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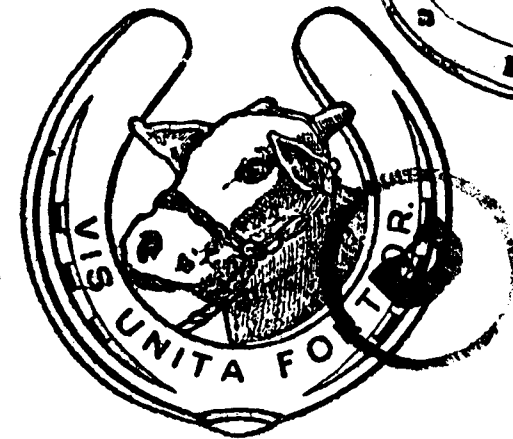
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(The Journal of the All-India Veterinary Association)

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Veterinary Science*



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[THE JOURNAL OF THE ALL-INDIA VETERINARY ASSOCIATION]

PUBLISHED MONTHLY

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A Monthly Record of Veterinary Science
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Veterinary Profession

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EDITOR

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sperm physiology is not clearly understood. It is sometimes considered that the accessory secretions have a favourable influence on spermatozoa, but Redenz was unable to establish either a stimulation of spermatozoa or a prolongation of their life (Anderson, 1945). Milovanov (1934) considered that the high content of electrolytes (particularly NaCl) and the alkaline reaction of the accessory secretions induce motility in the epididymal sperm. Nismeianowa (1936) believed that the prostatic secretion activated the sperm.

In view of the meagre information available on the ability for motility of the sperm from the deeper regions of the male reproductive tract, it was considered desirable to study this problem with reference to some species of farm animals.

Materials and Methods

Materials from the reproductive tracts of the animals listed were examined.

S. No.	Species.	No. examined.	Age.	Breed.
1	Stallion	10	3 to 6 years	English 4 Arab 3 Indian 3
2	Jack	2	6 to 8 "	Nondescript
3	Ram	10	1½ to 4 "	Merino 5 Nondescript 5
4	Buck	10	do.	Angora 3 Nondescript 7
5	Barbary sheep	1	—	—
6	Boar	10	1½ to 5 "	Poland-China 2 Duroc-Jersey 2 Nondescript 6
7	Buffalo-bull	10	6 to 10 "	Nondescript 2
8	Rooster	12	10 to 12 months	White Leghorn 8 Nondescript 2
9	Turkey tom	3	1 to 1½ years	Nondescript
10	Drake	3	1 year	do.
11	Male pigeon	3	8 to 10 months	do.

The male reproductive tract was obtained by castration by the open method in the case of the stallion, Jack, Barbary sheep and also some of the rams, bucks and boars. The reproductive tracts of the buffalo-bulls, and from some of the rams, bucks and boars were

collected from the slaughter house. In every case, the male reproductive tract was recovered within one half hour after the death of the animal and examined within another half hour after collection. In the case of the birds, they were decapitated, defeathered and the entire reproductive tract carefully dissected out and examined within one half hour after their death.

To obtain material from the testis, a small piece of the organ was dissected out, incised several times with a sharp scalpel and the cut surface touched to a couple of drops of normal saline placed on a clean glass slide, and the preparations observed under the microscope for motility. For obtaining material from the head and body of the epididymis, small pieces of the tissue from these regions were taken, tightly pressed between the jaws of an artery forceps and subjected to multiple incisions. The incised surface was then touched to a couple of drops of saline on a clean slide and preparations observed under the microscope for motility. The material from the epididymal tail was obtained by one of the following two methods. In one case the epididymal duct was incised with a sharp scalpel and sufficient quantity of the material collected by applying pressure around that region. When larger quantities were required, the method adopted by Branton and Balisbury (1947) was used. Material from the vas deferens and ampulla was obtained by milking them gently.

In the case of birds, material was collected from the testis by longitudinally incising the convex side, placing a couple of drops of saline on the incised area and collecting the saline mixed with the testicular material on a clean glass slide. The epididymis in the birds was very rudimentary and only a small drop or two could be obtained by carefully milking it with the jaws of a dissection forceps.

Results

Motility is a characteristic developed very early in life by the sperm and with the use of proper techniques this ability can be readily demonstrated. The material from the testis was generally very viscous and mucoid and it was not possible for the sperm to exhibit any motility in such an unfavourable environment. When this material was diluted with a drop of normal saline to reduce viscosity the sperm were found to exhibit weak movement this being slightly enhanced by warming the slide to 100°F. This reaction was observed in the case of all the farm animals studied. Even when a small bit of the testicular material was cut into small pieces and incubated with a few c.c. of normal saline for 15 to 30 minutes at 100°F. active motility could not be induced in the testicular sperm. A similar reaction was elicited from the sperm collected from the head and body of the epididymis. The material

Trichenella spiralis and *Macracanthorhynchus hirudinaceus* recorded in other parts of India have not been encountered in the course of this work.

Summary

All the adult pigs were found infected. Seventeen species of helminths, 2 species of arthropods and one species of fungus were encountered. The majority of the pigs examined harboured 3 to 5 species of parasites and the maximum number of species in an animal was found to be 9.

Paryphostomum sufraginifex, *Cysticercus tenuicollis*, *Oesophagostomum brevicaudum*, *Trichuris trichiura*, nymphs of *Linguatula serrata* and *Sarcocystis miescheriana* were encountered for the first time in Madras in pigs.

Simondsia paradoxa was recorded for the first time outside Europe.

Enterobius vermicularis, *Streptopharagus* sp. and *Onchocerca* sp. were the new records from pigs.

Acknowledgments

It is the pleasant duty of the author to thank the Principal, Madras Veterinary College for the encouragement given. Thanks are also due to the Health Officer and the Veterinary staff of Madras Corporation for affording the necessary facilities for this survey. The author's thoughts go to late Sri G. Ramanujachari, Professor of Parasitology, Madras Veterinary College with whose collaboration this investigation was undertaken.

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GENETICAL ASPECTS OF FERTILITY

By

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Research Officer, (Genetics), College of Veterinary Science and Animal Husbandry cum Livestock Research Institute, Mhow (M.P.).

Fertility is determined both by the genetic and environmental factors. Genetic causes although play a minor part in individual cases, are however responsible for causing large differences between the averages of groups, such as breeds or herds.

Genes which affect fertility in our domestic animals can be roughly divided into two classes.

(a) Genes which through their action produce morphological changes.

(b) Genes which express themselves without influencing the morphological characteristics.

Morphological changes can be easily detected. However, the action of genes which influence fertility without inducing the morphological characteristics can be detected only by special chemical, biological or other complicated tests, if at all. Further, the action of environment which can modify and thus mask the effects of inherited factors, makes the study and understanding of the genetical basis of fertility particularly difficult. In order to understand this subject fully an attempt is being made to summarise the important aspects of it.

For the sake of discussion it seems convenient to understand the problem of fertility under two headings.

(1) Superfertility.

(2) Subfertility.

By superfertility is meant the larger than the average number of young born over a given time period. The physiological processes concerned are fourfold.

(1) Early sexual maturity.

(2) Capacity to conceive soon after the termination of pregnancy.

(3) Capacity to produce great many functional ova at any oestrus period.

(4) Capacity to nourish many developing young to full term.

Genes affect, at least to some extent, all the four processes mentioned above. The evidence for genetic influence is wholly based on the differences in fertility which have been proved to exist between breeds.

The following data on fertility rates in sheep, pig and cows serve to illustrate existing breed differences in the capacity to produce simultaneously many progenies.

Sheep		Cattle		Pigs	
Breed	lambs/100 ewe	Breed	Twinning rate (%)	Breed	Litter size
Border Leicester	181	Friesians	3.8	Large White	10.2
English Leicester	163	Ayrshire	1.8	Middle White	9.7
Suffolk	144	Jersey	1.0	Berkshire	8.5
Lincoln	139	Beef breeds	0.5	Tamworth	7.2

In sheep and cattle genetical factors influence mainly the number of functional ova shed while in pigs inheritance may in addition determine the capacity to carry all developing young to full term.

Breeding for higher twinning rate in sheep or greater prolificacy in pigs should accordingly be possible. It has been claimed by several workers that some breeds are more prolific than others but, however, this has not been proved experimentally that prolificacy can be influenced by selective breeding.

Experiments on increasing the twinning rate in sheep by selection carried out in U.S.A. have given inconclusive results.

Some studies have, however, indicated that in cattle the differences in twinning rate due to inheritance do occur between herds of the same breed. It has been suggested that the genes concerned are recessive in character and that the modifying factors are also involved. In view of that some progress could thus be expected towards elimination of twinning in dairy cattle (which is thought undesirable) if twins are not kept for breeding and by avoiding breeding from animals belonging to families in which twins have occurred.

Subfertility can be divided into two headings.

- (a) Low-grade fertility.
- (b) Total sterility.

Of these the first type perhaps constitutes the main problem of fertility complex in farm animals on both the male and female sides.

Female:—In this sex the morphological effects are generally absent. This type of low-grade fertility is often described as "endocrine imbalance".

The most convenient yard-stick used for measuring low-grade fertility is to determine the number of services required per conception. A number of experiments have been conducted lately showing that there is a definite genetic basis for this condition. It has been determined that 15 to 20 per cent of the variation between cows in the number of services per conception is due to differences in inheritance.

Male:—Experiments on monozygotic twin bulls indicate that, of factors influencing the sexual strength of bulls, those which depend on

inheritance are by far the most important. Swedish workers using twins as experimental material, have concluded that the level of feeding has only slight effect on the sperm production of bulls which have been on different feed levels. They found that the variation in the number of sperm in each ejaculate due to inherited factors was about twelve times larger than the variation due to feeding intensity. Heredity mainly determines the bull's readiness and ability to serve.

One type of low-grade fertility in bulls is due to certain morphological characteristics of the sperm. It has been shown that the presence of an abnormal number of "returned tails," protoplasmic drops, or "tail-less heads" in a semen sample is an indication of poor fertilising ability. Research workers in New Zealand seem to believe that inherited factors are responsible for some of these abnormalities.

Total Sterility

Male and Female:—Total sterility can be in many cases related to definite morphological abnormalities. When such cases have a genetical basis it has often been possible to establish the mode of inheritance with some degree of certainty.

It is now clear that a condition named "congenital hypoplasia" occurring both in bulls and heifers is inherited as an autosomal, recessive character. Modifying factors are also involved.

Another morphologically different type of hypoplasia known only in bulls occurs in Swedish Friesians. This condition is always bilateral and its inherited nature has been proved.

Studies have been made in the U.S.A. on a type of sterility in Jersey cattle which appears to be due to recessive inheritance. The morphology of this condition is not known, but the disease differs from the Swedish cases in that it is sex-limited, as it occurs only in heifers.

Another type of total reproductive failure in Jersey cows has also been reported in the U.S.A. Morphologically it is due to the suppression of certain parts of genital tract derived from the Mullerian ducts. The genetical basis is well established; of 23 heifers which were the progeny of sire-daughter matings 13 proved to be sterile while the remaining 10 were fully fertile. This seems thus to be a clear-cut case of simple recessive factors.

The "white heifer disease", which occurs in Shorthorn breed is, perhaps, the best-known instance of hereditary sterility. In typical cases the hymen is constricted, the anterior vagina and cervix absent, the uterine body rudimentary, the cornua distended with cysts, and Wolffian remnants prominent. In all cases the external appearance of the animals is normal and the ovaries are functional. It has been estimated that approximately 10 per cent of White Shorthorn heifers in

Great Britain are affected. Strong evidence exists that the disease is due to a recessive gene which is widespread among pedigree dairy Shorthorns.

According to Swedish investigations, both nymphomania and adrenal virilism appear to be genetically conditioned.

The seminal characteristics of British Friesian bulls have also been reported to be genetically influenced. Experiments have indicated that these bulls having a high frequency (85-95 per cent) of abnormal sperms were found to be closely related to one another. It has been calculated that a recessive gene is most likely to be responsible for this condition.

In pigs the cryptorchidism has been reported to be due to recessive genes. Studies conducted in New Zealand indicate that intensive inbreeding may cause total sterility in sows of the Large White breed suggesting the existence of recessive inherited factors in this breed.

Summary

From the discussion above it is clear that both superfertility and subfertility depend to a large extent on the inherited factors. Of course, the programme for increasing the fertility over the normal level of a breed by improved breeding method must by necessity be slow as the effects of environmental factors tend to mask the genetical fertility level.

Problems relating to subfertility should however, be attended collectively by pathologists and geneticists. Monozygotic twins can form a suitable material for experimentation. From an immediate practical point of view it seems important to cull out animals as soon as possible if they show signs of sexual weakness and if there is any reason to believe that the weakness is due to hereditary conditions. The curative treatment for breeding animals, especially males, with signs of sexual weakness which might be hereditary conditioned, should consist only of environmental improvement. Hormone therapy should not be used in males that might have hereditary disposition.

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Veterinary Disease Investigation Officer (Poultry), Ranipet.

The Chick-embryo-Pigeon-Pox-vaccine - Beaudette strain :—This vaccine was found to be a safe product to be used systematically in free areas on baby chicks of 2 weeks and over. As many as 6313 chicks have been vaccinated by me during the last three years by feather follicle method in free areas. Satisfactory 'takes' appeared in the vaccinated chicks by about the 6th day and at the same time practically no systemic disturbance was noticed.

At the American Arcot Mission Poultry Farm, Katpadi, Madras State, systematic mass vaccination is being done every year with this vaccine on chicks of two weeks old and it has been noticed that the incidence of Fowl Pox amongst such vaccinated birds was practically nil until they were 10 or 12 weeks of age. After that age about 10 per cent of the vaccinated birds were found to take the infection in a natural outbreak of Fowl Pox. Even so, the attack was very mild in them with stray Pox lesions on the beaks. There was no mortality at any time from Fowl Pox among such vaccinated chicks.

As a control study, it may be stated here that 50 chicks that were not protected when they were two weeks old suffered during a natural outbreak of Fowl Pox from a severe cutaneous form all over the body and recorded a mortality of about 50 per cent. It is evident therefore that the Chick Embryo Pigeon Pox vaccine does confer immunity in the vaccinated chicks; but the immunity set up is not quite solid after about 10 to 12 weeks.

It follows therefore that immunity in the Pigeon Pox vaccinated chicks should be further reinforced with the egg adapted Fowl Pox vaccine when they are about 6 weeks of age.

Pigeon Pox vaccination in actual outbreaks of Fowl Pox :—With a view to test the efficacy of this product in actual outbreaks, baby chicks in particular along with other birds were given this vaccine and removed to an uninfected area. But in spite of all efforts taken, it was noticed that about 50 per cent of the vaccinated birds developed generalised lesions of Fowl Pox within a period of 7 to 21 days and about 12 per cent of them died heavily charged with lesions of Fowl Pox. It may be due to the fact that :

(1) Since immunity in vaccinated chicks is conferred only after 3 weeks from the date of vaccination, chicks vaccinated with Pigeon Pox vaccine in actual outbreaks of Fowl Pox acquired infection during the negative phase or that

(2) Chicks were incubating the disease at the time of vaccination.

However Pigeon Pox vaccination seems to be indicated in actual outbreaks of Fowl Pox as a control measure since about 50 per cent and over of the vaccinated birds escape infection or have a mild attack. A heavy toll or mortality is thus avoided.

The Chick-embryo Fowl Pox vaccine - Beaudette strain :—The vaccine has been tried on 726 chicks of 1 to 5 weeks of age in absolutely free areas. The method adopted was by prick method in the web without disturbing the feathers at the site of vaccination. The vaccinated chicks manifested a severe type of drowsiness and unsatisfactory general condition. One week old chicks in particular had a generalised cutaneous form of Fowl Pox all over the body and legs and died. The faecal contents of the above chicks were free from coccidial and helminthic infections. And so this vaccine was found unsuitable to chicks below 6 weeks of age.

The effects of Chick embryo Fowl Pox vaccine on chicks, 6 weeks and above of age :—I have vaccinated during the past three years, 4843 chicks of 6 weeks and above with the Chick Embryo Fowl Pox vaccine, Beaudette strain by prick method in the web without disturbing the feathers at the site of vaccination. Satisfactory 'takes' appeared on about the 10th day and no chick developed pox in a generalised form, but very stray pox lesions appeared only on the beak in about 2 to 3 per cent of chicks vaccinated. Otherwise all the vaccinated chicks were quite normal, healthy and brisk.

Mr. M. R. Dhanda of the Indian Veterinary Research Institute, Mukteswar wanted to carry out some field trials in Madras State with the freeze dried Chick Embryo Fowl Pox vaccine produced at the Indian Veterinary Research Institute, Mukteswar, before it was released for general use in the field. It was included in the programme to try the Fowl Pox vaccine of the Institute of Veterinary Preventive Medicine, Ranipet also simultaneously for comparing the results. Accordingly such vaccination trials were undertaken at the Government Poultry Research Station, Madras on 12-12-1956. A total number of 592 chicks of 6 to 12 weeks of age were made available for conducting the vaccination trials. The above lot consisted of the following breeds :—White Leghorns, Rhode Island Reds, Black Minorcas, Light Sussex, Barred Plymouth Rocks, New Hampshires and indigenous birds. The birds were divided into two lots of equal numbers, and of equal age, breed and sex. One of the lots consisting of 303 chicks were vaccinated with the Mukteswar Fowl Pox vaccine by prick method in the web by the Research Officer in Bacteriology, Indian Veterinary Research

Institute, Mukteswar and the other lot consisting of 289 chicks were similarly vaccinated by me with the Beaudette strain of Fowl Pox vaccine prepared at the Institute of Veterinary Preventive Medicine, Ranipet.

All the birds in the first group and all but one in the second group showed satisfactory 'takes' and no chick in either of the lots had developed generalised lesions of Fowl Pox.

Immunity test conducted :—On 4-1-1957, twelve chicks from each lot and 7 unvaccinated chicks were taken to Ranipet for conducting immunity tests. Another 7 unvaccinated chicks were added to conduct the challenge test. On 5-1-1957 six birds belonging to the Ranipet lot and six of the Mukteswar lot along with six unvaccinated controls were challenged with field Fowl Pox scab virus by feather follicle method. The remaining six birds of the Mukteswar lot along with four unvaccinated controls were challenged with the Mukteswar strain of Fowl Pox vaccine virus by feather follicle method. The remaining six birds of the Ranipet lot along with four controls were challenged with Ranipet Fowl Pox vaccine virus. All the control birds showed typical lesions of the disease at the site of inoculation. All the vaccinated birds excepting one in Mukteswar vaccinated lot and another in Ranipet vaccinated lot have not shown any reaction to the challenge virus. The two birds mentioned above have shown only slight swelling of the feather follicles at the site of inoculation. The details of immunity tests conducted have been furnished in the statement appended.

The results of experiments conducted indicated that both the vaccines were identical with regard to the type of local reactions produced and they were also found to be quite safe for vaccinating chicks of 6 weeks and above of age. Both conferred satisfactory immunity in the vaccinated birds.

Mr. M. R. Dhanda has made a similar report in his letter No. V 421-23 dated 5-4-1957.

Again to ascertain the period of immunity conferred by this Beaudette strain of Fowl Pox vaccine, two old birds obtained from the Livestock Research Station, Hosur Cattle Farm, one Black Minorca Hen No. 69 and another White Leghorn hen No. 882 vaccinated on 25-7-1954 and on 16-5-1954 respectively with the above said Fowl Pox vaccine were challenged with field Fowl Pox scab virus by feather follicle method on 16-2-1957 keeping suitable controls. The vaccinated birds withstood the challenge while the controls showed typical pox lesions at the site of inoculation.

Statement showing the results of immunity tests conducted on chicks vaccinated with Fowl Pox vaccine.

S. No.	Chick No.	Date of vaccination	Strain of vaccine used	Strain of challenge	Reaction	Unvaccinated controls.				
						S. No.	Chick No.	Date of challenge	Strain of challenge	Reaction
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	5048	12-12-1956	Beaudette strain of Fowl Pox vaccine prepared at Ranipet	Field scab virus	—	1	5683	5-1-1957	Field scab virus	+++
2	5132	"	do.	do.	—	2	5828	do.	do.	+++
3	5094	"	do.	do.	—	3	5792	do.	do.	+++
4	5127	"	do.	do.	+	4	4478	do.	do.	+++
5	5276	"	do.	do.	—	5	4477	do.	do.	+++
6	5302	"	do.	do.	+	6	4474	do.	do.	+++
7	5007	"	I.V.R.I. Mukteswar strain of Fowl Pox vaccine	do.	—	7	5734	do.	Ranipet Fowl Pox vaccine strain	++
8	5382	"	do.	do.	—	8	5760	do.	do.	Died
9	5192	"	do.	do.	—	9	4476	do.	do.	+
10	5049	"	do.	do.	—	10	4472	do.	do.	++
11	5299	"	do.	do.	—	11	5810	do.	I.V.R.I. Mukteswar Fowl Pox vaccine strain	+++
12	5599	"	do.	do.	—	12	5758	do.	do.	+++
13	5035	"	Beaudette strain of Fowl Pox vaccine prepared at Ranipet	Ranipet Fowl Pox vaccine strain	—	13	4473	do.	do.	+++
14	5042	"	do.	do.	—	14	4475	do.	do.	+++
15	5101	"	do.	do.	—					
16	5548	"	do.	do.	—					
17	5447	"	do.	do.	—					
18	5571	"	do.	do.	—					
19	5064	"	I.V.R.I. Mukteswar strain of Fowl Pox vaccine	I.V.R.I. Mukteswar Fowl Pox vaccine strain	—					
20	5087	"	do.	do.	—					
21	5047	"	do.	do.	—					
22	5304	"	do.	do.	—					
23	5283	"	do.	do.	—					
24	5229	"	do.	do.	—					

Fowl Pox vaccine has been therefore found to be a safe product for vaccinating chicks of six weeks and above of age in free areas.

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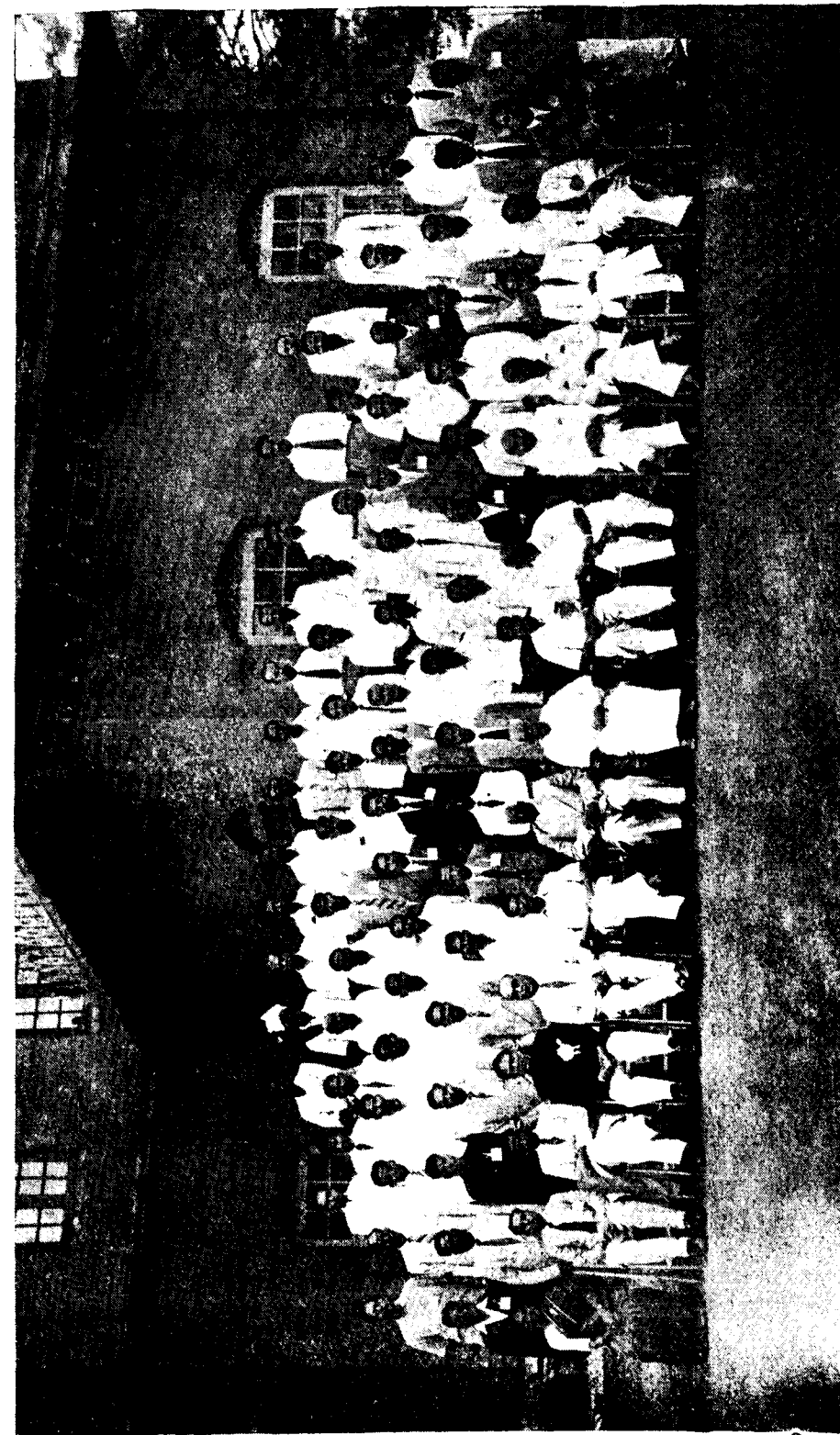
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THE MADRAS VETERINARY ASSISTANT SURGEONS' SERVICE ASSOCIATION CONFERENCE

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A SATISFACTORY EAR BANDAGE FOR DOGS

By

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Bandaging the ears of dogs generally requires daily attention. A satisfactory ear bandage should withstand mutilation, maintain the necessary pressure, protect wounds from dirt, prevent disfiguring corrugations, and absorb the discharge from wounds. In dogs, particularly those breeds with erect ears, bandaging the ears to maintain the correct carriage is an important post-operative treatment after ear-trimming and haematoma operations. In this connection, Hobday¹ described a simple many-tailed bandage for haematoma which is made of a piece of linen of sufficient size to cover the head and ears, cutting it at the edges, and tying each opposite end underneath the jaw and throat. Lacroix⁴ mentioned the use of gauze bandage roll in haematoma operation placed in contact with the inner surface of the affected ear and held in place by adhesive tape around the bandage roll and the outer surface of the ear. Lacroix³ described ear supports by metal frames protected with sterile gauze and cotton and fixed to the head by adhesive tape, while Jensen² used a taped tightly-rolled piece of cotton placed on top of the head with a tape over both ears.

A new ear bandage for dogs (Fig. 3) is herein reported and described which is specially useful after ear-trimming and haematoma operations. The materials consist of an aluminium plate No. 30 (Fig. 1A) shaped to the desired form and length (Fig. 1B), gauze bandage rolls (Fig. 1C), and an adhesive tape (Fig. 1D). Ether in cotton is used to clean the inner and outer sides of the ears. The flexible aluminium plate, shaped according to the desired form and length of the ears, is bent and fitted over the head, and the edges of the aluminium plate are covered with the adhesive tape. Sterile gauze pads are placed between the hair (medial) sides of the ears and the aluminium plate, and on the occiput, to minimize the formation of wounds from friction. The sutured edges of the ears after ear-trimming and the approximated wound following haematoma operation are dusted with sulfanilamide powder and then covered with sterile gauze pads. The aluminium plate is taped to the long axis of the free portions of the ears to ensure the proper support and form (Fig. 2). Then the gauze bandage rolls, preferably three inches wide and ten yards long, are applied against the lateral (inside) sides of the ears, and the gauze bandage rolls are taped against the ears.

Adhesive tape is used to connect the two gauze bandage rolls from each ear for additional stability (Fig. 3). The aluminium plate acts as a splint for the necessary support, while the gauze bandage rolls help in the drainage and pressure. If daily dressing of the ears is desired, the adhesive tape at the anterior or posterior margin of each ear is cut leaving the gauze bandage roll attached to one side thus exposing the wound, and the appropriate treatment applied. This is preferable to removing the whole bandage, because it saves time and materials. When properly applied, this ear bandage will stay unchanged for a week or more.

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Editorial

HORSE BREEDING AND RACING

There is hardly another industry in this land which had come in for so much of unmerited criticism and neglect as the horse-breeding in recent years. The post-independence days in particular have been very hostile to this industry. It is the foresight and courage exhibited by a single individual, that has saved this industry from complete extinction. We refer to the highly patriotic service rendered by Shri K. M. Munshi, as Home Minister of Bombay in 1939. He made the R.W.I. Turf Club at Bombay to increase the Stakes reserved for the Indian bred horses from 5 per cent to 45 per cent, spread over a period of five years. This at once gave the necessary impetus to revive this industry, which in the past was being systematically smothered by vested interests under foreign rule. Stud farms came into existence, practically over night, all over the country, thus proving beyond doubt the close relationship that exists between Racing and horse-breeding. It is nothing but the eternal principle of demand and supply. By 1948, there were as many as 1110 brood mares. But this spectacular rise in horse-breeding was only short-lived. For the very next Ministry in Bombay in 1946-47, threw the cold blanket on this infant industry by reversing the policy of the previous Ministry in declaring that racing would be abolished after a certain date. That threw the industry in a pell-mell. Large investments which came in so freely in 1939-40 began to melt away equally freely from 1946-47, with the result that there were only 449 brood mares in 1952. The losses involved in the process were something very considerable. The industry stands crippled even to this day in the midst of such vacillating policy of each State Government. Oh! the pity of it!

Clinical Article

LEAD POISONING IN A BULL

By

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Veterinary Officer, Kopargaon, Ahmednagar Dt. Bombay State.

Poisoning by metals, their salts and metalloids in cattle is rarely encountered and even this is of an accidental nature mainly due to lapses on the part of cattle owners and the indiscriminate feeding habits of cattle. Such accidental cases are much more common in cattle frequenting industrial concerns like sugar factories, metal and paint works, etc., where there are greater chances of an animal getting access to paints, discarded paint tins, painted railings, oil cloth, linoleum and sprays of fruit trees containing salts of lead and copper.

In this article a case of lead poisoning under similar circumstances in a premium bull which was treated in the Veterinary Hospital, Kopargaon for the first time in its annals of 35 years of existence is recorded.

History of the case

The case under record is a Gir premium bull aged about 8 years stationed at Bharatwadi Dairy Farm, Kanhegaon and belonging to the Godavari Sugar Mills Ltd. Sakharwadi, Taluka Kopargaon. During the first week of July 1957 along with other dairy stock the bull was let out for grazing for a few days in the regular sugar factory premises at Sakharwadi and during the second week the bull fell sick showing symptoms of impaired appetite, constipating bowels, dullness, depression, and salivation without any mouth lesions. Temperature and respirations were normal. It was suspected for facial paralysis by the sugar mill Vety. Officer Dr. M. R. Tagare and was being treated by him accordingly for about a week or so. The bull did not respond much to treatment. He then felt the necessity for a second opinion and approached me on 21-7-1957 with a request that I should visit Sakharwadi, (Bharatwadi) examine the sick bull and do the needful. On a detailed and thorough examination, I found the following clinical symptoms.

Symptoms :—The bull was found to be dull, depressed, off feed and off rumination, standing in an unnatural position and when made to move was having slightly staggering gait. It was also having constipation

with passage of hard black dung, colicky symptoms at intervals, thick foamy saliva more or less of a constant nature, foetid breath with gradual wasting and emaciation but with temperature, pulse and respiration almost normal.

On a closer and more careful examination in search of some mouth lesions a typical bluish line was noticed on the gums.

Diagnosis :—From the nature of all symptoms observed especially the bluish discolouration of the gums and constant salivation with absence of mouth lesions and fever, the case was diagnosed as one of subacute or chronic form of lead poisoning. After discussing with the Sugar Mills Vety. Officer, the line of treatment to be undertaken was drawn up.

Treatment :—Washed the mouth with solution of alum, back-raked and gave soap water enema. A good dose of saline purgative was given.

Dilute sulphuric acid or tannic acid in oil was advised the next morning. Pot Iodide in daily dose of one oz. was advised to be given twice daily for about a week so as to hasten the elimination of lead salts from the system. Feeding with easily digestible foods like gruels, milk and a little *kadbi* was also advised. On adopting the above line of treatment, the case made a gradual recovery during the first week and was completely all right within about a fortnight's treatment. To combat weakness and general debility a course of 4 injections of acetylsan (M & B) 10 c.c. one on every alternate day subcutaneously were administered. When I happened to visit the estate for a second time after about a month I was pleased to see the bull absolutely normal and active, improved in his general condition and giving satisfactory services to the cows of Bharatwadi dairy farm.

Conclusion :—Evidently as ascertained from the history of the bull he had an access to some discarded paint tins or oil cloth, fell a victim to the poisonous effects of red and white lead which are used in the manufacture of paints and oil cloth respectively and the treatment carried out after proper diagnosis gave the bull an uneventful recovery.

Acknowledgments

I am grateful to Dr. M. P. Tagare the Sugar Mills Vety. Officer for giving me an opportunity of attending on the case under reference and to Shri Hooja, the General Manager of the Godavari Sugar Mills Ltd. Sakharwadi for giving me all necessary facilities in the treatment of the case.

People talk of preserving 'wild life'! but what has the horse done to be wiped out of existence, in due course of time, of course. Anyone with the slightest knowledge of horse-flesh will admit that he is one of the finest specimens of creation under the Sun, with hardly another creature to beat him in the matter of symmetry, speed, stamina, beauty, courage and even gratitude! Is India going to be blind to the claims of this animal to exist in this country? If the horse could express himself, he would say it runs counter to the constitution of India!

Leaving sentiment alone, let us see if the poor animal has any claims to exist on economic and utilitarian grounds! Let us start with the army. The place of horse can never be filled in effectively during campaigns of War in difficult terrains of mountains, rivers and jungles. Our ancestors had them for such use. We are flanked on both sides by such country. We hope and pray there may not be any necessity for war campaigns on our borders. But if only all our wishes could be turned into horses, then we could afford to be complacent on this matter. Are we to cry out "A horse! a horse! my kingdom for a horse" when the time comes. Let us be worldly wise and not throw away from its legitimate place of pride an animal that has saved many a kingdom in the past.

Next, this industry could be so well developed in this country as to make it a fine source of income through foreign exchange. One has only to look at some of the fine specimens of Indian bred horses, to realise the great potentialities in that direction. At any rate, the eastern and far-eastern countries may patronise us to a very large extent. Livestock breeding is a slow process and there is no excuse in not making a start here and now.

Let us now pass on to home consumption. The army, the Police, the plantations, the civilian traffic and the like will continue to require horses. Are we going to import them always from outside and at what cost? World seems to pin its faith on petrol too much. It is a matter of common knowledge what amount of politics is intertwined with that oil. Let us be wary. There is one other need for horses, which goes quite un-noticed by the public. It would be interesting to know the number of horses required in India for production of Anti-Tetanus serum, Anti-Diphtheria serum, Anti-gas-gangrene serum, Anti-venom serum and such other biological products. These products are now imported in large quantities from foreign countries and the price

paid annually is something colossal. They could with advantage be produced in India itself if only enough number of horses is made available for the purpose. It is due to lack of horses and not due to lack of knowledge of the technique of manufacture, that this country is put to such heavy expenditure under this head. On the face of such valid reasons, it is unthinkable that any Government would go to the extent of wiping out this industry by banning racing in this country.

Finally we come to that field of a horse's activities, which has brought on its head the Government's wrath most undeservedly. We mean racing. There again this noble animal strains every nerve to contribute to the pleasure of man in the sporting field; but he is condemned not because of anything bad in him but because a section of humanity—a microscopic section, indulges in uncontrolled gambling. The best way to ward off the evil effects of racing is to regulate it on proper lines and under controlled conditions. A Racing Board of knowledgeable men of that art to advise the Government and run all the races, is the solution for it and not complete abolition of racing. Are we to cut the nose to spite the face?

What is the percentage of men who go to races and how many of them do actually indulge in ruinous betting? Is the country to lose a fine and artistic industry because of a few such undesirables? Again are the Government to throw away, more particularly in these days of financial stress and strain, a good source of income through what is after all a sporting past-time, which is not half as bad as the vice which prompted the Government to adopt the prohibition policy. It is more or less well understood now that the morals of people cannot be improved through Legislative measures. Ameliorative measures are better than punitive measures. The latter not only involves loss of money but also corrupts people at all stages. By abolishing racing we will kill an industry of great potentialities. Let no Government be guilty of such a national disservice. By all means, frame rules and regulations to control betting, book-makers, bucket-shops, the number of racing days, etc. These could be done easily. Abolish, if need be, some aspects of them, but never abolish racing. That is our appeal to all State Governments. If they only announce that they have no idea of abolishing racing, the private sector will take care of the horse-breeding industry. Let us help to build India and not destroy her in this interesting field of work.

Abstracts

Experimental Canine Leptospirosis:—IV. Evaluation of selected antibiotics in the therapy of acute experimental *Leptospira icterohaemorrhagiae* infections in immature dogs.—By H. W. YODER, E. N. BERGMAN and C. A. GLEISER. *The Journal of infectious diseases*. Vol. 100. No. 3., May-June 1957, P. 257-267.

Numerous studies have been conducted to determine the efficacy of antibiotics in leptospirosis. These studies have included experiments conducted *in vitro*, in experimental animal infections, and in naturally occurring cases in animals and men. The evaluation of various antibiotics as therapeutic agents of acute canine leptospirosis has been hampered by the sporadic natural occurrence of this disease and by the difficulty with which a consistently acute experimental infection in dogs is established. According to the authors, no studies have been reported dealing with the antibiotic therapy of acute experimental leptospirosis in dogs and undertaking of this work was possible for the authors after the technique of consistently inducing an acute experimental infection in immature dogs with a virulent strain of *Leptospira icterohaemorrhagiae* was found out by Low *et al* in 1956.

Streptomycin, Penicillin, Oxytetracycline, and chlortetracycline were evaluated in the therapy of experimental acute leptospirosis in immature dogs infected with *Lept. icterohaemorrhagiae*. Therapy was initiated only after obvious clinical symptoms were manifest, including the visible onset of Jaundice in one-half or more of the dogs employed. Evidence obtained from 6 trials, employing a total of 103 dogs, demonstrated that all 4 antibiotics were effective in reducing the severity of the disease as evidenced by the significantly lower mortality rate, reduction of the magnitude and duration of Jaundice, decreased duration of pyrexia and leptospiraemia, and lower blood urea nitrogen and plasma bilirubin levels. Penicillin produced the most dramatic effects, terminating leptospiraemia most abruptly. Every surviving dog developed a significant serum leptospiral agglutinating antibody titre, but antibiotic therapy generally inhibited the magnitude of these titres. *Leptospira* was demonstrated in 7 of the 21 (33.3%) surviving control dogs, but in none of the 43 surviving dogs which received antibiotic therapy during the acute phase. On the basis of these studies, the authors concluded that Penicillin, Streptomycin, Oxytetracycline, and chlortetracycline are of definite value in the treatment of acute canine leptospirosis caused by *Lept. icterohaemorrhagiae* if intensive therapy is initiated shortly after the onset of obvious clinical disease and is maintained for at least 5 days.

A. MUKERJI.

Bovine Leptospirosis in Kenya:—By M. L. BURDIN and G. FROYD. *Nature*, Vol. 179. June 1, 1957. P. 1140.

The authors recorded natural outbreaks of Leptospirosis in cattle, sheep and goats in Kenya. During May 1956, deaths occurred in all three species on ten farms on the Uaso Nyiro River in the Nanyuki district. Jaundice, red discolouration of milk, photosensitization-like lesions of unpigmented areas of skin, particularly that covering the udder and teats, and darkening of urine were the main symptoms noted in the acute syndrome in cattle. Sub-acute cases were also seen, with death after a long period of ill-defined sickness with loss of condition. Disease in the smaller ruminants was usually hyperacute. At post-mortem the main findings were nephritis with inconstant jaundice. *Leptospirae* were detected microscopically in the urine and kidney tubules of dead animals. A series of animals was inoculated with fresh kidney material from a clinical case in a goat. The acute disease was reproduced in a pregnant ewe. On pathogenicity test, the Guinea pig proved to be relatively insusceptible to the leptospirae concerned, but infections with death at 9-11 days after intraperitoneal inoculation were regularly reproduced in golden hamsters.

The species of leptospira involved is being determined.

A. MUKERJI.

Effect of Environmental Temperature upon Facility of Aerosol Transmission of Infection and Severity of Newcastle Disease among Chickens:—S. K. SINHA, R. P. HANSON and C. A. BRANDLY. *The Journal of infectious diseases*. Vol. 100. No. 2., March-April, 1957. P. 162-168.

Some diseases are more prevalent or severe during the summer and others during the winter season. As a result of influences, for the most part unknown, an enzootic may develop into an epizootic. With a better insight into the extent and mechanism of climatic influences on the infectious process it may be possible to bring more diseases under control. The authors quoted several works in support of the above statement and selected Newcastle disease for verification of the results. The severity of this disease was studied by them in chickens acclimatised to different environmental temperature. The mortality rate in chickens was 100% at moderately high environmental temperatures (85 F to 90 F), 95% at temperatures optimal for 5 to 6 week-old birds (70 F to 75 F), 75% at moderately low temperatures (50 F to 55 F), and only 55% at low environmental temperatures (32 F to 35 F). Susceptible groups of chickens receiving Newcastle disease virus from the infective groups by aerosol had greater mortality rate at warmer than colder environmental

THE PRESIDENT APPEALS

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Let us be true to such stalwarts of human character in our profession who made the profession what it is to-day. Let the high and the low contribute liberally and ensure the safety and stability of this *Journal* in the future as well. We wish to improve this *Journal* in many ways but the lack of finance is a great impediment. We look forward to good response both from the profession and from our sympathisers.

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An Appeal

It is within the knowledge of the profession that the *Indian Veterinary Journal* has never been a prosperous concern. From the very start of its career, it has had to struggle hard for its existence. This was mainly due to two factors—one being its very low rate of subscription and the other, accumulation of arrears of dues in spite of repeated reminders. Undaunted by such difficulties, we kept the flag flying but the present high cost of production makes it impossible for us to continue such a precarious existence. I appeal to one and all concerned to clear their arrears and pay up the current subscription in advance.

The *Journal* is moving so well now, that I feel that the time has arrived to make some permanent arrangement with regard to its future and leave it in safe hands as the present team of workers feel that they have rendered their share of service for quite a long time now and are thinking of retiring soon due to advancing age and other causes. But before doing so, they would like to place the *I.V.J.* on a better financial position and ensure its glorious future. It would be the height of folly to pursue a policy of drift, with a *Journal* that has developed so well and has shaped so nicely. Perhaps under other climes and environments, it would have had a larger measure of appreciation and support. Here in India we have to depend on our own strength as a profession and I have come to the conclusion that I should try and build up a Reserve Fund for this fine *Journal*, within my life time. I therefore appeal to one and all of our professional brothers and sisters, to contribute liberally to this proposed fund so that this pet child of ours may prosper well in the future. Let us be more practical than emotional and show our appreciation by building up the proposed fund. I have authorised the Editor to open a Reserve Fund List in the *I.V.J.* wherein all contributions would be acknowledged month after month. Cheques, money orders and correspondence may be sent direct to the Editor, *Indian Veterinary Journal*, Madras-17.

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temperatures. The incubation period was shortest at warmer temperatures and longest at colder temperatures. The nervous signs of the disease were predominant at the warmer temperatures. The respiratory signs were more pronounced at the colder temperatures.

A. MUKERJI.

News and Views

An unforgettable Leader:—"We live in deeds, not in years". How true! when we come to think about the unveiling of the portrait of late Sri A. Ramalinga Mudaliar, G.M.V.C., the Founder-President of the Madras Veterinary Association and a prominent builder of the All-India Veterinary Association and the *Indian Veterinary Journal*. Nearly two decades after his pre-mature retirement, the profession in Madras felt it necessary to keep his memory green and so got a portrait of his unveiled on 11-1-58. The honour of honouring this great leader nearly four years after his death and in such a spontaneous manner goes to the Madras Veterinary Assistant Surgeons' Service Association, which met in a Conference recently, a report of which is appearing elsewhere in this issue.

Innumerable messages have been received at this office, expressing supreme satisfaction at the way the *Indian Veterinary Journal* has been making progress. We feel very much heartened in our task and we convey our thanks to all of them and we regret we are not able to reply them individually. To place the journal on a better footing is our main concern now. God willing, we will succeed with the co-operation of the profession!

Weather forecasts:—A conference on meteorology was held at New Delhi recently. Delegates from over thirty countries attended the Conference. This is a branch of science which if properly purveyed in regional languages could benefit the ryots quite a lot. As in every branch of science they are trying to attain a certain standard of accuracy in their forecasts. We wish them all success!

The Copyright Act:—A new copyright Act has come into force in India on 21st January 1958. This places India on a par with other countries to safeguard the copyright prerogatives of painstaking authors. It is well for the profession to be informed about this Act.

What we have been saying:—The Prime Minister, Mr. Nehru said recently at a meeting of the U. N. Technical Assistance Board at New Delhi "Every country has a certain back ground, psychological, cultural or nationalist, which represent and condition the people in that country. It is not a safe thing to uproot the people of under-developed countries from their cultural environments and back-ground while technical and other changes are being brought about." Let our Reformers pay heed to the advice of this intellectual stalwart amongst the nations of the world!

Kaledioscopic changes of different pattern, colour and rapidity are proposed and carried out overnight, in our systems of technical education, administration, co-operation and rural polity. Tried methods are cast to the wind and new ones of doubtful utility are forced on the people in the name of 'Advancement of Science'! Whither India? is our poser.

Block Development Corner

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

CO-OPERATIVE FARMING

By

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

Retired Livestock Development Officer, Government of Madras.

Perhaps I am a little off the rails when I begin to write about co-operative farming. I wish to think aloud and share with you my ideas of co-operative farming. The subject is after all not completely cut off from mixed farming about which I have been writing in my previous articles.

Hardly a day passes without this subject hitting the head lines in news papers. I do not know if attempts have been made to find out the reaction of the actual tillers of the land on this important question. Block Development Centres must try and serve as touch-stone for all such new proposals to find out the wishes of the people. I believe some of these Centres are already being used as Laboratories for all such new ideas. They are good so far as they go. Co-operation must be genuine, not spurious, spontaneous and not enforced.

Co-operation is the highest form of human endeavour and if understood and practised on right lines, the millennium should not be far off. It is true there is a certain amount of co-operation amongst

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ryots when necessity arises. They lend labour, they lend bullocks, they lend seeds, they even till the neighbour's land when one is ill and they market the neighbour's produce, if so desired and so on. We must foster such co-operation and try to build up on them. Such co-operation I am inclined to think is based on finer qualities of man and may even be called as cultural co-operation. As against this, we find that in the name of economic co-operation they ask people to pool all their resources, their labour, their physical and intellectual capacities etc and try to fix up a ceiling. In actual practice it will mean nothing as this is a land of small holdings with no ceiling of any kind to shelter under. It will only mean levelling down a few of our wealthier class of people. How this levelling down is going to bring about co-operation in farming is a matter which needs very careful consideration. But judging from the results of existing co-operative institutions, it makes one rather pessimistic in the existing state of affairs.

Here is what Mr. D. Ananda Rao, Retired Director of Agriculture, Government of Madras, says in a recent article in the Madras Mail. "The Indian farmer is individualistic, first and foremost. He has been accustomed for generations to work his plot of land with the help of his family. He has no desire to share with another what he considers is his own. Lands vary in quality—there are differences in the inherent fertility of soils; each cultivator has his own ideas of bringing his land into good heart, which of course, depends on his economic position. Some very poor among them have no wherewithal to manure or properly cultivate. Therefore the more well-to-do among them are chary to pool all their resources together. Co-operative farming connotes that in the larger interests of the country, farmers should take the rough with the smooth, and divide the results of their common endeavour in proportion to the area they possess and the labour they contribute. It is feared that our country by and large, has not yet reached this stage and it would be only possible when the cultivators become more educated, enlightened and their vision broadened".

This co-operative spirit must germinate in the soil and grow with the people. This is bound to happen as time goes on. In the mean-while any amount of enforced co-operation cannot take us very far. What is needed is credit facilities to our ryots and wise guidance in spending. Let us work at essentials before we aim at huge co-operative farming as in other countries. Let us take the ryot step by step and not cause him much confused thinking. Let the Laboratory tests, if any, that are being conducted at Block Development Centres, prove an unqualified success, before we think of extending this idea as an applied Science in the field.

Farm News Releases

Sugarcane Trash Compost better than Farmyard Manure.—Experiments at Padegaon in Bombay State show that the compost prepared from sugarcane trash is superior to the local farmyard manure in quality, and is suitable for application to the sugarcane crop.

The trash compost will also have the advantages of containing a lesser number of weed seeds and being cheaper in cost.

Compost from the cane trash can be prepared either by the heap method or the pit method. In the former, the heap should be six feet broad and four feet high, with any convenient length. It will require to be periodically turned.

Compost heaps are best made in June, after the material has been soaked by the early rains.

The quantity of cane trash compost recommended for application is 40, 30 and 20 cartloads, for the *adsali*, preseasonal and *suru* crops, respectively.

Half the quantity of the compost (or other bulky manure) should be applied before the second ploughing, and the other half in furrows before planting. This secures a better germination of sugarcane. 310/57 ICAR.

Ration for Poultry Inclusion of Fishmeal.—Fishmeal is an important animal protein supplement, and should be included in rations given to poultry birds.

Sometimes, groundnut cake is added to the ration instead of fishmeal because of economy. Research has now shown that though groundnut cake supplies the necessary quantity of proteins, it does not supply the amino acids, minerals and vitamins needed for growth and production in poultry birds.

Where groundnut cake is used, there should be at least five per cent fish meal in the final mash to supplement the proteins of the ration.

3—13—57. I.C.A.R.

Silage from berseem excellent quality.—A silage of excellent quality can be prepared from berseem.

At the Indian Agricultural Research Institute, New Delhi, the silage is prepared by mixing berseem with oats straw or green oats, which serve as absorbents.

Layers of oats straw are placed between layers of chaffed berseem. The oats straw absorbs the juice that flows out of berseem in the process of silage formation.

Conference, wherever it may meet. In the meanwhile let us build up a Reserve Fund and relieve the I.V.J. of anxiety over its financial stability in its expanded sphere of work. I am sure the profession will to a man rise and respond and enable me to fulfil this last wish of mine.

As a token of my humble contribution I subscribe Rs. 100 towards the proposed fund but that should not in any way limit more generous contributions which I expect from one and all of our high-placed officials and all other members of the profession. Here is an opportunity for every one to put back a little of what we have been taking from the profession. It would also be a fine act of knitting the several States together in our own field of work and proving our *esprit-de-corps*.

JAI HIND !

M. S. SASTRY,
President,

Bangalore, }
1—2—1958. }

THE ALL-INDIA VETERINARY ASSOCIATION.

A New Year Offer

The Silver Jubilee Number of the *Indian Veterinary Journal* (July 1949) is offered to the Members of the profession and students at a concessional rate of Rs. 3/- (Reduced from Rs. 5/-) Postage 50 nP. extra. Only a limited number of copies are available. Hurry up to avoid disappointment ! It contains the genesis and growth of (1) all the State Veterinary Departments in India and Pakistan; (2) all the Veterinary Colleges in India; (3) the Indian Army Remount and Veterinary Services; (4) the I. V. R. I., (5) the A.I.V.A., (6) the *Indian Veterinary Journal*, as well as highly complimentary messages from all over the world.

There are special professional articles by Dr. G. Lapage; Dr. J. O. L. King; Dr. S. Datta; Dr. M. R. Dhanda and Dr. V. R. Rajagopalan; Dr. S. G. Iyer and Dr. C. S. Balakrisnan and Dr. S. N. Yeravdekar.

It is a historical document of great value which ought to be in the Library of every Veterinarian.

LOOK SHARP !

LOOK SHARP !

Apply to the Editor I.V.J.

General Articles

DEVELOPMENT OF MOTILITY IN THE SPERMATOZOA OF FARM ANIMALS

BY

DR. C. KRISHNA RAO, B.V.Sc., M.Sc., Ph.D.,
Deputy Director of Animal Husbandry, Andhra, Pradesh,
Hyderabad.

The ejaculated sperm from fertile males of all species demonstrate very active motility and a drop of good quality semen examined under the microscope presents the appearance of a whirlpool. Whether the sperm acquire this ability for maximal motility after ejaculation or whether those from the deeper regions of the male reproductive tract are by themselves capable of demonstrating such motility are questions that have not been satisfactorily answered.

The epididymis is believed to act not only as a storehouse for sperm but is also considered to provide suitable conditions for sperm maturation. In the bull, dog, rabbit, guinea-pig and rat, spermatozoa are very low in motility when they leave the testis and this power gradually develops as the sperm pass through the epididymis (Young, 1929). In the rooster, the testicular sperm show very poor motility, this faculty increasing in the epididymis and being greatest in the vas deferens (Munro, 1935). Lasley and Bogart (1944) observed only slight motility in epididymal boar sperm and sperm from different levels of the epididymis did not show much difference in the degree of motility. Rao and Hart (1948) found that in the bull, the sperm from the ampulla were actively motile while those from other regions were comparatively quiescent. Mukherjee and Bhattacharya (1949) found that the sperm from the ampulla of the ram, buck and buffalo showed progressive motility while those of the caput and corpus epididymis showed very slow movement. Rao (1949) reported work on the morphology and development of the spermatozoa of the stallion and the jack. Rao and Berry (1949, 1950) studied the physiological state of sperm from different levels of the male reproductive tract of the boar, ram, buck and the male Barbary sheep. Rao (1951) reported maximal motility of the sperm of the albino rat and the golden hamster collected from the epididymal tail, even in the undiluted state their activity being very greatly accentuated by dilution with normal saline and incubation at 100°F.

Certain ideas have prevailed for generations regarding the role of secretions of the male accessory sex glands but their exact role in

Berseem silage is best prepared in large-sized circular silo pits. The fodder is firmly pressed and compacted in the silo pit so that all air is excluded.

It is also found that berseem from the March—April cuttings is best for silage-making. 3—14—57. I.C.A.R.

Co. 1, Papaya new strain from Coimbatore.—A new strain of Papaya, called *Co. 1*, has recently been released by the Madras Department of Agriculture.

Co. 1, Papaya is a strain of the well-known *Ranchi* variety. It bears fruit at a low height of two feet six inches, facilitating early and better development of fruit and making harvesting easy. In the *Ranchi* variety, fruits are borne at a height of four feet six inches from the ground.

The unfavourable odour of the fruit in the *Ranchi* variety is almost missing in the new strain. Each fruit weighs three pounds, on an average, with uniform colour of flesh and skin.

The crop raised from the seeds of the strain is uniform in size, shape and quality. 3—16—57. I.C.A.R.

Association News

THE MADRAS VETERINARY ASSISTANT SURGEONS' SERVICE ASSOCIATION

A Conference of the above Association and a General Body meeting were held at the Madras Veterinary College on the 11th and 12th January 1958. It was inaugurated by the Hon'ble Sri M. Bhaktavatsalam, Minister for Home, Agriculture and Animal Husbandry, Government of Madras and presided over by Sri D. Veeraraghavan.

It was a highly successful session with as many as 94 members attending and 37 visitors, besides the students of the College. The highlight of the Conference was that the Association was able to put out for the first time a magnificent Conference Number as Souvenir. Messages from distinguished persons were all read and published.

Another interesting feature was that a portrait of late Sri A. Ramalinga Mudaliar, the Founder-President of the Madras Veterinary Association was unveiled by Sri D. Pattabhiraman, the Director of Animal Husbandry.

Sri D. A. Victor as Chairman of the Reception Committee dwelt mainly on the one burning question of the hour *viz.* dearth of trained

Veterinary personnel *vis a vis* the paucity of admissions to the Madras Veterinary College. He struck the right note when he told the Conference "Unless and until the pay scales are revised and made attractive, young men of to-day will still have apathy towards taking up the profession".

The Hon'ble Sri M. Bhaktavatsalam paid a handsome tribute to the working of the Animal Husbandry Department which he said was enjoying the confidence of the ryots and was highly popular in rural areas. He instanced the artificial insemination work which was growing in popularity every day and the great demand for Veterinary Dispensaries everywhere. He sympathised with the difficulties of the members of the Veterinary profession and assured the Conference that the "Government was anxious to improve their service conditions".

Sri D. Veeraraghavan, the President of the Conference dwelt on the need to concentrate on the production of food of animal origin. He said "The part played by a Veterinarian in public life can be said to be that of a medical practitioner, a vaccinator, an animal breeder, a public health man, all rolled in one." He finished by saying that the "labourer has proved himself worthy of the hire and may we entertain the hope that in the near future the hire might yet become worthy of the labourer."

Next the portrait of late Sri A. Ramalinga Mudaliar, the Founder-President of the Madras Veterinary Association was unveiled by Sri D. Pattabhiraman. He said "Mr. Mudaliar organised the Veterinary Graduates' Association which led to the formation of similar Associations all over the country. He was also instrumental, along with others to bring into existence the All-India Veterinary Association, and later its official organ "*The Indian Veterinary Journal*."

With a vote of thanks proposed by the Conference Secretary Sri T. Sivaraman, the Conference came to a close on the first day. The delegates next visited the Milk Factory at Teynampet.

On the second day, Dr. Clifford N. Stark, Dairy Production Adviser to the Government of Madras addressed the gathering on "Agriculture and Animal Husbandry in U.S.A." Several professional papers were read and discussed. Finally Sri T. A. Natarajan, the President of the Association made a moving appeal to the Members to do their best to the profession and the country.

Amongst the resolution passed the most noteworthy were :—

"Resolved to request the Director of Animal Husbandry to institute an inquiry on the impact of the changing pattern of agronomy from a pastoral system in the breed tract to a system of irrigation consequent on the completion of irrigation projects on the various

aspects of livestock development. For this a team headed by a Veterinarian and consisting of a Nutritionist, an agronomist and an economist be constituted."

"Resolved to request the Government to organise a separate marketing organisation for dealing with the marketing of livestock and livestock products as a wing of the Animal Husbandry Department."

Sri C. B. Viswanathan, on behalf of the delegates from the districts, thanked the Reception Committee for the excellent arrangements made for the Conference which made their short sojourn quite pleasant and comfortable. On the whole it was a memorable session and the Association is to be congratulated without reserve on its highly successful termination. A separate printed booklet of the proceedings has also been issued by the Association.

MEMOIR

Sri L. S. PARAMESWARA AYYER, G.M.V.C.
(Contributed)

We regret to record the demise of Sri L. S. Parameswara Ayyer, on 11th December '57. He retired from the staff of the Madras Veterinary College in 1939. His death has removed from our midst yet another brilliant product of the Madras Veterinary College. Born on 29th January 1888 at Lalgudi, Tiruchirapalli district, he joined the Madras Veterinary College after his secondary education at the Board High School of his native place. After his graduation, he served in several districts of the Madras State from 1910 to 1922, when he was drafted to his *alma mater* as a member of the staff. Since then he was attached to the Parasitology section till he went on leave preparatory to retirement, in 1939.

Sri L. S. P. Ayyer proved to be a very popular teacher. His mastery of the subject, coupled with his own style of teaching and affection towards the students, contributed not a little to the clear grasp of the subject by the taught. His initial labours in the Parasitology section, which then formed part of a single department along with the sections of Bacteriology and Pathology, paved the way for the organisation of the Parasitology section as a separate unit in 1929. Thereafter, he was associated in the work of the section with that eminent Parasitologist Sri M. A. N. Rao. The bulk of the specimens in the Helminthology museum, a proud feature of the institution, bears the imprint of Mr. Ayyer. He had contributed in collaboration with Rao some publications which were the results of research of an original nature. Moreover at a time when suitable text books on Veterinary Parasitology were not available, he brought out a concise but clear

"Notes on Helminthology" which proved to be very popular with the students of all the Veterinary Colleges in India. We still remember him as one of the pioneers who dared to organise the Madras Veterinary Assistant Surgeons' Service Association and who was its President for sometime.

We convey our heartfelt condolences to the bereaved family.
May his Soul rest in Peace!

Review

Veterinary Protozoology. Second Edition, 1957:—By U. F. Richardson, B.Sc., M. R. C. V. S., and S. B. Kendall, B.Sc., Ph. D., A. R. C. S., M. R. C. V. S., 260 Pages; 34 illustrations. Publishers Oliver and Boyd; Tweeddale Court, Edinburgh; 39-A, Welbeck Street, London, W.1. Price 22s. 6d.

The second edition of this popular book fulfils the need for incorporating the advances made in Veterinary Protozoology in recent years. The publication of this new edition is a welcome addition to the very few publications available on the subject.

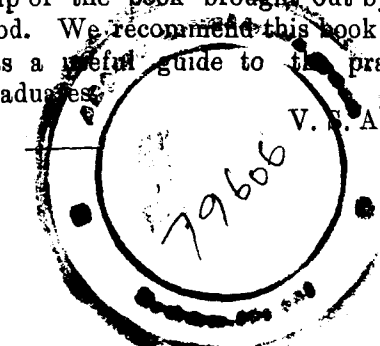
The authors have taken this opportunity to revise the general pattern of treatment of the subject by re-arranging the chapters, besides giving due consideration to the recent additions to our knowledge on protozoan parasites. Since due emphasis is laid on diseases, diagnosis, treatment, control and other related aspects with which the Veterinarian is primarily concerned, this handy book will be of immense use to the students and practitioners alike. The references given at the end of this book are quite exhaustive and must prove of immense value to those who wish to pursue further studies on any particular subject of their choice.

Readers in India will miss in this book, references to the valuable contributions made by Indian workers on *Trypanosoma evansi* as regards its culture in chick embryos and the diagnosis of the latent infection in bovines; *Plasmodium gallinaceum*, *Patonella gibsoni*, *Theileria annulata*, *Toxoplasma canis* and *Bartonella canis*. Some more details on *Hepatozoon canis*, Leucocytozoon infection in fowls and the studies of Reichenow and his collaborators on the phase of Piroplasms in ticks, would have enhanced the value of the book to the Post-graduate students in in Veterinary Parasitology.

The Printing and get up of the book brought out by the well known publishers are quite good. We recommend this book as a Text book for the students and as a useful guide to the practitioners, laboratory workers and Post-graduates.

V. S. A. WAR.

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collected from these regions also was similar in texture to that from the testis. Addition of 0.1 per cent strychnine hydrochloride to the sperm from these three regions threw the sperm into convulsive motility, the sperm movement being erratic without any progression and sperm motility was not very active.

When the undiluted material from the epididymal tail of the stallion, jack, ram, buck and Barbary sheep was spread in a thin layer and immediately examined under the microscope, sperm motility was good, there being the typical wave formation. Dilution of the material with a little normal saline greatly enhanced the motility and incubation at 100°F. for a few minutes further stimulated sperm motility. Motility in these preparations was quite comparable to that obtained in the ejaculate. The material from the vas deferens and ampulla in these species also showed sperm in very active movement. The secretions of the epididymal tail and vas deferens were not as viscous as those from the epididymal body and the testis. The sperm concentration in the epididymal tail and the vas did not also appear to be more than 3 or 4 times that of the ejaculate. The material from these regions was only slightly thicker or of about the same consistency as the normal ejaculate for the respective species.

In the case of the boar and the buffalo, the material from the epididymal tail was very viscous and very high in sperm concentration and there was little or no sperm movement. The sperm from the vas or the ampulla evinced active motility and the contents of these regions were also less viscous and were lower in sperm concentration than the contents of the epididymal tail. When the contents of the epididymal tail were diluted with normal saline the sperm exhibited active motility which was further enhanced by incubation at 100°F. The sperm motility in these preparations was as good as in the ejaculated semen. Addition of a drop of 0.1 per cent strychnine further stimulated the sperm.

With reference to the birds, unlike in the case of the other farm mammals, the testes were comparatively much softer in texture and on incising the convex border the fluid contents readily oozed out, there being no difficulty in collecting the testicular material which was also not very viscous. Microscopic examination of this material showed that the sperm were in active motion even without warming the preparations. Dilution with normal saline and incubation at 100°F. further enhanced the motility and addition of 0.1 per cent strychnine greatly activated the sperm. Motility of the avian testicular sperm was quite active. Sperm from the epididymis and vas also exhibited very active motility with wave formation. The material from these regions was

much less viscous than the testicular material and only slightly thicker than the ejaculated semen. The contents of the vas were less viscous than the epididymal contents. There was no perceptible difference in the grade of motility exhibited by the sperm from these two regions. The epididymis in the birds was very small and rudimentary and it was very hard to get more than a couple of tiny drops of the contents. When the material from these regions was diluted with normal saline and incubated at 100°F., the sperm demonstrated maximal motility and the addition of 0.1 per cent strychnine further stimulated the sperm.

Discussion

Many theories have been advanced regarding the initiation of motility in the spermatozoa. Milovanov (1934) held that sperm motility is induced by the admixture of the sperm with the accessory secretions and that the high electrolyte content coupled with the alkaline reaction of these secretions produces this stimulatory effect. Nesmeianowa (1936) believed that the secretions of the prostate gland activate the sperm.

The results of this investigation demonstrate that the accessory secretions are not essential for the initiation of sperm motility. The sperm from all regions of the reproductive tract are found to be capable of movement but the degree of their activity increases as they move away from the testis. The sperm appear to reach physiological maturity by the time they reach the tail of the epididymis. This is supported by the fact that the sperm in this region are capable of exhibiting maximal motility when provided with the optimal conditions for the expression of motility. These optimal conditions consist of a lowering of viscosity of the secretions, a lowering of sperm concentration and thirdly, a higher environmental temperature. In the case of certain species, sperm from the epididymal tail exhibited maximal motility in the undiluted state while in the boar and the buffalo sperm were quiescent in the epididymal material and active motility could be elicited only after dilution with normal saline. The reasons for this species difference in the behaviour of the sperm appears to lie in certain physical factors. The material from the epididymal tail of the stallion, jack, ram, buck and the male Barbary sheep was not very viscous, it flowed readily and the sperm concentration was also not very great. But the material from the epididymal tail of the boar and the buffalo was very thick and viscous and the sperm concentration was also very high and these two physical factors are sufficiently strong to suppress sperm motility. When these inhibitory factors are removed by dilution with normal saline the sperm were immediately thrown into active motility. In the case of the material from the vas or the ampulla of the boar and the buffalo the sperm were able to exhibit motility presumably

because of the lower viscosity of the contents and lesser sperm concentration.

Although the spermatozoa from the epididymal tail of several species of animals exhibited active motility *in vitro*, when examined in thin layers, it is doubtful whether the sperm exhibit the same type of motility *in vivo* in view of the different environmental conditions. It is probable that sperm movement is initiated *in vivo* for the first time in the ampulla, or the terminal section of the vas deferens in view of the lower viscosity of the contents, the lower sperm concentration and the higher temperature (body temperature) to which the sperm in this region are subjected by virtue of this region being located in the abdominal and pelvic cavities. It is also important to note that the temperature in the region of the epididymal tail is also lower than the body temperature and this is also one of the factors responsible for the quiescence of the sperm in this region *in vivo*.

In the case of the avian sperm, however, even the testicular sperm evinced fairly active motility presumably because of the mobility of the secretions and since the avian epididymis is very rudimentary, the testis itself perhaps acts partly as the reservoir for the sperm apart from the long and tortuous vasa deferens.

In the light of the above findings our concept of the role of accessory secretions in the physiology of the sperm has to undergo a certain amount of reorientation. The main role of these secretions appears to be to reduce the viscosity of the secretions and to lower the sperm concentration, thereby removing the physical impedimenta to the expression of motility. Further, the higher temperature of the secretions of these accessory glands which are located in the pelvic cavity helps in augmenting sperm motility. Thus the function of these accessory secretions appears to be of purely a mechanical nature. Walton (1933) believed that the main function of the accessory secretions is to provide bulk and thus facilitate the ejaculation process. That the high chloride and electrolyte content and the alkaline reaction of the accessory secretions are not very important for the initiation of sperm motility can be demonstrated by diluting the contents of the epididymal tail of the species mentioned with normal saline, 3 per cent sodium citrate (dihydrate) solution and 5 per cent aqueous solution of glucose separately, the epididymal sperm diluted with any of the solutions mentioned exhibiting the same type of motility. The maximal motility that is exhibited by the ejaculated sperm appears to be the result of the dilution of the secretions of the epididymal tail, vas and ampulla with the warm and mobile accessory secretions and the powerful rhythmic contractions that take place in the muscular urethral

wall during the ejaculatory process also greatly stimulate the sperm due to sheer mechanical force. As a matter of fact these rhythmic contractions start even in the epididymis itself and extend to the vas deferens, ampulla and urethra, thus forcing the contents of the deeper regions of the reproductive tract outwards. These contents from the deeper regions which are being forced outwards mix with the warm secretions of the accessory sex glands at the neck of the urinary bladder and from there on the diluted and warm secretions are subjected to much greater contractile force in the urethra. These mechanical factors are also perhaps quite important in accentuating sperm motility.

That the sperm undergo a process of maturation during their passage through the epididymis appears to be quite true. This is supported by the fact that the sperm collected from the head and body of the epididymis are not capable of active motility even in spite of being given the optimum conditions for the expression of motility. The sperm appear to become physiologically mature by the time they reach the tail of the epididymis. This is also supported by the morphological changes the sperm undergo and their physiological response to stimulating factors like dilution with isotonic solutions, incubation at 100°F. and stimulation with 0.1 per cent aqueous solution of strychnine hydrochloride. While addition of strychnine to sperm from the testis and the head and body of the epididymis produced only a convulsive type of motility, those from the epididymal tail and vas exhibited progressive and maximal motility after similar treatment.

Summary

The spermatozoa from different levels of the male reproductive tract of several species of farm animals were examined with reference to their physiological state in these regions. These animals included the stallion, jack, ram, buck, male Barbary sheep, boar, buffalo-bull, rooster, turkey tom, drake and the male pigeon. The following were the findings.

In all the farm mammals mentioned, the sperm collected from the testis and the head and body of the epididymis evinced very poor motility in spite of dilution, and incubation at 100°F. Addition of 0.1 per cent strychnine elicited only a mild convulsive type of motility. The avian testicular sperm exhibited fairly active motility even in the undiluted state.

The sperm from the epididymal tail of the stallion, jack, ram, buck and male Barbary sheep demonstrated very active motility even in the undiluted state. Dilution with normal saline and incubation greatly accentuated sperm motility. The sperm from the epididymal tail of the

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INDIAN COUNCIL OF AGRICULTURAL RESEARCH The Rafi Ahmed Kidwai Memorial Prizes for Agricultural Research

The Indian Council of Agricultural Research has with a view to creating an incentive for research workers and to recognising outstanding research work done by them in the fields of agriculture, animal husbandry and allied subjects, decided to institute 11 prizes of the value of Rs. 5000/- each. These prizes will be known as The Rafi Ahmed Kidwai Memorial Prizes for Agricultural Research and one prize will be awarded annually for outstanding research work done in India in each of the following subjects:

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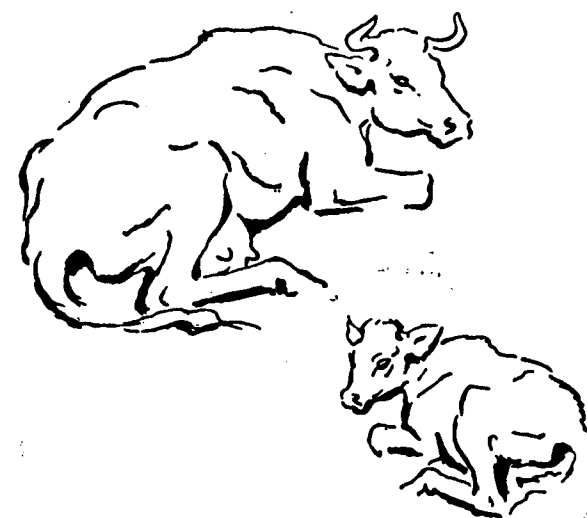
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boar and the buffalo were in a quiescent state but were thrown into active motility by dilution with normal saline and incubation. The difference in this physiological state of the sperm from the same region between the two groups of animals may be attributed to certain physical factors like viscosity and high sperm concentration. The sperm from the epididymal tail of all the species were greatly stimulated by strychnine. The avian epididymal sperm exhibited maximal motility even in the undiluted state.

With all the species studied, the spermatozoa from the vas deferens and ampulla exhibited very active motility which was augmented by dilution, incubation and addition of strychnine. Sperm motility is perhaps initiated for the first time *in vivo* in the terminal region of the vas or the ampulla.

It appears probable that the sperm of these species become physiologically mature by the time they reach the tail of the epididymis.

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By

M. L. KALIA, L.V.P., B.V.Sc.,

Research Assistant, Punjab College of Vety. Science
and Animal Husbandry, Hissar.

History.—An outbreak of *Histomoniasis* was recorded in chickens purchased locally for testing the potency of a brew of Ranikhet Disease vaccine. Since birds from the unvaccinated stock were not available at the Government Poultry Farm, Gurdaspur, at the time, 12 indigenous fowls had to be purchased locally. These were kept under observation in an isolated place meant for experimental animals, for about a week to ensure they were free from any other disease.

After 6 days, the birds started dying one after another. Post-mortem examination in four cases did not reveal any pathognomonic lesions. At the first instance the presence of *Histomonas* could not be suspected as this protozoan is not common in this country. Suspecting coccidiosis, caecal contents from one of the freshly dead birds were collected for microscopical examination. The microscopical study of the material revealed an organism indistinguishable from *Histomonas meleagridis*. Further study with regard to lesions and other postmortem changes brought about by this protozoan parasite was taken up. The postmortem presented a typical picture of lesions in the liver in the form of yellowish pin-head size necrotic specks. There was free haemorrhage in the lumen of the caeca with intensive haemorrhagic inflammation of the caeca. Three more cases were examined and typical lesions were seen in all. The microscopic examination of the caecal contents revealed the organism in its invasive phase. The two types of movements so characteristic of this protozoan parasite *viz* a pulsating movement and an amoeboid movement which varied from slight change of form to the formation of distinct pseudopodia were observed. Flagellated forms were also seen. The flagella gave rhythmic beats causing the organism to rotate one quarter to one third of a full rotation at each stroke.

Review of Literature.—Blackhead (entero-hepatitis) a disease of the turkeys was for the first time recorded in Rhode Island reds by Smith (1895) naming *Amoeba meleagridis* as the casual organism for the Blackhead. A further detailed study was made by the same worker (1910). He recorded his observations on the size of the organism, its method of multiplication and movements. The parasites were located in the interstices and lymph spaces of tissues but not within the cells. Tyzzer (1919-1920-1924) made detailed studies of the movements of the

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organism and described them as pulsating and amoeboid and renamed it as "Smith's organism" *Histomonas meleagridis*. He found the flagellated forms in the caeca of the chickens. He also studied its behaviour in the caecal discharge under optimum conditions.

De Valta and Devis (1933) later confirmed Tyzzer's observations as correct to a very large extent.

Kuprowski (1955) examined 11 turkeys and one hen dead of entero-hepatitis. He regards the hepatic lesions as amoebic infarcts. Horton Smith *et al* (1956) studied the *Histomoniasis* infection artificially produced in chickens with *Histomonas* suspensions. He observed that infection with tissue phases of *Histomonas meleagridis* could only be obtained when the chickens were starved or had received the alkali mixture. It was also proved that an acid P_H was lethal to the tissue phases of *Histomonas meleagridis*. The organism was however protected, in this environment when present in the ova of *Heterakis* and it was concluded that this could be the usual vehicle of natural infection.

Symptoms.—The sick birds presented a typical picture of the symptoms of the disease. They stood in huddled up position, with ruffled feathers and head retracted. Droppings were blood stained but in some cases blood was being passed freely with a little quantity of excreta. Straining was observed while passing excreta. Paleness of comb and wattles and dullness of plumage were characteristic. Course of the disease was short. Birds seen dull were found dead after 2 to 3 hours one after another. Rate of mortality was cent percent. Eight birds died within two days.

Postmortem.—A remarkable feature in this outbreak was the presence of typical lesions in 50% of the cases, which was a quite unusual observation. Since the outbreak was of a very acute nature, severe inflammation of the caeca with deeply embedded diphtheritic type of ulcers was noticed.

The lumen of the caeca was full of blood and in some cases caseous coats were also observed. Liver lesions were typical and very prominent; these were observed in the form of yellowish abscesses of pin-point size, visible to the naked eye on the surface of the liver and slightly depressed. A portion of liver from two cases was sent to Indian Veterinary Research Institute Mukteswar U.P. for Histopathological examination and confirmation of diagnosis. The presence of *Histomonas meleagridis* was confirmed in one of the liver sections.

Discussion

It is general belief that *Heterakis* eggs play an important part in spreading this infection and they harbour these parasites outside the body of the host. Hence the course of the disease depends upon the

presence or absence of the *Heterakis* eggs. In the present outbreak *Heterakis* eggs were not observed in any case. It could therefore be surmised, that the infection was direct through contaminated food and water and that the birds were harbouring the disease at the time of purchase or were actually in the incubation period of the disease. The incubation period in natural infection varied from 15–21 days depending upon the mode of infection, whether picked up directly from the droppings or *via Heterakis* eggs which first need to be embryonated and hatched in the gut before they liberate *Histomonas* parasite. Horton Smith *et al* (1956) recorded the incubation period after artificially infecting 1–3 weeks old chickens with the tissue phases of *Histomonas meleagridis*, as 7–14 days. He observed that the birds killed for postmortem examination, on 7th day of infection showed typical pathognomonic lesions in liver and caeca. The absence of *Heterakis* eggs and coccidiosis prove that the presence of these is not obligatory but some other factors may have predisposed the birds to infection. The typical pathognomonic lesions in the form of liver abscesses and diphtheritic type of ulcers with the presence of free blood in the caeca in the present outbreak were observed in higher percentage of cases than it has been recorded by other workers.

Summary

1. An acute outbreak of *Histomonas meleagridis* infection has been recorded in indigenous fowls.
2. Eight sick birds were opened for postmortem examination of which 4 showed pathognomonic lesions indistinguishable from those caused by the presence of *Histomonas meleagridis*. Prominent lesions were noted in liver and caeca.
3. Deaths in sick birds were 100% and mortality was cent-percent.

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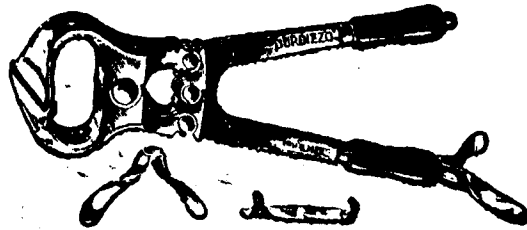
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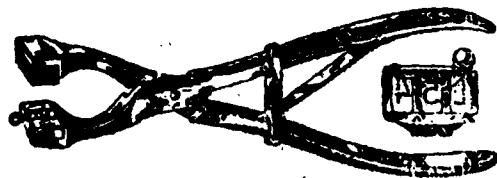
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On the finding of a Tubercle Bacillus, Morphologically Resembling the
Vole Bacillus, in Binturong (*Arctictis binturong* Raffles)

By
A. MUKHERJI AND D. P. CHATTERJEE

ON THE FINDING OF A TUBERCLE BACILLUS,
MORPHOLOGICALLY RESEMBLING THE VOLE BACILLUS,
IN BINTURONG (*Arctictis binturong* RAFFLES)

By

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and

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In December 1957, the internal organs from the carcass of an animal called 'Binturong', preserved in formalin, was received from the Zoological Garden, Calcutta, for examination and report. The forwarding letter did not contain any description of the said animal. The internal organs, particularly the spleen, presented many caseous nodules, two of them were as big as marbles. (See photograph). Lungs, liver and kidneys showed a few caseated nodules and a large number of necrotic foci. Other internal organs were not received. As the lesions looked tuberculous, one of the caseated nodules was incised and smears prepared. Suitable portion from the lesion was also taken for histo-pathological work. The smears were stained by Ziehl-Neelsen method, using 20% H₂SO₄ and Absolute Alcohol as decolourizers. On microscopical examination, numerous acid-alcohol fast organisms, morphologically resembling the vole bacillus, were seen in every field. The finding of tubercle bacillus of above description in a wild animal, not a vole, was not recorded by any earlier worker and this now opens a new line of research in tuberculosis. The authors regret that the material was received in formalin, thus preventing them from doing further work.

Description and other particulars of Binturong

The following description of the animal was found in Issack K. Funk's Dictionary (1937) "A civet-like Carnivore of Southern Asia, mainly arboreal, with prehensile tail, tufted ears and long coarse fur". (See photograph). In a communication, the Superintendent of Zoological Garden, Calcutta, supplied the following information:—

The Binturong or Bear Cat (*Arctictis binturong* Raffles)

Order—Carnivora

Family—Viverridae

Genus—*Arctictis*

Size—Head and body 2 feet 6 inches to 3 feet and tail 2 feet 4 inches.



The central caseous nodule has been incised. Caseous nodules of smaller size are seen towards the lower end of the spleen. Multiple incisions have been made on the upper portion for examining the nodules and preparing smears.



Microphotograph of Binturong bacilli. A cluster of bacilli seen in the centre of the field. Note the various curved forms.

A Satisfactory Ear Bandage for dogs

BY
JOSE B. ARANEZ, D.V.M., M.S.

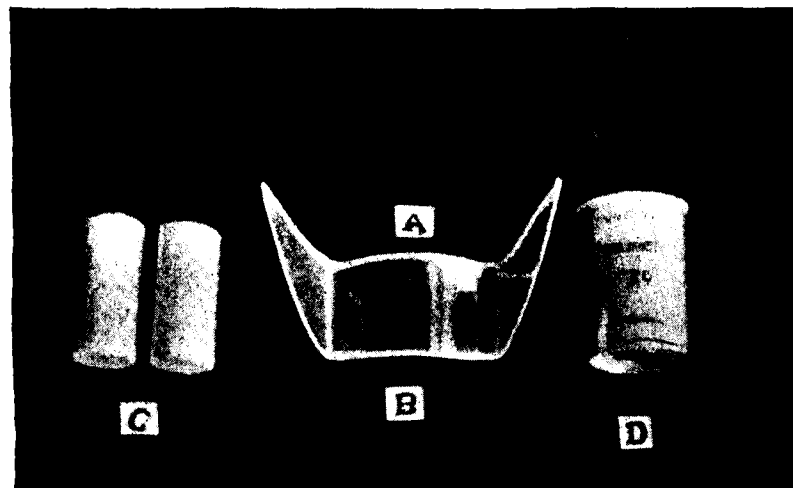


Fig. 1. Materials of the ear bandage:
(A) aluminum plate No. 30; (B) aluminum plate (A) shaped according to the desired form and length with the edges covered with adhesive tape;
(C) gauze bandage rolls; and (D) adhesive tape.



Fig. 2.
Aluminum plate taped to the long axis of the free portions of the ears before the gauze bandage rolls are taped against the ears.



Fig. 3.
The new ear bandage in place. Note the adhesive tape that connects the two gauze bandage rolls from each ear for additional stability.

[To face page 126]

Distinctive characters :—The Binturong is easily distinguished from other civets. Its tufted ears, its long shaggy coat suggestive of a bear, its tail markedly thick at the base and covered with large bristling hairs longer than those of the coat, are distinctive in this animal. Colour is very variable; mostly black but an intermingling of partly white and buff hairs may give the coat a grizzled appearance. In some animals the white and buff are so pronounced that the coat takes a straw colour or grey tinge.

Distribution :—In India, the range covers Nepal, Sikkim, Bhutan and Assam and extends into Burma and the Malayan states. Two races are recognised,—the Indian form is said to be distinctive by its fuller and more luxuriant winter coat and a more marked tendency to grizzled colouration.

Habits :—The Binturong is a creature of dense forests. It is mainly arboreal and spends the day curled up in a hole in a tree, its head tucked well under its bushy tail. These animals come out at dusk to seek their food. Their movements through the trees are slow and deliberate, but they climb with ease and use their tails to aid their climbing. The tail, very muscular at the base, is prehensile at the tip and is hitched round a branch as an anchorage particularly when descending. Baby Binturongs are able to support themselves by the extremity of the tail alone. Like other civets, Binturongs are omnivorous, living on small animals, birds, insects and fruits. When on the prowl, they are said to grunt and to make a hissing sound by expelling air through partly opened lips. From the build of the animal it would seem that most of its food is obtained in trees. The species, though particularly fierce, when taken young is easily tamed and becomes very gentle and playful. Because of its secretive and nocturnal mode of life, the animal is rarely seen.

Morphology of the Binturong bacillus

Direct smears and tissue sections from tuberculous lesions, including the necrotic foci, were stained, as usual, by the Ziehl-Neelsen method, using 20% H_2SO_4 and absolute alcohol as decolourizers. Large numbers of Ziehl-Neelsen positive bacilli of the following description were found in all the slides.

The bacilli were pleomorphic, measuring between 6 to 14 microns, slender, curved showing V. U. S. L. sickle-shaped and spiral forms, majority showing distinctly beaded appearance along their entire length, showing no branching and arranged mostly in scattered form, although a few tufts of bacilli were seen in all the slides. (See microphotograph).

Certain extreme tests were applied to find out the degree of acid-fastness and also acid-alcohol fastness of the bacilli. Some tissue sections after being stained with hot carbol fuchsin for 5 minutes, were kept immersed in freshly prepared 20% H_2SO_4 for 24 hours. Another set of tissue sections, after being stained with hot carbol fuchsin for 5 minutes and treated with 20% H_2SO_4 for 15 minutes, were kept immersed in absolute alcohol for 24 hours. Both the lots were then passed through the remaining procedure of the staining technique and were examined under microscope. The bacilli in all the slides of both the lots resisted decolourization and appeared intense red.

Histo-pathology

Sections from tuberculous lesions of Binturong revealed, on microscopical examination, the changes commonly associated with tuberculosis in other animals, viz presence of epithelioid cells, giant cells, caseation, necrosis and calcification.

Discussion

There are at present three recognised mammalian types of the tubercle bacillus, viz, human, bovine and murine, the last is now named as *Mycobacterium muris* which was isolated by Wells (1937) from voles *Microtus agrestis* suffering from natural tuberculosis in England. This bacillus, which is also known as the 'vole bacillus,' was found to be distinct from other known types of the tubercle bacillus. In his subsequent publications he noted that the disease had been identified in more than 900 small animals in 4 different species, viz. the wild vole (*Microtus agrestis*), the bank vole (*Clethrionomys glareolus*), the wood mouse (*Apodemus sylvaticus*), and the Shrew (*Sorex araneus*). The authors are not aware of any worker reporting the finding of the vole bacillus in animals other than the species mentioned above. This is for the first time that a tubercle bacillus, morphologically resembling the vole bacillus, has been found in a wild animal called Binturong which does not come under the vole family. It may be mentioned here that the Binturong, in question, was a newly acquired animal in the zoo; hence it must be conceded that the animal had tuberculosis in its natural wild life. Moreover, there are no voles in the Calcutta zoo. Hence, the question of getting infected with the vole bacillus while in the zoo is ruled out. The authors could not proceed with the typing of the Binturong bacillus for the reasons stated in the introduction. It may not be a mere speculation to suggest that future work on natural tuberculosis in Binturongs may reveal the presence of the fourth mammalian type of tubercle bacillus. Numerous workers in different parts of the world, including the present authors, have had opportunities to examine tuberculous lesions in various wild animals in the zoos, but

none of them ever reported the finding of tubercle bacillus of the description given above in any animal other than the voles. Datta (1954) reported the types of tubercle bacilli isolated from tuberculous lesions of various species of animals, viz Cattle, Goat, Pig, Horses, Elephants, Sambar, Llama, Spotted Deer, Nilgai, Antelope, Arabian Gazelle, Malayan tapir, Fowls, Monkeys, Dogs, Pigeons and Parrots. The types isolated were Human, Bovine and Avian.

Summary

1. Tubercle bacillus, morphologically resembling the vole bacillus, was found in the tuberculous lesions of a wild animal named Binturong or Bear Cat (*Arctictis binturong* Raffles), which is not a vole.
2. Description of the Binturong bacillus and particulars of the animal are given.
3. Possibility of the existence of a new mammalian type of tubercle bacillus has been hinted.

Acknowledgment

The authors are indebted to Mr. K. C. Mukerjee, M.Sc., M.R.C.V.S., Principal of Bengal Veterinary College for his keen interest in the finding.

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PARASITES OF PIGS (*SUS SCROFA DOMESTICA*) IN MADRAS. *

By

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In India pigs like the ruminants and poultry meet a part of the food requirements of a section of the meat eating population and so they are reared in considerable numbers in rural areas. Though it is known that pigs are susceptible to infection by a number of parasites and that some of them are of zoonotic importance, not much systematic work has been done to ascertain the extent of damage caused by the various parasites. Maplestone (1930) examined the alimentary tracts of 49 pigs in Calcutta and described a number of nematodes recovered by him. The trematodes collected by him were described by Bhalerao (1931). Later, Rao and Ayyar (1933) examined 81 pigs in Madras for schistosome infection and in the course of the examination collected the other helminths as well from them. Though the survey in Calcutta indicated the rate as well as the intensity of infection, it did not give any information on pathogenesis. Since the information on parasites in pigs in India especially in Madras was not complete as regards infection rate, intensity of infection and pathogenesis, it was thought that it would be worthwhile to undertake a systematic study to gather as much information as possible on these aspects.

Materials and Methods.—The pigs are generally brought in lots to the city of Madras for slaughter from the neighbouring districts of North Arcot, South Arcot and Chingleput and are housed in the premises adjoining the abattoir. In those districts from where they are got, they thrive mainly on groundnut, tubers, human excreta, etc. Since straying of pigs is prohibited in the city, they are kept in the sty itself and are fed with a small quantity of groundnut cake. But some of them manage to escape and gain access to human excreta. They are slaughtered at the rate of one or two per day usually in the early hours of the day. Part of the investigation was undertaken in the city pig slaughter house. Fifty adults and 15 piglings formed the material for the study. Ectoparasites, if any, were collected soon after slaughter. During evisceration and dressing of the carcass, search was made for larval and adult stages of helminths in musculature and peritoneal cavity. The complete alimentary tract with the tongue and mesentery intact, trachea and lungs, heart with a portion of the main blood vessels, diaphragm, liver, pancreas, spleen and kidneys with the perirenal fat were purchased and brought to the college by about 7 a.m. viz within an hour after

slaughter and kept in the frigidaire for detailed examination later on. The materials from the fifty adult pigs were subjected to a thorough examination, whereas a search for *Ascaris lumbricoides* alone was made in the 15 piglings ranging from the new born to 3 month old ones. The rectal contents of all the pigs were also examined for oocysts of coccidia.

Results of examination.—The information collected from this survey regarding the frequency as well as intensity of infection of the various parasites is given in the following table.

Parasite	No. infected	Location	* Intensity of infection		
			Light	Moderate	Heavy
<i>Paryphostomum sufrartylex</i>	2	Small intestine	2	—	—
<i>Schistosoma suis</i>	4	Liver	3	1	—
<i>Pseudanaplocephala crawfordi</i>	23	S. intestine	15	6	2
<i>Cysticercus cellulosae</i>	5	Oesophagus, Skeletal muscle, Diaphragm, heart	4	—	1
<i>C. tenuicollis</i>	1	Liver	1	—	—
<i>Hydatid</i>	15	Liver, lungs, Spleen, heart	10	5	—
<i>Enterobius vermicularis</i>	2	Large intestine	2	—	—
<i>Oesophagostomum dentatum</i>	30	do.	15	11	4
<i>O. brevicaudum</i>					
<i>Stephanurus dentatus</i>	2	Perirenal fat (larval forms in Liver)	2	—	—
<i>Metastrongylus apri</i>	4	Lungs	1	2	1
<i>Ascarops strongylina</i>	48	Stomach	10	32	6
<i>Physcephalus sexalatus</i>	43	do.	15	21	7
<i>Simonsia paradoxa</i>	84	do.	22	10	2
<i>Streptopharagus</i> sp.	1	do.	1	—	—
<i>Onchocerca</i> sp.	5	Aorta	5	—	—
<i>Trichuris trichiura</i>	5	L. intestine	5	—	—
<i>Haematopinus suis</i>	6	Skin	6	—	—
<i>Linguatula serrata</i> (nymph)	1	Lungs	1	—	—
<i>Sarcocystis miescheriana</i>	1	Diaphragm	1	—	—

* Light infection ... 1—10 parasites
Moderate " ... 11—30 "
Heavy " ... More than 30 parasites

Paryphostomum sufrartylex.—This fluke was recovered from pigs for the first time in Madras. While Maplestone collected this in abundance in Calcutta from 33% of the carcasses (Bhalerao, 1931) and Srivastava and Peter (1954) recorded its high incidence in Bareilly, only 4% of pigs in Madras was found to harbour this parasite. The infection was also very light. Except mild haemorrhagic catarrh at the sites of attachment of the parasites to the mucosa, no other damage was noticeable in the small intestine. The record of this trematode in Madras in a boy (Reddy and Varmah, 1950) and its presence in pigs as revealed from this survey stress the importance of further investigations into its incidence and other related matters.

* Read at the 45th Session of the Indian Science Congress, 1958.

Schistosoma suis.—Rao and Ayyar (1933) collected 4 pairs of this trematode from 4 pigs out of the 81 examined by them in Madras and Maplestone obtained about half a dozen males only from a pig in Calcutta (Bhalerao, 1934), while the infection was found to be quite common in Bareilly and the pigs were found heavily infected (Sinha and Srivastava, 1956). In this survey 8% of the pigs were found infected and the infection was light generally except in one. The liver was apparently normal in all mild cases and the one with moderate infection revealed indurated areas in its substance.

Pseudanoplocephala crawfordi.—This tape worm recorded for the first time in pigs in India by Mudaliar and Gopalakrishnan (1938) was found to be fairly common with an incidence of 46%. In the heavily infected animals the small intestines were more or less blocked by bundles of worms. Catarrhal enteritis was observed both in moderate and heavy infections.

Ascaris lumbricoides.—Not a single animal among those including the 15 piglings examined was found infected with this nematode. The presence of partly digested worms along with the human excreta in the stomach of three of the pigs only suggest that they were of human source obviously picked up by them during their stealthy straying. The very common incidence of *Ascaris lumbricoides* in human beings in Madras and the complete absence of its occurrence in pigs, which are notorious for their scavenging habits give proof to the inability of the human strain to develop to the adult stage in pigs normally. However, 48% of the cases examined revealed large number of necrotic spots in the liver resembling the milk spots of *Ascaris lumbricoides*. Though no helminth could be recovered from those lesions, they might have been caused by the human strain.

Enterobius vermicularis.—Two of the pigs examined were found to harbour this nematode, one in each in the colon and were found alive. The fact that they were alive precludes the possibility of human source. The occurrence of this worm—pin worm of human beings in pigs is an interesting observation.

Oesophagostomum dentatum and *O. brevicaudum*.—These helminths were met with in caecum and colon in 60% of the pigs, out of which a large percentage had nodules in the large intestine. In 50% of the affected pigs the number of worms found was 10 though there were numerous nodules. A similar condition was seen in those pigs harbouring a large number of adult worms. Besides the nodules, no other pathological changes could be noticed. Out of *Oesophagostomum dentatum* and *O. brevicaudum* identified in the collections, there was a preponderance of the former over the latter. The occurrence of *O. brevicaudum* was recorded for the first time in Madras. The observation of *O. dentatum*

as the common worm in pigs in Madras differs from that of Maplestone (1934) who recorded *O. brevicaudum* (*O. suis*) as the commonest of all the *Oesophagostomum* present in pigs in Calcutta.

Metastrongylus apri.—Eight percent of the pigs were found infected. Patches of congestion and copious catarrhal exudate in the affected bronchioles were evident. In a heavily infected lung areas of consolidation and emphysema were also noticed.

Simondsia paradoxa.—This interesting spirurid thought to be confined to Europe only was found parasitising a large percentage of domestic pigs in Madras ranking in incidence next only to *Ascarops strongylina* and *Physocephalus sexalatus*. Since the males very much resemble *Physocephalus* along which they are usually present in the gastric mucosa and the females are found in small cysts, it is presumed that this worm was missed so far. In a large number of cases severe inflammation of gastric mucosa resulting in its thickening was observed and the worms were found deeply embedded in the inflamed mucosa with a concentration in the fundus region. This pathological feature was noticed in infections by all the three above mentioned common spirurids.

Streptopharagus sp.—Only one specimen was encountered in the collection of *Physocephalus sexalatus* and its specific identity could not be made as it was in a damaged condition.

Onchocerca sp.—This filarid was found affecting the aorta of 10% of the pigs. The worms were found under the endothelial lining forming sinuous tracts. The atheromatous areas were seen prominently in all the cases in the region of the aortic arch. Though the lesions resembled those of *O. armillata* infection of cattle, the specific identity of the helminth under study is not yet established and is pending extraction of an entire male. This is the first record of onchocercosis in pigs affecting aorta.

Linguatula serrata.—The occurrence of nymphs of the tongue-worm in the lungs of a pig is an interesting find, since in Madras so far only on two occasions the adult worms were found infecting dogs and the larval forms were recovered from 3 bovines.

Sarcocystis miescheriana.—In only one pig a few pin point sized Miescher's tubes were met with in the diaphragm. Since the cysts were very small, it was likely they might have been missed in some cases.

Bourgelatia diducta and *Uncinaria stenocephala* recorded in Madras as well as *Opisthorchis noverca*, *Fasciolopsis buski*, *Gastrophilus hominis*, *Coenurus serialis*, *Ascaris lumbricoides*, *Pseudocercaria brumpti*, *Syphacia srivastavai*, *Oesophagostomum conicum*, *O. brevicaudum*, *Physocephalus samensis*, *G. conorfilii*, *G. urosulatus*, *Monostoma hispidum*, *C. callosi*,

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