaloes, 52,424 sheep, 34,451 goats and 701,723 pigs slaughtered during the year, 15,049 oxen, 5,894 buffaloes, 5,980 sheep, 25,955 goats and 576,645 swines were locally bred animals and their approximate total value was \$ 9,915,995. The importance of the live-stock industry is further emphasised when we consider also the values of their products such as milk, ghee, hides and skins, the value of poultry and the importance of live-stock to some plant industries.

Whole carcasses of 4 oxen and 20 swine and organs and parts of carcasses in 24 oxen and 1,164 swine were condemned on account of

tuberculosis. Total whole carcasses condemned on account of various disease conditions were 51 oxen, one buffalo, 56 sheep, 42 goats and 2,391 swine. Besides, organs and parts of carcasses were condemned due to various disease conditions in 27,216 oxen, 2,507 buffaloes, 10,084 sheep, 2,906 goats and 117,350 swine.

Survey of live-stock figures for oxen, etc., shows a general increase. Total approximate value of all animals was \$ 16,381,470.

Propaganda through lectures for the improvement of the Animal Husbandry was continued and it was proposed to supplement this, with demonstrations. Live-stock shows were also organised. The position of the Dairying Industry which is mainly in the hands of the Indians there, was not quite satisfactory for want of proper stud bulls. Selective breeding and improved food supply were felt quite necessary to improve this industry. In Singapore, the two European managed Dairy Farms run on up-to-date lines introduced several improvements. There were several cases of Mastitis in the herd of European cattle in the Fraser's Hill Dairy Farm and satisfactory treatment for this condition was not yet known. The period of gestation in Malayan water buffaloes has been recorded to vary from 330 days to 338. Insufflation of methylene blue into the prepuce of the bull was tried to establish the date of service as this would leave its mark on the female genital. Interval of calvings among these animals varies from 480 days to 976. "Heat" appears after calving, at monthly intervals and lasts about a fortnight if fertilisation does not occur. They reach puberty after two years of age. Castrations were carried out in the Farms. Cross breeding in Indian and Malayan buffaloes did not prove successful. The highest daily yield was four pints at one milking. One gallon of this buffalo milk yields 12½ ounces of butter or 9 ounces of ghee. For a fee of \$5 per year, paid either in *cash* or *kind*, a male goat (sire) would be given by the Government to any Society of Goat Breeders for improving the local breed and at the end of the year, it will be replaced by another sire if considered necessary. This method is a real encouragement to goat breeders. Swine breeding especially with European breeds is said to be quite profitable—both from manurial and pork points of view. Poultry husbandry also received attention and surveys regarding their conditions and diseases were being made.

Outbreaks of Foot-and-Mouth Disease, Hæmorrhagic Septicæmia and Strangles have been recorded. Goat-pox was rather severe. "Puru" or Necrobacillosis among goats broke out in several places. Detailed observations made in this connection and also on Swine Fever have been recorded in the report. Contagious Caprine-Pleuro-Pneumonia prevailed in a herd. Destruction of all goats in that herd and control of movements in the neighbourhood checked its spread. There were three cases of Trypanosomiasis in dogs. Distemper prevailed both among dogs and cats. Two cases of Tuberculosis in European birds (poultry) were confirmed. Fowl-pox, virus inspection, worms' infestation, Luco-cytozoon infection and some nervous diseases prevailed in poultry.

Research on (1) Equine Anhidrosis or 'Dry Coat,' (2) Fowl-pox, (3) Pigeon-pox vaccine, and (4) Syngamosis was conducted and the

elaborate and interesting observations in the case of Dry Coat in horses have been recorded. Legislative restrictions in force during the year against Rinderpest, Foot-and-Mouth Disease, Swine Fever, Rabies and goat diseases are also mentioned in the report. In F. M. S., a new enactment of Diseases of Animals (No. 40 of 1936) was put into force and according to this, importation of animals excepting from the specially declared areas is prohibited. Military animals were regularly inspected. Quantity and value of imports of various poultry, and animal and poultry products are given in a tabular form. Live-stock census figures in Malaya for 1935 and 1936 have been also given. This interesting report is a record of good progress.

Agriculture and Animal Husbandry in India, 1933-35.

PART II—ANIMAL HUSBANDRY.

This publication was formerly called the Review of Agricultural Operations in India and now this Part II has been based on the annual reports of the Veterinary and Agricultural Departments of the Provinces and a few of the States, the reports of the Imperial Agricultural Research Institute, New Delhi, and the Imperial Veterinary Research Institute, Muktesar, for the two years of 1933-34 and 1934-35 and has been issued under the authority of the Imperial Council of Agricultural Research in India, in two parts, Part I dealing with crop production and Part II, with Animal Husbandry. It has been since, however, arranged to publish this review annually.

Chapter I on Live-stock begins with (1) General Remarks, deals briefly with, (2) Contagious diseases and their control, (3) Local diseases and Public Health work, (4) Breeding operations among (a) Cattle, (b) other animals and (c) Poultry, and (5) Dairying.

In Chapter II, Veterinary and Animal Husbandry Research, Animal Health and Animal Nutrition work carried out during the two years has been summarised. Activities under Veterinary education and other courses in the Veterinary Colleges, Indian Dairy Diploma and Post-graduate courses, have been touched in Chapter III. Chapter IV—the last one—mentions very briefly the financial aspect of the receipts and expenditure of the various Agricultural and Veterinary Departments giving the figures province-war in the three statements attached to it.

Appendix I gives, in a tabular form, the working of the Veterinary departments in India mentioning figures under mortality, number of veterinary institutions, cases treated there and the number of cases treated and castrated on tours, outbreaks of contagious diseases in which inoculations were carried on and the mortality before and after the inoculation in the twelve British Indian provinces and in Hyderabad (Deccan), Mysore, Coorg and Ajmere-Merwara.

Appendix II gives the details of the working of the six Veterinary Colleges (including the Insein Veterinary School in Burma) regarding

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the number of years of training in each, admissions, educational qualifications of the students, final passes and the number of scholarship-holders.

In Appendix III, province-war figures are given showing the number of bulls, cows, male and female buffaloes and young stock issued out from the Government farms.

Appendix IV contains the list of Animal Husbandry and Veterinary publications in India published during the two years under review, mentioning their titles, authors and publishers.

The review concludes with the following passage, "Financial stringency was responsible to a great extent circumscribing the activities of the various Agricultural and Veterinary Departments in the Provinces". "Valuable research work, was however, carried out and in some cases initiated as a result of the grants made by the Imperial Council of Agricultural Research and the Indian Central Cotton Committee and the assistance of these two has been generously acknowledged in the various departmental reports of the provinces" and the States.

The Review contains much valuable information ably summarised under the several heads and it is not possible to do justice to it by further summarising it for a review in the limited space available in the *Journal* and we therefore commend this publication to every one interested in the great Live-stock Industry of this country, to read and ponder over the figures and other contents in it.

Administration Report of the Veterinary Section, Cochin State, for 1935-36.

Veterinary Section is a branch of the State Agricultural Department and its activities are chronicled in about seven pages in a report of 83 pages of the main department. Only one camp dispensary was added to the existing eight hospitals in response to the growing demand for increased veterinary aid. There were ten Veterinary Inspectors, two Touring Veterinary Inspectors and nine Honorary Veterinary Inspectors. In the absence of Veterinary Inspectors either on leave or otherwise, the Honorary Veterinary Inspectors were put in charge of the hospitals. It is regrettable to note that the one Veterinary Inspector under training in the post-graduate course at Muktesar from the State, died during the year. The additional Veterinary Inspector who had the post-graduate training in the Madras Veterinary College was attached to the Veterinary Hospital at Trichur, where he examined 70 specimens from all parts of the State. The necessity to provide microscopes to all hospitals has been stressed but the proposal was allowed to lie over for want of funds. Including 526 in-patients, 30,303 cases were treated and 2,564 operations including castrations were done in the hospitals against 25,505 and 2,414 respectively in the previous year. The two Touring Veterinary Inspectors treated 1,429 cases and did 347 operations

including 328 castrations. Though the cattle diseases were kept under proper control, still Foot-and-Mouth disease, Hæmorrhagic Septicæmia and Anthrax were reported. Mention is also made of the reports under Black-Quarter, Rabies, Canine Distemper, John's disease, Piroplasmosis, Fowl-cholera and Glanders which were all checked by the prompt and timely action taken. 1,305 serum-alone inoculations against Hæmorrhagic Septicæmia were done. Meat inspection in three towns, inspection of animals in the Central farm, Central Jail and Zoo and lecturing on Veterinary Science to the pupils of the Agricultural School were done by the staff of the Section. The total expenditure of the Section was Rs. 31,365 and the work turned out was quite an increase over that in the previous year.

It is hoped that under the new reforms and the Minister, the Section will soon develop into an independent department with a large staff to take up the several activities of the live-stock industry of the State as in other States and Provinces.

Annual Report of the Stud and Veterinary Department of H. E. H. The Nizam's Government, Hyderabad (Deccan), for the year 1934-35.

The Staff consisted of one Director, five Deputy Superintendents, 16 Veterinary Inspectors, 40 Assistant Veterinary Inspectors, 38 Veterinary Assistants, 17 Salustry Jamadars and eight Salustries.

Out of 1,131 outbreaks of Epizootics in the year, 464 were of Rinderpest; 205 of Foot-and-Mouth and the remaining were of other diseases. Total mortality fell to 18,573 from 22,097. Rinderpest was responsible for over 76 per cent of mortality among cattle. 510 reported outbreaks were attended by the staff. 83,250 Goat-virus-alone vaccinations against Rinderpest were done; 49,613 Serum-simultaneous inoculations were also done. Total number of inoculations was 2,19,276, an increase of nearly 7,000 over the previous year's figure. The number of animals treated at the hospitals, dispensaries and on tour rose from 3,67,831 to 3,90,708. Number of Veterinary Institutions increased from 85 to 91; the officials employed from 97 to 102 and the villages visited from 11,153 to 11,287. Castrations fell from 30,639 to 29,429.

There were 33 stallions and 16 stands. The coverings were 560, the average per stallion being 22'4 against 20'65 in the previous year. There were 25 breeding bulls as against 15 in the previous year.

The one noteworthy feature is the award of prizes of the value of Rs. 1,971 besides eight silver medals and 2,835 tolas of silver bangles in the sixteen Horse and Cattle shows held during the year. This is a very good encouragement to the Live-stock Industry. Experiments in the breeding of Bikaner sheep were continued. The Amrit Mahal bulls distributed by the Government were found to be quite satisfactory. The report records a great demand for breeding bulls from the cultivators. Rural Uplift work continued in 14 villages. There were only four State

Scholars, one in the Bombay Veterinary College and three in Madras. Besides, two Veterinary Inspectors were sent to the Madras Veterinary College for Post-Graduate course which is acknowledged to give beneficial results.

The report as usual contains many interesting photos and a number of useful statements and is a good record of general progress all round.

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The staff of the Department consisted of one Director, five Deputy Superintendents, 16 Veterinary Inspectors, 40 Veterinary Assistant Surgeons, 38 Veterinary Assistants, 17 Salustry Jamadars and 15 Salustries.

There were 102 Veterinary Institutions with 111 Veterinary Officers working in them as against 85 and 97 respectively in the previous year. Number of outbreaks decreased from 1,131 to 986. Of these 359 were of Rinderpest against 464 in the previous year and the mortality from 14,069 to 6,791, a marked decrease. 91,381 goat-virus-alone vaccinations and 31,713 serum-simultaneous inoculations were done against Rinderpest, whereas they were 83,250 and 49,235 respectively in the previous year. The total number of inoculations and vaccinations done in the year increased to 2,71,896 from 2,19,276 in the previous year whereas total number of cases treated and castrated fell from 3,90,708 and 29,429 in the previous year to 3,50,181 and 28,874 respectively, due to the increased attention paid by the staff to preventive inoculations and attendance at the outbreaks of contagious diseases. Goat-tissue vaccine production was started locally during the year.

The number of stallion stands was 16 and the coverings 513, the average covering per stallion being 21'37 as against 22'4 in the previous year. There were 25 breeding bulls. There was a great demand for still more breeding bulls and this matter was receiving the attention of the Government. Fifteen Horse and Cattle Shows were held. The district and several Samsthanam Officers took interest in them. There was a closer co-operation among the Veterinary, Revenue, Co-operative and Agricultural Departments and the sphere of utility, therefore, naturally extended. Participation in the Rural Uplift Work was continued in the year. There was only one State scholar in the Bombay Veterinary College. Two Veterinary Inspectors were deputed to the Madras Veterinary College for Post-Graduate training.

The Stud and the Fodder Farm at Hingoli continued to do good work. The demand for veterinary aid has been increasing every year. But the expansion of the department has not been keeping pace with this increased demand.

The report is, however, a record of increased work, especially on the preventive side and as usual contains many interesting photos useful and detailed statements and illustrative graphs. The increased useful work of the department has been well appreciated by the Government and the I. C. A. R. in India.

Annual Report of the Civil Veterinary Department, Bihar and Orissa, for the year 1935-36.

The Departmental staff consisted of one Director, three Provincial Service Officers, 13 Veterinary Inspectors, six Staff Veterinary Assistant Surgeons, two Laboratory Assistants, 12 Reserve Veterinary Assistant Surgeons and 126 District Veterinary Assistant Surgeons (31 Stationary and 95 touring). There was no change in the total number of subordinate officers. There was also one Disease Investigation Officer in the Provincial Cadre.

Of the total number of 5,403 outbreaks under head "Bovine", 4,636 were attended by the staff, giving a percentage of 85.8 attendance against 86 in the previous year. The Goat-virus work and the Rural Dispensary attendance account for the small decrease in the attendance at the outbreaks. Unless the staff is increased sufficiently, the report frankly says, the attendance cannot be increased. This is the bare truth. There were eight deaths from contagious diseases among equines, 9,794 among bovines and 1,682 among other animals, Rinderpest and Haemorrhagic Septicæmia being responsible to 6,427 and 2,609 respectively among bovines. 76,559 Serum-alone inoculations and 4,45,282 tissue vaccinations against Rinderpest were done. Total number of protective inoculations and vaccinations done was 5,76,011 against all contagious diseases in bovines and 80 in equines. 1,04,807 castrations were done, and 72,680 contagious and 2,51,713 non-contagious cases were treated on tour by 129 Veterinary Assistant Surgeons who visited 58,257 villages.

The thirty-three Veterinary Assistant Surgeons employing 33 Veterinary Institutions treated 99,326 cases, supplied medicines to 22,346 cases not brought to the hospitals and castrated 21,743 animals. The receipts and expenditure of these 33 institutions were Rs. 16,113 and Rs. 85,639 respectively. Besides, the Patna Veterinary College Veterinary Hospital treated 3,824 cases and did 186 castrations. Both the touring and hospital staff have shown a creditable record of work in the year.

There were 37 stud bulls supervised by the Department. The Patna Cattle Breeding and Dairy Farm attached to the Patna Veterinary College has done quite useful work. Twenty-one horse and cattle fairs were held and attended by the staff.

Altogether 1,178 specimens were examined. We are glad to note the close co-operation between the S. P. C. A. and the Department in

the Province. "Lactation in a Barren (Maiden) Heifer", "Doyle's Disease in Fowls", "Warble Flies in Cattle and Goats", and "Mango Leaves cause Retention of Urine in Bovines" were the articles contributed by the staff to the Veterinary literature. Total receipts and expenditure of the Department were Rs. 1,73,459-8-9 and Rs. 7,31,062-9-11 respectively, the latter working out .70 per cent of the total provincial revenues as against .62 in the previous year.

A marked improvement in the working of the Research Laboratory and satisfactory results in the Patna College examinations have been recorded. The College, however, did not attract more than three new students for admission from the province itself, though 33 came from outside. Riding classes were newly introduced during the year.

The department deserves congratulations on the record improvement in all directions.

Annual Report of the Civil Veterinary Department, Punjab, for the year 1935-36.

The Department consists of one Director, 34 other gazetted and 382 non-gazetted officers to carry out the three main duties of (1) Breeding operations, (2) Care and prevention of diseases among live-stock, and (3) Veterinary Education and Research in the Province. No addition was made to the staff. The total expenditure amounted to Rs. 20,23,024 against Rs. 19,80,505 in the previous year.

There is a wealth of useful information in the report on breeding operations under (1) Government Hissar Cattle Farm, (2) Grantee Cattle Farm, (3) and Cattle Breeding in special tracts and Cattle and Horse Fairs and Shows. Details are again given separately under horse, cattle, camel, goat and sheep breeding. 617 bulls were issued from the Hissar Farm. The Grantee Cattle Farm supplied 109 bulls. The total number of stud bulls was 5,033 and the stud buffalo bulls, 2,516 at the end of the year. There were 78 horse and 86 donkey stallions. Nearly Rs. 3,200 were spent in awarding prizes, etc., in 195 Fairs and Shows.

The number of milch cows in the province were 2½ millions in 1935. Calculating at one approved bull per 100 cows, the shortage of bulls was about 13,000. Though this province has more approved bulls than all other provinces combined, still she is not satisfied and it is vigorously pushing the schemes to increase the number of stud bulls available to the public. We wish the other provinces and the States would soon follow the good example of the Punjab in her Live-stock Industry work.

365 Veterinary Assistant Surgeons visited 68,935 villages, treated 1,10,051 contagious, 3,78,579 non-contagious cases and castrated 2,46,14 cases on tours. 304 Veterinary Surgeons employed in 300 Veterinary Hospitals and Dispensaries treated 15,13,543 in- and out-patients, supplied medicines to 2,54,840 not brought cases and castrated 330,193 cases.

29,472 deaths were reported in the year against 39,026 in the previous year, 50 per cent being due to Hæmorrhagic Septicæmia. Rinderpest came next in order. Rs. 1,200 were spent in rewarding Patwaris for prompt reporting of outbreaks. There were four cases of glanders in equines. 89,097 anti-Rinderpest inoculations were done in 524 outbreaks. 90,668 animals were given goat-tissue vaccine from Muktesar with great satisfaction. 56,477 Hæmorrhagic Septicæmia Serum inoculations in 399 outbreaks, and 3,85,582 Hæmorrhagic Septicæmia vaccinations were done in 2,015 villages.

The results in the Veterinary College were good. Fifty-six were newly admitted. Much valuable research work was being carried out in the College Laboratory on rabies immunisation and other useful subjects. The Government in their review of the report say that the separation of the department from the Agricultural Department against much opposition has been quite justified. It is gratifying to see the Government review is further very illuminating and enthusiastic. The report contains many fine photos, useful statements and tables and is a good record of useful and substantial work. We commend the report and the Government review on it to our readers for their profitable perusal.

Annual Report of the Civil Veterinary Department, Punjab, for the year 1936-37.

"The total cost, both to the Government and Local Bodies of the work of the Department, amounted only to about 6 pice per head of population—not a large amount in an almost purely agricultural province". Thus ends the concluding para of an exhaustive and appreciative Review on the report by the Government which has been quite conscious of the importance of the live-stock industry and has been striving now for several years to help the industry. A great portion of the report and the Government review thereon has been rightly devoted to the work, done during the year, of the breeding operations. The Government Cattle Farm at Hissar is the largest stock breeding in India and its live-stock rose by 700 to 9,325, of which 7,680 were cattle and 1,785 were sheep. Failure of monsoon in the area itself caused considerable anxiety regarding the supply of fodder but good monsoon in other parts of the province and the supply of canal water for irrigation and drinking made the situation less serious. The various activities of this farm are dealt with in the report under different sections, viz., live-stock, cattle breeding, milk recording, dairy bulls, milk yield, sheep breeding; goat breeding, donkey breeding and arab breeding; contagious diseases under Rinderpest, Black-quarter, contagious abortion in cattle, goats and donkeys; work of the farm, Veterinary Hospital; fodder production, fodder reserve, pasteur areas, implements and machinery, publication and propaganda work. Besides this Farm, there are five Government Grantee Farms in the Lower Bari Doab Canal colony including a Dairy Grant of 485 acres near Montgomery town and several small holders grantees in other places carry on breeding operations.

Cattle breeding operations in special tracts with allotments made by the Government and District Boards in ten districts were continued with good results. Intensive breeding operations were being continued under departmental supervision in selected areas, where pedigree bulls from Hissar Farm and Government Grantee Farms were located. There were seven such special selected areas in different parts of the province and they are said to be in a position to supply improved stock to those ready to give effect to the appeal of H. E. the Viceroy for the improvement of cattle breeding. The details of work of all these farms are given in the report. Besides these selected and special areas, there are non-selected areas wherein general breeding operations in horses, ponies, donkeys, cattle including buffalo, camel, sheep and goat breeding were continued during the year with satisfactory results. Hissar Farm issued a total stock 1,429 (1,385) including 711 (616) bulls to the book value of Rs. 2,58,560 at a concession price of Rs. 67,800 realised from the District Boards. Besides these bulls, 279 young male calves were brought to meet the growing demand for approved bulls. It was decided to increase the annual output of Farm-bred bulls from 600 to 1,000 per year to meet the new demand and to replace wastage. The Government has recognised that this would be a first rate investment for the province, if the financial difficulties could be overcome. Attention is also being paid to improve the milk yield without impairing draught qualities with encouraging results, so also the wool yield in sheep and milk yield in goats which are said to be 'poor man's cows', and in great demand especially from the Hissar Farm. Small wats or ridges (breeds) largely along contours were put up to protect the surface of the land against erosion and to retain the precious rain water, to increase the quantity and quality of grazing throughout the *bir*. 548 approved bulls were subscribed for as a result of the appeal of H. E. the Viceroy and the District Board bulls increased from 5,033 to 5,370. "Though this is proportionately a much larger number than in other provinces, it is still wholly inadequate for a province of 26,53,000 cows". The Government are not sparing any efforts to make up the deficiency. There were 2,029 approved buffalo bulls during the year. Buffalo breeding to meet the demand of milk supply and camel breeding are receiving proper attention. 252 (195) cattle shows and fairs were held and attended, in addition to 81 one-day small village live-stock shows. Cash prizes to the value of about Rs. 30,000 and several medals were awarded to the various exhibits.

The Punjab Government have empowered the District Boards by notification, to make action for the prevention and control of contagious diseases amongst birds and animals within their jurisdiction, the Department helping them in the framing of suitable bye-laws. Villages and Panchayats were being pressed to provide 'segregation enclosures' for cattle returning from fairs and markets or otherwise got from outside areas. Foot-baths for Foot-and-Mouth disease in the villages were on the increase. How we wish other provinces and States would soon follow these fine examples of the Punjab. The policy of retrenchment and not recruiting new graduates in the past years had adverse effect, and consequently though the Government sanctioned 37 new hospitals, no graduates were available and so no new hospitals were opened. The number of Veterinary hospitals (300)

remained unaltered during the year and the work demanded of the existing staff, heavily taxes them.

The L.V.P.'s are in great demand both in the province and in the neighbouring States. Since they are not available, ex-military men and retired Veterinary Assistant Surgeons were employed in the department to meet the several demands. Graduates of other provincial colleges may be employed if available and no provincialism need stand in the way. A proposal to train and employ the deserving agriculturists as stock-men under Veterinary supervision was under consideration. Veterinary hospitals treated 16,37,507 (15,13,543) cases, supplied medicines to 330,668 (254,840) cases, not brought to the hospital, and castrated 335,415 (330,198) animals. There were 1,200 outlying dispensaries (weekly). These were of great help to stock-owners in the villages. The proposal to extend the scheme of Veterinary First Aid centres under Co-operative Societies was given effect to. We are glad to note that the Punjab Civil Veterinary Department obtained a decent amount from the Rural Uplift Grant of one crore of rupees from the Government of India in 1935-36; 69 serum cellars were constructed in different veterinary hospitals and others were under construction at an estimated total cost of about Rs. 20,225 from the above fund. Reconstruction of Rohtok Veterinary Hospital (Rs. 12,000), construction of seven other veterinary hospitals and additions and improvements in some others, in several areas, were carried out (Rs. 60,000) from the same funds. Necessity for obtaining similarly a moiety from this Rural Uplift Grant did and does exist in other provinces for similar works, as pointed out already in these columns, but no information is available whether heads of all other provincial Veterinary Departments moved in the matter and if so with what results. Rarely will such windfalls be available and if and when available, should the departments neglect to seize them, it is a sad comment on the vigilance and solicitude of their heads towards the much needed improvement of the live-stock industry of the country.

73,384 (68,935) visits were paid to the villages. 556,403 (488,630) cases were treated and 271,789 (246,140) animals were castrated on tours. Total reported mortality from contagious diseases was 31,063 (29,473), Hæmorrhagic Septicæmia being responsible for about 63 per cent of them and Rinderpest coming next in importance. Glanders in equines were detected, destroyed and compensation was paid to the owners. Periodical inspection of all the hackney carriages was done to detect further cases, if any, as a usual routine. 3,762 (3,673) surra cases were treated in 46 centres. They include 2,668 camels, 1,086 equines and 8 others with encouraging results. Foot-and-mouth disease was rather severe in some districts and much attention was paid to check it. Foot-baths designed for the purpose is expected to help in the matter. Black-Quarter prevailed in 18 districts with a fairly heavy mortality in two districts.

Among animals other than equines and bovines, Foot-and-mouth, Rinderpest, Hæmorrhagic Septicæmia, Mange, Surra, Sheep-pox, Malta fever, pleuro pneumonia Gillar, Strongylosis and Vexaminous Bronchitis have been recorded.

58,917 (89,079) serum-alone inoculations in 357 (524) outbreaks and 169,116 (92,065) goat-tissue vaccinations in actual outbreaks against Rinderpest, 71,235 (56,477) serum-alone inoculations in 674 (399) outbreaks and 537,789 (385,382) vaccination in 2,549 (2,015) villages against Hæmorrhagic Septicæmia and 21,138 (20,351) vaccinations in 139 (130) villages were done against Black-Quarter. The figures in parentheses indicate those in the previous year.

There were 133 students in the Lahore Veterinary College including 75 new admissions, three in the final examination, eight in the third, nine in the second and 39 in the first examination passed out. Refresher courses, classes for dressers and farriers and training for syces were also conducted. Valuable research work was continued in the college laboratories. Tattooing forceps and ink were supplied to many hospitals and they have been included as part of the hospital equipment to mark on the ears of animals, to prevent cattle-lifting which prevails in some areas. The departmental staff helped in organising and supervising pure milk and ghee supply and the services of Veterinary Assistant Surgeons were almost everywhere used for the inspection of meat throughout the province which has again stolen a march, in these respects also, over other provinces and States.

The staff consisted of one D. V. S., and 35 other Gazetted Officers and 393 Subordinate Officers. The progress of work recorded has been well appreciated by the Government which has been striving to extend the usefulness of the Department and we heartily congratulate the Department and the Government. Since there is a great awakening in the country towards the "Economic Planning of Industries" we commend this report to our readers for their reading, to know the tremendous possibilities of live-stock industry.

The report as usual contains many photos, tables and graphs.

Annual Administration Report of the Mysore Civil Veterinary Department for the year 1935-36.

The gazetted staff of the Department consisted of one Superintendent and six Assistant Superintendents, i.e., one in charge of Divisions, two in Scientific Section and one attached to the Mysore Imperial Service Lancers. No mention is made in the report, of the strength of the subordinate service and leave reserve which are generally found in all such reports. The sixty-eight veterinary institutions including the newly opened four in the year, treated 28,360 fresh cases, castrated 16,707 bulls, 6,174 sheep and goats and 341 other animals, in addition to 16,284 other operations. The Veterinary Inspectors attached to these institutions while on tours, treated 1,06,106 cases, castrated 32,534 bulls, 24,920 sheep and goats and 810 other animals in addition to 1,561 other operations. They also attended 112 cattle fairs, attended 12 village panchayat conferences and visited 16,481 villages. There were only five Rinderpest reports against 25 in the previous year. This lowest number of Rinderpest outbreaks is a noteworthy feature due to the systematic

inoculation campaign for over ten years. Though the other outbreaks such as Hæmorrhagic Septicæmia, Black-Quarter and Anthrax were on the decrease, still their number is sufficiently large, *viz.*, 5,47,752 and 1,308 respectively. Rinderpest claimed 53 deaths, Hæmorrhagic Septicæmia 1,935, Anthrax 2,041, Black-Quarter 1,677, Foot-and-Mouth disease 1,175 and parasitic diarrhoea 1,960, total mortality from all contagious diseases being 11,567. Total number of outbreaks of all contagious diseases was 7,114 against 7,422 in the previous year. 1,423 Goat-virus, 288 Serum-simultaneous and 50 Serum-alone inoculations against Rinderpest, 50,432 against Black-Quarter, 47,134 against Hæmorrhagic Septicæmia, 18,886 against Anthrax and 24,431 against Sheep-pox were done, the total number of preventive inoculations and vaccinations against all contagious diseases being 148,362 against 144,217 in the previous year.

A few of the village panchahats employed castration demonstrators to do castration with the Burdizzo Emasculator. The report says "it is the idea of the Department to transfer this branch of work eventually to the ryots themselves by training one or two in each village—". This is indeed another move in the right direction.

Periodical dosing of sheep for parasitic diseases was continued and investigation was being carried on to find out whether this had anything to do with the sheep in the Hebbal Farm not coming into heat during the year, results are eagerly awaited. Valuable work was being carried on by two Officers in the Scientific Section and details are given in the report. Proposals were submitted to the Government to introduce a system of quarantine as a supplement to Cattle Disease Regulation.

Another noteworthy feature in the report is that the local bodies and philanthropic gentlemen have extended their co-operation in starting new institutions as well as constructing suitable buildings—fresh and additional—for the existing ones. This highly commendable example in Mysore is more due to the close personal touch between the public and the officers of the Department.

The report records a decided increase in the work.

Administration Report of the Mysore Serum Institute, Bangalore, for the year 1935-36.

The staff of the Institute on the technical side consists of a Superintendent, an Assistant Superintendent, six Veterinary Inspectors and eleven Salustries. The Institute originally for the manufacture and supply of the necessary quantity of anti-Rinderpest Serum and Virus to combat the scourge of Rinderpest in the State, has been manufacturing several other Biological products to meet the demands both from within and outside the State, the Sera and Vaccines prepared and supplied during the year being anti-Rinderpest, anti-Hæmorrhagic Septicæmia, anti-Black-Quarter and anti-Anthrax Sera; Hæmorrhagic Septicæmia Vaccine, Black-Quarter Bacterin, Black-Quarter Filtrate, Sheep-pox vaccine, Rinderpest bull-virus, and Goat-virus, anti-

Fowl-cholera serum and vaccine. The popularity of the products of the Institute even beyond the State has been growing every year with the result that Hyderabad (Deccan), Coorg, Baroda, Inchalkaranji, Cochin, Pudukottah, Bombay-Ramdurg, Kalol in Gujrat, C. & M. Station, Bangalore, and Colombo were among the customers during the year, for them.

It was really a wise step on the part of the State to have deputed the Superintendent during the year to visit some important Indian States and Biological Institutes to study the conditions and establish personal contacts there and this has helped in expanding the market for its products and in introducing further improvements.

In addition to the production of Sera and Vaccines, several investigation and researches of Valuable, were also conducted with a view to further improve the products and to prepare some more new ones for other diseases. Proposals to prepare prophylactic Rabies Vaccine (Veterinary) were under consideration during the year. This is since being carried out. Tests conducted during the year proved that Goat-virus as a single vaccine against Rinderpest confers a solid immunity on bovines against virulent bovine virus so far up to 33½ months. On economic and some other valid grounds mentioned in the report, goat-tissue vaccine was not favoured much in the State.

From a financial point of view, the working of the Institute was also satisfactory during the year. Names of several distinguished visitors to the Institute during the year have been mentioned in the report and the Institute has rightly become a place of interest to the Scientists and others who visit Bangalore. Eight Veterinary graduates from different places were given a short course of training in the Institute during the year. All the usual statements are appended to the report which is a good record of substantial work done during the year.

Picture Gallery of Canines.—The fourth edition of the *Picture Chart of all Dogs* has just been released from the Press of the Judy Publishing Company (*Dog World Magazine*), and brought up to date to include the latest additions to the Royal Canine family, namely Bernese mountain dog, puli, komondor, and Lhasa terrier.

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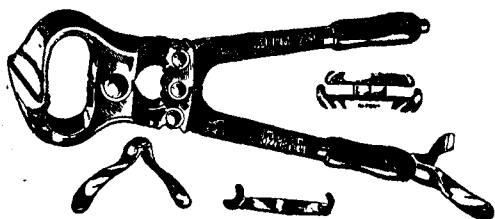
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