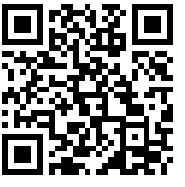

# TROPICAL VETERINARY BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 14.] February 28, 1926. [No. 1.

## DISEASES DUE TO PROTOZOAN PARASITES.

DIOS (R. L.) & ZUCCARINI (J. A.). **Primera comprobación de Tripanosomosis bovina en la R. Argentina.** [Bovine Trypanosomiasis in the Argentine.]—*Revista Med. Vet.* 1925. June. Sept. Vol. 8. No. 2-3. pp. 85-88. With 1 plate in colour.

The authors describe the detection of a large trypanosome of the *theileri* type in the blood of a 15-months-old bull inoculated experimentally with blood received from a ranch. The animal also developed babesia and anaplasma infections.

Attempts to transmit the trypanosome to other bovines failed, nor was it found possible to obtain cultures of it.

BEVAN (LI. E. W.). **The Trypanosomiases of Man and Animals in Southern Rhodesia.**—*Vet. Jl.* 1925. Nov. Vol. 81. No. 11. pp. 536-546.

This paper is an introductory address at a Conference held at Salisbury, April 14th, 1925, to consider ways and means of dealing with tsetse flies and the diseases they transmit. It is in the nature of a statement of the problems involved.

CURASSON (G.). **Réactions à la trypanoléine de van Saceghem et formol-gélification dans la trypanosomiase à** *T. pecaudi.* [Van Saceghem's Trypanoleine and the Formol-gel Test in Animals infected with *T. pecaudi.*]—*Bull. Soc. Path. Exot.* 1925. Apr. Vol. 18. No. 4. pp. 352-353.

Curasson has tested a number of horses infected with and cured of *T. pecaudi*, and healthy horses with a material prepared in the manner described by VAN SACEGHEM and named by him trypanoleine. He finds that the reaction appears within an hour and disappears within 24 hours. It develops in exactly the same way in healthy, diseased, and recovered animals. It appears to be due simply to irritation. Exactly similar reactions can be produced with defibrinated blood and healthy horse plasma.

Curasson concludes that as a diagnostic agent trypanoleine is useless.

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He has also carried out the formol-gel test in a number of cases with the following results :—

Of five horses severely infected with *T. pecaudi*, four gave clear reactions in 4 to 24 hours.

Two animals in very poor condition which had been treated with "914" and galyl respectively and whose circulation was free from parasites gave clear reactions in a few hours.

A horse which during the course of three years had had at least ten acute crises of Souma gave no reaction when trypanosomes were discoverable in the blood by centrifuging. A rapid reaction was given, however, five days later after two injections of galyl when trypanosomes were not discoverable in the blood.

Of four healthy horses three gave no reaction, and one which had a strained tendon gave a rapid reaction.

Curasson concludes that the method is of little value.

CURSON (H. H.). **Vivax in the Bechuanaland Protectorate.** [MS. of a Note read at the Meeting of the S. African Assoc. for the Advancement of Science. July 8th, 1925.]

The writer has detected *T. vivax* in a blood smear sent from Maun, Bechuanaland. *T. congolense* was identified in a smear from Kasungulu. Flies forwarded with the smears were found to be *G. morsitans*.

SOULE (M. H.). **Microbic Respiration. III. Respiration of** *Trypanosoma lewisi* **and** *Leishmania tropica*.—*Jl. Infect. Dis.* 1925. Mar. Vol. 36. No. 3. pp. 245–308.

The strain of *L. tropica* was obtained from the Rockefeller Institute and had passed through over 200 generations in the author's laboratory.

Full details are given of the technique of the cultivation of the organisms and of the analyses of the gases.

It was found that in tubes of a given size cultures of *L. tropica* consumed all the oxygen about twice as rapidly as those of *T. lewisi*. The latter parasite was the more susceptible to increasing partial pressures of oxygen. The organisms were not killed but their multiplication was inhibited.

A concentration of 50 per cent. was the critical point for *L. tropica*. Oxygen was necessary for growth, but atmospheres of nitrogen or hydrogen were not lethal.

A concentration of $CO_2$ higher than 20 per cent. was toxic for *T. lewisi*, even when oxygen was present, but with *L. tropica* partial pressures of 30 per cent. or more were required to produce toxic effects. True respiratory quotients were only obtainable with young cultures, as secondary changes in the medium caused alterations later.

DIOS (R. L.), ZUCCARINI (J. A.) & OYARZABAL (F.). **Nouveau cas de trypanosomiase humaine dans l'Argentine.** [A New Case of Human Trypanosomiasis in the Argentine.]—*C.R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1114–1115.

This is the third case reported by the authors. The blood of a boy, 4 years old, was found to contain *Schizotrypanum cruzi*. The clinical symptoms described by CHAGAS were not observed, but certain symptoms were noted which were ascribed to infestation with worms.

Trypanosomes were found in rats and dogs inoculated with blood, but in small numbers only. Guineapigs did not become infected.

The cerebro-spinal fluid was negative both by examination and inoculation.

YORKE (Warrington). **Co-ordination of Effort in Tsetse-Fly Investigations.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 373–379. [A paper read at the Second Imperial Entomological Conference, London, June 15, 1925.]

Four factors are concerned in the problem of Trypanosomiasis of man and domesticated animals: (1) The trypanosomes; (2) population and domestic stock; (3) the transmitting agent; and (4) the reservoir. All the above factors should be investigated at the same time and in the same locality.

The work must be carried on systematically through periods of years with close co-ordination if results are to be obtained. Many investigators are working in more or less isolation at different aspects of the problem. Their resources are limited, and the work is often brought to a complete standstill as a result of transference to another area or duty. The result is incomplete investigation and waste of time, money, and energy.

The author urges, as he has done before: (1) That effort should be concentrated; (2) that entomological, medical, and veterinary research should be under one central organisation; (3) the personnel should be sufficiently large to cover leave substitutes, the possibilities of illness, etc.; (4) the funds should be sufficient to allow of the employment of adequate native labour to enable experimental work to be carried out on a large scale.

KINGHORN (A.). **Human Trypanosomiasis in the Luangwa Valley, Northern Rhodesia.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 281–300.

The author deals with the physical aspects of the Valley, the distribution of the game and fly, the history of sleeping sickness, the incidence of the disease, the disease in human beings, treatment with "Bayer 205," and prophylaxis.

The evidence suggests that the waterbuck should be looked upon with suspicion. The fly, like the game, shows a seasonal variation of distribution. During the rains it spreads over the country, but during the dry season it is abundant near streams and hence near villages. As the villages are generally surrounded by gardens the fly does not, as a rule, invade them.

The disease was first detected in Europeans about 1909, but there is no evidence to suggest that the disease ever becomes an epidemic. The author believes, as do the natives, that the disease is an old one and not of recent introduction.

In human beings the period of incubation is between one and two weeks, and the disease rarely occurs in children under 15 years of age. Figures appear to show an increasing susceptibility up to about 35 years and then a decline. The disease is more common in women than men in the proportion of 3 to 2.

There is no evidence of the acquisition of immunity.

Of 38 cases treated with "Bayer 205" by the Commission in 1922, only 5 remain alive, but it is not certain that trypanosomiasis was

responsible for the deaths of all the others. Influenza may have played a part. Three doses of 1·2 g. were given at 10–18 days interval. Increased doses might have been more effective, but with the cost of the drug at 6s. 6d. per gramme larger doses would be prohibitive.

The attitude taken up by the native is one of passive resistance, and the writer does not think that it is practicable to treat the whole of the population and kill off all the game, as would have to be done if the trypanosome is a game parasite and not one of human beings only.

VAN SACEGHEM (R.). **Le bismuthoidol dans le traitement des trypanosomiases animales.** [Bismuthoïdol in the Treatment of Trypanosomiasis of Animals.]—*C.R. Soc. Biol.* 1925. Oct. 30. Vol. 93. No. 30. pp. 1046–1049.

Bismuthoïdol is finely divided colloidal bismuth rendered isotonic in solution with sugar. The author has used it for intravenous injection only.

Doses of 20 to 50 cc. have been given and the paper contains details of seven bovines placed under treatment. Four of these were infected with *T. cazalboui* var. *vivax*, two with *T. congolense pecorum*, and one with *T. brucei*. In the latter animal only did trypanosomes disappear from the circulation.

Further experiments could not be carried out as supplies of the drug were not available.

NICOLAU (S.), DOSKOCIL (A.) & GALLOWAY (I. A.). **Action de l'acétyloxyaminophénylarsinate basique de bismuth dans le nagana expérimentale et la spirillose des poules.** [The Action of Basic Acetyloxyaminophenylarsenate of Bismuth in Experimental Nagana and Fowl Spirillosis.]—*C.R. Soc. Biol.* 1925. Aug. 14. Vol. 93. No. 27. pp. 580–582.

The drug has been used as a suspension in oil containing 0·041 g. of bismuth, and 0·015 g. of arsenic per cc.

If 0·5 cc. or more of the suspension is injected subcutaneously into a mouse up to 48 hours after infection with nagana, when trypanosomes are numerous in the blood, a definite cure is effected. In 3 cases given the periods of observation were 92, 45, and 63 days.

A dose of 0·3 cc. given at the same time as the infective inoculation prolongs the period of incubation, but does not prevent infection.

A rabbit was given 2 cc. of a 10 per cent. suspension of the drug into the muscles of the back, and at the same time was infected by instillation of trypanosomes into the eye and was not infected, while a control succumbed in 9 days.

If treatment is postponed until 2 days after infection, less favourable results are obtained.

The drug appeared to be more effective as a spirillicide than as a trypanosomicide. 1 cc. per kilog. injected into fowls 2 days prior to inoculation prevented infection. 0·5 cc. was found to cut short infection, but with 0·2 cc. the disease ran a normal course.

If there is a delay of four days between the injection of the drug and infective inoculation the results are rather better, as in this case 0·5 cc. prevents infection. 0·2 cc. again fails to prevent the disease from running a normal course.

Dios (R. L.). **Ensayos de tratamiento preventivo y curativo con "Bayer 205."** ["Bayer 205" in the Curative Treatment and Prophylaxis of Trypanosomiasis (Mal de Caderas).]—*Revista Med. Vet.* 1925. June. Sept. Vol. 8. Nos. 2-3. pp. 89–93.

In his English summary the author states that very satisfactory results have been obtained, but it appears to be permissible to question this on the grounds of the details given of cases treated. One infected horse was treated, receiving a total quantity of 17 grammes in the course of 4½ months. Four relapses occurred and the animal died.

Berg (H.). **Die Eignung von "Bayer 205" zur Bekämpfung der afrikanischen Haustiertrypanosomen.** [The Treatment of Trypanosomiasis of Domesticated Animals in Africa with "Bayer 205."]—*Deut. Tierärzt. Wochenschr.* 1925. Vol. 33. No. 34. pp. 561–571.

Twelve oxen, ranging in weight from 225 to 330 kilogs., were given doses of 10–25 gm. of "Bayer 205" in 10 per cent. watery solution. Two days later they were exposed to natural infection in a fly belt. Half the animals were left there for 17 days, and the remainder for 31 days. All contracted trypanosomiasis. Abscesses developed in many of the animals at the seat of the subcutaneous injections. Eleven naturally-infected animals were treated with doses ranging from 5 to 30 gm. of the drug, and in some cases repeated doses were given. The maximum amount received by any animal was 52 grammes spread over a period of 5 weeks. All died of nagana. Twelve animals ranging in weight from 150 to 300 kg. were given doses of 10 to 30 gm. of the drug intravenously, and 5 days later they were exposed to the bites of flies. After 6 days, and after further intervals of 10 days, they received doses of 10–30 gm. and 2–3 gm. (twice) intravenously. Eight of these animals died, apparently as the result of poisoning with the drug. One which survived became infected, and the other three remained free from trypanosomes. Since the medicinal dose appears to approximate so closely to the toxic dose by intravenous injection, it appears to be impracticable to use the drug in this way.

These experiments were carried out in a fly belt, and the test was therefore the severest possible.

It is pointed out the fly land can be divided into three classes: (1) The actual fly belts; (2) heavily infested farms; and (3) lightly infested farms. The next experiments were therefore carried out in a place falling into the second category, and in some cases the "Bayer 205" was used in conjunction with tartar emetic.

Sixteen animals were treated with "Bayer 205" alone, 3 with tartar emetic, 13 with the two drugs, and 16 were kept as controls.

The combined drugs were prepared for injection as follows. One gram of tartar emetic was dissolved in 40 cc. of water and "sterilised for half an hour." The solution was cooled to about 60° C., and the "Bayer 205" was then added. Immediate solution took place.

The animals were injected with doses ranging from 2·5 to 10 grammes of "Bayer 205," and with 1 to 1·5 gm. of tartar emetic, usually by the intravenous path. They were then exposed to the bites of flies.

Of those treated with "Bayer 205" alone, 33⅓ per cent. failed to become infected. The same percentage of those treated with tartar emetic excaped infection. Of those treated with the combined

drugs 69 per cent. escaped infection. The control animals all became infected. The doses were administered every fortnight from December to May (the fly season).

The control animals of this experiment, which all became infected, were subsequently used for curative treatment.

KNOWLES (R. H.). **Treatment of Camels affected with *Trypanosoma soudanense* with "Bayer 205," and Further Observations on the Formol-gel Test.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. pp. 42–46.

The drug was used in 10 per cent. solution and was administered intravenously by gravitation. No precautions regarding the rate of administration were taken. In view of the production of albuminuria in the human subject samples were collected daily up to a period of 7 days after the last dose and tested for albumen. None was found.

The experimental treatments were controlled by microscopic examination of the blood, biological tests, and the formol-gel test.

The blood was examined twice daily for at least ten days before treatment, and for three months after.

Gerbils were inoculated with the camels' blood before and after treatment.

The formol-gel test was applied before treatment in two cases only as it had not been devised when treatment of the others began.

Two camels known to be infected a month before treatment received 3 doses of 6 grammes each with 1-day intervals. No trypanosomes could be found 8 and 9 months after treatment, and condition was greatly improved. A similar result was obtained in a camel when two doses of 8 grammes each were given. Three were given 10 grammes in a single dose. One died of enteritis 6 months later, but it was then apparently free from trypanosomiasis, the others were free 7½ and 9 months after treatment and had improved in condition.

Tests showed that after treatment with "Bayer 205" the serum of camels tends to lose the power of giving the formol-gel reaction, but the significance of this and the connection between this and cure requires further investigation.

It is notable that all the camels returned to working condition and were put to work three months after treatment. A single dose of 10 grammes was apparently effective.

DONATIEN (M.). **Les Piroplasmoses bovines en Algerie.** [The Bovine Piroplasmoses in Algeria.]—*Rev. Vét.* 1925. Aug. Vol. 77. No. 8. pp. 474–483.

This paper is a summary which previously appeared in the *Annales de l'Institut Pasteur* [see this *Bulletin*, Vol. 12, No. 3, pp. 82–84].

GALLI-VALERIO (B.). **La Piroplasmiase des Bovidés dans la plaine du Rhône.** [Bovine Piroplasmosis in the Rhone Plain.]—*Schweiz. Arch. f. Tierheilk.* 1925. Aug. 31. Vol. 67. No. 16. pp. 397–398.

The author has had the opportunity of examining blood smears from an ox and a heifer affected with haemoglobinuria near Collombey, on the left bank of the Rhone. Parasites were present in considerable numbers. They occurred singly and in pairs in the corpuscles. Single

parasites were generally disposed diametrically in the corpuscles, but the pairs were placed almost invariably along the edge, thus forming a wide angle between them. Rounded or ring forms were rarely encountered in the smears. In Giemsa stained preparations the thicker end showed a vacuole-like space and a large mass of chromatin.

The parasite is identified as *P. bovis*. The transmitting agent was *I. ricinus*, of which a large number were collected from the animals.

GAUPILLAT (M.) & NEVEUX. **Existence d'un foyer autochtone de piroplasmose équine à** *Piroplasma caballi* **en Haute-Marne.** [A Centre of Equine Piroplasmoses due to *P. caballi* in Haute Marne.] —*Ann. Parasit. Hum. et Comp.* 1925. Oct. Vol. 3. No. 4. pp. 375–383. With 1 text fig.

The authors record a second centre of equine piroplasmosis. Seven cases have been diagnosed by microscopic examination. They have collected *Dermacentor reticulatus* from horses healthy and sick and from dogs. Trypanblue was found to be efficacious.

KOHANAWA (C.) & OGURA (K.). **On a Piroplasmosis-like Disease of Cattle in Sapporo and its Neighbourhood.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Sept. Vol. 4. No. 3. pp. 322–323. [Authors' English Abstract.]

The disease has been known to exist for several years, particularly at the Makomanai Breeding Establishment. It is characterised by fever, anaemia, icterus, haemoglobinuria, and changes in the blood corpuscles, but the anaemia and cellular changes are the only symptoms constantly present. The condition is said to be identical with neither Texas fever nor East Coast fever; in fact, the authors say that they are not in a position to state definitely that the intracorpuscular parasites are certainly responsible for the symptoms for the reasons that they "have often found that healthy cattle have rather more parasites in the blood than diseased animals. As is proved by inoculation experiments with blood of infected cattle into healthy ones, the transmission of the piroplasm and invasion of the disease does not always go hand in hand."

Their experiments with trypanblue are inconclusive as yet, but they incline to the view that it is of no value for the treatment of the condition, and that, in fact, it may do harm.

CÉSARI (E.). **La Leishmaniose Canine.** [Canine Leishmaniasis.]—*Rev. Gén. Méd. Vét.* 1925. Nov. 15. Vol. 34. No. 407. pp. 613–632.

Canine leishmaniasis was first detected by NICOLLE in Tunis in 1908, and within a short time it was found to have a distribution parallel with the human disease on the Mediterranean littoral. The investigations carried out by others appear to indicate that visceral leishmaniasis of the dog has a distribution parallel with that of infantile leishmaniasis, while cutaneous canine leishmaniasis, regarding which little is known, appears to be found where oriental sore occurs in man.

Visceral leishmaniasis of the dog occurs along the north of Africa, in Southern Europe, and to a small extent in Western Asia. It has never been detected in America and Oceania. The parasites are

obtainable in culture where they assume a flagellate form. Morphologically and culturally no differences can be detected between the various parasites that have been found. They are distinguished solely on epidemiological and clinical grounds.

In the dog acute and chronic forms of infection occur.

In the acute form it is not improbable that there has been infection prior to the onset of marked symptoms, since such cases generally occur in animals that have been losing condition for some time. The acute symptoms are febrile attacks, enlargement of the abdomen which is associated with pain on manipulation, stiffness of gait, in some cases paralysis of the hind legs, and a certain amount of anaemia.

In the chronic form onset passes unnoticed, but subsequently the following lesions are observed; marked emaciation, loss of hair round the eyes and on the ears. These subsequently become covered with scabs and are very resistant to treatment. The degree of anaemia varies from case to case. Manipulation reveals enlargement of the liver. There may be ulceration of the lips and keratitis.

At the post-mortem the tissues involved are found to be principally the liver, spleen, and bone-marrow. In acute cases the spleen is blackish and softened, and shows infarcts and haemorrhages. In such cases death is not uncommonly due to rupture of this organ. In cases in which death is delayed there is thickening of the capsule and general sclerosis of the pulp. Similarly, in the more chronic cases there is cirrhosis of the liver. The bone-marrow usually appears as a red jelly which is devoid of fat, but it may be yellow and oily, with haemorrhagic areas scattered through it.

During life, should blood examination prove negative recourse should be had to liver puncture and trephination of the tibia or femur. Should microscopic examination prove negative cultures should be made on N.N.N. medium. Experimentally, the infection can be transmitted to the dog, jackal, monkey, dormouse, and white mouse. Guineapigs, rabbits and rats are resistant, as also are birds and cold-blooded animals. In the dog the experimentally-transmitted disease is usually less severe than that contracted naturally, and recovery is the rule, and inoculation with culture is a less certain method of infection than inoculation with infected tissue substance. In culture the organism loses virulence. In any case inoculation must be intra-peritoneal or intrahepatic. Subcutaneous inoculation always fails.

The method of transmission is still undetermined.

While the facts available appear to indicate that visceral canine leishmaniasis and infantile leishmaniasis are identical, proof has not as yet been furnished.

Atoxyl and arsenophenylglycine have been tried by NICOLLE and COMTE for the treatment of experimental leishmaniasis in the dog, but without success.

Tartar emetic administered intravenously in 1 per cent. solution appears to be very valuable.

In the absence of information as to the method of infection little can be done prophylactically.

ROW (R.). **Canine Leishmaniasis in Bombay.**—*Indian Med. Gaz.* 1925. July. Vol. 60. No. 7. pp. 317–318. With 5 text figs.

The dog was from the N.W. Frontier, and was found to have extensive ulcers on the lips, ears, nose and inner canthus of the left eye. There were also non-ulcerated pea-like nodules in the ears.

The presence of leishmania was confirmed by microscopic examination, and they appeared to resemble *L. tropica*, but were slightly larger than those seen in man. The cytoplasm appeared to be less dense, and the rod-like micronucleus was always placed at an angle to the diameter of the nucleus. Flagellation did not take place in N.N.N., nor in Row's haemoglobin saline prepared with rabbit blood. Dogs' blood might have yielded better results.

Attempts to infect mice by intraperitoneal inoculation failed, but two pariah dogs were infected cutaneously in the ear. These cases healed spontaneously.

PHADKE (V. R.) & SHAIKH (A. I.). **Cutaneous Leishmaniasis in a Dog.**— *Vet. Jl.* 1925. Nov. Vol. 81. No. 11. pp. 560–567. With 4 text figs.

A mongrel bull terrier puppy, nine months old, which had been brought down from Peshawar six weeks previously, was admitted to hospital in Bombay showing ulcers on the upper lips, both ears, a hind paw and sternum.

Microscopic examination of scrapings from the edges of the ulcers showed Leishman-Donovan-like bodies.

The animal was in fair condition, its temperature was normal, and appetite good. A prolonged search failed to reveal any ectoparasites of any kind. In scrapings from the lesions the parasites were found for the most part within large mono-nuclear cells, but scattered individuals were also seen.

Treatment was continued for four months before a cure was effected. Internally, liquor arsenicalis was first used, and this was afterwards replaced by mercuric cyanide. Locally chloral hydrate, carbolic acid and tincture of iodine were used in combination, this being replaced by a dry dressing of arsenate of iron. Occasionally, the ulcers were dressed with hydrogen peroxide and nitrate of silver.

Two dogs inoculated experimentally by scarification developed lesions in from 6 to 7 weeks. These were limited to the inoculated areas and healed spontaneously.

JAKIMOW (W.) & WASSILEWSKAJA (W.). **Über die Methode der Untersuchung der Oocysten der Coccidien.** [The Methods of Detecting Coccidial Oocysts.]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. p. 83.

The authors claim to have discovered independently the value of salt solution for the detection of oocysts.

KOLPAKOWA (T.). **Über die Rolle des Magensaftes bei der natürlichen Immunität der Kaninchen bei der Coccidiose.** [The Part Played by the Gastric Juice in the Natural Immunity of the Rabbit against Coccidiosis.]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. pp. 83–84.

Test-tube experiments were made in which material which was rich in oocysts was mixed with gastric and intestinal juice, pancreatic secretion and bile. Control tubes containing water and salt solution were used. Some of the tubes were incubated at 30–35° C., and some were left at room temperature. Sporogony began in the water,

physiological salt solution, and in some cases in gastric juice in 16–20 hours in the incubator and 2–3 days at room temperature. Sporogony was not observed in the tubes containing pancreatic juice, intestinal juice and bile.

JAKIMOW (W.), WASSILEWSKAJA (W.), MARKOWA (E.), & RASTEGAEWA (E.). **Über die Coccidiose der Schweine in Russland.** [Porcine Coccidiosis in Russia.]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. p. 84.

The examination of 104 pigs showed that 40 per cent. were infected.

JAKIMOW (W.). **Über die Periode des Heranreifens der Eier der** *Eimeria stiedae.* [The Period required for the Maturation of the Oocysts of *Eimeria stiedae.*]—*Rev. Microbiol. et Epidémiol.* 1925. Vol. 4. No. 3. p. 84.

In a suspension of faeces in a thin layer at room temperature the author found a single oocyst in which sporoblast formation had occurred at 24 hours. After 48 hours, 20 per cent. of the oocysts had undergone segmentation.

BEVAN (Ll. E. W.) & KINGCOME (Martin H.). **An Outbreak of Bovine Coccidiosis in Southern Rhodesia.**—*Jl. Comp. Path. & Therap.* 1925. Dec. Vol. 38. Pt. 4. pp. 292–294. With 1 text fig.

A number of deaths were reported in a herd of yearling grade-Herefords in April, shortly after exceptionally heavy rains. Inspection of the herd showed that a number of the animals were unthrifty and anaemic, and some had diarrhoea. Post-mortem revealed the usual lesions of general anaemia and unthriftiness.

At a further post-mortem the following lesions were found: Great thickening of the mucous membrane of the first portion of the small intestine ($\frac{3}{8}$ inch) the surface being covered with a thick, glairy material which was not readily removed by scraping. The mucous membrane of the terminal portion of the large intestine was similarly thickened. Examination for acid-fast bacteria was negative. Coccidia, it is stated, were not recognized until dark ground illumination was resorted to, when developmental forms of the parasite were detected.

Although the affected animals were removed repeatedly from one camp to another, the disease persisted well on into the dry weather.

DELAMARE (G.). **Pseudo-tubercules coccidiens du foie de lapin.** [Pseudo-Tubercles due to Coccidia in the Liver of a Rabbit.]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 633–634.

Four distinctly nodular lesions were found in the portal fissure of the liver of a rabbit. They were composed of a central mass of coccidia, a zone of embryonic tissue and, externally, a fibrous capsule. In the cellular zone masses of yellowish pigment, insoluble in alcohol or xylol, were found either free or in the interior of macrophages. Giant cells containing pigment were also present.

RUPPERT (I.), ROTTCARDT (A.) and SCASSO (R.). **La coccidiosis de los caprinos en la República Argentine.** [Caprine Coccidiosis in the Argentine.]—*Revista Med. Vet.* 1925. June-Sept. Vol. 8. Nos. 2-3. pp. 64–79. With 12 figs.

The authors describe the clinical picture of the disease and figure and describe the parasite involved. Emphasis is laid upon the necessity of examination of the faeces for the establishment of a diagnosis.

The disease, which runs a chronic course, may prove fatal.

The paper concludes with an extensive bibliography.

THOMSON (J. G.) & ROBERTSON (A.). **Notes on the Cultivation of Certain Amoebae and Flagellates of Man, using the Technique of Boeck and Drbohlav.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. Vol. 28. No. 19. pp. 345–349. With 2 text figs.

The authors have confirmed the results obtained by BOECK and DRBOHLAV. They have also succeeded in cultivating *Dientamoeba fragilis*, *Endolimax nana* and *Iodamoeba bütschlii*, but experimental infection of kittens failed. The addition of a small quantity of sterile human faeces to the medium has permitted the cultivation of *Trichomonas hominis*, *Chilomastix mesnili*, and *Tricercomonas intestinalis*.

GUÉRIN (F. H.) & PONS (R.). **Culture d'*Entamoeba dysenteriae* par le procédé de W. C. Boeck et Jaroslav Drbohlav.** [The Cultivation of *Entamoeba dysenteriae* by the Boeck and Drbohlav Technique.] —*Bull. Soc. Path. Exot.* 1925. July 8. Vol. 18. No. 7. pp. 517–520.

The authors confirm the results published by the originators of the technique.

DRBOHLAV (J. J.). **Une nouvelle preuve de la possibilité de cultiver *Entamoeba dysenteriae* Type *histolytica*.** [A New Proof of the Possibility of cultivating *Entamoeba dysenteriae*, Type *histolytica*.] —*Ann. Parasit. Hum. et Comp.* 1925. Oct. Vol. 3. No. 4. pp. 349–357.

The author summarizes his various attempts to obtain media suitable for the cultivation of amoebae.

The best media for conservation were agar prepared with Ringer's solution, and agar prepared with N.N.N. agar made up with Ringer to 1·4 per cent., the Ringer containing a regulator and having a pH of 7·4, and the same medium containing 1 per cent. starch. It was by chance found that the addition of 1 per cent. dextrin to the Ringer solution used for preparing the solution of egg albumen used for covering the cultures prevented the development of blastocystis.

An N.N.N. medium containing blood and heated to 100° C. for 30 minutes may be used both for isolation and conservation.

YAKIMOFF (W. L.) & MILLER (G. A.). **Les protozoaires de l'intestin des rats d'égout.** [The Intestinal Protozoa of Sewer Rats.]—*Bull. Soc. Path. Exot.* 1925. Apr. 8. Vol. 18. No. 4. pp. 311–312.

*Entamoeba muris* has been found in 9 per cent. of the sewer rats examined in Petrograd, *Trichomonas muris* in 18·1 per cent., and spirochaetes in 54·5 per cent.

PATAY (R.). **Sur l'extension aux flagellés d'un fixateur de Noguchi pour Spirochètes.** [The Application to Flagellates of a Fixing Agent devised by Noguchi for Spirochaetes.]—*Bull. Soc. Path. Exot.* 1925. Apr. 8. Vol. 18. No. 4. pp. 305–306.

The fixative may be employed upon wet or dry films, preferably the latter. As it destroys red blood corpuscles it is valuable for the examination of thick smears for protozoa. The author states that he has used it successfully for trypanosoma, spirochaeta, giardia, octomitus, trichomonas, and trichomastix. The solution is prepared as follows :—

$\frac{N}{15}$ di-sodium phosphate—88 parts.

$\frac{N}{15}$ Mono-potassium phosphate—12 parts.

Of this solution, 9 parts have added to them 1 part of commercial formalin. The solutions are mixed at the time of use as the mixture remains potent for only 2–3 weeks at room temperature.

DESCHIENS (R.). **Kystes de *Giardia* sp. observés chez le lion (*Felis leo*).** [Giardia Cysts in *Felis leo*.]—*C. R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1065–1066.

Cysts of giardia were found in the faeces of two lions in Paris. The fixed cysts measured 10–12·5$\mu$ by 6·5–7·5$\mu$. Two cats were fed with the faeces, but failed to become infected.

There is not sufficient information available to form an opinion as to whether the species is new or one of the three already described in carnivora.

NIESCHULZ (O.) & KRIJGSMAN (B. J.). **Über *Giardia simoni* Lavier.** [*Giardia simoni* Lavier.]—*Arch. f. Protist.* 1925. Vol. 52. No. 1. pp. 166–169. With 2 text figs. & 2 curves.

The authors describe *Giardia simoni*, which they found in *Mus norvegicus*, and a white rat in Holland.

PANISSET (L.) & VERGE (J.). **Les Spirochétoses du Chien.** [The Spirochaetoses of the Dog.]—*Rev. Gén. Méd. Vét.* 1925. Oct. 15. Vol. 34. No. 406. pp. 555–561.

This paper is a summary of the information gathered from existing literature and it concludes with a bibliography.

GALLOWAY (I. A.). **Cultures *in vitro* de *Spirochaeta duttoni* et de *Spirochaeta gallinarum*.** [Artificial Cultivation of *S. duttoni* and *S. gallinarum*.]—*C. R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1074–1076.

Egg-white is placed in test tubes and coagulated over a water bath in a slanting position. 5 cc. of rabbit serum diluted 1 to 5, or horse serum diluted 1 to 10, and heated for an hour at 58–60° C. is then introduced and finally a layer of liquid paraffin. The addition of a drop of fresh rabbit, monkey, or human blood favours growth. The optimum temperature is 30–32° C.

*S. gallinarium* has been carried through 18 generations in 65 days, using horse serum. Only a very small drop of blood should be used for inoculating the primary tube and for carrying on succeeding generations, as otherwise degeneration forms became numerous. 0·1 cc. should be used for this purpose. Growth goes on for four or five days and the degeneration begins. In certain tubes, when external conditions are not favourable, agglutination precedes degeneration. But when conditions are favourable collections of very mobile parasites resembling actual colonies may be found.

CASSAMAGNAGHI (A.). **Comunicacion previa sobre la constatacion de espiroquetas en un bovino.** [Preliminary Note regarding the Occurrence of a Spirochaete in Bovines.]—*Ass. rural del Uruguay.* 1924. Vol. 53. Ex. *Bull. Inst. Pasteur.* 1925. Aug. 31. Vol. 23. No. 16. p. 714.

The author describes a spirochaete having the characters of *S. theileri*. It is transmitted by *B. microplus*. It is not in itself responsible for illness, but it may aggravate conditions due to other parasites.

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IVANOFF (E.). **Le sort des trypanosomes (*T. brucei* et *T. pecaudi*) dans la cavité générale de *Galleria mellonella*.** [The Fate of *T. brucei* and *T. pecaudi* in the Body Cavity of *Galleria mellonella*.]—*C. R. Soc. Biol.* 1925. Aug. 14. Vol. 93. No. 27. pp. 571–572.

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## DISEASES DUE TO METAZOAN PARASITES.

WITENBERG (G.). **Notes on Strongylidae of Elephants.**—*Parasitology.* 1925. Aug. Vol. 17. No. 3. pp. 284–294. With 22 text figs.

Among the parasites figured and described are the following new species: *Murshidia lanei, Pterygopharynx neveu-lemairei.*

CHANDLER (A.). **A Contribution to the Life-History of a Gnathostome.**—*Parasitology.* 1925. Aug. Vol. 17. No. 3. pp. 237–244. With 6 text figs.

The author described work done with gnathostomes found in snakes from the Calcutta Zoological Gardens. The cysts containing larvae were found in the mesentery. They were yellow and opaque and

measured from 0·95 to 1·2 mm. The contained coiled larvae measured from 3–3·83 mm. Feeding experiments were carried out with cats, a rat and guineapigs. Most of the cats died in from 2 to 10 days, presumably from the infection, and young gnathostomes were recovered. The majority of these were found burrowing in the liver. The parasites were similar to those obtained from the snakes, but were larger. No further development occurred up to four weeks after feeding.

Ten per cent. of cats not fed were found to harbour similar parasites.

SMIT (H. J.) & IHLE (J. E. W.). *Filaria spirovoluta*, **ein neuer Nematode aus dem Bindegewebe des Pferdes.** [*Filaria spirovoluta*, a New Nematode from the Connective Tissue of the Horse.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1925. Aug. 15. Vol. 96. No. 1. pp. 30–32. With 1 fig.

The parasite was found in the loose connective tissue beneath the deep pectoral muscles of a horse. Three females were found. They could be removed from the tissues readily while fresh. They varied in length from 95 to 132 mm.

The parasite is figured and described.

WARE (F.). **On a Collection of Helminths from Domesticated Animals in Mauritius.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. p. 41.

The parasites identified were collected from domesticated animals, but it is not known whether these were imported or native. The parasites were : *Belascaris marginata*, *Dirofilaria immitis*, *Stephanurus dentatus*, *Eurytrema pancreaticum*, *Fasciola hepatica*, and *Cotylophoron cotylophorum*.

WARE (F.). **On a Nematode of the Genus Ostertagia.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. pp. 38–41. With 3 text figs.

The author describes a parasite which he names *Ostertagia asymmetrica*, sp. nov., found in the abomasum of a fallow deer (*Cervus dama*) in England.

BAYLIS (H. A.). **On the Identity of** *Heterakis neoplastica*, **Wassink.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 28. No. 20. pp. 362–364.

Comparative measurements lead the author to believe that *H. neoplastica* is identical with *H. isolouche* von Linstow, 1906.

BAYLIS (H. A.). **On the Identity of** *Gongylonema subtile* **Alessandrini.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 28. No. 20. pp. 361–362.

Baylis believes, as a result of measuring ALESSANDRINI's specimens, that *G. subtile* is identical with *G. pulchrum*.

BAYLIS (H. A.). **On the Species of Gongylonema (Nematoda) Parasitic in Ruminants.**—*Jl. Comp. Path. & Therap.* 1925. Mar. Vol. 38. Pt. 1. pp. 46–55. With 5 text figs.

The author describes *G. pulchrum* (= *G. scutatum*) with a view to bringing into prominence the differences between it and *G. verrucosum*. The intermediate host of *G. pulchrum* is probably to be found among dung beetles and cockroaches.

*G. verrucosum*, which has up to the present been found in India only, is described, and a table gives the measurements of the two parasites. The intermediate host is unknown.

BAYLIS (H. A.), PAN (T. C.) & SAMBON (Juliet E. B.). **Some Observations and Experiments on *Gongylonema* in Northern Italy. A Preliminary Note.**—*Jl. Trop. Med. & Hyg.* 1925. Dec. 1. Vol. 28. No. 23. pp. 413–419. With 14 text figs.

The authors describe the finding of larvae in certain species of dung beetles, but they have not been able to detect them in household insects such as blatta, blattella, blaps, tenebrio, and ephestia. It was found possible to infect *Blattella germanica* with eggs of the gongylonema of cattle, but experiments with *Blatta orientalis* failed.

The authors succeeded in infecting two rats with gongylonema of ruminants by feeding them with larvae from the intermediate hosts.

HADWEN (S.). **Ascariasis in Horses.**—*Jl. Parasit.* 1925. Sept. Vol. 12. No. 1. pp. 1–9. With 1 plate.

Three colts, two new-born, and one four to five months old, already naturally infested with Ascarides, were dosed with embryonated eggs of *Ascaris equorum*. In the younger animals coughing was observed after an interval of from 9 to 16 days. The older animal was coughing slightly about three weeks after the eggs had been administered. Larvae were found in the bronchi. In the older foal an eosinophilia was stimulated by a second dose of eggs given 31 days after the first.

In one of the new-born foals no eosinophiles could be found in the blood 71 days after it had been fed with the eggs, but they reappeared on the 145th day.

Examination of sections showed that eosinophiles collect in the connective tissues of the lungs and liver, this indicating that the larvae migrate through these tissues.

The writer puts forward the view that there is a condition of immunity produced by repeated invasions of ascarides, and that apart from the antibodies found the eosinophiles secrete a substance which is definitely detrimental to the worms themselves.

CAMERON (T. W. M.). **Some Recent Advances in Veterinary Helminthology.**—*Ann. Rept. National Vet. Med. Assoc. Great Britain & Ireland.* 1925. pp. 161–183.

This paper is an " attempt to place before the practitioner such of the more recent discoveries in worm parasites of the domesticated animals, their prevention and cure, as the writer considers to be of most outstanding interest to the veterinary surgeon."

SCHWARTZ (B.) & CRAM (Eloise B.). **Horse Parasites collected in the Philippine Islands.**—*Philippine Jl. Sci.* 1925. Aug. Vol. 27. No. 4. pp. 495–505. With 3 plates.

This paper, as the title indicates, is a record of the occurrence of certain parasites in the horse in the Philippine Islands. Twenty-three parasites are recorded for the first time in the Islands. No new species are described.

SCHWARTZ (B.). **Helminth Parasites of Hogs in the Philippine Islands.**—*Philippine Jl. Sci.* 1925. June. Vol. 27. No. 2. pp. 227–233. With 2 plates.

This report contains a list of the parasites collected from pigs slaughtered at the Azcarraga Abattoir in Manila.

No new species are described.

HALL (Maurice C.) & CRAM (Eloise B.). **Carbon Trichloride as an Anthelmintic, and the Relation of its Solubility to Anthelmintic Efficacy.**—*Jl. Agric. Res.* 1925. May 15. Vol. 30. No. 10. pp. 949–953.

Experiments in which coarse crystals or fine powder of carbon trichloride were given in capsules showed that the substance has no value as an anthelmintic.

SAHEKI (Y.). **An Experimental Study on the Development of the Dwarf Tapeworm** (*Hymenolepis nana*).—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 305–308.

The larvae penetrate the villi in the upper part of the small intestine and in four days become cysticerci. Five days after ingestion the well-developed larvae emerge and leave the villi. At seven days the young tapeworms have some segments at the end of the body. Two days later reproductive organs appear. Fourteen days after ingestion the segments are full of eggs, and three days later ripe segments may be found in the faeces of experimental animals. The dwarf tapeworm therefore appears to require no intermediate host.

BEDFORD (G. A. H.). **The Sheep Nasal Fly. S. Africa.**—*Jl. Dept. Agric. S. Africa.* 1925. Aug. Vol. 11. No. 2. pp. 119–123. With 3 text figs.

This short paper is a popular account of the life-history, symptoms, treatment and prevention. In connection with the latter it is stated that the most practical method is to provide the sheep with salt troughs smeared with tar. A V-shaped trough is best. If a trough with parallel sides is used, it should, after the sheep have become used to it, have placed over it boards with holes large enough to admit the noses of the animals. Tar should be smeared round the holes. Such precautions should be taken from the beginning of September to May. Infected sheep should be kept on hard ground, as this will prevent the animals from dropping larvae on to the veldt and infecting it. The larvae which fall can be collected and destroyed daily.

SMIT (Bernard). **Sheep Blow-Fly Control: A New Method.**—*Jl. Dept. Agric. S. Africa.* 1925. Nov. Vol. 11. No. 5. pp. 455–458. With 1 fig.

The three flies so far found to attack sheep in South Africa are *Lucilia sericata*; *Chrysomyia albiceps*, and *Chrysomyia chloropyga*. It would appear that dead meat is the natural food for the maggots, the habit of blowing the wool of live sheep having been acquired. The disposal of carcases is, therefore, of the utmost importance.

Experiments showed that from a single carcase left out thousands of flies might emerge. A few such carcases therefore would produce sufficient flies to cause enormous losses.

The means adopted for the disposal of carcases in various parts of the world are dealt with briefly. Burning is impracticable on account of the cost of fuel of any kind in the Karroo. Burying is also impracticable on account of the labour involved. Burying is ineffective unless it is deeper than 3 feet, and even then the ground must be rammed hard.

Poisoning carcases is open to obvious objections, and also was not found to be very effective.

The new trap method described is constructed on lines similar to the Baber Housefly maggot trap. Two 6-foot sheets of corrugated iron are bolted together along one edge, and then bent into the form of a trough with open ends. The top edges are bent inwards to form an incurved lip, thus preventing the maggots from crawling over the sides. The trough is then suspended by wire between fencing posts a foot or so from the ground, and a paraffin tin is placed under each of the ends. These tins are opened so as to leave a projecting rim about half-an-inch wide all round the top inside, and they are kept in place by banking them round with a little earth.

The carcases are simply thrown into the trough, the flies are attracted in enormous numbers, and very soon the carcase is a mass of maggots. These reduce the carcase to practically nothing but skin and bone. The maggots crawl away from the remains and fall into the tins, where they are killed by pouring paraffin and water over them. From four carcases two tins nearly full of maggots were collected. After these had been killed they were thrown out on the veldt, where they dried up.

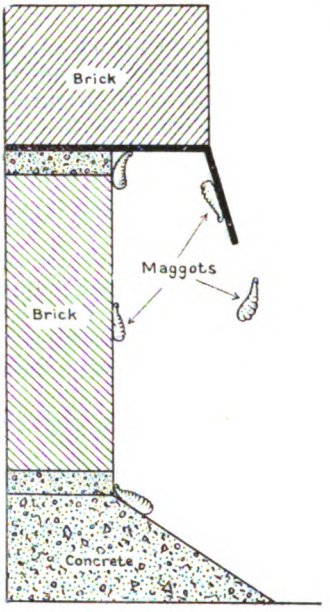
The suggestion is put forward that it may be possible to preserve the maggots for poultry food.

BABER (E.). **Fly Control by Means of the Fly-Larval-Trap Manure Enclosure.**—*Jl. Roy. Army Med. Corps.* 1925. Dec. Vol. 45. No. 6. pp. 443–452.

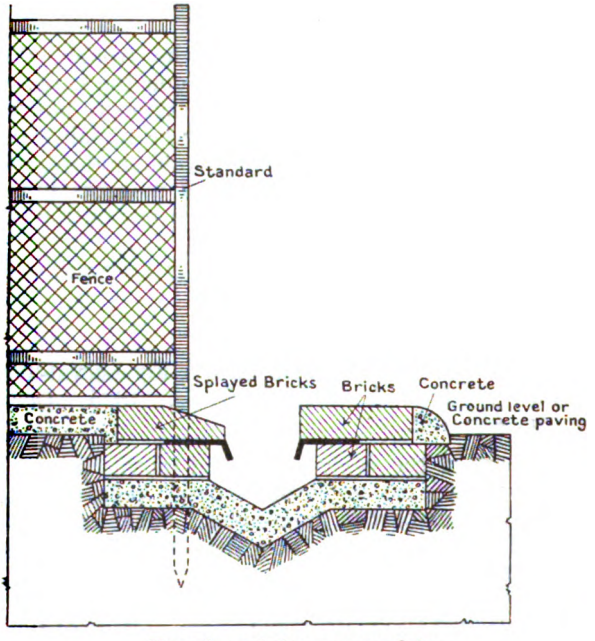
An essential part of the device described in this paper is an overhanging lip round which maggots cannot pass; temperature, however, also plays an important part in fly control. Larvae prefer a temperature of about 90° F. At 115° F. they die and at lower temperatures (108° F.) if the material in which they are placed is wet.

Records made at Pretoria showed that a manure heap measuring 4 by 4 by 4 feet reached and maintained a temperature of 120° to 130°F. for 7 weeks. It then gradually cooled and was at 80° F. at the end of 14 weeks. This heap was wetted with 4 gallons of water daily. A similar heap kept dry registered 20 degrees lower.

[Illustrating Captain E. BABER's paper on a Fly-Larval-Trap.]



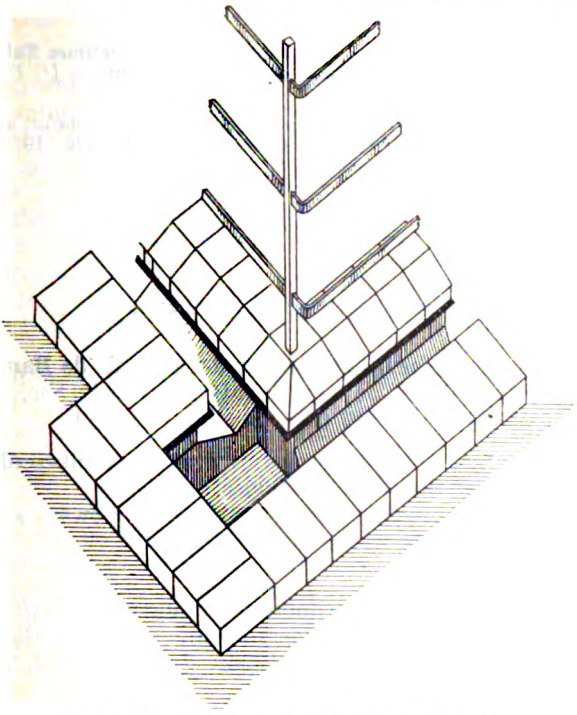

Maggot falling back into the Trench.




Trench and Fence complete.

[Reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

[Illustrating Captain E. BABER's paper on a Fly-Larval-Trap.]



Isometric View showing Sump of Corner.

[Reproduced by permission from the *Journal of the Royal Army Medical Corps.*]

The device is constructed as follows: A central concrete floor with a bricked or concrete trench running round it; the inner and outer edges of the trench have an overhanging metal rim which prevents the emergence of the larvae from the trench. At the corner there is a collecting sump also provided with the metal overhanging lip.

The liquid from the manure collects in the sump and should be returned to the heap, which stands on the central concrete floor surrounded by a frame and wire mesh fence to permit of packing.

The figures give a clear idea of the construction of the trap.

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CAWSTON (F. G.). **The Dangerous Snail. Need for Control of Fluke-Infested Pests.**—*The Farmers' Weekly* (South Africa). 1925. Oct. 7. Vol. 30. No. 761. p. 414.

KOTLÁN (Alexander). **On *Davainea proglottina* (Dav.) and its Synonyms.**—*Jl. Parasit.* 1925. Sept. Vol. 12. No. 1. pp. 26–32. With 1 plate.

NEVEU-LEMAIRE (M.). **Le mâle de *Pteridopharynx omoensis* Neveu-Lemaire parasite du Rhinocéros africain** (*Rhinoceros bicornis*). [The Male of *Pteridopharynx omoensis* Neveu-Lemaire of the African Rhinoceros.]—*Ann. Parasit. Humaine et Comparée.* 1925. Oct. Vol. 3. No. 4. pp. 392–393. With 1 plate.

PATTON (W. S.). **Diptera of Medical and Veterinary Importance. I. Types of Older Authors in Continental Museums.**—*Philippine Jl. Sci.* 1925. June. Vol. 27. No. 2. pp. 177–200.

SCHWARTZ (B.). *Ascaridia lineata*, **a Parasite of Chickens in the United States.**—*Jl. Agric. Res.* 1925. Apr. 15. Vol. 30. No. 8. pp. 763–772. With 18 text figs.

WEIDMAN (F. D.). **Hepaticoliasis. A Frequent and sometimes Fatal Verminous Infestation of the Livers of Rats and other Rodents.**—*Jl. Parasit.* 1925. Sept. Vol. 12. No. 1. pp. 19–25. With 2 plates.

WOODLAND (W. N. F.). **On** *Proteocephalus marenzelleri*, *P. naiae*, **and** *P. viperis*. —*Ann. Trop. Med. & Parasit.* 1925. Sept. 20. Vol. 19. No. 3. pp. 265–279. With 14 text figs.

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## BACTERIAL DISEASES.

CURASSON (G.). **La tuberculose bovine à l'abattoir de Bamako.** [Bovine Tuberculosis at Bamako Abattoir.]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 687–689.

The author records the occurrence of 7 cases of tuberculosis among 1,107 zebus killed at the slaughter house.

The organism appeared, from its pathogenic powers and from its cultural characters, to be of the bovine type.

BASSET (J.). **Réceptivité du péritoine et du sang pour** *Bacillus anthracis*. [The Receptivity of the Peritoneum and the Blood for *B. anthracis*.]—*C. R. Soc. Biol.* 1925. July 17. Vol. 93. No. 25. pp. 413–414.

The writer states that it is an error to say that if care be taken to prevent contamination of the skin hundreds of lethal doses can be introduced into the peritoneum without causing animals any harm. The intraperitoneal injections were made by removing a small flap of skin from the flank, cauterising the exposed surface, injecting into the peritoneum and recauterising. A dose of $\frac{1}{120}$ cc. of the culture used was fatal to guineapigs in 2–3 days by subcutaneous injection. Of this culture $\frac{1}{16}$ cc. was fatal in from 3–7 days when injected intraperitoneally.

If a less pathogenic material be used (pure spores) and the tissues traversed by the needle are contaminated the results indicate that the peritoneum is less susceptible to infection than the subcutaneous tissue, but the power of resistance is not so great as that assigned to it by BESREDKA.

If guineapigs are injected intraperitonally through the skin and killed at 30 hours the peritoneum appears to be normal. The peritoneum is then sprinkled with broth and the broth is used for the inoculation of culture media; only a few colonies grow. On the other hand, the omentum is contracted and congested. Microscopic examination reveals an enormous increase in the polynuclear leucocytes and a few bacteria undergoing dissolution which either are gram negative or stain irregularly.

Rabbits which succumb to $\frac{1}{16}$ cc. inoculated subcutaneously in 3–4 days, survive when the same dose is injected intravenously into the ear vein. 0·25 cc. proves fatal in 50 per cent. of animals, and 1 cc. is invariably fatal. The blood is therefore less receptive than the subcutaneous tissue.

SINGER (E.). **Milzbrandstudien.** [Anthrax.]—*Zeitschr. f. Immunitäts.* 1925. Oct. 31. Vol. 45. No. 1. pp. 12–26.

The author finds that aggressin which is most plentiful in the oedema which follows subcutaneous inoculation, while being harmless for healthy animals, is capable of modifying the course of an existent or subsequent inoculation. The bacilli, even after intravenous inoculation, are removed from the circulation by the histocyte cells. In these the bacilli multiply and paralyse their action. They then escape into the blood stream and produce the anthrax septicaemia.

When aggressin is injected this course of the infection is modified in that septicaemia occurs earlier. The injection may lead to complete paralysis of the histocytes and thus cause extracellular multiplication or it may partially paralyse them and thus lead to their earlier liberation from them.

The injection of aggressin 24 hours before intravenous inoculation with virulent culture did not prevent the bacilli from disappearing from the blood stream at first, but septicaemia occurred in 18 hours, whereas in controls it occurred in 30–48 hours.

Aggressin does not stimulate the bacilli to rapid multiplication.

That the septicaemia is delayed by the action of the histocyte cells is shown by the fact that the internal organs can be proved to be infected prior to the invasion of the blood.

This, perhaps, explains BESREDKA'S view that the skin is more susceptible than the internal organs, and of WOLLMANN'S finding that they are equally susceptible after aggressin injection.

Experiments with a haemolytic streptococcus indicated that the aggressin is specific.

VELU & VAYSSE. **Au sujet de la durée de l'immunité conferée aux animaux vaccinés contre le charbon bactéridien par la methode intradermique en un temps.** [The Duration of the Immunity Conferred by the Single Dose Intradermic Vaccination against Anthrax.]—*Rec. Méd. Vét.* 1925. June 30. Vol. 101. No. 12. pp. 259–260.

The authors give an account of outbreaks of anthrax in two herds of pigs in Morocco. In one, comprising 800 animals, 60 deaths occurred in a week, and in the other, of 150 animals, there were 11 deaths. The whole of both herds, including pigs only a few days old, were vaccinated intradermally without preliminary use of serum. The outbreaks stopped instantaneously.

About 8 months later 8 fatal cases of anthrax occurred in the first herd and two in the second. Investigation showed that all these cases had occurred in animals 5 to 6 months old, that is to say, in animals born after the general vaccination of the herds.

[It is regrettable that no unvaccinated controls were left in the herd.]

MULLER (Léon). **Quelques recherches sur le mécanisme de l'infection charbonneuse.** [Research regarding the Mechanism of Infection with Anthrax.]—*C. R. Soc. Biol.* 1925. Nov. 20. Vol. 93. No. 33. pp. 1243–1247.

Investigating a new method of vaccination against anthrax in 1914 the author carried out the following experiments. A pigeon's

egg was emptied and the shell sterilized. It was then half filled with a suspension of anthrax bacilli, the orifice was sealed with Canada balsam, and the shell was introduced into the peritoneal cavity of a rabbit. The rabbit died of anthrax five weeks later. Repeating the experiment with the substitution of flasks of broth for the peritoneal cavity the author found that after a minimal period of 12 days the bacilli passed through the shell close to the orifice made when its contents were evacuated. No doubt there were imperceptible holes in this area, and the permeability of the shell had been increased by the dislocation of the membrane in the interior of the shell.

It was difficult to explain the facts according to the theory expressed by BESREDKA. Further experiments were therefore planned.

Chamberland filters containing an emulsion of anthrax bacilli were placed in broth. The time required for the penetration of the filter was variable even with filters of the same density, but it ranged from about one to three weeks, depending largely on the texture of the filter used. Short lengths of filters were cut off with a saw and these had culture placed in them. The open end was closed with a cork which was sealed with Canada balsam.

By modifying the technique it is possible to liberate bacilli into the peritoneum after any desired interval [presumably short of that required for the natural penetration] by attaching a piece of capillary glass tube to the short length of filter and wrapping this round with cloth of some kind to prevent injury to organs by fragments of glass when the tube is broken.

Brief details are given of a number of experiments, but it is not stated which technique was used in each.

A further publication is promised.

SACHELARIE (V.). **Etude comparative sur l'immunité conférée par la vaccination anticharbonneuse pratiquée par inoculation dans la peau et par la vaccination pastorienne classique chez les bovins.** [A Comparison of Intradermal and Subcutaneous Inoculation of Cattle against Anthrax.]—*Arch. Veterinara.* 1924. Vol. 18. No. 5-6. pp. 116–125.

This paper has appeared elsewhere, and has already been abstracted in this *Bulletin* (Vol. 13, No. 3, Aug. 31, 1925, pp. 94–96).

NEWODOFF (A. P.) in collaboration with WEINTROB, PINOUS, WLADIMIRSKI, ANFILOFF & FROLOFF. **De la cutivaccination et de la cuti-immunité dans le charbon.** [Cuti-Vaccination and Cuti-Immunity in Anthrax.]—*Ann. Inst. Pasteur.* 1925. Nov. Vol. 39. No. 11. pp. 888–896.

The author gives details of experiments in which horses vaccinated intracutaneously withstood doses of virus administered subcutaneously. In one instance the animal received only one dose of vaccine and the test inoculation was given after an interval of eight months. Similar results were obtained when animals (horses and cows) vaccinated by the intracutaneous path were fed with culture.

As the result of these experiments, four horses vaccinated intracutaneously, and two unvaccinated, were inoculated subcutaneously with virulent anthrax cultures, the vaccinated animals receiving four and fifty times the doses given to the controls. The controls

died, but the vaccinated animals showed only an oedema at the seat of inoculation, and a rise of temperature ranging from 0·5 to 1·5° C.

Following these satisfactory results the method was put into general practice, and 2,450 bovines and 213 horses were vaccinated without complication of any kind. Several cases of anthrax occurred among the non-vaccinated animals.

With a view to testing whether animals can be infected with anthrax by paths other than the skin, an 18-months-old colt was inoculated intravenously with a large dose of culture. To avoid contamination of the skin a canula of wide bore was first passed into the vein, and then a long thin needle attached to the syringe was passed through this. Both the needle and canula were washed through with salt solution after the inoculation. The colt failed to become infected.

BUZNA (D.). **Die Unterscheidung des Vollvirulenten Milzbrandbazillus von den mitigierten (Vaccine-) Varietäten auf verschiedenen Kohlehydrat-Nährböden.** [The Differentiation of Virulent and Vaccine Strains of Anthrax Bacilli by Carbohydrate Fermentations.]—*Zeitschr. f. Infektionskr. parasit. Krankh. u. Hyg. d. Haust.* 1925. Nov. 16. Vol. 28. No. 4. pp. 267–276.

The author gives tabular statements of the results obtained.

EDWARDS (J. T.). **The Prevention of Strangles.**—*Jl. Comp. Path. & Therap.* 1925. Dec. Vol. 38. Pt. 4. pp. 256–266.

This paper contains an account of attempts that have been made to check the ravages of strangles in India by means of vaccine and serum. Strangles is the cause of a loss estimated at 5 per cent. among young country-bred horses on admission to Army remount depots.

Bacteriological examinations have shown that streptococci are almost invariably present in pure culture in samples of pus, but these organisms do not appear to be all of one type. For this reason some fifty different strains have been used in the preparation of serum and vaccine. No details are given regarding the technique of production of either the vaccine or serum.

Tests were also carried out with an " extracted vaccine " prepared on the lines of DREYER'S tuberculosis vaccine, and with an " aggressin."

The figures given show on the whole that the various methods appeared to reduce mortality somewhat.

SEDDON (H. R.). **The Cause of Botulism in Animals in Australia.**—*Jl. Australian Vet. Assoc.* 1925. Sept. Vol. 1. No. 3. pp. 59–62.

Cases of botulism have been recorded in horses following the ingestion of chaff, hay, and pasture grass, and in cattle after chaff, hay and bones or other carrion. Of the foodstuffs only chaff has been proved toxic experimentally. Toxin producing organisms have been recovered from the bones of cattle, sheep, and from grain. The train of symptoms is, however, so characteristic that it would appear that in all cases the symptoms are produced by organisms of the botulinus group. The only strain so far isolated in pure culture in Australia is that described by the author as *B. parabotulinus.* A number of impure strains have been recorded by other authors, and

two of these appeared to be identical with SEDDON'S strain. An organism possibly identical has been isolated in the United States and termed *B. botulinus* type C.

An organism agreeing with the American type B has been isolated. This was recovered from maize ensilage, the feeding of which led to the death of three cows and three horses presenting suspicious symptoms. The silage was to some extent mouldy, and some of the mouldy portions had been fed to the animals which died. Anaerobic cultures were obtained and these proved fatal to guineapigs with typical symptoms on the second or third day.

Further supplies of silage were obtained and cultures again made. These proved toxic for guineapigs, but large animals fed on the silage developed no symptoms.

A guineapig injected with antitoxins of types A and B survived, while those done with antitoxins of parabotulinus and type C (Graham) and a control died.

Attempts to isolate the toxin producing organism in pure culture failed. Further tests with filtered cultures (impure) and antitoxins indicated that the organism present was of type B.

MITCHELL (C. A.). *Hemophilus ovis* **(Nov. Spec.) as a Cause of a Specific Disease in Sheep.**—*Jl. Amer. Vet. Med. Assoc.* 1925. Oct. Vol. 68. No. 1. (From a reprint.)

The author describes a disease of sheep which has been encountered in the Ottawa Valley, and which was at first thought to be haemorrhagic septicaemia. The disease is sudden in onset. Difficulty of respiration accompanied by a grunting sound, cyanosis of the skin, and great depression are the most marked symptoms. In the later stages there is a distressing cough. The faeces contain blood, the urine shows a variable amount of albumen and renal cells and blood corpuscles are found in the sediment. Tonic spasm of the neck-muscles have been observed.

From the bronchial mucus the author isolated a small gram-negative bacillus which he names *Haemophilus ovis*, and which he holds to be the cause of the condition.

On blood agar pin-head viscous colonies develop in 36 hours. These later become dry and dull-looking. A small amount of growth is obtained in plain agar only after repeated subculture on blood agar. From plain agar subcultures could be obtained in broth in which turbidity and ropy strands were formed.

Acid was produced with a large number of sugars, but there was no gas production. The organism was pathogenic for guineapigs and rabbits, but though it caused illness in sheep it was not invariably fatal.

Experiments indicated that natural infection was via the respiratory tract. No evidence of toxin formation was obtained.

STUART (G.). **The Occurrence of Contagious Abortion of Cattle in Palestine.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. June 18. Vol. 19. No. 3. pp. 131–137.

The authors record the occurrence of contagious abortion in cattle in Palestine, and find that about 30 per cent. of the animals are infected.

Reference is made to the establishment of the fact that undulant fever has recently made its appearance in Palestine. Of seven cases detected in 1924, all but one were traced to goat's milk. The other case occurred in a boy who had never taken goat's milk, and had never been in contact with goats.

BEVAN (Ll. E. W.). **The Abortoscope. A Simple Apparatus for the Detection of Infectious Abortion of Cattle.**— *Vet. Jl.* 1925. Oct. Vol. 81. No. 10. pp. 476–479.

The apparatus, which the author terms the Abortoscope, was demonstrated at a meeting of veterinarians and medical men held at Salisbury in November, 1921. By its means it is claimed that tests for abortion can be carried out in the field with a considerable degree of accuracy.

A small test tube contains a suspension of the abortion bacillus in a special diluent, the composition of which is not stated. The mouth of the tube is closed by a cork projecting from which into the tube is a coil of wire. This coil is so made that by capillary attraction it will hold such an amount of blood that when this is mixed with the suspension of bacilli the dilution is 1 in 100. The liquid used for suspending the bacilli is " so carefully adjusted that the whole blood can be used, thus obviating the separation of the serum."

In use the tube is shaken vigorously until the word " infected " printed on a label attached to the tube can no longer be read through the emulsion. Blood is obtained from an animal by either snipping the edge of the ear or puncturing a vein with a needle. The cork is removed and the liquid contained in the coil is shaken or blown out. A drop of blood about the size of a match head is collected in the loop. The cork is replaced and the tube shaken vigorously. Tubes thus prepared are placed in a vertical position in a warm place for 18 hours. If at the end of that time the contents of the tube have settled to the bottom, leaving the contents water-clear, and the word " infected " on the label clearly visible, the animal may be regarded as infected. If there is any degree of opacity the result should be considered as doubtful or negative, and a further test made.

The tubes remain fit for use for six months after issue.

MCALPINE (J. G.) & RETTGER (L. F.). **Serological Studies on Bovine Infectious Abortion.**— *Jl. Immunol.* 1925. Sept. Vol. 10. No. 5. pp. 811–828. With 10 text figs.

The purpose of this paper is to point out certain relations between serum and milk titres obtained by complement fixation and agglutination tests, and to show the dependence of the serological reactions of new-born calves upon the colostrum ingested.

Samples were obtained from a herd comprising Jerseys, Guernseys, Holsteins and Ayrshires. The average percentage of infected animals ranged from 20–30 per cent. The blood of all animals was tested quarterly, and all infected animals were tested monthly. Milk from reactors was also tested monthly. Samples of blood were taken from calves whenever possible before they sucked, and afterwards at intervals until they became negative, when they were tested quarterly. Serological tests were carried out with colostrum before the calves had sucked in some instances.

It was found possible to classify the animals tested into three groups. Group 1 contains cows which possess a high blood titre to both agglutination and complement fixation, and whose milk shows both types of antibody throughout lactation. In Group 2 are animals whose blood titres are lower than in Group 1, and whose milk contains reacting bodies only during colostral and drying-off periods. Group 3 comprises cows whose serum titres are low and whose milk shows agglutinins, but not complement fixing bodies.

Complete results have been obtained from 14 cows. 28·57 per cent. (4 animals) fell into Group 1, 50 per cent. (7 animals) in Group 2, and 21·34 per cent. (3 animals) in Group 3. It would appear that most animals with positive sera have antibodies in their milk only during the colostral and drying-off periods.

Tests have been made with blood from 34 calves taken before they were allowed to suck. Of these, 19 were from reacting cows and 15 from non-reactors. All were negative to both tests. All the calves from non-reactors remained negative, and the colostrum from these animals always gave negative results.

The calves of reactors became reactors themselves soon after they were allowed to suck. Antibodies could be detected in the blood within 2 hours, and the reactions increased during the first 24 hours, but the titres never equalled those of the colostrum.

One of the 19 calves died at three days. This calf was negative before sucking, and its serum remained negative 24 hours after it had taken colostrum. The calf died of a digestive disturbance.

Calves fed upon high titre colostrum remain reactors longer than those fed upon low titre colostrum. It is an almost invariable rule that the power of reaction is lost by calves within 6 months. One case is mentioned by the authors in which complement fixation tests were positive up to 10½ months, although agglutinins had disappeared by the 5th month.

Three calves were kept from colostrum for 24 hours and were fed upon milk containing antibodies. The sera of these calves gave no reaction. This confirms ORCUTT and HOWE'S result that agglutinins appear in the blood only after colostrum is fed.

SEELEMANN (M.). **Zur bakteriologischen Diagnose der Gasödeme bei Rind und Schaf.** [The Bacteriological Diagnosis of Gas Oedema in Cattle and Sheep.]—*Arch. Wissen. u. Prakt. Tierheilk.* 1925. Aug. 1. Vol. 52. No. 6. pp. 525–532.

The author described tests carried out with material from 100 cases (44 from cattle and 56 from sheep).

Most of the muscular tissue received for investigation was dry, but in cases where it was not it was dried at 37° C.

Fragments weighing about a gramme were soaked in 96 per cent. alcohol for 10 to 20 minutes, and were then ground up in a mortar with 2–3 cc. of broth. About five loopfuls of this were spread on a grape-sugar-blood-agar plate and by means of a Drigalski spatula a series of 2 to 4 dilution plates were made. The plates were incubated in a Zeiszler anaerobic apparatus for 36–48 hours at 37° C. The blood used was sheep-blood and the sugar was present in 2 per cent. concentration.

The author does not agree with ZEISZLER that sheep-blood is not satisfactory for culture purposes. He also found that 1 per cent. sugar yielded better growths than 2 per cent. The colonies obtained on solid media were irregularly rounded in shape with either a central prominence or a depression. Such growth could be obtained on the surface of blood agar dried from diseased muscle, but better in sub-cultures from liver broth cultures.

The author is under the impression, but cannot definitely state it as a fact, that sheep blood is not so suitable for the cultivation of the blackquarter bacillus from bovine cases.

Parablack-quarter bacilli (Type III) and Fraenkels gas bacillus both grew on the medium as described by ZEISZLER, the former as a veil and the latter as a reseda-green growth.

DE JENEY (A.). **Rôle de la peau dans le hog-choléra du cobaye. Infection et immunisation locale.** [The Skin in Hog-Cholera in the Guineapig. Infection and Immunization.]—*C. R. Soc. Biol.* 1925. Oct. 23. Vol. 93. No. 29. pp. 921–923.

These experiments appear to have been carried out with the so-called bacillus of hog-cholera, and not with the filterable virus. The results indicated that the skin was about ten times as susceptible as the peritoneum.

JORDAN (E. O.). **The Differentiation of the Paratyphoid Enteritidis Group. IX. Strains from Mammalian Hosts.**—*Jl. Infect. Dis.* 1925. March. Vol. 36. No. 3. pp. 309–329.

## MYCOTIC DISEASES.

MÉLANIDI (C.) & STYLIANOPOULO (M.). **Conjonctivite cryptococcique expérimentale chez le chien.** [Experimental Cryptococcic Conjunctivitis in the Dog.]—*C. R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1081–1083.

The authors inoculated a dog subconjunctivally with pus from an unruptured farcy bud. The pus contained large numbers of cryptococci but no bacteria of any kind. About a week later a small swelling appeared, and this continued to increase in size, and the conjunctiva covering it became markedly congested. There was somewhat marked lachrymation.

A fortnight after inoculation there was ulceration of the conjunctiva and pus containing cryptococci was obtained. There was enlargement of the parotid lymph gland. Pus was taken and used after dilution for the inoculation of a second dog. The course of the disease could not be followed in the first because it died as the result of an accident.

The infection developed far more slowly in the second animal. It was not until a month or more after inoculation that ulceration occurred. In this case the ulceration involved the skin. There was no enlargement of the lymphatic gland. Cryptococci were present in large numbers. Spontaneous recovery took place in about 10 days.

Further information is promised regarding experiments with rabbits and other animals.

## DISEASES DUE TO FILTERABLE VIRUSES.

STUART (G.) & KRIKORIAN (K. S.). **Anti-Rabic Procedure in Palestine with Special Reference to Decentralization of Treatment.**—*Ann. Trop. Med. & Parasit.* 1925. Dec. 16. Vol. 19. No. 4. pp. 391–418.

Cauterisation of the wound with, preferably, fuming nitric acid is of value only if applied within half an hour of the bite. The vaccine used is a 2 per cent. suspension of the brain of a rabbit killed with fixed virus in 1 per cent. phenol in distilled water. Before issue the vaccine is diluted with an equal amount of normal saline solution. Distilled water is preferred to normal saline for making the first emulsion as a better suspension is obtained. This vaccine is incubated at 37° C. for 24 hours before dilution with salt solution, and it is tested for anaerobic and aerobic organisms. The dose in all circumstances is 5 cc. daily (2·5 cc. "intracutaneously" on each side of the abdomen). Fourteen injections on successive days are given.

No cases of post-treatment paralysis have been encountered.

If preserved in the dark and on ice the vaccine retains its immunizing power for three months; the method lends itself therefore to the distribution of the vaccine to different centres for use.

The paper concludes with appendices showing the form of register of cases undergoing treatment and the regulations for the control of rabies.

LÜHRS (E.). **Winke für die histologische Tollwutdiagnose.** [Points in the Histological Diagnosis of Rabies.]—*Zeitsch. f. Infektionskr. parasit. Krankh. u. Hyg. d. Haust.* 1925. Nov. 16. Vol. 28. No. 4. pp. 300–303.

After pointing out what he considers to be the defects of the methods of histological diagnosis (referring only to the detection of Negri bodies) in use, the author describes the technique of the method which he has devised.

Clean slides are covered with a thin film of 20 per cent. gelatin in water, and a second batch are coated with glycerin-albumen. Thin transverse slices of Ammon's horn are placed upon the albuminised slides. A drop of paraffin oil is then spread over the surface of the gelatin on the prepared slides and these are inverted over the slice of tissue. The slides are kept in contact under pressure by pinch cocks for a quarter to half-an-hour at room temperature. The clips are then removed and the slides, adhering to each other, are placed in a slanting position in the paraffin oven. The gelatin melts and the slides are taken apart. An impression of the tissue is left on the albuminised slide, and this is ready for fixation and staining. This is generally done by methyl alcohol and Lenz method.

LEBAILLY (C.). **La réapparition des foyers de fièvre aphteuse et la conservation du virus dans la nature.** [The Reappearance of Centres of Foot and Mouth Disease and the Preservation of the Virus in Nature.]—*C. R. Acad. Sci.* 1925. Sept. 21. Vol. 181. No. 12. pp. 383–384.

The author thinks that caution should be exercised in the acceptance of the view that outbreaks of foot-and-mouth disease may be due to virus liberated from the hoofs when these are pared.

In a number of cases infected animals have been removed from farms and sent back after recovery. This has in no case led to fresh outbreaks.

TRAUTWEIN (K.). **Zur Frage der Einschluszkörperchen bei Maul und Klauenseuche.** [Inclusion Bodies in Foot-and-Mouth Disease.] —*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1925. Aug. Vol. 52. No. 6. pp. 475–482.

The author confirms GINS' observations regarding the occurrence of inclusion bodies in specimens from foot-and-mouth disease lesions, but he states that, whereas GINS showed that these could be detected from 2–4 days after infection in guineapigs, he has been able to find them in still larger numbers up to 18 days after infection.

Foot-and-mouth disease lesions, and particularly those of the tongue, heal very readily. In examining sections it was found that nuclear inclusions were present in large numbers in the cells around the leucocyte invasions which are caused by the lesions of the disease.

Control specimens were taken from lesions on the tongues of guineapigs which were caused by heat or by acids. In these, exactly the same cell inclusions were found as in the foot-and-mouth disease lesions. They could also be found in sections of tongues of normal guineapigs. The possibility, therefore, of their being of a specific nature is excluded.

Further, it can be shown that the cell inclusions are to be found readily in cells in the stomach, duodenum, spleen, and pancreas in both healthy guineapigs and in guineapigs infected with foot-and-mouth disease.

The author believes that they are fragments of chromatin derived from leucocytes.

WALDEMANN. **Richtlinien zur Schutzimpfung gegen Maul-und Klauenseuche.** [Protective Inoculation against Foot-and-Mouth Disease.]—*Berlin. Tierärzt. Wochenschr.* 1925. Oct. 30. Vol. 41. No. 44. pp. 713–715.

Serum is now being produced in large amount in Germany. The laboratories on the Island of Reims are turning out 1,000 litres a week. It must be remembered that the serum is capable of producing passive immunity for a period of about ten days only. It must, therefore, be used only in circumstances in which this period of immunity is valuable, such as at fairs and markets, or on journeys.

ARKWRIGHT (J. A.) & BURBURY (M.). **Observations on Foot-and-Mouth Disease. Section I.—Transmission of Foot-and-Mouth Disease to Rodents.**

BEDSON (S. P.) & MAITLAND (H. B.). **Section II.—The Attempted Cultivation of the Virus and its Reaction to Various Agents, Chemical and Physical.**—*Jl. Comp. Path. & Therap.* 1925. Dec. 31. Vol. 38. Pt. 4. pp. 229–255.

As stated in a footnote, this paper is published by permission of the Foot-and-Mouth Disease Research Committee of the Ministry of

Agriculture and Fisheries, and contains a fuller account of the observations made than the First Progress Report of the Committee.

It has already been established that guineapigs can be infected with the virus of foot-and mouth disease, with the development of primary lesions within 24 hours at the seat of inoculation (when this is by scarification of the skin of the sole), and a secondary crop of vesicles and general systemic infection some twenty-four hours later. The blood is infective at the time of maximum development of the primary vesicles, but this disappears almost as soon as the secondary vesicles appear. The infection establishes immunity. It is advisable to select guineapigs of 300 grammes weight or more. The fluid from the vesicles 24 to 48 hours after inoculation contains a very active virus. The epithelium covering vesicles is virulent, and may be stored for weeks in 50 per cent. glycerol. The disease does not spread naturally among guineapigs.

The work done by Arkwright and Burbury confirms and extends these findings.

They find intracutaneous inoculation into the integument of the sole of the hind foot preferable to scarification as the means of infecting. Not only are better lesions produced by smaller doses, but the lesions are uniform and are more constant. One virus failed to cause infection when 1 cc. of 1 in 200,000 dilution was injected intracardially, while a dilution of 1 in 1,000,000 of the same virus set up the disease by intracutaneous inoculation. After intracutaneous inoculation primary vesicles appear in 18–24 hours, but rarely as late as the 4th day. The variation depends upon the size and condition of the animal, and the the size and infectivity of the dose of virus. Symptoms of generalization appear one or two days after the primary vesiculation. There is salivation and vesiculation of the mouth. About 12 hours later vesicles appear on the fore feet. By the 4th or 5th day salivation has ceased and healing has begun. Desquamation of the foot lesions begins about the 10th day, and is complete in about 3 weeks. At the onset of generalization the temperature generally rises about 2° F., but this is said not to be a reliable indication of infection. During the illness there is loss of appetite and condition accompanied by diarrhoea. A guineapig may lose one-third of its weight in a week. The mortality is about 5 per cent.

When inoculation is practised on other (hairy) parts of the body primary vesiculation is not observed.

The blood appears to be most infective about the time of local reaction and thereafter decreases. At the maximum ·05 cc. of blood diluted 1 in 1600 has been found infective by intracutaneous inoculation.

" After a typical attack of the disease, even when this has not been at all severe, guineapigs, whenever tested, have proved to be immune to the virus with which they were originally inoculated, with one possible exception in the case of an animal first inoculated with ' No. 1 ' and subsequently with ' G.F. " (' No. 1 ' and ' G.F. ' were the two viruses used.—Ed.). The tests have usually been made three weeks to a month after the attack. Animals which have been unsuccessfully inoculated with weak or deteriorated virus have almost invariably proved susceptible when again inoculated with active virus."

Natural immunity, if it occurs, must be rare.

It has not been found possible to infect by ingestion.

In no case has any evidence that recovered guineapigs might act as carriers been obtained.

In attempts to infect rats and mice the following results have been obtained. Intramuscular inoculation of wild rats had caused the development of vesicles in the mouth, and the virus has been present in the blood for 24 to 48 hours. White rats appear to be less susceptible than wild ones. House mice have failed to develop lesions after inoculation, but the virus has persisted in the blood for a short time. In some wood mice lesions developed in the mouth, but in only about 50 per cent. of those inoculated.

SECTION II.

The virus used was collected from foot vesicles at their maximum tension, and prior to filtration diluted to 1 in 50. Mandler candles were found to be the best for the purpose of filtration. All samples of vesicular fluid used for cultural and other experiments were titrated by guineapig inoculation. Although some fluids showed a titration as high as 1 in 5,000,000 the majority were in the neighbourhood of 1 in 500,000.

In cultural work the first method attempted was that described by FROSCH and DAHMEN, but the results were entirely negative.

Various other methods and modifications were tried, but without success in any one instance. From experiments designed to test the vitality of the virus *in vitro* the following facts were ascertained. The virus persists longer the colder it is kept. In certain media, e.g., saline, acid phosphate solutions, and glycerol, infectivity was lost so rapidly at 37° C. (less than 24 hours) that survival experiments could only be carried out at lower temperatures. Experiments to test the best pH for the survival of the virus showed that it was between 7·5 and 7·6 no matter at what temperature the material was stored. Both potassium phosphate and potassium acetate appeared to exert a favourable influence upon the survival of virus. Reduction of atmospheric pressure to 50 or 30 mm. of mercury did not appear to have any influence upon it.

Glycerol in a 50 per cent. concentration will preserve the virus for some months if fragments of epithelium from vesicles are placed in it and kept in cold store. This is remarkable as the pH of glycerol is usually about 5·5. It was further found that the presence of glycerol enables the virus to survive in an acid medium which by itself was destructive to it. Filtered virus preserved with glycerin does not survive so long, but owing to the difficulty of ascertaining how much virus is present in the epithelium it is impossible to say whether the tissue elements themselves play any part in the preservation.

Filtered virus (1 in 500) in M/50 phosphate ($KH_2PO_4$ and $K_2HPO_4$) at pH 7·6 without glycerol is still infective after 96 days in cold store. Among the chemical agents tested with a view to determine their action upon the virus were: Phenol, alcohol, acetone, chloroform, formalin, and sodium citrate. The last was included in view of the frequency with which it is used in the collection of blood. The virus was found to possess considerable resistance against the first three of these, but 0·1 per cent. formalin destroyed it within 48 hours. Sodium citrate in a concentration of 0·5 per cent. at 37° C. was found to be definitely harmful to the virus as judged by survival tests.

No evidence was obtained that the virus was capable of adhering strongly to washed red corpuscles. Precipitation of vesicle fluid caused no reduction in the amount of virus remaining in the fluid and, finally, centrifuging diluted vesicle fluid (1 in 50) for 2 hours at 5,500 failed to cause any concentration of virus.

NICOLAU (S.) & GALLOWAY (I. A.). **Activité pathogène du virus de la fièvre aphteuse pour le lapin.** [The Pathogenicity of the Virus of Foot-and-Mouth Disease for the Rabbit.]—*C. R. Soc. Biol.* 1925. Nov. 27. Vol. 93. No. 34. pp. 1283–1284.

Using a virus which had been passed through guineapigs, the authors have produced lesions on the tongues of rabbits by intralingual inoculation. The lesions were vesicular and made their appearance in 24 to 48 hours. The vesicles ruptured and left an erosion which was sometimes covered with a delicate false membrane.

To prove that these were true foot-and-mouth lesions emulsions were prepared from them, generally on the third or fourth day, and these, after filtration through a Chamberland L3 filter, were used for inoculation into guineapigs. Success was obtained in every case. They also succeeded in transmitting the infection from rabbit to rabbit by means of filtrate through 13 passages.

Histological examination of the lesions showed that an intense polynuclear invasion was a pronounced feature, and surrounding the lesion there was marked infiltration of large mononuclears. The affected epithelium had undergone complete necrosis and had been replaced by a fibrinous exudate containing a large number of leucocytes and blood corpuscles. The lesion, in fact, tended to become a pustule. No evidence of generalization of the virus was obtained.

DI DOMIZI (Giovanni). **Il Sangue ossalato iperimmune nella profilassi contro la peste bovina.** [Hyperimmune Oxalated Blood in the Prevention of Cattle Plague.]—*La Clin. Vet.* 1925. Aug. Vol. 48. No. 8. pp. 516–524.

The author recommends the use of hyperimmune oxalated blood on the grounds that the technique of preparation is far more simple than that of hyperimmune serum and the number of doses obtained from the amount of blood drawn is greater. It is on both grounds more economical.

CURASSON (G.). **Les séquelles de la peste bovine et les porteurs de germes.** [The Sequels to Cattle Plague and Virus-Carriers.]—*Rev. Gén. Méd. Vét.* 1925. Oct. 15. Vol. 34. No. 406. pp. 519–554.

In animals which have recovered from cattle plague the following symptoms are sometimes observed: Persistent poorness of condition, dull coat, frequent cough, intermittent febrile attacks, chronic enteritis, in females chronic vaginitis and sterility. At places where skin lesions developed in the course of the infection tufts of hair stand erect. The serum of such animals does not give the formol-gel reaction save when the temperature is up.

At the post-mortem examination of such animals healed ulcers are found in the abomasum, patches of inflammatory congestion may be found in various parts of the intestine and the mesenteric glands are enlarged and moist. With regard to virus carriers the author states that the already known facts are as follows: The milk of a cow which recovered two months previously was infective, and in two cases vaginal discharge from recovered cows (interval since recovery not stated.—Ed.) was infective.

In further support of his view regarding the existence of carriers the author gives the following facts: The faeces of a heifer which had recovered from cattle plague 7 weeks previously, after dilution and filtration through a Kitasato filter, proved infective for a calf by inoculation. At the post-mortem of the heifer three days after the faeces were taken a patch of congestion was found in the duodenum. An emulsion of this lesion was not infective.

A virus producer, 34 days after apparent recovery, showed a rise of temperature. It was slaughtered. Healed lesions were found in the abomasum and some small patches of congestion in the duodenum. One of these was mashed up in a mortar, filtered through a Martin filter and used for the inoculation of a calf. Cattle plague developed on the sixth day.

A virus producer which had recovered from inoculation about a month previously showed a rise of temperature. Blood drawn from its jugular was used for the intravenous and subcutaneous inoculation of a calf. Classical lesions developed on the fifth day.

The possibility of accidental infection is ruled out by the author. The author believes that carriers are a source of infection through the medium of their excreta. It is admitted that such carriers are rarely met with.

RABAGLIATI (D. S.). **The Potency of Anti-Cattle Plague Serum.**—*Jl. Comp. Path. & Therap.* 1925. Sept. Vol. 38. Pt. 3. pp. 204–213.

This article is based upon tests carried out on lines indicated by EDWARDS in his Report of the Imperial Bacteriological Laboratory, Muktesar. The accounts of research work published in this report have not been abstracted because further full publication is promised.

According to EDWARDS the classic method of hyperimmunization of cattle for anti-serum production is no longer necessary. It is held that after the first reaction due to simultaneous inoculation no injection of virulent blood, however large the dose, is capable of increasing the anti-body content of the blood. If a sufficiently large dose of serum be used all trace of reaction to virulent blood given at the same time can be prevented. "With the blocked-out or nearly blocked-out reaction a potent anti-serum is obtained only for about four weeks after the injection of the virus, whereas after a mild but decided reaction a potent serum is obtained about a week after the commencement of apyrexia and then for a period of about eight weeks, and perhaps longer, without further treatment of the animals."

Rabagliati describes the method employed at the Serum Institute, Cairo. Susceptible Egyptian cattle are given simultaneously 2 cc. of virulent blood and 100 cc. of serum. This produces little or no reaction. A fortnight later they receive 4 litres of virulent blood, and after a further fortnight are bled for serum. They immediately receive 4 more litres of blood and are bled twice at fortnightly intervals. The third hyperimmunizing dose is followed by three bleedings and the fourth by four. This process is then continued, bleeding every fortnight and hyperimmunizing every two months. The hyperimmunizing injections are given intramuscularly.

In Rabagliati's first test 6 Cyprus bulls were given virulent blood and serum prepared in the manner indicated by EDWARDS from 6 animals. A representative sample of the whole was used and doses

ranging from 15 to 30 cc. per 200 lb. body weight were employed. Three of the animals died, one was killed when moribund, and two, after a severe attack, recovered. Four controls were used. Two of these, on the score of economy, were bled for virus on the 6th day. One died of rinderpest, and one made only a partial recovery and had to be destroyed. The protective doses used were those employed for the standard serum issued by the Cairo Institute.

The serum used in the above tests was obtained by bleeding the animals 21, 28, and 35 days after simultaneous inoculation. It was thought desirable to carry out a test using serum taken 14 days after the simultaneous inoculation.

Four Cyprus bulls were used in this test, and doses of 20 and 30 cc. per 200 lb. body weight were given. All four developed clinical cattle plague. Three died and one made only a partial recovery and had to be slaughtered. Two controls were bled to death for virus on the 6th day.

Parallel with the first experimental test 6 Cyprus bulls were treated in the routine manner for potency tests with the standard serum issued by the Institute. All showed a temperature reaction, but nothing more.

Rabagliati concludes that the method would not be suitable for Egypt. Even if the serums could be used in doses sufficiently large the method could not be applied owing to the almost constant complication of piroplasmosis. Rabagliati has found, as SHILSTON found in India*, that the immunity following simultaneous inoculation when the dose of serum has been sufficiently large to prevent reaction absolutely is permanent.

Rabagliati finds in Egypt that the potency of serum does not decline even though an animal be in use as a serum producer for periods up to 5 years.

EDWARDS states that after a " certain limited period " the hyperimmunizing doses given are actually without effect.

In a further experiment Rabagliati shows that 6 bulls immunized with serum prepared from the blood of cattle which had been in use for 4 years and had had their immunity reinforced 24 times all recovered. A similar number given the same doses of serum from animals which had had a single hyperimmunizing dose only after simultaneous inoculation, all developed severe reactions and 3 of them died.

In 1919 tests showed that serum from animals that had been in use for a longer time was more potent than that from animals recently immunized.

Further experiments in 1923 indicated that the potency of the serum was influenced by the amount of blood given for hyperimmunizing purposes.

Rabagliati's conclusions are as follows :—

1. That the potency of anti-cattle-plague serum made from blood drawn within 5 weeks of the simultaneous inoculation cannot always be relied on.

2. That before the classic method of hyperimmunization be given up, careful tests of the new method should be made in the country concerned.

3. That under the old hyperimmunization method serum cattle can produce a potent serum for at least four years, and probably much longer periods.

* SHILSTON's death prevented publication of his results (Ed.).

HORNBY (H. E.) & HALL (G. N.). **Studies in Rinderpest Immunity: I. Susceptibility and Resistance.**— *Vet. Jl.* 1925. Nov. Vol. 81. No. 11. pp. 529–536. With 2 charts.

In a note at the beginning of this article the authors state that they are recording what they have found to occur, and the conclusions they have drawn irrespective of whether they are in agreement with commonly accepted theories or not. This paper is to be one of a series, and all references to literature will be found in the final one of the set.

The cattle used in the experiments were all obtained from the Iringa district, were there has been no rinderpest for 5 years, and more than 90 per cent. of the young animals were found to be susceptible.

The strain has been maintained by weekly subcutaneous inoculations for 3 years, but every few months some irregularity has broken the sequence of inoculations and then it has been carried on by contact or by intravenous inoculation. The results have been constant throughout. A 5 cc. dose given to a batch of cattle has usually resulted in death in 30 per cent., severe reactions with recovery in 30 per cent. and temperature reactions only in the remainder. It is held by the authors that these differences are due to differences of *resistance* after the body has been invaded and not due to differences of *susceptibility*.

The definitions of susceptibility and resistance given by the authors are as follows: Susceptibility is a condition which allows the rinderpest virus to get sufficient foothold in the tissues of its host to cause symptoms of disease. Resistance is the rapidity and efficiency with which the defensive forces of the body are mobilised against the invading virus, after this has already obtained a foothold by reason of the body's susceptibility.

There is no such thing as partial susceptibility of cattle to rinderpest, for if an animal is not susceptible it is immune and no exposure to infection will set up the disease. Were the differences observed in the courses taken by the disease due to differences of susceptibility the minimal infective dose would vary from animal to animal. If, however, susceptibility is constant, and independent of the course subsequently run by the disease, the minimal infective dose will be constant.

To test this point experiments have been carried out by means of dilutions of infective materials, blood, peritoneal washings, etc. Preliminary tests showed that the most useful results were obtained when 20 cc. of dilution contained 0·2, 0·02, and 0·002 cc. of the original infective material.

Details are given of 10 tests in which this plan was followed. In 8 of these the results supported the writers' theory. One experiment was spoiled owing to the fact that the animal receiving the weakest dilution proved to be immune, and the other because a sufficiently weak dilution was not employed. Various infective materials were employed, e.g., blood on the 3rd day of reaction, liver extract on the same day, peritoneal washings, blood on the 1st day of reaction, and on the 4th day of reaction.

The writers feel justified in continuing the series of experiments in the hope of obtaining data from which to construct a curve showing the rise and fall of virus content in the blood and afterwards in the

other tissues as the disease advances. From these it may be possible to obtain information regarding the best method of obtaining antigen for hyperimmunization purposes. The authors do not wish to convey the impression that they think susceptibility is invariable, they believe it to be constant to the extent that any complex biological phenomenon can be constant, i.e., sufficiently constant to permit of definite conclusions being drawn regarding the minimal infective doses. Two anomalous cases have been met with in a series of experiments similar to those detailed in the present papers. In these animals receiving smaller doses reacted while those receiving larger doses failed to do so, although they were proved by subsequent inoculation to be susceptible.

A possible explanation of such cases may be that in weak dilutions, that is in dilutions containing only a small amount of virus, the distribution of the virus may not be absolutely uniform. That this may be actually so is shown by an experiment in which a group of oxen received the same minimal infective dose. The period of incubation was prolonged in two and the third failed to become infected, although susceptible.

ONO (S.). **Further Notes on Contagious Pleuro-Pneumonia in Imported Cattle.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Sept. Vol. 4. No. 3. pp. 257–258. [Author's English abstract.]

The author's experiments have been carried out with virus obtained in the course of an outbreak at Osaka in May, 1925. This, like the previous outbreak in September, 1924, appears to have originated among cattle imported from China.

He has obtained cultures (stab) in beef-broth-agar or Martin's agar containing 9 per cent. bovine serum. In shake cultures growth took place in a disk 0·5 centimetres below the surface of the medium. Good growths were obtained in about a week under anaerobic conditions, and in a medium prepared from the aqueous humour of bovine eyes an opalescent culture was obtained within about the same period.

Intraocular inoculation of rabbits produced iritis, and the virus survived in the eye for two weeks. Intratesticular inoculation produced swelling which lasted from a fortnight to three weeks, but there was no suppuration.

Serum from inoculated rabbits gave a precipitin reaction with serum from infected cattle.

NAGAO (M.). **Beitrag zur Pathogenese der Erythrozytenverminderung bei der infektiösen Anämie des Pferdes.** [Pathogenesis of the Reduction of the Red Blood Corpuscles in Equine Pernicious Anaemia.]—*Jl. Jap. Soc. Vet. Sci.* 1925. June. Vol. 4. No. 2. pp. 151–154.

The author believes that the anaemia is of the haemolytic type and is brought about by destruction of the red cells in the spleen, bone marrow, and to a less extent in the lymphatic glands.

During febrile attacks there is actually an increase in the number of red cells. This is caused by stimulation of the bone marrow by the virus.

HARALAMBOPOULO & PAPACHRISTOPHILOU. **Variole des chèvres.** [Variola of Goats.]—*Rec. Méd. Vet.* 1925. Sept. 15. Vol. 101. No. 16. pp. 528–529.

Benign and severe forms of the disease are described.

In the benign form four stages are recognizable.

The first stage is characterized by fever, dullness, loss of appetite, acceleration of respiration, and congestion of the mucous membranes. This lasts about four days.

In the second or eruptive stage patches of congestion appear on the thin skin in the neighbourhood of the tail. The skin becomes thickened and a pustule forms. The pustules may remain descrete or may become confluent. They may spread to all parts of the body. This phase lasts about five days.

The pustule becomes converted into a " vesico-pustule " containing reddish or yellow liquid. Within four or five days these vesicles burst and brownish crusts are formed. The crusts then fall and scars are left. Healing is delayed as a result of scratching.

In the severe form of the disease the onset is marked by very high fever and general exacerbation of the other symptoms. The lesions are extensive and diffuse. Suppuration occurs and this is accompanied by a blood-stained discharge from the nose, and diarrhoea. In these cases death usually occurs.

At the post-mortem examination broncho-pneumonia and enteritis are found. In the lungs the variolous pustules form nodules as large as peas, they are of a greyish tint and are surrounded by zones of broncho-pneumonia. Variolization yielded favourable results. The sheep is not susceptible even to inoculation.

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NIKOLAJEWA (E.). **Antiwutimpfung mittels Karbolvakzine nach der Methode von Prof. Fermi.** [Anti-Rabies Inoculation with Fermi's Carbol-Vaccine.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1925. Aug. Vol. 95. No. 7/8. pp. 423–428.

ZIEGLER (M.). **Zur Histologie der ansteckenden Blutarmut.** [The Histology of Infectious Anaemia.]—*Berlin. Tierärzt. Wochenschr.* 1925. Nov. 13. Vol. 41. No. 46. pp. 751–752.

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## MISCELLANEOUS.

COWDRY (E. V.). **Studies on the Etiology of Heartwater. I. Observation of a Rickettsia,** *Rickettsia ruminantium* **(n.sp.) in the Tissues of Infected Animals.**—*Jl. Exp. Med.* 1925. Aug. 1. Vol. 42. No. 2. pp. 231–252. With 2 plates.

The investigations detailed were carried out at the suggestion of THEILER.

In a tabular statement are given the passages through which the virus was maintained, the virus was carried from animal to animal by intravenous inoculation.

A further tabular statement shows the material used for inoculation, date of the first rise of temperature, date of maximum rise, date of destruction of the animal, post-mortem findings, and the distribution of the organisms.

As controls normal animals and animals suffering from other diseases were examined. In no case were Rickettsia found in the blood by microscopic examination. They were, however, most readily detected in the endothelial cells of the capillaries of the renal glomeruli, and in the superficial grey matter of the cerebral cortex. They were also found in the spleen, lymph glands, corpus luteum, cerebellar cortex, suprarenals, midbrain, medulla, ovaries, corpus striatum, salivary glands, pancreas, and heart muscle. They were never found in the liver or lungs. Testicles were seldom available for examination. The detection of the organisms became difficult when the period elapsing between death and examination exceeded 6 hours.

The most favourable time for finding them was two to four days after the maximum temperature had been reached. As a rule they could not be found 6 days after the temperature had fallen to normal, and this was in general agreement with the loss of infectivity of the blood.

The most characteristic lesion is swelling of the endothelial cells. The organisms were never found in such cells as individuals, but in dense masses ranging from a small number up to several hundred. The swelling of the cells was sometimes so marked as to occlude the lumen of the vessels. In other cases the cells became detached into the stream. The invaded cells appeared to show no other abnormality, nor was there any leucocytic infiltration.

The organisms after fixation in Zenker and staining were found to be coccus-like and to measure from 0·2 to 0·5 $\mu$. Occasionally diplococcus-like forms were seen, and this was the only suggestion of multiplicative forms observed.

All fixatives ordinarily used for bacteria were found to be suitable. Stained by Giemsa they acquired a clear deep blue colour, but they also stained with simple basic dyes. They were gram negative. When stained with iron-haematoxylin they lost their colour before the nuclear chromatin.

Details are given of the reasons for excluding the Rickettsia as normal cellular inclusions or products of degeneration or phagocytosis. A tabular statement shows comparisons between the Rickettsiae of Rocky Mountain spotted fever, typhus and heartwater as seen in the mammalian tissues.

COWDRY (E. V.). **Studies on the Etiology of Heartwater. II.** *Rickettsia ruminantium* **(n. sp.) in the Tissues of Ticks transmitting the Disease.**—*Jl. Exp. Med.* 1925. Aug. Vol. 42. No. 2. pp. 253–274. With 2 plates.

In these experiments larvae from a single female were used. These were divided into batches some of which were fed upon normal animals and some upon animals suffering from heartwater. Since the infection does not pass through the egg the larvae were clean and these together with nymphs and adults derived from them were available for examination. The sick animals upon which they were fed were proved to be infective by inoculation.

It was not found possible to obtain very satisfactory specimens by embedding in paraffin, and many of the examinations were carr ed out with smears and teased specimens.

All ticks, infective and non-infective, showed a large gram-positive pleomorphic bacterium-like organism in the epithelium of the Malpighian tubules. This will be described with others in a subsequent paper.

It was found impracticable to examine the organism in fresh teased specimens on account of the difficulty of identifying it. Granules from the salivary glands presented a very similar appearance. Medicinal methylene blue in a concentration of 1 in 20,000 stained the organisms more intensely than the granules. Brilliant cresyl blue and neutral red could also be used but with less success. Dark ground illumination was also of little use on account of the presence of enormous numbers of mitochondria. With air-dried, Giemsa stained preparations care was necessary to distinguish the two structures, but the salivary granules were usually brick red and Rickettsia blue or light purple. When individuals could be seen it was found that two minute granules of a red tint were embedded in a blue stained material. No filamentous forms were found.

The clump-like formation of the Rickettsia was very permanent. In older nymphs clumps were found in the lumen of the intestine, but there were also scattered individuals. In clumps the bodies appeared coccus-like, but in sections where masses had been cut barely tangentially the effect of superposition was avoided and they were seen to be bacillary in shape. The staining reactions in sections depended upon the fixative. With Giemsa after Zenker they were blue, bluish-purple after Regaud's fluid, formalin or Carnoy's liquid, pale green after Flemming and light pink after Mayer's picro-sulphuric mixture. They were gram negative, but stained well with Goodpasture's fuchsin and Unna's alkaline methylene blue. Their outlines, by any method, were less distinct than those of bacteria.

Larvae which were fed upon animals suffering from heartwater acquired Rickettsiae which appeared to be identical with those found in the tissues of the affected animals upon which they were fed. Larvae of the same brood fed upon healthy animals did not acquire the parasite.

Larvae which had engorged themselves upon infected animals could not be tested for infectivity directly because they would not feed, but the nymphs developed from them were proved to be infective.

The organism was found in the heartwater tick *Amblyomma hebraeum* only. More than a score of other species were examined, but with negative results.

MARSHALL (A.) & MACDONALD (N.). **Hints on Tropical Technique.**—*Jl. Trop. Med. & Hyg.* 1925. Oct. 15. Vol. 28. No. 20. pp. 371–375. [Abstracted from the *Laboratory Journal*, Dec. 1924.]

This paper contains valuable hints to workers in the tropics.

It is recommended that glass-ware be cleaned by placing it for an hour in the following solution: Caustic potash, 100 gm., water, 100 cc., and methylated spirit, 800 cc. Cover glasses should always be stored in 60 per cent. alcohol. Bleeding needles and canulae should be stored in alcohol and each should be passed into a piece of glass tubing

having a slightly greater length so that the point is not injured. Rubber tubing should be stored in glycerin or in an atmosphere of carbon dioxide. The tube is coiled in jars having corks sealed with paraffin wax. The tube is passed through an aperture of the required size in the cork. Carbon dioxide is passed into the jar through the tube and the lumen of the tube is then closed with a piece of glass rod. As tubing is required a length is cut off and the glass rod replaced in the cut end.

In certain circumstances it has been found useful to close flasks of culture media with surgical oiled silk instead of cotton wool plugs. The silk is secured over the opening of the tube or flask with a few turns of thread below the lip. Sterilizing is effected at 15 lb. for 20 minutes. On cooling the silk is pulled taut by the contraction of the air within the flask. The silk is then coated with molten paraffin. To inoculate the flask, melt the paraffin, pierce the silk with a syringe needle, and inject the seed material from the syringe. Re-seal the hole by melting the paraffin. Paraffined paper is recommended for the sealing of stock cultures as rubber caps perish too readily.

If rubber caps have to be used they should be coated with low melting point paraffin. Blood films should be packed for despatch by post with pieces of cardboard between the slides to prevent rubbing. The slides should then be rolled in paper. The package, after it has been sealed up, should be dropped into melted paraffin until it is permeated. This prevents the growth of fungi, and the smears will keep indefinitely.

THEILER (A.). **Das Knochenfressen der Rinder in Südafrika.** [Osteophagia of Cattle in South Africa.]—*Schweiz. Arch. f. Tierheilk.* 1925. Sept. 15. Vol. 67. No. 17. pp. 405–414.

Formerly osteophagia was thought to be closely allied to, if not identical with, " licking disease " (Lecksucht) as seen in Europe. It is now, however, realized that the two are distinct.

Osteophagia may occur in stabled animals or in animals on the veldt. In the early stages more or less fresh bones are eaten, but as the disease progresses even putrid bones are attractive to the affected animals. The depravity of appetite, however, is not limited to the eating of bones. Bone-eaters as a rule show no digestive disturbances, nor are nervous symptoms seen. In some cases, but not in all, there is some degree of wasting.

The evidence suggests that osteophagia is due to a lack of phosphorus. This was obtained in experiments in which several hundred cattle were used. The disease was more in evidence during the winter when the veldt is dry, and it declined in the spring with the appearance of the new vegetation. Analysis showed that the phosphorus content of the grass was lowest when the percentage of affected animals was highest. The $P_2O_5$ content of the grass ranged from 0·08 per cent. minimum to 0·6 per cent. maximum of the weight of the dry plant. The addition of 2 per cent. $P_2O_5$ to the diet caused the disappearance of the disease within six weeks. 120 gm. of sterile bone meal per day stamped it out within a month, and 400 gm. per day in less than a fortnight. Calcium phosphate, sodium phosphate and pure phosphoric acid in the drinking water achieved the same result.

Dressing the land with superphosphate likewise caused the disappearance of the disease, but animals again showed symptoms when they were transferred to land not so dressed.

Osteophagia is, therefore, not a disease, but merely a symptom; the disease itself is termed Aphosphorosis.

Experiments showed that different animals required different amounts of phosphorus, in the form of bone meal, to maintain what was termed "osteophagia-equilibrium." Full grown oxen required the least, and milch cows in milk the most. Half a pound weekly was sufficient for a full grown ox. Growing animals over 300 lb. weight required 1 lb., and 2 to 4 lbs. were required for cows in milk. Sucking calves do not require bone meal.

That calcium was not deficient was shown in further experiments which were carried out on a farm which was deficient both in phosphorus and calcium. The addition of prepared chalk to the diet had no effect. The animals so treated showed, in fact, more marked symptoms than controls. Further investigations showed that the condition of aphosphorosis may exist without osteophagia being observed. The addition of phosphorus to the diet was followed by a marked increase in weight. That is to say, that there are all grades of aphosphorosis. The slight cases may show only an absence of proper growth and increase in weight. In other cases the body may show disproportionate growth in different parts. Symptoms are most noticeable in cows with their second or third calf. Great stiffness of gait is also seen. Recovery frequently takes place when the calf is weaned. The calves of such animals generally remain normal while sucking, but when weaned their bones become fragile, and the metacarpal and metatarsal bones show marked thickening of the epiphyses.

The disease should not be confused with rickets, osteomalacia, and "licking disease."

COWDRY (E. V.). **Studies on the Etiology of Jagziekte. I. The Primary Lesions.**—*Jl. Exp. Med.* 1925. Sept. 1. Vol. 42. No. 3. pp. 323–333. With 3 plates.

Jagziekte is a chronic catarrhal pneumonia of the sheep, which is peculiar to South Africa. It is thought to be contagious and causes severe losses.

The extensive overgrowth of the pulmonary epithelium which is characteristic of the disease appears to be secondary to changes in the interalveolar tissues.

What appears to be the primary lesion is a thickening of the interalveolar tissue. These thickenings take place in scattered foci. There appears to be no definite relationship between them and the pleura or the bronchi. They are due to collections of macrophages which are accompanied by lymphocytes. None of the cells show signs of mitotic division, and they do not appear to be produced by local multiplication of any kind. Coincident with this change there is a variable amount of dilatation of the alveolar capillaries. The macrophages then migrate into the alveoli. Very few polynuclear cells are present.

Foreign material was found in the peribronchial lymphatics and less frequently in the macrophages in the thickened interalveolar septa. It was also found in the mediastinal gland. It took the form of biconvex lens-shaped bodies from 3–15 $\mu$ in diameter and 1–5 $\mu$ in thickness. No definite crystalline facets were seen. The bodies were translucent and faintly yellow in colour. Chemical tests showed that

they were not composed of cholestrol, or some other material likely to be produced locally. The fact that they were contained in macrophages indicated an exogenous origin.

Irregular vegetable fragments were also observed.

A gram-negative bacillus and a gram-positive diplococcus were identified microscopically in some of the cases.

COWDRY (E. V.). **Studies on the Etiology of Jagziekte. II. Origin of the Epithelial Proliferations, and the Subsequent Changes.**—*Jl. Exp. Med.* 1925. Sept. 1. Vol. 42. No. 3. pp. 335–345. With 3 plates.

As a result of epithelial proliferation portions of the lungs affected assume an adenoma-like appearance, the scattered proliferations becoming confluent. In certain cases growth takes place in the form of packed masses of cells. Fibrosis occurs in the centre and the animals die of broncho-pneumonia.

In the early stages the proliferating cells may assume a papilloma-like form, or they may be spread over the alveolar wall. The epithelial proliferation is accompanied by a multiplication of fibroblasts. And in rare cases foci of myxomatous tissue develop in the connective tissue.

Although there is marked proliferation of the epithelium mitotic figures are rarely seen. Metastases are not observed in any part of the body.

The areas involved may reach several inches in diameter and on examination may bear some resemblance to adenomata. Extensive lymphocytic infiltrations do not always occur.

It is to be noted that in any affected lung, lesions at different stages may be encountered.

No worm parasites could be found to account for the lesions, nor could any bacteria be detected microscopically which could be causally connected with the lesions.

JEANTET (P.). **L'examen sur fond noir au microscope des préparations fixées et colorées.** [The Examination by Dark Ground Illumination of Fixed and Stained Specimens.]—*C. R. Soc. Biol.* 1925. Oct. 23. Vol. 93. No. 29. pp. 895–896.

The method of using the apparatus is the same as for moist preparations.

The author states that organisms are more readily detected than in moist preparations and than in films examined in the ordinary way. He also states that it is very valuable for photomicrography.

BEVAN (Ll. E. W.). **Carcinoma of the Conjunctiva of Hereford Cows.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. June 18. Vol. 19. No. 3. pp. 153–155.

The author records 8 cases of growths involving the eyes of Hereford cattle in Rhodesia. Six were imported animals, from different herds in Great Britain, one was bred in the Union of South Africa, and one —a bull—was bred in Rhodesia. Sections from one of the cases were submitted to McFadyean, who gave a definite diagnosis of carcinoma.

No cases were observed among any of the animals on the ranch other than the Herefords.

CHANDLER (A. C.) & CHOPRA (R. N.). **The Toxicity of Carbon Tetrachloride to Cats. A Warning.**—*Indian Med. Gaz.* 1925. Sept. Vol. 60. No. 9. pp. 406–407.

The authors, using carbon tetrachloride which is used for human beings, and which is free from carbon bisulphide and phosgene, found that the doses mentioned by HALL and SHILLINGER were very toxic.

Of 49 cats given 0·5 cc. per kilo 4 survived, of 27 given 0·25 cc. per kilo. 3 survived, and of 12 given 4 cc. per kilo, all died. In the latter experiment vomiting almost always occurred within half an hour. The liver in every case showed central necrosis, and extensive fatty degeneration. In the kidneys there was fatty degeneration and necrosis and infiltration of Bowman's capsule with blood.

Albumen was present in all the samples of urine tested.

BUBBERMAN (C.). **Rapport omtrent een reis naar Australië ter bestudeering van veeartsenijkundige toestanden.** [Report of a Tour of Australia to Study Veterinary Conditions.]—176 pp. With 15 plates. 1925. Weltevreden: Landsdrukkerij.

HOWE (Paul E.) & SANDERSON (Everett S.). **Variations in the Concentration of the Globulin and Albumin Fractions of the Blood Plasma of Young Calves and a Cow following the Injection of** *Bacillus abortus*. **Variations in the Concentration of the Protein Fractions of the Blood Plasma of Pregnant and Non-pregnant Cows, or of Cows which have Aborted.**—*Jl. Biol. Chem.* 1925. Jan. Vol. 62. No. 3. pp. 767–788.

RABAGLIATI (D. S.). **Veterinary Legislation in Egypt.**—*Vet. Jl.* 1925. Oct. Vol. 81. No. 10. pp. 479–484.

## REPORTS.

JAARBOEK VAN HET DEPARTEMENT VAN LANDBOUW, NIJVERHEID EN HANDEL IN NEDERLANDSCH-INDIE. 1924. [**Year-book of the Dept. of Agriculture, Industry and Commerce in the Dutch East Indies.**]

The Annual Report of the Veterinary Research Laboratory is given in Chapter XII (pp. 197–220).

During the year, great increases were noted in the amount of work of various kinds which the laboratory had to undertake; this increased activity affected especially the section dealing with sera and vaccines. Corresponding increases in building accommodation, apparatus and experimental animals had also to be made.

Of 410 specimens sent in for diagnosis, 214 were negative; the positives included: 28 cases of anthrax; 22 of rabies; 42 of septicaemia haemorrhagica; 19 of blackquarter, and 20 of surra, with only two each of babesiosis and anaplasmosis respectively. It is of interest to note that all the cases of septicaemia haemorrhagica, and 27 out of the 28 cases of anthrax, occurred in buffaloes; 5 of the cases of blackquarter also occurred in this species.

The complement-fixation test for glanders was applied to 1,493 sera; 484 positives were recorded, and 243 gave doubtful results. There was obvious need for some additional test, and the complement-haemagglutination reaction was first tried, but it was given up, as it was found that the various bovine sera tested had too low a content

of normal haemolysin for guineapig corpuscles. The conglutination reaction (technique of PFEILER-WEBER) appeared from a few tests to give very good results, and will be applied systematically in 1925.

The complement-fixation reaction was applied to the sera of 12 tuberculous cattle; 5 were positive, one was doubtful, and 6 were negative; several sera from healthy cattle all gave negatives.

Only 7 sera were sent in to be tested for contagious abortion (bovine), although the disease occurs widely in the Dutch East Indies.

A large amount of mallein was prepared; it was tested on infected and healthy horses, but it was felt that some further means of testing is needed. An enquiry into the possibility of adapting to the control of mallein the guineapig test used for tuberculin was instituted; the results are not yet complete, but it appears (as has been found by others) that the method is not successful with mallein.

With epizootic lymphangitis, the work done in 1924 confirmed previous experience that vaccino-therapy has no advantage over the usual methods of treatment.

One subject of investigation was "Thick-knee Disease," which occurs in trek animals in Sumatra. Cattle of both sexes are affected, and it appears as an acute affection of various joints—ulnar, tarsal, carpal, etc.—with severe lameness; in many cases cows abort, and castration of males seems to favour its development. This investigation is incomplete.

A bovine disease known as "Cascado" was suspected to have a phyto-parasitic cause, but skin material received at the laboratory showed the presence of worm-embryos, and further work is necessary. A skin disease which occurs in cattle at Bali, and which is associated with necrosis of patches of skin and with mummification of the edges of the ears, was suspected to be comparable with fagopyrism.

A chorioptic mange, affecting the mouth region, was observed in goats.

W. H. Andrews.

MUKTESAR. **Imperial Bacteriological Laboratory Report for Two Years ending March 31, 1924.**—1925. Calcutta. Govt. of India Central Publication Branch.

This report contains, apart from the usual statistical sections, a survey of a very considerable amount of research work done during the period under review, particularly in connection with rinderpest and haemorrhagic septicaemia. As detailed technical papers are promised it seems to be advisable to suspend abstraction until these papers appear.

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## BOOK REVIEW.

BLENKINSOP (L. J.) [K.C.B., D.S.O., Colonel-Commandant R.A.V.C.] & RAINEY (J. W.) [C.B.E.] [Edited by]. **History of the Great War Based on Official Documents. Veterinary Services.**— pp. x+782. With 9 plates & various charts, plans & diagrams. 1925. London: H.M. Stationery Office. [Price, £1 1s. net.]

Gratification and pride will, we imagine, be the feelings uppermost in the minds of members of the Veterinary profession as they reach the end

of this history, which records in some 750 pages the official services of the British veterinary profession during the Great War, services ably—often brilliantly—performed amid circumstances generally of difficulty and not seldom of hazard.

While we cannot share the optimism of those international pacifists who consider that the lamb is already showing a tendency to lie down beside—and outside—the lion, we still think our late experience will prove to be unique and one not likely to recur, both as regards the extent, and the varied nature, of the opportunities for service which the great occasion afforded.

Be this as it may, the Veterinarian of to-day can say, if evidence of past monumental service is required, " Circumspice."

Amid the records of the colossal wastage and destruction of war contained in this history it is with gratification that, here and there, one comes across a golden grain of extended knowledge or of ripened experience, an improvement in surgical technique, the delimitation of a fly-belt, or the successful application to a devastating disease of preventive measures, etc., etc.

Even so, one stands aghast at the toll of animal life exacted by this great war, and the mind is staggered by the mass of animal suffering and enormous economic loss implicit in such statement as "during their advances on the Canal their (the enemy) losses in camels alone were 45,000 " (p. 252), or with the Remount Commission in Canada " Died and destroyed before shipment, 42,261 " (p. 512), or " the total dead wastage from August, 1914, to November, 1918, was more than half-a-million animals " (p. 508).

When one adds the animal losses incurred by the other belligerents, such total is apt by its very magnitude to exceed our intelligent comprehension.

The death-roll in France alone amounted to 269,000 animals from 1914 to 1918.

Such figures for the French front were, we note, composed of wounds and disease in almost balanced proportions (131,000 deaths from wounds, and 138,000 from disease and debility).

This latter cause (debility), together with respiratory disease, would seem to have accounted for the great bulk of deaths from disease. Referring to the debility prevalent in 1917 the history says, page 514, " the fact that all animals had been kept clipped as a precaution against mange may have contributed to this disastrous occurrence." Such a statement seems one of much significance and tends to raise the well-worn controversy as to the protective utility of the horse's coat under conditions of active service.

That the removal of mud accumulations and epithelial débris is facilitated by clipping is undoubted, but if this gain in stable management involves the wastage—in circumstances of exposure—of animal heat, with a consequent loss of condition, wide-spread reduction of efficiency, or an actual state of debility, we may well doubt on which side the balance of advantage lies. That this removal of the coat is necessary as a precaution against mange appears to the writer unproven.

Previous to the Great War it was shown by a Natal worker as far back as 1910 that it was practically impossible to produce the disease in animals which had been dipped in an arsenical dipping fluid even when such animals were maintained for lengthy periods closely in contact with cases of advanced mange. If, therefore, the dipping-tank—or some equivalent apparatus—can be made available, it follows that the necessity for the removal of the coat as a mange precaution ceases to exist, and such an equivalent apparatus, designed and perfected by the same worker, was existent long before the outbreak of hostilities.

This spray-pen, as it is called, is operated with only 400 gals. of dipping fluid, as compared with the 3,500 gals. of the ordinary tank. Besides

being rapid and economical in use, the appliance is easily portable and much less costly than the immovable dip-bath. Debility owing to coat removal for mange should therefore be an avoidable equine trouble in future campaigns.

The respiratory disease which caused such grievous losses amongst remounts in the earlier phases of the war can also be counted as a thing of the past owing to a recognition of its causal factors.

While on the Western Front the above diseases were responsible for the great bulk of the disease loss; tropical diseases proper exacted a heavy toll in other theatres of the War. In glancing down this long list of diseases the Trypanosomiases seem to have been responsible for the greatest loss, and it would seem that in no direction of tropical veterinary effort is further research so needed as in the production of an efficient trypanocide—such as of the Bayer type—rendering unnecessary the enormous physical task attending the destruction of the habitat of the various biting flies, or the extermination of the big game.

When we recall the ease with which an immunity can be secured by the use of an appropriate antitoxic serum against rinderpest, the losses from this disease would appear to have been more avoidable than those experienced from the various forms of trypanosomiasis. Time and facilities for the production of an active form of immunity against rinderpest are both generally wanting in a war of movement, but the complete temporary or passive immunity conferred by a single inoculation with well-prepared serum is sufficient for the prompt protection of in-contacts and the avoidance of extension from infected foci. The Laboratories at Nairobi, Muktesar, and Constantinople all did yeoman service in the supply of quantities of this serum, but it is evident from the losses incurred that much larger quantities could have been profitably employed. In times of urgency intelligent laymen can well be entrusted with work of this nature, thereby freeing the overworked veterinary officer for the far more important administrative work necessary to efficient control of this disease.

Horse-sickness caused considerable loss in the mounted units both of the South-West and East African campaigns, nor is evidence forthcoming in the history that the method of immunizing the horse against this disease has yet become usefully established. The use of smoke protection—smudges—the utility of which was first shown so clearly in Zululand in 1899, seems to have been the main system of protection adopted. The value of the arsenical dip in lessening the incidence of horse-sickness has been well demonstrated in the past, and in such cases the portable spraying apparatus mentioned above would have had its uses.

This same remark applies to the measures possible for the control of East Coast fever, which is stated to have been a most difficult disease to control in the East African campaign, owing—as with mange on the Western Front—to the absence of dipping facilities.

Previous Natal work had, however, shown that the tick, though attached to its host, is unable to infect before the expiration of 72 hours—an interval which affords ample time for its destruction by dipping or spraying—and that the process may be repeated at such short interval as to render infection theoretically impossible. The protection of ox transport while on trek seems, therefore to be attainable by the use of the travelling spray-pen, while *a fortiori*, in standing-camps and with slowly moving columns its proper use should ensure complete protection not only from East Coast fever, but in the avoidance or lessening of several other diseases.

Only the briefest enumeration is possible of such interesting maladies as latia, the poly-arthritis of camels, coccidiosis of sheep, or specific ophthalmia, etc. These and many other disease-conditions furnished ample opportunities for observation to our veterinary officers—ably reinforced in many cases by specialists in Hygiene, Entomology, etc., observations on horse-mastership, food-equivalents, camp sanitation, records of marching and working, food and water requirements under tropical conditions,

age in relation to endurance, poisonous plants, etc., these and scores of other such observations have enriched the sum of knowledge of our domestic animals in health and disease and their efficiency both in war and peace.

Never has the veterinary profession deserved so well of the British public, and never has its claim to consideration been so ably brought to prominence as by the authors of the Official History of the War.

The History is ably written, well illustrated, printed, and indexed. If one hopes at times for maps of locality and position to amplify the text one feels sure that responsibility for the omission cannot be laid to the charge of those who have collaborated so felicitously towards the production of this Official History of the War.

H. Watkins-Pitchford.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 14.] May 30, 1926. [No. 2.

## DISEASES DUE TO PROTOZOAN PARASITES.

WALRAVENS (P.). **Note concernant le** *Trypanosoma rodhaini* **Walravens.** [A Note on *T. rodhaini* Walravens.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan 1. Vol. 4. No. 1. pp. 31–32. With 1 text fig.

In this brief note the author gives measurements of 100 trypanosomes and a short description of the morphology of the parasite.

The nucleus is situated anterior to the middle point of the body, and occupies the whole width of it. The blepharoplast is always very close to the posterior end and is in close contact with the margin of the body. There is a moderately long free flagellum, and the parasite is always monomorphic.

In the fresh state the parasite executes slight wriggling movements which do not involve translation, resembling the movements shown by *T. congolense*. The organism is extremely pathogenic for the pig, but appears to be incapable of infecting the guineapig and rabbit.

[*Note by the Editor.*—In connection with the above publication, Mr. H. E. Hornby has sent to the Director of the Bureau a copy of the following letter which he addressed to the Editor of the *Annales de Parasitologie* :—

In the last number of your paper, Vol. 4, No. 1, you publish a brief description of *Trypanosoma rodhaini* Walravens. I wish to point out that in the *Veterinary Record*, 1923, Vol. 3, pp. 531–532, I described an outbreak of porcine trypanosomiasis in this country, of which the causal trypanosome appeared to be the same as that now claimed by Walravens as a new species. In my opinion the parasite is *T. uniforme* Bruce and others, 1911, and I cannot understand on what grounds Walravens is justified in calling it a new species. His description fits sufficiently well that of *T. uniforme*, and although the measurements given in the text are not quite those of this species, yet the specimens figured measure, according to the scale on the plate, between 14 microns and 20 microns, which are the ordinary limits of length of *T. uniforme*. Until this parasite is maintained in a laboratory, and its range of pathogenicity and its development in the tsetse (if any) ascertained, it is surely advisable to refrain from stating confidently that it is a new species.

H. E. HORNBY,

*Veterinary Pathologist*, Mpapwa, Tanganyika.]

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DUKE (H. Lyndhurst). **A Discussion on *Trypanosoma rhodesiense*.**—*Parasitology*. 1926. Jan. Vol. 18. No. 1. pp. 67–73.

This paper is a reply to a criticism by BRUMPT of Duke's publications regarding the identity of *T. rhodesiense*.

VAN SACEGHEM (R.). **Le traitement des trypanosomiases animales avec le 205 Bayer (Naganol).** [The Treatment of Animal Trypanosomiases by "Bayer 205."]—*Ann. Soc. Belge Med. Trop.* 1925. June. Vol. 5. No. 1. pp. 101–107.

The drug has been used in 20 per cent. solution in distilled water without sterilization. The solution was of a pale pink tinge, which subsequently became dark red. The animals used in the tests were infected with *T. vivax* or *T. congolense*.

Doses of 5 grammes per 100 kilos injected intravenously into cattle infected with *T. congolense* cleared the circulation of trypanosomes for a period not exceeding 27 days. In young animals the period was longer than in adults. The average period in the case of the latter was 9 days. Twelve animals were used in the test.

Three animals infected with *T. vivax* were similarly treated, and the period of absence of trypanosomes from the blood was only a week. Doses at the rate of 15 grammes per 100 kilos proved fatal. Doses of 2·5, 3 and 5 grammes per 100 kilos given after a preliminary clearance of the circulation had passed caused only very brief disappearance of the parasites from the blood stream.

In three experiments doses of 5 g. of "Bayer 205" per 100 kilos were injected into animals which were subsequently inoculated with blood containing *T. congolense*, the intervals ranging from a fortnight down to simultaneous injection of the drug and the blood. All the animals became infected.

One bovine which was given 15 g. of the drug died 12 hours later.

HORNBY (H. E.). **Tryparsamide and *Trypanosoma congolense* Infection of Bovines.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Nov.-Dec. Vol. 19. Nos. 5-6. pp. 317–320. With 1 text fig.

*T. congolense* is the cause of the majority of cases of nagana in bovines from Zululand to the Sudan. Tartar emetic stands alone at present as being of value for treatment of the disease, which, untreated, almost invariably terminates fatally. With tartar emetic, however, results are not sufficiently good to allow of any relaxation in efforts to find something superior to it. Hornby has had the opportunity of testing the value of tryparsamide on cattle infected with nagana, and has given it intravenously in concentrated solution in water.

100 cc. of 10 per cent. solution was found to be ineffective for clearing the circulation for more than 5 days. Similarly, 20 gms., dissolved in 80 cc. of water, failed to clear the circulation for more than a few days.

Forty-five grammes administered in four doses of 10 g. and one of 5 g. on successive days, failed to clear the circulation. This animal died, but no lesions attributable to the drug could be found.

Fifty grammes administered in 10 g. doses on successive days was not lethally toxic, nor did it clear the circulation. In fact, on the

fifth day after the treatment the animal's blood was swarming with trypanosomes.

Hornby concludes that tryparsamide "appears to make the blood extraordinarily favourable for the multiplication of the parasites."

VAN SACEGHEM (R.). **Note préliminaire sur l'action du tryparsamide dans les trypanosomiases animales.** [Preliminary Note on the Action of Tryparsamide in Animal Trypanosomiases.]—*Ann. Soc. Belge Med. Trop.* 1925. June. Vol. 5. No. 1. pp. 65–67.

The author tried the drug in 40 per cent. solution in distilled water for the treatment of two animals infected experimentally with *T. congolense*. The first received 40 grammes in the course of three intravenous injections given during a period of 7 days, and the second the same quantity in two doses of 20 grammes each with an interval of 5 days.

Trypanosomes did not disappear from the circulation, and both animals died, apparently as a result of poisoning by the drug.

CURSON (H. H.). **Die Behandlung von "Nagana" mit Brechweinstein in Zululand in den Jahren 1921–1923.** [The Treatment of Nagana in Zululand by means of Tartar Emetic, 1921–1923.]—Inaug. Dissert. Veterinary High School, Hannover, 1926. 94 pp. With 2 maps, 3 charts and 12 figs.

The disastrous epidemics of nagana in 1920 caused the establishment of veterinary and entomological research stations in Zululand. The author was placed in charge of the Veterinary Laboratory, and the thesis represents the results of his work during the years 1921–1923.

In the author's view the name nagana is not applicable only to infections caused by *T. brucei*, but to those caused by *T. congolense*. In equines and canines *T. brucei* produces an acute infection and blood examination is reliable for determining the possible action of drugs, but in *T. congolense* infections trypanosomes may be absent from the circulation for long periods. The only reliable guide as to the efficacy of the drug in such cases is whether or not the animal improves in condition.

The longer the duration of improvement brought about, the more efficacious the drug. The time of year is of importance in this connexion, for as pasture improves after spring rains infected animals may lose all clinical evidences of disease. Unless adequate attention is given to protect such animals from cold and wet, and from overwork and starvation, a large proportion are likely to relapse and die. Another difficulty in Zululand is that it is generally impossible to say whether an animal has relapsed or has been re-infected for the reasons that Glossina is so widely distributed and herding is so careless.

The author gives an extensive review of the literature dealing with the administration of tartar emetic in the treatment of trypanosomiasis, and points out that a large proportion of the work has been done with laboratory animals, the value of which is from the field point of view limited, very largely because laboratory animals are well kept and fed.

The drug, which was administered intravenously, was dissolved, at first, in normal saline, but subsequently in water. Yearling bovines received 1 gramme, adults 1·5 g., donkeys 1 g., the solution used being 5 per cent. In some cases the solution was used at 10 per cent. strength, without ill effects.

It is important to begin treatment as early as possible as this gives a better chance of recovery; it also lessens the risk of the animal acting as a reservoir for direct transmission. In giving the injections any introduction of the drug under the skin must be avoided as serious local lesions may develop if this occurs. As a routine method five injections on consecutive days are advised. Since an animal which is improving in condition may nevertheless have parasites in its blood, and thus acts as a reservoir, all infected and suspected animals should be treated once a week during the fly season (October to March).

It was realized that the demands made by the five injection method were heavy. To reduce this three doses were given progressing from 1 gramme to 1·5 and then 2, and this was found to be satisfactory.

Injections of tartar emetic may cause alarming symptoms, but in only 9 cases out of 705 did these appear during the author's work. He believes that the symptoms are due to the toxic action of the drug and not to the destruction of the trypanosomes by the drug with the liberation of toxin. Tolerance is rapidly established, however, as a double dose on the day following the first injection is borne with impunity.

In cases of nagana caused by *T. congolense* the effect of the drug was to clear the circulation of trypanosomes in periods ranging up to 1½ hours. The periods for which the circulation remained free ranged from 6 to 414 days, but as the animals were grazed on the confines of fly country it is impossible to say whether the reappearances were due to relapses or re-infections. From a tabular statement it appears that there is no direct relationship between the number of doses given and the interval of freedom from parasites in the blood, but field experience tended to show that recovery was hastened and relapses were less likely to occur when a succession of larger doses was given. It was thought that the trypanosomes became drug-fast more readily when small doses were given and also that large doses decreased the virulence of the strain. As in other diseases, the occurrence of relapses was associated with meteorological conditions.

The author draws special attention to the development of lesions of the eyes as an aid to diagnosis. These range from photophobia and lachrymation to opacities of the cornea and actual ulceration. Under treatment these lesions rapidly clear up. Ocular lesions are more serious in *T. brucei* infections than in *T. congolense* infections.

It is estimated that during 1920 approximately 33 per cent. of the cattle died of nagana, and that over 90 per cent. of those infected died. In the following year about 25 per cent. of the animal population died. During 1922, when the issue of tartar emetic to farmers was in full swing, it was calculated that the losses fell to about 5 per cent., and that only 20 per cent. of these infected died. It is admitted that these figures are approximate only.

DAHMEN (H.). **Zur Chemotherapie der Beschälseuche.** [The Medicinal Treatment of Dourine.]—*Berlin Tierärzt. Woch.* 1926. Feb. 5. Vol. 42. No. 6. pp. 85–89.

The author cannot recommend neosalvarsan for the treatment of dourine because in some cases it appears to exert no influence at all, and in others it does not prevent clinical and serological relapses occurring.

Relapse, wasting and abortion followed the use of silver-salvarsan.

More satisfactory results were obtained with neo-silver-salvarsan, but in view of the small number of cases (17) in which it was used, and in view also of the fact that some of the animals treated had previously been treated unsuccessfully with other drugs, a definite opinion of its value cannot be formed.

In 4 out of 10 cases treated with " Bayer 205 " clinical relapses were observed, and in two others relapses were detected by serological means.

Attention is drawn to the fact that in estimating the value of a method of treatment the possibility of natural recovery must not be lost sight of.

LECKIE (V. C.). **Some Notes on Surra in the Camel, its Prevention and Treatment.**— *Vet. Jl.* 1925. June. Vol. 81. No. 6. pp. 281–292; July. No. 7. pp. 346–352; Aug. No. 8. pp. 398–404; Oct. No. 9. pp. 494–499; Nov. No. 10. pp. 546–553.

The paper contains the author's observations and experiences during a period of two years.

The publication of the " notes " was prompted by the variations encountered by less experienced people in the results of treatment along the lines suggested by CROSS, namely, the repeated intravenous injection.

Leckie suggests the classification of surra under three heads : Acute, sub-acute, and chronic, and he tabulates the classifications in the following way :—

| *Acute.* | *Sub-acute.* | *Chronic.* |
|---|---|---|
| Lasting 3–6 months ... | Beginning 4–6 months after the first attack and lasting up to two years. | Beginning in some cases a year after the first attack and lasting about three years. |
| Trypanosomes appear in the blood three or four times a month. | Trypanosomes appear in the blood once or twice a month. | Trypanosomes appear in the blood once in six months or once a year. |
| Most dangerous stage... | Not fit for work ... | Fit for work except during paroxysms of fever. |

In addition to the usual symptoms associated with the acute and sub-acute type of the disease, the author notes that camels sometimes show great restlessness, acceleration of respiration, frothing at the mouth, and, if tied down, violent struggling. A free animal may gallop until it falls exhausted, and in such cases death generally takes place.

In the chronic stage the appearance of the camel varies very greatly with the manner in which it is looked after. Animals that are well fed and lightly worked may present no clinical evidence of infection at all. If not well looked after general loss of condition and enlargement of the superficial glands are observed. There is little or no direct evidence regarding the transmission of surra from camel to camel, but it is significant that if camels are kept away from areas infested by Tabanidae the incidence of the disease is materially reduced.

From experiments it would appear that an interruption of feed is necessary for the transmission of surra, that is to say, a fly feeding on

an infected animal must be disturbed and transfer itself to a healthy camel for the infection of the latter. After a full meal on an infected camel the fly digests the blood and is not infective when it bites again. The possibility, however, is not excluded that such a fly might become infective again after an interval.

Leckie draws special attention to the possibility of transmitting the disease to healthy camels through carelessness in making routine blood examinations of a number of animals.

The author describes in detail the whole of the apparatus necessary for the preparation and use of a solution of tartar emetic by intravenous injection. The drug is used at 1 per cent. strength in distilled water injected at body temperature. Before and after the introduction of the tartar emetic solution into the vein a quantity of 1 per cent. salt solution is introduced. From a tabular statement given it appears that 50 cc. of salt solution are used for this purpose, divided into two lots of 25 cc. each.

The needle is sterilized between injections by placing it in methyl alcohol.

In the early stages of treatment the camel has two adverse influences to contend with: (1) Surra toxaemia; and (2) poisoning by the drug. As condition improves tolerance of the drug becomes greater, and in this lies the necessity of very gradual increase in the dosage. Careful watch must be kept on camels under treatment as a certain proportion of animals, and sometimes a large proportion, will become "sick" during treatment. To push treatment when this occurs almost certainly means death. Animals showing symptoms of poisoning have administered to them magnesium sulphate in doses of 2 to 4 lb. in several gallons of water. This may have to be repeated. Temperatures must be taken daily as a rise to 100° F. from the average mean of 98° F. is usually the first symptom of poisoning. The train of symptoms following an overdose is cessation of rumination, loss of appetite, orange-coloured or blood-tinged urine, yellow discolouration of the mucous membranes, lachrymation, dermatitis, constipation, paraplegia and muscle tremors, and disorganization of the eyes. In connexion with the passage of coloured urine, it is noted that camels which have browsed on "pipal," one of the Indian fig trees, pass urine the colour of red ink.

A standard treatment which yielded 95 per cent. of cures was as follows:—

| | |
|---|---|
| 1st day ... ... ... ... | 20 cc. ½ per cent. solution. |
| 2nd and 3rd days... ... ... | 20 cc. 1 per cent. solution. |
| 5th, 7th and 9th days ... ... | 50 cc. 1 per cent. solution. |
| 11th, 13th and 15th days ... | 100 cc. 1 per cent. solution. |

On every other day from the 17th to the 35th 150 cc. of 1 per cent. solution.

| | |
|---|---|
| 37th, 39th and 41st days ... | 175 cc. of 1 per cent. solution. |
| 43rd, 45th, 47th and 49th days... | 200 cc. of 1 per cent. solution. |

It may be necessary to discontinue treatment for a time if poisoning occurs. The total amount of tartar emetic given is about 30 grammes. In some cases as much as 40 grammes in all have been given. It is said that if re-infection occurs after cure, larger doses may be given as tolerance has been established.

Treatment should not be begun while trypanosomes are demonstrable in the blood, for "fainting" is likely to occur. The post-mortem findings in an animal dying under treatment are: Yellow staining

of the tissues. Fatty degeneration of the heart. Spleen slightly enlarged and flaccid. The liver is enlarged and pale in colour with a tendency to a greenish tint. On section the cut surface is bright orange in colour. The parenchyma is readily broken down with the fingers. The kidneys show fatty degeneration. Care must be exercised in the general management of camels under treatment, special attention being paid to the question of suitable food. Digestive disturbances are likely to occur, and a ration of salt helps to overcome this. Some camels apparently cured again fall sick with surra after their return to their owners. These may be relapses, but the possibility is not excluded that they are actual re-infections. Experiments have been made with sodium antimony tartrate in place of the potassium salt. It is said to offer the following advantages: It is less depressing and may be given in larger doses; it clears the circulation of trypanosomes very rapidly; general improvements in health and condition are noted during treatment. While camels appear to be more tolerant of the sodium salt than of the potassium salt, the same care must be exercised in carrying out the treatment.

The treatment has not been under test sufficiently long to warrant conclusions, but it promises well. It has been found that infected camels not showing trypanosomes in their blood may with safety be given an initial dose of 200 cc. of a 1 per cent. solution of the sodium salt.

The effect of the drugs on the trypanosomes was studied in moist and stained preparation at definite intervals (10 minutes) after injection of the drugs. The first indication of action is that the cytoplasm stains faintly. This is followed by a disappearance of the centrosome and flagellum and finally disintegration of the nucleus.

The author describes two forms of trypanosome in camels, a long slender form with a pointed posterior extremity and a shorter broad form with a blunt posterior end, and suggests that the slender forms result from binary division, and then become changed into the broad forms.

DESCHIENS (R.). *Giardia cati* **R. Deschiens, 1925, du chat domestique** (*Felis domestica*). [*Giardia cati* of the Domestic Cat.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 33–48.

As the result of the comparison of measurements the author comes to the conclusion that *Giardia cati* and *Giardia felis*, Hegner, are identical species. He distinguishes three types based upon certain measurements.

Experimentally it was found impossible to infect two guineapigs, two mice, and a puppy by feeding them with cysts. It is therefore concluded that the organism is specific for the cat.

TANABE (M.). **The Cultivation of Trichomonads from Man, Rat and Owl.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 101–104.

The culture medium used has the following composition:—

| | |
|---|---|
| Sodium chloride ... ... ... | 0·7 g. |
| Sodium citrate ... ... ... | 1·0 g. |
| Löffler's blood serum (dehydrated) | 0·5 g. |
| White of egg ... ... ... ... | 2 cc. |
| Distilled water ... ... ... | 100 cc. |

The substances are added to the water in the order given, with vigorous shaking. The reaction is adjusted to pH 8 to 8·2. Cultures were incubated at 35° C.

MAGNEVILLE (A.). **Un cas de theilériose bovine congénitale.** [A Case of Congenital Bovine Theileriasis.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 721–722.

A calf, a week old, had appeared perfectly well at 11 a.m., but at 2 p.m. it was seen to be in a fit, with muscular spasms, nystagmus and coma. The mucous membranes were very pale. Slight stimuli precipitated further muscular contractions. There was great acceleration of the pulse. Death occurred in a fit of great violence about an hour or so later.

The post-mortem examination was made at once. The liver was yellow and showed a number of infarcts. The spleen was enlarged and softened. The mucous membrane of the abomasum showed lenticular ecchymoses.

Material was sent to the Pasteur Institute, Algiers, and a diagnosis of theileriasis was made. In the pulp of the solid organs schizonts and gamonts were found.

According to the owner the dam had shown no signs of infection, but in view of the facts revealed by the post-mortem and microscopic examination it must be admitted that the infection had been present for some days, and must therefore have been contracted in utero.

Theileriasis was known to be in existence on the farm.

YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **Contribution a l'étude des piroplasmoses bovines en Russie.** [Bovine Piroplasmosis in Russia.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Jan. 30. Vol. 97. No. 2-3. pp. 192–210. With 1 plate & 5 text figs.

The authors find that two types of piroplasmoses occur in bovines in Russia. In the south the parasite closely resembles *B. bigeminum*, and in the north-west, *B. bovis*.

PÉRARD (Ch.). **Recherches sur les coccidies et les coccidioses du lapin.** [Coccidiosis in the Rabbit.]—*Ann. Inst. Pasteur.* 1925. Dec. Vol. 39. No. 12. pp. 952–961. With 3 text figs.

The investigations recorded here had for their object the study of the schizogonous cycle of development. The author subdivides the parasite occurring in the intestine into two species, *Eimeria perforans* and *E. magna*, the latter being so named on account of its size.

In order to obtain specimens showing schizogony rabbits should be killed on the 7th to 12th day after feeding in the case of *E. stiedae*, and on the 3rd to the 5th day in the case of the intestinal species.

At these stages macroscopic lesions are not very marked.

In scrapings from the invaded bile ducts schizonts and merozoites are plentiful.

The number of merozoites in a schizont may range from 2 to 30, but in the great majority of parasites the figure lies between 6 and 10. At one pole of the organism there is a residual body, which has little affinity for nuclear strains. The individual merozoites are from 8 to 10$\mu$ long by 1·5 to 2$\mu$ in diameter. The nucleus shows a large vacuole containing a caryosome and the cytoplasm is free from granules

Exceptionally, one may find a parasite developing in a liver cell instead of in the epithelium of the bile ducts. In lesions of the intestine caused by *E. perforans*, it is a striking feature of the picture presented by any one part of a lesion that all the parasites present are in approximately the same stage of development.

The merozoites developed from schizonts in the case of this parasite are longer and more slender than those of *E. stiedae*. They measure 10–12$\mu$ by 0·5 to 0·75$\mu$. As a rule, about 40 merozoites are formed from a single schizont, but the number may be as high as 70. Their bodies contain a row of granules which stain with nuclear dyes. There is also a residual body at one pole which has similar staining reactions.

In the case of *E. magna* the schizonts range in size from 10–25$\mu$. The merozoites have one rounded end and one pointed, and range from 4–10$\mu$ in length by 1 to 2·5$\mu$ in thickness. They may number from 2 to 50 in a single schizont. The measurements are all taken from specimens in sections of fixed tissues. In the case of this parasite the author states that schizonts may be found developing within cells of the connective tissue of the villi beneath the epithelial layer, and this not rarely.

The author holds that the developmental phases of *E. magna* make it certain that it is a species distinct from *E. perforans* and *E. stiedae*.

HENRY (A.) & LEBLOIS (Ch.). **Essai de classification des coccidies de la famille des** *Diplosporidae* **Léger 1911.** [The Classification of the Coccidia belonging to the Family *Diplosporidae* Léger 1911.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 22–28. With 6 text figs.

The authors suggest that the parasites hitherto grouped as Isospora can in reality be subdivided into four groups depending upon : (1) The form of the sporocysts; and (2) the disposition of the sporozoites within these. One group—*Isospora*—has its four sporozoites in each sporocyst lying in the same direction. The second—*Diplospora*—has the sporozoites in pairs, the individuals of each pair lying head to tail. These two groups have pyriform sporocysts. The other two groups have oval or fusiform sporocysts. These are *Lucetina*, in which the sporozoites lie in the same direction, and *Hyaloklossia*, in which they are in pairs, but crossed.

The types of the classification are given as follows :—

| | | |
|---|---|---|
| Pyriform sporocysts | ... | *Isospora rara.*<br>*Diplospora avium.* |
| Oval Sporocysts | ... | *Lucetina rivoltai.*<br>*Hyaloklossia lieberkühni.* |

DOBELL (Clifford). **On the Species of** *Isospora* **parasitic in Man.**—*Parasitology*. 1926. Jan. Vol. 18. No. 1. pp. 74–85.

This paper is a criticism of WENYON'S paper on " Coccidiosis of Cats and Dogs and the Status of the Isospora of Man " (this *Bulletin*, Vol. 11, p. 120).

ADIE (Helen). **Nouvelles recherches sur la sporogonie de** *Haemoproteus columbae*. [Fresh Researches on the Sporogony of *H. columbae*.] —*Arch. Inst. Pasteur Algérie*. 1925. Vol. 3. No. 1. pp. 9–15. With 2 plates & 5 text figs.

The author repeated the work carried out in India and published in 1915 in part for the purpose of drawing attention to the fact that in

some recent editions of text books the original diagrammatic representation of the life cycle of the parasite published by BEAUREPAIRE-ARAGAO in 1907 is reproduced without alteration. She has, in addition, been able to demonstrate the sporozoite of the parasite, the stage which is responsible for the infection of birds, in the pigeon fly. In fact, the cycle of development runs parallel with that of the malarial parasite of man.

In studying the phases of development in the pigeon fly the author has infected these by feeding them on birds suffering from a primary attack, and has then continued the feeding on very young birds which could not possibly have been infected. This was necessary for the reason that if infected blood is constantly used for the nourishment of the flies all stages of development may appear at one and the same time in the fly.

It requires about 9 days for an oocyst to become mature in the stomach wall of the fly, and at this stage the parasite measures about 36$\mu$ in diameter.

At the 10th to 12th day the liberated sporozoites invade the salivary apparatus. These are sickle-shaped bodies measuring 7–10$\mu$ in length and having a nucleus which is a little nearer the anterior than the posterior end.

MARTIN (M. A.). **Sur quelques "Enterites à Protozoairés" du chien et du chat.** [Protozoal Enteritis of the Dog and Cat.]—*Rev. Vét.* 1926. Jan. Vol. 78. No. 1. pp. 5–18.

Little is known regarding the pathogenic rôle played by the Giardia parasites of the cat and dog. It is possible, but by no means certain, that the species parasitizing these animals are distinct both from each other and from parasites of the same genus in other animals and in man. Statistics regarding the frequence of occurrence are not available. Existing knowledge would appear to indicate that in animals the parasites are not responsible for the severe enteritis caused in man, and carriers in apparent perfect health are not uncommonly met with.

Amoebic dysentery occurs both in dogs and cats, but more rarely in the latter species, and in these animals the disease closely resembles the corresponding condition in man. It appears to be not improbable that the amoebae of man and the carnivora are identical, but medical opinion at the present time is that human beings contract the infection from others of their race and not from the lower animals. Spirochaetal infections occur in dogs and cats, and the view has received some support that parasites of this genus are responsible for gastro-enteritis (Stuttgart disease) in dogs.

KLIGLER (I. J.). **The Cultural and Serological Relationship of** *Leishmania.*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Nov. & Dec. Vol. 19. Nos. 5-6. pp. 330–335.

Technique.—Cultures were maintained on 0·2 per cent. nutrient agar containing 0·1 per cent. of dextrose and 10 per cent. of fresh rabbit

serum. The stock semi-solid agar is prepared by adding one part of standard dextrose agar to nine parts of normal saline. The rabbit serum is added to the melted agar just before use.

In this medium the flagellates grow in the upper part of the medium, and after about a week there is a greyish mass at the top 3–5 mm. thick, which swarms with them. For fermentation reactions the medium described is used with the required carbohydrate in place of the dextrose. The presence or absence of fermentation was tested by taking the pH of the medium. Neutral red proved a satisfactory indicator because the acidity rarely rises above pH 6·0.

In testing the pH 1 cc. of the upper parts of a culture was mixed with 4 cc. of neutral distilled water, three drops of indicator were added, and the colour compared with standards in a comparator. Cultures showing little or no visible growth should not be used. Immune sera were prepared by inoculating rabbits at 3- to 5-day intervals with pooled cultures of the same strain in doses of 0·5 to 2·0 cc. The rabbits were bled 7 and 10 days after the last injection. In all cases sera which were potent in dilutions of 1 in 40 to 1 in 100 were obtained. The serum drawn at 10 days was more potent than that drawn at 7 days.

In devising a technique for agglutination tests the principal difficulties to be overcome were the interference of the agar and the tendency to spontaneous agglutination and sedimentation.

The former of these was avoided by growing the cultures on 1·5 per cent. agar slants to which 0·1 per cent. dextrose and 10 to 15 per cent. rabbit serum were added. A heavy suspension of young flagellates is inoculated into the water of condensation, and the tube slanted so that the entire surface is covered with the liquid. In 7 to 10 days a complete film covers the surface in good cultures.

The growth is washed off in saline and shaken up with beads. It is then allowed to stand to let the coarse particles settle and the supernatant suspension is used. If the suspension is made up in buffered solution to pH 7·0 it stands better than in saline.

Serum concentrations of 1 in 5, 1 in 10, etc., are used, and the tubes are incubated at 25° C. In higher concentrations sharper results are given because of the more prompt agglutination. This is readily distinguishable from spontaneous sedimentation.

The author also states that the following technique gives satisfactory results. Agar containing only 0·1 per cent. is used. The growth obtained after a week is suspended in salt solution, and this is added in equal amount to dilutions of the serum to be tested.

Six strains have been used in tests, as follows: One from an Aleppo boil, one from a Bagdad boil, one from a case in Palestine, and three old strains obtained from NOGUCHI—*L. tropica*, *L. infantum*, and *L. braziliensis*. *L. braziliensis* and *L. infantum* sera invariably agglutinated specific cultures only. Sera prepared from *L. tropica* failed to agglutinate *L. infantum* and *L. braziliensis*.

It had been observed in earlier work that specific sera in higher concentrations produced a lytic effect. This effect was found to be specific. It could be demonstrated by adding graded amounts of immune sera to the tubes of culture media. A concentration of immune serum above a certain point inhibited growth.

Attempts to work out the fermentation reactions of the organisms have not yielded satisfactory results up to the present, because only a small number of strains have been submitted to examination.

FUNAIOLI (Giulio). **La leismaniosi canina in Tripolitania.** [Canine Leishmaniasis in Tripoli.]—*Arch. Ital. Sci. Med. Colon.* 1925. Jan.–Feb.–Mar. Vol. 6. Nos. 1–2–3. pp. 12–14.

The author has examined smears from the liver and spleen of 177 dogs during the period August, 1922, to August, 1923, and has found two animals infected. He was not able to make preparations from the bone marrow.

DOGIEL (V.). **Une nouvelle espèce du genre** *Blepharocorys, B. bovis* **n. sp. habitant l'estomac du boeuf.** [A New Species of *Blepharocorys, B. bovis*, inhabiting the Stomach of the Ox.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 61–64. With 2 text figs.

The author describes the organism found in the rumen of cattle from various parts of Russia, and states that 25 per cent. of the animals harboured it.

From measurements it appears that the infusorian is smaller than any previously described.

The paper includes a key to the species already known.

DIOS (R. L.) & ZUCCARINI (J. A.). **Présence de Spirochètes dans le sang des chevaux en Argentine; première observation.** [Spirochaetes in the Blood of Horses in the Argentine.]—*C.R. Soc. Biol.* 1925. Dec. 11. Vol. 93. No. 36. p. 1457.

The authors have detected spirochaetes in the blood of horses which had been injected protectively against Mal de Caderas with "Bayer 205" and sent into an infected area. They failed to transmit the parasite to sheep and goats by inoculation. Not all the animals which had received the protective treatment showed the parasite.

STYLAPANOPOULO (M.). **La spirochétose des poules en Grèce.** [Spirochaetosis of the Fowl in Greece.]—*Bull. Soc. Path. Exot.* 1925. Nov. Vol. 18. No. 9. pp. 701–702.

The author places on record the occurrence of spirochaetosis of poultry in the neighbourhood of Athens.

BOSSELUT (R.). **Sur un spirochète sanguicole du chien domestique.** [A Spirochaete in the Blood of a Dog.]—*Bull. Soc. Path. Exot.* 1925. Nov. Vol. 18. No. 9. pp. 702–704. With 1 text fig.

The author records the occurrence in Algeria of spirochaete infection in the blood of a dog. The diagnosis was made at the Pasteur Institute.

The parasites ranged from 8 to 22 $\mu$ long, and showed 3 to 6 irregular coils. There was marked anisocytosis and polychromatophilia, but no piroplasms were found.

An attempt was made to transmit the infection by inoculation, but a dog suitable for inoculation was only found six days after the parasites had been seen in the blood. The inoculation failed.

Systematic examinations of the blood of dogs in the same district since has not revealed any case of infection.

The author names the parasite *Spirochaeta canina*, n. sp.

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PHISALIX (M.). *Cyclospora viperae*, **Coccidie parasite de l'intestin de la vipère aspic, infecte également nos autres serpents indigènes, et spécialement la Couleuvre d'Esculape et la Couleuvre de Montpellier.** [*Cyclospora viperae* infects also *Coluber esculapii* and *Coelopeltis monspassulana.*]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 707–709.

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## DISEASES DUE TO METAZOAN PARASITES.

CHANDLER (Asa C.). **The Helminthic Parasites of Cats in Calcutta and the Relation of Cats to Human Helminthic Infections.**—*Indian Jl. Med. Res.* 1925. Oct. Vol. 13. No. 2. pp. 213–227. With 2 plates.

The following parasites have been found, and their percentage incidence in 250 cats is given :—

| | | |
|---|---|---|
| Trematodes— | | |
| *Opisthorchis felineus* ... ... ... | 61·0 | per cent. |
| *Echinochasmus perfoliatus* ... ... ... | 2·0 | ,, |
| Cestodes— | | |
| *Diphyllobothrium decipiens* ... ... | 0·5 | ,, |
| *Taenia taeniaeformis* ... ... ... | 42·0 | ,, |
| *Dipylidium caninum* ... ... ... | 43·0 | ,, |
| Nematodes— | | |
| *Strongyloides stercoralis felis* ... ... | 20·0 | ,, |
| *Belascaris mystax* ... ... ... ... | 63·0 | ,, |
| *Ancylostoma braziliense* ... ... ... | 70·0 | ,, |
| *Gnathostoma spinigerum*, from at different seasons. ... ... | 0 to 31·4 | ,, |
| *Physaloptera praeputialis* ... ... ... | 3·0 | ,, |
| *Spirocerca felineus* ... ... ... | 2·0 | ,, |
| Acanthocephala— | | |
| *Centrorhynchus erraticus* ... ... ... | 0·5 (one case) | ,, |

Of these, *Spirocerca felineus* and *Centrorhynchus erraticus* are new species.

SMIT (H. J.). *Filaria spirovoluta* **Smit-Ihle. een nieuwe (?) filaria van het paard.** [*Filaria spirovoluta* Smit-Ihle. a New (?) Filaria from a Horse.]—*Nederl.-Indië Blad. v. Diergeneesk.* 1925. Dec. Vol. 37. No. 6. pp. 529–534.

The author describes a filaria found in the fibrous tissue beneath the deep pectoral muscle of a native pony. Three females only were found. They ranged from 95–132 mm. in length and were 272 $\mu$ thick. They appeared to be oviparous as well as ovoviviparous. The blood contained larvae measuring 160–190 $\mu$ by 3·3 $\mu$.

It is suggested that the parasite is transmitted by blood-sucking flies.

ROSS (I. Clunies). **A Note on the Occurrence of *Dirofilaria immitis* (Leidy) in the Dog in New South Wales.**—*Jl. Austral. Vet. Assoc.* 1925. Dec. Vol. 1. No. 4. pp. 94–95.

Ross records the discovery by DODD of this parasite in the heart of a dog in Sydney. It has previously been encountered in the northern part of the State. The dog was two years old and had spent the last 18 months of its life in Sydney. Previously it had not been further north than Newcastle.

SANDGROUND (J. H.). **Speciation and Specificity in the Nematode Genus Strongyloides.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 59–80. With 2 plates.

The erection of new species on the basis of morphological studies is weak. The range of variation is so great that few species can be definitely differentiated by these characters.

Specificity for hosts is regarded as the best means of determining specificity, but certain considerations must be observed in the interpretation of the results of infection experiments. From a morphological standpoint *S. ovocinctus* Ransom 1911 is questioned. *S. stercoralis* is held to be identical with the human parasite.

The parasite of the rat is differentiated from *S. papillosus* on morphological and biological grounds, and a new species *S. ratti* made.

A new species from *Hydrochoerus hydrochoera* is described, *Strongyloides chapini.*

NICHOLLS (L.) & CRAWFORD (M.). **Verminous Ophthalmia of the Horse in Ceylon.**—*Ceylon Jl. Sci.* 1925. Nov. Vol. 1. No. 3. pp. 147–149. With 3 plates.

The authors give a brief account of the clinical symptoms caused by the presence of worm parasites in the anterior chamber of the eye in horses, but point out that occasionally cases are encountered in which the presence of the worm is not responsible for any symptoms. Descriptions are given of three nematodes extracted surgically from the eyes of horses.

1. A larval nematode (female) 3·4 centimetres in length by ·38 mm. at its greatest thickness. The oesophagus shows two distinct portions. The anterior measures ·6 mm. and the posterior 5·8 mm. The mouth is unarmed. The vulva opens ·6 mm. from the anterior end. There are two caudal papillae measuring ·015 mm. in length.

2. A male larva measuring 3·53 centimetres in length and ·34 mm. at its greatest thickness. The mouth is unarmed. The oesophagus is divided into two parts, the anterior of which measures ·6 mm. and the posterior ·9 mm. The excretory pore opens 0·3 mm. from the anterior end.

The caudal extremity is crescentic. There are 6 small papillae on the short margin of the crescent. The cloaca opens at the level of the 4th papilla.

3. Adult female nematode measuring 1·6 centimetre by ·37 mm. The cuticle is striated transversely throughout the length.

The mouth is large and armed with two chitinous plates. The anus is ·07 mm. from the posterior extremity. The ovaries are packed with eggs measuring $32 \times 28 \mu$. The two uteri unite and open through the vulva ·98 mm. from the anterior end.

WALTON (C. L.) & JONES (W. Norman). **The Control of Liver Fluke in Sheep.**—*Jl. Ministry Agricult.* 1925. Nov. Vol. 32. No. 8. pp. 686–693.

This paper contains a summary of the experiments carried out in North Wales prior to 1925 and an account of the work carried on during that year.

A severe outbreak occurred in 1920–21, and investigation showed that *Limnaea truncatula*, the host snail, was present in enormous numbers. Field experiments in June, October and November, 1921, showed that a 1 per cent. solution of sulphate of copper was valuable for killing off the snails, and that a dust of 1 part sulphate of copper and 2 parts china clay was also effective.

The hot dry summer of 1921 rendered work difficult, but the wet sunless summer of 1922 resulted in an increase in the snails. In December, 1922, and March, 1923, experiments were carried out for the purpose of testing sulphate of ammonia against sulphate of copper. The former failed completely while the latter yielded good results.

The wet years 1923–24 caused a recurrence of liver rot in many places, and during the winter 1924–25 further experiments were carried out with a view to simplifying and cheapening the process of snail destruction.

It is noted that the three species of Limnaea are known to occur in North Wales. *L. truncatula* is the most abundant. *L. peregra*, which is seldom found save in mud in ditches, has been definitely incriminated as a host. *L. palustris*, which has a localized distribution, has not been incriminated.

In the field experiments carried out in 1925 it was found that copper sulphate could be used successfully whether sprayed, dusted, or broadcast. Solutions of 2, 1 and ½ per cent. were all equally successful when used as a spray. If land is actually carrying standing water the stronger solutions should be used. On land that has become partially dried snails may remain alive unless there is thorough wetting of the surface. It will be seen that the amount of liquid required per acre must vary. On a plot carrying long herbage where the land was damp about 140 gallons per acre were required.

Dusting with the copper sulphate kaolin mixture is useful for ditches, margins of ponds, etc., but the action is slower, as it is dependent upon rain, and the risk to stock is greater. Animals should be kept off treated areas till the herbage has been washed clean by rain. The amount required is roughly 1¼ cwt. per acre.

By broadcast method 1 part of sulphate of copper to 4, and 1 to 8 of fine dry sand proved suitable for treating large swampy areas. Sulphate of iron and salt were not successful, and sulphate of ammonia was successful only at a prohibitive cost.

Cost. Spraying, excluding the cost of labour, works out at about 7s. 6d. per acre.

Dusting costs about 12s. 6d. per acre (excluding labour).

Broadcasting, 10s. per acre, with the cost of sand and labour in addition.

HENRY (A.), LEBLOIS (Ch.) & DERVAUX (P.). **Echinococcose péritonéale chez un chat.** [Peritoneal Echinococcosis in a Cat.]—*C. R. Soc. Biol.* 1925. Dec. Vol. 93. No. 37. pp. 1470–1471.

The cat was thought to be suffering from Ascites as it abdomen was enormously enlarged and actually touched the ground.

On post-mortem examination an enormous number of echinococcus cysts escaped. The whole of the peritoneum was covered with cysts.

There were no parasites in the substance of the liver, spleen or lungs.

The right kidney could not be found and the suggestion is put forward that the immense invasion of the peritoneum was secondary to a primary infestation of this organ.

SKRIABINE (K. I.) & SCHULZ (R. Ed.). **Affinités entre le *Dithyridium* des souris et le *Mesocestoides lineatus* (Goeze, 1782) des carnivores.** [The Relationship between *Dithyridium* of the Mouse and *Mesocestoides lineatus* (Goeze), of Carnivora.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 68–73. With 3 text figs.

The authors state that Dithyridium of the abdominal cavity of rats and mice represents the larval form of *Mesocestoides lineatus*, and that these animals must therefore be considered the intermediate hosts of the mature parasite of the small intestine of cats, dogs, and other carnivora.

The hypothesis put forward by ALESSANDRINI that the larval form of this parasite occurs in the serous cavities of birds must be abandoned.

CURASSON (G.). *Ctenocephalus canis* **parasite du mouton.** [*Ctenocephalus canis* occurring as a Parasite of the Sheep.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 755–756.

It is generally held that sheep do not harbour fleas, possibly on account of suffocation by the grease in the fleece. Whatever the reason, it is a fact that fleas do not occur frequently as parasites of the sheep.

For this reason the author places on record the occurrence of infestation of sheep, an infestation which is sometimes serious, in the Macina area.

The parasite is *Ctenocephalus canis*, and it is found during the cold weather. Young animals are mostly attacked, and the lower parts of the limbs which are devoid of wool may be literally covered with fleas. Among indigenous lambs, which have a more open fleece, the whole of the body may be invaded. In cross bred indigenous-merino animals invasion of the body is less pronounced.

Severe losses may result from loss of blood and constant irritation.

GIRARD (G.) & LEGENDRE (F.). **Premières observations sur les puces de rat des régions pesteuses de Madagascar.** [Preliminary Observations on Rat Fleas from Plague Areas in Madagascar.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 730–731.

All the rats examined belonged to the species *M. rattus* var. *alexandrinus*.

The following fleas were found out of 1,675 examined :—

| | |
|---|---|
| *Xenopsylla cheopis* ... ... ... | 60 per cent. |
| *Ctenopsylla musculi* ... ... ... | 25 per cent. |
| *Sarcopsylla* (*Echidnophaga*) *gallinacea* | 15 per cent. |

SÉGUY (E.) **Etude sur quelques Muscides exotiques à larves parasites.** [Exotic Muscidae the Larvae of which are Parasitic.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 732–735.

The author gives a list of 18 genera of flies the larvae of which are parasitic or sarcophagous.

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DE BLIECK (L.) & BAUDET (E. A. R. F.). **Contribution à l'étude du développement des Strongylidés (Sclérostomes) du gros intestin chez le cheval.** [The Development of the Strongyles of the Large Intestine of the Horse.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 87–96.

BOULENGER (C. L.). **Report on a Collection of Parasitic Nematodes, mainly from Egypt. Part IV. Trichostrongylidae and Strongylidae.**—*Parasit.* 1926. Jan. Vol. 18. No. 1. pp. 86–100. With 28 text figs.

FAUST (E. C.). **Further Observations on South African Larval Trematodes.**—*Parasit.* 1926. Jan. Vol. 18. No. 1. pp. 101–126. With 2 plates & 1 text fig.

HOEPPLI (R. J. C.). *Mesocestoides corti,* **A New Species of Cestode from the Mouse.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 91–96. With 1 plate.

MACCALLUM (G. A.). **Revue du Genre** *Spirorchis* **MacCallum.** [A Review of the Genus *Spirorchis.*]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 97–103. With 5 text figs.

NEVEU-LEMAIRE (M.). **Le Femelle de** *Buissonia longibursa* **Neveu-Lemaire Parasite du rhinocéros africain (Rhinoceros bicornis).** [The Female of *Buissonia longibursa* Neveu-Lemaire of the African Rhinoceros.]—*Ibid.* pp. 85–86. With 1 plate.

ORTLEPP (R. J.). **On Two Nematode Parasites from the Gizzard of Pea-Fowls.**—*Jl. Helminth.* 1925. Dec. Vol. 3. No. 5. pp. 177–184. With 7 text figs.

PRICE (E. W.). **The Occurrence and Distribution of** *Cysticercus cellulosae* **in Texas Swine.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 81–82. With 1 map.

RANSOM (B. H.). **Hookworms of the Genus Uncinaria of the Dog, Fox and Badger.**—*Proc. U.S. Nat. Museum. 1924.* Vol. 65. Article 20. pp. 1–5. With 1 plate.

SENEVET (G.). **Description des nymphes de** *Rhipicephalus bursa* **et de** *Hyalomma lusitanicum* **avec un tableau pour la détermination des nymphes des Ixodidés algériens.** [Description of the Nymphs of *Rhipicephalus bursa* and *Hyalomma lusitanicum,* with a Key to the Nymphs of the Ixodidae of Algeria.]—*Arch. Inst. Past. Algérie.* 1925. Vol. 3. No. 1. pp. 59–63.

STILES (C. W.) & ORLEMAN (M.). **La nomenclature des genres de cestodes** *Raillietina, Ransomia,* **et** *Johnstonia.* [The Nomenclature of the Genera of Cestodes *Raillietina, Ransomia,* and *Johnstonia.*]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 65–67.

STEKHOVEN (J. H. S.). **Studies on** *Hippobosca maculata* **Leach and** *H. equina* **L. in the Dutch East Indian Archipelago.**—*Parasit.* 1926. Jan. Vol. 18. No. 1. pp. 35–50. With 1 plate, 1 map, & 5 text figs.

WARBURTON (C.). **On Three New Species of Ticks (Arachnida, Ixodoidea),** *Ornithodorus gurneyi, Ixodes arvicolae* **and** *Haemaphysalis mjöbergi.*—*Ibid.* pp. 55–58. With 3 text figs.

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## BACTERIAL DISEASES.

VALLÉE (H.) & RINJARD (P.). **Études sur l'entérite paratuberculeuse des bovidés.** [Johne's Disease.]—*Rev. Gen. Méd. Vét.* 1926. Jan. 15. Vol. 35. No. 409. pp. 1–9.

This is a preliminary note regarding a possible method of protecting cattle against Johne's disease. The theory that forms the basis of

the method is that animals suffering from chronic infections cannot be super-infected.

The available evidence goes to show that subcutaneous inoculation of animals with cultures of the bacillus of Johne's disease fails to cause infection.

With the object of producing a persistent local infection with the bacillus the authors have adopted the plan devised by CALMETTE in connexion with the tubercle bacillus of injecting certain weighed quantities of culture with sterile paraffin, and the result of such injection is to produce after a lapse of some 48 hours a hot painful swelling about 5–7 cms. in diameter. There is no febrile reaction. In the course of a few days the acute inflammatory symptoms subside and there is left a hard painless swelling about half this size. These bosselated fibrous lesions are very persistent, and they have been observed to persist for as much as two years without change. The duration of their persistence is not yet known. In no case has there been observed any softening, or breaking down of the tissues with expulsion of the contents of the nodules. Nor has there been found in any such inoculated animal when submitted to post-mortem examination any evidence of extension of the infection.

The local lesions when examined post-mortem are found to comprise a central cavity containing an oily substance, which is the original excipient, around which are grouped clusters of small nodules about the size of peas. These are embedded in fibrous tissue and have all undergone caseation. The whole lesion is surrounded by fibrous tissue which is adherent to the skin and the underlying muscles and which isolates it from the rest of the tissues.

Guineapigs and cattle are quite unaffected by inoculation with the caseous material.

Observation on animals at the laboratory indicated that the inoculation was quite harmless.

As it is impossible to produce Johne's disease as it occurs naturally by experimental means, the value of the method has to be tested in the field.

Up to the present the authors have had 277 apparently healthy animals placed at their disposal for field tests. About one-third of these have been kept uninoculated as controls.

Full details of these tests are promised in a later communication. The authors content themselves for the time being by stating that they have grounds for considering the method of protective inoculation promising. On one farm where three cases have occurred among the controls none of the inoculated animals have developed the disease. On another farm where controls have become infected one animal among those inoculated has been slaughtered on account of infection. This animal, however, showed no inoculation nodule at the time of death. The authors state that this may have burst or have been absorbed, or it is possible that owing to an error the animal actually escaped the inoculation.

With regard to the suppuration of inoculation lesions, the authors note that there is a tendency for this to occur when animals already infected are inoculated. Inoculated animals react to a test material prepared from Johne's bacillus (using *B. phlei* and not tubercle bacilli for the preparation of the media) but not to tuberculin.

MORIN (H.) & VALTIS (J.). **Sur la filtration du Bacille de Johne à travers les bougies Chamberland L2.** [The Filtration of the Bacillus of Johne's Disease through Chamberland L2 Filters.] —*C.R. Soc. Biol.* 1926. Jan. 15. Vol. 94. No. 1. pp. 39–40.

In experiments reported by BOQUET the intraperitoneal inoculation of rats with Johne's bacillus produced minute tubercles on the peritoneum and epiploon in which the bacillus could be found in large numbers, and they could also be found in the enlarged bronchial glands.

The authors have inoculated rats with filtrate of suspensions of the bacillus in salt solution which had been passed through filters found to be capable of arresting the bacillus of fowl cholera. No visible lesions were produced in any, but acid fast bacilli could readily be found in smears from the omentum, liver, spleen and bronchial glands of some of them.

MORIN (H. G. S.). **Premières lésions viscérales déterminées chez le rat par l'inoculation de Bacille de Johne.** [Visceral Lesions in a Rat inoculated with Johne's Bacillus.]—*C.R. Soc. Biol.* 1925. Dec. Vol. 93. No. 38. pp. 1573–1574.

The author confirms BOQUET's observation.

BASSET (J.). **Immunisation des bovidés par la toxine symptomatique.** [The Immunization of Bovines with Blackquarter Toxin.]—*Rev. Vét.* 1926. Jan. & Feb. Vol. 78. Nos. 1 & 2. pp. 18–34, & 80–102.

The toxin was prepared by growing *B. chauvaei* in serum-liver-broth. There was abundant effusion of gas and the turbidity produced began to clear on the third day. The culture was filtered through a Chamberland F filter and the pH of the filtrate was found to be 5·5, as against the original pH of the broth of 7·04. Filtrate used immediately after preparation. The cultures were incubated for 2 days and then filtered (A). Doses of 15–25 cc. intraperitoneally killed guineapigs in 10 to 25 hours. Doses of 3–5 cc. subcutaneously caused local lesions which terminated in scar formation.

When the cultures were incubated for 5 days similar results were obtained, but the lesions following subcutaneous inoculation were more pronounced (B). Toxin which had been obtained from cultures incubated for 5 days but which were kept unfiltered for a month before they were used produced similar results (C).

Similar tests were carried out with the toxins prepared in these three ways after they had been kept in the dark and in sealed vessels for from 2 to 6 months. There was no difference in the results obtained with the first two, but there was some loss of toxicity with that which had been kept for a month before filtration.

Guineapigs inoculated subcutaneously with 5 cc. of toxins B and C were tested at 12, 20, 30 and 60 days with virulent culture which proved fatal for controls, and all survived. In some individuals a local lesion developed, but healing occurred. Guineapigs tested 7 days after inoculation with the filtrates were found to possess a less

solid immunity. Toxins B and C used two months after preparation possessed the same immunizing powers as the freshly prepared toxines. After four months 5 out of 18 guineapigs died when tested with virus.

Toxin C at 6 months failed to confer protection on the majority of the guineapigs.

When two injections of toxins B or C were given at intervals of a fortnight to a month all the animals resisted several lethal doses of virulent culture when tested at 12 days.

In a small number of experiments with bovines the author found that 10 cc. of toxin protected against a dose of virus which was fatal to controls in 2 days.

A recently prepared toxin when heated to 60° C. for an hour in a water bath was found to have lost all power of immunizing. During the heating a fine precipitate formed. This neither provoked lesions nor set up immunity.

The treatment of toxin by formalin in the proportion of ·5 per cent. with incubation at body temperature for a month results in the production of an anatoxin whether the liquid be exposed to the air or covered with paraffin. This could be injected subcutaneously in doses of 5 cc., with the production of a local lesion in a proportion of cases only.

After the lapse of a week these animals were found to have no immunity, but when an interval of 12 days was allowed to elapse rather more than 50 per cent. of the animals survived, although they developed large local lesions.

Heated (60° C.) anatoxin possessed the same properties as unheated, thus differing from the toxin.

The results, however, showed that anatoxin was not so satisfactory as the filtrate (toxin) for the production of immunity.

In about 70 per cent. of the guineapigs dead of blackquarter the gastric mucous membrane was closely beset with small ulcers and as the result of post-mortem examinations made upon animals just prior to death the author comes to the conclusion that this ulceration takes place very rapidly just before death occurs.

He states that this lesion is of very frequent occurrence in other diseases, having observed it in "gangrenous septicaemia, anthrax, pasteurellosis, paratyphoid, and tuberculous septicaemia." They are identical with those described in connexion with cattle plague and theileriasis.

As the result of experiments carried out on guineapigs and cattle Basset draws the following conclusions :—

Filtrate retains its properties for about four months. It is capable of conferring a solid immunity without exposing animals to any risk. The existence of some degree of immunity is recognizable a week after injection, but full immunity is not established until about the 12th day.

That it is possible to get a stronger immunity is suggested by Basset's recommendation that two injections should be given at an interval of "several" weeks. Animals so treated will resist "several" fatal doses.

The use of toxin alone has the advantage over virus vaccines in that it does not set up the disease in animals that are in a state of latent infection.

Formalin is said to reduce the immunizing properties of the filtrate considerably.

LOPEZ (C. L.). **Ampliación de las anatoxinas. Valor immunizante de los cultivos de** *Bacillus chauvoei* **estériles por el formol.** [Anatoxins. The Protective Properties of Cultures of the Blackquarter Bacillus rendered Sterile by means of Formol.]—*Revist. Hyg. y. Sanidad Pecuarias.* 1926. Jan. Vol. 16. No. 1. pp. 1–5.

The author finds formalin the best agent for sterilising cultures of *B. chauvoei* for the purpose of preparing a vaccine.

MORITA (H.). **An Experimental Study on the Pathology of the Black-leg.**—*Scientific Reports from Govt. Inst. Infect. Dis.* Tokyo. 1924. Vol. 3. pp. 97–102. With 9 figs. on 2 plates.

This is a very brief contribution to the subject and contains nothing of special importance.

STAUB (A.). **Quatre années de vaccination contre le choléra des poules.** [Four Years of Vaccination against Fowl Cholera.]—*Ann. Inst. Pasteur.* 1925. Dec. Vol. 39. No. 12. pp. 962–967.

Vaccination of fowls against fowl cholera had not been practised for some time in France on account of the infrequence of occurrence of the disease. The Pasteur Institute had, in fact, given up making the vaccines.

Shortly after the war extensive outbreaks occurred as the result of the importation of birds from German sources.

As it was impossible to prepare vaccines in a less period than some months, the author decided to try the use of a pasteurella derived from a rabbit. This organism, he states, is innocuous for fowls.

As some ampoules of culture were available, the virulence of the organism was restored by passage through guineapigs inoculated intraperitoneally. It was then tested on fowls and found to be harmless, and used as vaccine.

Reports are quoted which show that not only did the vaccine protect healthy birds, but that in some cases birds which were actually ill recovered. In all the cases quoted the cause of death was confirmed at the laboratory as fowl cholera.

Similar results were not obtained, however, in laboratory experiments, and the author explains the difference on the ground that natural infection does not take place in the same way as infection by inoculation. The uncertainty of transmitting the disease by ingestion is known, and the author attempted to get over this difficulty by feeding birds with the contents of the intestine of birds killed by inoculation. He found that he could readily kill the first bird of a series in this way, but that the second failed to become either infected or immunized.

The manner in which epidemics spread among birds, and the persistence of infection in farmyards are therefore matters which are difficult of explanation.

The view favoured by the author is that carriers exist.

In some instances deaths occurred after a lapse of some months after vaccination with the rabbit strain of organism.

An attempt was made to attenuate the strain in the classical manner, but the author notes that caution must be exercised in using attenuated

vaccines as in one case after the virulence had been reduced to a point of safety by prolonged incubation, it became exalted again, or at least it proved fatal in 33 per cent. of birds inoculated with it. The author suggests that certain organisms in the culture had retained their original virulence.

BRIDRÉ (J.) & DONATIEN (A.). **Le microbe de l'agalaxie contagieuse du mouton et de la chèvre.** [The Organism of Contagious Agalaxia in the Sheep and Goat.]—*Ann. Inst. Pasteur.* 1925. Dec. Vol. 39. No. 12. pp. 925–951.

The first record of the occurrence of this disease outside Europe appears to be that made by SERGENT and ROIG, who detected it in Algeria in 1908.

It again made its appearance in 1923 in some sheep purchased by the Pasteur Institute, Algiers, and it is from these cases that the authors have succeeded in isolating and cultivating a filterable but visible organism.

They have cultivated the organism in mutton broth plus horse serum, and have produced arthritis and mammitis in animals by inoculation.

The best medium for cultivating the organism, which is present in the inflammatory exudate of affected joints and in the mammary gland, is broth containing 5 to 10 per cent. serum. It appears to be immaterial what serum is used, but too high a proportion inhibits growth.

The majority of sugars retard growth slightly, but lactose and mannite favour it.

In serum broth tubes incubated at 37° C. a very faint turbidity makes its appearance after 3 or 4 days. This increases and after a few days a sediment forms and the liquid becomes clear.

With repeated subcultivation in the same medium growth becomes more rapid and more abundant. Exactly similar results are obtained under anaerobic conditions.

On the surface of serum agar minute colonies which are almost invisible to the naked eye make their appearance in three or four days. These eventually attain a diameter of 1 mm. They adhere firmly to the medium, and under a low power are seen to have an opaque raised centre with a thin transparent margin. Giemsa is the best stain for demonstrating the morphology of the organism. The short forms are vibrio-like and measure 2–5 $\mu$ in length. Longer spirochaete-like forms measuring up to 15 $\mu$ are found in cultures. Some individuals appear to have a deeply stained granule at one end, while others appear to be granular throughout their length. In fact, the authors state, the morphological details are exactly those of the pleuropneumonia virus as described by BORREL, DUJARDIN-BEAUMETZ, and others.

With dark ground illumination the granular forms appear as chains of minute cocci. The organism is non-motile. Isolation of the organism from contaminated materials is not difficult if the following technique be followed :—

An L1 *bis* Chamberland filter is used and the liquid for filtration is diluted with about 80 volumes of broth at 37° C. The greater part of this is passed through the filter under a 25 cm. of mercury vacuum. Then 10 to 20 cc. of horse serum are passed through and finally the

rest of the diluted virus is passed. The flask containing the filtrate is plugged and incubated. In three or four days turbidity shows itself.

If a Chamberland L2 filter be used no growth is obtained.

The optimum temperature for growth is 37° C., but the temperature limits are 24° to 41·5° C. The organism grows under either aerobic or anaerobic conditions.

Incubated aerobically cultures generally die out in a month, but anaerobic cultures and cultures which are sealed up or under paraffin may be kept in the incubator for as long as 22 months without losing their vitality. Tests for longer periods than this have not been made. At temperatures below that of the body (from 0° to 25° C.) cultures were found to be sterile after five months.

The virus survives a temperature of 50° C. for 1½ hours, but it is killed in 10 minutes by a temperature of 53° C. Under conditions of prolonged incubation and repeated subculture the virulence of the organism remains constant.

Agglutination, complement fixation and precipitin tests have yielded unsatisfactory results.

Experimentally sheep are less susceptible to infection than goats. Subcutaneous inoculation leads to the formation within a week of a small local lesion in the form of a nodule which disappears about 15 days after inoculation. After a period ranging from a week to a month lesions develop elsewhere in the body—the joints and the eyes.

In lactating females mammitis is produced, the secretion becoming purulent.

Intravenous inoculation appears to be very fatal in the goat, death occurring (2 cases) in 8 and 19 days. In cattle inoculation produces only a temporary local lesion.

A large number of methods have been employed with a view to establishing immunity in sheep and goats, but so far certain success has not been achieved.

HRUSKA (Charles). **Recherches expérimentales sur le charbon (Premier mémoire). Les vaccins charbonneux.** [Investigations in connection with Anthrax. First Memoir. The Anthrax Vaccines.] *Ann. Inst. Pasteur.* 1925. Nov. Vol. 39. No. 11. pp. 897–908.

The author's experiments have been carried out with first and second vaccines obtained from the Pasteur Institute, Paris. The vaccines have been transplanted every week on plain agar and during the period 1920–1925 have passed through 255 generations. During the whole of this period no morphological changes have been observed. Cultivated on agar, both vaccines produce spores between the 10th and the 15th day. In broth, on the other hand, spores have not been observed even in cultures four months old. The results obtained may be summarized as follows. In all the tests agar cultures of 18 to 24 hours were used. It appears that after eight generations on agar the first vaccine had become rather more virulent than it was originally as it tended more to prove fatal to guineapigs. But the passage through the guineapig did not appear to have enhanced the virulence. In the tabular statement given it is shown that while three mice died, three guineapigs survived as did also three rabbits.

A twenty-four hours' culture of first vaccine that had become virulent for guineapigs by repeated subcultivation on agar when inoculated into 11 sheep and 500 cattle failed to cause any infection, although in some animals oedema occurred at the seat of inoculation which lasted for periods ranging up to a fortnight. In plain broth and in salt solution the first vaccine becomes avirulent even for mice in three months.

Preserved in the dry state on a rod of glass fixed to the ground-in stopper of a glass flask sealed with paraffin, the vaccine retains its vitality and remains constant in virulence up to five years. Occasionally cases occur in which mortality results from the use of the first vaccine. These are to be explained on one of two hypotheses. Either there is actual inoculation infection with the production of a large amount of oedema or the animals died from naturally contracted anthrax, the vaccine having been injected during the negative phase.

From two cases which terminated fatally and in which there was extensive oedema the author isolated an organism having the characters of the first vaccine.

Experiments with second vaccine grown on agar showed that after some 38 passages virulence was to some degree reduced, so that it was fatal for mice only. Passing this vaccine through mice enhanced its virulence again for the guineapig but not for the rabbit. Passing it through guineapigs in series again increased its virulence for the rabbits. The vaccine may be preserved unchanged in the dry state as already described for years.

In Czecho-Slovakia where certain areas are very heavily contaminated with anthrax outbreaks sometimes occur within 8 to 12 weeks after vaccination. For this reason vaccination is practised twice yearly. The general method is to give the first and second vaccines in 0·25 cc. doses and then ten days after the second vaccine a further dose of 1 cc. of second vaccine.

In some experiments the author found that vaccines sent out by the Charkow Laboratory were not of constant virulence.

RUNNELLS (R. A.) & HUDDLESON (I. F.). **The Nature of** *Bacterium abortus* **Infection in the Udder of the Bovine.**—*Cornell Vet.* 1925. Oct. Vol. 15. No. 4. pp. 376–390. With 3 figs.

Details are given of the examinations carried out with materials derived from the udders of four animals, three of which were infected with contagious abortion, and the fourth was included as a normal control. None of the udders showed any gross histological change, but on microscopic examination of sections there were found small foci of a sub-acute or chronic inflammatory nature. The lesions appeared to originate in the parenchyma and then spread to the interstitial tissue. The supra mammary glands showed evidence of the existence of chronic lymphadenitis. It is noteworthy that in none of the specimens were abortion bacilli discovered by microscopic examination, although their presence in the milk was detected by inoculation and artificial cultivation.

RAMON (G.). **Procédés pour accroitre la production des antitoxines.** [Methods of Increasing the Production of Antitoxins.]—*Ann. Inst. Pasteur.* 1926. Jan. Vol. 40. No. 1. pp. 1–10.

As a general rule the titre of antitoxic sera can be increased up to a certain maximum beyond which no amount of antigen will force it.

Often the titre of such sera tends to fall in spite of increasing hyperimmunization. The author has observed, however, that in horses producing antidiphtheritic serum there is sometimes an unexpected rise in the titre over and above the maximum to which it had been found possible to obtain in the particular animal. Observation showed that in all such cases the animals showing the exalted titre had developed abscesses as the result of contamination with ordinary skin bacteria. It was experimentally demonstrated that the production of an abscess at the seat of inoculation of a hyperimmunizing dose of toxin definitely led to the exaltation of the titre of the serum above the value to which it had been possible to get it prior to the abscess production. It was further found that an abscess produced in some part of the body other than the seat of infection of the hyperimmunizing dose did not produce the effect. It was clearly undesirable to add bacterial contaminations to the antigens for injection, and the author cast about for something which could be added to them which would produce the same effect as suppuration. After a number of trials he found that starch prepared by pulverizing tapioca suited the purpose. The addition of this powder to the antigens used for injection has been applied to the production of both antidiphtheria and antitetanic serum.

In controlled experiments it was found that the antitetanic serum produced with the tapioca was markedly more antitoxic than that produced with the simple antigen. In some cases it was 10 times as strong.

INOUYE (Z.). **A New Method of Staining Flagella and Observation on the Morphological Changes of Flagella, depending upon the Age of Bacteria.**—*Scientific Reports from Govt. Inst. Infect. Dis.* Tokyo. 1924. Vol. 3. pp. 11–15. With 1 plate.

The author recommends the following method :—

A thin film of very dilute suspension of the organism in distilled water is spread on a coverglass, air dried, and fixed by heat.

Place as much as it will hold of the following mordant on the coverglass and heat (well above the flame) until steam rises.

| | |
|---|---|
| Tannic acid, 20 per cent. aq. sol. ..... ... ... | 10 cc. |
| Ferrous sulphate, sat. aq. sol. ... ... ... | 5 cc. |
| Sat. alcoholic fuchsin ... ... ... ... | 1 cc. |

Wash thoroughly.

Cover the film with Muir's stain.

| | |
|---|---|
| Alum, sat. aq. sol. ... ... ... ... | 25 cc. |
| Gentian violet, sat. alcoholic sol. ... ... ... | 5 cc. |

Filter and heat over the flame until steam rises. Wash thoroughly, dry, and mount.

Cultures of *Bacillus proteus* were examined at different stages and the author found in young cultures (8 hours' incubation) that not only was the bacillus larger than in older cultures but that the flagella were shorter and more numerous. With increasing periods of incubation the flagella became longer and thicker, but less numerous.

## DISEASES DUE TO FILTERABLE VIRUSES.

SCHERN (Kurt). **Immunisierungverfahren gegen Tollwut.** [Immunization against Rabies.]—*Berlin. Tierärzt. Woch.* 1926. Jan. 1. Vol. 42. No. 1. pp. 1–2.

The author gives details of a small number of dogs treated by the Japanese single injection method of vaccinating, and shows that all those treated resisted an inoculation with virus which proved fatal to controls. He states that he has also used a modification of the Japanese technique for the preparation of the vaccine, but gives no particulars.

MERY (M. F.). **Un cas atypique de rage confirmé.** [An Atypical Case of Rabies.]—*Rev. Vét.* 1926. Feb. Vol. 78. No. 2. pp. 102–104.

The case occurred in a Pekingese. This showed marked salivation and rapid champing movements of the jaws. There was no loss of consciousness. The attack lasted a few seconds. A similar attack occurred when the animal was given milk to drink.

During the next two days the attacks became rarer and shorter. The dog died on the third day after it was first seen. At the post-mortem the only abnormality found was a quantity of hair and paper in the stomach. Negri bodies were found in the brain.

BOYD (J. E. M.). **Some Notes on Canine Rabies.**—*Jl. Royal Army Med. Corps.* 1926. Jan. Vol. 46. No. 1. pp. 23–31.

The author gives a general account of the disease for the benefit of officers who have not served in countries where the disease is prevalent.

JACOTOT (H.). **Contribution à l'étude de l'ecthyma contagieux des lèvres, affection des petits ruminants.** [Contagious Ecthyma of the Lips of Small Ruminants.]—*Arch. Inst. Pasteur d'Indochine.* 1925. Oct. No. 2. pp. 235–244.

This is a very contagious papulo-vesicular condition involving primarily the lips and mouths of sheep and goats. Secondary infection of the other natural orifices occurs. The same disease has been recognised for many years in France, and is known to occur in various parts of the world. Different races of sheep vary in susceptibility to the disease. In Annam the animals most seriously affected are the young indigenous goats. While the disease does occur all the year round, definite recrudescences generally make their appearance at the onset of the rains.

Primarily the disease occurs as a papulo-vesicular eruption on the lips, with more or less severe involvement of the submaxillary glands.

In the normal course of the disease the lesions pass through the typical phases of papule-pustule, scab, and healing in about a fortnight. But the course of the disease is generally complicated by spreading to adjacent parts, by lesions becoming confluent, and by mechanical irritation. Prehension of food becomes difficult, and there is as a result great loss of condition. When the disease involves the nostrils respiration is obstructed.

About the 15th day of the disease, in a large proportion of cases, papilloma-like growths develop at the seat of lesions. These disinte-

grate and disappear in the course of a month. Systemic disturbance associated with enteritis or broncho-pneumonia does not occur as a rule unless there is secondary invasion of the lesions accompanied by suppuration. The mortality may reach 50 per cent. in bad outbreaks. The virus is capable of passing through Chamberland L and Berkefeld V filters, but the results obtained by inoculation with filtrate would appear to indicate that only a small proportion of the virus actually passes the filter. The virus is very abundant in the lesions since crusts taken at the 15th day are infective when mashed up 100,000 volumes. The virus can be found in the lesions only. It has not been detected in the blood at any stage of the disease, and even enlarged submaxillary glands appear to be virus-free. The virus has a predilection for skin and mucous membrane, and is readily transmissible to susceptible species by inoculation.

Outside the body the virus may be preserved in glycerine or chloroform for periods up to 3 months. It is readily destroyed by heat.

There are facts which appear to suggest that the virus persists in the Malpighian layer of the skin after lesions have healed. Crusts themselves remain virulent for much longer periods than dilutions of the virus, and in this fact lies the explanation of recrudescences of the disease when fresh animals are introduced.

In spite of the close resemblances between sheep pox and ecthyma, the diseases are quite distinct entities, and immunization against one confers no immunity against the other. A naturally-contracted attack of the disease confers an immunity which is apparently life-long, the establishment of which is gradual and begins about the 10th to 20th day.

The immunity is purely a tissue one. The body fluids cannot be shown to possess any antigenic properties. Vaccination is effected by scarification, using an emulsion of scabs in equal parts of glycerine and water.

In outbreaks among indigenous sheep and goats it is not worth while to intervene because of the small value of the animals, but in imported stock vaccination is essential. Pregnant or suckling animals are vaccinated on the caudal folds, others on the inner face of the thigh.

Vaccination by scarification is far more effective than by subcutaneous inoculation.

GINS (H. A.) & FORTNER (J.). **Experimentelle Maul-und Klauen-seuche beim Kaninchen.** [Experimental Foot-and-Mouth Disease in the Rabbit.]—*Berlin. Tierärzt. Woch.* 1926. Feb. 5. Vol. 42. No. 6. pp. 89–90.

By scarification of the inner side of the lip the authors have been able to produce lesions with guineapig virus. The blisters make their appearance within 24 to 48 hours. The epithelium is readily shed, and complete healing usually takes place within a week.

It was also found possible to set up lesions on the lips by massive intravenous injections of virus from guineapigs. Inoculation experiments back into guineapigs also succeeded. In some of the rabbits inoculated by scarification of the mucous membrane of the lip the disease was responsible for the production of a lesion resembling weeping eczema at the angle of the mouth. In only two cases were lesions found on the tongue itself when that had not been scarified, and in no case was any evidence of generalization obtained.

In about 25 per cent. of cases only was there any invasion of the blood by the virus. This was tested by plantar inoculation of guineapigs; there was, however, in these cases, a slight rise of temperature during the first few days. No deaths from foot-and-mouth disease occurred among inoculated rabbits.

At first some difficulty was experienced in carrying on the infection in series in rabbits, but eventually it was carried to 16 generations before inoculation failed. Recourse was then had to glycerinated virus of the 13th generation, and by means of this it was carried to the 20th generation. To succeed it is necessary to inoculate every two days.

Passage through the rabbit caused no reduction in virulence for the guineapig, but recovered rabbits showed immunity up to over 300 days. The serum of such immune rabbits when mixed (undiluted) with virus in vitro had a sterilizing effect upon it. When diluted 1 in 100 no such effect was produced.

HELM (R.). **Weitere Versuche zur Uebertragung der infektiösen Anämie der Pferde auf Meerschweinchen.** [Further Attempts to transmit Infectious Equine Anaemia to Guineapigs.]—*Berlin. Tierärzt. Woch.* 1926. Jan. 15. Vol. 42. No. 3. pp. 37–42. With 8 charts.

As the result of observations carried out on guineapigs inoculated with blood from cases of equine pernicious anaemia the author comes to the conclusion that the method is of some value.

Account must be taken of evidences of anaemia appearing in the blood, of variations of temperature, and of the appearances presented at the post-mortem.

DI DOMIZIO (G.). **Osservazioni su la produzione del virus per la iperimmunizzazione nella peste bovina.** [The Production of Virus for Hyperimmunizing Purposes in the production of Anti-Rinderpest Serum.]—*La Nuova Vet.* 1925. Oct. 15. Vol. 3. No. 10. pp. 21–24.

The author finds that in Somaliland virus producers, when bled out, yield from 3¼ to 4 litres of blood per 100 kilogs. body-weight. He has tried the method advised by MARTOGLIO in 1915 of a partial bleeding followed by washing out the vessels with salt solution and finds that while the average increase in virus obtained amounts to only half a litre per 100 kilogs body-weight, the virus obtained after the injection of salt solution is less virulent than that contained in the whole blood taken at the first bleeding. He therefore concludes that the method is not worth the trouble involved.

## MYCOTIC DISEASES.

BUBBERMAN (C.) & HUBER (F. L.). **Over de Immunotherapie bij Lymphangitis epizootica van het Paard.** [Protective Inoculation against Epizootic Lymphangitis.]—*Nederl-Indië Blad. v. Diergeneesk.* 1925. Dec. Vol. 37. No. 6. pp. 516–528.

The authors are of the opinion that it is possible to effect a cure by vaccine treatment provided the cases are not of more than moderate severity, and the animals are in good condition.

Treatment requires about 5 months. Excluding severe cases the percentage of recovery is about 60.

Vaccine therapy is not superior to surgical interference combined with chemical treatment.

OTA (Masao) & GALLIARD (H.). **Sur une teigne trichophytique d'un bovidé du Cameroun produite par une espèce nouvelle de** *Grubyella, G. camerounensis* **n. sp.** [A Case of Ringworm in an Ox caused by *Grubyella camerounensis* n. sp.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. 1. Vol. 4. No. 1. pp. 14–21. With 3 text figs.

The lesions presented by the animal were in the form of rounded or oval patches devoid of hair and covered with crusts. The largest measured about 9 centimetres in diameter. They were scattered irregularly over the body. The crusts were readily detached and crumbled easily.

The parasite did not appear to invade the substance of the hairs. The growth was composed of more or less quadrangular segments measuring 5–6$\mu$ in width. Dichotomous branching was readily found.

In addition to the chains of spores there was also a sheath composed of rounded or ellipsoid cells. These were as a rule not in rows, but formed a kind of mosaic. The cells measured up to 8$\mu$ in diameter and had thick walls.

Mycelium with long cells was not very readily found in the sheaths of growth round the hairs. In artificial cultures, which were obtained in from one to three weeks on Sabouraud's medium, the earliest stage of growth was in the form of a small hemispherical whitish colony, with a very delicate down-like surface. Growth was very slow, and after about six weeks there formed a wrinkled rim or margin around the central hemispheric mass. These colonies measured about 5 mm.

Microscopic examination of the growth reveals striking features. In cultures arthospores predominate particularly in the central parts of young cultures. Mycelium is to be found more readily in the superficial parts of old cultures. Pedunculated chlamydospores frequently occur.

The parasite is readily transmitted to the guineapig, but the infection is quite benign and clears up within a few days.

AYGAR (V. Krishnamurti). **Nasal Granuloma in Cattle.**—*Memoirs Dept. Agric. in India. Veterinary Series.* Vol. 3. No. 6. 1925. Aug. With 9 plates.

Nasal granuloma, or snoring disease, is widespread among cattle in Madras, and possibly in other parts of India. It is not, as was at one time thought, limited to animals having nose strings, but occurs also in cows, heifers and bulls.

The lesions take the form of clusters of rounded growths, each of which may attain the size of a pea. They appear at the junction of the nasal mucous membrane with the skin and round the perforation made in the septum for the nose string. They spread up the nasal fossae causing occlusion. On pressure of larger lesions beads of pus escape, and older lesions tend to break down and to be sneezed out. Microscopic examination revealed the presence of a ray fungus akin to actinomyces bovis. The colonies were found to be very alcohol- and acid-fast. They could not be stained by Gram's method.

BIGOT (A.) & VELU (H.). **Contribution à l'étude des blastomycoses animales.** [Contribution to the Study of the Animal Blastomycoses.]—*Rev. Path. Comparée et d'Hyg. Générale.* 1925. Vol. 25. Nos. 280 & 281. 52 pp. With 10 figs. on 3 plates.

This paper is a summary of our knowledge regarding epizootic lymphangitis of the horse and mule and lachrymal blastomycosis of the donkey.

It is divided into three main sections dealing respectively with (1) the causal organisms; (2) the histology of the lesions; and (3) the pathogenic rôle of the cryptococcus and the associated bacteria in epizootic lymphangitis, and the connexions which exist between human and animal blastomycoses. The authors find that the best media for the cultivation and subcultivation of the cryptococcus are broth, peptone water, and more particularly Sabouraud's agar acidified to 5 per thousand with citric acid.

By using this medium for primary cultures associated organisms are got rid of. Further experiments indicated that while in broth the citric acid exercised a true sterilization action on bacteria, on acidified Sabouraud's agar the growth of these bacteria was merely prevented.

*Cryptococcus mirandei* can readily be isolated on citric Sabouraud agar, but acidified peptone broth sterilizes the seed material containing this organism.

*Cryptococcus mirandei* in artificial cultures occurs as a rounded or oval body of very variable size. In cultures of a fortnight's standing filamentous and other elongated forms occur. The organisms will grow in both acid and alkaline media, but growth stops in the latter when the proportion of "soda" added reaches 1·5 per cent. Growth is equally good at 30° C. as at 37° C., but is very slow at room temperature. Acid potato, carrot, beetroot, Jerusalem artichoke, are all good culture media, but of these beetroot appears to be the best. The following liquid media are good:—Malt water, decoction of prunes, Pasteur's liquid, Hayem's liquid, Hansen's liquid No. 1, Cohn's medium.

Glucose and laevulose are fermented with the evolution of gas. Lactose, galactose, mannite, saccharose, and maltose are not affected.

Statistics gathered over a number of years show that vaccinotherapy is not always successful in the treatment of epizootic lymphangitis. This the authors believe to be due to the association of other organisms with the cryptococcus. They therefore suggest the advisability of employing polyvalent vaccines. In examining pus from suspected lesions (buds which have not been ruptured prior to the removal of the pus for examination) the authors have rarely encountered any associated bacteria, but they believe that when marked softening has taken place organisms from the surface can penetrate the skin and so appear as contaminations in the pus.

It has been generally recognized that it is difficult to get satisfactory staining of the organism in smears or sections. Bigot and Velu find that the only fixative which gives good results is Bouin-Dubosq, in which smears are placed for 20–24 hours. Fragments of tissue require rather longer. The specimens are washed in water, then in lithium alcohol to remove as much colour as possible, and again in water. Sections should be passed through lithium alcohol after they have been passed through pure alcohol and 90 per cent. alcohol.

Gram's stain is used. Carbol gentian violet is allowed to act for four hours at least. The iodine is used for five minutes and

decolorization is prolonged. Fuchsin or eosin may be used as counterstains.

Mann's stain (16–36 hours), anilin safronine, haemalum, haematein-Tribondeau, eosin, May-Grünwald and panchrome, Giemsa, and other stains may be used, but in all cases the process of staining is very prolonged. Fuchsin, Unnas' blue, Loeffler's blue, carbol-thionine, and Ziehl's stains give poor results.

The examination of the tumour-like growths seen in lachrymal blastomycosis of the mule shows that they are inflammatory enlargements composed for the main part of lymphocytes and plasma cells. Giant cells do not occur. The growths are non-vascular.

In connexion with epizootic lymphangitis the authors describe the histology of the lesions dealing with the nodules of the skin, the corded lymphatics, the enlarged glands, and the ulcerations of the respiratory mucous membranes.

In whatever situation lesions occur they are always histologically of the same type. The invasion of the tissues by the parasite leads to the multiplication of the fixed and migratory connective tissue elements and when the lesions become invaded by pyogenic bacteria polynuclears are attracted.

As a result of their observations and experiments in connexion with the vaccine therapy of epizootic lymphangitis the authors come to the conclusion that staphylococci play no inconsiderable part in the processes of the infection. They may, in fact, change what would be a benign infection into a serious one. The use of staphylococcus vaccine in conjunction with pyotherapy in ten cases produced markedly favourable results.

BIGOT (A.) & VELU (H.). **Des Indications que l'on peut tirer au point de vue vaccinotherapie de l'étude Anatomo-pathologiques des lesions (à propos des Blastomycoses).**—*Maroc Médical.* 1925. Feb. 15. No. 38.

This paper is an abbreviated form of the above.

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## MISCELLANEOUS.

MUTO (K.). **On the Toxic Action of Carbon Disulphide.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Dec. Vol. 4. No. 4. pp. 346–348. [Author's English abstract.]

Both cocaine and atropine are antagonistic to carbon bisulphide.

In rabbits dying as the result of inhalation of carbon disulphide haemorrhages are found in the bronchial mucous membranes. The internal administration of the drug produces, if toxic doses be used, haemorrhages of the gastric mucosa and erosions of the mucous membrane of the small intestine.

CURSON (H. H.). **Some Little Known South African Poisonous Plants and their Effects upon Stock.**—M.S. Thesis for the Fellowship Diploma R.C.V.S. 1925.

The following plants have been proved to be toxic: *Moraea polystachya*, Ker., *Moraea spathacea*, Ker., *Homeria pallida*, Baker,

*Urginea burkei*, Baker, *Senecio latifolius*, D.C., *Setaria sulcata*, Raddie, *Cotyledon wallichii*, Harv., *Cotyledon ecklonii*, Harv., *Dichapetalum cymosum*, Hook, *Acokanthera venenata*, G. Don., *Cynanchum africanum*, R. Br., *Melianthus major*, Linn., *Ornithogalum tenellum*, Jacq., and *Melothria punctata*, Cogn.

The poisonous nature of all of these save the last five was already known and the author limits himself to a description of his work in connexion with those the toxicity of which had not previously been determined.

*Acokanthera venenata.*—The author uses this name to cover what may possibly be two species, *A. venenata* and *A. spectabilis*. But SIM believes these to be only local varieties depending upon their surroundings.

Cattle are the principal victims, but cases of poisoning have been recorded in goats, donkeys and ostriches. The symptoms are abdominal pain, often with dysentery, frequent urination, salivation, cold extremities, jugular pulse, laboured respiration and possibly froth from the nostrils.

*Cynanchum africanum.*—The symptoms of poisoning are staggering gait in the early stages with chronic spasms of groups of muscles, followed by collapse and tetanic spasms. There is apparent complete loss of consciousness. In severe cases there may be opisthotonus, with convulsive movements of the limbs. In mild cases the attitude, which is characteristic of milk fever, is often assumed.

*Melianthus major.*—It is possible that the five species of Melianthus are all toxic. The symptoms in cases observed by the writer were those of an irritant vegetable poison : acute diarrhoea with dysentery, colic and salivation.

*Melothria punctata.*—Curson has not seen cases of poisoning by this plant, but in cases in which it was suspected the symptoms produced were those generally caused by gastro-intestinal irritants.

*Ornithogalum tenellum.*—Horses suffering from poisoning by this plant show at first dullness and disinclination to feed. This is followed by a rise of temperature and purgation, with accelerated pulse and respiration. Later the pulse becomes weak and the temperature falls to subnormal. In the final stages there is acute abdominal pain.

The author deals with each plant referred to from a botanical point of view and also gives an account of the literature containing references. His paper is illustrated with photographs of the plants, and in one or two instances of animals suffering from poisoning.

An appendix contains the details of the experiments carried out with the plants.

PUNTONI (V.). **La préparation de l'azur de méthylène au moyen de l'ozone et son emploi pour les colorations par la méthode de Romanowski.** [The Preparation of Azur by means of Ozone, and its Use in making Romanowsky Stains.]—*C.R. Soc. Biol.* 1926. Jan. 15. Vol. 94. No. 1. pp. 21–23.

Medicinal methylene blue, or methylene blue of less pure quality containing zinc chloride is dissolved to the strength of 2·5 per cent. in 1 per cent. of sodium carbonate solution. The liquid is incubated for 24 hours with repeated shaking. There is a slight sediment from which the solution is separated by careful decanting.

Ozonized air obtained from a Siemen's ozonizer is bubbled through the liquid for 48 hours, by which time it is almost colourless, having only a greenish tint. An insoluble basic precipitate of methylene azur adheres to the sides of the vessel. The liquid is thrown away and the vessel is placed in an incubater. During the next 24 hours the sediment dries and is at the same time converted into a soluble carbonate by the carbon dioxide of the air. The precipitate is readily collected by scraping the walls of the vessel. Twenty-five grammes of methylene blue yield about 12–13 g. of azur. This dye corresponds exactly with Azur I of giemsa (Azur P).

To prepare a Romanowsky stain grind together :—

| | |
|---|---|
| Azur P. ... ... ... ... ... ... | 0·3 g. |
| Medicinal methylene blue Höchst ... ... | 0·15 g. |
| Eosin A.B. Grübler ... ... ... ... | 0·15 g. |

Add 50 cc. of pure glycerine and after thorough mixing add 50 cc. of pure methyl alcohol. Incubate for 24 to 48 hours with frequent gentle shakings. Filter and store in a coloured glass bottle with a glass stopper.

For use make a 1 in 20 (1 drop per cc.) dilution in neutral distilled water.

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Lowe (H. T.). **A Veterinary Survey of the Bukoba District, Tanganyika Territory.** —*Vet. Jl.* 1925. Dec. Vol. 81. No. 12. pp. 592–608.

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## BOOK REVIEW.

Banham (George A.) [F.R.C.V.S.] & Young (Wm. J.) [F.R.C.V.S., D.V.S.M. (Vict.).] **Table of Veterinary Posology and other Information for the Use of Students and Practitioners.**—pp. ix+359. 5th Edition. 1926. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden, W.C. 2. [Price 8s. 6d. net.]

A new (fifth) edition of this work has just made its appearance in its usual garb of post-office red. The number of pages has been increased to 360 by the inclusion of new matter, but this enlargement has a tendency to take it out of the " pocket " class. A casual glance through the volume creates the impression that it contains much valuable matter put together in a convenient form. Unfortunately a closer inspection shows that though a great part of the material is new and up-to-date, yet there is a superfluity of the ancient. The tables of posology, which give the book its title, extend over 29 pages, and contain most of the drugs commonly used and many that are not. Carbon tetrachloride is absent, though it appears in a later section. The doses and the strengths of preparations leave a lot to be desired. There is evidence that they have not been thoroughly revised. For instance, the dose of dry extract of nux vomica for the dog is given as 1 grain under one heading, and one-tenth grain under another. With regard to the tinctures, which are always interesting to posologists, an effort might have been made to group them under three doses as in the British Pharmacopoeia. What do we find ? The maximum

dose for a dog of seven tinctures taken at random from the list differs in each case, thus: Calumba 1 drachm, gentian 1½ drachm, iron 30 minims, opium 20 minims, nux vomica 10 minims, paregoric 40 minims, aconite 5 minims. The tinctures of iron, opium and nux vomica can all be given to the dog in maximum doses of 15 minims, and calumba, gentian and all such harmless tinctures, including paregoric, in doses of 1 drachm. Strangely enough, the dose of strong tincture of iodine is given as 7–20 minims, surely a heroic dose.

The section devoted to synonyms is interesting, but contains much redundant matter. For instance, it may not be generally known that white precipitate is ammoniated mercury, but it seems hardly necessary to inform us that white precipitate ointment is ammoniated mercury ointment (in Latin). One entry is beyond understanding, namely, "cuprea bark," or "copper nucleinate." The title of the next section is open to discussion. It is called a Dictionary of Chemical Solubilities, but solution is generally considered a physical phenomenon.

The sections devoted to what might be termed the treatment of disease cannot be criticized in the same way as those we have dealt with above as they are concerned with matters about which there may be honest differences of opinion.

Altogether the work leaves one with a feeling of disappointment. Perhaps the scope has become too ambitious, and the accuracy of figures has suffered from the demands made by the therapeutical portions of the volume. We would advise the authors in the next edition to thoroughly overhaul the tables of doses, removing many items, and adding a few. At the same time a grouping of the drugs according to their doses might be adopted. Finally, it would not be disadvantageous to use more English and less Latin, because the employment of the latter language leads to mistakes in grammar, especially in the cases of nouns.

Bernard Gorton.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 14.] August 31, 1926. [No. 3.

## DISEASES DUE TO PROTOZOAN PARASITES.

TRIFFITT (Marjorie J.). **Observations on Amoebae found in the Faeces of certain African Ungulates.**—*Protozoology.* 1926. Jan. No. 2. pp. 27–30. With 1 plate.

The author describes amoebae found in the faeces of *Hippotragus niger* (sable antelope), *Cobus ellipsiprymnus* (common waterbuck), and an eland (*Oreas canna*). The animals were all in the Zoological Gardens, London. It is not stated whether they were freshly imported or not.

The organisms are figured and described. It is thought that two species are represented.

Both vegetative and encysted forms were present in the faeces of the antelope and the waterbuck, but only encysted forms were obtained from the eland. In the latter case all the specimens found were uninuclear, but otherwise the organism closely resembled *E. histolytica.*

IZQUIERDO (A.). **Modificaciones del aspecto físico de la sangre en la durina y sus causas.** [Changes in the Physical Properties of Blood from Animals affected with Dourine.]—*Rev. Hyg. y Sanidad Pecuarias.* 1926. Mar. Vol. 16. No. 3. pp. 148–150.

The author finds that in 20 per cent. of animals affected with dourine the blood behaves in a variable manner when withdrawn. Either the corpuscles sediment very rapidly, or form a uniform red clot. There is also a "rarefaction" of the serum.

He believes that the sedimentation is due to the presence of an auto-agglutinin. He does not appear to have examined the blood of controls not affected with dourine.

IZQUIERDO (Amado). **Contribución al estudio biológico del tripanosoma equiperdum.** [The Biology of *T. equiperdum.*]—*Rev. Hig. y Sanidad Pecuarias.* 1925. Nov. Vol. 15. No. 11. pp. 739–743. With 10 text figs.

The trypanosome of dourine may be met with in the male urethra or in the vagina of the female fairly frequently, though not in all

cases. It is rarely encountered in the blood in spite of the fact that it would have to pass through the circulation to produce the cutaneous and other lesions. Noting the auto-agglutination of erythrocytes in this disease the author diluted the blood one hundred-fold with normal saline in order to see whether he could not discover the living protozoon in its adult or intermediate stages. He noted at certain parts of the preparation sudden shaking movements among the corpuscles which were found to be due to the rapid passage of crithidial forms. These were oval in shape, 8–12 microns long by 5–8 broad, narrow at one end which is denominated the anterior, and with a flagellum, 14–16 microns in length, at the other. They were watched for 48 hours and were still living when kept at the laboratory temperature, 20° C. They were seen to multiply by fission and at the end of 30 hours the original number had been approximately doubled. Several were seen to engulf red blood-corpuscles.

The author believes that the positive results of inoculation experiments with the blood, although examination of the blood itself shows no trypanosomes, are due to the parasite being present in the crithidial forms only.*

QUIROGA (Santiago S.). **Sobre el cultivo de los tripanosomas. Algunos ensayos con el** *Tr. equinum.* [The Cultivation of Trypanosomes. Attempts with *T. equinum.*]—*Revista Zootécnica.* Buenos Aires. 1925. Dec. 15. Vol. 12. No. 147. pp. 367–374. [24 refs.]

The author briefly reviews the previous accounts of cultivation-experiments of trypanosomes and then records the results of his own attempts with various media, in particular N.N.N., Miyajima's blood-broth, aerobically and anaerobically, with and without fragments of organs (kidney, testis, brain of rabbits), and Ponselli's medium. The tubes after inoculation were kept between 20° and 25° C., and examined at intervals. Even at the end of a fortnight some living forms were seen, but from their appearance they were regarded as surviving members of the material originally introduced. In no instance was the author satisfied that any actual growth or multiplication took place.*

HOWARD (G. G.). **A Note on Treatment of Equine Trypanosomiasis (Surra) "in the Field" in India.**— *Vet. Jl.* 1926. Feb. Vol. 82. No. 2. pp. 105–110.

Ten clinical cases of Surra were placed under treatment. Trypanosomes were present in the blood at intervals ranging from three to ten days.

Treatment was begun by giving each animal 7 cc. of normal solution of tartar emetic (approximately 3 per cent.) intravenously. This dose was responsible for transitory symptoms of intoxication in some of the animals. It had the effect of clearing the circulation, but as a rule parasites reappeared on the third day.

The animals were then divided into two batches, A and B.

Batch A received on three consecutive days 1,000 cc. of 1 per cent. arsenious acid solution, 100 cc. of 4 per cent. solution of atoxyl

* Summarized by Dr. H. Harold Scott.

subcutaneously and 1·5 g. of crude arsenic in bolus. After three days interval the three doses were repeated. This treatment lasted from October 24th 1924 till November 20th.

Batch B received only atoxyl and crude arsenic alternately with one day interval between each. The treatment was continued for the same length of time.

Of the five in Batch A, two relapsed and were destroyed, one was destroyed before treatment was completed owing to an accident, and two apparently recovered (February 1925).

Batch B. One relapsed but was kept for subsequent treatment with " Bayer 205," one relapsed and was destroyed. One showed marked toxic symptoms and, after an interval of two weeks, died. The remaining two apparently recovered, but one of these showed inco-ordination.

The four surviving animals which showed no trypanosomes in their blood were given doses of " Bayer 205 " ranging from 1 gramme to 3 grammes " without visible effect."

VAN SACEGHEM. **Traitement des infections dues à** *Trypanosoma brucei*. [The Treatment of *brucei* Infections.]—*Bull. Méd. Katanga*. 1925. Dec. Vol. 2. No. 6. pp. 254–255.

A dog infected experimentally with *T. brucei* in December 1924 was given a single intravenous injection of 50 centigrammes of " Bayer 205." The following day the blood was free of trypanosomes, and has remained so up to the time of writing (November 1925).

A mule, naturally infected with *T. brucei*, was given 3 grammes of the drug intraveneously. Trypanosomes disappeared, but reappeared after a lapse of a month. A further injection of 4 grammes was then given and the circulation remained clear for two months. An injection of four grammes again cleared the circulation, but the animal died about ten days later. The exact cause of death was not established.

COLLIER (W. A.). **Sobre la acción del " Bayer 205 " en combinación con el antimonio.** [On the Combined Action of " Bayer 205 " and Antimony.]—*Revista de Med. Vet.* Buenos Aires. 1925–26. Oct.–Mar. Vol. 8. Nos. 4–6. pp. 119–127.

This contribution is an attempt to solve the problem why a mixture of " Bayer 205 " and tartar emetic proves so much more effective in treating cattle suffering from trypanosome infection than either drug separately. The whole subject is a complicated problem in immunology. It has been shown that " Bayer 205 " in certain strengths lessens or actually abolishes the coagulation of blood-serum by heat, and this may be due to an albuminoid compound formed between the drug and the serum. A series of tests was set up the results of which demonstrated that 1 per cent. of " Bayer 205 " had this effect, whereas 0·5 per cent. had none, and apparently a compound is formed between it and the globulins. A similar series showed that the antimony salt has no such effect; on the contrary, it annuls that of " Bayer 205." It is, therefore, inferred that the globulin-Bayer compound is changed

by the addition of antimony. The first of these experiments may help in explaining the action of those drugs which have an effect upon parasitic organisms *in vivo*, but appear to be inert *in vitro*.*

HORNBY (H. E.) & BURNS (William A.). **An Attempt, with the Aid of Drug Treatment, to keep Cattle in a Tsetse-fly Belt.**—*Jl. Comp. Path. & Therap.* 1926. Mar. Vol. 39. No. 1. pp. 30–38.

The work here recorded is being done in connexion with SWYNNERTON'S experiment of cleaning large areas of bush. The attempt is being made to protect the oxen used for ploughing up the cleared and stumped areas in the neighbourhood of bush.

Two lines of treatment are being followed. These are BERG'S system of injecting a mixture of 2·5 g. " Bayer 205 " and 1 g. of tartar emetic at intervals of a fortnight (see this *Bulletin*, Vol. 14, No. 1, pp. 5–6), and the injection of tartar emetic alone.

A batch of 30 bulls was used. Ten of these received tartar emetic alone (25 cc. of 4 per cent.), 10 received 2·5 g. of " Bayer 205 " and 1 g. of tartar emetic in 25 cc. of water, and the remaining 10 were controls.

Of the controls 6 died within 3 months, and none survived 8 months. Of the 10 receiving tartar emetic once a fortnight (approximately) 2 died within seven months, and the remaining 8 were in marketable condition, although infected at that time.

Of the 10 treated with the two drugs, 3 were dead within seven months, 1 was very ill, but the surviving 6, although infected, were in marketable condition.

The parasites responsible for the infections were *T. congolense* and *T. vivax*, and the fly was *G. swynnertoni*.

MIESSNER (H.) & BERGE (R.). **Die trypanozide Kraft des Arsenobenzol-Präparates "Albert 102."** [The Trypanocidal Properties of " Albert 102."]—*Deut. Tierärzt. Woch.* 1926. Apr. 17. Vol. 34 No. 16. pp. 285–289.

" Albert 102 " is a chrome yellow powder which is readily soluble in water, particularly with slight warming. It is also soluble in warm glycerin. It is slightly alkaline in reaction.

It may be used for subcutaneous or intravenous injection, or, in glycerin, as an unguent.

A small number of tests were carried out with a view to ascertainng its bactericidal qualities, but it was found to be practically ineffective.

In vitro tests with trypanosomes showed that the addition of 1 drop of a 1 per cent. solution to 2 cc. of a suspension of *T. equiperdum* obtained from a mouse rendered the trypanosomes motionless in a few minutes.

In animal tests mice and guineapigs infected with *T. brucei* and *T. equiperdum* were used.

It was found that a 50 per cent. solution in glycerin rubbed into the abdominal wall prior to inoculation protected mice from infection when the interval between the operations was 3 days, but not 6 days.

When the drug (doses not stated) was injected subcutaneously at the same time that intraperitoneal inoculation was carried out, the mice failed to become infected.

Summarized by Dr. H. Harold Scott.

VAN SACEGHEM (René). **L'action du tryparsamide dans les trypanosomiases animales.** [Tryparsamide in the Treatment of Animal Trypanosomiasis.]—*Ann. Soc. Belge Méd. Trop.* 1926. Jan. Vol. 5. No. 2. pp. 121–123.

The author gives details of experiments the results of which confirm his views that Tryparsamide has no therapeutic value for the treatment of animals infected with *T. congolense* and *T. cazalboui* var. *vivax*. Doses of 0·066 g. per kilo live weight are toxic, but do not cause disappearance of trypanosomes from the circulation.

VAN DEN BRANDEN (F.). **L'action du tryparsamide chez les trypanosés chroniques.** [Tryparsamide in Chronic Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 8–11.

The author reports cases which he considers support his view that failures in the treatment of chronic trypanosomiasis with tryparsamide are due either to the simultaneous existence of syphilis or to a previous treatment with arsenic which has rendered the parasites fast to the drug.

LAIGRET (J.). **Traitement de la trypanosomiase humaine par la tryparsamide.** [The Treatment of Human Trypanosomiasis by Tryparsamide.]—*Ann. Inst. Pasteur.* 1926. Mar. Vol. 40. No. 3. pp. 173–193.

The author finds tryparsamide at least as good as atoxyl in the first stage, and far superior to it in the second stage. The remarkable apparent recoveries obtained in advanced cases have exercised a very favourable moral effect upon the natives.

The drug is equally effective in pian and syphilis.

VAN DEN BRANDEN (F.). **Le stibosan "préparation Heyden No. 471" dans le traitement de la trypanosomiase humaine.** [Stibosan "Heyden No. 471" in the Treatment of Human Trypanosomiasis.]—*Bull. Soc. Path. Exot.* 1926. Mar. Vol. 19. No. 3. pp. 193–196.

The author gives details of five cases treated.

He concludes that stibosan has a trypanocidal action, but that this action is slower than that of tartar emetic, although more rapid than that of stibenyl.

It is not of great value for the treatment of chronic cases.

BARBACCI (P.). **Sur un cas de *Leishmania infantum* observé à Sienne (Italie).** [A Case of *Leishmania infantum* at Sienna.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 11–14. With 1 text fig.

The case was detected in a four-year-old child who had, at the age of two, lived at Monaco for some weeks. The first symptoms appeared about seven weeks after arrival there.

On return to Sienna a definite diagnosis was established by spleen puncture. Attempts to cultivate the parasite from the spleen failed,

and blood examination was negative. Intravenous injection of antimony tartrate was without avail. Death took place from tuberculous broncho-pneumonia.

It is not certain by any means that the disease was contracted at Sienna, more particularly as there is in the clinique there another case of the disease in a child. This child had also spent some months in Monaco. In this second case cultures from the spleen have been positive.

TRIFFITT (Marjorie J.). **Some Sporozoan Parasites found in the Intestinal Wall of Bennett's Wallaby** (*Macropus bennetti*).—*Protozoology*. 1926. Jan. No. 2. pp. 31–46. With 17 text figs.

Special attention is drawn to the fact that parasites described in this paper were all studied in fixed tissues. Measurements are therefore not to be taken as indicative of the sizes of the living organisms.

A parasite resembling *Ileocystis macropodis* was found measuring in the apparently mature phase from 40 $\mu$ to 70 $\mu$ in diameter. A fairly complete range was found in which the smallest uninuclear forms measured about 8 $\mu$ in diameter up to the large mature forms mentioned. The smallest organisms occurred in the intestinal epithelium and submucosa, but the mature forms were seen in the submucosa only.

As the parasite increases in size repeated division of the nucleus occurs. Finally, the parasite is found to be filled with spores, but the stage of transition from nuclear division to spore formation was not seen.

During the process the "outer margin of the envelope tends to lose its regular definite contour, and short ill-defined processes project from it at irregular intervals. At the same time, the substance of the envelope shows a faint striation, indicating fibrillar structure, and it may, especially in the thickened region round the nucleus, become more or less coarsely vacuolated."

In the thickened submucosa lymphocytes were found containing the spores of some parasite. Only a single stage of development was observed. In these the invaded lymphocyte was greatly distended and in a vacuole-like space in the cytoplasm the somewhat club-shaped, curved spores were found. Twelve to 20 such spores could be found; but in no case was any residual body detected. Free spores were found in intercellular spaces. They measured 6 $\mu$ by 2 to 2·5 $\mu$.

It is suggested that the organism is identical with *Lymphocystis macropodis* (Gilruth & Bull 1912).

Between the fibres of the muscular layers exactly similar spores were found, either isolated or in groups. In one part of the intestine a very heavily, but nevertheless localized, invasion with a coccidium was found.

Merozoites ranged in number from 8 to 32, and they measured 8 $\mu$ by 2 to 2·5 $\mu$.

The microgametocytes and microgametes possessed the usual characters.

The faeces of other wallabies were examined and what is held to be the oocyst of their parasite was found. These tended to be slightly flattened on one side and measured 22–34 $\mu$ by 10–17 $\mu$. The wall showed three layers, of which the central one was brownish in colour.

Sporocysts were fully developed within 48 hours of the passage of faeces. There was no residual body in the oocyst, but one was always present in the sporocysts.

The parasite is *Eimeria macropodis.*

KOLPAKOFF (T. A.). **Le rôle du suc gastrique dans l'immunité naturelle des lapins dans la coccidiose.** [The Part played by the Gastric Juice in Natural Immunity of Rabbits to Coccidiosis.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 266–268.

An attempt was made by the author to ascertain the effects of gastric juice, pancreatic juice, intestinal secretions, and bile, upon coccidia in vitro. Suspensions of coccidia were placed in tubes containing the various alimentary juices and finely powdered charcoal was added to inhibit the growth of moulds. The tubes were incubated at 30°–35° C., and some were maintained at room temperature. The tests were apparently carried out with unsporulated organisms, and the observations were directed to the effect of the various secretions upon the process of sporogony.

There was no sporogony in any of the juices with the exception possibly of the gastric secretion. In control preparations in salt solution, distilled water, and tap water development took place.

YAKIMOFF (W. L.). **Sur la question de l'*Eimeria stiedae* du lapin.** [*Eimeria stiedae* of the Rabbit.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 269–271.

As the result of observations carried out under varying conditions Yakimoff finds that under ordinary conditions of temperature and light and in a moist medium the process of sporulation requires a month for its completion.

A single case is recorded: in 1922 in a young rabbit, which passed no oocysts in the faeces, and showed no lesions in the liver, organisms found in smears from the lymphatic glands (exact glands not stated.—Ed.) were identified as young coccidia. It is said that the theory of invasion of the liver by either the blood stream or the lymph stream is plausible.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.), MARKOFF (E. N.) & RASTEGAÏEFF (E. F.). **La coccidiose des porcs en Russie.** [Coccidiosis of the Pig in Russia.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 263–266.

42·8 per cent. of the pigs examined in the slaughterhouses at Petrograd have been found to be infected with coccidia.

The parasites measured 19·4–21 $\mu$ by 9–14·4 $\mu$.

YAKIMOFF (W. L.). **Les coccidioses des animaux domestiques en Russie.** [The Coccidioses of the Domesticated Animals in Russia.]—*Bull. Soc. Path. Exot.* 1926. Apr. Vol. 19. No. 4. pp. 262–263.

Yakimoff and his pupils have detected coccidia in the faeces of cattle, sheep, goats, pigs, poultry, and snakes.

This brief paper is a preliminary note, simply recording occurrence.

SHEATHER (A. L.). **A New Species of Coccidium of the Sheep.**—*Jl. Comp. Path. & Therap.* 1926. Mar. Vol. 39. No. 1. pp. 79–82. With 1 plate.

The parasite here described is in all probability identical with that described by SPIEGL (see this *Bulletin*, Vol. 13, No. 3, p. 84).

PERARD (Ch.). **Sur la Coccidiose du Rat.** [Coccidiosis of the Rat.]—*Rec. Méd. Vét.* 1926. Feb. Vol. 102. No. 4. pp. 120–124.

The disease in rats is confined to the intestine, and as a rule produces serious results in animals under 6 months old only. The author states that polyuria is a constant symptom in rats as in other animals affected with coccidiosis. Appetite is maintained until near the end. In acute cases death takes place in a week or ten days, but if the disease runs a more chronic course recovery as a rule takes place. In acute cases there is very extensive destruction of the intestinal mucous membrane, and secondary bacterial infections frequently occur.

The parasite is a rather rounded one and measures on an average 23 $\mu$ by 18 $\mu$. Sporulation requires from two to four days, according to the temperature. Sporoblast formation leaves no residual body, but each sporocyst contains a large residual body when sporozoite formation occurs.

The author believes that the experiments carried out by himself and others indicate that the coccidium is not identical with *E. falciformis* of the mouse.

He draws attention to the fact that while there is a family resemblance between rats and mice, there is one anatomical feature in which they differ from each other markedly, and that is that whereas the mouse has a gall bladder, the rat has none.

YAKIMOFF (W. L.). **Der Kampf gegen die Rinderpiroplasmose in Petrograder (Leningrader) Gouvernement im Jahre, 1924.** [The Campaign against Bovine Piroplasmosis in the Petrograd Province in 1924.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1926. May. Vol. 29. No. 2. pp. 83–99.

The bulk of this paper is made up of tabular statements giving various combinations of factors, e.g. age of animals, the period of infection at which treatment was given, the intervals elapsing between the administration of treatment and the drop in temperature, the relationship of the drop of temperature to the disappearance of redwater in point of time.

The average percentage mortality after treatment with trypanblue is 8, but mortality is lower in cases which come under treatment early than in those in which it is delayed.

A few cases have been treated with satisfactory results with ichthargan and luargol, but their number is too small to be of any value for appraising the worth of these drugs.

YAKIMOFF (W. L.). **La campagne anti-piroplasmique dans le gouvernement de Pétrograde en 1925.** [The Campaign against Piroplasmosis in the Province of Petrograd in 1925.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 14–15.

Ichthargan, protargol, luargol, silver salvarsan, arrhénal, and apiroplasmine, have been used for the treatment of 773 animals.

From a tabular statement it appears of 743 animals treated with one or other of these drugs 44, or 5·9 per cent., died; of 121 left untreated 52, or 42·9 per cent., died.

Apiroplasmine is a mixture of drugs the composition of which is given below.

YAKIMOFF (W. L.). **L'ichtargan dans le traitement de la babésiellose bovine du nord-ouest de la Russie.** [Ichtargan in the Treatment of Bovine Babesiellosis in North West Russia.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 16–18.

This brief paper contains tabular statements of the number of animals treated, the time of disappearance of haemoglobinuria, and the time elapsing before the temperature fell.

In native animals the percentage mortality after treatment was 2·3, in imported animals 11·8.

No details of dosage, etc., are given.

YAKIMOFF (W. L.), GALOUZO (J. G.), LOUKIANOFF (W. A.) & FURIKOFF (M. J.). **L'apiroplasmine dans le traitement de la piroplasmose bovine.** [Apiroplasmine in the Treatment of Bovine Piroplasmosis.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 18–21.

Apiroplasmine is prepared by G. ALESSANDRINI in Rome and has the following composition:—

| | |
|---|---|
| Cacodylate of Caffeine .. .. | 30 per cent. |
| Benzoin monocarbonic Acid .. | 10 per cent. |
| Sodium phenate .. .. .. | 2 per cent. |

As a result of trial on four cases the authors conclude that the solution is not of any great value.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.), GALOUZO (J. P.), LOUKIANOFF (W. A.), WOITZEKHOWSKY (A. M.) & YAKOWLEFF (S. P.). **Le traitement de la piroplasmose bovine par le salvarsan à l'argent (Silbersalvarsan).** [The Treatment of Bovine Piroplasmosis by means of Silver Salvarsan.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 34–41.

Eight cases have been treated by intravenous injections of 1 per cent. solution in sterile water, made up without heat.

The bulk of the paper is occupied by details of leucocyte counts before and after treatment.

Seven of the animals recovered, the dose in each case being 1 gramme of the drug.

The authors consider that silver salvarsan is useful for the purpose, but that possibly larger doses, up to 1·5 g., should be given.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.), GALOUZO (J. G.), LOUKIANOFF (W. L.), RASTEGAÏEFF (E. F.), ROUMIANZEFF (E. W.) & WOITZEKHOWSKY (A. M.). **Essais de traitement de la piroplasmose bovine par le protargol.** [The Treatment of Bovine Piroplasmosis by Protargol.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 41–49.

The drug was used in a 1 per cent. solution in sterile water, solution taking place in the cold, and was injected intravenously. It is perhaps

a little difficult to be sure that one may rely upon the tabular statement of the results obtained, as it appears to contain at least one misprint.

Thirteen cases are referred to. Ten of these recovered after doses ranging from 0·5 to 1·5 g. of the drug.

Two cases were also treated with ichthargan, and one further animal died.

BRAGA (Americo) & FONSECA (Affonso). **Contribuição experimental ao estudo hematologico e urologico da Anaplasmose bovina** [Haematological and Urological Studies in connexion with Bovine Anaplasmosis.] Rio de Janeiro. Posto Exp. Vet. Districto Federal. 15 pp. With 2 charts.

This paper contains the results of examination of the blood and urine of six bovines before, during, and after an attack of anaplasmosis produced by inoculation.

It appears that the amount of urea in the blood rises during the attack as a rule and subsequently falls very considerably.

The salts in the urine fall during attack and then rise to a little above the normal level during recovery.

There is a very marked drop in the haemoglobin figure of the blood.

The corpuscular content may fall to about 30 per cent. of normal.

The leucocyte formula is also given at the three stages.

DESCAZEAUX (J.). **Spirochétose cutanée du porc.** [Cutaneous Spirochaetosis of the Pig.]—*Bull. Soc. Path. Exot.* 1926. Feb. Vol. 19. No. 2. pp. 86–88.

Cutaneous spirochaetosis of the pig, which has been recorded in many parts of the world, is now reported from Chili.

The disease is enzootic in certain places, attacking particularly the young pigs and causing ulceration of the mucous membranes and swellings on the head and testicles. The lesions first appear as dark red patches, and later necrosis and shedding of the superficial layers occurs.

The spirochaete, which is constantly found in the lesions, is a slender organism measuring 7 to 10$\mu$ and showing 2–3 turns.

All attempts to cultivate it have failed, and attempts to infect guineapigs and rabbits have not succeeded. Similarly, intracutaneous and subcutaneous inoculation of healthy pigs does not transmit the infection. No evidence has been obtained that the pig louse (*Haematopinus suis*) plays any part in the transmission of the disease.

In almost every case the author has found in pus from "open" lesions "actinomycotic grains," but it has not been possible to produce an infection with this organism. It is suggested that it is in the nature of a secondary invader.

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BERGE (R.). **Ein Fall von Hühnerspirochätose in Deutschland.** [A Case of Spirochaetosis of the Fowl in Germany.]—*Deut. Tierärzt. Woch.* 1926. March 6th. Vol. 34. No. 10. pp. 169–172. With 1 text fig.

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## DISEASES DUE TO METAZOAN PARASITES.

McKAY (A. C.). **An Intermediate Host of** *Fasciola hepatica* **in New South Wales.**—*Jl. Australian Vet. Assoc.* 1926. March. Vol. 2. No. 1. pp. 9–14.

The author's investigations have been concerned with the determination of the fresh-water molluscs to be found in districts of New South Wales known to be infested with fluke, and the identification of the snail or snails concerned in the transmission of *Fasciola hepatica*. In the course of visits to various parts of the country the author has obtained specimens of the following snails :—

*Bullinus gibbosus, Limnaea lessoni, L. brazieri, B. productus, B. proteus, B. aciculata, B. fusiformis, B. tenuistratus, Segmentina australiensis, B. hainesii, Gabbia australis, Planorbis macquariensis, B. pectorosus.*

Examination for rediae and cercariae has not yet been completed for all species. *L. brazieri* has, however, been found to be heavily infested.

Three types of cercariae were found in *Limnaea brazieri*, and one of these was proved by experiment to be that of *Fasciola hepatica*.

*L. brazieri* was found only in alkaline waters, and cercariae only escaped in water of the same reaction. The temperatures of the water ranged from 15° to 24° C. A single snail of this species may excrete over a thousand cercariae. These are capable of encysting on grass or even free on the surface of water, but contaminated herbage is the more serious source of danger.

The author is unable to confirm BRADLEY's statement that fluke eggs do not develop or develop very slowly at cold room temperatures and in the dark. His own experience is opposed to this.

ISSAITCHIKOFF (J. M.) & WEINBERG (M.). **Sur le développement du Trematode** *Cryptocotyle concavum* **(Creplin, 1825).** [The Development of the Trematode *Cryptocotyle concavum* (Creplin, 1825).]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 305–307. With 1 text fig.

This parasite is not found exclusively in birds, but also in dogs, cats, and other animals. Infestation results from the ingestion of fish harbouring the larvae in the intestine and the gills.

ALCEO (Gurini). **La "Bilharzia crassa" negli ovini Sardi.** [*Bilharzia crassa* in Sardinian Sheep.]—*La Clin. Vet.* 1926. Feb. Vol. 49. No. 2. pp. 78–81.

The author states that this is in the nature of a preliminary note, as his observations are not yet complete. He has found the parasite in 5 animals out of about a hundred examined.

SCHWARZ (Benjamin). **Parasitic Nematodes from China.**—*Proceedings United States National Museum.* 1926. Vol. 68. Article 13. pp. 1–10.

"The lists of species given in the following pages contain not only many new records, but also represents an attempt to systematize our knowledge of these parasites from China."

A new species *Subulura chinensis* from *Scops stictonotus* is described. For the rest the interest of the paper is mainly in connexion with distribution of known parasites.

CASTELLI (Agostino). **Una nuovo specie di Nematode** (*Micronematodum ovis*, **n. sp.**) **patogena per gli ovini.** [A New Species of Nematode (*Micronematodum ovis* n. sp.) of the Sheep.]—*La Nuova Veterinaria.* 1926. March 15. Vol. 4. No. 3. pp. 64–68.

The worm described is held to be accountable for a large number of deaths in sheep in Sardinia. The symptoms were those of wasting and anaemia, and in many instances death occurred within a fortnight of the onset of symptoms. The parasites were detected in minute whitish nodules present in the lungs.

As the worm appears to be quite unlike anything previously described, the author suggests the creation of a genus *Micronematodum* for it, and names the species as above.

The adult worms are said to have a length ranging from 25 to 30 $\mu$, and a maximum thickness of 2 $\mu$. [Measurements are as in original.]

The larvae measured 10 to 12 $\mu$ by 2 to 3 $\mu$, the eggs 8 to 9 $\mu$ by 4 to 5 $\mu$. In some of these the larvae could be distinguished.

SEBASTIANO (Raffaelli). **Presenza di Gongylonema nell'apparecchio digerente degli Animali da macello di Ravenna e dintorni.** [Gongylonema in the Alimentary Tract of Butchers' Animals at Ravenna.]—*La Clin. Vet.* 1926. May. Vol. 49. No. 5. pp. 296–301. With 2 text figs.

The author examined the carcasses of 1,970 bovines and found gongylonema in the oesophagus of about 20 per cent. The majority occurred in the lower part of the gullet.

In the case of sheep, of which 2,800 were examined, the percentage of infected animals was 70. In some of these immense numbers (up to 200) were detected.

Three hundred and thirty pigs were examined and only one was found infected. In this case 12 worms were present.

The organs of 15 horses were examined, but the parasite was not found.

Four hundred and ninety head of poultry were examined and small specimens of gongylonema were found under the lining membrane of the crop of one of these. These measured about 3·5 cm. long.

JACK (R. W.). **Tsetse Fly in the Lomagundi District.**—*Rhodesia Agric. Jl.* 1926. Feb. Vol. 23. No. 2. pp. 134–150. With 2 plates and 1 map; and No. 3. pp. 257–267. With 2 plates.

As a result of the spread of tsetse in the area and the losses of cattle a conference was held at Salisbury in April 1925 with a view to taking steps to deal with the danger.

The author describes at some length the area of country to be covered by the experiment undertaken.

There has been an increase in game in the district of recent years, and this is thought to be due in part to the low market value of hides, etc., and in part to the detection of sleeping sickness in the Sebungwe district, the presence of tsetse fly affording protection to the game.

Records show that during recent years there has been a considerable extension of the fly area.

Two undertakings were considered at the conference, viz. : The clearing of a barrier to arrest the spread of the fly and a vigorous campaign against game by means of controlled hunting.

The objections to clearing a barrier are that it is not known how wide the clearing would have to be, and the exact limit of the fly being unknown the position of the barrier would present great difficulties.

In the author's opinion the clearing would have to be some miles wide, and further he thinks that the policy of elimination of game by hunting is not likely to achieve the desired result.

Grass fires as tested by SWYNNERTON in East Africa do not appear to offer any chance of reducing the danger in Rhodesia on account of the differences in the types of country involved, and a further objection is the difference in the density of population and the corresponding difficulty of burning effectively.

The author proceeds to describe in detail the formation of barriers on either side of an area freed as far as possible from game, with the idea of interposing a gameless buffer zone between the fly and the farms.

A line 100 yards wide has been cleared on each side of the area and through the centre of this has been run a barbed wire fence 6 feet high.

An account is given of the clearance of the area of game.

RODHAIN (J.). **Existence d'un foyer de Glossines du groupe** *morsitans* **dans le Bas-Ouellé.** [A Centre of Glossina of the Morsitans Group in Lower Ouellé.]—*Bull. Soc. Path. Exot.* 1926. Mar. 10. Vol. 19. No. 3. pp. 197–198.

The author records the capture of a specimen of *G. morsitans* near the village of Caré—between the parallels 4° and 5° N. and near the parallel 25° E.

SMIT (Bernard). **Sheep Blow-Fly Control. Fly-traps and their Construction.**—*Jl. Dept. Agric. Union of S. Africa.* 1926. Feb. Vol. 12. No. 2. pp. 132–143.

In controlling flies trapping is only a supplementary measure. The first step is the destruction of breeding places. This has been dealt with in a previous article (*ante*, p. 17).

The number of flies caught is not always an indication of the amount of good that trapping is doing. The destruction of a small number of flies in winter is responsible for a great reduction in number during the summer.

The improved trap described by the author is constructed as follows :

Two paraffin cans are placed one above the other and held in position by a wide strip of sheet metal.

The upper tin is the trap proper and contains a wire gauze cone or pyramid with its apex about three inches from the top of the tins.

Figs. 1, 2 and 3 (pp. 96–97) show more clearly than a lengthy description the details of construction of the trap.

Decaying meat forms a very good bait, but it must be rememb red that putrefaction is more rapid in summer than in winter and that therefore bait remains attractive longer in the cold weather. The bait receptacle is filled to within an inch of the fly entrances, and a quart or so of water poured over it, but the water should contain a weak solution

of tobacco to prevent maggots developing in the bait. One part of tobacco extract containing 8 per cent. nicotine in 50 parts of water is effective.

Traps should be set near rivers and dams and in sheltered bush rather than in the open. Similar traps baited for house flies should be kept near the house, preferably close to the stables.

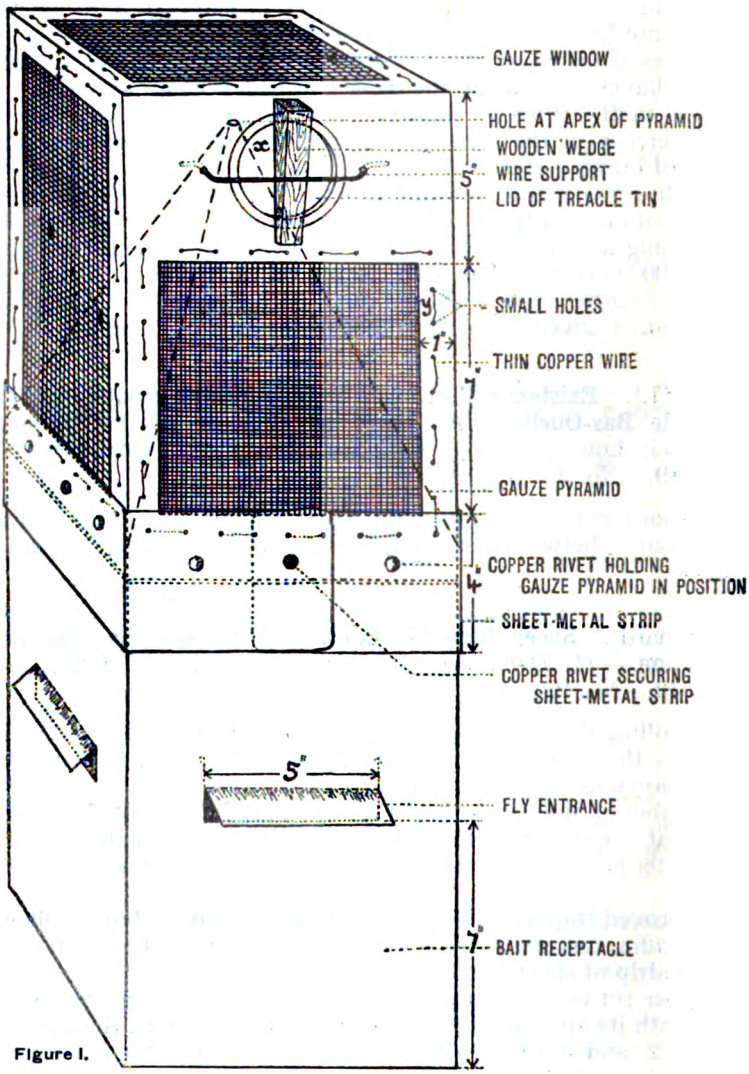


Figure I.

[Reproduced from *Jl. Dept. Agric. Union of S. Africa.* 1926. Vol. 12. No. 2.]

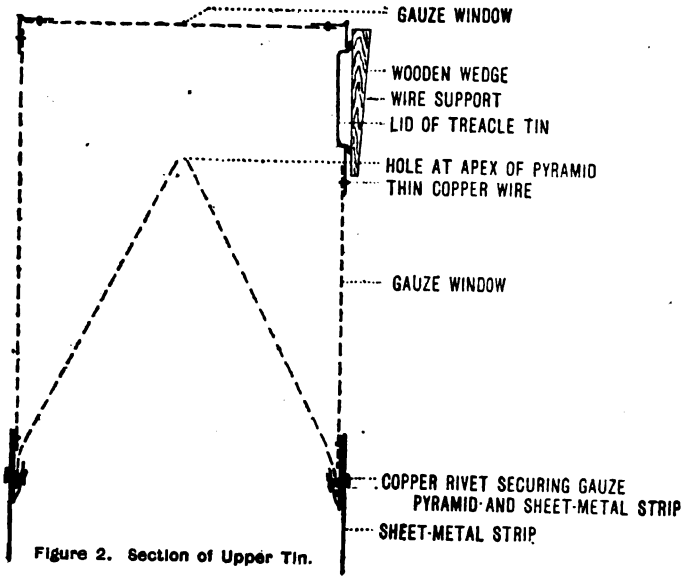


Figure 2. Section of Upper Tin.

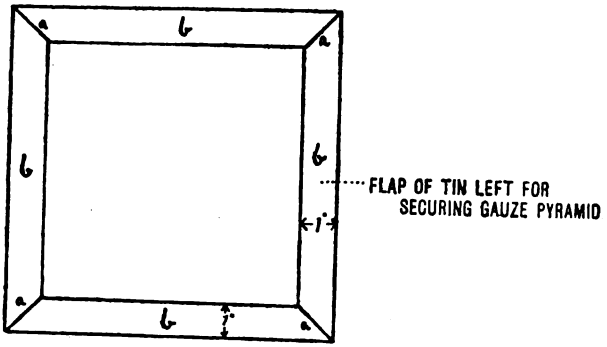


Figure 3. Bottom of Upper Tin.

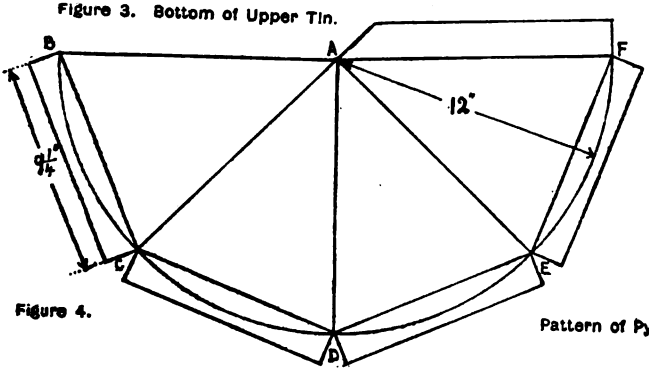


Figure 4. Pattern of Pyramid.

[Reproduced from *Jl. Dept. Agric. Union of S. Africa.* 1926. Vol. 12. No. 2.]

DROUIN (V. F.). **Prevention et Traitement de l'hypodermose du Boeuf.** [Prevention and Treatment of "Hypodermosis" of the Ox.]—*Rev. Gén. Méd. Vét.* 1926. April. Vol. 35. No. 412. pp. 184–195.

A new campaign against *Hypoderma bovis* is to be begun, the previous plan having been interrupted by the war, and in this paper the author summarizes the attempts already made to deal with this pest and gives an account of his own experiments.

Spraying the parts of the animals with liquids repellent to the fly has not so far proved successful in practice; dipping tanks which are used for the destruction of ticks have been proved to reduce the damage done by hypoderma, but the expense prevents general adoption for the latter purpose alone.

Something can be done in certain cases by stabling or providing shade for animals under 18 months, which are the most frequently attacked, during the day from June to September. But the author thinks that the most practical way of attacking the problem is to deal with the larvae in the definitive position under the skin during the spring. The larvae should be attacked as soon as possible after they establish themselves in this position, as they are then more vulnerable, and if killed are readily absorbed without suppuration.

Hand extraction is obviously impossible when animals are heavily infested, and further it is to be remembered that crushing a larva in situ may lead to the production of alarming symptoms.

The author enumerates various substances which have been suggested as local dressings for the destruction of the larvae, but to nearly all of these some objection can be raised. He has had most favourable results with paradichlorobenzene, and this he used as an ointment made up with 5 parts of vaseline to one of the drug.

The hair is clipped over the orifice and the ointment applied with a spatula. It may be repeated twice with intervals of a few days.

The drug is not very expensive, costing 6 to 10 francs per kilog., and is readily obtained commercially.

Another substance upon which the author based considerable hope of success was fluosilicate of soda.

The results, however, were not so good, and in addition the drug was more costly.

KEANE (P. M.). **A Light-Trap for Flies.**—*Jl. Roy. Army Med. Corps.* 1926. June. Vol. 46. No. 6. pp. 450–452. With 3 text figs.

The trap described is inefficient unless the room in which it is installed can be made absolutely dark. A "chink" under the door, or some reflection inside the room may render the trap useless.

Essentially the trap comprises a box with a small opening on one side and a large one on the other. The small opening (about 4 inches by 1) has fixed in it two pieces of glass. One of these is in close contact with the bottom and sides of the opening. The other overlaps it leaving a space of about ¼ inch between them and with a similar space between its top edge and the margin of the opening. The large opening is glazed. The trap is fixed with the small opening towards the interior of the room. When the room is darkened the flies attempt to make their way out and pass between the overlapping pieces of glass into the box, where they can be killed with pyrethrum.

COMPTON (A.). **Phthiriasis of the Mouse,** *Haematopinus muris,* **with Observations on Treatment by Salicylidene Compounds.**—*Vet. Jl.* 1926. May. Vol. 82. No. 5. pp. 255–257.

The author describes the clinical picture presented by infested mice, and gives a description of the parasite.

Photomicrographs of the male and female are given.

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ARNDT (H. J.). **Zur Pathomorphologie zooparasitärer Leberveränderungen (Echinokokkose und Distomatose).** [The Histology of the Lesions caused by Echinococcus and Distomes in the Liver.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1926. May 3. Vol. 29. No. 2. pp. 100–123.

LIESZ (J.). **Über eine Demodex Invasion bei einer Ziege.** [A Case of Follicular Mange in a Goat.]—*Deut. Tierarzt. Woch.* 1926. Feb. 6. Vol. 34. No. 6. pp. 93–95. With 3 text figs.

MONTGOMERIE (R. F.). **The Treatment of Liver Rot with Preparations of Male Fern. A Historical Survey.**—*Jl. Comp. Path. & Therap.* 1926. Mar. Vol. 39. No. 1. pp. 38–42.

SKRJABIN (K. I.). **Infestation simultanée d'un oiseau par 17 espèces d'helminthes.** [The Simultaneous Infestation of a Bird with Seventeen Species of Worms.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 307–308.

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## BACTERIAL DISEASES.

FUJIMURA (Seiichi), TOYOSHIMA (Takeo) & SUENAGA (Takeo). **Contribution to the Biological and Serological Study of** *B. abortus equi.* *Jl. Jap. Soc. Vet. Sci.* 1926. March. Vol. 5. No. 1. pp. 15–18.

The bacillus of mare abortion elaborates a toxin which is most potent at about 5 weeks' incubation, and after that declines. The filtrate, by intravenous injection of ·05 to 1·0 cc. into rabbits and guinea-pigs, caused dyspnoea, weakness of the hind legs, diarrhoea and death in from 30 to 70 minutes. In some animals recovery took place.

Subcutaneous injection of sublethal doses of filtrate protected against a second dose a fortnight later.

By agglutination tests the authors have been able to distinguish the organism from members of the paratyphoid-enteriditis group.

In order to obtain the typical dry wrinkled growth upon agar it is essential that the culture medium should have a pH lying between 6·0 and 8·4.

OHLSSON (Lorenz). **Testikelförändringar hos tjur förorsakade av infektion med Bangs Abortbaciller.** [Changes in the Testicle caused by Bang's Bacillus.]—*Skandinavisk Vet.-Tidsk.* 1926. Feb. Vol. 16. No. 2. pp. 25–37.

The author describes the findings in two cases of orchitis caused by the abortion bacillus.

There was marked hyperplasia of the connective tissue and necrosis of the essential tissue.

CONNAWAY (J. W.), DURANT (A. J.) & NEWMAN (H. G.). **Contagious Abortion Investigations.**—*Missouri Station Bulletin, 228.* 1925. pp. 84–86. Ex. *Exp. Station Record.* 1925. Oct. Vol. 53. No. 5. p. 480.

Abortion in swine is due to *B. abortus* Bang., and the general features of the disease are identical in the two species. Newborn pigs give positive serum tests as a result of ingestion of antibodies with colostrum. Occasionally antibodies make their escape into the circulation of pigs in utero.

It is suggested that there is a lesion of the placenta to account for this.

The duration of the persistence of antibodies ingested with the colostrum in the serum appeared to be proportional to the amount of antibody ingested.

NELSON (J. B.). **A Rapid Method for the Isolation of *Bacillus abortus* from Uterine Exudate and Diseased Placenta.**—*Jl. Exp. Med.* 1926. Mar. 1. Vol. 43. No. 3. pp. 331–338.

The author describes a technique to replace the method of guineapig inoculation with subsequent cultivation from the spleen after about 3 weeks. It is based upon SMITH's observation that whereas in the peritoneal cavity most bacteria, other than spores, are killed, the abortion is not.

After intraperitoneal inoculation with the suspected material one of the guineapigs is chloroformed to death on the fifth day. The peritoneal cavity is flushed out thoroughly with several cubic centimetres of broth, and after it has been introduced and withdrawn a number of times half a cubic centimetre of the broth is used for the inoculation of agar slants. Then the spleen is exposed and a fragment is torn off and transferred to each of the slants. The tubes are incubated in a jar with an atmosphere of 5 per cent. carbon dioxide. Growth develops in 2 to 7 days and usually without contaminations. Should no growth take place or should there be heavy contamination the second guineapig is used in the same way. Should this fail the third is used for spleen culture at three weeks.

It is noteworthy that in no case, out of twelve of which details are given, were any gross lesions found in the spleen.

The organism was obtained from the spleen as early as the third day, and regularly by the fifth day.

SMITH (Theobald). **Variations in $CO_2$ Requirements among Bovine Strains of *Bacillus abortus*.**—*Jl. Exp. Med.* 1926. Mar. 1. Vol. 43. No. 3. pp. 317–325.

This paper does not lend itself to abstraction, as it is largely concerned with a description of technique for cultivation purposes and with detailed statements of the results obtained.

The author's conclusions are as follows:

Strains of *Bacillus abortus* freshly isolated vary in their $CO_2$ requirements.

The origin and sources of the strains growing with less dependence on $CO_2$ (or sealing) may be in vaccinal strains or possibly in continued existence in the udder. The importance of these possibilities makes it desirable that all strains isolated should be subjected to some such test as is outlined in these pages.

SMITH (Theobald) & LITTLE (Ralph B.). **Further Data on the Effect of Vaccination against Bovine Infectious Abortion.**—*Jl. Exp. Med.* 1926. March 1. Vol. 43. No. 3. pp. 327–330.

The authors give details of the results obtained using dead and living vaccines. Four doses of dead vaccine were given, two before, and two after service. A single dose only of living vaccine was given.

The abortion rate among the herd (118 head) was 27·1 per cent. After dead vaccine it was 26·3 the first pregnancy (34 head) and 23·3 the second (30 head). Of those given live vaccine (9 animals) none aborted at the first or second pregnancy.

BUCK (J. M.) & CREECH (G. T.). **Abortion-Bacterin Treatment of Cows having Udders infected by** *Bacterium abortus*.—*Jl. Agric. Res.* 1925. Oct. Vol. 31. No. 7. pp. 663–684.

Experimental work was carried out with a herd in which contagious abortion was known to have existed for about 5 years. Thirty of the animals were reactors.

Repeated injections were given of a suspension of the organism containing approximately 1 billion organisms per cubic centimetre. The suspension was killed by heating in a water-bath at 60° C. for half an hour.

The bulk of the paper consists of tabular statements dealing with various aspects of the problem.

The authors conclude that repeated injections of dead bacilli do not achieve any result with regard to clearing up abortion infection in the udder.

From their results there emerges the fact that eight out of a group of 15 cows with infected udders continued to pass out infected milk for about 2 years.

Serum may continue to give positive agglutination tests for at least a year after disappearance of infection from the udder, as indicated by guineapig inoculation tests.

WITTE (J.). **Vergleichende Untersuchungen über die Verwertbarkeit der Komplementbindung mit aktivem und inaktivem Serum sowie mit der Agglutination bei der Diagnose des seuchenhaften Verkalbens.** [Comparative Experiments with Active and Inactive Serum in the Complement Fixation Test and with Agglutination in the Diagnosis of Contagious Abortion.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1924. Nov. Vol. 27. No. 3. pp. 207–217.

The author finds that while the agglutination test yields sharply defined diagnoses, there are cases in which results are doubtful, and these are detected by the complement fixation test.

If active serum is used for the complement fixation test the risk of deviation of the complement is avoided; the results with positively reacting sera are in agreement with those given by the agglutination test.

Haemolytic sera which with inactive sera inhibit haemolysis in a nonspecific manner, with active sera behave in a manner that leaves no room for doubt.

NICOLAS (E.). **Intradermo-vaccination anticharbonneuse en deux temps des chevaux et mulets de l'armée française du Levant en 1925.** [Intradermal Vaccination against Anthrax of Horses and Mules in the French Army of the Levant in 1925.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 336–337.

During the years 1919 to 1923 no anti-anthrax vaccinations were carried out owing to the danger of the subcutaneous method.

In 1924 8,912 animals were vaccinated intradermally, two doses being given at a six-days' interval. Only four deaths occurred from anthrax. These were sporadic. There were no actual outbreaks. During 1925 the same procedure was adopted, and 6,904 animals were vaccinated. There were only 5 deaths. It is the more remarkable since 1925 was an "anthrax year," and the losses, mainly among sheep, but also involving cattle, pigs, and horses, amounted to over 7,000 head.

Local swellings as a result of vaccination were about 5 times as frequent in 1925 as in 1924. The winter was exceptionally severe, and is blamed for this increase in the number of local reactions.

The inoculations are carried out during the cold weather.

TATIN & VELU. **La vaccination du cheval contre le charbon bactéridien par voie intradermique en un temps.** [Intradermal Vaccination of Horses against Anthrax with a Single Dose.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 5. pp. 334–336.

During 1925 3,140 native horses have been immunized by the single dose intradermal method in Morocco, without an accident of any kind and, in fact, without any one of them showing any reaction.

Two hundred and fifty French horses were also vaccinated in the same way. Of these 95 were animals in hospital for various reasons. Among these there were some which showed local reactions, but there was practically no systemic disturbance.

MONOD (Th.) & VELU (H.). **La vaccination intradermique contre le charbon bactéridien d'après les results pratiqués.** [The Results of Intradermal Vaccination against Anthrax.]—*Rec. Méd. Vét.* 1926. Feb. 28. Vol. 102. No. 4. pp. 72–79.

During 1925 over 130,000 doses of anthrax vaccine for intradermal use have been prepared by the authorities in Morocco. A tabular statement shows the number of animals of different species inoculated each month. From January to June the vaccinations were precautionary; from that time onwards they were carried out while outbreaks were actually in existence. As during 1924, the Veterinary Surgeons using vaccine were requested to collect all particulars in connexion with it, and the present report is based upon the figures and facts so collected.

At the outset the authors state that the conclusions previously drawn have been amply confirmed. A single intradermal vaccination establishes a solid and durable immunity; the method can be used even when an outbreak is in progress; animals may be vaccinated at one and the same time against anthrax, blackquarter, and pox.

The immediate effects of vaccination are negligible. In a few horses there has been a temporary local reaction. In one animal vaccination led to a relapse of piroplasmosis.

In a few instances the immunity was reported to have broken down, but on strict enquiry being made it was established that the animals which died had not been vaccinated.

Instances are given in which the vaccination was carried out during outbreaks, and in all cases the mortality came to a stop within a very short time.

It is difficult to determine the duration of the immunity because it is impossible to imitate natural infection, but facts gathered in the field indicate that it is serviceable for 7 or 8 months.

In one case the evidence appeared to show that at nine months it was no longer certainly serviceable.

SOITUZ (S.). **Séro-vaccination anticharbonneuse intradermique chez le cheval.** [Intradermal Vaccination against Anthrax in the Horse.]—*Archiva veterinara.* 1926. Vol. 19. Nos. 1-2. pp. 1-3.

It is difficult to get a clear idea of the author's experiments, as he appears to state that he has injected quantities of serum and vaccine ranging up to 5 cc. (cmc. is the symbol used in the original) intradermally. It is also noted that the same symbol (cmc) is used in the description of the area scarified for the application of vaccine, thus—100–200 cmc.

ANDRIEU (Alejandro). **Accidentes de las vacunas e Inmunidad anticarbunclosa. 1a Comunicacion.** [Accidents from the Use of Anthrax Vaccine and Immunity against Anthrax.]—*Revista de Med. Vet.* Buenos Aires. 1925–26. Oct.–Mar. Vol. 8. Nos. 4–6. pp. 111–118.

This is an interesting paper illustrating the practical difficulties in the prophylaxis of anthrax. Accidents are usually due to one of two causes, either an impure product or too large a dose, and, in the latter connexion, it is important to note that a dose easily tolerated by one animal may prove fatal to another. Cases are recorded in which two doses of vaccine were given to a large number of cattle, and 11 per cent. died within a fortnight; the vaccine was found to contain cocci in large numbers. On other farms the mortality was higher and three vaccinators developed malignant pustules. If the animals are sent up-country or by rail journey the risk is greater; also debilitated animals appear to bear vaccine badly.

In view of BESREDKA'S work on tissue immunity the author experimented with guineapigs and showed that intradermal inoculation produced a greater degree of immunity than either cutaneous or subcutaneous inoculation.*

MORITA (Heijiro). **An Experimental Study of the Pathology of Black-Leg.**—*Jl. Jap. Soc. Vet. Sci.* 1926. March. Vol. 5. No. 1. pp. 1–7.

The author describes three stages in the changes produced in the muscles involved in black-leg lesions, cloudy swelling, waxy degeneration, and myolysis.

He states that the rancid odour was not noticed in the carcases examined. Gas formation is said to be very slight and recognizable by microscopic examination only. It is held to be mainly a post-mortem change and of no significance.

Summarized by Dr. H. Harold Scott.

In inoculated guineapigs the presence of bacilli in the blood-stream is said to be passive only. There is no true septicaemic condition. Changes in the adrenals are referred to as significant.

LECLAINCHE & VALLÉE. **A l'occasion du charbon symptomatique.** [With Reference to Black-Leg.]—*Rec. Méd. Vét.* 1926. Feb. 28. Vol. 102. No. 4. pp. 113–119.

In this paper the authors reply to a charge of having taken results from a paper by another author and of having incorporated them in one of their own.

They point out that their conclusions are diametrically opposed to those held by the author in question.

This paper must be consulted in the original for details.

DESCOMBEY (P.). **Sur la vaccination antitétanique du cheval. Durée de l'immunité.** [Anti-tetanic Vaccination of the Horse. Duration of the Immunity.]—*C.R. Soc. Biol.* 1926. Feb. 5. Vol. 94. No. 4. pp. 253–254.

The author gives brief details of a number of tests carried out with serum from horses immunized by means of anatoxin.

The results indicated that where there was a decline in the neutralizing power of the serum from different animals from the 6th month after immunization onwards, at the end of twelve months 1 cc. of serum was sufficient to neutralize 1 cc. of toxin.

DESCOMBEY (P.). **Immunisation antitétanique du cheval. Effets des injections d'anatoxine sur des sujets antérieurement vaccinés.** [Immunization of the Horse against Tetanus. The Effects of Injections of Anatoxin on Animals previously Vaccinated.]—*C.R. Soc Biol.* 1926. Feb. Vol. 94. No. 5. pp. 315–316.

The author has shown that horses injected twice with anatoxin acquire a solid immunity against tetanus and that this immunity lasts for a year or more.

In the present paper he records the results of a repetition of the vaccination.

Horses which had been vaccinated a year previously were first given 10 cc. of pure tetanus anatoxin, and a week later the same dose with some sterile tapioca added to it.

The animals were bled for testing the serum just before the second injection was given, and a week after it.

One cubic centimetre of serum from the first bleeding was found to neutralize 10 lethal doses of toxin. Thus the titre of the serum was twice as high as the maximum obtained by the immunization a year before.

Blood taken seven days after the injection of anatoxin and tapioca yielded a serum of which 0·02 cc. completely neutralized in vitro 100 lethal doses of toxin. With a view to comparing these results with those obtained by serotherapy the author injected 10 cc. of Pasteur Institute antitetanic serum into a horse. Four days later 1 cc. of serum neutralized 10 lethal doses of toxin. Serum taken 15 days after injection neutralized toxin only in the proportion of 1 cc. per 1 lethal dose.

JACOTOT (H.). **Sur la tuberculose des bovidés en Annam.** [Bovine Tuberculosis in Annam.]—*Ann. Inst. Pasteur.* 1926. April. Vol. 40. No. 4. pp. 309–313. With 2 charts in text.

During the period 1922–26 post-mortem examinations have been carried out on 1,500 bovines ranging from 1 year to 2½ years old, and 3 cases of tuberculosis have been detected.

Four hundred and sixty-five cows have been tested by the intradermal palpebral test, without a single reaction being obtained. Three hundred and twenty calves of these cows all under two years of age have also been tested with the same result. These animals all belonged to the Institut Nha-Trang.

Two hundred and thirty calves ranging from one to three years purchased for serum production yielded one positive and one doubtful reaction. Of 380 oxen purchased for serum production or for work 6 yielded positive reactions.

TEPPAZ (L.). **Les tuberculoses animales en Afrique occidentale française.** [Animal Tuberculosis in French West Africa.]—*Rec. Méd. Vét.* 1926. April 15. Vol. 102. No. 7. pp. 213–214.

Tuberculosis is of very infrequent occurrence in zebras and pigs in French West Africa.

GONZÁLEZ RUIZ (Maximiliano). **Sobre un comentario a la septicemia hemorrágica del ganado vacuno en las montañas de León.** [Haemorrhagic Septicaemia among Cattle in the Uplands Districts of León.]—*Rev. Hig. y Sanidad Pecuarias.* 1925. Nov. Vol. 15. No. 11. pp. 743–746.

The author some time ago stated that a certain disease which proved fatal to a considerable number of cattle in the hilly districts of León (Spain) was a form of haemorrhagic septicaemia. The chief symptoms were a very loose diarrhoea with flakes of fibrin, mucus, and blood. There may also be peritonitic, or, in the pulmonary form, pleuritic effusion, blood-stained, yellowish red in colour. FERRERAS appears to have disputed this and maintains that the condition is a distomiasis. The author returns to the charge and affirms that he is well acquainted with both diseases and that they are quite distinct. The septicaemia cannot be definitely proved because the actual organism has not yet been isolated, but the " incubation-period " is 5–7 months [he appears to mean that new arrivals are attacked after this interval], the disease is not contagious from case to case direct but apparently exists in the soil, pasture, or stalls; finally, ethereal extract of Malefern readily cures the helminthic infection, but has no effect upon the other.*

SOBERNHEIM (G.) & IMANISHI (K.). **Immunisierungsversuche mit keimfreien Filtraten und mit Kulturverdünnungen des Oedembazillus (R. Koch).** [Immunization Experiments with Germ-free Filtrates and Culture Dilutions of the Oedema-bacillus, Koch.]—*Ztschr. f. Infektions. parasit. Krankh. u. Hyg. d. Haust.* 1924. Nov. Vol. 27. No. 3. pp. 161–170.

It is generally accepted that the principal cause of blackquarter is the well-known bacillus of blackquarter, but no explicit answer can be

* Summarized by Dr. H. Harold Scott.

given to the question as to how many other bacteria are capable of producing a similar condition.

Recently the detection of the blackquarter bacillus has become less frequent, other anaerobes, and particularly the bacillus of malignant oedema, being found instead.

The blackquarter bacillus forms smaller colonies on serum agar than the others, and it will not grow on grape sugar agar.

But it must not be forgotten that both bacilli may be present simultaneously in lesions resembling those of true blackleg.

It has been suggested that polyvalent filtrates are required for the protection of animals against this group of diseases.

Up to the present, however, little systematic work has been done regarding immunization against malignant oedema infections by means of filtrates. This subject has been taken up by the authors and they have used three different strains (vib. septique P., oedema bacillus 151, and oedema bacillus D.G.A.) in their experiments. Controls were carried out with a strain of blackquarter bacillus proved capable of producing an efficient filtrate.

The filtrates were made from cultures in liver broth after prolonged incubation, and were passed through Berkefeld filters. Their sterility was tested by sowing out quantities ranging from 1 to 5 cc. in liver-peptone-broth.

Guineapigs were injected subcutaneously on the abdomen with 0·5 to 5 cc. of filtrate, and two to three weeks later with a living 48-hour culture of the homologous strain.

The results of eighteen experiments of this nature are given in tabular form.

Fourteen of the guineapigs died with typical lesions.

It has been shown by NISHIURA that cultures of the blackquarter bacillus in liver broth when diluted 1:1,000 to 1:100,000 with sterile culture medium produce just as good an immunity in guineapigs as germ free filtrates. It appeared therefore to be of interest to ascertain whether similar results could be obtained with vibrion septique. The presence of viable organisms in the diluted cultures was proved by subcultivation.

Tabular statements show the results obtained in 17 experiments of this nature carried out with 2 different strains. The results were very irregular. Twelve guineapigs died. In some of these the disease followed a typical course. In others it was prolonged to several days. Three survived, and two died, without evidence of infection with the vibrion septique, after inoculation. The inference to be drawn is that both filtrate and diluted cultures are very uncertain means of inducing immunity in guineapigs against malignant oedema infections.

Biologically the vibrion septique is readily distinguished from the bacillus of blackquarter by this means.

KLARIN (E.). **Om kastning genom Spirillinfektion.** [Vibrionic Abortion.]—*Skandinav. Vet-Tidsk.* 1926. Ap. Vol. 16. No. 4. pp. 63–87.

The author summarizes the literature upon the subject, and records the occurrence of the disease in Sweden.

An account of the bacteriology of the disease is also given.

FUTAMURA (H.). **New Cases of Contagious Pustulous Dermitiis in Swine.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Mar. Vol. 5. No. 1. pp. 11–12.

From a skin lesion of pigs, which is characterized by the formation of pustules, the author has cultivated a streptococcus which he considers to be the cause.

BOURDENKO (N. N.) & GIVAGO (N. L.). **Traitement des inflammations suppurées par les filtrats d'après la méthode de Besredka.** [The Treatment of Suppurative Lesions by Besredka's Filtrate Method.] —*Ann. Inst. Pasteur.* 1926. March. Vol. 40. No. 3. pp. 232–241.

The authors find that the best filtrates are obtained in cases of staphylococcic infections when the cultures are incubated for 8 to 12 days. The sterility of the filtrate is ascertained and it is then re-inoculated with the original organism, and if no growth takes place in 24 hours the liquid is again filtered and used. If growth occurs incubation is continued for eight to ten days, and it is again filtered, and inoculated a third time with the original organism.

In laboratory experiments the following results were obtained :—

Two guineapigs were enveloped in compresses saturated with filtrate and two with compresses soaked simply in broth. The following day the dressings were removed and the four guineapigs along with two further untreated controls were inoculated subcutaneously with 2 cc. of staphylococcus culture. Only those treated with the filtrate compresses survived. The remainder were dead in 29 hours.

Four guineapigs were inoculated subcutaneously with a mixture of filtrate and culture (quantities not given). Two survived and two died. Two controls which received culture alone also died.

In a similar experiment in which the mixture of filtrate and culture was given intraperitoneally there were no survivors. Filtrate of staphylococcus culture yielded no protection against culture of streptococci, and vice versa.

Details are given of a number of suppurative conditions, chronic and acute, in human beings which have been treated with same success.

GRASSET (E.). **Sur la résistance du cobaye aux toxines additionées de tapioca et sur le rôle du tapioca.** [The Resistance offered by Guineapigs to Toxins mixed with Tapioca, and the Part played by Tapioca in the Reaction.]—*C.R. Soc. Biol.* 1926. Feb. 5. Vol. 94. No. 4. pp. 260–262.

To a dose of 2 cc. of diluted diphtheria toxin containing two lethal doses for a guineapig of 300 g. was added to some tapioca, so that only a part of the liquid was absorbed by it. This mixture was injected subcutaneously into a guineapig. The animal died with typical lesions, but there was a considerable delay as compared with a control guineapig.

With a quantity of tapioca sufficient to soak up the whole of the toxin dilution the only result was a local reaction which was characterized by oedema which was slowly reabsorbed. In some cases a little abscess developed at the seat of injection.

Repeating the experiment with increasing doses of toxin the author found that guineapigs could survive four or five lethal doses with only a slight loss of weight during the first few days. Some guineapigs

survived four or five injections, each representing three fatal doses, the injections being given immediately the reaction caused by the previous one had disappeared (about 10 days).

Practically parallel results were obtained with tetanus toxin.

In investigating the part played by the tapioca in this reaction, the author found that if the toxin-tapioca mixture is acted upon by an amylolytic ferment the toxicity of the mixture is restored. Apparently the tapioca does not act by allowing the absorbed toxin to act slowly and so gradually produce immunity, because guineapigs, which had been injected with the tapioca-toxin mixture, were found after this had been absorbed to possess no general immunity.

The author's explanation of the action of the tapioca is that it produces an inflammatory reaction and that the mobilized defences of the body deal with the traces of toxin as they are liberated from the tapioca.

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## DISEASES DUE TO FILTERABLE VIRUSES.

STOCKMAN (S.) & MINETT (F. C.). **Researches on the Virus of Foot-and-Mouth Disease.**—*Jl. Comp. Path. & Therap.* 1926. Mar. 31. Vol. 39. No. 1. pp. 1–30.

The present paper embodies the results obtained at the Laboratory of the Ministry of Agriculture between August, 1924, and October, 1925. There are not included any details of experiments carried on at the Pirbright Experimental Station with larger animals.

The work has been carried out with virus from nine sources. Six of these were outbreaks in Great Britain, and the remaining three were one isolated by GINS and FORTNER and obtained from the Lister Institute, and the O and A viruses of VALLÉE.

With the exception of one of the British viruses and the Virus A (VALLÉE) all could be used for the infection of guineapigs. The exceptional British virus appeared to be a very feeble virus for the guineapig, and died out after a few passages. The Virus A was only induced to infect guineapigs with difficulty, and success was only achieved when fresh epithelium from an experimentally-infected calf was used.

In fixing the filtration technique to be followed the most satisfactory results were obtained with Seitz filters, although these failed to arrest bacteria on one or two occasions.

In a single experiment a collodion filter was found to arrest the virus. The lymph was generally diluted with 50 or 100 volumes of saline before filtration.

Experimental tests indicated that epithelial cells washed free from adhering lymph are more virulent than the lymph, as tested by the amount of dilution required to render the materials avirulent.

Attempts to concentrate the virus by centrifuging failed on the whole, but it is considered that centrifuging possibly causes some alteration in the density of the virus.

No evidence of adsorption of the virus by red corpuscles or by dead bacteria could be obtained and consequently this method of attempting concentration failed.

In experiments with Kieselguhr as the adsorbing agent there was evidence to suggest that the virus was adsorbed to some extent, but the adsorption was a loose one.

No evidence was obtained of the existence of an antibody in the lymph as postulated by DAHMEN and FROSCH.

No success was achieved in attempts to cultivate the virus, but it was noted that the virus will survive for several weeks at 34° C.

Investigations were carried out regarding the favourable or unfavourable effects of certain external circumstances upon the survival of the virus at 30° C.

The pH of the suspending liquid was found to be of the utmost importance, and tests carried out showed that the optimum is 7·5 or 7·6.

Variation in the oxygen pressure appeared to exercise no influence upon the survival of the virus. Similarly, colloidal substances which have been used for protection of fragile organisms against the harmful effects of sodium and other ions, failed to increase the period of survival.

In spite of numerous attempts by various means to separate the hypothetical antibody referred to by DAHMEN from the vesicle lymph, no evidence was obtained that the rapid death of the virus is due to the action of any such body. Phosphate mixtures, glycerin, leucocyte extract, *B. coli* extract, sterile raw potato, sterile unheated kidney tissue were all tried with a view to finding which would favour the survival of the virus. Glycerin, sterile animal tissue, and phosphates appeared to favour survival. The work lends support to the view that the virus finds the materials necessary for its growth only within the cell protoplasm.

The duration of survival of the virus varies greatly with the temperature at which it is kept. The lower the temperature the more prolonged the survival. It was also found that the virus was resistant to repeated freezing and thawing, a process generally destructive to bacteria. Glycerin is almost universally used as a preservative for the filterable viruses, and the virus of foot-and-mouth disease is very resistant to the action of glycerin in 50 per cent. dilution. Pure glycerin is more destructive to it.

The resistant of the virus to chloroform is very great. In one case the virus was not destroyed when chloroform vapour was bubbled through it for 36 hours. The results with ether were somewhat similar. Antiformin and formalin are rapidly destructive to the virus.

The authors confirm in general the results obtained by others in the inoculation of guineapigs.

Intradermal inoculation leads to the development of primary lesions with generalization 24 hours later. It is noted that if the primary vesicles are slow in developing generalized lesions do not as a rule appear. The virus does not tend to persist in the internal organs as these have yielded negative inoculation results on the third day. Similarly, the primary lesions soon lose virulence, and material taken from them on the fifth day may be non-infective.

Guineapigs may be infected by intravenous, intramuscular and intraperitoneal inoculation, but of these the first is somewhat unreliable. Scarification is a certain means whether the part selected is covered with hair or not, but rubbing the virus into sound skin does not infect. The disease is slower of development in the guineapig when first inoculated from cattle than subsequently after a few passages.

The disease shows no tendency to spread naturally among guineapigs by simple contact.

While guineapigs are generally very sensitive to virus adapted to them it must not be forgotten that refractory individuals may be encountered.

Attempts to produce infection in fowls, ducks, martins and sparrows have failed, but the virus may be detected at the site of intradermal inoculation after a lapse of five days.

Up to the present sufficient evidence regarding the possibility of the existence of different strains of virus has not been accumulated to allow of any statement as to their existence or otherwise.

VAN SACEGHEM (René). **La fièvre aphteuse dans l'est Africain Belge.** [Foot-and-Mouth Disease in Belgian East Africa.]—*Ann. Soc. Belge. Méd. Trop.* 1926. Jan. Vol. 5. No. 2. pp. 209–214.

In September, 1924, foot-and-mouth disease broke out in Ruanda. The source of the outbreak was not discovered. The actual deaths among adult cattle were few, but a not inconsiderable number of calves died, and numerous cases of abortion occurred. The author observed a few cases of mastitis, in which the milk was tinged with blood. Pigs are as susceptible as cattle to infection. A number of cases were observed in pigs in which the lesions were limited to the feet, with shedding of the claws. There was a mortality of 50 per cent. among the young pigs.

The author draws special attention to the fact that animals that had recovered from cattle plague became affected with foot-and-mouth disease, because he states that this is proof that the two diseases are distinct, and that cattle plague is not a specially severe form of foot-and-mouth disease as has been held by some. [No names are given.—Ed.] He states that using the ultramicroscope he has been able to see in the blood of animals affected with foot-and-mouth disease large numbers of minute bodies showing brownian movements. The author states that as the virus of the disease is dermatotropic the ectoderm is the seat of election for vaccination, and that if one could vaccinate the skin against the virus there would be no further risk of infection.

He has devised a method by means of which he has attempted vaccination. The technique is as follows: Instead of fixing the virus on the blood corpuscles of recovered bovines, which, depending upon the degree of immunity possessed by the animal, more or less neutralize the virus, he has fixed the virus on the blood corpuscles of insusceptible animals, e.g., the dog, man, and the fowl. The virus so fixed has been inocuated intradermally into cattle.

The fixation was achieved by mixing foot-and-mouth disease lymph with 5 volumes of dog blood corpuscles obtained by centrifuging citrated blood. Unaffected animals from a herd in which the disease existed were inoculated intradermally into the skin of the lower lip. All the animals showed a swelling as large as a pigeon's egg at the seat of inoculation a week later, and in several of them there was a true vesicular lesion. Complete recovery took place without further extension, and when these animals were returned to the infected herd none became infected [no numbers of animals treated are given].

The author does not advise inoculation into the lip, however, as this tissue is very susceptible to the virus, and further it would be difficult to carry out the inoculation without infecting the animal by way of the alimentary tract. The virus was fixed to human or fowl corpuscles in the same way, but in this case the skin of the scrotum was selected as the seat of operation.

Thirty animals from an uninfected herd were so treated. There was a slight local reaction. A fortnight later the animals were mixed

with an infected herd. None of them developed the disease. It is said that two months later the animals were still resistant, but circumstances beyond his control prevented the author from ascertaining the full duration of the immunity.

WINKEL (A. J.). **Mond- en Klauwzeeronderzoek.** [Foot-and-Mouth Disease Investigations.]—*Tijdschr. v. Diergeensk.* 1926. June 1. Vol. 53. No. 11. pp. 489–501.

Waldemann's method of serum testing may furnish valuable information regarding the protective properties of the blood or serum of a recovered animal. Although it is established that recovered animals or animals that are actually recovering may furnish serum which is of value for the protection of young calves and pigs, similar results are not to be expected in adult animals.

The amount of antibody present in such sera is very variable, and they cannot, therefore, be used in regular practice for the control of the disease.

On the other hand, a properly prepared hyperimmune serum is at least three times as effective as a convalescent serum.

In addition, the exact value of a hyperimmune serum can be fixed.

The part that may be played by such an immune serum in the control of the disease is a subject for further research.

SCHMID (F.). **Die Lebenfähigkeit des Maul- und Klauenseuchevirus in Äther.** [The Vitality of the Virus of Foot-and-Mouth Disease in Ether.]—*Deut. Tierärzt. Woch.* 1926. June 12. Vol. 34. No. 24. pp. 443–444.

The virus of foot-and-mouth disease is not certainly destroyed by exposure to ether for a period of 54 days or even more, but prolonged exposure tends to weaken it. This is shown by the localized lesions resulting from the injection of virus exposed for 12 to 16 days.

It is stated that a valuable degree of immunity may be established by intra-abdominal inoculation with virus treated with ether for periods ranging from 18 to 28 days.

WALKER (G. K.) & TAYLOR (W.). **Foot-and-Mouth Disease—Control by Chemotherapy.**—*Vet. Bull.* No. 17. Dept. Agric. Punjab.

In starting the experiments detailed in this Bulletin the authors experienced difficulty in obtaining a virus of sufficient virulence. A virus obtained from England was found to be readily transmissible to guineapigs, but it failed to infect cattle.

Eventually, however, a strain of high virulence was obtained from BRANFORD at the Government Cattle Farm, Hissar.

In the course of the experiments it was found that vesicular lesions develop in 8 to 24 hours after the thermal reaction which marks infection has occurred.

In each experiment weaned calves were used, and for each treated experimentally a control was kept. It is to be remarked that in three cases the control calves developed a second crop of vesicles within a day or two after the original vesicles had healed. At first hill cattle were used, as these were thought to be more susceptible, but later it

was found that plains cattle were equally susceptible. The treatment resorted to was the intravenous injection of a solution of iodine having the following composition :—

| | |
|---|---|
| Iodine ... ... ... ... | 1 g. |
| Potassium iodide ... ... ... | 2 g. |
| Distilled water ... ... ... | 300 cc. |

By experiment it was found that doses of over 100 cc. were not always tolerated, and that doses of 50 to 100 cc. were capable of yielding good results.

Some 17 of the 22 pages which go to make up this Bulletin are given over to a tabular statement of the experimental details of 11 pairs of calves.

The injection of iodine was made when the temperature rose, following the inoculation with virus.

With one exception none of the injected animals developed lesions of the disease.

With a view to ascertaining whether the temperature reaction had conferred any degree of immunity all the treated animals were exposed to natural infection and, in addition, were inoculated intravenously with virulent blood at intervals ranging from 1 to 24 days after the injection of iodine. In no case did any lesions develop. The virus used was controlled.

With the object of ascertaining the effect of an injection of iodine prior to the inoculation with virus four calves were given 50 cc. of the solution and virulent blood after the lapse of 24, 48, 72 and 96 hours.

Symptoms of the disease developed in all, but the periods of incubation were inversely proportional to the intervals elapsing between dosing and inoculation. In the animal inoculated one day after treatment the period of incubation was 12 days, and in that inoculated four days after the injection of iodine the period of incubation was four days. In each instance the disease ran a normal course. From the experiments it appears that a sufficient dose of iodine injected intravenously prior to the development of lesions will cut short the course of the disease and prevent the formation of vesicles. Some degree of immunity is conferred in this way, but it is not yet known to what degree this immunity develops.

It seems to be probable that the period of infectivity of cattle treated in this way must be short since it appears to be fair to assume that in the absence of lesions the chance of transmission of the disease to other animals must be very small.

As the effect of an injection of iodine prior to inoculation was tested in one experiment only, judgment of the result must be suspended for the time being.

In one instance in which vesicle formation had begun before treatment was resorted to the injection appeared to exercise a favourable effect upon the course of the disease as compared with that in the corresponding control.

It is suggested that in outbreaks of the disease injections of iodine should be given to all animals showing a rise of temperature. If it is impracticable to take temperatures all in-contacts should be injected, but it is admitted that in this case no appreciable immunity would be conferred upon those not actually infected at the time. But the method might be used pending the introduction of the taking of all temperatures twice daily.

Another procedure worthy of consideration is the inoculation of all in-contacts with virulent blood and the injection of iodine when the temperature rises.

A further point requiring investigation is the possibility of reinforcing immunity by inoculation with virulent blood while the animals are still immune as the result of iodine treatment of a primary attack.

An important point noted in the course of the experiments is that there is little or no loss of condition in treated animals.

VALLÉE (H.), CARRÉ (H.) & RINJARD (P.). **Sur l'immunisation anti-aphteuse par le virus formolé.** [Immunization against Foot-and-Mouth Disease by means of Formolized Virus.]—*Rev. Gén. Méd. Vét.* 1926. Mar. 15. Vol. 35. No. 411. pp. 129–134.

As virus the authors use fragments of epithelium exfoliated from lesions, but they have used fragments taken from unruptured lesions or from lesions which have burst only a few hours previously.

These may be kept either dry in cold store at 0° C. or placed in a mixture of equal parts of glycerine and salt solution.

The fragments are weighed, finely divided with scissors, and very thoroughly ground in a mortar with a small quantity of salt solution and sand. When trituration has been completed a very small quantity of salt solution is added and the mixture is strained through fine muslin. Further salt solution is added, through the straining cloth, so that finally there is 10 cc. for every 30 centigrammes of epithelium.

Finally, 25 per cent. solution of commercial formalin is added in the proportion of 0·2 cc. per 10 cc. The mixture is thoroughly shaken and kept in the dark for at least 48 hours.

The virulence of the material is tested by guineapig inoculation prior to the addition of the formalin, and its sterility is tested in a similar manner 48 hours after the formolized vaccine has been prepared.

Two heifers were inoculated with vaccine prepared from virus O in a dose of 10 cc., the inoculation being carried out behind the shoulder. There was no reaction of any kind.

A month later these animals along with a control were each inoculated with 10 cc. of virulent blood (virus O). The control developed infection in 50 hours, while the vaccinated animals failed to become infected. The whole process was repeated with vaccine prepared from virus A, and this virus was used for immunity test. Five heifers were vaccinated, and two were used as controls.

These were tested with virulent blood. The controls reacted, but the vaccinated animals resisted infection. The vaccinated animals were then retested with materials taken from mouth lesions of the controls. No infection occurred.

A bivalent vaccine was prepared by the technique described from both viruses (A and O).

Six heifers were inoculated subcutaneously with 20 cc. of this and four intracutaneously with 2 cc. There were no reactions. Twenty-six days later three of these vaccinated subcutaneously and two vaccinated intradermally were tested with O virus along with one control.

The control, the animals inoculated intradermally, and one of those treated subcutaneously became infected. The two remaining animals failed to react to test inoculations. Thirty-four days later the remaining animals were tested with O virus together with a control. The control, and one animal vaccinated intradermally reacted. The remainder resisted inoculation and also aphthization.

Forty-eight days after vaccination the whole groups was tested by inoculation with 10 cc. of virulent blood (virus A), together with the control which resisted virus O. The latter animal became infected, the six vaccinated heifers resisted infection.

WALDMANN. **Richtlinien zur Simultan- und Heilimpfung gegen Maul- und Klauenseuche.** [Indications regarding Simultaneous and Curative Inoculations against Foot-and-Mouth Disease.]—*Berlin. Tierärzt. Woch.* 1926. Jan. 22. Vol. 42. No. 4. pp. 53–55.

This is a brief account of methods of dealing with foot-and-mouth disease by inoculation methods for the guidance of practitioners.

PLANTUREUX (Edmond). **Contribution à l'étude du traitement préventif de la rage chez les animaux.** [The Protective Inoculation of Animals against Rabies.]—*Ann. Inst. Pasteur.* 1926. Feb. Vol. 40. No. 2. pp. 141–151.

The author points out that while in other countries protective and curative treatments are carried out on dogs, the law of France compels the slaughter of all dogs bitten. On the other hand, there is nothing against the retention of herbivora. Since the war the cost of cattle in France has gone up enormously, and there is every incentive to attempt to save animals bitten by rabid dogs. Any vaccine used for the purpose must fulfill certain conditions. It must be reasonably cheap, must require only a few injections, it must be capable of being used at a distance from laboratories, and must be simple to apply.

The methods hitherto devised are open to one or more of these objections.

Since PASTEUR showed that a whole series of injections of spinal cord could be given to dogs without danger within 48 hours, and HÖGYES found that six injections of dilutions ranging from 1 in 5,000 to 1 in 10 could be given at intervals of two hours, the author argued that it should be possible to achieve immunization if the spinal cord emulsion were introduced in a fatty excipient for the purpose of delaying absorption.

His first experiments were carried out with a vaccine prepared by mixing 1 part of fixed virus brain intimately with 2 parts of lanoline and adding, with constant stirring, 7 parts of sterile olive oil.

Abscess formation proved an objection to the use of this vaccine.

In subsequent experiments the oil was replaced by a 33 per cent. solution of dextrin. Suspensions in this medium rapidly lost virulence, but it was found possible to immunize rabbits solidly with a single injection of 10 cc. The vaccine contained 1 part of rabbit brain to 19 parts of carbolized dextrin solution.

In an experiment in which eight rabbits were treated after infection only two failed to contract the disease. Seven dogs were given two doses of 8 to 12 cc., according to their size, at an interval of two days. When tested by corneal scarification three months later all survived, while one of two controls contracted rabies on the twenty-third day.

Five dogs were treated after infection with doses of 4, 6, 8, 10 and 12 cc., which were repeated after two days. Three were kept as controls. Two of the latter developed the disease in 19 and 21 days, and the third, which was old and blind, died on the 26th day, but not, apparently, from rabies.

One of the treated dogs contracted rabies on the 37th day.

The remaining four were tested by inoculation four months later and all contracted rabies.

Two goats and two sheep were given two doses (of 10 and 20 cc.) of vaccine each with an interval of two days. They were tested after an interval of four months by inoculation into the anterior chamber of the eye with street virus and all resisted infection. Two control dogs contracted rabies in 12 and 14 days.

The preparation of the emulsion requires special skill and could not be carried out by a practitioner. The difficulty of dispensing the vaccine for use in the field may be overcome by keeping the fixed virus in carbolized serum and mixing this with the dextrin solution at the moment of injection.

Six goats were treated with vaccine 48 hours after inoculation intramuscularly with street virus. All survived. Of three untreated controls two developed rabies. With a view to further simplification of the preparation of the vaccine the author has tested the following technique: The rabbit brain containing the fixed virus is mashed up in 19 parts of a liquid having the following composition: Normal salt solution 400, carbolic acid 1, normal horse serum 200. The emulsion is filtered through sterile gauze.

For vaccination the first vaccine is a dilution of 1 in 1,000, the second 1 in 150, and the third the original emulsion.

The first and second vaccines are given on consecutive days, and the third after an interval of one day.

In experiments with rabbits using 5 cc. doses, and with dogs using 10 cc. doses immunity was established, and was shown by the animals resisting inoculation with fixed virus.

PLANTUREUX (Edm.). **Pouvoir infectant du virus rabique fixe d'Alger inoculé dans la chambre antérieure de l'oeil et le tissu conjonctif sous-cutané de divers animaux.** [The Infectivity of the Algerian Fixed Virus of Rabies by Intra-ocular Inoculation.]—*C.R. Soc. Biol.* 1926. Feb. 5. Vol. 94. No. 4. pp. 247–249.

With repeated passage fixed virus becomes more and more differentiated from street virus. Its virulence for nerve tissue becomes increased while it loses virulence for other tissuse.

It has been stated by PUNTONI that the virus used in Rome (1,850th passage) is only virulent by subdural and intracerebral inoculation.

Experiments carried out at the Pasteur Institute at Algiers indicate that the virus used there (1,500th passage) has not lost any of its virulence when injected into the anterior chamber of the eye. Rabbits, dogs, goats, and sheep were used in the test.

In tests by the subcutaneous path 6 out of 8 rabbits became infected. Dogs, however, resist subcutaneous inoculation, and three out of four tested in this way were found to be immune to intra-ocular inoculation a month later.

In certain laboratories the view was held that the fixed virus was harmless for man and some animals by subcutaneous inoculation, and it was suggested that fully virulent cords should be used for protective inoculation by this path. As a result of accidents this method of vaccinating has been discontinued.

It appears to be not impossible that in certain circumstances fixed virus may recover a part of its virulence.

Three dogs were inoculated intramuscularly with 5 cc. of a 1 in 25 emulsion of street virus. Three days later two of them were given 10 cc. of a 10 per cent. emulsion of fixed virus subcutaneously. These developed rabies in three weeks and died within 48 hours. The brain of one of these was used for the inoculation of rabbits, which developed symptoms of rabies on the 6th day—the period of incubation of the fixed virus.

The third dog was a control, and survived.

SCHERN (K.). **Ueber Tollwutimmunisierung und die Notwendigkeit der obligatorischen Impfung aller im Verkehrsleben befindlichen Hunde.** [The Necessity for Compulsory Immunization of Dogs.]—*Seuchenbekämpfung.* 1926. Vol. 3. No. 1. pp. 46–50.

The author has not observed any disturbance of health in any of the dogs injected with a single immunizing dose of fixed virus, nor has he encountered any dog so immunized that was a virus carrier.

The method may be employed after a dog has been bitten by a rabid dog, provided the interval does not exceed 14 days.

REMLINGER (P.). **Au sujet de la vaccination contre la rage. Procédés rapides d'inoculation des lapins de passage.** [The Rapid Inoculation of "Passage" Rabbits with the Virus of Rabies.]—*Ann. Inst. Pasteur.* 1926. Feb. Vol. 40. No. 2. pp. 167–168.

The author suggests that the trephine can be done away with in connection with this operation. A drawing pin or a tin-tack may be used for perforating the cranium.

MALFROY (M. F.). **La peste bovine en Afrique Occidental Française.** [Rinderpest in French West Africa.]—*Bull. Comité d'Etudes Hist. et. Scientif. de l'Afrique Occidental Française.* 1925. July–Sept. Vol. 8. No. 3. pp. 439–496. With one map.

In this paper the author gives an account of the history of rinderpest in French West Africa, and traces the spread of the disease into the territories from areas further east.

He pleads for an efficient veterinary service to check its spread into the French possessions.

MIESSNER (H.) & BERGE (R.). **Die Geflügenpest bei Gänsen.** [Fowl Plague in Geese.]—*Deut. Tierärzt. Woch.* 1926. May 22. Vol. 34. No. 21. pp. 385–393.

The author reports the occurrence of what appears to have been true fowl plague in two consignments of geese despatched from Northern Italy. Of the first batch of 210, 81 died, and of the second of 96, 40 died.

The paper gives an account of the clinical and bacteriological investigations, and contains a number of illustrations showing the most typical symptoms.

The principal symptoms were of a nervous type, and presented themselves as varying degrees of paralysis and incoordinated movements. There was also a mucous discharge from the nares, and diarrhoea.

At the post-mortem ecchymoses were found on all the mucous membranes. It was not found possible to transmit the disease by inoculation to young geese, but it was readily transmitted to fowls with production of the same symptoms, and similarly it could be carried on from fowl to fowl.

It was found possible to infect geese with virus that had been passed through fowls; it therefore appears probable that the virus was attenuated to some extent by passage through the goose, and that its virulence was restored by passage through the fowl.

The filtrability of the virus was established in passage experiments with fowls. Simple contact and feeding with contaminated foodstuffs failed to set up the disease.

Attempts to infect ducks with passage virus failed.

TEPPAZ (L.). **Contribution à l'étude de la Horse-Sickness au Sénégal.** [Horse-Sickness in Senegal.]—*Rec. Méd. Vét.* 1926. Mar. 30. Vol. 102. No. 6. pp. 128–129.

This note is a report by BROCQ-ROUSSEU on a paper submitted by Teppaz for the Doctorate.

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LUSENA (M.). **Studi sull' epitelioma contagioso aviario.** [Epithelioma contagiosum of Birds.]—*Sperimentale.* 1926. Jan. Vol. 79. No. 6. pp. 969–1002. With 2 plates.

PAILLOT (A.). **Contribution à l'étude des maladies à virus filtrant chez les insectes. Un nouveau groupe de parasites ultramicrobiens : *Les Borrellina.*** [Diseases of Insects caused by a New Group of Filterable Viruses. Borrellina.]—*Ann. Inst. Pasteur.* 1926. Apr. Vol. 40. No. 4. pp. 314–352.

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## MYCOTIC DISEASES.

ARROYO Y MARTIN (C.). **Contribución al estudio de la linfangitis epizootica.** [Epizootic Lymphangitis.]—*Revista Zootécnica.* Buenos Aires. 1925. Nov. 15. Vol. 12. No. 146. pp. 333–343.

This contribution gives an excellent account of epizootic lymphangitis showing how the condition arises in wounds which have been neglected, or which have not been energetically treated. Experimental infection is difficult to bring about, either by subcutaneous inoculation of pus, or cutaneously after scarification, or even after repeated inoculation intravenously of as much as 1 cc. of pure culture of the cryptococcus. Horses which have been debilitated from some other condition, for example, the Pasteurelloses, are particularly susceptible, and in them the course and evolution are rapid. The incubation period seems to vary considerably, between one and four months. VELU, a French veterinarian, described two forms: the ordinary type, as described in the text-books, and an atypical form characterized by indolent, painful wounds, without the typical nodes and ulcers. Infection of mucous membranes is uncommon, occurring only in 1–2 per cent. of cases.

The subjects do not give the mallein reaction, unless, as occasionally occurs, true glanders is also present. A table of distinctive points between the two diseases is given of which the chief are: In glanders the pus is oily and ropy, the edges of the ulcers are hard and indurated, with characteristic lymphatic ramifications; the lymphangitis is not limited to one set of vessels, and there is constitutional upset, with fever. In epizootic lymphangitis, on the other hand, the pus is never oily, but serous or creamy, and of a yellowish colour; the lymphangitis is usually limited to one system; there is little if any constitutional disturbance and, as a rule, no rise of temperature. Lastly, microscopical examination will suffice to differentiate the two. The best treatment is excision, or, failing this, if the condition is extensive, cautery. It may be necessary, if the ulcer is deep and fungoid, to precede the cauterization by scraping. The use of arsenicals, as salvarsan and cacodylate of sodium, or of potassium iodide, is not recommended. Prophylaxis is summed up in isolation of cases, early segregation of suspects and contacts, and adequate treatment of wounds, disinfecting of stalls, and cleanliness generally.*

EBERBECK (Erich). **Ätiologisch-biologische und pathologisch-histologische Untersuchungen über die Lymphangitis epizootica des Pferdes.** [The Etiology and Pathological Histology of Epizootic Lymphangitis.]—*Arch. f. Wissenschaft. u. prakt. Tierheilk.* 1926. Mar. 6. Vol. 54. No. 1. pp. 1–31.

The author found that Loeffler's blood-serum medium prepared with horse serum was a good one for growing two strains of the organism which had been maintained on glycerin-grapesugar agar for about 6 years. Growth took place at 22° C., but none at 37° C.

It was found possible to get a growth on pure liquid blood serum when a cork raft was used for floating the seed material.

The author thinks that the organism develops free spore cases containing four typical spores and that therefore it should be named *Endomyces farciminosus*. The strains grown on the sugar agar medium had almost entirely lost their virulence for the horse, but this was recovered when the cultures were grown upon the horse serum.

In experimental inoculations with cultures the author has found that an immunity may be established in about half the time recorded by BOQUET & NÈGRE, namely, in about four weeks.

It was not found possible to infect a horse by friction with virulent culture into a shaved area of skin. Subcutaneous inoculation produces an abscess, but the greater part of the culture injected disappears within 24 hours, and the leucocytes are found to be moderately laden with the organism.

BARDELLI (P. C.). **Ricerche sulla linfangite criptococcica. Nota IV. Antigenoterapia specifica della linfangite criptococcica.** [Antigenotherapy in Cryptococcic Lymphangitis.]—*Nuova Veterinaria.* 1925. Mar. 15. p. 9. Ex. *Bull. Inst. Pasteur.* 1926. Feb. Vol. 24. No. 3. pp. 125–126.

The author finds that heated cultures are of undoubted value for the treatment of epizootic lymphangitis.

* Summarized by Dr. H. Harold Scott.

BARDELLI (P. C.). **E'possibile vaccinare preventivamente contro la linfangite criptococcica?** [Is it Possible to protect Animals against Cryptococcic Lymphangitis by Inoculation?]—*Ann. d'Igiene.* 1926. Jan. Vol. 36. No. 1. pp. 36–38.

Two horses were given injections, one of " crude antigen " derived from the cryptococcus in doses of ·005, ·01, and ·02 g. at intervals of 10 days and the other of a similar antigen prepared from Monilia macroglossae. Thirty days later both horses were injected subcutaneously with culture of the cryptococcus of Rivolta, and the injections were twice repeated at intervals of a fortnight.

The first horse failed to become infected, and the second developed the disease after an incubation period of a month.

BARDELLI (P. C.). **Ricerche sulla linfangite criptococcica. Coltivazione in serie del Criptococco di Rivolta.** [The Cultivation of the Cryptococcus of Rivolta.]—*Ann. d'Igiene.* 1924. Nov. Vol. 34. p. 796. Ex. *Bull. Inst. Pasteur.* 1926. Feb. Vol. 24. No. 3. p. 125.

Using Sabouraud's agar containing 2 per cent. peptone and 5 per cent. glucose with the addition of a maceration of calf thymus the author has obtained cultures in only 1·8 per cent. of cases with pus as seed material.

GALLEGO (A.). **Contribución al estudio de las blastomicosis. Algunas observaciones sobre la histopatologia de la linfangitis epizoótica.** [Blastomycosis. The Morbid Anatomy of Epizootic Lymphangitis.]—*Revist. Hyg. y Sanidad Pecuarias.* 1926. Mar. Vol. 16. No. 3. pp. 141–147.

The author points out that clinically epizootic lymphangitis may be confounded with farcy, but that there are ample means available for arriving at a definite diagnosis. He appears to believe, however, that histological examination of lesions is superior to microscopic examination directed towards the detection of the causal organism of lymphangitis.

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## MISCELLANEOUS.

BOHN (Hans). **Die Behandlung der Gehirn-Rückenmarksentzündungen des Pferdes mit Urotropin.** [The Treatment of Cerebral and Spinal Meningitis in Horses with Urotropin.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1926. Apr. Vol. 54. No. 2. pp. 141.

The author has treated one case of the so-called Borna disease, three of infectious meningitis, one each of infectious cerebro-spinal meningitis and of inflammation of the spinal cord, and twelve of non-infectious acute inflammation of the brain.

He concludes that the number of cases is not sufficient to warrant any conclusion.

Single doses up to 50 g. may be injected.

EDELMANN. **Zur Bekämpfung der Gehirnrückenmarkentzündung (Bornaische Krankheit) der Pferde.** [The Control of Borna Disease.]—*Deut. Tierärzt. Woch.* 1926. Mar. 6. Vol. 34. No. 10. pp. 167–169.

This paper is a review of the history of the disease and an account of the regulations issued from time to time for its control.

LE COULTRE (A. P.). **De Balische Ziekte.** [Bali Disease.]—*Nederl.-Ind. Blad. v. Diergeneesk. en Dierent.* 1926. Feb. Vol. 38. No. 1. pp. 73–91. With 1 plate.

The author gives an English summary of his paper.

The disease is sporadic and, in the case seen by the author, the following symptoms were presented. Marked anaemia accompanied by rapid emaciation, slight yellow discolouration of the serous and mucous membranes. There was lachrymation and nasal discharge. Superficial ulcers were present at the margins of the nostrils, on the under side of the tongue, and in the vagina. At parts of the body the superficial layers of the skin become leathery and hairless and later these are shed, exposing the corium. At the post-mortem only slight degeneration of the heart muscle and liver and ulceration of the bladder were found. Nothing is known regarding the cause.

EDWARDS (J. T.). **Some Recent Advances in the Protection of Cattle and other Animals against Disease. I.**—*Agric. Jl. India.* 1925. July. Vol. 20. No. 4. pp. 252–269.

——. **II. Some Points of General Importance in the Hygienic Maintenance of the Domesticated Animals.**—*Ibid.* Sept. No. 5. pp. 367–369.

——. **III. Rinderpest.**—*Ibid.* No. 6. pp. 429–443.

——. **IV. Johne's Disease.**—*Ibid.* 1926. Jan. Vol. 21. No. 1. pp. 6–13.

These contributions are intended to be educative to cattle owners in India and do not contain any reference to new research, save that in the third publication the author states that " much work has been done upon its (the virus) nature, and researches have been carried out upon a large scale in this direction at Muktesar during the last three years. It would appear to be an extremely minute fragile organism of the spirillary class to which the property of producing violent disease in cattle seems to be one readily lost when its propagation takes place elsewhere than in the animal body."

RABAGLIATI (D. S.). **Notes on a Few Bovine Diseases dealt with by the Egyptian Veterinary Service.**—*Vet. Jl.* 1926. May. Vol. 82. No. 5. pp. 248–255.

The nature of this brief paper is indicated by the author in his concluding paragraph : " It is hoped that the above rough sketch of the ailments to which cattle are liable in Egypt may prove of interest to the casual reader, but by anyone requiring further information, reference must be made to the published reports which used to be issued annually by the Director of the Veterinary Service, Cairo . ."

CREW (F. A. E.). **A Note on a Sexually Abnormal Camel.**— *Vet. Jl.* 1926. June. Vol. 82. No. 6. p. 311.

This brief note is illustrated by a photograph of the abnormality. No details are available other than those shown by the photograph.

" It may be assumed with a considerable degree of confidence that in this case there were well mal-descended testicles, and fairly well developed derivatives of both Müllerian and Wolffian ducts."

The note is published in the hope that it may sufficiently interest veterinary surgeons who have to do with camels, so that they may, whenever possible, enquire completely into the nature of such an abnormal individual.

JALABERT (M.). **Au sujet de la Toxicité de la Férule.** [The Toxicity of Ferula.]—*Rev. Vét.* 1926. May. Vol. 78. No. 5. pp. 276–281.

The author summarizes the various views that have been expressed regarding the toxicity of ferula, but concludes that his own experiments carried out with rabbits leave no doubt that the plant is poisonous.

There remain for examination points regarding the toxicity of different parts of the plant, and the possible seasonal variation in toxicity.

VELU (H.) & JALABERT (H.). **Toxicité des jus de férule pour le lapin et le porc.** [The Toxicity of the Juice of Ferula (Giant Fennel) for the Rabbit and the Pig.]—*Bull. Soc. Path. Exot.* 1926. Jan. Vol. 19. No. 1. pp. 22–25. With 1 text fig.

As a result of their experiments the authors feel justified in concluding that the juice expressed from leaves collected immediately after the rains, when *Ferula communis* and *Mandragora officinalis* constitute the only vegetation, is poisonous for rabbits and pigs.

The symptoms and lesions presented by experimental animals are absolutely identical with those recorded by CHAPINS and BALOZET in natural cases.

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HADLEY (F. B.). **Sweet Clover Poisoning of Cattle.**— *Vet. Med.* 1926. May. Vol. 21. No. 5. pp. 213–214.

MALFROY (M.). **L'elevage du mouton à laine au Soudan et la bergerie administrative.** [The Raising of Wool Breeds of Sheep in the Soudan.]—*Rec. Méd. Vét.* 1926. Apr. 30. Vol. 102. No. 8. pp. 178–182.

PAMMEI (L. H.). **Some Poisonous Plants of California.**— *Vet. Med.* 1926. May. Vol. 21. No. 5. pp. 220–223.

RETTERER (Ed.). **Structure de la défense d'eléphant.** [The Structure of the Elephant's Tusk.]—*C.R. Soc. Biol.* 1926. Feb. Vol. 94. No. 4. pp. 255–259.

SCHERN. **Die amtliche Prufung der Zeckenvertilgungsmittel in Uruguay.** [Official Tests of Dips in Uruguay.]—*Berlin. Tierärzt. Woch.* 1926. Mar. 12. Vol. 42. No. 11. pp. 170–171.

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## REPORTS.

SUDAN GOVERNMENT. **Report of the Veterinary Research Officer, Sudan Government, for the period October 1st, 1924, to September 30th, 1925.** [KNOWLES (R. H.).]—*Ann. Report of the Vet. Dept. Sudan Govt. 1925.* Appendix I. pp. 24–47. [Printed report, 8vo.]

It has been found that a single dose of 10 g. of " Bayer 205 " administered intravenously is the minimum required to effect a cure of camel trypanosomiasis. Sufficient for 800 doses is being purchased for an extended trial.

Experiments are under way in which tartar emetic is being tried in conjunction with " Bayer 205 " with a view to reducing the cost.

A preliminary test appears to indicate that while camels cured with " Bayer 205 " are susceptible to re-infection, they offer a greater resistance than untreated camels, and, developing a chronic form of infection, remain in good condition. From the results obtained in a considerable number of tests it appears that the percentage error in the formol-gel test is about 8 in the direction of incriminating healthy animals.

Three cases of *T. congolense* infection and two of *T. vivax* infection were detected in cattle. Knowledge regarding the incidence of these diseases is deficient. Two cases of trypanosomiasis in horses due to *T. pecaudi* were diagnosed in horses. One was treated with 2 doses of " Bayer 205," 3 grammes and 2 grammes, with a nine days' interval. The fact that the horse is fit and well eight months after treatment indicates a cure.

It has been found possible to prepare an anti-rinderpest serum which is efficient at a dose of 6·6 cc. per 100 lb. bodyweight.

A vaccine is being prepared from artificial cultures against contagious pleuro-pneumonia. The inoculation produces only a slight reaction, but confers a solid immunity. The medium used for the cultivation of the virus is a mixture in equal parts of Martin's broth and meal infusion with 10 per cent. of serum added. The reaction is adjusted to pH 8·0.

Contrary to what has been stated elsewhere, it appears that under continued cultivation there is a progressive loss of virulence, and that the virulence does not tend to become fixed after a certain amount of attenuation has occurred.

The programme for further investigation includes the following :—

1. Estimation of the relation between virulence of the vaccine and its antigenic properties.
2. The possibility of using non-virulent strains in larger doses, and the use of a single vaccine to replace the double vaccine.
3. The duration of the immunity conferred by the different methods.

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## BOOK REVIEWS.

BAYLIS (H. A.) [M.A., D.Sc., Brit. Museum (Nat. History)] & DAUBNEY (R.) [M.Sc., M.R.C.V.S., Vet. Res. Laboratory, Kabete, Kenya Colony.] **A Synopsis of the Families and Genera of Nematoda.**—pp. xxxvi+277. 1926. London : Printed by Order of the Trustees of the British Museum. [Price 10s. 6d.]

Recent years have seen enormous advances in the ancillary medical sciences—and none has advanced more rapidly than Helminthology. New

species have been described, new facts have been added to our knowledge of the biology of these parasites and a widely scattered literature has accumulated on the subject. For this reason we welcome this synopsis of genera and families of Roundworms as one of the primary steps necessary to evolve an orderly and systematic conception of the subject.

Dr. Baylis and Mr. Daubney have rendered an invaluable service to the science of Helminthology. Our knowledge of the systematic side of the subject is not sufficiently advanced to make it possible to formulate an infallible scheme of classification, but with the materials available the writers have produced a very successful guide. The generic descriptions are succinct, clear and epitomatic. Each includes the general habitat of the parasite, the name of its typical species, and references to important papers on the genus. Frequently, also, a critical commentary is given on the authors' conception of its name, its systematic position, or on obscure details. All genera of Nematodes—free-living as well as those parasitic on plants or animals—are described, and in this way over 600 diagnoses are given and classified. In addition, exhaustive systematic and alphabetical indices are provided.

The value of this volume to the practising Veterinary Surgeon is problematical. Its value to the laboratory worker is certain, and it will, in the future, form an essential book of reference. It is unfortunate that it contains neither illustrations nor lists of species, but both would have added considerably, not only to the bulk, but to the cost. Species can be readily found by reference to the well-known Index Catalogue of Roundworms compiled by STILES and HASSALL in America, but satisfactory illustrations are not so readily obtainable. The writers have compromised on this point by appending references after each genus which will enable these to be searched for in periodicals and other works. On account of this compromise it has been possible to keep the price moderate, and the size convenient.

T. W. M. Cameron.

MÜLLER (Georg) [Professor and Director of the Clinic for Small Animals at the Veterinary High School at Dresden] & GLASS (Alexander) [A. M., V.S. (McGill), Professor of Canine Medicine in the Veterinary Department, University of Pennsylvania.] **Diseases of the Dog and their Treatment.** Fifth Illustrated Edition Revised and Enlarged.—pp. xvi+655. With 7 plates & 255 text figs. 1926. London: Baillière, Tindall & Cox. [Price 30s. net.]

The prefatory note to the fifth edition of this work in English claims that it is a practically new book, having been entirely revised from beginning to end. It is apparently a translation of the third German edition published in 1921 with additions by Dr. Glass, for which a similar claim was made. It will, therefore, be seen that there have been considerable changes since the fourth English edition published ten years ago. The result is a work of considerable excellence, and one likely to be of great assistance to veterinary surgeons and students. The text is, on the whole, of a very high order, and most of the views expressed coincide with the opinions now held in authoritative circles in this country. As an example of this may be quoted the chapter on Distemper. After briefly referring to various researches and expressed opinions as to etiology, the authors conclude with the statement that " the bulk of evidence tends to lean to the theory that the specific micro-organism, whatever it is, must be ultra-microscopical." The clinical features are described, almost identically with a recent English work on the subject, as developing in four forms, (1) Catarrhal distemper (eyes, nose and lungs), (2) gastric distemper (intestinal distemper), (3) nervous distemper, (4) exanthematical distemper. Thus the disease is systematically dealt with, and sound therapeutical measures are indicated for almost any complication.

There are, however, defects which are a little surprising. For example, there is no reference to the important rôle of vitamins in general development and nutrition, particularly in regard to the absence of the fat-soluble vitamins, and the production of rickets, and the onset of polyneuritis in the absence of water soluble B.

The descriptions of some of the operations are very lucid, while others are vague and difficult to follow. It is doubtful if any person reading the amounts of operations for scrotal hernia and inguinal hernia would feel competent to undertake either operation. It is misleading to note that luxation of the patella, excellently described otherwise, is seen only in small animals. The writer has met with it quite frequently in bulldogs, collies, and Alsatian wolthounds.

There is a good chapter on diseases of the eyes. With regard to entropion, the authors state that HALTANHOFF considers that the tendency to it is hereditary, but they neither agree nor disagree with this view. The writer has considerable evidence to show that it is very frequently indeed hereditary, and follows certain strains regularly in the case of chow-chows, airedales and others.

The book is generously illustrated, but we regret that we cannot express the same compliments regarding their quality. Many of them are distinctly crude and very diagrammatic. For example, the figures illustrating different methods of amputation (p. 464) look more like sawing through bundles of firewood than through legs. The plate facing p. 454 shows a dog undoubtedly suffering from a deficiency of certain accessory food factors, but it is certainly not rickets, while the coloured plate facing p. 59 is both hideous and crude and in our opinion of no value whatever. We hope that in the next edition, and we feel certain that the general excellence of the work will merit one, some of these eyesores will be removed or replaced by something better.

The printing and binding are in the publishers' usual good style.

G. H. W.

LANDER (G. D.) [D.Sc., Formerly Professor of Chemistry and Toxicology, Roy. Vet. College, London.] **Veterinary Toxicology.** 2nd Edition.—pp. xiv+325. With 39 text figs. 1926. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden. [Price 12s. 6d. net.]

It is, perhaps, even more important for the veterinarian than for the medical practitioner to possess a sound knowledge of poisons and of their action on the animal organism.

Since agriculturists have been provided with artificial fertilizers and manufactured foodstuffs the toxic actions of some of these have caused considerable economic damage. It is only necessary to recall the poisonous actions of sodium nitrate and of foods containing castor seed, mustard and cyanogenetic glucosides on stock to indicate the practical relation of veterinary toxicology to agriculture. Under modern conditions carbon monoxide appears to be the most frequent poison encountered in man, whilst the common fatal intoxications produced by lead compounds and poisonous plants in cattle have no counterpart in human medicine. It is therefore obvious that a good text-book on veterinary toxicology is essential for the veterinarian and Dr. Lander published his text-book fourteen years ago. The present edition includes a substantial proportion of the more recent additions to our knowledge, particularly in the domain of plant poisons. For the sake of completeness, a short section on the effects of mustard gas (and other poisonous gases used in the war) on horses might have been usefully included. This work should be in the hands of every English veterinary surgeon. The author's experience has led him

to write a practical work rather than a purely scientific treatise. Hypotheses and theories are ephemeral; the fashion of to-day is obsolete to-morrow. But the records of careful observations have a permanent character and are independent of theory.

The occurrence of each poison, the symptoms, *post-mortem* appearances and, where possible, chemical diagnosis and toxic doses are enumerated, the least satisfactory of these sections being necessarily that referring to fatal toxic doses. For example, Kaufmann's toxic dose of strychnine for a dog (one-twelfth to one-third grain) is undoubtedly much too high. The book is singularly free from typographical errors, the only one noticed by the reviewer being on page 118, where the author's meaning has been reversed by the printing of "*marked*" for "*masked.*" This is the only modern English work on veterinary toxicology and it can be recommended unreservedly to the student and the practitioner.

G. W. Clough.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 14.] November 30, 1926. [No. 4.

## DISEASES DUE TO PROTOZOAN PARASITES.

VAN SACEGHEM (R.). **Propagation de *Theileria parva* par les tiques.** [The Spread of *Theileria parva* by Ticks.]—*Bull. Méd. Katanga.* 1925. Oct. Vol. 2. No. 5. p. 213.

East Coast fever is endemic in the Ruanda Urundi area, and the mortality among calves amounts to about 25 per cent. Adult animals are more or less immune as a result of infection during early life.

The disease does not appear to occur at altitudes of 2,000 metres, although ticks are present but in small numbers. van Saceghem believes that the lower temperature at high altitudes has an attenuating effect upon the parasite. When animals born on the higher ground are brought down they contract the disease at about 1,500 metres, and adults die.

WITKAMP (J.). **Onderzoek naar het bestaan van een toestand van labiele infectie ten opzichte naar piroplasmosis canis bij inheemsche honden.** [Latent Infection of Native Dogs with *B. canis*.]—*Ned.-Ind. Blad. v. Diergeneesk.* 1925. Aug. Vol. 37. No. 4. pp. 385–392.

From observations Witkamp concluded that canine piroplasmosis is endemic in the Buitenzorg and other districts of Java, and that most of the native dogs are "salted," and harbour latent infection. To prove this he performed splenectomy on a number of native dogs, and examined the blood carefully. In some cases parasites were seen only after prolonged examinations over several days, and he considers that some of the cases recorded as negative may have been positive. Out of 10 dogs, 6 were shown to be infected; piroplasms appeared in one case only 24 hours after the operation, but in the other cases the interval was about two days.

One dog died from trypanosomiasis on the fourth day, and appears to have been suffering from chronic surra, although (like the others) it appeared healthy before splenectomy was performed.*

*Summarized by Dr. W. H. Andrews.

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CONTIS (Georg). **Beitrag zur Hundepiroplasmose in Griechenland.** [Canine Piroplasmosis in Greece.]—*Berlin. Tierärzt. Woch.* 1926. May 7. Vol. 42. No. 19. pp. 314–316.

The author gives an account of nine cases of piroplasmosis encountered in his practice during the course of 6 months.

The dogs were treated with 10 to 20 cc. of 1 per cent. trypanblue and recovery took place in all cases but one in which treatment was given on the eighteenth day of illness.

The anaemia persisted for about 3 months.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.), & PLANTUREUX (E.). **Des piroplasmes bovins du S.G.** *Babesiella.* **Description d'une nouvelle espèce** *B. major* **(origine : France).** [A New Babesiella, *B. major* of Bovines in France.]—*Ann. Inst. Pasteur.* 1926. July. Vol. 40. No. 7. pp. 582–594. With 1 chart & 1 text fig.

The observations recorded in this paper were carried out in Algeria, but both the calf in which the organism was detected and those used for experimental inoculation were recent importations from France.

Seven animals were used for experimental transmissions, and in only one of these, namely, the first passage, was any elevation of temperature noted. This was recorded on the 8th day and lasted for one day only. It cannot be stated definitely that it was caused by the parasite.

In the experimental animals the period of incubation ranged from 4 to 11 days, with an average of 7. In the sixth calf of the series no parasites were found in the blood until the 30th day, but it is considered that this was probably in the nature of a relapse, the primary invasion having escaped detection. The parasites persisted in the blood for periods ranging from 1 to 11 days, with an average of 6.

The details given regarding the extent to which the blood is invaded appear to contain an error, since it is stated that the invasion varies from 1 to 30 per 1,000 corpuscles, and the average is given as 9 per cent.

Blood changes are slight, and only a temporary anisocytosis has been observed. The parasite appears to be devoid of pathogenic powers.

As observed in the blood rather more than 50 per cent. of the parasites are round, or approximate to round. Nearly 40 per cent. are elongated, and the remainder have a trefoil shape. A single corpuscle may contain from 1 to 3 round forms. In one case 5 elongated forms were found in a single corpuscle. In some cases twin parasites were found joined together at their narrower end by a filament and forming approximately a right angle. About 50 per cent. of the elongated parasites were pear-shaped. The average size was $2{\cdot}7\mu$ by $1{\cdot}6\mu$.

The trefoil and even quatrefoil forms resembled those described by the authors as occurring in *B. berbera.*

Trypanblue was found to be without effect upon the parasite.

In only one case were parasites found at the margin of the corpuscle.

It would appear that the organism is quite distinct from *B. bovis.* Cross-immunity tests afforded evidence that the parasite was specific.

NIESCHULZ (Otto). **Zoologische bijdragen tot het Surraprobleem. III. Overbrengingsproeven met** *Tabanus rubidus* **Wied.,** *T. striatus* **Fabr., en** *Stomoxys calcitrans* **L.** [Biological Contributions to the Surra Problem. III. Transmission Experiments with *Tabanus rubidus*, *T. striatus*, and *Stomoxys calcitrans*.]—*Nederl.-Ind. Blad. v. Diergeneesk.* 1926. June. Vol. 38. No. 3. pp. 255–279. With 1 plate.

The author gives an account of his experiments in which flies belonging to the three species referred to in the title were fed upon infected buffaloes or horses and after varying periods were transferred to horses at different intervals. The tabular statement shows the essential details of the tests and the results:—

| Expt. No. | Species of Fly and Number used. | Infecting animal. | Feed interrupted. After. | Feed interrupted. For. | Test animal. | Result. |
|---|---|---|---|---|---|---|
| 1 ... | *T. rubidus* 2 | Horse | 3 min. | 1–2 min. | Horse | + |
| 2 ... | ,, 5 | Buffalo | 3 ,, | 1–10 ,, | ,, | — |
| 3 ... | ,, 20 | ,, | 3 ,, | 1–3 ,, | ,, | + |
| 4 ... | ,, 101 | ,, | 3 ,, | 1–7 ,, | ,, | — |
| 5 ... | ,, 7 | Horse | 3 ,, | 30–35 ,, | ,, | + |
| 6 ... | ,, 100 | ,, | 3–5 ,, | 8–15 hours | ,, | — |
| 7 ... | ,, 119 | ,, | 10 ,, | 1–3 days | ,, | + |
| 8 ... | ,, 97 | ,, | 10 ,, | 1 ,, | ,, | — |
| 9 ... | ,, 97 | ,, | 10 ,, | 2 ,, | ,, | — |
| 10 ... | ,, 97 | ,, | 10 ,, | 3 ,, | ,, | — |
| 11 ... | ,, 6 | ,, | Not. | 3–30 ,, | ,, | — |
| 12 ... | *T. striatus* 1 | ,, | 3 min. | 2 min. | ,, | + |
| 13 ... | ,, 3 | Buffalo | 3 ,, | 4–8 ,, | ,, | — |
| 14 ... | ,, 25 | Horse | 3 ,, | 28–36 ,, | ,, | + |
| 15 ... | ,, 102 | ,, | 3–5 ,, | 8–15 hours | ,, | — |
| 16 ... | ,, 8 | ,, | Not. | 1–8 days | ,, | — |
| 17 ... | *Stomoxys* 100 | ,, | 3 min. | 1–11 min. | ,, | — |
| 18 ... | ,, 100 | ,, | 3 ,, | 26–37 ,, | ,, | — |

In the table where more than one period is given for the interval between the two feeds it means that some of the flies of the batch were used for each period.

FABRE (H.) & BERNARD (M.). **Sur un nouveau foyer de trypanosomiase bovine observé à la Guadeloupe.** [A New Centre of Bovine Trypanosomiasis in Guadeloupe.]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 435–437.

A score of bovines at Blanchon, Guadeloupe, developed symptoms which were not recognized as indicating any of the diseases of cattle commonly encountered. There were observed anaemia, muscular atrophy of the hind quarters, and subsequently paralysis and death. The appetite and rumination were normal. In some of the animals lachrymation was noticed, but there was little or no oedema in any instance. It was thought that piroplasmosis was responsible, but blood examination immediately revealed the presence of trypanosomes in large numbers. A number of the animals died. The trypanosome has not been identified, but it is described as very active in the blood, the centrosome is at the posterior extremity, the free flagellum is short and the undulating membrane not very well developed.

An unidentified blood-sucking fly is suspected as being the transmitting agent, but specimens of it have not been caught and examined.

In a note MESNIL states that the parasite appears to resemble *T. cazalboui* (*T. vivax*).

BAROTTE (J.). **Prophylaxie de la dourine. Réaction de fixation et chimiothérapie.** [Dourine Prophylaxis. Complement Fixation and Chemotherapy.]—*Bull. Soc. Path. Exot.* 1926. May 12. Vol. 19. No. 5. pp. 325–330.

The author thinks that the doubtful results which have been obtained with the complement fixation tests in the diagnosis of dourine in asses and mules is due to insufficient preliminary heating of the serum. He insists that the serum must be heated to 60–62°C. for not less than half an hour, as otherwise the anticomplementary properties of the sera are not destroyed.

He believes that the antigen prepared according to the technique described by WATSON is not sufficiently stable and homogeneous. He prefers an alcohol-ether antigen, prepared from dried trypanosomes after they have been ground up. The technique used originally in the test was that of CALMETTE and MASSOL, but more recently BESREDKA'S technique, devised for the diagnosis of tuberculosis, has been employed in preference.

"Bayer 205" and 309 of Fourneau have been tested, but neither has given results superior to those obtained by atoxyl and tartar emetic in combination. Relapses have occurred within a week or a fortnight, and treatment has been unsuccessful when it has been delayed. Furthermore, it would appear that in equines the safety factors of "Bayer 205" and "Fourneau 309" are smaller than they are in man.

KLIGLER (I. J.) & WEITZMAN (I.). **Susceptibility and Resistance to Trypanosome Infections. I. Attempts at Immunization with Dead and Attenuated Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. pp. 147–160.

The aim of the authors' investigations is to throw light upon the mechanism of immunity to protozoal infections. That such an immunity exists in, for example, the case of malaria, there is considerable field evidence to show. The immunity conferred by an attack is, however, not readily investigated on account of specific affinity of the malarial plasmodium for human hosts. In their experiments, therefore, they have used trypanosomes pathogenic for laboratory animals. The trypanosome selected was *T. evansi* isolated from mules, and the animal used was the rabbit.

In a previous publication the authors showed that it is not generally possible to demonstrate humoral parasiticidal antibodies, that there is a definite change in the leucocyte picture during the disease, that by disturbing the leucocyte balance by means of olive oil injections relapses can be produced at will, and that "Bayer 205" treated animals acquire a more or less durable resistance to re-infection. They concluded from their previous work that destruction of trypanosomes in the circulation led to a partial immunization, which in turn led to a disappearance of parasites from the circulation.

The experiments recorded in the present communication had for their object the production of changes simulating those occurring during infection, and an increase in resistance of the host by the injection of dead or attenuated parasites. The index of host resistance was gauged by the interval elapsing between inoculation and the appearance of trypanosomes in the blood.

In blood examinations thick drops stained with Giemsa were used, and the relative intensity of infection was judged by the number of trypanosomes per field. An occasional parasite (less than one in 20 fields) was not considered as indicating blood invasion.

In the first experiments recorded rabbits were injected with washings from sedimented trypanosomes or autolysed trypanosomes (by freezing and thawing). Three doses were given at 5-day intervals. Rabbits so treated showed shorter incubation periods than controls.

Animals given repeated (25) injections of washed trypanosomes killed by heat at 56° C. showed still shorter periods of incubation than those treated with washings or autolysed parasites. In fact, the onset of infection when living trypanosomes were given was so to speak explosive. Subsequently the disease followed the usual or a possibly milder course.

Repeated experiments showed that no difference resulted whether the citrated blood was allowed to stand for some time before the trypanosomes were collected or whether the whole process of centrifuging and killing was carried out at once. By reducing the number of injections of dead trypanosomes to 10 it was found that the course of infection in injected animals ran parallel with that in control animals.

Autolysed or dead trypanosomes therefore appeared to render the animals hypersensitive to infection, in that the period of incubation was reduced.

In animals subjected to a long series (25) of injections of trypanosomes killed by heat, marked swelling and oedema developed.

The immediate effect of injections, whether of trypanosomes, serum, or autolysed trypanosomes, was a rise in the number of polynuclear leucocytes, and this was followed by a fall associated with a proportional increase in lymphocytes. But control injections indicated that this was not a specific reaction.

Attention was next turned to the possibility of producing some degree of immunity by injecting trypanosomes together with "Bayer 205."

Trypanosomes were collected from citrated guineapig blood by fractional centrifuging, and autolysed by freezing and thawing. Half the material obtained was injected into a rabbit direct and the other half was mixed with a solution of "Bayer 205" and injected after an interval of half an hour at room temperature. A control rabbit was given an equivalent amount of the drug without trypanosomes. The amount injected, ·005 g. per kilo, had previously been found to be insufficient to confer any protection.

The results were that the animal receiving trypanosomes only had an explosive infection, the one receiving "Bayer 205" only developed a fatal infection after a period of incubation of 10 days, and the third, which received the mixture, gave a blood picture suggesting that infection was about to develop, but it recovered without becoming infected. The resistance was of short duration, because the animal succumbed later to a test inoculation.

Experiments on similar lines were repeated using different amounts of the drug, but generally speaking the results were in agreement in that the mixture of " Bayer 205 " and trypanosomes conferred some degree of resistance.

ARCHIBALD (R. G.) & RIDING (D.). **A Second Case of Sleeping Sickness in the Sudan caused by** *Trypanosoma rhodesiense.*—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. pp. 161–166. With 1 map in text.

The case occurred in a boy 15 years of age, in the Tembura district of Bahr-el-Ghazal—where *G. morsitans* is plentiful. The clinical history of the case resembled that of *T. rhodesiense* infection in man, rats inoculated showed a high percentage of posterior nuclear forms, and the pathogenicity of the parasite for laboratory animals closely resembled that of *T. rhodesiense.*

VAN SACEGHEM (R.). **Le bismuthoidol dans le traitement des trypanosomiases animales.** [Bismuthoidol in Treatment of Animal Trypanosomiases.]—*Bull. Méd. Katanga.* 1925. Oct. Vol. 2. No. 5. pp. 243–246.

Bismuthoidol is colloidal bismuth in isotonic sugar solution.

A few experiments have been carried out, using the intravenous path. It is concluded from these that the drug has no action upon *T. congolense*, but that it has a marked trypanocidal action upon *T. brucei.*

KELLERSBERGER (E. R.). **" Bayer 205 " dans la maladie du sommeil. Considérations sur 105 cas traités.** [" Bayer 205 " in Sleeping Sickness. 105 Treated Cases.]—*Bull. Méd. Katanga.* 1926. Feb. Vol. 3. No. 1. pp. 3–16.

As a result of his observations on 105 cases of sleeping sickness treated with " Bayer 205 " the author concludes that it is effective before the nervous system is involved, provided the injections are given at sufficiently short intervals. It achieves only a temporary clearance of the circulation if it is used after the central nervous system has been invaded. It does not influence the cellular contents of the cerebrospinal fluid in such cases.

LAGAS (D.). **Over de toepassing van Bayer 205 als hulpmiddel bij de bestrijding van surra bij karbouwen in de Onderafdeeling Samosir der Batakeanden.** [The Use of " Bayer 205 " for the Control of Surra in Buffaloes in the Samosir District, Sumatra.]—*Nederl.-Ind. Blad. v. Diergeneesk. en Dierenteelt.* 1926. Apr. Vol. 38 No. 2. pp. 192–203. With 5 tables.

During the period October 1924 to April 1925, 811 buffaloes were treated prophylactically with " Bayer 205." Sixty-four of these were apparently healthy carriers, 94 showed more or less marked clinical symptoms, and 42 were clinical cases in which the trypanosome could be found.

During the period mentioned, 49 of the treated buffaloes died from various causes, and nine animals were found showing trypanosomes

in their blood. The intervals elapsing between appearances ranged from 3 weeks to 10 months, but on an average the period was 2 months.

Eight animals, which received a second dose of " Bayer 205 " of from 2 to 4 grammes, have not, up to the present, shown relapses. Buffaloes outside the affected areas were given small doses for protective purposes, and this was found to be economically advantageous, as a larger number of animals were by this means prevented from becoming a means of spread of the disease.

It was confirmed that in order to put up a successful fight against the disease a large proportion of the animals in infected areas would have to be injected.

It was a generally held opinion that the treated animals improved in condition.

It is advised that for full grown animals the dose be raised from 2 to 3 grammes.

KEEVILL (A.). **The Treatment of Sleeping Sickness** (*Trypanosoma rhodesiense*)—**a Study of Fifty Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 111–118.

The author gives details and tabular statements of his cases and from these draws the following conclusions :—

Tryparsamide fails to sterilize either the blood or the spinal fluid in cases of *T. rhodesiense* infection. " Bayer 205," on the other hand, causes a disappearance of trypanosomes both from the blood and spinal fluid, and as a rule causes a prompt improvement in general condition.

Tryparsamide is of particular value in those cases which have relapsed after treatment with ' Bayer 205 " or, better, for the subsequent treatment of all cases in which the spinal fluid does not become normal.

Treatment with tryparsamide should be delayed at least ten weeks after treatment with " Bayer 205," otherwise there is a great risk of visual disturbance or blindness.

The immediate results obtained with Fourneau, Tréfouel and Vallée's 309 are at least as good as those obtained with " Bayer 205."

DYE (William H.). **The Serum-Formalin Reaction in** *Trypanosoma rhodesiense* **Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 74–92. With 2 text figs.

An account is given of an outbreak of human trypanosomiasis which was due to *T. rhodesiense*. The specific diagnosis was based upon the facts that short and posterior-nuclear forms were found in inoculated rats, and that the local species of fly was *G. morsitans*. A few specimens of *G. pallidipes* were found, but no specimens of *G. palpalis* occurred among the many thousands of flies collected.

In addition to observations on the serum-formalin reaction the paper contains accounts of cases treated with " Bayer 205 " and tryparsamide.

The evidence regarding the outbreak itself indicated that the disease was endemic in the particular area, and had been so for many years.

It also appeared to indicate that the infection which was of comparatively feeble virulence was spread direct from man to man.

"Bayer 205" appeared to be markedly more effective than tryparsamide for clearing the circulation, but the most marked improvement in treatment, which was shown by rapid convalescence and return to normal, occurred in those cases which were treated first with "Bayer 205" and subsequently with tryparsamide.

It was noted that just as the number of trypanosomes present in the peripheral blood is no indication of the severity of the disease, so the severity of the blood invasion did not materially influence the degree of reaction obtained with the serum-formalin reaction. In carrying out the test 1 minim of formalin was added to 1 cc. of serum, and the results were read at periods ranging from 30 minutes to 24 hours, the degree of solidification being noted at each reading.

It was noted that if the serum were made hypertonic by the addition of salt, the reaction was accelerated, but the addition of salt to a normal serum did not cause it to give the reaction.

The addition of ¼ grain of "Bayer 205" to the serum an hour before the formalin was added greatly retarded the reaction.

The addition of the same, or double the amount of tryparsamide to the serum, did not influence the speed of the reaction at all.

The cerebro-spinal liquid did not give the reaction.

As to the value of the method, the author comes to the conclusion that while it is to some extent disappointing, it has some value.

A negative result in an untreated case is of undoubted value. The value of a positive result in an untreated case may be confirmed by giving three 1 gramme injections of "Bayer 205." If the case is one of trypanosomiasis the injection of the drug will alter the intensity of the reaction.

The results of treatment recorded differ markedly from those obtained in *T. gambiense* infection, and the author points out that it would be interesting to get results of the serum-formalin reaction of such patients, as well as those of local mammals.

Experiments carried out by the author with the blood of animals in his area, some of which were infected with trypanosomes (supposedly *T. brucei*), yielded results parallel with those given with the blood of his patients.

From this it would appear that the difference between *T. brucei* and *T. rhodesiense*, if there is any at all, is slight.

MAZZA (Salvador). **Existencia de la leishmaniosis cutánea en el perro en la República Argentina. (Nota preliminar).** [Cutaneous Leishmaniasis in Argentine Dogs.]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. No. 11. 5 pp. With 1 text fig.

Cutaneous leishmaniasis has been known to exist amongst dogs in Persia and Turkestan for some years. The author found several cases in the Argentine. The lesion was often situated at the root of the ear, but was also present elsewhere. He never found any leishmanial infection of the mucosae, and splenic puncture in life, and examination of the liver, spleen and bone-marrow after death failed to reveal any involvement of these tissues.*

* Summarized by Dr. H. Harold Scott.

ADLER (S.) & THEODOR (O.). **Further Observations on the Transmission of Cutaneous Leishmaniasis to Man from** *Phlebotomus papatasii.*—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. pp. 175–194. With 3 plates.

Systematic examination of sandflies in Jericho during 1925 showed that approximately 1 per 1,000 were infected with Herpetomonas. Nearly 4,000 flies were examined, of which the great majority were females of *P. papatasii.*

During the period 1924–25 seven infected flies were found, and of these, four contained mammalian blood and three no recognizable blood.

In stained preparations the Herpetomonas show great polymorphism, and it appeared to be possible to make two groups of them—flagellated and non-flagellated. Details of both forms are given and a plate shows their morphology.

In the flies containing mammalian blood the majority of the parasites were found in the stomach. In the other three they were in the oesophagus, oesophageal diverticulum, and both portions of the gut. In two out of three cases volunteers were successfully inoculated with material from the flies.

Sand-flies were fed upon oriental sores and 10 per cent. acquired herpetomonas.

Eleven attempts were made to infect volunteers with material from sand-flies artificially infected with Herpetomonas, but all remained negative during observation of three and a half months.

PUPO (J. Aguiar). **Traitement de la leishmaniose des muqueuses par l'éparseno (amino-arséno-phénol de Pomaret). Ses possibilités d'emploi dans le traitement du kala-azar.** [The Treatment of Leishmaniasis of Mucous Membranes with Éparseno. The Possibilities of treating Kala Azar with it.]—*Bull. Soc. Path. Exot.* 1926. May. Vol. 19. No. 5. pp. 331–335.

The author gives details of three cases treated and finds amino-arseno-phenol Pomaret superior to 606 and 914.

TANABE (Misao). **The Cultivation of Trichomonads from Man, Rat and Owl.**—*Jl. Parasit.* 1925. Dec. Vol. 12. No. 2. pp. 101–104.

The composition of the culture medium used is as follows :—

| | |
|---|---|
| Sodium chloride ... ... ... ... | 0·7 g. |
| Sodium citrate ... ... ... ... | 1·0 g. |
| Loeffler's blood serum (dehydrated) ... | 0·5 g. |
| White of egg ... ... ... ... | 2 cc. |
| Distilled water ... ... ... ... | 100 cc. |

The salts are first dissolved in the water, then the egg with vigorous shaking, and finally the blood serum.

This medium does not readily become heavily invaded by bacteria, and trichomonas cultures can be carried on by subinoculating every three days. Incubation is at 35° C.

The most favourable reaction was pH 8·0 to 8·2.

NIESCHULZ (O. C. H.). **Die Kokzidiose beim Geflügel und bei Kaninchen.** [Coccidiosis in Birds and Rabbits.]—*Deut. Tierärzt. Woch.* 1926. May. Vol. 34. No. 19. pp. 352–353. With 1 text fig.

This brief paper gives the life cycle of coccidium. It appears to have been read at a meeting of laymen interested in breeding birds and rabbits.

i. YAKIMOFF (W. L.) & MARKOFF-PETRASCHEWSKY (E. N.). **Modifications du sang au cours de la coccidiose des animaux. I. Le sang au cours de la coccidiose bovine.** [Alterations in the Blood of Animals infected with Coccidiosis. I. Bovine Animals.] —*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 427–428.

ii. YAKIMOFF (W. L.) & DAWYDOFF (A. M.). **II. Le sang au cours de la coccidiose des rats blancs.** [II. White Rats.]—*Ibid.* pp. 428–429.

i. The authors find that the eosinophiles are increased in number, and that the increase is in proportion to the age of the animals.

ii. In white rats heavily infected with coccidia the authors find a decrease in the number of neutrophile polynuclears and an increase in the lymphocytes and eosinophiles.

CATANÉI (A.) & PARROT (L.). **Sur le virus de la spirochétose aviaire en Algérie et sur la longue durée de sa conservation chez** *Argas persicus.* [Algerian Avian Spirochaetosis and its Preservation in *Argas persicus.*]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 419–421.

Cross tests go to show that the spirochaetosis of birds in Algeria is the same as that described by MARCHOUX & SALIMBENI in Brazil.

In 1920 the authors detected a case of spirochaetosis in a duck. Tests have shown that although it was at first thought that this was a distinct species, it is in all probability identical with the fowl type of parasite. On March 8th 1926 the authors ground up about a score of adult *Argas persicus* which had been collected at Biskra on March 22nd 1924. The ticks had been kept at room temperature throughout the period except that they were incubated at body temperature for the last five days before they were used for the inoculation of a young fowl. Spirochaetosis developed.

SEDDON (H. R.). **A Note on Spirochaetosis in Fowls.**—*New South Wales Dept. Agric. Vet. Research. Rept.* No. 2. 1926. Apr. pp. 17–19.

The existence of spirochaetosis was established and argas ticks were collected. Susceptible birds were infected by contact in 3 to 4 weeks after contact. It was noteworthy that the attacks were mild and that spirochaetes were found to be present in the blood for a few days only, when obvious symptoms of illness were present.

MATHIS (C.) & GUILLET (R.). **Réceptivité du lapin au spirochète de la Musaraigne.** [The Susceptibility of the Rabbit to the Spirochaete of the Shrew Mouse.]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 504–507.

LEGER in 1917 expressed the opinion that the spirochaete of the shrew—*S. crocidurae*—was not transmissible to the rabbit. The authors find, however, that it is capable of setting up a slight transitory infection.

MAZZA (Salvador). **Sobre una espiroqueta encontrada en un perro de Tabacal (Salta). (Nota preliminar.)** [A Spirochaete found in a Dog at Tabacal (Salta).]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. No. 11. 6 pp. With 5 figs.

The author, in the course of examination of dogs in Tabacal for filarial infection, found certain spirochaetes, particularly abundant in smears and sections from the spleen and liver, present also, but in smaller numbers, in the kidneys and lungs. The average length was 7·7 microns, the limits being 6 and 9·2 microns, and the thickness 0·2–0·35 microns ; the average number of turns was 6, but they varied between 4 and 9. They differ in size from those previously described under the names of *Sp. canis* and *Sp. regaudi*, and the author, from the locality where it was found, gives it the name of *Treponema tabacalensis* [*sic*] n. sp.*

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LEVADITI (C.), NICOLAU (S.), SCHOEN (R.), GIRARD (M. A.) & MANIN (Y.). **Mode de résorption et mécanisme d'action du bismuth dans la syphilis expérimentale.** [The Resorption of Bismuth and the Mechanism of its Action in Experimental Syphilis.]—*Ann. Inst. Pasteur.* 1926. July. Vol. 40. No. 7. pp. 541–573. With 20 text figs.

MAZZA (Salvador). **Observación de infección espontánea del perro por el *Schizotrypanum cruzi*.** [Spontaneous Infection with Schizotrypanum cruzi in the Dog.]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. No. 11. 7 pp. with 4 figs.

## DISEASES DUE TO METAZOAN PARASITES.

BAYLIS (H. A.), SHEATHER (A. L.) & ANDREWS (W. H.). **Further Experiments with the *Gongylonema* of Cattle.**—*Jl. Trop. Med. & Hyg.* 1926. July 1. Vol. 29. No. 13. pp. 194–196.

The experiments recorded in this paper were undertaken with a view to determining, if possible, whether *Gongylonema scutatum* of cattle can be transmitted to other hosts.

A calf, a sheep, and a pig were fed with specimens of the small cockroach, *Blattella germanica*, experimentally infected with the larvae of bovine gongylonema in Italy. One sheep and one pig were fed with dung beetles collected from cow dung at Villa Lagarina, Trentino. A control sheep and a control pig were kept. The three sheep were kept in a loose-box together throughout the experiment. The pigs after the first few days were penned separately for the purpose of facilitating the collection of faeces for examination as to the presence of eggs.

* Summarized by Dr. H. Harold Scott.

The calf when killed was found to have 80 worms in the oesophagus. Both sheep were also infected showing 46 and 15 adult Gongylonema respectively. No parasites were found in the oesophagus of either of the pigs. The control sheep was negative, and the control pig was not killed as the experimental ones were negative. It may be noted that although the faeces were examined on a number of occasions by the sugar flotation technique, no eggs of Gongylonema were found. On a number of occasions the sediment was also examined, but with negative results.

BAYLIS (H. A.). **A New Species of Hepaticola (Nematoda) from the Rat's Stomach.**—*Jl. Trop. Med. & Hyg.* 1926. Aug. 2. Vol. 29. No. 15. pp. 226–227. With 2 text figs.

The author describes *Hepaticola gastrica* n. sp. which he found in the epithelial layer of the cardiac portion of the stomach of rats from Bologna and Villa Lagarina. He believes the worms collected by WASSINK in Holland and by FIBIGER in Denmark belong to the same species. The principal points upon which the separation of the species from *Hepaticola hepatica* rests are the differences to be observed in the eggs and the difference in location.

GOODEY (T.). **On the Ascaris from Sheep.**—*Jl. Helminth.* 1926. Mar. Vol. 4. No. 1. pp. 1–6. With 3 text figs.

The author gives reasons for maintaining that the Ascaris of the sheep is *Ascaris lumbricoides*. The list of hosts for this parasite therefore is at present as follows: Man, chimpanzee, orang-outang, pig, sheep, cattle and squirrels.

O'BRIEN (H. R.). **Hookworm Control with Chenopodium-Carbon Tetrachloride.**—*Jl. Trop. Med. & Hyg.* 1926. Aug. 2. Vol. 29. No. 15. pp. 227–229.

In this paper the author records the treatment of more than 225,000 individuals. Only three deaths occurred, but these were not connected with the treatment.

The maximum dose was 2 cc. of a mixture containing 40 per cent. oil of chenopodium and 60 per cent. carbon tetrachloride [by volume].

The routine was :—

1. No breakfast was given.
2. 7 a.m. 1 cc. of the mixture.
3. 8 a.m. 1 cc. of the mixture.
4. 9 a.m. 1 ounce of magnesium sulphate in hot water.
5. Instructed to take no food until the bowels had moved.

The actual results of the treatment are not stated.

BLACKLOCK (D. B.). **The Further Development of *Onchocerca volvulus* Leuckart in *Simulium damnosum* Theob.**—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. pp. 203–218. With 1 text fig. & 1 plate.

Larvae of *O. volvulus* taken up by *S. damnosum* undergo development in the fly and finally reach the proboscis. The shortest period observed for this process was seven days.

MAZZA (Salvador) & ROSENBUSCH (Francisco). **Sobre una microfilaria sp. de los perros del norte de la República. (Nota preliminar.)** [Filarial Embryos in Dogs of the Northern Argentine.]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. No. 11. 5 pp. With 1 plate.

The authors examined 55 dogs and found filarial embryos in considerable numbers in the peripheral blood of 19 of them. These embryos were unsheathed, had an average length of 200 microns, varying between 182 and 262 microns. The average internal measurements, starting from the anterior extremity, are given as follows: Nerve ring 47·9, excretory pore 68·5, excretory cell 74·5, anal pore 158·5, caudal cell 195·6 microns. They differ from the embryos of *Dirofilaria immitis*, *F. repens*, *F. recondita*, and *F. Ochmani* in the measurements.

Except for the presence of one in the lungs, they did not discover any in the viscera, and a rigid search of all the tissues proved negative as regards the adult worm. Affected dogs were emaciated.*

SYMONS (T. H.). **A Case of** *Spirocerca sanguinolenta* **in a Foxhound.**—*Vet. Jl.* 1926. Sept. Vol. 82. No. 9. pp. 472–475.

The case here recorded was one of obscure illness occurring in a bitch belonging to the Madras Hunt. Tick fever (*P. gibsoni*) was excluded. No evidence of tuberculosis could be obtained. Worm eggs were not found, but the animal continued to lose condition. It was finally decided to destroy her.

Just before chloroform was administered, faeces were passed. These, to begin with, were sloppy and cream coloured, but the last part of the motion was covered, externally only, with blood.

The oesophagus, in the thoracic portion, showed a tumour like mass the size of a walnut, from which 32 specimens of *Spirocerca sanguinolenta* were obtained. There was also chronic venous congestion of the liver and interstitial nephritis and the spleen showed a scar indicating an old rupture.

PILLERS (A. N.). *Fasciola hepatica* **in the Wild Rabbit in England.**—*Ann. Trop. Med. & Parasit.* 1926. June 24. Vol. 20. No. 2. p. 219.

Pillers records the presence of 38, 33, and 22 adult flukes, which were found to be morphologically similar to *Fasciola hepatica*, in the livers of three wild rabbits. Sheep had not had access to the land upon which the rabbits were for over seven years, and the disease had not been recognized in any farm animals in the surrounding district. The affected rabbits appeared to be confined to a particular belt of land, those on either side being unaffected.

MCKAY (A. C.). **A Note on the Intermediate Host or Hosts of** *Fasciola hepatica* **in New South Wales.**—*Med. Jl. Australia.* 1926. Mar. 13. 13th Year. Vol. 1. No. 11. p. 300.

The author produces evidence to show that *Limnaea brazieri* is an intermediate host of *Fasciola hepatica* in New South Wales.

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* Summarized by Dr. H. Harold Scott.

CAWSTON (F. G.). **The Problem of the Rhodesian Fluke-Carriers.**—*Rhodesian Agric. Jl.* 1926. Apr. Vol. 23. No. 4. pp. 347–348. With 1 plate.

The author states that HORNBY has informed him that he has collected numerous cercaria-carriers among Rhodesian snails, but that so far it is not possible to state which species is responsible for the spread of fluke disease in Southern Rhodesia.

The presence of *Limnaea natalensis* or *L. truncatula* must be considered as a possible source of danger.

On fluke-infested farms the methods of keeping the carriers within limits include *burning* the rushes during the dry season, as the products of burnt rushes are detrimental to the growth of those snails which live in shallow water; *complete drying* of pools for short periods, lime and sulphate of copper, and the introduction of the domestic duck.

NORRIS (J. H.). **The Control of Liver Fluke Disease in Sheep and Cattle.**—*National Vet. Med. Assoc. Great Britain and Ireland. Ann. Congress.* 1926. Programme. pp. 111–161.

The worst seasons for fluke infestations occur after a wet summer following a mild winter. It is doubtful if even very prolonged drought would cause the disease to die out, but a hard winter followed by a dry summer reduces the incidence of the disease.

In view of the life-history of the parasite measures for control of the disease fall into two categories: (1) The destruction of the flukes in the livers of infested animals; (2) the destruction of the intermediate host.

The bulk of the paper is devoted to an account of experimental work carried out with carbon tetrachloride and male fern extract. The author emphasizes the necessity of careful attention and good food.

Extract of male fern of good quality is a satisfactory anthelmintic for adult flukes, but it fails to destroy the immature ones. This can be overcome by repeated dosing. The objections to the drug are that it is difficult to get a standard extract at a reasonable price, and it is toxic in relatively small doses.

Carbon tetrachloride is superior to male fern. It has proved to be completely effective against adult flukes, it is very much cheaper, there is a far wider margin of safety, single doses are effective, there is no absolute necessity of weighing the animals for the graduation of the dose, and it is not necessary to fast beforehand.

HUNG (See-Lü). **A New Species of Fluke** *Parametorchis noveboracensis*, **from the Cat in the United States.**—*Proc. U. S. Nat. Museum.* 1926. Vol. 69. Art. 1. 2 pp. With 1 text fig.

The author figures and describes a fluke found in the gall-bladder of the domestic cat in New York. Only three specimens were available for examination.

CAMERON (T. W. M.). **Observations on the Genus** *Echinococcus* **Rudolphi, 1801.**—*Jl. Helminth.* 1926. Mar. Vol. 4. No. 1. pp. 13–22. With 2 text figs.

The author is unable to accept the view that Taenia, Taeniorhynchus, and Multiceps are valid genera. He holds that they should all be

referred to the genus *Taenia*. The genus *Echinococcus* is a valid one, and the type is *E. granulosus* (Batsch, 1786). This genus includes also *E. oligarthrus* Diesing 1863. This species is figured and described.

*E. longimanubrius*, n. sp., from the Cape hunting dog (*Lycaon capensis*) closely resembles *E. granulosus*, but there are marked differences in the hooks.

*E. minimus* n. sp. has been collected from *Canis lupus* in Macedonia.

MILLZNER (Theresa Marie). **On the Cestode Genus Dipylidium from Cats and Dogs.**—*University of California Publications in Zoology.* 1926. Vol. 28. No. 17. pp. 317–356. With 7 plates.

The author figures and describes the worms of the genus *Dipylidium* found in the course of the examination of 28 dogs and 30 cats. In all, 1,230 specimens were found, of which 3 only were *D. caninum*, all from one dog.

*D. sexcoronatum* formed 0·2 per cent. of the specimens obtained from dogs, and 3 per cent. of those found in cats. Five new species were created for the remainder. 74 per cent. of those from dogs and 40 per cent. of those from cats were *D. gracile* n. sp. *D. crassum* n. sp. formed 25 per cent. of the worms in dogs. *D. compactum* n. sp. formed 40 per cent. of those found in cats. *D. longulum* n. sp. and *D. diffusum* occurred in cats only and represented 10 and 7 per cent. respectively of the whole number found.

RABATEL (M. J.). **La Gale sarcoptique du Mouton au Dahomey.** [Sarcoptic Mange of the Sheep in Dahomey.]—*Rec. Méd. Vét.* 1926. May. Vol. 102. No. 9. pp. 285–287.

The author records the occurrence of sarcoptic mange among sheep along the border between Dahomey and the contiguous British territory. About 70 per cent. of the sheep are affected. Although horses, goats and dogs live in close proximity to the affected sheep, they do not contract the disease.

The disease begins round the muzzle, but however long-standing it may be, it never spreads to the body. It is confined to the bare or hair-covered parts only.

Affected animals are in poor condition, partly no doubt because of the difficulty of prehension of food, but cases never terminate fatally.

The natives take no notice of the disease, and take no steps either to prevent or to cure it.

DIEBEN (C. P. A.). **Geitenschurft.** [Goat Scab.]—*Nederl.-Indië. Blad. v. Diergeneesk. en Dierenteelt.* 1926. Apr. Vol. 38. No. 2. pp. 177–191. With 1 plate.

The author records a severe outbreak of goat scab caused by *Chorioptes caprae*.

The infection begins in most cases at the commissures of the lips, and in some cases affects the skin above the hoofs, particularly in the cleft. The nose, udder, scrotum, anus, under-side of the tail are somewhat rarely affected.

There is loss of hair and desquamation of the skin followed by thickening and wrinkling. Warty outgrowths may develop. Secondary infestations with maggots must be guarded against. In uncomplicated cases a cure is readily effected by treatment with liniment containing sulphur, tar, alcohol and soap.

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BOREL (M.). **Note préliminaire sur les moustiques de Cochinchine et du Sud Annam (Massif du Langbian).** [Preliminary Note on the Mosquitos of Cochin China and Southern Annam.]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 472–479.

CAMERON (A. E.). **Bionomics of the Tabanidae (Diptera) of the Canadian Prairie.**—*Bull. Entom. Res.* 1926. July. Vol. 17. No. 1. pp. 1–42. With 5 plates & 18 text figs.

JONES (W. Norman). **A Preliminary Survey of the Nematode and Cestode Parasites of Sheep in North Wales, Oct. 1923, to Sept. 1924.**—*Jl. Helminth.* 1926. Mar. Vol. 4. No. 1. pp. 31–35.

———. **A Further Survey of the Nematode and Cestode Parasites of Sheep, Pigs, and Cattle in North Wales, Oct. 1924 to Sept. 1925.**—*Idem.* pp. 36–42.

ROSS (I. Clunies). **A Survey of the Incidence of *Echinococcus granulosus* (Batsch) or Hydatid Disease in New South Wales.**—*Jl. Austral. Vet. Assoc.* 1926. June. Vol. 2. No. 2. pp. 56–67.

WETZEL (R.). **Strongyliden der Pferde in Deutschland.** [Strongyles of Equines in Germany.]—*Deut. Tierärzt. Woch.* 1926. Aug. 28. Vol. 34. No. 35. pp. 619–625.

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## BACTERIAL DISEASES.

BLANC (G.) & CAMINOPETROS (J.). **Quelques expériences sur l'infection charbonneuse.** [Some Experiments with Anthrax Infection.]—*C.R. Acad. Sci.* 1926. Apr. 26. Vol. 182. No. 17. pp. 1055–1057.

In this paper the authors briefly report experiments which, they claim, show that it is not the skin which is alone susceptible to infection with anthrax as held by BESREDKA, but that the nervous system is the most susceptible.

By introducing a glass tube into the rectum of rabbits and than passing a syringe needle with rubber attachment through this the authors pierced the intestine and the sublumbar muscles and introduced a dose of virulent anthrax into the sublumbar muscles. All the animals used died of anthrax. In order to overcome objections that by this means injury to the skin was not certainly avoided, or that in piercing the tissues bacilli were allowed to escape into small vessels by which they were carried to some damaged piece of skin (as it is impossible to guarantee the perfect condition of the skin of an animal), the authors tried the following plan.

Instead of using fully virulent anthrax cultures, with which a minimal infection may cause a fatal result, they employed second vaccine which was of slightly exalted virulence resulting from numerous passages through rabbits in large doses. The strain was innocuous by subcutaneous or endermic inoculation, but produced a fatal result in

almost every case when given into the brain or transorbitally. A single experiment is recorded to show this. The rabbits inoculated intracranially or transorbitally nearly all died, and the remainder survived. The organism could be recovered from all the viscera of those that died.

It may be that the success of BESREDKA's method of vaccination is due to the fact that the skin everywhere contains nerve fibrils, but it has yet to be shown that the nervous system plays any part in immunity.

DELPY (L.). **L'infection charbonneuse et la vaccination intra-cutanée en un temps avec les vaccins pastoriens en Guinée Française.** [Anthrax and Single Dose Cutaneous Vaccination in French Guinea.]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 499–503.

Anthrax has assumed considerable importance in French Guinea since cultivation with the plough was introduced. Cases occurred only exceptionally in native animals living free in the bush, but it is of frequent occurrence among working oxen.

Over-work appears to play a part in the causation of the disease, and in the majority of cases it appears that infection is by way of the skin. Even before the introduction of the plough natives had noticed that cases of anthrax occurred only in animals showing skin wounds.

While exact observations have not been possible the field veterinary service has noted the occurrence of wounds and injuries in cattle dying of anthrax.

When, however, the disease becomes enzootic, cases occur in which no wounds can be found.

The natives of Upper Guinea habitually eat large amounts of anthrax flesh without ill effect, but it has been observed that cases occur among men engaged in porterage work when they have received injuries to the feet and legs and have eaten anthrax meat.

The difficulties associated with the classical double dose subcutaneous inoculation in a country like Guinea are well known. It was decided, therefore, to test the cuti-immunization. It was of the utmost importance that no ill effects should follow the vaccination. A beginning was made by vaccinating 25 cattle with doses of the third vaccine of the Pasteur Institute in doses of $\frac{1}{8}$ to $\frac{1}{4}$ cc., depending upon the size of the animals. A calf only three weeks old was given $\frac{1}{8}$ cc. without an ill-effect being produced. There were no accidents as a result of the vaccination and the animals were put to work the following day.

Subsequently 55 bovines belonging to natives were vaccinated without accident. Later the doses used were increased to $\frac{1}{4}$ cc. Two calves developed alarming symptoms and treatment with anti-serum was resorted to. Each received 10 cc. intravenously and subsequently 10 cc. every quarter of an hour subcutaneously. When 50 cc. had been given there was distinct evidence of improvement and both animals recovered.

In all, 5,000 animals have been vaccinated without accident and it has been found that adults will quite well withstand $\frac{1}{2}$ cc. of the second vaccine.

Sheep have been given $\frac{1}{4}$ cc. of second vaccine without ill effect.

In August 1925 a severe outbreak occurred at Kato and vaccination was begun on the 5th day. A cow which was obviously infected at

the time was treated with 200 cc. of serum only and recovered. From the second day after the vaccinations had been done no deaths occurred.

No cases of anthrax have occurred among animals vaccinated a year previously.

HRUSKA (C.). **Recherches expérimentales sur le charbon.** [Experimental Investigation of Anthrax.]—*Ann. Inst. Pasteur.* 1926. Aug. Vol. 40. No. 8. pp. 710–712.

Following BESREDKA'S views upon immunization against anthrax by the cutaneous path the author has carried out experiments with the following materials: (*a*) Broth cultures of anthrax sterilized by filtration; (*b*) broth cultures sterilized by heat at 100° C.; (*c*) a heat sterilized salt solution of extract of anthrax spleen; (*d*) Anthrax oedema heated to 96° C. for an hour; (*e*) anthrax oedema either filtered or sterilized by the addition of formalin.

No protection was obtained with any of these save the last.

BROCQ-ROUSSEU, STAUB & URBAIN. **Nouvelle technique de préparation d'un sérum anti-charbonneux. Peut-on titrer ce sérum?** [A New Method of preparing Anti-Anthrax Serum. Can this Serum be titrated?]—*Ann. Inst. Pasteur.* 1926. July. Vol. 40. No. 7. pp. 595–605.

The authors state that anti-anthrax serum prepared by their technique is not markedly superior to good sera prepared in the usual ways, but they claim that the guineapig can be used to titrate the quality of the serum. Staub and FORGEOT have shown that non-sporulating culture killed by alcohol-ether can be used for the immunization of guineapigs against the same organism.

The authors first tried this method with a horse. The animal was given on four consecutive days, by the intravenous path, 10, 20, 25 and 30 centigrammes of alcohol-ether antigen. The antigen was emulsified in normal salt solution at a strength of 1–2 milligrams per cubic centimetre. The first injections caused respiratory distress practically at once. The horse showed discomfort, pawing at the ground, and repeatedly lying down and getting up.

This series of injections was repeated a number of times. [Number not definitely stated.]

The serum from this horse, although it contained 15,000 units of antibody as shown by Calmette and Massol's method, was quite inactive. The symptoms presented by the horse clearly showed that it was susceptible to the action of the antigen.

A mare was first immunized by the process described by Brocq-Rousseu & Urbain with the two Pasteur vaccines. It was then given [interval not stated] 1 centigramme of alcohol-ether antigen intracutaneously. This was distributed at eight places on the side of the neck. During the week following this inoculation this method of inoculation was repeated. [It is not clear whether this was done daily.] Blood was withdrawn about three weeks after the first inoculation.

A month after the first inoculation four scarifications on the neck were "touched with" virulent non-sporulating culture. There was no reaction.

A fortnight later another series of inoculations were given six intravenous injections of antigen and six intradermic inoculations of virulent anthrax culture in doses ranging from 0·1 to 0·5 cc.

The serum was subsequently tested on guineapigs. It was injected intraperitoneally and culture was injected subcutaneously 48 hours later. The results are given in 12 tabular statements. The serum was found to contain agglutinins, and was very prompt in producing a precipitin reaction. It also yielded positive complement fixation tests.

It is stated that the richness of a serum in antibodies is no guide as to its protective properties.

SCOTT (J. P.). **A Comparative Study of Strains of** *Clostridium chauvoei* **obtained in the United States and Abroad.**—*Jl. Infect. Dis.* 1926. Mar. Vol. 38. No. 3. pp. 262–272.

*Clostridium chauvoei* is the primary cause of blackleg in cattle. Other anaerobes may be associated with it. *C. chauvoei* is highly pathogenic, but *C. oedematis* (Vibrion septique) is non-pathogenic. *C. chauvoei* does not produce a soluble exotoxin.

*C. chauvoei* ferments glucose, lactose and sucrose under favourable conditions, but vibrion septique ferments all sugars under favourable conditions, but under adverse conditions only glucose, lactose and salicin.

ROTTGARDT (Abel). **Die Milch nach Tarozzi als Nährboden und zur Differenzierung des Rauschbrandbazillus und des** *Vibrio septicus* **von Pasteur.** [Tarozzi Medium made with Milk for the Differentiation of the Bacillus of Blackquarter from the Vibrion Septique of Pasteur.]—*Deut. Tierärzt. Woch.* 1926. July 31. Vol. 34. No. 31. pp. 553–556.

The author finds that milk sterilized at 110° C. for 10 minutes, with the addition of pieces of cooked meat, is an excellent medium for cultivating the bacillus of blackquarter and the vibrion septique. The addition of glucose appeared to be unnecessary, although it improved the medium slightly. Gas is produced when growth takes place, and an acid reaction develops within 48 hours.

In the differential tests 32 strains of blackquarter and 9 strains of vibrion septique were used. The majority of these were obtained from the Argentine and from Germany.

The cultures of both organisms were incubated at 37° C. and were kept under observation for 35 days, and tabular statements of the results are given.

From these it appears that while coagulation of the milk in the blackquarter cultures occurs at the earliest on the third day, in the case of the vibrion septique it appears usually in 30 hours and exceptionally as late as 40 hours only.

In the case of blackquarter, the coagulation takes place slowly. It begins at the bottom of the tube and spreads upwards. The clot is soft but it never exudes a watery fluid, it never breaks up or becomes dissolved.

In the case of the vibrion septique the clotting takes place rapidly, but it is subsequently digested and liquefied to a large extent.

MIESSNER (H.) & MEYN (A.). **Vergleichende Untersuchungen über den Rinder- und Schafrauschbrand.** [Blackquarter of the Ox and Sheep. Comparative Investigations.]—*Deut. Tierärzt. Woch.* 1926. Aug. 7. Vol. 34. No. 32. pp. 571–580.

There is a very considerable literature to show that it is a commonly held view that blackquarter of the ox and sheep are one and the same disease. On the other hand, there is the striking epidemiological fact that the two diseases do not as a rule occur in the same districts.

In cattle the majority of cases occur at pasture, but they occur in the stable also, and these facts suggest that infection is due to ingestion.

In the sheep, however, cases are most frequent at lambing and shearing times, and after castration and docking. Thus the disease in the sheep would appear to be usually a wound infection.

Systematic comparative tests were therefore undertaken with a view to ascertaining whether the organisms are identical or not. Morphologically and tinctorially the organisms could not be distinguished. Nor could any difference be detected in the cultural characters of the organisms save that if ox immune serum were used for the preparation of grape-sugar-blood-agar plates the growth of organisms from a bovine source was more restricted than that of bacilli from an infected sheep. Similarly sheep anti-blackleg serum in the medium checked the growth of the sheep bacillus, but not of the bovine type of organism.

In experimental inoculations it was impossible to detect any difference in the infections caused in guineapigs, cattle, and sheep by the two types of bacilli.

Eight guineapigs were immunized with ox-blackleg-filtrate and were tested with bacilli from an ovine source. Two died of the infection, four developed severe oedema and recovered, and two failed to become infected. Of eight guineapigs treated in the reverse way, three died of blackquarter, three developed extensive oedema, and two showed no evidence of infection.

Of two guineapigs inoculated with filtrate from Martin's broth cultures of the bovine bacillus and inoculated with ovine bacilli, one died and one remained healthy. In the reverse experiment both remained healthy. In a final experiment two pairs of sheep were immunized and tested with the homologous and heterologous strains and all remained alive. Two unprotected controls died.

In spite of these results, the authors conclude that in practice it would appear to be advisable to use homologous filtrates for the immunization of the two species.

GRÄUB (E.). **Weitere Beiträge zur den Schutzimpfungen gegen den Rauschbrand mit dem Keimfreien Filtrat Gräub-Zschokke.** [Further Information regarding Protective Inoculation against Blackleg with Gräub-Zschokke Germ-Free Filtrate.]—*Schweiz. Arch. f. Tierheilk.* 1926. July. Vol. 78. No. 7. pp. 388–392.

This is a statistical paper showing results obtained during the period 1920 to 1926. Tables show the percentage of deaths among unvaccinated animals, animals vaccinated with Lyons vaccine, and those done with filtrate. The losses after the latter are very much smaller than those following the Lyons vaccine.

TUBBEHUSEN (R. E.), FITCH (C. P.) & BOYD (W. L.). **A Study of the Value of the Living Vaccine in the Control of Bovine Infectious Abortion.**—*Cornell Vet.* 1926. July. Vol. 16. No. 3. pp. 166–185.

The work here recorded was carried out on a herd of 60 animals. Clinical records showed that between 1917 and 1921 the abortion rate ranged from 11·3 to 21 per cent. The first tests were carried out in 1918, when 72 per cent. of the animals gave positive or doubtful results.

At the beginning of the experiment the herd was divided into two groups which were equal in number and in percentages of reactors. The normal movement of animals into and out of the herd was not interfered with, as it was intended to carry out the experiment under natural conditions, but the numbers were kept as even as possible.

This led to the addition of animals both to the vaccinated and control groups as required. No isolation was practised save shortly before and after parturition, as is usually done in a well-managed herd.

As four breeds were represented in the herd four bulls were used. These constantly gave negative results to serological tests, and they were used to serve the infected and uninfected without any precautions against the possibility of their acting as mechanical transmitters.

The vaccines used were all prepared from recently-isolated organisms of known pathogenicity, and the vaccines were injected within three hours of preparation. The doses used were 20, 45, and 60 cc. The larger doses were injected at more than one place to reduce the risk of abscess-formation. Heifers were vaccinated two months before service, and cows immediately the uterus returned to normal after calving.

The data obtained in the course of the investigation are presented in the form of tabular statements, it being found impracticable by the author to present the results in a readily understood manner in any other way. The first two charts deal with clinical observations and the administration of vaccines. The second two with the results of pregnancy (abortion or otherwise) and bacteriological findings. The last table contains the results of serological tests. Of the vaccinated animals 81 per cent. calved normally and 19 per cent. aborted. The foetal membranes were retained in 30·9 per cent. of pregnancies. Of the animals calving normally 17·64 per cent. retained the membranes, while 87·5 per cent. of the animals which aborted failed to cleanse properly.

In the control group 71·2 per cent. calved normally and 28·7 per cent. aborted. Of the animals which calved normally 17 per cent. retained the membranes. The same thing occurred in 73·7 per cent. of those which aborted.

Five animals aborted twice, and of these 4 belonged to the unvaccinated herd.

The two groups appeared to conceive with equal readiness, the average number of services per pregnancy being 2·5. There was a little difference in the average number of pregnancies in the two groups during the period under view, namely, 1·88 for the vaccinated and 2·39 for the controls, but the authors explain this difference on the ground that " a number of the animals of the vaccinated group we disposed of when ' open ' following the termination of one pregnancy." " In considering the cases of sterility in the vaccinated group, and their probable relationship to the use of living vaccine,

it is of interest to note that the organism was not recovered in a single instance, either following normal calving or in the discharges incident to a metritis." Bacteriological examination showed that 30 per cent. of the vaccinated animals passed the organism out either with discharge or milk or both, and of the control group 42·4 per cent. excreted the organism by these paths.

Of 8 abortions occurring in the vaccinated group 5 (or 62·5 per cent.) were due to Bang's bacillus. One of the remaining three showed no evidence of infection with this organism, one aborted so early that the results obtained are open to doubt, and the remaining one was probably infected with the organism as this animal had always given a strong positive reaction in tests. Of 19 abortions in the control lot, 11 were due to *B. abortus* and 5 were not.

While in the negative cases *B. abortus* was not found, nor also were mucor or vibrio.

Summing up the bacteriological findings the authors state that while 30 per cent. of the vaccinated group passed the organism out of their bodies, in the unvaccinated group the percentage was 42·4.

Attention is drawn to the fact that the bacillus may be and has been isolated from animals failing to react to serological tests.

Cow 366 was vaccinated in July, 1923. She conceived to a fourth service, and calved January, 1925. In October, 1923, the agglutination titre was partial at 1 in 200, and complement fixation complete at 0·1 and 0·025. In September, 1924, the agglutination titre had dropped to partial in 1 in 25, while the complement fixation figures remained constant. In January, 1925, two days before calving the agglutination titre was quite negative while complement fixation remained positive. *B. abortus* was isolated from the placenta.

Cow 143 gave partial agglutination in 1 : 25 and 1 : 50 in October, 1922, and subsequently failed to react to either test, was found to be eliminating the bacillus with the milk in October, 1924, and it was isolated from the placenta in January, 1925. This animal aborted at the following pregnancy, but no evidence of infection with *B. abortus* was found.

Another example is given of a cow which had constantly yielded negative results to agglutination and fixation tests, and which was proved to be passing the bacillus with the milk. Among their conclusions the authors state that they have obtained no evidence that the use of the living vaccine retards conception or is responsible for sterility.

BIRCH (R. R.) & GILMAN (H. L.). **The Agglutination Test as an Aid in handling Bang Abortion Disease.**—*Cornell. Vet.* 1926. Apr. Vol. 16. No. 2. pp. 127–132.

The authors summarize information obtained as a result of having at their disposal an experimental herd of approximately 50 animals, for a period of about four years. Among other findings is their opinion that an agglutination titre of 1 in 40 is normal for non-infected heifers or cows. They consider a reaction at 1 in 40 and 1 in 80 is doubtful.

" The status of a cow, naturally infected, whose agglutination curve descends to normal and is thus maintained is not well determined. Certainly there is a degree of immunity or resistance developed, but whether the majority of such animals are *Bacterium abortum* carriers is yet to be determined. Our work indicates that they are not, but our data on this point are meagre."

CARPENTER (C. M.). *Brucella abortus* **in Udders of Vaccinated and Naturally Infected Cows.**—*Cornell Vet.* 1926. Apr. Vol. 16. No. 2. pp. 133–136.

Agglutinins were found in the blood of 86 per cent. of a group of animals which had been infected subcutaneously at least three times before three gestation periods with 10 cc. of living suspension of the organism. Twenty-four per cent. of this group aborted, and the bacillus was recovered from the milk of 38 per cent. of the animals. In a second group of cows which had aborted, or had had retention of the placenta at least once during three gestations and where no vaccination had been practiced, agglutinins were found. In 72 per cent. of the samples of blood there were agglutinins and the organism was present in 66 per cent. of samples of milk from these animals.

MOORE (Veranus A.) & CARPENTER (Charles M.). **Undulant Fever in Man associated with Bacteria Indistinguishable from** *Brucella abortus.*—*Cornell Vet.* 1926. Apr. Vol. 16. No. 2. pp. 147–152.

The authors briefly summarize the literature regarding the relationships of *B. melitensis* and *B. abortus* Bang.

In 1925 Carpenter isolated from the blood an organism indistinguishable from *B. melitensis.* This was successfully repeated on six occasions, and on three occasions the organism was isolated from the blood.

The second case occurred later in the same year. In this instance the patient showed reddish oedematous spots on the legs, an undulating fever and general malaise. Blood cultures gave positive results.

Four other positive cases have been encountered. One of these, occurring in a man aged 41, terminated fatally, and chronic splenomegaly was found. The second case had three attacks lasting about ten days, and at intervals of ten days. The third case was complicated with typhoid, and there is not available any history of the fourth.

Abortion bacilli have been proved to be present in the milk from the dairy supplying the first of these patients. The authors have produced abortion in heifers with the strains isolated from their first two cases. The organisms were recovered from the foetus, placenta and milk in each case. The strains were very virulent for guinea-pigs.

PANISSET (L.) & VERGE (J.). **Diagnostic de l'avortement épizootique des Juments,** [The Diagnosis of Equine Contagious Abortion.]—*C.R. Soc. Biol.* 1926. Mar. 19. Vol. 94. No. 10. pp. 640–641.

1. Microscopic examination of any of the tissues is practically useless.

2. Cultivation is an excellent method. The best media are agar and Marten's broth with a pH of 7·2–7·4.

3. Sera from infected mares cause agglutination in dilutions from 1-300 to 1-1,000 or higher.

Heating the serum for half an hour at 56° C. does not destroy its power of agglutinating.

Natural agglutinins may give a reaction up to 1 in 300, but these are readily destroyed at 56° C.

PANISSET (L.) & VERGE (J.). **Recherches bacteriologiques sur l'avortement épizootique des Juments.** [Mare Abortion. Bacteriological Investigations.]—*Ann. Inst. Pasteur.* 1926. June. Vol. 40. No. 6. pp. 524–540.

Since the paper by DASSONVILLE and RIVIÈRE was published in 1913, nothing appears to have been reported in French literature regarding mare abortion. In three cases the authors isolated a streptococcus from the heart blood, stomach, and bone marrow. The organism, which was the same in all three instances, possessed the following characters :—

It occurred in chains comprising 5 to 40 individuals, each of which was somewhat oval in shape.

It was gram-positive, and grew well at body temperature. Cultures required frequent renewal, particularly when the strains were recently isolated.

In broth cultures of pH 7·2 to 7·4 a flocculent sediment formed, the broth remaining clear. In slightly acid broth (pH 6·8 to 7) there was slight general turbidity, with flocculi adhering to the walls of the tubes. Milk was coagulated in 48 hours. No growth occurred on potato. In stab gelatin cultures there was a minimal amount of growth along the needle track, but no liquefaction.

The organism did not appear to be pathogenic for the rabbit and white rat, but the guineapig could be fatally infected and death took place in 24 to 45 days. It was not found possible to recover the organism from the tissues of dead guineapigs. Filtered broth cultures were toxic for the rabbit and guineapig. Death occurred in 30 to 45 days, but there were no recognizable lesions. Mice were resistant to subcutaneous inoculation with 1 and 2 cc. of filtrate.

Comparative tests indicated that the organism was not identical with the streptococcus of strangles. Bacilli of the colon type were recovered from two of the foetuses, in one case from the stomach and in the other from the heart blood, which also contained the streptococcus referred to.

In two instances *B. abortus equi* was isolated.

This organism is a short cocco-bacillus, which is motile, gram-negative and a facultative anaerobe.

The organism grows well at temperatures of 18°–20° C., and agar cultures may remain alive for two months. Virulence is rapidly lost in artificial cultures.

Transplantations should be carried out every month, but in sealed tubes. Kept in a refrigerator the organism will remain alive for three months or more. On agar a moist whitish growth is formed, but in some cases a dry semi-transparent layer is formed.

In broth there is a marked turbidity, but no surface growth. After several days the growth settles leaving the broth clear.

A moist whitish growth develops on potato, and the latter becomes brownish in three to five days. At the end of a month the colour is dark brown. Stab cultures in gelatin grow well, and there is no liquefaction.

The *B. abortus equi* reduces neutral-red agar and renders it fluorescent with production of gas. It ferments glucose, mannite, galactose, dulcite, laevulose, saccharose, maltose and glycerin, with gas production. The authors consider that the organism is related to the paratyphoid B group.

Rats are killed by intraperitoneal inoculation in 48 hours or less, while by the subcutaneous path death is delayed until the 5th or 6th day. Guineapigs behave in a similar manner.

The organism produces fatal infection in rabbits by intravenous inoculation only. Inoculation by other paths causes loss of appetite and condition and recovery is slow. The intravenous inoculation of the dog with 5 cc. of culture causes only a rise of temperature during the first 24 hours. Birds are resistant.

Filtrate causes a fatal result in guineapigs, death occurring in about a month. Rabbits are not susceptible to the toxin. On two occasions pregnant guineapigs have aborted as the result of inoculation.

Success has not been achieved in similar experiments with rabbits. Intraperitoneal or subcutaneous inoculation of rabbits enables them to resist a subsequent intravenous injection which is fatal to controls.

MAGNUSSON (H.). **Ueber Abortusinfektion beim Stier.** [Abortion Infection in a Bull Calf.]—*Berlin. Tierärzt. Woch.* 1926. July 9. Vol. 42. No. 28. pp. 460–462.

This article is a German translation of a paper by Magnusson which appeared in the *Skandinavisk Veterinaerdidskrift* in 1925.

A description is given of a diseased testicle and brief notes of the results of animal experiments are recorded. The paper contains a review of the cases of infection of bulls with *B. abortus*.

EHRLICH. **Ein Fall von Bangscher Abortusinfektion beim Bullen.** [A Case of Infection of a Bull with Bang's Bacillus.]—*Deut. Tierärzt. Woch.* 1926. June 26. Vol. 34. No. 26. pp. 469–473. With 3 text figs.

According to the owner the bull was 1 year and 10 months old, and had covered 30 cows on 6 farms. In almost every case conception occurred after a single covering. Four of the cows served aborted at 5 to 7 months. These cows were all the property of the owner of the bull, and the owner believed that these were the only cows on his premises that had aborted. Their serum yielded positive results to the agglutination test.

The bull, while grazing, had developed well, but when stalled he was a poor feeder and lost condition. He was never keen on covering cows, but even when there was recognizable enlargement of one testicle he was capable of covering without difficulty. The acute inflammatory condition extended to the spermatic cord and the animal lost condition, and the owner feared that death would supervene. The animal was, however, castrated, and although the wound suppurated considerably recovery took place and eventually the animal was sold for slaughter.

The affected testicle measured 13 centimetres long, 9 centimetres wide, and 6 thick. From the cut-end of the cord a thick whitish slimy liquid could be made to exude on pressure. The cut surface was of a saffron yellow colour, and there was an obvious increase in the amount of connective tissue. The epididymis contained a number of abscesses varying in size from a hazel nut downwards, and the testicular substance contained a very large number of centres about the size of a pin's head.

On microscopic examination of the diseased testicle the increased amount of connective tissue was very obvious, together with a

marked infiltration of plasma cells and round cells. Only a few of the spermatic canals still retained the normal-looking epithelial lining, but in these there was no evidence of spermatogenesis, the majority possessed a lining composed of a single layer of epithelium only. In the majority of cases the lumen was packed with cells of various kinds.

Smears stained with bacterial dyes revealed the presence of an organism indistinguishable from *Bacillus abortus*, and cultural and agglutination tests confirmed this.

BOEZ (L.). **Milieu de culture pour le bacille tuberculeux à base de peptone pancréatico-intestinale.** [A Culture Medium for the Tubercle Bacillus having a Pancreatico-Intestinal Peptone as the Basis.]—*Ann. Inst. Pasteur.* 1926. Sept. Vol. 40. No. 9. pp. 746–754.

The best method of preparing a culture medium rich in amines was to mix 100 grammes each of fresh meat, pancreas, and small intestine (from the pig) with 450 grammes of water, correcting the reaction to pH 7·5, and adding 20 cc. of chloroform. No definite advantage was gained by passing the meat through a peptic digestion also.

It is not necessary to allow the digestion to proceed beyond 48 hours.

The products of digestion were added to a medium composed of water 1 litre, glycerin 20 g., glucose 10 g., 0·25 g. magnesium sulphate, 1 gramme dibasic potassium phosphate, and 7 grammes of sodium chloride, in amounts ranging from 2 cc. to 20 cc. per 100 cc.

The media were compared by weighing the bacilli obtained, the conditions being duly controlled, and it was found that the addition of 10 per cent. gave the best results. The results were practically parallel with those obtained with the synthetic asparagin medium, but the cost is very much lower.

Filtration of the digest through Chamberland L3 slightly reduces its value. Sterilization for an hour twice at an interval of 24 hours and a single sterilization at 105° C. for an hour yielded practically parallel results, but sterilization for 10 minutes at 100° C. is said to be inferior, and this would, in view of what is said above, be an error. [Possibly the temperature referred to here should be 110° C.—Ed.]

Further experiments regarding the mineral content of the broth and other factors led to the following technique being adopted.

500 grammes each of fresh meat, pancreas and small intestine are cleaned of fat and finely minced. To two and a half litres of water are added 6 grammes of sodium carbonate and 40 grammes of chloroform. The whole are mixed together in a 5-litre flask and this is closed with a rubber stopper to prevent evaporation of the chloroform. The reaction should be pH 7·5. The mixture is left to deposit at 37° or better 40° C. for 48 hours. There should be no putrefaction. The process of digestion is stopped by the addition of sufficient hydrochloric acid to render the reaction distinctly acid. In this condition the digest can be stored in an ice chest or used as required.

The amount required is taken, filtered and sterilized and added in the proportion of 5 or 10 per cent. to the following mixture :—

| | |
|---|---|
| Magnesium sulphate ... ... ... | 0·25 g. |
| Dibasic phosphate of potassium ... | 1 gramme. |
| Salt ... ... ... ... ... | 7 grammes. |
| Distilled water ... ... ... | 1,000 cc. |

The media should have a reaction of pH 6·9.

After sterilization at 105° C. for an hour, the glycerine (20 cc.) and 10 grammes of glucose are added.

The medium can be used liquid, or solidified by the addition of 2·5 per cent. agar.

Tested against ordinary tuberculin and asparagin-medium tuberculin on tuberculous guineapigs, the digest-medium tuberculin was found to be eight times as effective as the former and twice as effective as the latter.

ABT (G.) & ERBER (B.). **Sur le titrage des antitoxines et des toxines tétaniques par la floculation.** [The Titration of Tetanus Antitoxins and Toxins by Flocculation.]—*Ann. Inst. Pasteur.* 1926. Aug. Vol. 40. No. 8. pp. 659–665.

The authors have tested RAMON'S method of flocculation titration of diphtheria toxins and antitoxins with tetanus toxins and antitoxins. Their technique has not yielded perfect results, but they claim 90 per cent. of successes.

SEDDON (H. R.) & CARNE (H. R.). **Determination of the Presence of *B. botulinus*, type B, in New South Wales.**—*New South Wales, Dept. of Agric. Vet. Res. Rep.* No. 2. (*Science Bull.* No. 26.) 1926. Apr. pp. 12–16.

In 1924 a number of horses and cattle were involved in what appeared to be an outbreak of forage poisoning (botulism); actual proof that the cases were those of botulism was wanting, but the authors record the recovery of *B. botulinus* from a sample of the fodder. The cultures were toxic for the guineapig by ingestion, and by serological tests the organism was identified as belonging to type B.

MARTINAGLIA (G.). **Fowl Typhoid.**—*Jl. Dept. Agric. Union S. Africa.* 1926. June. Vol. 12. No. 4. pp. 298–304.

The experience of a number of investigators, including the author, would appear to indicate that the majority of epidemics of septicaemic disease among fowls in South Africa are not fowl cholera, as has generally been held, but fowl typhoid. There is no information available regarding the introduction of the disease, but it would appear to be on the increase. The cause of the condition is the bacillus described by KLEIN in 1888 as *Bacillus gallinarum*. Subsequently the disease was studied by MOORE in the United States, and this author named the causal organism *B. sanguinarium*. HEDLEY later showed that the organisms isolated by MOORE and KLEIN were identical. The author of the present paper has had the opportunity of investigating five outbreaks in the Transvaal, Natal and East Griqualand.

The outbreaks were very severe, and save in one case, where the fowls were in separate coops, the mortality was high. The same organism was isolated from all the outbreaks, and under experimental conditions the period of incubation proved to be from two to six days.

The symptoms are sudden onset with considerable mortality. Birds show dullness, loss of appetite and great thirst. The feathers are ruffled, especially round the neck, and the head is held close to the body.

The wings droop, and the birds stand with eyes closed in a moping attitude. There is greenish diarrhoea. As a rule there is cyanosis of the comb.

The lesions are as follows : An excess of amber or blood stained fluid in the abdomen. Marked engorgement of the liver, spleen and kidneys. The liver may show multiple irregular necrotic areas. The heart muscle sometimes shows large haemorrhages, and this is held by some to be diagnostic of the disease. The author observed these lesions in three of the outbreaks investigated.

Methods for combating the disease are those generally applicable in such cases. Careful destruction of the dead birds, killing of the sick, penning of the healthy in as small batches as possible. General attention to hygiene.

The Onderstepoort Laboratory is supplying a vaccine.

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UCHIDA (Y.). **Experimentelle Infektionen von Mäusen und Meerschweinchen parenteral und von den natürlichen Eingangspforten aus. I. Mitteilung. Versuche an Mäusen mit Milzbrand und anderen Septicämieerregern.** [The Experimental Infection of Mice and Guineapigs with Anthrax by Parenteral and Natural Paths.]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1926. Mar. Vol. 106. No. 1. pp. 96–112.

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## MYCOTIC DISEASES.

BARDELLI (Plinio Carlo). **Ricerche sulla linfangite criptococcica.** [Epizootic Lymphangitis.]—*Ann. d'Igiene.* 1926. Feb. Vol. 36. No. 2. pp. 105–117.

The author gives an account of a number of cases treated by vaccine, and claims a percentage of 84 cured.

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OTA (Masao) & GALLIARD (Henri). **Sur une teigne trichophytique d'un bovidé du Cameroun produite par une espèce nouvelle de** *Grubyella, G. camerounensis* **n. sp.** [A Bovine Ringworm in the Cameroon caused by a New Species of Grubyella, *G. camerounensis* n. sp.]—*Ann. Parasit. Hum. et Comp.* 1926. Jan. Vol. 4. No. 1. pp. 14–21. With 3 text figs.

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## DISEASES DUE TO FILTERABLE VIRUSES.

KLING (C.) & HÖJER (A.). **Recherches sur le mode de propagation de la fièvre aphteuse. Géographie et topographie des épizooties en Suède.** [The Spread of Foot-and-Mouth Disease. Geography and Topography of Outbreaks in Sweden.]—*C.R. Soc. Biol.* 1926. Mar. 12. Vol. 94. No. 9. pp. 613–615. With 1 text fig.

Foot-and-mouth disease has occurred in Sweden twelve times since 1875, the last outbreak occurring in November 1924. By May 1925, when the disease began to die down, 4,000 herds had been attacked.

In 10 instances the disease first made its appearance in that part of Sweden which is nearest to Denmark, and on every occasion the

disease was prevalent in Denmark at the time. In 9 instances the first outbreaks appeared in the south-west part of the province, where there is a large population and means of communication are well developed. The disease has never appeared in the wooded north-eastern part of the province.

Examination of the distribution of outbreaks shows that 90 per cent. have occurred in the lower-lying ground where the towns are situated.

Outbreaks appear far more frequently in large herds than in small ones. Only 1 per cent. of small farms have been involved, while 50 per cent. of farms of 50 to 100 hectares have been affected. The large " model " farms of more than 100 hectares have been affected somewhat less frequently (40 per cent.), but this is explained by the greater care taken of the animals (isolation, etc.). The higher incidence in large herds is, according to the authors, to be explained on the ground that the possibilities of contact between men and animals and between animals themselves are greater.

KLING (C.) & HÖJER (A.). **Recherches sur le mode de propagation de la fièvre aphteuse. Transmission du contage.** [The Method of Spread of Foot-and-Mouth Disease.]—*C.R. Soc. Biol.* 1926. Mar. 12. Vol. 94. No. 9. pp. 615–618. With 2 text figs.

The authors have not been able to obtain any evidence that the direction and force of the wind plays any part in the spread of the disease.

Of 66 farms involved during the early stages of the current outbreak only 25 per cent. used any fodder of foreign origin, and even in those cases there was no justification for supposing that the imported materials contained the virus.

When the disease makes its appearance on a number of premises simultaneously the source of origin is frequently a dairy.

With the exception of three, the last of which occurred in 1898, none of the outbreaks which occurred during the period 1875 to 1925 could be attributed to imported animals. The restriction of movement of animals during the course of an outbreak practically excludes animals as the means of spread.

The situation of 33 of the premises first involved in the 1924 outbreak is of interest. They were all grouped round four populous centres, Helsingborg, Kelvinge, Malmoe and Ystad, and it was established that 29 of these had had communication with one or other of these during the few days prior to the outbreaks. These towns all have a large tourist traffic.

When the first outbreaks were detected cases occurred upon two islands, upon both of which people had arrived from Helsingborg.

The authors come to the conclusion that man is the principal vector of the virus in the process of spread.

KLING (C.) & HÖJER (A.). **Recherches sur le mode de propagation de la fièvre aphteuse. Mécanisme de la transmission du contage par l'homme.** [The Manner in which the Virus of Foot-and-Mouth Disease is carried by Human Agency.]—*C.R. Soc. Biol.* 1926. Mar. 12. Vol. 94. No. 9. pp. 618–620.

In the present communication the authors summarize their observations regarding the manner in which the infection is carried by man.

They consider that the infection may be carried by a human being for periods ranging from 1 to 60 days.

Only 10 per cent. of vectors of virus are held to have visited infected premises, while 90 per cent. acquire it through infected milk or by contact with carriers of the virus (*individus porteurs du virus*).

The experiments of LEBAILLY, VALLÉE and CARRÉ have shown that under ordinary conditions the virus is very labile. It is therefore improbable that virus on clothing, boots, etc., remains infective for long. One is therefore forced to suppose that it is in the interior of man, probably in the mucous surfaces, that the virus is capable of maintaining itself. If this be so, then man would appear to be a true carrier of the virus. Cases of foot-and-mouth disease have been recorded during most outbreaks of the disease both in Sweden and abroad, but definitely diagnosed cases are of rare occurrence. In 1921 PAPE accidentally inoculated himself with virus from a pig, and established the pathogenicity of the virus for man. It might be thought that it would be a simple matter to arrive at a diagnosis in man by inoculating guineapigs with contents of vesicles in man, but the authors state that their observations lead them to think that by the 2nd or 3rd day the contents of such vesicles are no longer infective for the guineapig.

The infectivity of the virus for man can also be shown by the fact that in some instances at least (four out of seven) the serum from recovered human beings is destructive to the virus. Blood was taken from three children on an infected farm, who presented symptoms of the disease, two months after the illness developed. Two of the sera possessed specific destructive properties, but the third did not. Blood from 15 controls from uninfected areas were tested simultaneously, and in every case with negative result. Blood from 11 persons suspected of being carriers or transmitters of the virus was examined, but no evidence of specific antibodies was obtained.

Although proof has not been furnished of their existence, it cannot be denied that apparently healthy carriers may occur among men, as, indeed, is known to be the case with a number of diseases of the human subject.

In populous centres there may be a not inconsiderable number of carriers, but the danger attaching to them is lessened by the fact that only a small proportion of them come into contact with animals directly. But it must be remembered that the virus may be transferred from man to man, and this would tend to increase the spread of the disease. It is suggested that in passages from man to man the virus loses virulence, but that, on the other hand, the existence of some intercurrent disease such as influenza may stimulate the virus to multiply.

BUSCHLE (J.). **Über die Empfänglichkeit zahmer Ratten für Maul- und Klauenseuche.** [The Susceptibility of Tame Rats to Foot-and-Mouth Disease.]—*Deut. Tierärzt. Woch.* 1926. July 10. Vol. 34. No. 28. pp. 510–512.

The author states that while rats can be infected with the virus of foot-and-mouth disease, the infection cannot be carried on in series.

RUHLE (F.). **Über die Ginsschen Einschulszkörperchen bei Maul- und Klauenseuche.** [Gins' Inclusion Bodies in Foot-and-Mouth Disease.]—*Arch. f. Wissen. u. Prakt. Tierheilk.* 1926. June 24. Vol. 54. No. 3. pp. 197–212.

The author gives tabular statements showing that he has been able to find the "inclusion bodies" described by GINS as being present in the nuclei of epithelial cells and subepithelial connective tissue cells in the same situations in animals not affected with foot-and-mouth disease as well as in those so affected. Guineapigs, sheep and cattle were used.

He therefore concludes that they cannot be considered as specific. The paper is illustrated by four figures.

TRAUTWEIN (Karl). **Versuche zur Tenazität des Maul- und Klauenseuche Virus in der Auszenwelt.** [The Vitality of the Virus of Foot-and-Mouth Disease in the Outer World.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1926. July 24. Vol. 54. No. 4. pp. 273–279.

Lymph from lesions in pigs was allowed to become dry on various materials, such as sand, manure, cloth, and glass, and it was found to remain infective for periods ranging from 5 to 11 days. Epithelial shreds retain their virulence for much longer periods even when exposed to sunlight. Putrefaction and drying are also less effective in this case.

Fragments of epithelium placed in dung, in water or simply exposed to the air in the open remained virulent for periods ranging from 41 to 67 days.

Heating to 60° C. is rapidly fatal to the virus. A period of exposure to this temperature of five minutes is sufficient.

Epithelial shreds buried in dung to a depth of 30 centimetres become avirulent within 6 days.

TRAUTWEIN (Karl). **Maul- und Klauenseuchedesinfektion mit schwefliger Säure, speziell mit Sulfoliquid D.S.** [The Disinfection of Foot-and-Mouth Disease Virus with Sulphurous Acid, and particularly Sulfoliquid D.S.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1926. July. Vol. 54. No. 4. pp. 280–296.

The author finds that the sulphurous acid is particularly effective for the destruction of the foot-and-mouth disease virus, and that "Sulfoliquid D.S." is the best preparation. This has, however, a relatively small bactericidal action.

The material is used in 5 per cent. solution, and in this dilution it remains active for 5 days at least. Slight warming increases its activity.

Some other proprietary disinfectants were tested but they were inferior to Sulfoliquid.

WALDMANN (O.). **Ein Schluszwort zu den vorstehenden Versuchen Dr. Trautwein's über Virustenazität und Desinfektion bei Maul- und Klauenseuche.** [An Addendum to Trautwein's Experiments regarding the Vitality of the Virus of Foot-and-Mouth Disease.]—*Arch. f. Wissenschaft u. Prakt. Tierheilk.* 1926. July. Vol. 54. No. 4. pp. 297–298.

Waldmann draws attention to the difference in the behaviour of the virus and bacteria to disinfectants. The hypochlorites are active

against bacteria and not against the virus. Sulphurous acid acts in the reverse way. He considers that this indicates a distinct biological difference of some kind, and that it is a mistake to continue to attempt to cultivate the virus on media used for bacteria or modifications of these.

Unfortunately, there are at present no indications as to the direction in which work should proceed for the successful cultivation of the virus.

WALDMANN (O.) & TRAUTWEIN (K.). **Experimentelle Untersuchungen über die Pluralität des Maul- und Klauenseuche Virus.** [Experimental Investigation regarding the Plurality of the Foot-and-Mouth Disease Virus. Preliminary Communication.]—*Berlin. Tierärzt. Woch.* 1926. Aug. 27. Vol. 42. No. 35. pp. 569–571.

This paper contains a brief account of cross immunity tests carried out with strains of foot-and-mouth disease virus obtained from different sources. The publication of a full account of the work is promised. Working with 32 such strains, the authors were able to distinguish three main types of virus with a number of variants of these. It is remarked that the types had not geographical distributions. The experiments were carried out with both guineapigs and cattle, and more or less parallel results were obtained. The three strains or types of virus did not afford protection against each other, and thus animals could be re-infected three times within a brief period. The view put forward by VALLÉE and CARRÉ is thus supported.

LEVADITI (C.), NICOLAU (S.) & GALLOWAY (I. A.). **Passage du virus de la fièvre aphteuse à travers les membranes en collodion.** [The Passage of the Virus of Foot-and-Mouth Disease through Collodion Membranes.]—*C.R. Acad. Sci.* 1926. Jan. 18. Vol. 182. No. 3. pp. 247–248.

The virus used was one which had been maintained in guineapigs by plantar inoculation. It was filtered (apparently without dilution) through sacs made of three layers of Poulenc collodion under a pressure of 10 centimetres of mercury. The speed of filtration varied with the sac from 1 drop in 2 minutes to 1 drop in 5 minutes. The contents of the sacs and the filtrate, which were both bacteriologically sterile, were used for the inoculation of guineapigs.

Nine experiments have been carried out, and eight positive results have been obtained. Details of one experiment are given in which the filtrate produced vesicles in 18 to 24 hours and generalization in 36 hours to 4 days.

The authors conclude that the virus of foot-and-mouth disease will pass under pressure through collodion membranes which are practically opaque to proteids, permeable to bacteriophage, peptones, and amide-acids and which retain to a large extent alexin, haemolytic sensitiser, certain diastases (trypsin) and bacterial toxins.

The virus therefore behaves in a similar way to the viruses of rabies, encephalitis, herpes, and neurovaccine.

HUBAC (A.). **Le traitement et la prophylaxie de la peste bovine.** [Treatment and Prophylaxis of Rinderpest.]—1926. Paris: Vigot Frères. 56 pp.

The author of this short treatise is a Veterinary Inspector in Indo-china. The paper does not appear to contain anything new.

HORNBY (H. E.). **Studies in Rinderpest Immunity. (2) Methods of Infection.**— *Vet. Jl.* 1926. July. Vol. 82. No. 7. pp. 348–355.

In this paper the author deals with the sources of infection and the usual avenues of infection. Experiments in connexion with the former revealed nothing contrary to what is stated in reliable text-books, but experiments in connexion with the second point yielded results at variance with the belief that infection usually takes place through the alimentary tract.

The nasal discharge is infective on or even before the second day of the febrile reaction, but is no longer so on the second or third day after the remission of fever.

Urine appears to be non-infective until the third day of fever, and is non-infective about 4 days after the temperature has subsided.

Rinderpest virus appears to have little specific action on the kidneys, but frequently causes acute cystitis, and the author believes that most of the virus present in the urine is attached to cells derived from the blood vessels of the congested mucous membrane of the bladder.

The faeces are infective on the 6th day of the reaction, and in mild cases cease to be so three or four days after it has subsided, but where there is acute diarrhoea the faeces may be infective for a longer period.

The author does not consider rinderpest very infectious, as in mild cases several days of contact may not in some instances suffice for the transmission of the disease.

Although probably all the secretions and excretions contain the virus, they are not invariably infective.

Experiments have shown that while the virus cannot infect an animal through sound skin, it readily gains access to the body through broken skin.

The author has proved by experiment that *Glossina morsitans* can transmit the infection.

It is readily transmitted by subcutaneous, intravenous and intra-peritoneal inoculation, but Hornby has experienced difficulty in transmitting the disease by ingestion. Virus introduced into the rumen by means of a canula passed through the abdominal wall caused infection in one case out of three. Three animals in which the virus was introduced directly into the abomasum died, but as leakage from the abomasum is more likely to take place than leakage from the rumen actual proof is not furnished by this experiment.

Intrarectal injections of 200 cc. of virulent blood failed to set up infection.

Infection is readily set up by the respiratory tract by drenching via the nostrils, and intratracheal injection. Swabbing the nasal mucous membrane with infective material is also a certain method of infection. This may readily happen in nature when an animal pushes its nose into urine that is being passed by an infected beast.

The swabbing of the conjunctiva with an infective liver extract transmitted infection, but swabbing with lachrymal discharge from an animal dying of rinderpest failed to transmit the disease.

STICCO (Emilio). **Richerche urologiche nella rabbia sperimentale del coniglio.** [Urological Researches in Experimental Rabies in the Rabbit.]—*La Clin. Vet.* 1926. June. Vol. 49. No. 6. pp. 345–359.

The author has found albumen in the urine in 121 out of 123 rabbits dying of fixed virus. In one case a negative result was obtained, and in the remaining case sufficient urine was not present.

In 51 cases sugar was found, in 2 the reaction was doubtful, and in 69 it was definitely negative.

In a single case of street rabies no albumen was found in the urine, but sugar was present.

PHISALIX & MARCENAC (M.). **La soi-disant immunité naturelle du chien Sloughi aux venins de scorpion et de vipère ainsi qu'au virus rabique.** [The Alleged Natural Immunity of the Sloughi Dog to the Venom of the Scorpion and of the Viper and to the Virus of Rabies.]—*Bull. Soc. Path. Exot.* 1926. June 9. Vol. 19. No. 6. pp. 438–440.

The belief that the Sloughi, a greyhound-like dog, is immune to the venoms of the scorpion and viper and to the virus of rabies is widely held among the natives of Morocco.

Experimentally, it was found that a single sting of a scorpion was sufficient to kill a young sloughi of about the size of a fox terrier, but that it required more than one to affect an adult dog. The susceptibility of the dog to the venom was proved by using a maceration of the glands of the scorpion.

Similarly, a dose of 0·87 mg. per kilog. of venom of *Vipera aspis* proved as fatal to adult sloughis as to ordinary dogs in France.

Using the fixed virus from the Pasteur Institute at Paris, the authors found the sloughi normally susceptible to the rabies virus.

BELIN (M.). **Conservation et exaltation de la virulence du virus aphteux par cultures simultanées avec le virus vaccinal.** [Preservation and Exaltation of Virulence of the Foot-and-Mouth Disease Virus by Simultaneous Cultivation with the Vaccine Virus.]—*C. R. Soc. Biol.* 1926. Apr. 9. Vol. 94. No. 12. pp. 816–818.

## MISCELLANEOUS.

JAUFFRET (R.) & HAW (Ngutjón-Cêng). **Un cas d'ostéomalacie. Son traitement par le salicylate de soude en injection intraveneuse.** [Osteomalacia treated by Intravenous Injection of Salicylate of Soda.]—*Rev. Vet.* 1926. Aug. Vol. 78. No. 8. pp. 481–484.

The subject was a four-year-old native horse which showed the usual symptoms of osteomalacia including the enlargement of the bones of the jaws. Faecal examination showed that ascarides were present

but no cylicostomes. There was no equipment available for analysis of the urine. For the worms 1 gramme of arsenious acid was prescribed daily for 8 days. On the fourth day of treatment an intravenous injection of 100 cc. of a solution composed of 400 cc. of water containing 12 grammes of sodium salicylate was given. Two days later the gait appeared to have improved. A second injection of 100 cc. was given and at the same time four injections each of 1 cc. of turpentine were give in the neighbourhood of the enlarged near shoulder-joint. The general condition of the animal improved and fixation abscesses developed at the shoulder. These were evacuated and soon healed up. Subsequently progress towards recovery was steady and the animal had almost completely recovered.

SEDDON (H. R.) & CARNE (H. R.). *Diplarrhena moraea* **Labill.** *New South Wales. Dept. Agric. Vet. Res. Rep.* No. 2. 1926. Apr. pp. 44–45.

Freshly-cut leaves of the plant (N.O. Iridaceae) were offered to a heifer, but were refused. When cut and mixed with chaff about 7 lbs. were eaten on one day, and about 2 lbs. on the following day. Diarrhoea with blood in the faeces followed. There was loss of condition, but recovery took place in a few days after the plant was stopped.

i. SEDDON (H. R.) & CARNE (H. R.). **Feeding Experiments on Cattle with** *Hibbertia volubilis* **(F. u. M).**—*New South Wales. Dept. Agric. Vet. Res. Rep.* No. 2. 1926. Apr. pp. 41–42.

ii. ——. ——. **Feeding Experiments with** *Bartsia trisago.*—*Ibid.* p. 43.

i. The plant came under suspicion as being poisonous, and in feeding experiments it was found that cattle could only be induced to eat it when the fresh shoots were mixed with other food. There was some salivation but no other symptoms of illness were seen.

ii. Stock do not readily eat this plant and the ingestion of small amounts is not followed by the development of symptoms.

SEDDON (H. R.) & CARNE (H R.). **Staggers in Stock due to Rough-Bearded Grass** (*Echinopogon ovatus*). **Preliminary Account.**—*New South Wales. Dept. Agric. Vet. Res. Rep.*—No. 2. 1926. Apr. pp. 34–40.

The condition described in this paper is said to be quite distinct from the Staggers due to Mallow (*Malva parviflora*), stagger weed (*Stachys arvensis*) or *Lamium amplexicaule.*

It was found by investigation that when the suspected plant was removed from the diet improvement and then recovery took place.

Two adult sheep which received 1½ lb. daily for three weeks developed no symptoms, nor did a lamb which consumed 1 lb. per day for a month. Another lamb which was fed for 40 days developed very definite symptoms.

A yearling calf which consumed 192 lbs. in 25 days remained normal.

Further investigations are to be undertaken, but it appears that prolonged feeding is required to produce symptoms even in young animals. The grass appears to lose some of its harmful properties when it is cut, and it appears to be less harmful when it has seeded.

SEDDON (H. R.), HINDMARSH (W. L.) & CARNE (H. R.). **Further Observations on *Stachys arvensis* ("Stagger Weed") as a Cause of Staggers or Shivers in Sheep.**—*New South Wales. Dept. Agric. Vet. Res. Rep.* No. 2. 1926. Apr. pp. 25–33.

The experiments recorded in this paper indicate that two factors are concerned in the production of staggers in sheep, viz., the age of the animal and the amount of seed present in the feed. Young animals develop symptoms of intoxication before older ones. The seed appears to be the important part of the plant from the point of view of staggers production.

VAN SACEGHEM (R.) & WITVROUWEN. **Empoisonnements dus à des vegetaux, observés au Katanga chez des bovidés.** [Cases of Poisoning in Cattle caused by Plants in Katanga.]—*Bull. Méd. Katanga.* 1926. Feb. Vol. 3. No. 1. pp. 17–18.

The authors have been able to detect strychnine, veratrine, aconitine, and digitalin in the liver of animals dying from plant poisoning.

Analyses of plants have revealed the presence in these of strychnine, veratrine, and digitalin. The plants themselves have been sent to Belgium for identification.

METALNIKOV (S.). **Contribution à l'étude de l'immunité chez les invertébrés.** [Immunity in Invertebrates.]—*Ann. Inst. Pasteur.* 1926. Sept. Vol. 40. No. 9. pp. 787–826. With 9 text figs.

The view has long been held that immunity is a process of adaptation in one form or another, and the essence of the process of immunization is that the changes are progressive.

The author claims that there is another type of immunity, which he terms immunity of defence. Adaptation immunity is based upon loss of sensibility, while defence immunity is an exaltation of the sensibility of the cell, and of the power of reaction. External reactions take place when the injurious substance, of whatever nature, comes into contact with mucous membranes. The reactions of mucous membranes all have for their object the removal of the substance. The substance is, in fact, one which stimulates mucous membranes into activity.

Internal reactions, which result from actual invasion of the tissues by some excitant, are far more complicated, because all the tissues represent a complex balanced system, and all therefore take part in reactions.

Among lowly organized animals immunity of adaptation is mainly seen, but in those more highly organized the immunity is an active one of defence.

In both vertebrates and invertebrates immunity to invasions by bacteria may be achieved in three ways: (1) By destruction, e.g., ingestion by phagocytes; (2) isolation, that is encapsulation; (3) elimination as in abscess formation. In these processes the various

defensive cells of the reticulo-endothelial system play the important part. In fact the introduction of an antigen of any kind stimulates the cellular tissues and they react with increased vigour.

SCHENNER (S.) & EIGENDORF (R.). **Die diagnostische Bedeutung des Kaninchen-impfversuche bei der infektiösen Anämie der Pferde.** [The Diagnostic Importance of Rabbit Inoculations in Infectious Equine Anaemia.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1926. July. Vol. 54. No. 4. pp. 299–336.

The authors claim to show that the phenomena observed by OPPERMAN in rabbits inoculated with the anaemia virus are not specific. Repeated subcutaneous or intraperitoneal injections of extracts of gastrus larvae, of normal horse or pig serum will produce exactly the same effects. By carefully graduating the dose it can be found that the first injection produces an increase in the number of red cells. After one or two days there is a fall to below the normal. This persists for a day or two, and then balance is again restored. During the reaction the temperature tends to rise. With subsequent injections the increase in blood corpuscles tends to become smaller and smaller, while the drop in the number persists or becomes greater. Anaemia thus produced may last for weeks. It is associated with an elevation of temperature or loss of weight. Other evidences of anaemia make their appearance, and death may occur. All rabbits do not react in the same way to the same dose. By a particular dose severe anaemia may be caused in one and slight anaemia in another.

A single injection of 15 to 20 cc. of blood from a rabbit showing this anaemia will reproduce the condition in a sound rabbit.

In some cases the picture of anaemia has been produced by a single subcutaneous injection of 8 cc. of normal pig serum, 20 cc. of normal horse serum and 20 cc. of normal rabbit blood or serum after inactivation. The pig serum is the most effective for producing this condition.

MIESSNER (H.). **Seuchenhafte Gehirn-Rückenmarksentzündung des Schafes. Meningo-Encephalomyelitis epidemica ovis.** [Epidemic Meningo-Encephalomyelitis of the Sheep.]—*Deut. Tierärtz. Woch.* 1926. Sept. 4. Vol. 34. No. 36. pp. 637–639.

The author briefly reviews the literature regarding the occurrence of this disease, and points out that its resemblance to Borna disease of horses was detected by PRIETSCH in 1896.

The symptoms and lesions of two cases are described, and it is recorded that one rabbit contracted infection by inoculation. The results of further inoculation tests are to be published later.

WITKAMP (J.). **Een geval van "braakziekte" bij den hond.** [A Case of "Vomiting-Disease" in the Dog.]—*Ned.-Ind. Blad. v. Diergeneesk.* 1925. Aug. Vol. 37. No. 4. pp. 392–393.

Witkamp mentions two cases of "vomiting-disease," and states that the condition was reported to be not uncommon in Batavia. He describes in detail a case in a fox-terrier, about one year old. The

dog had for 3 days shown dullness, and a constant tendency to vomit; when seen by him, it showed a high temperature, slow pulse, and pale and icteric membranes. The urine contained a little protein and bile pigments, and occasional piroplasms were found in the red corpuscles; treatment with trypanblue caused rapid improvement, and recovery within three days. He considers that piroplasmosis should be borne in mind in cases of persistent vomiting, especially if associated with icterus; he mentions that such vomiting may be an early, and for a time the only, symptom of rabies.*

SCHMID (G.). **Knochenbrüche beim Kamel (Dromedar).** [Fractures of Bones in Camels.]—*Berlin. Tierärzt. Woch.* 1926. June. 25. Vol. 42. No. 26. pp. 425–427.

* Summarized by Dr. W. H. Andrews.

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Compiled by MISS M. H. JAMES.

*Note.*—Incidence, Treatment, &c., are indexed only under Diseases, and not under Animals affected by the Diseases.



* The numbers in heavy type refer to the titles of papers summarized.

# TROPICAL VETERINARY BULLETIN

ISSUED UNDER THE DIRECTION OF THE HONORARY MANAGING COMMITTEE.

VOL. 15.

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London:
BUREAU OF HYGIENE AND TROPICAL DISEASES,
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1927.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 15.] March 1, 1927. [No. 1.

## DISEASES DUE TO PROTOZOAN PARASITES.

YAKIMOFF (W. L.) & WOÏZEKHOWSKY (A. M.). La résistance des érythrocytes au cours de la babesiellose bovine. [**The Resistance of the Red Blood Corpuscles in Bovine Babesiellosis.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 548–549.

The author has tested the fragility of the red corpuscles by mixing with citrated blood solutions of salt of different concentrations. The concentrations ranged from 1 per cent. to 0·3 per cent., with intervals of ·02 per cent.

Samples of blood from normal cows were first tested, and it was found that haemolysis began on an average in tubes containing ·7 per cent. salt and that it was complete in tubes containing ·43 (average) per cent.

Samples of blood from 11 animals infected with *Babesiella bovis* were tested in the same way. The concentration in which haemolysis began ranged in these from 1 per cent. down to ·76 per cent. and the concentrations in which it was complete varied from ·56 per cent. to ·40 per cent. The authors conclude that this is evidence of an increased fragility.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.) & LOUKIANOFF (W. A.). A propos de l'immunisation des bovidés vis-à-vis de *Babesiella bovis* en Russie. [**Immunization against** *Babesiella bovis* **in Russia.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 550–554.

The authors give details of six cases in which a dose of blood containing the parasite was followed by injection of trypanblue when the parasites made their appearance in the circulation.

The experiments are also described in which a dose of trypanblue was given first and was followed at intervals ranging from 20 to 53 days by a dose of infective blood. All three animals became infected, but recovered. No controls to show the action of the infected blood alone are mentioned.

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YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.), GNÉDINE (A. N.), RASTÉGAIEFF (E. F.), ROUMIANZEFF (E. W.) & TURIKOFF (M. F.). L'arrhénal dans le traitement de la babesiellose bovine. (Note préliminaire.) [**The Treatment of Bovine Babesiellosis with Arrhenal. Preliminary Note.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 554–557.

The authors found the dose recommended by PIOT-BEY (5 cc. of a 10 per cent. solution) insufficient, and used in succession 1 and 2 grammes of the drug, but without success.

They state that for subcutaneous injection the dose must be 2·5 to 3 grammes, and for intravenous injection at least 1·5 grammes.

One hundred and thirty-six animals were treated by subcutaneous injection with a mortality of 8·8 per cent.

Sixty-seven were treated by intravenous injection with a mortality of 7·4 per cent.

YAKIMOFF (W. L.) and others. **Piroplasmosis (Babesiellosis, Red Water) of the Cattle in the North-West of Russia.**—*Cent. f. Bakt.* I. Abt. Orig. 1926. Oct. 30. Vol. 100. No. 4-6. pp. 224–258.

Piroplasmosis occurs throughout the greater part of Russia, only the extreme north and the north-east being free. The first portion of the paper, which is divided into ten sections, deals with the spread of the disease, and gives statistical figures of the incidence and mortality. The symptoms and lesions are dealt with, but the description does not add to our knowledge. The transmitting tick is *Ixodes ricinus*. Rupture of the spleen is known to occur, but this does not happen frequently. No evidence of the existence of anaplasmosis has been obtained.

DONATIEN (A.) & LESTOQUARD (F.). Transmission expérimentale de *Piroplasma caballi* à l'âne. [**The Experimental Infection of the Donkey with** *P. caballi*.]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 546–547.

The authors infected a donkey foal 8 days old with blood containing *Piroplasma caballi*. A 10-year-old native horse inoculated at the same time failed to become infected. An attempt was made to infect the foal's dam and an imported horse from the foal, but without success, owing it is held to their having been "premunised" by a natural infection at an earlier date.

YAKIMOFF (W. L.). L'hématurie au cours des épizooties de piroplasmose. [**Haematuria in the Course of Epizootics of Piroplasmosis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 686–688.

The author states that during the period 1923–1925, when he was in North-Western Russia supervising a campaign against piroplasmosis (babesiellosis) of cattle, he encountered no case of "haematuria." During 1926 his collaborators have seen three cases, but in these cases no piroplasms were found in the blood.

RAU (M. A. N.). **Experimental Infection of the Jackal** (*Canis aureus*) **with** *Piroplasma canis*, **Prana and Galli-Valerio, 1895. A Preliminary Note.**—*Indian Jl. Med. Res.* 1926. July. Vol. 14. No. 1. pp. 243–244.

A jackal cub which had been under observation for a month was given 5 cc. of blood from a dog harbouring *P. canis*. On the next day but one a second dose was given. Both inoculations were by the intravenous path. On the day following the second dose of blood smears showed parasites to be fairly numerous. The number very rapidly declined during the next two days. For nine days no parasites were found, but they reappeared in fairly large numbers and persisted for a fortnight. In a second jackal inoculated from the first parasites appeared on the second day and were discoverable for ten days.

THEILER (A.) & DU TOIT (P. J.). La transmission des maladies, dont les tiques sont les vecteurs, par l'injection intrajugulaire d'une émulsion de l'hôte intermédiaire. [**The Transmission of Tick-conveyed Diseases by the Intravenous Injection of an Emulsion of the Intermediate Host.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 725–737.

Heartwater.—Whereas Rocky Mountain fever is transmitted by a three-host tick, which can pass on the infection from any one stage to the next, including adult to larva through the egg, heartwater infection, although handed on from the immature stages to adults, is apparently not transmissible by larvae which are the progeny of infected adult ticks.

In experiments it was found that nymphs of *Amblyomma hebraeum*, both fed and starved, infected with heartwater could be used to transmit the infection by the intravenous inoculation of an emulsion of their bodies. The infection produced by starved ticks was less severe then that produced by engorged ticks, but in no case was the disease fatal. In some cases inoculation with starved ticks failed, and in these instances no immunity was produced.

Similar experiments were carried out with East Coast fever using *R. appendiculatus*. The transmitting ticks of this disease are three host ticks. The ticks acquire infection during their immature phases, but the infection is not passed through the egg, nor is the infection of a larva passed on to the adult if the nymphal stage is passed on a non-infected animal. In the experiments described the fact was not lost sight of that infected nymphs and adults only transmit the infection between 72 and 120 hours after attachment.

In experimental tests it was found that unengorged adults failed to transmit East Coast fever when an emulsion of them was inoculated intravenously. Adults which had fed for 72 hours when so injected caused a mild attack of the disease. Adults fed for 90 hours produced the disease in the two experiments carried out.

In experiments carried out with nymphs it was found that neither engorged nor unengorged were they capable of transmitting East Coast fever by intrajugular inoculation of an emulsion. Nymphs fed for 90 hours produced an infection and established immunity, but in two cases immunity was not conferred by this means.

BROUDIN & PEYTAVIN, with NGUYÊN-VAN-DÊN, KIÊU-THIÊN-THÊ & NGUYÊN-TRUNG-TRUYÊN. Contribution à l'étude du surra d'Indochine. [**Surra in Indochina.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 746–761. With 7 charts in text.

The authors deal in this paper with the following subjects: (1) History, distribution and species affected; (2) diagnosis in the ox; (3) clinical notes; (4) lesions; (5) test inoculations with small animals; (6) epizootics; (7) transmitting agents; (8) carriers; (9) treatment; (10) laboratory studies.

It is noted that no mortality due to surra is ever encountered in the buffalo in Indochina, while in oxen the disease is sometimes very serious. Buffaloes however, are of extreme importance as reservoirs.

NIESCHULZ (O.). Zoologische Bijdragen tot het Surraprobleem. IV. Over de ontwikkeling van *Tabanus striatus* Fabr. [**Contributions to the Surra Problem. IV. The Development of *Tabanus striatus* Fabr.**]—*Nederl.-Indië Bladen v. Diergeneesk.* 1926. Aug. Vol. 38. No. 4. pp. 327–347. With 3 text figs. & 2 plates.

The following is abstracted from the author's German summary of his paper.

*Tabanus striatus* is one of the most widely spread Tabanidae in the Indian Archipelago, and plays a great part in the transmission of surra.

The egg-packets measure from 6·5 to 11 mm. long, 3·25–5 mm. wide and 1·5–2·25 mm. thick, and contain on an average some 300 eggs. The packets are flatter than those of *T. rubidus*.

The period of incubation is 4–5 days.

The fly passes through seven larval stages which can be divided into three groups. During the first stage which is very brief the larva does not eat. The second to the sixth stages each occupy from two to ten days, and during this period the larvae eat regularly. The seventh stage lasts from 14 to 159 days. During the earlier part of this phase the larvae eat freely, but later they enter a period of complete quiescence.

The larvae of *T. striatus* are smaller than those of *T. rubidus* and measure 26·5–30·8 mm. (*T. rubidus*, 34·5–42·4 mm.)

The pupal stage lasts from 8 to 12 days. The pupa may be distinguished from that of *T. rubidus* by the fact that the hindermost dorsal pair of tubercles on the head are not larger than the ventral and ventrolateral pair, whereas in *T. rubidus* they are. The males and females occur in approximately equal numbers, but during the observations in the laboratory it was found that in the pupal stage far more females than males died. The pupal period of the males is generally shorter by a few days than that of the females.

DIOS (R. L.) & ZUCCARINI (J. A.). Primera comprobación de Tripanosomosis bovina en la R. Argentina. [**The Detection of Bovine Trypanosomiasis in the Argentine.**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 80–84. With 1 coloured plate.

The authors figure and describe a trypanosome detected in the blood of a bovine infected with redwater (*B. bigeminum*).

They failed to transmit the infection by inoculation, and attempts to cultivate the trypanosome did not succeed.

On morphological grounds they indentify the parasite as *T. theileri.*

VAN DEN BRANDEN (F.). L'action du Naganol "Bayer 205 Vétérinaire" sur les infections à *Trypanosoma congolense* et à *Trypanosoma dimorphon.* [**The Action of Veterinary "Bayer 205" (Naganol) on** *Congolense* **and** *Dimorphon* **Infections.**]—*Ann. Soc. Belge. Méd. Trop.* 1926. July. Vol. 6. No. 2. pp. 207–212.

The authors have tested naganol and tryparsamide on guineapigs inoculated with blood containing *T. congolense* and *T. dimorphon.*

Naganol was injected subcutaneously at the rate of 1 g. per 25 kilos, the doses ranging actually from 12 to 14 mg. Six guineapigs were treated and all were cured, the period of examination of the blood continuing for 2 months.

In the experiments with tryparsamide the dose was 3 g. per 50 kilos, and ranged from 27 mg. to 40 mg. for the different guineapigs. Under this treatment *T. dimorphon* disappeared while *T. congolense* persisted. Three of the guineapigs died of *congolense* infection.

Of 6 pigs naturally infected with the 2 trypanosomes 5 recovered and 1 died when treated with tryparosan. Three were treated with naganol, and all recovered. Brief details of the latter cases are as follows: Pig 1. Weighing 40 kilos, was given 1 g. of naganol in 10 cc. of distilled water subcutaneously. The blood was examined daily with negative results for a week, when a second dose of 0·5 g. was given.

Pig 2. Weight, 50 kilos. This animal received similar treatment, but trypanosomes persisted in small numbers in the blood after the first injection. The second was given a fortnight after the first.

Pig 3. This animal weighed only 30 kilos and was given 0·5 g. in 5 cc. subcutaneously. The circulation was cleared and the dose was repeated after a fortnight.

A number of zebus and native Dahomey cattle which showed either the mixed infection or the pure *congolense* infection were put under treatment.

The experiments with zebus indicated that while a cure of *congolense* infection can be achieved, failures resulted with the *T. dimorphon* infection.

The drugs used were copper sulpharsenol, tartar emetic and naganol. The following illustrates the way in which the treatment was administered. A cow weighing 250 kilos was given 0·3 g. of copper sulpharsenol subcutaneously. Two days later 0·2 g. of tartar emetic was administered intravenously and 3 and 7 days later 5 g. of naganol were given subcutaneously. *T. dimorphon* persisted and the animal died showing posterior paralysis. A similar course of treatment cured a pure *congolense* infection.

Native animals treated with 3 doses of naganol ranging from 1·5 to 2 g. with 2 or 3 day intervals recovered when their infection was a pure *congolense* one, but died when the double infection was present.

DIOS (Roberto L.). Ensayos de tratamiento preventivo y curativo con " Bayer 205." [**Preventive and Curative Treatment with " Bayer 205."**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* Buenos Aires. 1925. Mar. Vol. 4. No. 1. pp. 51–56.

A horse experimentally infected with Mal de Caderas received a total of 17 grammes of " Bayer 205 " intravenously in the course of about 4 months. It is not specifically stated what was the dose in each case, but the first two were of 4 grammes each. The trypanosomes disappeared for periods ranging from 4 to 31 days between the doses, but the animal finally died of the disease. The failure to effect a cure is attributed by the authors to too long intervals having been allowed to elapse between the doses.

In a second experiment a horse was given an intravenous injection of 4 grammes of the drug in 60 cc. of salt solution and this was followed by an inoculation with 70 cc. of blood containing a very virulent strain of trypanosomes. Infection failed to occur.

A dog which was infected with the trypanosome from a horse was cured (period of observation 1 year 11 months) by a single injection of " 0·50 centigrammes." At the end of the period of observation the dog was successfully re-infected and was cured (4 months observation) by a dose of " 0·60 centigrammes." The protective power of the drug for dogs was shown by injecting two dogs with 1·24 g. and 0·48 g., and later inoculating them along with two controls with the trypanosome. Both the treated dogs resisted infection and the controls died.

DIOS (R. L.) & ZUCCARINI (J. A.). Action préventive du Bayer 205 sur l'inoculation du " Mal de Caderas " au cobaye. [**The Protective Action of " Bayer 205 " upon the Inoculation of Guineapigs with Mal de Caderas.**]—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. p. 828.

Series of guineapigs were given injections of " Bayer 205 " in increasing amounts and were tested at progressively longer intervals. [The exact significance of the results cannot be stated since owing to a misprint one or more lines appear to be missing from the text.] It would appear that 9 mg. protected against infection practised 45 days later and progressively 200 mg. protected against inoculation 100 days later.

LEDENTU (G.) & DAUDE (J.). Contribution à l'étude du produit " 309 " dans la trypanosomiase des bovidés. Action préventive et action curative. [**The Protective and Curative Actions of " 309 " in Bovine Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 614–620.

After experiments had been carried out upon guineapigs it was decided to carry out a large scale test with cattle, and for this purpose a mob of cattle travelling from Tchad to Brazzaville was used.

Half the herd was to be kept as control and the other was to be given 10 grammes per head at Fort Archambault—the starting point—and two other injections of 5 grammes at intervals of a month. This

was an average of 0·07 centigrammes per kilogramme body weight. The drug was given intravenously into the ear vein in 20 per cent. solution. Of 61 animals collected at Melfi, 32 became infected with baléri on the way to Fort Archambault. This point is interesting, as it shows the virulence of the epizootic along the banks of the Chari during November. This journey occupied a month.

It is not improbable that some of the animals thought to be healthy when they were dispatched from Fort Archambault were actually infected.

Twenty-seven apparently healthy animals were sent off, and of these 16 were given two of the doses of "309." On arrival at Bangui six weeks later there were 25 survivors, 15 injected and 10 controls. Of these about one-third of each batch were found to be infected. Prior to despatch from Bangui the third dose of "309" was given and 7 injected and 5 controls were sent on. A month later 5 injected and 4 controls reached Brazzaville. Examination showed that only one animal—a control—had escaped infection.

Seven of these animals were subjected to curative treatment with the drug. Five of these had already received 20 g. for protective purposes, and the other two were controls. The injections were given intravenously in 25 per cent. solution.

In the controls a single dose of 10 g. caused a disappearance of the trypanosomes for four days. After three doses of 10 g. each trypanosomes made a brief appearance in the circulation 15 days after the third dose.

In the animals previously treated a single dose of 10 g. caused sterilization, which lasted 6 days. After a single dose of 15 g. relapse occurred on the 4th day, and after two doses of 10 g. relapse occurred after 18 days.

The necessity of slaughtering the animals prevented the prolongation of the experiment. In the course of the tests it was noted that the drug is without action upon microfilariasis.

LEDENTU (G.). Note complémentaire sur l'action curative du 309 Fourneau dans la trypanosomiase bovine. [**Additional Note on the Curative Effect of Fourneau 309 in Bovine Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 692–693.

A single animal was used to test the extent to which the drug could be pushed. The beast had already had two courses of treatment, each comprising 20 grammes. Doses of 10, 5 and 5 g. had been given at intervals of a month to test the protective power of the drug. Infection with *T. congolense* occurred. As an attempt at curative treatment two doses of 10 g. had been given at an interval of 4 days, but relapse occurred on the 18th day. Six intravenous injections were given at intervals of 5 days, each dose being 10 grammes. The first four doses appeared to be well tolerated, and the animal improved somewhat in condition, but with the last two doses there was marked loss of condition, and the animal died about a month after the last dose in a condition of extreme cachexia.

Trypanosomes were apparently absent from the circulation during this period.

VAN DEN BRANDEN (F.). Le "Heyden 661" ou antimosan dans le traitement de la trypanosomiase humaine. [**Heyden 661 or Antimosan in the Treatment of Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 688–691.

Antimosan is less trypanocidal in action than tartar emetic, and its action is temporary. It has however the advantage that it can be administered subcutaneously or intramuscularly.

Chronic cases rapidly lost condition under treatment.

EDWARDS (J. T.). **The Chemotherapy of Surra** (*Trypanosoma evansi* **Infections) of Horses and Cattle in India.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 10–71. With 1 diagram, 12 charts & 2 figs. on 1 plate.

The author details experiments carried out with "Bayer 205," tryparsamide, tartar emetic, bismuth phosphate, and bismuth sodium tartrate.

In the earlier experiments bovines were used, but subsequently experiments were carried out on horses. In the latter the average period of incubation was 5–6 days.

"Bayer 205" was used for prophylactic treatment of horses in doses ranging from 1 to 10 g. per 1,000 lb. body weight. Details of 6 such animals are given, and from these it may be gathered that while a dose at the rate of 7·5 g. protected up to 22 days, a dose at the rate of 10 g. failed to protect at 2 months. It is suggested that for horses working in surra areas the treatment should be "Bayer 205" intravenously at the rate of 1 g. per 1,000 lb. once a fortnight. In the course of experiments with tartar emetic it was found that horses and cattle can stand approximately the same dosages by intravenous injection, i.e., about 5 cc. of M-10 solution per 100 lb. body weight.

This drug remains in trypanocidal concentration in the blood for about 24 hours only. Hence the necessity for repeated injections. Tartar emetic appears to exert a direct toxic effect upon trypanosomes, and when given to an animal having trypanosomes in its blood may cause sudden death.

In experiments to test the prophylactic action of tartar emetic it was found that only 2 out of 7 were protected. These animals had one or more doses of 10 cc. of 3 per cent. solution (nearly M/10), the last of which was not more than a day before test inoculation. Where the interval was three days relapse occurred.

Bismuth compounds yielded results somewhat similar to those given by antimony, but they were generally less efficacious.

Tryparsamide yielded poor results. Its action as a prophylactic was similar to that of tartar emetic, but even less pronounced. Rapid excretion appears to explain the inability of the drug to produce more than a brief sterilization.

The author gives an account of the technique for withdrawing cerebro-spinal fluid from horses during life.

FERNANDEZ (N. F.). Formalinbehandlung der Surra. [**Formalin Treatment of Surra.**]—*Berlin. Tierärzt. Woch.* 1926. Oct. 15. Vol. 42. No. 42. p. 707.

The author treated three camels suffering from surra with formalin by intravenous injection. Doses of 20 cc. were given on alternate

days until 13 doses had been given, then doses were given at three-day intervals. The treatment lasted 1½ months. On the days when no injection was given 2 drams of liquor arsenicalis were given by the mouth.

During treatment the animals improved rapidly in condition and no trypanosomes were found in the blood. The camels were put to work and three months later were apparently quite healthy. The author claims to have had strikingly successful results in the treatment of distemper, strangles, mastitis in cows, haemorrhagic septicaemia, and rinderpest with intravenous injections of formalin. He has also used it in cases of epizootic lymphangitis, farcy, and microfilariasis. He claims good results in the first of these.

The dilution used was ½ to 1 ounces per pint, and for horses, cattle and camels the dose was 20 cc.

Dogs received 1 to 3 cc. of a dilution containing ½ to ¾ of a dram in 5 ounces of distilled water.

LEVADITI (C.), NICOLAU (S.) & GALLOWAY (I.) Essais de prophylaxie des trypanosomiases par des dérivés phényl-arsiniques administrés *per os.* [**Phenylarsenic Compounds given per os as Prophylactics against Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 737–746.

Tryparsamide and " 270 " Fourneau protected rabbits against subcorneal or conjunctival inoculation with the nagana trypanosome. Stovarsol and " 192 " Fourneau were less effective. The dose of the former was 0·1 g. per kilog. administered 24 hours to 3 days before infection. In infected rabbits 6 doses of 0·02 g. per kilog. of the drug given at intervals of a day or two caused the keratitis to clear up.

" 270 " was used in 0·1 g. per kilogramme doses, and was effective if the period between dosing and inoculation did not exceed 48 hours. But the prevention of local lesions did not always correspond with general sterilization.

It is noted that the doses used approximate to the maximum medicinal dose, for in some cases it appeared that poisoning resulted.

KEEVILL (Arthur). **The Treatment of Sleeping Sickness** (*Trypanosoma rhodesiense*)**—a Study of Fifty Cases.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 111–118.

Tryparsamide was found to fail to sterilize neither the blood nor the spinal fluid. With " Bayer 205 " there was sterilization of the blood and spinal fluid, and immediate improvement as a rule. Tryparsamide should be used in cases relapsing after " Bayer 205," but three months should elapse before it is applied, as otherwise the risk of visual disturbance or blindness is greatly increased.

The immediate results of the drug " 309 " (Fourneau, Tréfouel & Vallée) are at least as good as those of " Bayer 205."

DYE (William H.). **The Serum-Formalin Reaction in** *Trypanosoma rhodesiense* **Infection.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 74–92. With 2 figs.

The author gives an account of an outbreak of *rhodesiense* infection and details the results obtained with various methods of treatment.

With regard to the serum-formalin reaction the following conclusions are drawn :—

1. The reaction is accelerated by rendering the serum hypertonic with sodium chloride, but this does not cause a normal serum to give the reaction.

If a small quantity of " Bayer 205 " (¼ grain) be left in contact with the serum for an hour before the formalin is added there is a marked retardation of the phenomenon. Tryparsamide did not cause this retardation unless the drug were added in the proportion of at least 1 grain per cc. The cerebrospinal fluid does not give the reaction even if taken just before death.

The reaction is to some extent disappointing, but a negative result in an untreated case is of value. In the case of a positive result in an untreated person the value of the result can be decided by three injections of " Bayer 205," for if the case be not one of trypanosomiasis there will be no alteration in the reaction.

THIROUX (A.) Au sujet de la prophylaxie de la maladie du sommeil. [**Prophylaxis in Sleeping Sickness.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 701–702.

In this short note it is suggested that oil of cajeput might serve as a repellent to biting flies.

SCHERN (Kurt). Ueber die auf grund des Zuckerphänomens der Trypanosomen geklärte Pathogenese der Trypanosomosen. [**The Pathogeny of Trypanosomiasis explained upon the basis of Trypanosome Sugar Phenomena.**]—*Berlin. Tierärzt. Woch.* 1926. Oct. 1. Vol. 42. No. 40. pp. 665–666.

In this short note the author expresses the view that trypanosomiasis brings about a condition of hypoglycaemia. This causes disturbance of liver function and " sugar hunger." Finally a general intoxication with coma results from the derangement of the physiological action of the liver. No experimental details are given.

MAZZA (S.). Infection spontanée du chien par le *Schizotrypanum cruzi*. [**Spontaneous Infection of a Dog with** *Schizotrypanum cruzi.*]—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. pp. 809–811.

The author records the occurrence of a natural infection in the dog with *Schizotrypanum cruzi*. Guineapigs and mice were inoculated from it, but in only one mouse did infection occur. *Amblyomma cajennse* and *A. variegatum* were found on the dog. No flagellates were found in these.

BOECK (W. C.) & TANABE (M.). *Chilomastix gallinarum*, **Morphology, Division and Cultivation.**—*Amer. Jl. Hyg.* 1926. May. Vol. 6. No. 3. pp. 319–336. With 2 plates & 1 text fig.

The authors give a detailed account of *Chilomastix gallinarum* which occurs in the caeca of turkeys and fowls, its mode of division and cultural methods.

They found that parasites of turkeys could be transferred by injection of either motile or encysted forms to chickens, and vice versa.

The parasite is not a Tetrachilomastix as described by FONSECA. There are only three anterior flagella, but there is a cytostomal flagellum. The nucleus is vesicular and anteriorly placed, and there are four blepharoplasts and a centrosome.

The right lip of the cytostome is supported by the right fibre and the peristomal fibre and the left by the left fibre which supports the undulating membrane and this carries the cytostomal flagellum along its margin.

The anterior pair of blepharoplasts give rise to the anterior flagella, and the posterior pair to the right and left fibres of the cytostome and to the cytostomal flagellum.

Division is by binary fission. The blepharoplasts divide and the new flagella form as outgrowths from the daughter blepharoplasts.

Cultures were obtained in Locke's solution 8 parts and human serum 1 part, and in egg medium covered with the same mixture (L. E. S. medium).

HINDLE (E.) HOU (P. C.) & PATTON (W. S.). **Serological Studies on Chinese Kala Azar.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 368–373.

Whereas in the case of the Indian type of leishmaniasis normal human serum is found to have an inimical effect upon cultures of the flagellate, the results obtained in similar tests with Chinese strains were very variable. Some of the sera from both normal and Leishmania-infected people destroyed the parasites; other did not. In each case about 60 per cent. of the sera were effective and 40 per cent. ineffective. Similar inconstant results were obtained with the blood of normal and infected hamsters and with the blood of the dog, sheep, rabbit and guineapig. By increasing the proportion of serum to culture a greater number of the parasites could be immobilized. Heating the serum to 55° C for half an hour destroyed the power.

These results would appear to suggest that the body cannot be invaded by the flagellate forms, as these would be destroyed by the serum.

The " destruction " of parasites is probably, however, more apparent than real. Certainly the majority of the parasites are immobilized when mixed with serum, and many are dissolved.

By staining such preparations the authors have frequently been able to find parasites with no obvious signs of degeneration, and culture experiments indicate that the parasites are not completely destroyed by the serum. Conclusive evidence that the flagellate stage can produce infection is shewn by the successful inoculation of hamsters. It would appear, then, that some of the parasites in culture can resist the action of serum. No morphological differences have been made out.

In infection experiments capillary tubes containing cultures were placed under the skin and in the peritoneum and examined at intervals. Large numbers of phagocytes were found in the tubes and the parasites had disappeared. No appearance of development could be detected in any of the organisms ingested by the leucocytes.

Experiments appeared to indicate that there was no special increase in the complemental power of the serum of kala azar patients.

Using spleen emulsion of infected hamsters as antigen, the authors found that the complement fixation test gave comparatively good results. Of 24 cases diagnosed by liver puncture, 19 gave definitely positive complement fixation tests, and there was a partial reaction in the remaining five.

To test the specific nature of the reaction the blood of 54 patients suffering from other diseases was tested. In 44 there was complete haemolysis and in 4 incomplete haemolysis. Six gave definite reactions. Five of these were syphilitics and the other serum was definitely anti-complementary.

The blood of three patients successfully treated with tartar emetic gave negative results.

HINDLE (E.) & PATTON (W. S.). **Experiments bearing on the Susceptibility of the Striped Hamster** (*Cricetulus griseus*) **to Leishmania of Chinese Kala Azar.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 374–379.

The rodent is markedly susceptible to infection by intraperitoneal inoculation, using both flagellate and non-flagellate stages. When only small numbers of parasites are contained in the inoculum, the resulting infection may be very slight and may be missed. There is commonly no enlargement of the spleen even when large numbers are given. If a heavy inoculation is given, there may be great enlargement of the spleen, and in such cases the parasite can be recovered from the blood.

PATTON (W. S.) & HINDLE (E.). **Notes on Kala Azar in Shantung.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 379–384. With 1 text fig.

The disease is probably more common in males than females, and is most prevalent during the first decade of life. From this time onwards the incidence declines until it is very rare after 40 years of age. An analysis of three hundred cases suggests that there is no special seasonal incidence as judged by admissions to hospital.

In China it would appear that the mean duration of the disease is from 1 to 2 years, whereas the figures for Assam indicate a duration there of about half this. In some cases histories of infection for periods of 15 years have been obtained.

Seventy-five per cent. of the cases occur among villagers as distinct from townsmen, and among neighbouring villages the incidence is uneven.

The period of incubation is long, running into many months at least.

HINDLE (E.) & PATTON (W. S.). **Resistance of Leishmania Cultures to Cold.**—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 385–386.

Observations on hibernating insects showed that the natural flagellates of these insects are not affected by cold. Experiments with cultures in Wenyon's NNN medium revealed the fact that they are able to withstand intermittent exposures to temperatures of –12° C (exposure out of doors at night) for a period of at least 10 days. The flagellate

stage is able to survive freezing solid, for within an hour of being thawed active organisms could be found. In view of these facts it is reasonable to assume that it can survive in hibernating insects through the winter.

SMYLY (H. Jocelyn). **Chemotherapy of Experimental Leishmaniasis in Hamsters.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Mar. 18 & May 20. Vol. 20. Nos. 1 & 2. pp. 104–110. With 1 text fig.

Tryparsamide, sodium and potassium tartro-bismuthate, ethyl hydnocarpate, and sodium antimonyl tartrate have been tried for the treatment of hamsters (*Cricetulus griseus*) experimentally infected with leishmania. In no case was a cure obtained, but the average spleen-weight was less in treated than in untreated hamsters.

SERGENT (Edm. & Et.), PARROT (L.), DONATIEN (A.) & BÉGUET (M.). Transmission expérimentale du bouton d'Orient (clou de Biskra) à l'homme par *Phlebotomus papatasi* (Scopoli). [**The Transmission of Oriental Sore to Man by** *Phlebotomus papatasii*].—*Ann. Inst. Pasteur.* 1926. May. Vol. 40. No. 5. pp. 411–430. With 5 text figs.

In this paper are set out at length details of the work done in connexion with the transmission of oriental sore to man by means of *P. papatasii*, a note regarding which was presented to the Académie des Sciences in November, 1921.

The morphology of the parasite both in the lesion and in cultures was that of *L. tropica*, but as certain identification was not possible by these means alone the parasite was used for the inoculation of white mice and dogs.

The virus was first inoculated, at the 6th subculture (age 21 days) into 6 mice intraperitoneally. Five of these died in less than 3½ months without shewing any evidence of infection. The sixth died just over four months after inoculation and was found to be infected.

Five mice inoculated with the 11th subculture (age 21 days) failed to become infected.

Six mice inoculated with the 15th subculture (age 12 days) became infected.

It was also found possible to transmit the infection from mouse to mouse by intratesticular inoculation.

The first attempt to transmit the infection to the dog by intracutaneous inoculation failed. But subsequently five dogs were successfully infected by the intradermal path with material obtained from the testicular lesion of an infected mouse.

PARROT (L.) & DONATIEN (A.) Infection naturelle et infection expérimentale de *Phlebotomus papatasi* (Scop.) par le parasite du bouton d'Orient. [**The Natural and Experimental Infection of** *Phlebotomus papatasii* **with the Parasite of Oriental Sore.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 694–696.

Publication of full details of the work recorded in this short paper is to be made later in the Archives of the Pasteur Institute of Algeria. Examination of 181 female phlebotomi revealed infection with leptomonas in one only. In this fly hundreds of the parasites were present

in the stomach, and these appeared, for the most part, to be attached to the epithelium by their flagella.

Forty-three female flies were given access to a mouse infected with leishmania and 6 were found to be infected. The mouse was infected by intradermal inoculation on the tail with culture. This method of inoculation leads to the development of local lesions in a week or ten days.

The flies had access to the whole surface of the mouse's body, and fed largely upon the nose and ears.

In a second experiment 29 flies were used, and the experiment was so arranged that the flies could reach the tail only. In this instance 11 flies were found to be infected.

The flagellates found in the flies possessed all the characters of cultural forms of *L. tropica*. In the stomach of the fly multiplication takes place very rapidly, and short ovoid forms and slender forms may be found 16 hours after the infecting meal. By the 36th hour parasites are generally numerous in the anterior part of the stomach, where they occur in rosettes. Some show evidence of longitudinal fission.

The living flagellates persist long after digestion of the blood meal has been finished. They have been found up to the 95th hour, and in one case up to 12 hours after the death of the fly, although there was no trace of blood in the stomach or intestine.

In spite of careful examination, the only part of the fly invaded by the flagellates appears to be the alimentary tract from the oesophageal valve to the origin of the malpighian tubes.

PARROT (L.) & LESTOQUARD (F.). Sur quelques détails de la structure des Leishmania. [**Some Structural Details of Leishmania.**] —*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 327–332. With 2 plates (1 coloured).

The authors state that they have devised techniques of fixing and staining Leishmania, at least *L. tropica*, whereby the existence of an internal flagellum or rhizoplast can be demonstrated in every parasite, and not only exceptionally as is usual with Romanowsky methods. First technique. Fix in Schaudinn's fluid for 10 minutes, and treat with iodized alcohol. Remove the iodine with 95 per cent. alcohol and dry. Cover the specimen with horse serum and leave for ten minutes. Dry rapidly in the air and stain for an hour in 1:10 giemsa. It is to be noted that the sublimate solution should be not less than 24 hours old. The iodized alcohol should be made by adding 2 parts of the official tincture to 98 parts of 95 per cent. alcohol. While almost any sort of serum will do, horse serum gives the best and most constant results. The water used for diluting the giemsa should be exactly neutral, but rather acid than alkaline.

Second technique. Fix in iodized alcohol for 10 minutes. Wash out all traces of iodine with 95 per cent. alcohol and dry.

Cover with horse serum for 10 minutes. Dry rapidly in the air and stain for an hour with Crétin's formula of 10 per cent. trieosinate of methylene. Wash and dry.

The first of these methods is the more complicated of the two, but it gives the better results.

Stained by either method and examined by artificial light the Leishmania shew a pink body with a dark margin. The nucleus is deep

red with a central area (? nucleolus) which is wine red. The centrosome is also wine red and the rhizoplast a reddish pink.

In specimens made from the testicular lesion of experimentally infected white mice the authors have been able to follow the division of the rhizoplast in organisms that are in the process of multiplication.

In the resting state the rhizoplast appears as a straight or curved fibrillar band of a pinkish tinge. It begins close to the middle point of the centrosome and extends outwards to the enveloping membrane, which it reaches at a point which is as a rule close to one of the poles of the parasite. It does not extend outside the parasite, as stated by GONDER. In the process of multiplication the rhizoplast splits longitudinally, beginning at the centrosome end.

The techniques described colour the enveloping membrane, which is still little known, selectively. As the staining affinities of this membrane are identical with those of the rhizoplast, the usual methods of staining do not allow of its detection, but its presence may be suspected from the regularly oval contour of the parasites.

The techniques described show up this envelope as a "veritable pink shell," which is of a paler tint than the rhizoplasts. It is this structure which makes the cytoplasm of the organism appear pink by this method of staining; the cytoplasm in reality is scarcely coloured at all.

In smears made from the lesions of mice or monkeys there are often found, and frequently in abundance, the empty envelopes of the parasite. These may be torn or split like a seed pod. Sometimes in these damaged parasites the centrosome and rhizoplast are still present, the nucleus alone having disappeared. The author believes that these correspond to the forms described by MESNIL, NICOLLE, & REMLINGER as "atypical forms staining uniformly pink and containing only a little mass of chromatin."

KRIJGSMAN (B. T.). De therapie der Coccidiose. Part I. De therapie der koninjnencoccidiose. [**The Therapy of Coccidiosis of the Rabbit.**]—*Tijd. v. Diergeneesk.* 1926. Sept. 15. Vol. 53. No. 18. pp. 817–824, & No. 19. pp. 865–879.

The value of any therapeutic agent can only be determined by experimental means in the laboratory.

A fatal termination of a case of coccidiosis is almost invariably due to lesions of the bowel allowing bacterial invasion to take place.

Creolin is a very valuable remedy in all stages of the disease, and when used in conjunction with proper hygienic measures may render possible the stamping out of the disease.

The creolin used in the experiments contained 25 per cent. cresol, and the animals used were experimentally infected. The dose for a rabbit is 20 cc. of ½ per cent. solution per kilogramme. This dose given three days in succession produced no evidence of nephritis.

YAKIMOFF (W. L.), GALOUZO (J. G.) & RASTEGAIEFF (E. F.). La coccidiose des porcs en Russie (U.S.S.R.) [**Coccidiosis of Pigs in Russia.**]—*Russian Jl. Trop. Med.* 1926. No. 4. p. 77.

Examination of 40 animals in the Lodeinoé Polé district showed that 12 were infected with coccidia, and in the Wolkhov district 2 were found out of 29 examined.

At the Leningrad abattoirs 20 pigs from the Wiatka province were examined, but only one shewed oocysts in the faeces, and of 30 from the Ekatérinoslav province 2 were found infected.

Twenty pigs examined on a Leningrad farm were found to be free from infection.

During a tour in the Transcaucasus faeces of fifty-one pigs from four different places were examined. Only one was found to be infected.

TYZZER (E. E.). *Heterakis vesicularis* **Frölich 1791: a Vector of an Infectious Disease.**—*Proc. Soc. Exp. Biol. & Med.* 1926. May. Vol. 23. No. 8. pp. 708-709.

Blackhead, caused by *Histomonas meleagridis*, is transmitted experimentally and to some extent in nature by direct ingestion of material contaminated with freshly passed discharges containing the protozoon. It appears, however, to be much more frequently transmitted indirectly by some phase distributed on the soil, evidently in association with the eggs of the caecal worm *H. vesicularis*. The presence of the protozoon in the egg of Heterakis is indicated by experimental evidence of various kinds. Heterakis eggs kept in 1·5 per cent. nitric acid until embryonated, in order to render the eggs bacteriologically sterile, produce blackhead in young birds isolated from other sources of infection. That the parasite apart from the egg cannot resist this strength of acid is shown by the fact that excreta from infected birds so treated are not infective. Blackhead will not be produced by feeding with eggs that have not embryonated. Unripe eggs invariably give negative results.

The feeding of male Heterakis furnishes negative results.

Only negative results have been obtained with Heterakis from pheasants and geese.

The presence of the parasite in the egg has not been established, but the invasion of the tissue of the worm by the parasite has been demonstrated in a number of cases in half grown worms from cases of blackhead.

It is not yet known whether the acute disease or the carrier stage is most favourable for the infection of the worm.

HERMITTE (L. C. D.) GUPTA (S. C. S.) & BISWAS (T. N.). **The Therapeutic Value of Stovarsol administered by Mouth in Parasitic Infections of the Bowel, with Special Reference to its rapidly Curative Effect in Human Balantidiosis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. June. Vol. 20. No. 3. pp. 206–212.

The authors give an account of three cases in which stovarsol administered by the mouth caused a rapid disappearance of balantidium. The dose given was 4 grains dissolved in 5½ ounces of water in the morning. The parasites disappeared after the second to the fourth dose.

PATTON (W. S.) & HINDLE (E.). **Notes on Three New Parasites of the Striped Hamster** (*Cricetulus griseus*).—*Proc. Roy. Soc.* 1926. Oct. 1. Ser. B. Vol. 100. No. B 704. pp. 387–390. With 2 text figs.

The authors describe *Trypanosoma cricetuli* n. sp., *Grahamella cricetuli*, n. sp. & *Sarcocystis cricetuli* n. sp.

HANSCHELL (H. M.). **On Supposed Drug-fast Parasites in Syphilis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. June. Vol. 20. No. 3. pp. 213–223.

The author thinks it inadvisable to refer to drug-fastness as an explanation of the failures recorded in cases of syphilis. He points out that the destruction of the parasites is not a direct action of the drug, but that it is probably due to some substance resulting from the interaction of the drug with the host tissues. It is possible therefore that failures in treatment may result from the deficiency of this specific therapeutic agency in the host's tissues. A further possible explanation of failures is the existence of some centre where the parasites are not exposed to or are protected against the action of the drug.

Histories are given of two sets of cases from which the conclusion is drawn that alcohol and fear may be responsible for an inhibition of the power to react on the part of the tissues of the hosts.

An account is given of a case the history of which furnishes evidence that an enlarged inguinal gland formed a centre in which the parasites were protected from drug action.

A further case is described the features of which suggest the existence of syphilis of the central nervous system leading to disease elsewhere in the body. The latter could be cleared up by treatment, but relapse through infection from the central nervous system occurred.

DIOS (R. L.) & ZUCCARINI (J. A.). Primera comprobación de Espiroquetes en la sangre de caballos de la República Argentina. [**The Detection of Spirochaetes in Equine Blood in the Argentine.**] —*Revist. Inst. Bact. Dept. Nac. Hyg.* 1925. Sept. Vol. 4. No. 2. pp. 119–120. With 1 coloured plate.

The occurrence of spirochaetes in the blood of horses showing no clinical symptoms is recorded.

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BATTAGLIA (Mario). Degenerazione grassa e necrosi acuta del fegato e del rene da *Trypanosoma brucei*. [**Fatty Degeneration and Acute Necrosis of the Liver caused by** *T. brucei*.]—*Pathologica*. 1926. July 15. Vol. 18. No. 417. pp. 336–337.

DOGIEL (V.). Sur quelques infusoires nouveaux habitant l'estomac du Dromadaire (*Camelus dromedarius*). [**New Infusoria from the Stomach of the Dromedary.**]—*Ann. Parasit. Hum. et. Comp.* 1926. July. Vol. 4. No. 3. pp. 241–271. With 10 text figs.

FABRE (H.) & BERNARD (M.). Trypanosomiase bovine à la Guadeloupe. [**Bovine Trypanosomiassis in Guadeloupe.**]—*Rec. Méd. Vét.* 1926. Aug. 15. Vol. 102. No. 15. pp. 465–467.

This paper has appeared elsewhere and has been abstracted.

FOLEY (H.) & CATANEI (A.). Hémogrégarines de sauriens d'Algérie. [**Haemogregarines of Lizards in Algeria.**]—*Arch. Inst. Pasteur d'Algérie*. 1925. Dec. Vol. 3. No. 4. pp. 344–351. With 4 plates.

HEGNER (R. W.). *Endolimax caviae* n. sp. **from the Guinea-pig and** *Endolimax janisae* **n. sp. from the Domestic Fowl.**—*Jl. of Parasit.* 1926. March. Vol. 12. No. 3. pp. 146–147. With 1 plate.

PETROCHI (J.) & ZUCCARINI (J. A.). Sobre la presencia del *Plasmodium danilewsky* y de *Haemoproteus* sp. en. la sangre de los gorriones (*Passer domesticus*) de Buenos Aires. [**The Presence of** *Plasmodium danilewskyi* **and** *Haemoproteus* **sp. in the Blood of Sparrows at Buenos Aires.**]—*Revist. Inst. Bact. Dep. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 57–62. With 1 coloured plate.

## DISEASES DUE TO METAZOAN PARASITES.

SCHWARTZ (B.). **Specific Identity of Whipworms from Swine.**—*Jl. Agric. Res.* 1926. Aug. 15. Vol. 33. No. 4. pp. 311–316. With 2 figs.

A morphological comparison of whipworms (Trichuris) from man, the chimpanzee, cercopithecus, and swine, has shown that the worms from these hosts are morphologically indistinguishable as far as they have been compared. SCHNEIDER's differentiation between whipworms from man and other primates and those occurring in swine has been shown to be due to individual variation.

SANDGROUND (J. A.). **Biological Studies on the Life-Cycle in the Genus** *Strongyloides* **Grassi 1879.**—*Amer. Jl. Hyg.* 1926. May. Vol. 6 No. 3. pp. 337–388. With 1 plate & 2 text figs.

A review of the literature shews that nothing is definitely known as to the causes of the alternative methods of development occurring in a number of species belonging to this genus. The theories put forward by earlier workers are found to be inadmissible.

The examination of small faecal cultures is unreliable. When BAERMANN's technique is used with larger cultures both modes of development are found to exist together.

By following infections over a considerable time, the quantitative relationship between direct and indirect development is found to be subject to constant changes. Infection in some abnormal hosts lead to changes in life cycle.

The parasitic female strongyloides is at present held to be parthenogenetic, but there are indications that it is really hermaphroditic.

LEWIS (E. A.). **Starlings as Distributors of "Gapes."**—*Jl. Helminth.* 1926. May. Vol. 4. No. 2. pp. 43–48.

During November, 1925, to February, 1926, examination of 482 starlings shewed 35 per cent. to be infested. Starlings, turkeys, and pheasants carry over the parasite from one chick season to the next.

CAMERON (T. W. M.). **On the Morphology of the Adults and the Free Living Larvae of** *Dictyocaulus arnfieldi*, **the Lung-worm of Equines.**—*Jl. Helminth.* 1926. May. Vol. 4. No. 2. pp. 61–68. With 2 figs.

Basing his work on living specimens from the lungs of a donkey, the author describes the adult worms, and the free living larvae. For details the original paper must be consulted, but it may be stated that the females range from 43 to 60 mm. in length and are 0·4 mm. thick. The males measure 25 to 35 mm. by 0·25 mm.

The eggs are almost round and measure 0·09 mm. and contain living embryos when deposited. In water at 20° C the eggs hatch within a few hours, yielding first stage larvae, which measure 0·43 mm. by 0·015 mm.

The larva completes its first moult within 24 hours of hatching, but does not escape from the old cuticle until after the second moult has been completed. The second stage is rather smaller than the first, as it still remains in the old cuticle.

The second stage lasts 12 to 24 hours, and normally the double cuticle can be seen. At a variable period after reaching the third stage the larvae generally escapes from the first cast cuticle, but in no case was one seen to lose the cuticle of the second stage, As material was scanty little experimental work could be done. It was found, however, that larvae were able to survive for two days at temperature just above freezing point. Desiccation was found to be fatal to larvae. No evidence of skin penetration or migration was obtained. The larvae could not be kept alive in water beyond a fortnight.

AYNAUD (M.). Présence de larves de Nématodes dans les tumeurs du charbon symptomatique et du Bradsot. [**Larval Nematodes in Black-leg and Bradsot "Tumours."**]—*Compt. Rend. Soc. Biol.* 1926. July 16. Vol. 95. No. 25. pp. 440–441.

The author suggests that Black-leg and Bradsot may be caused by worms, because in sections from a muscle tumour from a heifer (one of a herd affected with parasitic bronchitis) and in 3 cases of Bradsot strongyles were found in the contents of the abomasum and larvae were found in the wall of the organ.

DIOS (R. L.) & ZUCCARINI (J. A.). Microfilaire du sang des chevaux. [**Microfilariae in the Blood of Horses.**]—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. p. 827.

The authors record the occurrence of microfilairae in the blood of a horse at Buenos Aires. The parasites were found in blood from the jugular, but not from the ear. Inoculation of another horse with 80 cc. of blood subcutaneously and with 20 cc. intravenously apparently failed to cause infection.

ROSSI (P.). Contribution à l'étude du Phlébotome en Aunis. [**Phlebotomus in Aunis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 705–709.

This paper contains an account of observations regarding the occurrence of Phlebotomus at La Rochelle.

NITZULESCU (V.). Sur la constitution du canal alimentaire chez les phlébotomes. [**The Alimentary Canal of Phlebotomus.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 709–714. With 5 text figs.

The author disagrees with the description of the piercing apparatus given by CHRISTOPHERS, SHORTT & BARRAUD.

SMITH (R. O. A.). **A Simple Method for the Staining and Mounting of Sandflies.**—*Indian Jl. Med. Res.* 1926. July. Vol. 14. No. 1. pp. 171–172. With 1 plate.

Certain details such as the nature of the hairs on the abdomen, the colour, and the presence or absence of scales are recorded before the fly is mounted, as the method removes the hairs.

Dead flies are placed in 10 per cent. caustic potash over night. They are then placed in pure liquid carbolic acid containing 1 cc. of saturated alcoholic eosin to 7 or 8 cc. The tube containing the flies in this liquid is heated in a water bath for 15 minutes; the liquid must not boil. The flies are washed in clove oil and mounted in thin Canada balsam or preferably euparal.

CLEVELAND (C. R.). **Repellent Sprays for Flies attacking Dairy Cattle.**—*Jl. Econ. Entomol.* 1926. June. Vol. 19. No. 3. pp. 529–536.

The author records the results of a systematic examination of this question during a period of 2 years and covering nine and ten herds respectively. The formulae of 7 home-made sprays are given.

A uniform method of spraying all cows once a day after morning milking was resorted to, but in some instances there was in addition an evening spraying during part or the whole season.

Figures are given regarding the cost of each for spraying ten cows for 3 months. In most cases, one spraying per day proved to be effective and sufficiently lasting. It is important that sufficient material be used; an excessive quantity was not more effective.

*Haematobia irritans* L. was the most abundant fly, but *Stomoxys calcitrans* was present in numbers nearly as large. The latter species was more difficult to deal with than the former, which was readily repelled.

While all the sprays tested were of some value, from the general point of view, economy, ease of preparation, effectiveness, etc., it was thought that one containing used crank case oil 1 gallon, oil of tar 1 pint, was the best.

LAAKE (E. W.), PARMAN (D. C.), BISHOPP (F. C.) & ROARK (R. C.). **Field Tests with Repellents for the Screw Worm Fly,** *Cochliomyia macellaria* **Fab., upon Domestic Animals.**—*Jl. Econ. Entomol.* 1926. June. Vol. 19. No. 3. pp. 536–539.

This paper contains a summary of the work done during the summers 1924 and 1925 in Texas. 332 goats, 78 sheep, 115 cattle, 28 horses, 5 hogs, and 6 dogs were used in the tests.

The method of treatment was as follows: Benzol was poured over the eggs and larvae and in the wounds of infested animals. The dead larvae and eggs were then removed and the area swabbed over with the repellent. The treated animals were all kept under conditions rendering regular observation and examination easy.

In view of the great variation in size, number, and nature of the wounds treated, it was thought inadvisable to judge any dressing by the time taken for the wound to heal. The number of times a wound became re-infected after the first application appeared to afford a better criterion.

Altogether, 18 repellents were tested, but only 11 to an extent warranting any conclusions.

The best results were apparently obtained with Pure Tar Oil 95 vols. Beta-naphthol ethyl ether 5 vols.

PILLERS (A. W. N.) & EVANS (A. M.). **A New Larva of** *Oestrus* (*Gastrophilus*) **from Zebras.**—*Ann. Trop. Med. & Parasit.* 1926. Aug. 13. Vol. 20. No. 3. pp. 263–264. With 1 plate.

Small numbers of the parasite were found, but the authors have no hesitation in confirming the opinion of POTTS, who examined the material in 1925, that it is a new species.

The larvae described is most closely related to *O. veterinus* Clark (*O. nasalis* Brauer), but differs from it in having no spines on the 3rd and 4th segments.

BISHOPP (F. C.), LAAKE (E. W.), BRUNDRETT (H. M.) & WELLS (R.) W.). **The Cattle Grubs or Ox Warbles, their Biologies and Suggestions for Control.**—*U.S.A. Dept. Agric. Department Bull.* No. 1369. April. 1926.

Of the two species *H. bovis* appears to occur further north than *H. lineatum.*

The larvae penetrate the skin at or near the place where the eggs are laid.

*H. lineatum* prefers the heels as points of attachment for the eggs and it attaches them to the hairs in rows. *H. bovis* deposits its eggs singly on the hairs of the legs and particularly on the thighs and rump. The incubation period is 3 days or a little more.

Larvae begins to appear in the chest and abdomen about 2 months after penetration of the skin.

It appears to be a fact that *H. lineatum* is the only one which spends any time in the submucosa of the gullet. Most of the parasites in this position are 2nd stage larvae.

The passage from the oesophagus to the subcutaneous tissue of the back appears to occupy a short space of time only.

The period spent under the skin of the back ranges from about 5 weeks to 11 weeks ; the shorter period was recorded in Texas and the longer in New York.

Larvae emerge at any time, but the majority come out during the morning.

*H. lineatum* in Texas required from 18–77 days between emergence and the appearance of the fly. In New York State *H. bovis* required 22–45 days for this stage of development.

The adult flies of both species last only some 5 or 6 days.

The times at which larvae become mature and leave the host are of great importance in the matter of control. Temperature, humidity, cloudiness and drainage are of importance also. No insect enemies or diseases have been found affecting Hypoderma.

The most effective time for control measures is during the period of development in the subcutaneous tissues of the back. Among the most effective materials are : Derris used as a wash, ointment or powder, iodoform or pyrethrum as ointments, benzol and carbon-tetrachloride injected into the grub cysts, fine tobacco powder applied as such, and nicotine dust applied dry.

Experiments with wading baths showed, that no good results were obtained in attempts to attack the parasite in the egg or grub stage. Treatment is deprived of a great deal of its value if untreated animals

are in close proximity. Treatments must be applied at intervals not exceeding 35 days, and the first must be applied before the first larvae have emerged. As a rule it is necessary to give four treatments during the season.

PARMAN (D. C.). **A Brief History of the Stick-tight Flea and the Fowl Tick in the United States.**—*Jl. Econ. Entomol.* 1926. Aug. Vol. 19. No. 4. pp. 644–648.

The object of the paper is to bring to the general notice the losses caused by these parasites and to emphasize the need for concerted action against them. The loss is estimated at hundreds of thousands of dollars annually.

The poultry flea attacks, besides poultry, sparrows, owls, cats, rats, rabbits, goats, dogs, mules, horses, and human beings, and there is reason to believe that it lives on wild hosts also. The attacks of the tick *Argas miniatus* are confined practically to poultry although other hosts have been reported.

The present distribution of the parasites in the United States is not known with certainty, but the tick is known from Florida to California and as far north as Oklahoma.

The established flea infestations extend from S. Carolina to California and north to Kansas and Missouri.

The adult flea spends most of its time upon its hosts. The eggs are laid there, but drop off to the ground. The immature phases will develop or die within 2 or 3 months. Experimentally it was found that without a host the flea probably dies in 6 months. The ticks on the other hand may live for a year or more without a host, and eggs have been found viable after six months.

Under favourable conditions the flea requires 2 to 3 weeks for complete development, the tick not less than 6 weeks.

Fleas usually remain on the hosts for about 2 weeks, but it may be as long as a month. The larval tick remains for about four days, and the adult for a few hours only, and usually at night.

GUYTON (F. E.). **Preliminary Report on Sodium Fluoride as a Control for Cattle Lice.**—*Jl. Econ. Entomol.* 1926. Aug. Vol. 19. No. 4. pp. 602–603.

Sodium fluoride was applied to the neck, shoulders, and rump by means of a small tin shaker, after which it was rubbed into the hair by the naked hand.

After a preliminary trial in a few badly infested animals an entire herd of 86 animals was treated.

The application was made on February 22nd, and on the following day a few living lice were found only on those animals which were most seriously infested. On March 1st a few lice were found on two cows only. One of these died and no lice could be found on the others a week later. A subsequent inspection failed to reveal the presence of any lice.

The species of lice present were :—*Trichodectes scalaris*, *Haematopinus eurysternus*, and *Haematopinus vituli*. The dressing required about an ounce for each animal.

SENEVET (G.) & ROSSI (P.). *Ixodes ricinus*, tique des régions froides ou tempérées. [*Ixodes ricinus*. **The Tick of Cold or Temperate Regions.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 558–560.

The authors have collected together the references regarding the distribution of *Ixodes ricinus*, and they find that with a few minor exceptions no record of its occurrence south of parallel 40 has been made.

The tick therefore, is one of temperate and cold climates. The cycle of development takes place during the part of the year when the temperature is favourable. In the more northern countries this is during the summer, but in the hotter parts of the temperate zone development takes place during the winter.

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BISHOPP (F. C.). **The Fowl Tick and how Premises may be freed from it.**— *U.S.A. Dept. Agric. Farmers' Bulletin No.* 1070.

——. **Fleas and their Control.**— *U.S.A. Dept. Agric. Farmers' Bulletin No.* 897.

—— & WOOD (H. P.). **Mites and Lice on Poultry.**— *U.S.A. Dept. Agric. Farmers' Bulletin No.* 801.

CAMERON (T. W. M.). **On the Life History of the Lungworm,** *Synthetocaulus abstrusus*, **hitherto confused with that of** *Ollulanus tricuspis* **in Cats.**— *Jl. Helminthology.* 1926. May. Vol. 4. No. 2. pp. 53–60. With 1 plate.

HOEPPLI (R.). Anatomische Veränderungen des Hundedarms, hervorgerufen durch *Nanophyes salmincola* Chapin. [**The Lesions caused by** *Nanophyes salmincola* **in the Intestine of the Dog.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1926. Sept. 13. Vol. 30. No. 9. pp. 396–399. With 2 text figs.

WETZEL (R.). Strongyliden der Pferde in Deutschland. [**The Strongyles of the Horse in Germany.**] **Part III.**—*Deut. Tierärzt. Woch.* 1926. Oct. 16. Vol. 34. No. 42. pp. 739–744.

WETZEL (R.). Strongyliden der Pferde in Deutschland. [**The Strongyles of Equidae in Germany.**] **Part IV.**—*Deut. Tierärzt. Woch.* 1926. Nov. 20. Vol. 34 No. 47. pp. 817–821.

WURM (H.). Ueber eine Milbenerkrankung der Lunge bei *Macacus rhesus*. [**A Disease of the Lungs of** *Macacus rhesus* **caused by Acari.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. June 7. Vol. 98. No. 7-8. pp. 514–521. With 6 text figs.

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## BACTERIAL DISEASES.

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1925. Dec. Vol. 3. No. 4. pp. 436–438. Immunisation anticharbonneuse des solipèdes par inoculation intradermique des vaccins pastoriens destinés à l'Algérie. Épreuve de l'Immunité. [**Anti-anthrax Immunization of Solipeds by the Intradermic Method with Pasteur Vaccines.**]

Anti-anthrax vaccination of solipeds by the subcutaneous path has been open to two objections. In some cases too severe a reaction has been produced, and in others animals have died of anthrax shortly after immunization.

Nine solipeds (four horses, two mules, and 3 donkeys) have been vaccinated intradermally with $\frac{1}{5}$ cc. of 1st Pasteur vaccine, followed by $\frac{1}{5}$ cc. of second Pasteur vaccine a week later. As the object of the test was to ascertain the degree rather than the duration of the immunity a test inoculation of $\frac{1}{5}$ cc. of a virulent culture was given eighteen days later.

In no case did the first vaccine produce any local reaction, and only one native horse which was anaemic shewed a rise of temperature for three days. The second vaccine produced a nodule ranging in size from a pea to a nut, but no thermal reaction. The test inoculations produced a small amount of oedema locally. A control donkey recovered after developing a local oedema and having a temperature of 39° for a week. Control ox, sheep and guineapig all died.

It is concluded that the method should be widely practised in Algeria.

LUSZTIG (Alexander). Die Wertbestimmung des Milzbrandserums. [**The Titration of Anthrax Serum.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. June 7. Vol. 98. No. 7/8. pp. 492–501. With 1 text fig.

The author points out that anti-anthrax serum differs from the majority of protective sera in that it is difficult to titrate it satisfactorily by any of the usual methods. Exact estimations can only be made when very exact dosage regulated according to body weight of the test animals is employed. He selects young rats as being the most convenient test animal. The dose given is established by plate counting of colonies.

Graduated doses of serum and a minimal lethal dose of culture are given subcutaneously at the same time on opposite sides of the body. The value of the serum is expressed as the amount which protects rats per gram body-weight.

ROSENTHAL (L.). Sur la production de bactéridies charbonneuses asporogènes par un procédé nouveau. [**A New Method of obtaining Non-sporulating Anthrax Bacilli.**]—*Compt. Rend. Soc. Biol.* 1926. July 16. Vol. 95. No. 25. pp. 445–447.

Success has been achieved by growing the bacillus in filtered broth from previous cultures, whether these were sporebearing or not.

Five different strains have been used, all of which sporulated within 24 hours.

After two or three passages in filtrate from broth cultures (about a fortnight old) non-sporulating cultures are obtained, and these can be plated. Three of the cultures have given this result. This character is firmly impressed. Cultures have been carried on at intervals of 4 or 5 days for 2½ months without spores developing. Passage through the guineapig does not effect any alteration.

Cultures should be transplanted fortnightly or otherwise they may die out, even when kept at room temperature. EISENBERG has stated that laboratory strains of the bacillus contain sporulating and non-sporulating elements. In order to remove all doubt as to the sporulating power of the original cultures used the strains were purified in the manner suggested by EISENBERG.

SCHILLING (S. J.). **Studies on Anthrax Immunity. 1. The Attenuation of *Bacillus anthracis* by means of Sodium Chloride and other Chemicals.**—*Jl. Infect. Dis.* 1926. Apr. Vol. 38. No. 4. pp. 341–353.

The object of the author's investigations was the discovery of a vaccine which had a greater margin of safety than the Pasteur vaccine, which are still the ones most widely used, and which do not invariably have the desired result.

The author has attempted to achieve attenuation without destruction of the antigenic powers of the organism by growing the bacillus on agar slants to which chemicals have been added in different concentrations.

The following were selected for trial :—Sodium chloride to represent a relatively non-toxic neutral salt, potassium ferrocyanide, a neutral salt with a potentially high toxicity for animal cells, copper sulphate, a neutral salt with a relatively high toxicity for plant cells, sulphuric acid, a non-volatile mineral acid, and sodium hydroxide, a non-volatile base.

Various concentrations of the chemicals mentioned were tried, but some were left out of further consideration as they were responsible for changes in the agar, rendering it unsuitable for cultivation tests. Thus sulphuric acid and sulphate of copper produced hydrolysis of the agar in all concentrations, as did sodium hydrate in concentrations of more than 0·15 per cent. On inoculating and incubating the other media it was found that sodium chloride about 5 per cent, and potassium ferrocyanide about 1 per cent. completely inhibited growth.

It was found that the organism became acclimatized to some extent to the media on subcultivation.

Transfers were made weekly.

At the end of 6 weeks tubes of Dunham's peptone solution were inoculated from each of the cultures, incubated, and used for the inoculation of guineapigs.

The results indicated that, while sodium chloride had produced attenuation, neither potassium ferrocyanide nor sodium hydrate had had any such effect. Subsequently, guineapigs were tested with the sodium chloride cultures to ascertain what dosage could be given without ill effect. It was found that a guineapig could stand an entire slant of a nine days old culture. This produced extensive oedema on the abdominal wall, but not fatal anthrax.

In an attempt to test the immunity of guineapigs inoculated with the cultures attenuated by sodium chloride, the guineapigs all died before it came to giving a test inoculation. The author believes that the immunizing doses were given at too short intervals to allow of the establishment of immunity.

It was found possible to immunize rabbits by such cultures, so that they would withstand doses fatal to non-immunized rabbits.

These rabbits received two immunizing doses at 14 days interval.

SCHILLING (S. J.). **Studies on Anthrax Immunity. II. The Immunization of Sheep by means of Anthrax Bacilli attenuated with Sodium Chloride.**—*Jl. Infect. Dis.* 1926. June. Vol. 38. No. 6. pp. 499–505.

The present paper, as indicated by the title, contains an account of experiments in connexion with the immunization of sheep by the same method.

The vaccine was prepared as follows :—The sixth subculture on the sodium chloride medium was transferred to ordinary agar, from that to Dunham's peptone broth, and then to agar again. These details are given as a check on the stability of the characters of the cultures used. The growth obtained was washed off in normal saline and carbolic acid to 0·5 per cent. was added.

Four sheep were injected subcutaneously with doses of 1, 2, 3 and 5 cc. respectively. All developed local lesions, but these were not very marked although they persisted for some days. There was no general reaction.

After an interval of eleven weeks, these sheep and two controls were given a virulent culture. The controls died and the vaccinated sheep recovered after showing marked local and general reactions. [According to the dates given in the table referring to this experiment, the interval was 5 months and not eleven weeks as stated in the text.] In one of the vaccinated animals there was found ten days after the virulent inoculation a small hard swelling at the seat of that operation. Virulent anthrax bacilli were cultivated from it.

NEVODOFF (A. P.). Cuti-vaccination anti-charbonneuse en un temps: sa valeur pratique chez le cheval. [**Single Dose Cuti-Vaccination against Anthrax: its Practical Value in the Horse.**]—*Compt. Rend. Soc. Biol.* 1926. June 25. Vol. 95. No. 22. pp. 154–155.

The author gives details of two experiments in which three horses were vaccinated once by the intracutaneous path and two were used as controls. In both the vaccinated animals survived without showing any illness and the controls died.

Subsequently, 499 horses and 2 camels were vaccinated by the method without accident. Experiments to test the duration of immunity are to be carried out.

Immunity is established seven days after vaccination and possibly earlier.

ROSSI (L.). De la cuti-vaccination du cobaye contre le charbon au moyen du premier vaccin seul. [**Cuti-Vaccination of the Guinea-pig against Anthrax by means of First Vaccine alone.**]—*Compt. Rend. Soc. Biol.* 1926. Nov. 12. Vol. 95. No. 32. pp. 1138–1139.

Guineapigs were injected with $\frac{1}{50}$ cc. and $\frac{1}{4}$ cc. of first vaccine, at an interval of 8 days. One batch was done subcutaneously and one intracutaneously. A fortnight later the whole, with some unvaccinated controls, were given $\frac{1}{20}$ cc. of second vaccine subcutaneously. Those vaccinated intracutaneously survived, while those done subcutaneously and the controls died.

In a second experiment, the test dose was $\frac{1}{5}$ cc. of second vaccine and the result was the same.

In a test with fully virulent anthrax culture, which was capable of killing guineapigs in a dose of 1/100,000 cc., a dose of 1/50,000 cc. proved fatal.

In a fresh experiment the immunization of the guineapigs was pushed further, a third dose of 1 cc. of first vaccine being given a week after the second dose of $\frac{1}{4}$ cc. Twelve days later, a dose of 1/50,000 cc. of virulent broth culture proved fatal for controls, but not for any of the vaccinated animals in either batch. But when the dose of virulent material was raised to 1/10,000 cc. two out of three of the guineapigs vaccinated intracutaneously were the sole survivors.

URBAIN (A.) & ROSSI (L.). Vaccination du cobaye contre le charbon par le liquide d'oedème. [**Vaccination of Guineapigs against Anthrax by means of Inflammatory Exudate.**]—*Compt. Rend. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 544–545.

It appears to have been generally found that the anthrax inflammatory exudate cannot be used very successfully for the immunization of guineapigs when it is injected intravenously, intraperitoneally, or subcutaneously.

Urbain and Rossi report experiments in which the cutaneous path was used.

The exudate was obtained just before or immediately after death, defibrinated by shaking with glass beads, and sterilized with chloropicrine.

Doses of 1 to 2 cc. were given, and in some cases these were repeated at 10 to 15 days interval. Batches of guineapigs were inoculated intravenously, intraperitonealy, subcutaneously and cutaneously.

Intravenously, whether one or two doses were given, the liquid produced no immunity. By subcutaneous injection, if two doses were given, fifty per cent. of guineapigs acquired immunity, and similar results followed double intraperitoneal inoculation. Two intracutaneous injections or two applications of swabs soaked in the exudate conferred immunity on all the animals so treated.

Two doses were found to be necessary, and the interval was 10–15 days. The immunity developed slowly and was established 12 to 15 days after the second injection.

UCHIDA (Y.). Experimentelle Infektionen von Mäusen und Meerschweinchen parenteral und von den natürlichen Eingangspforten aus. II. u. III. Mitteilungen. [**The Experimental Infection of Mice and Guineapigs by way of the Tissues and by Natural Paths.**]—*Zeitschr. f. Hyg. u. Infektionskrankh.* 1926. June. Vol. 106. No. 2. pp. 275–280; 281–307.

As a result of comparative inoculation tests, the details of which are given in a tabular statement, the author comes to the following conclusions.

1. Mice can be infected with anthrax bacilli or spores either by way of the blood stream or by the peritoneal path.

2. Smaller doses suffice for subcutaneous inoculation, provided highly virulent spores are present. If the inoculum is free from spores, the minimal lethal dose is about the same in all three cases.

3. Mice inoculated intravenously or intraperitoneally die more quickly than those done subcutaneously with the same dose. He considers that in mice the vascular system and the peritoneum are more susceptible to anthrax infection than the subcutaneous tissue.

The results recorded in the second paper lead him to conclude that in the case of the guineapig the reverse is the case.

Strains of fowl cholera bacilli and Paratyphoid B bacilli isolated from natural cases of guineapig sepsis were found to infect more readily by way of the peritoneum than by the blood and the skin.

The pneumococcus is not readily conveyed by way of the three paths, while the tubercle bacillus is.

REDKO (S. A.). Le charbon bactéridien chez un ours. [**Anthrax in a Bear.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 518–519.

The bear was one year and three mouths old; and, so far as the history given states, showed evidence of ill health, dullness and loss of appetite for two days before death occurred.

At the postmortem the subcutaneous vessels were engorged with "nearly liquid" blood. The abdominal cavity contained nearly a litre of clear reddish liquid. There was marked hyperaemia of the mucous membrane of the stomach, which was haemorrhagic. The spleen was not enlarged, and was of a bluish-grey colour. The spleen pulp was reddish-black, and a little thick dark red blood trickled from it. The liver was enlarged, yellowish in tint and friable. There was a small amount of reddish urine in the bladder. The heart was dilated and filled with partially coagulated dark coloured blood. Both epicardium and endocardium shewed ecchymoses. Cultures were obtained, and animals inoculated experimentally died of anthrax.

KATSCHAKHIDZÉ (W. A.). Les oiseaux rapaces et le charbon bactéridien. [**Birds of Prey and Anthrax.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 519–520.

The author fed an eagle with material containing anthrax bacilli and found that while the bird did not become infected cultures of anthrax could be obtained from its faeces.

MULLER (L.). De l'influence de la température sur l'evolution de l'infection charbonneuse. [**The Influence of Temperature upon the Development of Anthrax.**]—*Compt. Rend. Soc. Biol.* 1926. Oct. 19. Vol. 95. No. 28. pp. 861–863.

It is probable that the fact that the temperature of the skin is lower than that of the internal organs plays a favourable part in the development of anthrax.

Of two guineapigs inoculated with culture, one was kept at room temperature and the other was placed in an incubator the temperature of which oscillated between 34 and 38° C. The first died in 4 days and the second survived until the 11th day. At the postmortem, the latter shewed congestion of the lungs with large numbers of staphylococci, but no enlargement of the spleen. Anthrax bacilli were not recoverable in culture.

The experiment was repeated, the incubator being rigidly maintained at 36° C. In this case the incubated guineapig survived.

In a third test three guineapigs were used. One was placed in a chamber cooled by running water. The second was kept in an incubator at 36° C., and the third was kept at room temperature. The experiment was carried out during the summer, when room temperature did not fall below 24° C., even at night. The incubated guinea pig alone survived.

The experiments were repeated with mice. Seven kept at room temperature died, and 5 out of seven kept in an incubator survived.

The experiment with mice was repeated, but the incubator was run at 39° C. In this case the four incubated guineapigs died of anthrax in 48 hours, while the last of the room-temperature controls died on the 8th day.

The author concludes that the temperature at which the skin is kept may be a factor in the skin immunity.

IIZUKA (A.). **On the Disinfection of Anthrax-Spores with Chloride of Lime.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Sept. Vol. 5. No. 3. pp. 183–192.

The author has carried out experiments with solutions of chlorinated lime in well water with the addition of various acids and salts.

No details are given of the exact method of carrying out the tests, but in each case anthrax spores were used. As the author is writing in a foreign language, it is difficult to follow his exact meaning at times.

He finds, however, that the disinfecting power of chloride of lime depends upon the presence of free chlorine. The addition of certain acids—and particularly acetic acid—favours the action. Tartaric and citric acids exercise an inhibitory action. The addition of sodium chloride, alcohol, caustic soda, and sodium carbonate has no influence upon the disinfecting power of the solution. When the materials to be disinfected contain any considerable amount of protein, such as serum, chloride of lime is without disinfecting action. Sodium bicarbonate liberates about 60 per cent. free chlorine from the available chlorine, as does also ammonium carbonate.

ZANOLLI (C.) & SORDELLI (A.). Identidad del Carbunclo Sintomático y de "La Mancha." [**The Identity of Blackleg with "La Mancha."**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* Buenos Aires. 1925. Mar. Vol. 4. No. 1. pp. 40–50.

The authors believe that Blackleg and "La Mancha" are identical. Culturally and microscopically no difference can be detected between the causal organisms. Their pathogenic range is the same, and serological tests fail to disclose any differences. The fact that animals of different ages may contract the two diseases is not held to be of sufficient importance to warrant their being held to be separate entities.

KRAGE (P.). Ueber Myokardveränderungen bei der Haemorrhagischen Septikämie der Kälber. [**Myocardial Lesions in Haemorrhagic Septicaemia of Calves.**]—*Berlin. Tierärzt. Woch.* 1926. Nov. 5. Vol. 42. No. 45. pp. 759–762.

The author's observations were made upon the thoracic viscera of 5 calves which died suddenly. A number of cases of sudden death in calves ranging from 2–5 months had been encountered on different farms in East Prussia, and the only lesion discoverable on post-mortem examination was myocarditis. It was from this outbreak that the author obtained his materials.

In apparently two cases only out of the five was bacteriological examination undertaken. Microscopic examination was negative. By mouse inoculation an organism of the haemorrhagic septicaemia group was recovered. It is noteworthy that in one of the cases mice inoculated with heart blood survived, while those done from the muscular tissue died.

Microscopically, the heart muscle lesions are described as resembling those seen in malignant foot and mouth disease. There is either an acute multiple interstitial myocarditis with primary parenchymatous degeneration, or subendocardial and intramyocardial haematoma. The variations in the severity of the myocardial lesions depend upon variations in virulence of the organisms.

FROHBÖSE (H.). Beitrag zum biochemischen Verhalten der bipolaren Bakterien der hämorrhagischen Septikämie. [**The Biological Features of the Bipolar Bacilli.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. Oct. 30. Vol. 100. No. 4/6. pp. 213–218.

The author has tested the sugar reactions of 44 strains of avian origin, 3 from rabbits and 3 from cats. He finds that they all ferment dextrose, saccharose, and mannite. Arabinose, rhamnose, lactose, maltose and milk are not changed. All produce indol.

JACOTOT (H.). Sur la vitalité de l'agent du barbone des buffles. [**The Vitality of the Barbone Bacillus.**]—*Compt. Rend. Soc. Biol.* 1926. Oct. 29. Vol. 95. No. 30. pp. 1020–1021.

Suspensions of the bacillus in normal saline will not yield subcultures if the emulsion has been kept at 37°. C. for five hours. In distilled water, the bacillus loses its capacity for growth in 2½ hours. Broth is better than agar for subcultures, and agar made with Martin's broth is superior to plain agar.

Prolonged suspension in salt solution leads to inconstant variations in the morphology of the bacillus.

The addition of yeasts or staphylococci to suspensions renders the bacillus capable of maintaining its viability for longer periods, and also its virulence for the rabbit. Subcultivation of contaminated cultures shows, sometimes with great clearness, a numerically compensative alternation of the organisms present.

On one occasion lysogenic power appeared in an emulsion contaminated with yeast after 20 days at ordinary temperature. This lytic principle disappeared after the second passage.

TANAKA (Asazo). **A Comparative Study of Pasteurella Cultures from Different Animals.**—*Jl. Infect. Dis.* 1926. May. Vol. 38. No. 5. pp. 421–428.

The author has studied 26 strains of organisms of the fowl cholera type. These included 6 from rabbits, 8 from cattle, 2 from sheep, 5 from birds, 4 from pigs and 1 from the buffalo.

They were subject to sugar fermentation tests, the results of which are given in a tabular statement. The results, with a few exceptions, were generally as follows:—All the strains fermented dextrose, galactose, laevulose, mannose, mannite, saccharose, sorbit, and xylose. Maltose was fermented by most of them after 3–5 days. The majority of them also fermented salicin and trehalose. None fermented adonite, dextrin, dulcite, insulin, raffinose, rhamnose and erythrit. All produced indol, and all reduced nitrates.

By colorimetric methods it was ascertained that all cultures reached the maximum in 3 to 4 days.

Antisera were produced from rabbits, but by means of serologic tests (agglutination and complement fixation) no groups of organisms could be distinguished.

FRANCKE (G.) & GOERTTLER (V.). Grundsätzliches zur Rauschbrandfrage. [**Basal Ideas regarding Blackquarter.**]—*Berlin. Tierärzt. Woch.* 1926. Sept. 10. Vol. 42. No. 37. pp. 605–611. With 2 plates.

The authors are of the opinion that it is not possible to distinguish the bacilli of blackquarter and malignant oedema by means of the cultural characters alone. Working along the same lines as ZEISSLER they have been able to get a number of cultural forms which are intermediate between the forms described by him. Special attention is drawn to the necessity of having culture plates in exactly the right condition for getting growth. There must be no trace of condensation moisture. It is admitted that the form of the colonies is valuable, but it is held that it alone is not sufficient for the separation of the organisms. All the cultural characters and the pathogenicity of the organisms must be taken into consideration.

CORDIER (G.) Essais d'immunisation contre le charbon symptomatique. [**Immunization against Blackquarter.**]—*Compt. Rend. Soc. Biol.* 1926. Oct. 19. Vol. 95. No. 28. pp. 848–851.

The author prepares a vaccine in the following way: The heart of an animal which has been inoculated with blackquarter intramuscularly is dropped into Martin's broth, which is covered with a layer of paraffin. After incubation at 37° C., formalin is added in the proportion of 4 or 5 per thousand. Incubation is continued for 24 hours and then the product is tubed. No information is given regarding the duration of the first incubation, or the exact manner of treating the liquid before putting it into phials. Of this vaccine 0·5 cc. is sufficient to protect a guineapig against a virulent inoculation after an interval ranging from 10 to 27 days. The dose of virulent material is obtained by mashing up the heart (apparently of an animal experimentally infected) in salt solution, using 1 cc. of the liquid per gramme.

The method was tried on 9 bovines of different weights and ages, which received doses of 1 to 2 cc. of the formolized vaccine. The test inoculation was 0·25 cc. of heart muscle mash. None of the animals became infected, while a control died.

LECLAINCHE & VALLÉE. Sur l'obtention du sérum contre le charbon symptomatique. [**The Preparation of Anti-Blackleg Serum.**]—*Rev. Gen. Méd. Vet.* 1926. Sept. 15. Vol. 35. No. 417. pp. 481–484.

This brief paper conveys the information that the authors are preparing anti-blackleg serum from bovines instead of from horses as hitherto. The hyperimmunization is carried out with formolized whole culture.

BALOZET (L.) Diagnostic expérimental du charbon symptomatique par culture de la moelle osseuse. [**The Diagnosis of Blackquarter by Culture using the Bone Marrow.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 515–518.

The author has been able to obtain cultures of the bacillus from the bone marrow of all experimental and natural cases of the disease in which the method has been employed. It is important (particularly in a hot country) that the bone should be taken as soon after death as possible, and the author recommends the metacarpal or the metatarsal. A large amount of seed material should be used, and the media to be preferred are peptone liver broth or Hibler's medium, with a layer of paraffin on them.

BALOZET (L.). Isolement de *Clostridium chauvoei* par culture de moelle osseuse. [**The Isolation of** *Clostridium chauvoei* **by Culture from Bone Marrow.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 295–296.

Bone marrow can be used for obtaining pure cultures provided the following conditions are fulfilled.

The metatarsus or metacarpus should be selected, and it should be obtained as soon after death as possible. If all the soft tissue is removed immediately, the bone may be kept for some days without the marrow becoming contaminated. A fair amount of marrow must be used as seed material. Liver peptone broth under paraffin (with or without a piece of meat), or Hibler's medium must be used.

MATHEWS (F. P.). **Obscured Reactions in the Agglutination Test for Bacillary White Diarrhea.**—*Jl. Immunol.* 1926. June. Vol. 11. No. 6. pp. 499–504. With 1 text fig.

In carrying out agglutination tests for bacillary white diarrhoea difficulty is sometimes experienced in reading the results owing to the formation of a precipitate, which may settle out, remain in suspension, or collect at the top of the liquid.

The exact cause of this is not yet known, but it appears to be associated with the drawing of the samples of blood from birds that are being richly fed. A period of starvation tends to reduce the liability to the formation of the precipitate. The author finds that a fast of 48 hours is required before appreciable results are obtained. This is impracticable. It was found that the addition of 2 cc. of 2 per cent. sodium hydrate to 100 cc. of antigen prevented precipitation in 95 per cent. of cases, and thus rendered reading of the results possible.

RAMON (G.) & DESCOMBEY (P.). Sur l'appréciation de la valeur antigène de la toxine et de l'anatoxine tétaniques par la méthode de floculation. [**The Estimation of the Antigenic Powers of Tetanus Toxin and Anatoxin by Flocculation.**]—*Compt. Rend. Soc. Biol.* 1926. July 16. Vol. 95. No. 25. pp. 434–436.

Since anatoxin is non-toxic its antigenic power cannot be evaluated in terms of toxicity, but its antigenic power requires some means of standardization. This can be achieved by the flocculation technique.

MacConkey (A. T.). **On Tetanus in the Horse subsequent to Prophylactic Immunization; with Observations on Re-vaccination.**—*Brit. Jl. Exp. Path.* 1926. June. Vol. 7. No. 3. pp. 133–140.

The horse is so very susceptible to tetanus that it is difficult to avoid occasional cases in a stud at a serum laboratory. The risk may be minimized by (*a*) the regular injection of doses of tetanus antitoxin or (*b*) active immunization with a series of doses of toxin guarded by a few doses of antitoxin. The occurrence of tetanus in horses treated in the latter way has raised doubts as to its effectiveness. Four horses received 1,500 U.S.A. units of tetanus antitoxin followed by 150,000 M.L.D. of toxin (for guineapig) subcutaneously. The doses of toxin were spread over 9 days and given in increasing amounts.

Two of these were bled out one and two months later. One was used for other sera for 4½ years and shewed no evidence of tetanus. Three years after dosing its blood did not contain 1/100 unit of antitoxin per cubic centimetre.

The fourth animal received a last dose of an immunization on October 7, 1924, and was bled for serum on October 14. Ten cubic centimetres of serum of this bleeding did not produce the slightest evidence of tetanus in a guineapig. On October 21st there was evidence of tetanus. 16,000 units of antitoxin were given intravenously. The animal showed little sign of illness, except that it appeared to be fatigued until the 5th day, when it was found stretched at full length and showed occasional spasms.

A further 5,000 units of antitoxin were given. Two days later the animal was much worse and was shot. It is suggested that had more antitoxin been given the animal would have been saved, but it was thought that when the disease had been checked the animal's own antitoxin producing mechanism would have come sufficiently into play, it having been immunized by toxin at the beginning.

From tests made with the serum of this animal, at times it would appear that the antitoxin content fell very rapidly during the two months before death, when there was less than 1/100 antitoxic unit per cc. It would appear that 1/100 unit is the limit of safety for the animal. Comparing the facts of the case with those reported by Mohler and Eichhorn, who found that 700 U.S.A. units given 96 hours after infection was enough to ward off an attack of tetanus, it would appear 16,000 units were not sufficient to prevent infection, which must have been in existence less than a week since the serum of a bleeding a week before caused no symptoms in a guineapig. This emphasizes the necessity of giving antitoxin early. Another horse was given 1,500 U.S.A. units of tetanus antitoxin intramuscularly and this was followed by 390,000 M.L.D.'s of toxin distributed over 18 days. At the time the penultimate dose of 100,000 M.L.D.'s was given, 2,000 U.S.A. units of antitoxin were given intramuscularly.

About ten months later this horse was given a dose of scorpion venom and ten days later symptoms of tetanus were noticed. 20,000 U.S.A. units of antitoxin were given at once intravenously, and a further 20,000 on the following day. The symptoms appeared to be passing off and the animal was feeding well, when on the fifth day after the second dose he dropped dead from internal haemorrhage. Examination of sera of a number of horses at different periods

after prophylactic immunization showed that they varied in their response to prophylactic treatment as much as they do to the more prolonged immunization necessary for the production of therapeutic sera and that a certain dose of toxin cannot be relied upon to produce a certain antitoxin immunity. An increase in the amount of toxin does not necessarily cause an increase in the amount of antitoxin produced.

A further point is the possibility, as suggested by the work of TENBROECK and BAUER, that an antitoxic immunity may not necessarily protect against infection. Animals that have recovered from severe generalized tetanus show practically no antitoxin in their blood, but are immune to the type of organism which produced the original infection. It might be suggested that the horses were infected with a type of tetanus bacillus other than that against the toxin of which they were immunized. This is contraindicated by the fact that more than 8 strains of bacilli are always used for the preparation of the toxin for immunizing purposes.

It appears to be clear that the limit of antitoxin immunity is about 3½ years, and consequently revaccination should be practiced every 3 or 4 years.

Details are given of the process of re-immunizing two horses and the tests of their serum at intervals during the process.

The first animal's serum contained less than 1/100 antitoxin unit per cc. The process of re-immunization was therefore begun with 1,500 U.S.A. units of antitoxin intramuscularly; it then received on alternate days 15,000, 25,000 and 40,000 M.L.D.'s (for guineapigs) of toxin. By this time the serum contained 1/50 antitoxin unit per cc. Then a further 1,500 antitoxin units were given intramuscularly, and these were followed on alternate days by 40,000, 70,000, and 100,000 M.L.D. of toxin. At this stage the serum contained more than 3 but less than 5 units per cc.

The toxin injections were continued with 100,000, 150,000, and 250,000 M.L.D., after which the antitoxin content of the serum was more than 10 but less than 20 units per cc. The second animal had, at the time of re-vaccination, 10 units per cc.; antitoxin was therefore not injected and doses of 15,000, 25,000 and 40,000 M.L.D. were given with intervals of two days later. On the fourth day after the last dose the antitoxin content was between 30 and 50 units per cc.

ROZNATOVSKY (J. P.). La fièvre ondulante dans le Caucase du Nord. [**Undulant Fever in the Northern Caucasus.**]—*Rapport. Soc. Méd. Rostov et Séance Conjointe Cons. San. et Epidém. et Assoc. Inst. pour recherches scientif.* 1926. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. pp. 723–724.

Undulant fever was first recognised in Northern Caucasus in 1925, when the organism was isolated from the blood and urine of a case.

Forty-five persons in the same village were tested and 19 gave reactions of varying strength.

The sera of 4 goats out of 8, 2 sheep out of 3, and 2 horses out of 3 also gave positive reactions.

TAPIA (M.) & DE NICOLAS (M.). Sur la différentiation du *Micrococcus melitensis* et du *Bacillus abortus* par l'agglutination. [**The Differentiation of** *Micrococcus melitensis* **and** *Bacillus abortus* **by means of Agglutination Tests.**]—*Compt. Rend. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 563–565.

Using a number of sera from different species of animals inoculated with the two organisms, the authors have carried out agglutination tests, but have not been able to discover any differences of importance.

MAGOON (C. A.). **Studies upon Bacterial Spores. 2. Increasing Resistance to Heat through Selection.**—*Jl. Infect. Dis.* 1926. May. Vol. 38. No. 5. pp. 429–439. With 1 chart in text.

Working with the *Bacillus mycoides*, the author has found that some bacterial spores derived from resistant survivors in thermal death time tests possess higher resistance to heat than the original spores. By a process of selection a strain of bacteria may be obtained whose spores attain a resistance of at least 25 times that of the original spores.

CARBONELL (M. V.) & MAYER (E.). Nueva técnica para la preparación de vacunas bacterianas. [**A New Technique for the Preparation of Bacterial Vaccines.**]—*Revist. Inst. Bact. Dept. Nac. Hyg.* Buenos Aires. 1925. May. Vol. 4. No. 1. pp. 35–39. With 1 text fig.

The authors method for killing bacteria is to pass ether vapour at 42° C into the bacterial emulsion kept at the same temperature. It is claimed to be superior to simple shaking with ether and to be more rapid.

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CHRISTIANSEN (M.). *Bacterium abortus* als Ursache der nekrotisierenden Orchitis (orchitis mortificans) beim Stier. [*Bacillus abortus* **as a Cause of Necrotic Orchitis in a Bull.**]—*Maan. f. Dyrl.* 1926. Vol. 37. p. 545. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. p. 726.

MAGNUSSON (H.). Ein Fall von Abortusinfektion beim Stier. [**Abortion Infection in a Bull.**]—*Skand. Veter. Tdsk.* 1925. Dec. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. pp. 726–727.

MESSIERI (A.). Sul rapporti etiologici fra aborto epizootico da bacillo di Bang e febbre di Malta. [**The Etiological Relationship of Bang's Bacillus with the** *Micrococcus Melitensis.*]—*La Nuova Veterinaria.* 1926. Aug. 16. Vol. 4. No. 8. pp. 201–205.

OHLSSON (L.). Veränderung des Hodens beim Stier, verursacht durch Infektion mit Bang's Abortusbazillen. [**Lesions in the Testicle of a Bull caused by the Abortion Bacillus.**]—*Skand. Vetér. Tdsk.* 1926. Feb. p. 25. Ex. *Bull. Inst. Pasteur.* 1926. Aug. 31. Vol. 24. No. 16. p. 727.

RUPPERT (F.) & ROTTGARDT (A.). Rauschbrand und kein Pararauschbrand. [**Black Quarter and no Para-Black Quarter.**]—*Deut. Tierärzt. Woch.* 1926. Aug. 21. Vol. 34. No. 34. pp. 603–606.

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## DISEASES DUE TO FILTERABLE VIRUSES.

BELIN (M.). Base scientifique d'une méthode de vaccination antiaphteuse. [**Vaccination against Foot and Mouth Disease.**]—*Rec. Méd. Vét.* 1926. July 30. Vol. 102. No. 14. pp. 307–311.

The desiderata of an efficient vaccine against foot and mouth disease, are (1) that it can be obtained in large amounts, (2) that it is living but attenuated, it being possible to ascertain the degree of the latter, (3) it should retain its vitality and virulence for a sufficient length of time, (4) it must be easily applied in practice. So far no vaccine devised has satisfied these conditions.

During the last three years the author has been working upon the simultaneous cultivation of two dermotropic viruses—the foot and mouth disease virus and the vaccine virus. By this means he claims to have produced a vaccine which satisfies all the above conditions.

The simultaneous inoculation of an animal with vaccine virus and the virus of foot and mouth disease at two different parts of the body leads to the production of a large amount of "lymph" which is very rich in both of them. The foot and mouth disease virus appears to multiply readily in the lesions produced by the vaccine virus. The animals providing such lymph were killed by bleeding out before the lymph was collected so that there could be no question of the foot and mouth disease virus being present in it as a result of admixture of virulent blood.

It has been found that this simultaneous inoculation when carried on in series leads to a diminution of virulence of the virus of foot and mouth disease, as shown by inoculation with controls.

If the lymph is collected at the moment when the temperature is at its maximum, however, the virus is not found to be attenuated, but may even be of exalted virulence. To obtain the attenuated virus it must be collected between the 4th and 6th days, that is to say when the temperature has dropped.

Experiments indicate that the virus in the lymph will retain its vitality and its degree of virulence practically unimpaired for months. In a future publication the author promises to show that the vaccine foot and mouth disease lymph can readily be used for immunization by applying it to scarifications of the skin.

BLANC (G.), MELANIDI (C.) & STYLIANOPOULO (M.). Contribution à l'étude expérimentale des varioles animales. L'encéphalite claveleuse du mouton. [**Sheep Pox Encephalitis.**]—*Compt. Rend. Soc. Biol.* 1926. Apr. 23. Vol. 94. No. 13. pp. 959–960.

It has been shown by a number of investigators that intracranial inoculation of the rabbit with "vaccine" causes a distinct vaccinal encephalitis, and that inoculation in any part of the body also sets up a more or less benign encephalitis. The vaccinal virus can be recovered from the brain.

It appeared to be of interest to ascertain whether ordinary subcutaneous inoculation with sheep-pox produced an analogous condition. It is known that the virus of sheep-pox inoculated intracranially will cause severe and even fatal encephalitis. Two sheep giving reaction to

sheep-pox inoculation were killed and emulsions of brain substance inoculated subcutaneously into fresh animals. Typical reactions occurred.

BLANC (Georges), MELANIDI (C.) & STYLIANOPOULO (M.). Contribution à l'étude expérimentale des varioles animales. La réceptivité du cheval au virus claveleux. [**The Susceptibility of the Horse to Sheep-pox.**]—*Compt. Rend. Soc. Biol.* 1926. June 25. Vol. 95. No. 22. pp. 156–157.

This brief note contains a summary of the authors' experiments designed to test the transmissibility of sheep-pox to horses.

They have inoculated the animals subcutaneously, intracutaneously, and into the mucous membranes of the nose and mouth. Only by the second of these methods has any success been achieved. In these cases, an oedematous area measuring 20 by 5 or 6 centimetres developed. Some of the tissue from such a swelling was used for the inoculation of a lamb and infection occurred. Subsequently the lamb was found to be immune. No evidence of bacterial contamination could be found in the material from the horse or the lamb. The infection therefore was specific and pure.

BLANC (G.), MELANIDI (C.) & STYLIANOPOULO (M.). Contribution à l'étude des varioles animales. Variole des chèvres et stomatite pustuleuse. [**Variola of Goats and Pustular Stomatitis.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 259–260.

In this brief paper the authors summarize the results of observations and experiments which lead them to conclude that caprine variola and pustular stomatitis are two separate and distinct conditions.

The virus of goat variola is not transmissible to the rabbit, dog, fowl, or man. It causes a slight infection in the sheep. It does not immunize against variola, nor does the reverse action take place. The authors have succeeded in infecting a goat three times with variola.

BRIDRÉ (J.) DONATIEN (A.) & LESTOQUARD (F.). De la Virulence de certains tissus chez les Moutons producteurs de virus claveleux. [**The Virulence of certain Tissues of Sheep-pox Virus Producers.**]—*Compt. Rend. Soc. Biol.* 1926. July 23. Vol. 95. No. 26. pp. 533–534.

According to BLANC, MELANIDI, and STYLIANIPOULO, the brain of sheep inoculated subcutaneously with sheep-pox contains the virus. The authors of this paper quote experiments to show that in all probability this virulence was in reality due to the blood contained in the nerve tissue used for the inoculation.

BRIDRÉ (J.) DONATIEN (A.) & LESTOQUARD (F.). Observations sur le virus claveleux. [**Observations on the Virus of Sheep-pox.**]—*Rec. Méd. Vét.* 1926. July 30. Vol. 102. No. 14. pp. 323–326.

It is quite well known that the virus varies in virulence under natural conditions. In countries where it is enzootic outbreaks may be so

benign in character that they may escape notice, while outbreaks occurring in countries where it does not commonly occur may be responsible for serious losses. Experimentally the authors have found that for some unexplained reason the virus may suddenly lose virulence. This occurred in one instance after 600 passages without any apparent change during their course. It is not to be concluded that such attenuation is permanent, but it is not known under what conditions it may regain its former virulence.

The authors criticise experiments published by BLANC, MELANIDI, and STYLIANOPOULO, from which the conclusion was drawn, that even when there is only a very slight local reaction to inoculation with virus, the central nervous system can be proved to contain the virus. They show that it is the blood contained in this system which is infective and not the nerve tissue itself.

SAITO (T.). Vergleichende Untersuchungen ueber Hühner- und Taubenpocken. [**Comparative Investigations of Fowl and Pigeon Pox.**]—*Zeitsch. f. Immunitätsf. u. Experim. Therap.* 1926. Oct. 15. Vol. 48. No. 5/6. pp. 451–466. With 5 text figs.

Direct passage of fowl-pox virus to pigeons leads to infection in a proportion of cases only, and the disease is very mild. Such virus when passed through pigeons in series becomes more virulent for the pigeon. There is simultaneous loss of virulence for the fowl.

Pigeon-pox virus readily infects fowls, but does not produce such marked lesions as in the pigeon. With passage the virus becomes to some extent less virulent for the fowl, while the virulence for the pigeon remains constant.

Either type of virus produces immunity in both species of birds.

CURASSON (G.) & DELPY (L.). Sur l'immunization contre la peste bovine par le virus formolé. [**Immunization against Cattle Plague by means of Formolized Virus.**]—*Rec. Méd. Vét.* 1926. July 30. Vol. 102. No. 14. pp. 297–300.

In the course of their investigations connected with immunization against cattle plague, the authors found that virus killed with carbolic acid, chinosol, and cyanide of mercury yielded no results. The work done in connexion with foot and mouth disease prompted them to try a similar technique for rinderpest. The spleen of a virus producer killed at the height of the thermal reaction when mouth vesicles are beginning to form is minced finely and has added to it normal salt solution containing 0·2 per cent. commercial formalin in the proportion of 5 cc. per gram of spleen pulp. The mixture is kept in the dark at 35–38° C and used after the lapse of at least 40 hours.

In the first test a calf was given " a 100 grammes of spleen " subcutaneously, the dose being divided into three parts and injected at separate places. Abscesses developed at all of these and a slightly foetid pus was evacuated. Eighteen days later this calf and a control were given 5 cc. of virulent blood. The vaccinated calf showed no reaction, while the control developed typical rinderpest.

In the second experiment 50 grammes of spleen were injected. There was neither local nor general reaction. Eleven days later 5 cc. of virus produced no reaction, while the control developed the disease. In subsequent tests the dose of spleen was reduced. A dose of 12 grammes of spleen appeared to afford perfect protection. A calf receiving 5 grammes showed a slight rise of temperature only when tested, and calves receiving 1 and 2 cc. of spleen both developed cattle plague like the control. It is noted, however, that the spleen was 15 days old when these last two animals were injected.

ALIVISATOS (G. P.). Neue Erfahrungen bei der Schutzimpfung gegen Lyssa durch das ätherisierte "Virus fixe." [**Immunization against Rabies by means of Etherized Fixed Virus.**]—*Cent. f. Bakt.* I. Abt. Orig. 1926. May. Vol. 98. No. 5/6. pp. 394–407.

In 1919 and 1920, 424 patients were treated by a modified Högyes method of inoculation, with 8 deaths either during or after treatment. As a result of the careful study of the effects of treatment, the conclusion was arrived at that conditions with regard to rabies in Serbia differ from those in other countries. Rabies is a severe epidemic among dogs, a fact which is no doubt connected with the occurrence of the disease in wolves in the mountainous areas. There is a huge population of stray dogs, and the police regulations are not enforced.

Rabies also occurs in other species of domesticated animals, and a table shows the number of cases encountered in these for the years 1921–1924.

That the street virus is particularly virulent is indicated by the fact that the period of incubation in rabbits inoculated intramuscularly in 60 per cent. of cases ranges from 8 to 15 days. Tabular statements are also given showing that there is good ground for belief that the street virus is particularly virulent for man.

These facts indicate the desirability of devising some means of establishing a high degree of immunity more rapidly than can be done by the Högyes method. The method of preparing the vaccine is as follows: Rabbits which have been infected with fixed virus are killed when death appears likely to take place within a few hours. The entire brain and medulla are removed, freed from meninges and placed in ether. The vessel containing the brain is then left in the ice chest for 72 hours. The cerebral hemispheres are then removed by cutting the crura cerebri above the corpora bigemina. The mid-brain is not used, but the cerebellum has the grey layer shaved off it. The cerebral hemispheres are then separated and the grey matter carefully cut away from the white. The two lots of grey matter are mixed, ground up very finely, and suspended in normal salt solution in the proportion of 1 in 75.

This emulsion is used in cases of persons severely bitten in doses of 150 to 170, or even 200 cc. for subcutaneous inoculation on the abdomen. Where bites do not appear to be dangerous, 30 cc. are given. Where patients have received 100 to 120 cc. at the first injection, the balance up to a total of 170 cc. is given within a week. The observations made appear to indicate that a minimal amount of 60 cc. is necessary to ensure immunity.

VELU (H.), BIGOT (A.) & EYRAUD (R.). Essai de vaccination préventive contre la rage par intervention unique. [**The Single Vaccine Method of immunizing against Rabies.**]—*Compt. Rend. Soc. Biol.* 1926. Apr. 23. Vol. 94. No. 13. pp. 967–968.

Two series of experiments were carried out. 26 dogs were vaccinated with a recently prepared (14 days) vaccine; all received three doses of 2 cc. each. These were divided into four lots (A to D) to be tested respectively at 1, 3, 6, and 12 months interval. The second batch of ten dogs was vaccinated with vaccine from 2–3 months old. These were divided into 2 lots (E & F) and tested at 1 month and 5½ months.

Test inoculations consisted of intraocular inoculation with 0·1 cc. of a 1 to 10 emulsion of virus of different origin. Some were street virus.

There were 3 dogs and one rabbit as control to each lot, and all of these, with one exception, died of rabies. Of lot A four out of 6 were resistant. Five out of 6 died in lot B. Lot C resisted an inoculation, which killed only one control dog out of three. When tested at 10 months with a more active virus, there was only one survivor. In view of the negative results, lot D was not tested. Lot E, one survivor out of 5, lot F, two out of 5.

The results indicate that recently prepared vaccine (Japanese technique) confers a certain amount of immunity, but this lasts for a short time only.

The suggestion is put forward that advantage may possibly be taken of the brief period of immunity to strengthen it by a less attenuated virus.

NAKAMURA (N.) FUTAMURA (H.) & WATAMIKI (T.). **Contributions to Biological Studies on the Virus of Contagious Pleuro-pneumonia of Cattle.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Sept. Vol. 5. No. 3. pp. 194–208. With 1 plate.

The authors have used five strains of virus obtained from different sources in their experiments, of which four were of Japanese original and the other German.

In culture experiments upon solid media, they found that the virus grows more readily under aerobic conditions than under anaerobic conditions, but that in shake cultures the result obtained resembles cultures of Bang's bacillus, the growth developing a little below the surface of the medium. They further found that it was distinctly advantageous to close their culture tubes with rubber stoppers instead of with cotton wool plugs.

Tests made, both with agar and broth containing variable amounts of horse serum and corrected to pH 7·5, shewed that the best growths were obtained when the amount of serum added fell between 10 and 30 per cent.

Broth was prepared from beef, pork, horse flesh and rabbit, but cultural experiments failed to reveal any marked superiority of any one of these. Solid media appeared to require rather less serum (10–15 per cent.) to obtain a maximum growth than liquid media (20–30 per cent.). It is preferable to use fresh serum or serum that has not been heated at a temperature higher than 70° C. A reaction of pH 7·0 to 7·6 was found to be the most favourable. Above and below this little or no growth took place.

The optimum temperature lies between 36° and 38° C. No growth takes place below 27° C.

Fermentation tests were carried out with glucose, mannose, galactose, laevulose, lactose, maltose, saccharose, dextrin, mannite, xylose, arabinose, asparagin, insulin, salicin, isodulcite, and starch. Marked fermentation occurred in glucose, mannose, maltose, dextrin, and starch. There was no formation of indol or sulphuretted hydrogen, and no haemolysis of red corpuscles.

Pleural exudates kept in an ice chest at " 3°–15° C." retained their virulence for six months.

Cultures kept at 37°–38° C. lost their virulence in from 1 to 2 months. At 5°–32° C. virulence was maintained for 2–4 months, and at 3°–15° C. for a little longer. There was, however, a good deal of variation in different cultures, and it was found necessary to transplant cultures once a month in the laboratory.

Cultures heated in water baths were killed in 2 minutes at 60° C., 5 minutes at 55° C., 1 hour at 50° C. and 4 hours at 45° C.

Pieces of porous earthenware soaked in culture were dried and then exposed for different periods to varying temperatures (dry heat). 70° C. proved fatal in 5 minutes, 65° C. in half an hour, 55° C. in 1 hour, 50° C. in 2 hours and 45° C. in 3 hours. 1 in 5,000 perchloride of mercury, 0·1 per cent. " chlorate of lime," 1 per cent. " cresin," lysol, and creolin, exercise a destructive effect upon the virus very rapidly. 0·5 per cent. carbolic acid destroys the virus in 3 hours, and 4 per cent. formalin (Japanese pharmacopeia formalin) in 20 minutes.

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DA SILVA (E. P.). Apparition précoce de substances rabicides dans le sang des individus traités par le virus rabique fixe éthérisé. [**The Rapid Appearance of Rabicidal Substances in the Blood of Individuals treated by Etherized Fixed Virus.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 323–325.

—. Persistance de substances rabicides dans le sang des individus traités par le virus rabique fixe éthérisé. [**The Persistence of Rabicidal Substances in the Blood of Persons treated with Etherized Fixed Virus.**]—*Compt. Rend. Soc. Biol.* 1926. July 2. Vol. 95. No. 23. pp. 326–327.

WESTRING. Versuche und chemische Studie über Behandlung von Maul- und Klauenseuche mit Metallsalzen. [**The Treatment of Foot and Mouth Disease with Metallic Salts.**]—*Berlin. Tierärzt. Woch.* 1926. Nov. 19. Vol. 42. No. 47. pp. 801–802.

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## MYCOTIC DISEASES.

NAINSOUTA (R.). Action specifique du Biiodure de mercure contre la lymphangite épizootique. [**The Specific Action of Biniodide of Mercury in Epizootic Lymphangitis.**]—*Rec. Méd. Vét.* 1926. Sept. 15. Vol. 102. No. 16. pp. 534–536.

The author has used biniodide of mercury by intravenous injection and claims good results. Two cases were cured in 5 weeks by doses of 2·5 centigrammes in 50 cc. of water, and a very severe case was cured in less than a month by 5 centigrammes daily. [It is not stated for how long these daily injections were given.]

Later he found that 10 centigrammes could be given in 50 cc. of water without ill effect, and two severe cases were cured by 10 injections of this given at two days intervals. [It is not stated how the solution of the biniodide was effected.]

NAINSOUTA (R.). Action spécifique du Biiodure de mercure contre la lymphangite épizootique. [**The Specific Action of Biniodide of Mercury in Epizootic Lymphangitis.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 762–764.

The author advocates intravenous injections of solutions of biniodide of mercury at a strength not exceeding 2 per thousand. It is stated that the drug was dissolved in water; but that would appear to be an error.

Two cases were treated with 2·5 centigrammes dissolved in 50 cc., and this was given "for a week." Complete recovery occurred in 5 weeks.

A dose of 5 cg. per day yielded a complete cure of a severe case in a month. It is not stated how frequently the dose was repeated.

One horse weighing 350 kg. was given 15 daily injections of 10 cg. of biniodide of mercury in 50 cc. of water. No disturbance was observed.

A case occurring in one batch of horses arriving from the Sudan led the author to try the drug as a prophylactic. Each animal was given 5 cg. once a week for three weeks. No further cases developed.

SCHABUROFF (A. N.). Autohämotherapie bei Lymphangitis epizootica [**Autohaemotherapy in Epizootic Lymphangitis.**]—*Berlin. Tierärzt. Woch.* 1926. Oct. 29. Vol. 42, No. 44. p. 739.

Washed red blood corpuscles from diseased animals were injected subcutaneously in doses of 12 to 20 cc. divided between three or four places on the neck, the injections being repeated after 4 to 7 days. Details are given of an animal which had been affected for some time and shewed about 60 abscesses. Autohaemotherapy was applied and the case cleared up in 5 weeks, injections having been given every 5 or 6 days. Six months later there was no evidence of relapse.

In another case, where diagnosis was established by microscopic examination, and glanders excluded by a mallein test, autohaemotherapy was applied at once and recovery took place in 2 weeks.

A month later the animal was still apparently quite healthy.

Two further cases with a similar history are briefly related.

MARTINEZ HERRERA (Clemente). Organización del Servicio Veterinario Regimental, Estadística de los años 1924 y 1925 y Notas sobre la Linfangitis epizóotica y la profilaxis antimuermosa. [**Notes on Epizootic Lymphangitis and the Prevention of Glanders.**]—*Rev. Hig. y San. Pecuarias.* 1926. May–June. Vol. 16. No. 5–6. pp. 285–327. With 25 figs. (2 coloured plates).

This contribution contains an excellent and clearly expressed account of epizootic lymphangitis, its cause, pathology, symptoms and treatment, curative and prophylactic. The symptomatology of the disease is too well known to all veterinarians to need repetition here. The organism, a lemon-shaped body, 3–5 $\mu$ in length, 2–4 $\mu$ broad, is characteristic. It grows readily on 5 per cent. glucose-Sabouraud at 35°–38° C. The first culture takes 10–12 days, but this is later reduced to 6–8 days, and it will remain alive for three months without subculturing. In young cultures there are at first yeast-like forms,

then long, filamentous, segmented and branching forms with thin walls and finely granular contents with refractile droplets, and, later, chlamydospores develop.

Infection takes place by direct contact, or may be indirectly transferred by brush or curry-comb. Flies gather on an infected wound, but conveyance by insects has not been definitely proved.

Inoculation can be successfully performed in the dog, rabbit, guineapig, fowl and horse. In the last, oedema is at first produced, followed in 15–16 days by small nodules which increase in size, break down, and open on the surface to exude creamy pus, swarming with the Cryptococci. Lymphatics leading from the site become infected and similar nodules appear along the tract. In nature, the disease starts by infection of some wound, and fistulae may form leading to the deeper tissues, bones and ligaments. The period of incubation is probably 7–10 weeks. Diagnosis from sporotrichosis, pustular dermatitis, and such-like conditions is made by microscopic examination of the discharge. The differences between it and glanders are fairly well marked. In glanders the pus is of an oily character, the margins of the ulcers are indurated, though the swellings are soft; the disease is not confined to one lymph-tract, and there is systemic disturbance with fever. In epizootic lymphangitis the pus is creamy, or thin and serous, sometimes yellowish, but never oily; the wound fungates to form an abscess which cicatrizes slowly, the swellings become purulent successively, in most cases only one set of lymphatics is involved, and the mallein reaction is always negative. The disease can be transmitted to man.

As regards treatment, the author has tried intravenous injections of atoxyl, electrargol, biniodide of mercury, colloidal arsenic, salvarsan and its allies, potassium iodide and other drugs recommended, but without benefit. He relies on local measures, extirpation and cautery, opening small abscesses by the thermocautery and washing the wound daily with a concentrated solution of potassium permanganate. Prophylaxis consists in isolation of the infected, frequent inspection of the healthy, and keeping all wounds clean and covered, if possible.

In glanders, prevention of spread can only be ensured by early diagnosis, by the use of mallein, and killing off all the sick; palliative measures are unsafe.*

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## MISCELLANEOUS.

Sulpey (E. W.). Méthode de Coloration rapide pour recherches hématologique. [**A Rapid Method of Staining Blood Films.**]—*Bull. Soc. Path. Exot.* 1926. Oct. Vol. 19. No. 8. pp. 723–724.

The staining solution used is:—

| | |
|---|---|
| 1 per cent. watery solution of Toluidine Blue ..... ..... | 10 cc. |
| Neutral distilled water ..... ..... ..... ..... ..... | 40 cc. |
| 95 per cent. alcohol ..... ..... ..... ..... ..... | 10–15 cc. |

The stain is applied to dry but unfixed films. One or two drops are placed on the film and drained off, and this is repeated a second time.

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* Summarized by Dr. H. Harold Scott.

The film is then carefully blotted with filter paper and examined with the oil immersion. By this means the haemoglobin is removed, but the corpuscles are not otherwise altered. The blood corpuscles and any parasites that may be present are well stained.

YAKIMOFF (W. L.) & RASTEGAÏEFF (E. F.). Sur la question des leucocytes des chameaux. [**The Leucocytes of Camels.**]—*Bull. Soc. Path. Exot.* 1926. July. Vol. 19. No. 7. pp. 582–583.

The authors, as the result of the examination of blood smears from 39 camels, found that the leucocyte formula was liable to variation, and that the smears could be divided into three classes on this basis. Thirty of the smears fell into one group. These were obtained from animals of all ages :

| | |
|---|---|
| Lymphocytes | 21–35 per cent. |
| Large mononuclears | 0–2 per cent. |
| Transition forms | 0–4·3 per cent. |
| Polynuclears | 61·3–78 per cent. |
| Eosinophiles | 0 |
| Mast cells | 0 |

In the second group, which contained the blood smears of 6 animals the following formula was found.

| | |
|---|---|
| Lymphocytes | 10·6–19·6 per cent. |
| Large mononuclears | 0–1·3 per cent. |
| Transition forms | 0–2·3 per cent. |
| Polynuclears | 78·6–89·3 per cent. |
| Eosinophiles | 0 |
| Mast cells | 0 |

The third group of three gave the following formula :—

| | |
|---|---|
| Lymphocytes | 38·3–57·3 per cent. |
| Large mononuclears | 0–·66 per cent. |
| Transition forms | 0–1 per cent. |
| Polynuclears | 41·6–61·3 per cent. |
| Eosinophiles | 0 |
| Mast cells | 0 |

No explanation of the variation is offered.

DONATIEN (A.) & LESTOQUARD (F.). Etiologie des anémies du Mouton et de la Chèvre. [**The Etiology of the Anaemias of the Sheep and the Goat.**]—*Rev. Vet.* 1926. Oct. Vol. 78. No. 10. pp. 597–609.

The authors summarize our knowledge regarding anaemia in sheep and goats caused by animal parasites, protozoa invading the blood, bacteria, and the virus of pernicious ovine anaemia.

BULL (L. B.) & MACINDOE (R. H. F.). **Photosensitisation in Sheep : Trefoil Dermatitis.**—*Jl. Austral. Vet. Assoc.* 1926. Sept. Vol. 2. No. 3. pp. 85–91.

The authors relate circumstances which appear to suggest that the ingestion of *Medicago denticulata* may produce photosensitization of the skin of sheep. There appeared to be a period of latency in the development of the dermatitis.

FOLEY (H.) & MUSSO (L.). Les plantes du Sahara toxiques pour les animaux. Présence d'un glucoside cyanhydrique dans le *Lotus jolyi* Battandier. [**The Toxic Plants of the Sahara. The Presence of a Glucoside in *Lotus jolyi* Battandier.**]—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 394–400.

MUSSO (L.). Sur l'emploi des papiers réactifs pour déceler sur place la présence de l'acide cyanhydrique dans les végétaux. [**Test Papers for the Detection of Hydrocyanic Acid in Plants.**]—*Arch. Inst. Pasteur d'Algérie.* 1925. Dec. Vol. 3. No. 4. pp. 401–404.

## REVIEWS AND NOTICES.

CAMERON (Thomas W. M.) [M.A., B.Sc. Ph.D., M.R.C.V.S., London School of Hygiene & Trop. Med.] **Diseases of Animals in relation to Man.**—222 pp. With 13 figs. The Modern Health Books. Edited by Prof. D. Fraser Harris, M.D. 1926. London: Faber & Gwyer, Ltd. (The Scientific Press). [3s 6d.]

A review of this book appeared in the *Bulletin of Hygiene*, 1926, Dec., Vol. 1, p. 1011. It should be stated however that the Editor of the *Tropical Veterinary Bulletin* dissociates himself from the view there expressed.

A. G. B.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 15.] June 1, 1927. [No. 2.

## DISEASES DUE TO PROTOZOAN PARASITES.

ROBINSON (E. M.). **Serological Investigations into Some Diseases of Domesticated Animals in South Africa caused by Trypanosomes.**— *Union of South Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 9–25.

In this paper the author describes his experiments in connexion with the diagnosis of dourine and nagana by means of the complement fixation test, and gives brief accounts of the application of the Sachs-Georgi test and the Meinicke lipoid fixation reaction.

For the preparation of antigen for the complement fixation test WATSON'S technique is followed, the blood of white rats being used. The trypanosomes obtained were stored with two volumes of WATSON'S glycerin formalin preservative at 35° F. It is stated that if the antigen is kept at this temperature formalin is unnecessary.

All sera were inactivated at 62° F. because it was found that non-specific reactions were obtained if a lower temperature were employed. It was also found that non-specific reactions were obtained with some donkey sera even when heated to 62° C.

In the experiments connected with the diagnosis of nagana the antigen used was the same as for the dourine tests. Shortage of white rats prevented the preparation of antigen from *T. brucei* or *T. congolense.* The animals tested were all experimentally infected with pure strains of *T. brucei* or *T. congolense.*

Although it was found possible to transmit the strain of *T. congolense* to guineapigs these furnished no satisfactory antigen. The few tests that were carried out were done with antigen made from infected white rats. Even these, however, produced only a small amount. Sera from animals infected with *T. congolense* gave no reaction with *T. equiperdum* antigen, but those infected with *T. brucei* gave as strong reactions with the *equiperdum* antigen as animals infected with dourine.

A small amount of evidence was obtained that the sera of *congolense*-infected animals will react with *congolense* antigen whereas the sera of animals infected with *T. equiperdum* react slightly or not at all.

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The sera of cattle infected with *T. vivax* gave no reactions with *T. equiperdum* antigen.

With the Sachs-Georgi test a number of variable results was obtained with the sera of about a score of animals which were tested at intervals of a week to a fortnight.

A tabular statement gives the results obtained with the Meinicke lipoid reaction. The test would appear to be less specific than the complement fixation test.

BEVAN (Ll. E. W.). **The Influence of Dipping in Solutions of Arsenic upon the Course of Trypanosomiasis.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 284–292.

In view of the results achieved in the control of tick borne diseases by short interval dipping, it has frequently been suggested that dipping might play a part in the control of trypanosomiasis in one or more of the following ways: (1) By poisoning the fly taking blood from a skin in which arsenic had been deposited; (2) by destroying trypanosomes in flies imbibing such blood; (3) by rendering the fly infertile; (4) by protecting the animal into which infective material was injected by the fly in the act of biting.

To begin with experiments were carried out upon guineapigs. Great care has to be taken that none of the dip is swallowed, and bedding had to be withheld until the animals were dry. In dull damp weather, when drying occurred slowly, there was a risk of scalding, and, in fact, this caused the death of a few animals. Two strains of trypanosomes were used. One of these was from a native, and the other from a donkey. The strains were morphologically identical. The dip used contained 0·16 per cent. of arsenious oxide. For three day dipping it was used in the proportion of 1 gallon to 300 and for weekly dipping 1 to 156.

Dipping guineapigs in the weaker solution failed to drive trypanosomes from the blood. But dipping in the stronger solution at intervals of three or four days did clear the peripheral circulation for short periods after 3 to 6 dippings. Similarly the weaker solution did not protect animals against syringe infection. Dipping the animals in the stronger solution at 3 and 4 day intervals did cause delay in development of the disease, the delay persisting while dipping was continued. When this was suspended, the infection developed. In one experiment, dipping on three consecutive days in the strong solution did cause the permanent disappearance of the parasite.

The facts suggest that it is the accumulation of arsenic that is responsible for the results, but the result is an arrest of the development of the parasite rather than its destruction.

Immersion of infected guineapigs in cold water hastened the development of the disease.

The fact that thin skinned animals like guineapigs could be dipped on consecutive days with a dip at a strength designed for weekly dipping is striking. They were, however, able to tolerate this only provided drying was rapid. It is suggested that tests should be carried out to see whether shorter interval dipping might be tolerated by cattle.

A few experiments with cattle yielded inconclusive results owing to the scarcity of parasites in the peripheral blood.

VAN SACEGHEM (R.). *Trypanosoma congolense* dans l'Est Africain. [*Trypanosoma congolense* **in East Africa.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 569–571.

In this brief note the author reports the results of a few inoculations of dogs with *T. congolense.* He finds that the period of incubation is shorter, and death takes place more rapidly when dogs are inoculated with blood from infected dogs than when the infective blood is taken from cattle.

VAN SACEGHEM (R.). La formol-gélification et le diagnostic des trypanosomiases chez les bovidés. [**Formol-Gelification and the Diagnosis of Bovine Trypanosomiasis.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 571–573.

The author's test have been carried out by adding 2 drops of commercial formalin to 1 cc. of serum. It is not stated at what temperature the tubes were kept.

The serum of 15 bovines infected with *T. congolense* or *T. vivax* were tested and the period required for gelification ranged from 5 minutes to 24 hours. Seven healthy controls gave periods ranging from 25 minutes to 7 days.

The conclusion is drawn that the test is of no value.

Citrated plasma also gave results of no value.

NIESCHULZ (O.). Zoölogische Bijdragen tot het Surraprobleem. V. Overbrengingsproeven met *Haematopota cingulata* Wied. [**Contribution to the Surra Problem. V. Transmission Experiments with** *Haematopota cingulata.*]—*Veeartsenijkundige Mededeeling.* 1926. No. 57. *Departement van Landbouw, Nijverheid en Handel.* 10 pp. With 1 text fig. Archipel Drukkerij-Buitenzorg.

Of 677 Haematopota caught in the neighbourhood of the breeding station at Pengarasan in January 1926, 315 were *H. cingulata.* This species does not occur in the neighbourhood of Buitenzorg. The flies used in the experiments had therefore to be taken a day's journey before they could be used for experiment. Of 820 caught, 319 arrived alive and 73 were used for experiments.

In an experiment in which these flies were transferred direct from an infected to healthy horse, infection resulted. In a similar experiment in which 22 flies were used the result was negative. Fifteen flies were used in an experiment in which after sucking blood from an infected animal for two minutes they were transferred after the lapse of half an hour to a healthy animal. The result was positive. In a second experiment of the same kind 29 flies were used and half an hour elapsed between feeds; the result was negative. In one experiment in which 4 flies were used an interval of one day elapsed between feeds. The result was negative.

KIMURA (T.), FUKUSHIMA (T.) & FUJII (T.). **Pathological Anatomy of Experimental Trypanosomiasis of the Horse.**—*Sei-I-Kwai Med. Jl.* 1926. Aug. Vol. 45. No. 4. pp. 1–5.

The trypanosome used was obtained by subinoculation from the blood of a buffalo in Formosa, and it was thought to be *T. evansi.*

Eight Korean ponies were used and death occurred in from 38 to 117 days.

Microscopic examination revealed the following lesions. Round-celled infiltrations in the heart muscle. In some cases there was a similar lesion in the skeletal muscles associated with atrophy and waxy degeneration. The brain and meninges showed perivascular infiltrations.

Haemosiderin deposits were found in the spleen, liver, bone marrow and lymphatic glands. There was also small haemosiderin granules in the glomeruli, alveolar walls, mucous membrane of the intestines, and thyroid epithelium.

BRUNI (N.). Observations et recherches sur *Trypanosoma lewisi* et *Schizotrypanum cruzi*. [**Trypanosoma lewisi** *and* **Schizotrypanum cruzi.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 791–794.

Of 103 rats examined at the Military Hospital at Bologna, 56 were found to be infected with *T. lewisi*. As a result of examinations carried out at different seasons of the year the author has not been able to establish any special seasonal incidence. He has however found that while in one building a high proportion of the rats may be infected, in a neighbouring one the percentage infected may be low. In one instance a heavily infected pregnant female was caught. The trypanosome was not found in the young rats at birth. The infection has not been transmitted to white rats placed in cages along with wild rats which had both lice and fleas on them. Nor has it been found possible to infect rats by feeding them upon infected blood and organs. Intraperitoneal inoculation of white rats has always caused severe infection, and of 20 inoculated only two survived and recovered.

Examinations of the alimentary contents of fleas and lice caught on infected rats has in no instance revealed the presence of any flagellate forms of any kind.

In carcases preserved in cold store, the trypanosomes retain their vitality for a considerable time, and in moist preparations under cover glasses trypanosomes have remained alive until the fourth day.

Two pregnant guineapigs infected with *S. cruzi* aborted on the 16th day, and though the blood was rich in the parasite, none could be found in the foetuses.

Twelve white mice which were inoculated died in 2–3 days. The feeding of mice with infected organs has failed to transmit the infection.

The author has failed to infect frogs (*R. esculenta* and *viridis*), and toads (*B. vulgaris*).

i. VAN SACEGHEM (R.). Contribution à l'étude du " 309 " Fourneau dans les trypanosomiases animales. [**"309" Fourneau and Mammalian Trypanosomiasis.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 574–578.

ii. ———. Le bismuthoidol dans le traitement trypanosomiases animales. [**Bismuthoidal in the Treatment of Animal Trypanosomiasis.**]—*Ibid.* pp. 578–582.

i. The author has used the drug in 25 per cent. solution in distilled water by intravenous injection to cattle.

With a dose of 2·3 g. per 100 kilos. body weight the circulation was cleared for periods not exceeding seven days. Similar results were obtained with *T. vivax cazalboui*. A dose of 4 grammes was toxic.

ii. The strength of the colloidal solution used is not stated, but doses ranging from 10 to 40 cc. were given intravenously to animals ranging from 200 to 350 kilos. in weight. In no case did trypanosomes (*T. vivax cazalboui*) disappear from the circulation for more than a few days.

Parallel results were obtained in two experiments carried out on animals infected with *T. congolense*.

One bovine weighing 225 kilos was given 20 cc. of the solution when trypanosomes were present in the circulation and these disappeared two days later and are said not to have reappeared.

LEDENTU (G.). Sur le pouvoir protecteur du sérum sanguin vis-à-vis du *T. gambiense*, après injection de "309 Fourneau." [**The Protective Properties of Blood Serum against** *T. gambiense* **after the Injection of "309 Fourneau."**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 838–844.

Serum from cattle which have been injected with Fourneau 309 taken within 48 hours of the injection protects guineapigs in a dose of 1 cc. against infection with *T. gambiense*. In doses of 0·1 and 0·2 cc. the serum has no protective power, nor does it shorten the period of incubation, but it has a distinct effect in reducing its rate of progress. This is particularly the case when the serum is obtained less than 24 hours after the injection of the drug.

If the serum is not obtained until four days after injection it exercises no protective power.

Animals thus protected are not immune to inoculation with large doses of infective blood.

FOURNEAU (E.), TRÉFOUEL (M. et Mme.) & DE LESTRANGE-TRÉVISE. Les dérivés de l'acide phénylarsinique (arsenic pentavalent) dans le traitement des trypanosomiases. Relation entre l'action thérapeutique des acides arsiniques aromatiques et leur constitution. (Deuxième mémoire), [**The Relationship between the Therapeutic Action of the Aromatic Arsenic Acids and their Constitution in the Treatment of Trypanosomiasis.**]—*Ann. Inst. Pasteur.* 1926. Nov. Vol. 40. No. 11. pp. 933–951.

The authors find that the most active substances of the arsenical series are those in which there is substitution in both the ortho and-para positions, that in the para position being an amino function.

When a modification of a substance increases its therapeutic activity, the introduction of that modification into another and even more active substance does not of necessity have the same effect.

MACLEAN (G.). **History of an Outbreak of Rhodesian Sleeping Sickness in the Ufipa District of Tanganyika Territory with Short Notes on Cases and Treatment.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 329–339. With 1 text fig.

After dealing with the nature of the country and the spread of the disease the author gives a table showing its incidence. From this it appears that there were 62 positive cases out of a population of 563 during 13 months, between November 1924 and December 1925. The

diagnosis was based upon the comparatively acute course run by the disease—not usually longer than 6 months, and the finding of posterior nuclear forms in an infected rat.

The only species of tsetse met with was *G. morsitans*. Other biting flies were Tabanus, Haematopota, and in some places Chrysops.

Of 27 cases treated with " Bayer 205 " between November 1924 and March 1925, fourteen were still surviving a year later, and eight of these had remained in good health without further treatment. All the relapsed cases had been ill for 2 months or more before treatment was begun. A full treatment was four or more injections of 1·1 to 1·2 grammes for adults, and of the 12 who died only 6 had the full course.

Symptoms, with negative blood, were met with four months after treatment. In other cases parasites were found in the blood without symptoms nine months after treatment (but they may have been present earlier than this).

Albuminuria is a frequent sequel to treatment with " Bayer 205."

One woman treated with 3 g. of Tryparsamide weekly appeared to recover, but trypanosomes returned and another course of treatment was given.

In a second case trypanosomes disappeared after the first dose and reappeared after the eighth. Death from pneumonia occurred.

A third case died suddenly after the second injection.

A fourth case in which trypanosomes could be found with difficulty only had its blood swarming a week after a dose of 4 g. A complete course was not given in this case.

THOMSON (J. G.) & ROBERTSON (A.). **Variations in the Virulence and in the Morphology of Certain Laboratory Strains of** *Trypanosoma gambiense* **and** *Trypanosoma rhodesiense* **isolated from Human Cases.**—*Jl. Trop. Med. & Hyg.* 1926. Dec. 15. Vol. 29. No. 24. pp. 403–410. With 1 chart in text.

*Trypanosoma rhodesiense* is more readily established in rats than *T. gambiense*. *T. gambiense* varies in its behaviour as regards virulence in inoculated rats. It may become exalted or attenuated.

Strains of trypanosomes isolated at intervals from the same individual may vary in virulence for laboratory animals. Transmission by mechanical means tends to exaltation of virulence for the species of animal inoculated and passage through a host other than the usual one may modify the virulence in either direction.

Treatment by drugs may also vary the virulence of the parasites for experimental animals, again in either direction.

Mechanical transmission in series to one species of host tends to reduce the polymorphism of trypanosomes, but up to a certain point this can be restored by a change of host.

DUBOIS (A.) & BOUCKAERT (J. P.). L'hypoglycémie au cours des trypanosomiases expérimentales à *Trypanosoma brucei*. [**Hypoglycaemia in Experimental Trypanosomiasis.**]—*C.R. Soc. Biol.* 1927. Feb. 18. Vol. 96. No. 6. pp. 431–433.

The authors find that in animals infected with *T. brucei* there is a degree of hypoglycaemia which is chemically recognizable. Further research is required to elucidate its manner of production. They do not believe that the condition is in any way connected with the clinical symptoms of the infection.

REITANI (U.). Richerche sulla filtrabilità del trypanosoma marocanum. [**The Filtrability of** *Trypanosoma marocanum*]—*Ann. Med. Nav. e. Col.* 1926. Sept.–Oct. (32nd Year). Vol. II. No. 3–4. pp. 159–163.

Full details are not given, but the author finds that occasionally material containing *T. marocanum* is able to cause infection after passage under controls through a Berkefeld V filter.

CHADWICK (C. R.) & MCHATTIE (C.). **Notes on Cutaneous Leishmaniasis of Dogs in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. 9. Vol. 20. No. 7. pp. 422–432. With 3 plates.

The authors' investigations show that cutaneous leishmaniasis of the dog is of very common occurrence in Iraq.

In dealing with the factors which may influence the incidence of the disease the authors give some data regarding the nature of the soil, altitude, general sanitation, and seasons. The dogs show the sores during the cold months. Old sores may be found on dogs during the hot weather, but microscopic examination of these fails to reveal leishmania.

The period of incubation is from one to three months, and the period during which the lesion is unrecognizable as a sore also amounts to about a month. Sores become recognizable about the end of November, and it is therefore probable that infection takes place towards the end of August or later.

Although conditions are otherwise elsewhere, the observations of the authors indicate that human and canine leishmaniasis have about an equal prevalence in Iraq. Data are not yet sufficiently large to permit of the formation of any opinion regarding the relative prevalence of the canine disease in the towns and the open country. There appears to be no special age or breed susceptibility among dogs, and no case has been seen in a cat (a comparatively rare animal in Iraq).

In no case has evidence of infection of the internal organs or bone marrow been obtained.

The cutaneous lesions are generally found in the hairless parts of the dog, but they occur on various parts of the face with considerable frequency, and in many cases on one or both ears.

Irritation appears to be a constant symptom; dogs constantly rub or scratch the ulcers. The primary lesion is always followed by a crop of secondaries. These may be close together and coalesce, forming large ulcers.

In bad cases there may be marked emaciation, but since with care and a good diet this disappears, it would seem to be possible that loss of condition is partly, at least, due to lack of care and attention.

Two types of the disease are distinguished. In Type A there is a papular stage which lasts for two months or more, followed by a period of about equal duration when the lesions form ulcers. Healing requires about three months.

In Type B the papular stage lasts only for 3–4 weeks. The ulcers are small and more superficial and they readily respond to treatment.

It is not held that these are distinct conditions, but it is believed that the milder form represents a re-infection when the primary attack has not conferred complete immunity.. Dogs, cats, horses, cattle, sheep, pigs, fowls and rabbits have been inoculated with material containing large numbers of parasites without success.

SHORTT (H. E.), CRAIGHEAD (A. C.), CHAND (K.) & SWAMINATH (C. S.). **The 'Resistant Non-flagellate Torpedo and O Bodies' of Row seen in Old Cultures of *Leishmania donovani* in their Relationship to the Production of Infections.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 567–576.

The authors conclude that available evidence is against the probability of O bodies playing any part in producing infections.

SHORTT (H. E.) & SWAMINATH (C. S.). **The Mode of Formation and Morphology of the O Bodies of Row in Old Cultures of *Leishmania donovani*.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 581–587. With 1 plate.

The authors believe that these bodies are end-products of degeneration and are not viable. The necessity of an insect transmitter renders the production of resistant forms unnecessary.

SHORTT (H. E.), BARRAUD (P. J.) & CRAIGHEAD (A. C.). **Note on the Infectivity of the Forms of *Leishmania donovani* found in *Phlebotomus argentipes*.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 577–579.

The form of the parasite found in the fly is certainly infective, and the white mouse is proved to be suitable for experimental work.

NAPIER (L. Everard) & SMITH (R. O. A.). **The Development of *Leishmania donovani* in the Gut of the Sandfly *Phlebotomus papatasii*.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 713–716.

In parallel tests with *P. argentipes* and *P. papatasii* it was found that while about 40 per cent. of the former became infected with leishmania, the percentage in the case of the latter was only 2.

ADLER (S.) & THEODOR (O.). **The Identity of *Leishmania tropica* Wright, 1903, and *Herpetomonas papatasii* Adler, 1925.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 355–364. With 2 plates.

The authors express the view that serological tests will oust all other methods of identifying species of Herpetomonas. Agglutination tests indicate that *Leishmania tropica* and *Herpetomonas papatasii* are identical.

ADLER (S.). **A Note on the Histopathology of a Case of Experimental Cutaneous Leishmaniasis.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 407–410. With 1 plate.

A human being was inoculated with herpetomonas from naturally infected *P. papatasii*. About 3½ months later a subcutaneous nodule developed. From this cultures were obtained on a medium containing

Agar 1, Locke's solution made up with 0·2 per cent. glucose 8, and fresh rabbit serum 1.

The lesion was punctured frequently during the next seven months. Cultures were positive from the latter examinations. Part of the lesion which measured 4·5 mm. in diameter was removed for microscopic examination. The summit of the nodule was 2·5 mm. below the surface of the skin. Hence feeding experiments with Phlebotomus failed.

The lesion was not encapsuled but consisted of a conglomeration of typical tubercles separated by strands of connective tissue, which were infiltrated with lymphocytes, plasma cells, and endothelial cells. The tubercles were at various stages of development. Some were recent and some showed fibrosis and caseation.

TURNBULL (D. O.). **Tropical Piroplasmosis in the Fort Jameson District of North-Eastern Rhodesia. With Plasma Bodies representing Developmental Stages of a Parasite Morphologically similar to** *Gonderia mutans*.—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 307–311.

The disease recorded by the author was originally diagnosed by him as East Coast Fever, on account of the symptoms, post mortem appearances, and the detection of plasma bodies. The disease, however, did not follow the course to be expected if this were actually the case, and subsequently the periodical detection of plasma bodies in the superficial lymphatic glands of animals in which recrudescences of the disease occurred as a result of unfavourable conditions of various kinds led to the exclusion of East Coast Fever.

The chronic form of the disease is generally seen in calves, but acute cases occur both in calves and in adults. The chronic form has not been observed in adults.

In calves the disease runs a course of some months, and periodic exacerbations occur. These cannot always be attributed to adverse circumstances, and in some cases appear to represent heavy re-infections. The disease so closely resembles East Coast Fever in all its manifestations, including the morphology of the causal organism, that it is surprising that the two are distinct entities. There is, however, a distinct difference in that after clinical recovery the animal remains a carrier. Lack of facilities has prevented the author from carrying out any tests from which conclusive results might be obtained.

Plasma bodies have been detected in a naturally infected calf at 18 days old, and the intracorpuscular parasite has been found in the blood at one month old.

The disease is of great economic importance both because of the mortality and the adverse effect upon calves suffering from a protracted infection.

In chronic cases in calves the parasite is generally very scantily present in the blood, and even in acute cases the blood invasion is never so heavy as in East Coast Fever. In cases where plasma bodies have been detectable the blood invasion is usually very slight. Morphologically the parasite is not recognizably different from *Theileria parva*. Plasma bodies have been detected in various internal organs, lymphatic glands, and in the circulating blood. They are usually more readily found in the glands than in the spleen. The usual corpuscular abnormalities of the blood associated with anaemia are discoverable.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les piroplasmoses bovines dues aux *Babesiella.* Etude d'ensemble, avec description d'une espèce nouvelle : *B. major*, originaire de France. [**The Babesielloses of Bovines. General Survey, with a Description of a New Species** *B. major* **of French Origin.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. June. Vol. 4. No. 2. pp. 318–339. With 1 plate and 5 text figs.

The new species was encountered in a calf obtained from Aubrac. This animal did not harbour any other endoglobular parasites and the pure infection has been passed in series through seven animals imported from France.

In only one case was there a rise of temperature after inoculation. The parasites appeared in the blood from 4 to 11 days after inoculation. In one case they were first seen on the 30th day, but it is said that this was probably due to a relapse, the first appearance having been overlooked. Parasites have been found in the blood for periods ranging from 1 to 11 days. The average number of invaded corpuscles is 9 per mille. The infection produces very little evidence of anaemia, and is very benign.

More than half the parasites are rounded, the remainder are for the most part elongated, but trefoil forms form about 4 per cent. of the total.

Trypanblue is without effect.

LESTOQUARD (F.). Les piroplasmoses du mouton et de la chèvre. [**The Piroplasmoses of the Sheep and Goat.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. June. Vol. 4. No. 2. pp. 222–312. With 3 plates and 19 text figs.

This is a general account of the piroplasmoses and allied diseases of the sheep and goat.

The conditions caused by *Piroplasma ovis, Babesiella ovis, Gonderia ovis, Theileria ovis,* and *Anaplasma ovis* are all described at length.

The sheep and goat are susceptible to the same infections.

DONATIEN (A.). Le diagnostic des piroplasmoses. [**The Diagnosis of the Piroplasmoses.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. June. Vol. 4. No. 2. pp. 161–221. With 3 plates and 15 text figs.

This paper is in reality a general survey of the piroplasmoses. In an introductory chapter the general characters of the infections and the methods of diagnosis are dealt with. In succeeding chapters the piroplasms and allied organisms occurring in the different species are dealt with at greater length. The avowed object of the paper is to stimulate the interest of field officers in the scientific aspects of the disease and foster co-operation between them and the laboratory workers. It is pointed out that laboratory investigations are essential for the establishment of specific diagnoses.

VAN SACEGHEM (R.). Propagation de *Theileria parva* par les tiques. [**The Spread of** *Theileria parva* **by means of Ticks.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 582–591.

The author holds the opinion that recovery from East Coast Fever is not, as believed by many, a complete one. He believes that after

recovery there is a latent infection which ensures only a relative degree of immunity.

He finds that adult animals which have certainly passed through one attack as calves may again become infected when owing to scantiness of foodstuffs they lose condition.

In connexion with the question of the transmissibility of East Coast Fever the author states that he has frequently found small piroplasms exactly like *Theileria parva* in the blood of animals inoculated with blood containing that parasite. These are said to make their appearance a few days after the inoculation.

By the transfusion of three litres of blood containing *T. parva* in healthy animals the author states that he has been able to set up infection.

The first result of the transfusion is the appearance in the blood of parasites exactly like *Theileria parva* and in numbers which are proportional to the amount of blood used. No thermal reaction accompanies this appearance of parasites, which takes place about the 5th day. These forms disappear and about 18 days later they reappear and are accompanied by a marked thermal reaction. This reaction lasts about 5 days. With the virus used in these experiments the disease so produced is a benign one and does not always protect animals against natural infection.

This is held by the author to be the explanation of the results obtained by THEILER and others in connexion with East Coast Fever.

The author states that in view of his experiments he has serious reasons for thinking that *T. parva* and *T. mutans* are one and the same thing. It is admitted that the infection is not passed through the egg of infected ticks. The immature ticks must therefore, in an area like the Ruanda-Urundi district, where only calves contract the disease and where adults are immune, acquire the infection from calves. If that is so, how does it come about that the disease is enzootic there? If cattle from land more than 2,000 metres above sea level are brought down and placed in contact with cattle of the plains they become infected. This implies either that the ticks can acquire infection from the plains cattle and hand it on to the hill cattle, or that there is some other source of infection. Van Saceghem adduces further evidence in support of this view from BRUMPT'S experiments. This author produced a disease with the characters of Theileriasis by inoculating cattle in France with blood from an apparently healthy African beast. Koch's bodies were found in these cases.

He believes, too, that *Theileria dispar* is also identical with *T. parva*, and states that this could be established with certainty by the inoculation of cattle which have passed through an attack of East Coast Fever with *T. dispar*.

DONATIEN (A.) & LESTOQUARD (F.). Sur l'emploi du trypanobleu dans le traitement des piroplasmoses des ruminants. [**Trypanblue in the Treatment of the Piroplasmoses of Ruminants.**]—*Bull. Soc. Path. Exot.* 1927. Jan. Vol. 20. No. 1. pp. 64–77. With 10 text figs.

The authors give details of cases of infection with *Babesia bigeminum* and *Babesia ovis* treated with trypanblue and find that it is very effective. They state that doses smaller than those generally used are sufficient. 0·1 to 0·2 g. injected intravenously suffices for the treatment of bovines.

Infections due to Babesiella, on the other hand, do not yield to treatment with trypanblue, and the authors consider that this resistance is a generic character.

YAKIMOFF (W. L.). Le trypanobleu agit-il sur les babésielloses? [**Is Trypanblue effective in Babesiella Infections?**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 783–786.

The author gives statistics to show that in spite of the opinions expressed by others, trypanblue is of great service in the treatment of babesiella infections (*Babesiella bovis*). In Novgorod and Petrograd the use of the drug has reduced the mortality from between 30 and 60 per cent. to less than 8 per cent.

During the summer of 1926 the author immunized 124 animals by inoculating them and treating the resulting infection by intravenous injection of 2·25 g. of trypanblue.

The author believes that four different species of Babesiella occur in Russia, but up to the present information is available only regarding the action of trypanblue on *B. bovis*. He considers that the subgenus Babesiella should be subdivided into 2 groups.

Group 1. *Babesiella*, of which the type species is *B. bovis* Babes. The principal characteristic is a twin-pear forming an obtuse angle and situated at the margin of the corpuscle.

Group 2. *Françaiella*, which includes *B. argentina* Lignières, *B. berbera* Sergent, *B. major*. The characteristic form of this is also a twin-pear shaped form, but placed centrally in the corpuscle.

YAKIMOFF (W. L.), KÉDRINSKY (A. J.), AFANASIEFF (J. A.), IWANOFF (P. S.) & SWIRSSKY (S. A.). Le traitement de la babesiellose des bovidés par les sels d'argent. [**The Treatment of Bovine Babesiellosis by Silver Salts.**]—*Bull. Soc. Path. Exot.* 1926. Dec. Vol. 19. No. 10. pp. 887–890.

*Albargine.* This is a compound of dialysed gelatine with nitrate of silver, and contains about 15 per cent. of silver.

In very brief notes of six cases treated by an intravenous injection of 1 gramme of the salt the solvent is not mentioned. In four cases the exact result is not stated, but one is led to suppose that recovery took place. Two cases terminated fatally.

*Argoflavine.* This is a compound of trypaflavin with silver and contains 20 per cent. of silver. Two cases were treated, one with 1 g. intravenously and one with 1·5 g. No definite statement is made regarding the result, but apparently recovery took place in both cases as it is said that the urine lost its colour.

*Silvernovarsolan.* This drug is a silver salvarsan compound of Russian manufacture, containing 20 per cent. arsenic and 7 per cent. silver. Four cases are recorded. In one, recovery took place after an intravenous injection of 1 g. of the drug. In three cases ichthargan was resorted to after the silvernovarsolan and recovery took place in two of these.

BÉLAWINE (W. S.). Traitement de la piroplasmose à *Piroplasma bigeminum* au nord du Caucase. [**The Treatment of Piroplasmosis due to *B. bigeminum* in Northern Caucasus.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 786–791.

In southern Caucasus the mortality from infection with *B. bigeminum* is said to be from 90 to 92 per cent.

Experiments in treatment have been carried out with ichthargan arrhenal, trypanblue, and protargol.

One hundred and twenty cases were treated with ichthargan in doses of 1·0 to 1·5 g. dissolved in 100 cc. of water given intravenously. There were 14 deaths. 2·5 per cent. of the animals treated showed relapses 4 to 12 days later, and after a second treatment 80 per cent. of these died. [These figures appear to contain discrepancies.]

Three hundred and thirty three animals were treated by subcutaneous injections of arrhenal. The drug was used in 10 per cent. solution and the doses ranged from 2 to 4 grammes.

During the spring 33 animals were treated and the percentage mortality was 8·3. The remainder were treated during the summer and the percentage mortality was 24·8.

Among 200 animals injected intravenously with 1·0 to 1·5 g. of protargol dissolved in 100 cc. of water the mortality was 27·6 per cent. Two hundred animals were given intravenous injections of trypanblue in doses of 3 to 5 grammes. The strength of the solution is not stated. The percentage mortality was 18.

MACHADO (A.). La piroplasmose canine et son traitement. [**Canine Piroplasmosis and its Treatment.**]—*C.R. Soc. Biol.*. 1927. Feb. 25. Vol. 96. No. 7. p. 477.

Canine piroplasmosis is responsible for heavy losses in puppies in the neighbourhood of Rio de Janeiro. Trypanblue, while causing a disappearance of the parasites from the blood stream, does not effect a radical cure. Relapses which end fatally are likely to occur. Stovarsolate of soda does appear in some instances to effect a complete cure, but not in all.

Colloidal oxide of silver and argyrol have been quite ineffective.

Neosilversalvarsan in doses of 3 to 4 cg. per kg. has produced definite cures. The minimum effective dose has not been established, nor has the shortest interval elapsing between administration and the disappearance of the parasite from the blood been ascertained.

PURVIS (G. B.). **Immunity in East Coast Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. Vol. 20. No. 7. pp. 447–449.

The matter contained in this communication has been published elsewhere.

DESCHIENS (R.). Sur les protozoaires intestinaux des singes. [**The Intestinal Protozoa of Monkeys.**]—*Bull. Soc. Path. Exot.* 1927. Jan. Vol. 20. No. 1. pp. 19–23.

The author examined the faeces of 20 monkeys at the Pasteur Institute. Chimpanzees harboured *Entamoeba coli*, *E. dysenteriae*. *Endolimax kueneni*, Chilomastix and Trichomonas types of organisms. In Macacus organisms of the same types were found, except *E. dysenteriae* and Trichomonas. This genus however, harboured Giardia (in one out of nine examined).

Cercopithecus monkeys showed organisms resembling *E. coli*, *Endolimax kueneni* and Giardia.

DESCHIENS (R.). *Chilomastix* sp. observé chez le chimpanzé (*Anthropopithecus troglodytes*) et chez le macaque (*Macacus sinicus*). [**A Species of Chilomastix found in a Chimpanzee and a Macacus.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 794–798. With 2 text figs.

The two parasites are figured and described. That of the chimpanzee was transmissible to macacus, but material was wanting for the reverse test. The parasite is not morphologically distinguishable from *C. mesnili.*

RODHAIN (J.). Plasmodium de *Nycteris hispida* Schreber au Congo Belge. [**Plasmodium of** *Nycteris hispida* **in the Belgian Congo.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 780–781. With 1 text ffg.

The author has found the parasite described in this paper in the blood of one bat out of 59 examined. The organism is readily recognizable in fresh blood owing to the large size and black colour of the melanin granules, and owing to the enlargement of the invaded corpuscles. Only microgametocytes and macrogametocytes were found. The latter possess a more dense protoplasm and are richer in pigment. The parasites are rounded and non-vacuolated. The nucleus is usually excentrically placed, oval or irregular in outline. The pigment granules are elongated.

YAKIMOFF (W. L.), GALOUZO (I. G.), RASTAGAIEFF (E. F.), MIZKEWITSCH (W. J.) & TOLSTOFF (A. N.). Ueber die Darmkokzidiose der Schafe in Russland. [**Intestinal Coccidiosis of the Sheep in Russia.**]—*Berlin. Tierärzt. Woch.* 1926. Dec. 17. Vol. 42. No. 51. pp. 877–881.

The author records the occurrence of *E. Faurei* and *E. intricata* (Spiegl 1925) in sheep in Russia.

KRIJGSMAN (B. J.). Die Therapie der Kokzidiose. 1. Teil: Die Kokzidiose der Kaninchen. [**The Treatment of Coccidiosis. Part I. Coccidiosis of the Rabbit.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1–3. pp. 108–126. With 1 plate and 7 text figs.

The author finds that atoxyl is of no value, but the use of creolin in conjunction with thorough prophylactic measures is valuable.

COOPER (H.) & GULATI (A.). **On the Occurrence of Isospora and Balantidium in Cattle.**—*Mem. Dept. Agric. in India.* Vet. Series. 1926. Nov. Vol. 3. Nos. 8–9. pp. 191–193.

Isospora were found in the faeces of 5 out of 181 cattle examined. The oocysts were round and sporoblast formation occurred within 24 hours.

Detailed examination could not be made at the time of collection of the samples of faeces as the authors were on tour.

Specimens of the faeces were mixed with formalin for preservation, but when these were examined later the parasite could not be found.

The Balantidium found is figured and described. The organisms ranged from 60–120$\mu$ by 44–90$\mu$. The organism appeared to differ

from *Balantidium coli* in that the greatest diameter was about the middle plane of the organism and not posterior to this. The macronucleus was ribbon-like with folded ends and not oval.

*Balantidium coli* var. *bovis* is suggested as the name.

CATANEI (A.). Sur la durée de l'immunité dans la spirochétose expérimentale des oiseaux. [**The Duration of Immunity in Experimental Avian Spirochaetosis.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Mar. Vol. 4. No. 1. pp. 53–55.

Experimental infection of birds with spirochaetes leaves a lasting immunity, the duration of which is not in proportion to the severity of the infection. This immunity does not appear to be reinforced by repetition of inoculation.

The immunity is effective against strains of spirochaetes from different sources.

SANARELLI (G.). Les spirochètes caecaux. [**The Spirochaetes of the Caecum.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 1–44. With 2 plates.

The author deals at considerable length with the methods which may be employed for the cultivation of the organisms. Animal inoculations appear to indicate that the parasites produce effects mainly on account of the direct toxic power of their proteid.

In diseased conditions it is not impossible that spirochaetes which ordinarily occur in the lumen of the gut, and particularly in that of the large bowel, may gain access to the tissues.

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DOBELL (Clifford) & LAIDLAW (P. P.). **On the Cultivation of** *Entamoeba histolytica* **and some other Entozoic Amoebae.**—*Parasitology.* 1926. Sept. Vol. 18. No. 3. pp. 283–318.

PATTON (W. S.) & HINDLE (E.). **Reports from the Royal Society's Kala Azar Commission in China. No. 6. Notes on the Species of Sandflies (Genus** *Phlebotomus*) **of North China.**—*Proc. Roy. Soc.* 1926. Dec. 10. Series B. Vol. 100. No. B 705. pp. 405–412. With 7 text figs.

PINTO (César). Sur les genres de la sous-famille des *Eimeriinae*. (*Sporozoa. Eimeriomorpha*). [**The Genera of the Sub-family** *Eimeriinae* (*Sporozoa. Eimeriomorpha*).—*C.R. Soc. Biol.* 1927. Feb. 25. Vol. 96. No. 7. pp. 488-489.

RODHAIN (J.). *Plasmodium epomophori* n. sp., parasite commun des rousettes épaulières au Congo belge. [*Plasmodium epomophori* **n. sp., a Common Parasite of the Flying Fox in the Belgian Congo.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 828–838. With 2 text figs.

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## DISEASES DUE TO METAZOAN PARASITES.

ORTLEPP (R. J.). **On a Collection of Helminths from a South African Farm.**—*Jl. Helminth.* 1926. Aug. Vol. 4. No. 3. pp. 127–142. With 6 text figs.

The author enumerates the worms found in certain domesticated and wild animals.

He describes the male of *Gongylonema monnigi* BAYLIS, the account being based upon the examination of eleven specimens.

*Dibothriocephalus scenopi* n. sp. from the clawed toad is figured and described, and also *Diplodiscus doyeri* n. sp. from the same host.

BAER (J. G.). **Contributions to the Helminth-Fauna of South Africa. Mammalian Cestodes.**—*Union of South Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 63–136. With 1 map and 43 figs.

The author gives a detailed description of a portion of a collection of parasites made by THEILER and presented to FUHRMANN. Twenty-two species were examined, of which nine were new. There were included two new genera and one new family. Of the nineteen hosts, fifteen appear to be new.

The new Family is *Lüheellidae*, with n.g. *Lüheella*, and n. sp. *L. pretoriensis*. *Fuhrmannella* n. g. (Fam. *Cyclophyllidea*), with n. sp. *F. transvaalensis*, and *P. acanthocirrosa* n. sp. of *Paranoplocephala*. *Inermicapsifer aberratus* n. sp. *Dipylidium fuhrmanni* n. sp. *Hymenolepis macroscelidarum* n. sp. *Hymenolepis* sp. *Taenia hyaenae* n. sp. *Taenia parva*, n. sp.

JOYEUX (Ch.) & BAER (J.-G.). Etude de quelques cestodes provenant des Colonies françaises d'Afrique et de Madagascar. [**Some Cestodes from the French African Colonies and from Madagascar.**]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 27–36. With 8 text figs.

The authors refer to the following worms : *Cittotaenia africana* (n. sp.) obtained from a bird (probably a species of Bucerotidae), *Inermicapsifer arvicanthidis* (Kofend, 1917), *Thysanotaenia lemuris* (Beddard, 1911), *Raillietina* (*Paroniella*) *blanchardi* (Parona, 1897), *Raillietina* (*Paroniella*) *retractilis* (Stiles, 1895), *Raillietina celebensis* (Janicki, 1902), *Hymenolepis diminuta* (Rud., 1819), Hymenolepis sp. found in *Thryonomys swinderenianus*, Icterotaenia sp. found in a rat. *Catenotaenia lobata* (Baer, 1925) and *Cysticercus fasciolaris* (Rud., 1808).

JOYEUX (Ch.). Recherches sur le cycle évolutif d'*Hymenolepis erinacei* (Gmelin, 1789). [**The Cycle of Development of** *Hymenolepis erinacei.*]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 20–26.

In the present state of knowledge it must be concluded that *Hymenolepis erinacei* develops directly. The armed cysticercoid inhabits the intestinal villi of the hedgehog, and the adults are unarmed.

HILES (I.). **Serological Studies on Hydatid.**—*Jl. Helminth.* 1926. Nov. Vol. 4. Nos. 4–5. pp. 143–178.

The author finds that an alcoholic extract of scolices is a more potent antigen than hydatid fluids. Saline in the alcohol used for extraction appeared to decrease the potency of the antigen.

MAROTEL (G.). Une nouvelle maladie parasitaire : La monostomidose cutanée du dindon. [**A New Parasitic Disease. Cutaneous Monostomidosis of the Turkey.**]—*Rev. Vét.* 1926. Dec. Vol. 78. No. 12. pp. 725–736. With 2 text-figs.

The lesions took the form of pea-like cutaneous nodules from 4 to 6 mm. in diameter. The majority showed a central orifice covered

with a brownish crust. They occurred over the abdomen and particularly around the cloaca. In some cases they were aggregated together to form larger masses. Each lesion on section was found to contain two worms. These were lentil shaped and measured 3–5 mm. in diameter. The bodies were greyish and gelatinous looking, but a yellow and a brown U-shaped marking indicated the disposition of some of the internal organs. There was a single sucker anteriorly, which contained the mouth. The intestinal sacs, which were of relatively enormous size, were unbranched. These were the yellow bodies visible with the naked eye.

There were two piriform testes and a branched ovary, two lateral vitelline glands, a large uterus showing two or three convolutions, and a large excretory vesicle. The musculocutaneous system was very poorly developed.

Nothing is known regarding the development and method of infestation.

FAIRLEY (N. Hamilton) & JASUDASIN (F.). **The Experimental Transmission of** *S. spindalis* **to the Indian Water Buffalo.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 701–706. With 1 plate & 1 graph.

Two buffaloes were exposed to the action of nearly 60,000 cercaria each. Post mortem examination was carried out on the 81st and 94th days, when living schistosomes were found in the portal and mesenteric veins and ova containing living miracidia were found in both large and small intestines. They were also found in the liver. Bilharzial pseudo-tubercles were found in the liver. The periportal zones showed leucocytic infiltrations and there was thrombosis of the periportal veins. Ova were found in the clots.

The Bordet-Gengou antibody response was later in developing and less marked than in goats. This is attributed to the disparity in dose administered to the heavier animals.

The author believes that the water buffalo will be found to constitute the chief definitive host of *S. spindalis*.

ZUNKER (M.), BACH (V.) & JORDAN (W.). T.53 Merck, ein neues Leberegelheilmittel für Rinder. [**T.53 Merck, a New Drug for the Treatment of Fluke Disease in Cattle.**]—*Berlin. Tierärzt. Woch.* 1927. Feb. 25. Vol. 43. No. 8. pp. 121–123.

This potent drug is injected intraperitoneally in doses ranging from 30–50 cc. Postmortem examination of 658 affected animals has, it is claimed, established the value of the treatment.

GULATI (A.). **On the Occurrence of a Lung Fluke** *Paragonimus edwardsi* **n. sp. in a Palm Civet** (*Paradoxurus grayi*) **in Kumaon Hills.**—*Mem. Dept. Agric. India. Vet. Ser.* 1926. Nov. Vol. 3. Nos. 8–9. pp. 187–190.

The author figures and describes the parasite found in the lungs of *Paradoxurus grayi*. Eight cysts were present and from each of these a pair of parasites was obtained.

BHALERAO (G. D.). **The Trematodes of** *Corvus insolens* **(a Burmese House-Crow), with a Description of Four New Species.**—*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 387–398. With 7 figs.

The new species described are *Echinochasmus corvus*, *Stephanoprora reynoldi*, *Phaneropsolus insolens*, and *Lyperosomum kakea.*

KHALIL (M.). Une nouvelle espèce de *Parabronema* du rhinocéros (*Parabronema rhinocerotis* n. sp.). [**A New Species of Parabronema of the Rhinoceros** (*Parabronema rhinocerotis* **n. sp.**).]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 37–40. With 4 text figs.

The parasite is figured and described, and a table of comparative measurements is given.

GULATI (A.). **Experiments on the Treatment of Hookworm Infections in Dogs.**—*Mem. Dept. Agric. India. Vet. Series.* Vol. 3. No. 7. 1926. Nov. pp. 167–184.

The paper records a series of observations regarding the prevalence and intensity of infection of hookworm disease at Muktesar (U.P., India), and gives the results of experiments in connexion with the treatment; 96·2 per cent. of 104 dogs were found to harbour the parasite. About half of those infested had 50 or less worms. About a quarter had between 50 and 100, and the remainder from 100 to 500. All the worms belonged to the species *A. caninum* and *A. braziliense.*

The drugs used were oil of chenopodium, chloroform, carbon tetrachloride,and tetrachlorethylene.

Mixtures of oil of chenopodium with chloroform and carbon tetrachloride, carbon tetrachloride alone, and tetrachlorethylene were not effective.

VELU & BALOZET. Sur une maladie méconnue : La Bunostomiase ovine. [**A Little Known Disease : Ovine Bunostomiasis.**]—*Rec. Méd. Vét.* 1926. Dec. Vol. 102. No. 22. pp. 434–437.

The authors describe outbreaks of disease with considerable losses in flocks of sheep in which it appeared to be certain that infestation with *B. trigonocephalum* was responsible. Both adults and lambs were attacked, but more particularly the latter. They state that they have had the opportunity of seeing an outbreak of the disease under conditions which were almost experimental.

The flock, which comprised some 600 head, had been treated with arsenic for two years. This, it is stated, certainly frees the stomach and intestine of other parasites. [This is open to question.—Ed.].

In adults the disease can scarcely be identified with certainty by the symptoms. At post mortem examination there are found oedema of the intestinal wall, petechiae, and erosion, which is sometimes extensive, of the mucous membrane.

In lambs the symptoms of verminous anaemia are not so pronounced, but weakness of the legs, with knuckling over at the fetlocks, increasing paralysis, and finally collapse into a semi-comatose condition are the symptoms noted.

The course of the disease may be so rapid that there may be no great degree of wasting, but the animals are literally bled white. Lesions in the intestine are not conspicuous and worms may not be very numerous.

SCHWARTZ (B.). **A New Parasitic Nematode from the Stomach of an Unknown Member of the Cervidae.**—*Jl. Parasit.* 1926 Sept. Vol. 13. No. 1. pp. 25–28.

The author figures and describes a parasite from the stomach of a deer (?) from Tonkin. The parasite is named *Ostertagia houdemeri*, n. sp.

GENDRE (E.). Sur un nématode nouveau, parasite des poissons. [**A New Nematode of Fish.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 798–802. With 7 text figs.

The parasite was found in an undetermined fish caught at the confluence of the Kouloufing and the Gambia. Certain of its characters resemble those of the Subuluridae, Kathlaniidae and Cucullanidae, but the mouth parts and oesophagus are quite distinct in character from any of these. The discovery of neighbouring forms must be awaited before the parasite can be placed definitely. The name *Quimperia* n. g. *lanceolata* n. sp., is suggested.

Reference must be made to the original for details.

CRAWFORD (M.). **Development of Habronema Larvae in Drosophilid Flies.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 321–323. With 1 text fig.

In the stomach of an arab stallion there was found a large habronemic tumour containing great numbers of *H. megastomum*. There was also extensive ulceration caused by a heavy infestation with *H. muscae*.

A tray of stomach contents was kept exposed for five days and then covered with a glass beaker and kept at room temperature for a week. A number of flies were found in the beaker and these were identified by HUTSON as drosophilid flies. One of these was crushed in saline under a coverglass and nine larvae were found. From their position in the specimen it appeared to be probable that they had emerged from the crushed thorax. None were seen near the proboscis. They did not move about the field. In half an hour all movement stopped. Of twenty flies examined, two were found infected; one contained nine larvae, and the other, one.

On the eighth day, further flies hatched out, but these were not examined, and on the following day there were two larger flies, apparently belonging to the same genus, but of a different species. In one of these two larvae were found, and in one of nine of the smaller species four larvae were detected.

It is said that the precautions taken were sufficient to prevent contamination of the stomach contents with any extraneous material, and it is therefore concluded that the larvae must have been those of either *H. muscae* or *H. megastomum*. No *Musca domestica* or *Stomoxys calcitrans* hatched out.

The larvae were 400 to 460$\mu$ long by 8 to 12$\mu$ broad. The caudal extremity was sharply pointed, the body tapered slightly towards the cephalic extremity and the head was slightly expanded.

KEILIN (D.). **The Problem of the Origin of Nematodes.**—*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 370–374.

In this paper the author discusses the relationship between the free-living and the parasitic nematodes and that between the nematodes and the arthropods.

The author expresses the view that free-living nematodes are derived from parasitic forms by secondary re-adaptation to the free mode of life. Their original change from free to parasitic mode was accompanied by morphological adaptation, but (on the basis of DOLLO's law of the irreversibility of evolution) they have not re-acquired their original characters on reverting to a free mode of living.

The author does not accept the view of the arthropod origin of nematodes.

MONTGOMERIE (R. F.). **Some Miscellaneous Observations on the Anthelmintic Value of Carbon Tetrachloride in Sheep.**— *Vet. Jl.* 1926. Dec. Vol. 82. No. 12. pp. 583–591.

The author gives details of experiments, field trials, and flock treatments with carbon tetrachloride in conjunction with magnesium sulphate. In the first experiment a Welsh mountain ewe was given 1 cc. of carbon tetrachloride in a soft gelatin capsule, and immediately afterwards as much dry magnesium sulphate as would fill a No. 12 capsule (hard gelatin). [There is no indication as to what weight of magnesium sulphate was given.—Ed.] Liver fluke eggs practically disappeared from the faeces, but the "count of nematode eggs, while somewhat reduced, remained considerable."

Post-mortem examination was made on the 12th day. Thirty-seven *Haemonchus contortus* and 242 comprising *Chabertia ovina*, *Oesophagostomum venulosum* and *Monodontus trigonocephalus* were recovered from the large intestine.

In the second experiment the dose of carbon tetrachloride was increased to 5 cc., the dose of magnesium sulphate remaining the same. At the post-mortem examination 20 specimens of *O. venulosum* and 2 of *Chabertia ovina* were found. In the course of the 12 days the nematode egg content had fallen from 866 per gramme to 22.

In the first field trials eight Welsh mountain yearlings were put under treatment. The post-mortem examination of a number of the flock beforehand showed the presence of *H. contortus*, apparently pure, in the abomasum. *T. ovis* and *O. venulosum* were present in the large intestine. According to a tabular statement each animal showed a steady fall in the egg content of the faeces during a period of 36 days after treatment; only one of the animals was subjected to post-mortem examination, and in it 30 specimens of *H. contortus*, 31 *T. ovis*, and 11 *O. venulosum* were found.

In the second trial 4 similar sheep were used. The same dose of carbon tetrachloride was given but no magnesium sulphate. Again there was a steady drop in the egg content over a period of about a month. No post-mortem examinations were made.

In the third trial two Shropshire ewes were used. These had the same treatment as those in the second trial. The results were the same. No post-mortem examinations were made.

In all cases clinical improvement associated with the slow fall of the egg content is taken as indicating efficient treatment.

In the flock treatments 150 young mountain ewes were given 5 cc. of carbon tetrachloride and dry magnesium sulphate, and 222 wethers were given the carbon tetrachloride alone. Rapid improvement in condition is reported.

WALTON (C. L.) & WRIGHT (W. Rees). **Hydrogen-ion Concentration and the Distribution of** *Limnaea truncatula* **and** *L. peregra*, **with a Note bearing on Mosquitoes.**—*Parasitology*. 1926. Dec. Vol. 18. No. 4. pp. 363–367.

The authors are of the opinion that the pH of the medium is not a matter of vital importance. There is, however, a differential distribution, and this it is thought may be connected with morphological differences between the two species. In *L. truncatula* the foot is small and the shell a narrow spire. In *L. peregra* the foot and shell are relatively broader. The latter can travel over soft mud in which the former would sink. *L. truncatula* will always leave a soft substance for a harder one.

Hydrogen-ion concentration also appears to be of little or no importance in mosquito development.

BARAH (M.). L'huile de Chaulmoogra dans le traitement de la Démodécie. [**Chaulmoogra Oil in the Treatment of Demodectic Mange.**]—*Rec. Méd. Vét.* 1926. Nov. Vol. 102. No. 19. pp. 666–669.

The author has had good results in some fifty cases with a dressing having the following composition :—

| | |
|---|---|
| Carbolic Acid ... ... ... ... | 10 g. |
| Ether ... ... ... ... ... | 250 g. |
| Chaulmoogra Oil ... ... ... ... | 750 cc. |

During treatment the animals are not washed, as it is held that this tends to spread the infection.

Daily applications are made without friction for five or six days, and then every two or three days until the hair begins to grow again. Once a week the treated areas are cleaned with camphorated alcohol.

Three to six weeks are required for a cure, depending upon the extent of the disease. No relapses have occurred.

The disadvantages of the method are : (1) the disagreeable odour of the oil ; (2) the irritant effect of the oil. Friction and excessive amounts of dressing must be avoided ; (3) licking the dressing may result in vomition. It is therefore difficult to dress lesions satisfactorily in the neighbourhood of the mouth.

VERNEY (F. A.). **Sheep and Goat Scab in Basutoland.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 301–306.

The author describes the plan put into force for the control of these diseases.

As it was impracticable to make a charge for dipping, a tax was placed on all wool exported to provide the funds. Tanks have been erected at approximately 12 miles apart. First and second dippings are marked by different coloured brands and all animals in the area covered by a tank are dipped simultaneously. In the general plan of campaign it was decided to begin at the confines of the country and work

inwards. This was done first to reduce the risk to clean flocks over the border and secondly because the scheme was easier of application on the lower lying land. Experience would therefore be gained more readily. No sheep are allowed without permit to enter an area that has been cleaned, and such sheep have to be dipped prior to entry.

Extreme care must be exercised in using absolutely reliable dips, and in mixing thoroughly. The losses have amounted to about ·002 per cent. (over 2,000,000 sheep having been dipped in 1924–25), and 75 per cent. of the losses occurred at the second dipping among the sheep first dipped when a new tank-full had been mixed. Goats stand dipping better than sheep, and they are therefore dipped before them.

The author draws attention to the following points in connexion with the diagnosis of the disease. In advanced cases the parasite favours the orbital fossa and the ear, and recurrences are probably due to the escape of these situations when hand dressing is done. In dipping each animal has its head immersed four times, but this is not sufficient to ensure full effect of the dip. The perinaeum is another favourite place, and here there may be little disturbance of the skin. No flock should be passed until every ram has been caught and carefully examined in the perinaeum, testicles, penis and brisket. Bastard sheep appear to be very insensitive to the parasite. Infection in these animals may be overlooked.

The ravages of scab are largely dependent upon the season and amount of grass available.

Badly infected flocks are dipped three times during a period of 19–20 days, and no attempt is made to deal with infected kraals. The infected kraal is now known not to be the source of danger it was once thought to be.

There is evidence that severe outbreaks of goat mange may result from infection from horses, the type being sarcoptic. Ordinary dipping is of no value for this. But treating with horse-mange dressing was effective in two applications.

MINISTRY OF AGRICULTURE AND FISHERIES. **Report of the Departmental Committee, 1926, on Warble-Fly Pest.**—pp. 1–48. London: H.M. Stationery Office.

In the eradication of the fly is a two-fold problem, viz., to prevent egg laying and to destroy the ripe maggots. So far no satisfactory method has been devised for the former of these. In regard to the latter, a great deal can be done by the application of suitable dressings every two or three weeks between February and June. It is essential that the dressing penetrates the breathing hole in the skin and gains access to the parasite.

Tobacco powder and lime, a mixture of 3 lb. of tobacco powder with 2 lb. of lime per gallon, was found to kill 90 per cent. of the warbles. It was also found that a dressing containing 4 lb. of tobacco powder, 1 lb. of lime in 1 gallon of water was effective. This mixture must be used fresh, as it deteriorates. Dressings containing derris root powder were used, but there is difficulty in obtaining a standard product. A mixture of nicotine sulphate and lime can be recommended. The formula for this is: Nicotine sulphate 2 fluid ounces, Calcium hydrate 1 pound, and water 1 gallon. This must be prepared just prior to use, as it does not retain its strength.

An ointment composed of 1 part iodoform and 5 parts vaseline has been used with success by others, but it was not tested by the Committee.

FABER, (Harald). **Exterminating the Warble-Fly in Denmark.**—*Jl. Ministry of Agriculture.* 1927. Jan. Vol. 33. No. 10. pp. 905–907.

Extermination is more likely to be achieved in Denmark than in some other countries, because on account of the severe winters cattle are generally stall fed for about 7 months, and are taken out about the end of April. Inspection before they leave the byres is therefore more or less readily carried out.

A number of laws have been passed compelling the removal of warbles before the animals are turned out. The percentage of hides damaged by warbles has as a result of this campaign fallen from 20 per cent. in 1922 to 4 per cent. in 1925.

IMES (M.). **Summary of Results of Field Trials by the U.S. Bureau of Animal Industry on Ox-warble Control.**—*Jl. Parasit.* 1926. Sept. Vol. 13. No. 1. pp. 42–46.

The infestation by flies may be reduced but not eradicated by the use of arsenical or other cattle dips. Wading vats are useful and economical for the application of repellents to the legs of cattle. So-called " processed crude petroleum " or similar oils and 2 per cent. solution of coal-tar-creosote dip are the most effective medicaments.

MASON (G. B.). **A Method for Destroying Fly Larvae developing in Stable Manure.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. Vol. 20. No. 7. pp. 433–435. With 1 plate.

Conditions in Bermuda favour the breeding of flies in manure and other refuse throughout the year. Adult flies hatch from the egg in twelve days. They are known to cover distances up to thirteen miles, and can travel six miles in twenty-four hours. Their duration of life is eight to ten weeks.

A concrete platform 6 ft. square is surrounded by walls on three sides and divided by a central partition. On the fourth side there is a gutter towards which the platform slopes. All walls have an overhanging edge to prevent the larvae crawling away.

In one partition the manure and litter, after removal of excess of straw (which is raked off and burnt), are stacked daily. It is essential that it be beaten tightly down with a spade, and in dry weather watered. There must be left a space of one foot between the edge of the heap and the gutter.

Each day the surface layer which has not become heated is lifted off and turned into the centre, which is opened for the purpose. One compartment is used until the heap reaches to within 6 inches of the top of the walls. The heap is then left for ten days, the surface drier layers being turned into the centre of the heap, and previously heated manure is beaten down on the top. A covering of earth is put over the top. This is left for ten days, while the other half of the platform is stacked. The manure from the compartment first filled is removed for use. A few larvae which may escape destruction by heating cannot escape

over the projecting ledges as the top of the walls and those crossing the bare space of floor, fall into the gutter in which some disinfectant is placed. This not only kills them, but prevents the breeding of mosquitoes in the water. If no roof is provided for the protection of the heaps from rain a gutter containing desinfectant must be run all round the platform on the outer side of the wall.

Larvae can climb the walls when wet and escape.

URIBE (C.). **On the Biology and Life History of *Rhodnius prolixus* Stahl.**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 129–136. With 1 plate.

Sixty-two per cent. of 553 specimens examined were found to harbour stages of *Trypanosoma cruzi*.

The faeces of fully fed insects were found to contain infective forms of the parasite and starved larvae were observed to feed on such faeces.

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CAMERON (T. W. M.). **On the Morphology of the Free Living Larvae of *Chabertia ovina*.**—*Jl. Helminth.* 1926. Nov. Vol. 4. No. 4-5. pp. 185–190. With 10 text figs.

CONNAL (A.). **The Rodents of Lagos and their Ectoparasites with Reference to Plague.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17 Vol. 20. No. 4. pp. 341–352. With 1 chart and 1 map.

COUTELEN (F.). Essai de culture *in vitro* de scolex et d'hydatides échinococciques (*Echinococcus granulosus*). [**An Attempt to Cultivate in vitro Scolex and Echinococcus Hydatids.**]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 1–19. With 2 figs.

FAUST (E. C.) & NISHIGORI (M.). **The Life Cycles of Two New Species of Heterophyidae, Parasitic in Mammals and Birds.**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 91–128. With 4 plates and 4 text figs.

JOBLING (B.). **A Comparative Study of the Structure of the Head and Mouth Parts in the Hippoboscidae** (*Diptera pupipara*).—*Parasitology.* 1926. Sept. Vol. 18. No. 3. pp. 319–349. With 5 plates and 4 text figs.

ROSS (I. Clunies). **The Metazoan Parasites of Poultry in Australia.**—*Jl. Austral. Vet. Assoc.* 1926. Dec. Vol. 2. No. 4. pp. 129–139.

SCHWETZ. La limite actuelle de la *Gl. morsitans* autour d'Elisabethville (Katanga) avec quelques considérations sur les causes du recul progressif de cette mouche. [**The Actual Limit of *G. morsitans* in the Neighbourhood of Elizabethville with some Considerations regarding the Causes of the Progressive Retreat of this Fly.**]—*Bull. Soc. Path. Exot.* 1927. Jan. Vol. 20. No. 1. pp. 78–87.

YOUNG (T. C. McCombie). **Some Observations on Sandflies in Bombay City.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 679–683.

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## BACTERIAL DISEASES.

GILTNER (Ward). **Vaccination against *Brucella abortus* with Non-Virulent Cultures.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 318–320.

The author surveys very briefly the subject of the respective values of live and dead vaccines. He points out that while dead vaccines and bacterins are discredited great risk attaches to the use of living vaccines which are pathogenic.

HUDDLESON, working with the author, encountered a strain of *Br. abortus* which was non-pathogenic for guineapigs. It was isolated from the placenta of an aborting cow in the experimental herd. It was capable of producing good antibody reactions in guineapigs and also protected

them against pathogenic strains. Experiments with cattle showed that it could be used for them also. At first the live vaccine was preceded by a dead one, but this was subsequently omitted.

Over a thousand cattle have been treated, and the results indicate that the vaccine is safe and effective. Pregnant and non-pregnant cows may be inoculated. It is emphatically stated that the vaccine is not to be used upon infected animals, but no reason for this is given.

In guineapigs the duration of immunity is two gestation periods. It has not been determined how frequently cattle should be inoculated.

The paper contains no details of the preparation of the vaccine, but it is stated that the viability of the organism is readily affected by the reaction of the medium in which it is suspended, and that this may be affected by the quality of the glass used in the container.

ASCOLI (M.) & SANFILIPPO (E.). **On the Immunization of the Goat against Undulant Fever.**—*Jl, Trop. Med. & Hyg.* 1927. Jan. 15. Vol. 30. No. 2. pp. 19–21.

The authors find that goats can be immunized to an as yet undetermined extent by inoculation with cultures of *B. melitensis* killed either by heating to 60° C. for two hours or by a 1 per cent. solution of gold-chloride. The latter vaccine is better tolerated, it caused less reaction, and produced a higher agglutinin concentration.

Only two animals have been treated.

MESSIERI (A.). Studio sperimentale sull'infezione da germi del genere "*Brucella*" nella specie canina. [**The Experimental Study of the Infection of Dogs with the Genus** *Brucella*.]—*La Nuova Veterin.* 1926. Dec. 15. Vol. 4. No. 12. pp. 317–325.

The author has carried out comparative tests with *M. melitensis* of caprine and of human origin and with *B. abortus* Bang.

He finds that dogs offer a high degree of resistance to infection, and that to achieve infection large doses of organisms are requisite.

The organisms do not persist for long in the bodies of dogs so infected.

The dog does not furnish any differential criterion between the types of organisms used.

BÉQUET (M.). Sur les conditions de l'agglutinabilité des microbes et du phénomène de l'agglutination. (Étude faite sur *Br. melitensis* et *Br. abortus*.) [**The Conditions controlling the Agglutinability of Microbes and the Phenomenon of Agglutination using** *Br. melitensis* **and** *Br. abortus*.]—*Ann. Inst. Pasteur.* Jan. 1927. Vol. 41. No. 1. pp. 49–58.

The phenomenon of agglutination depends upon the flocculation of various bacterial substances which are in part absorbed by the bacterial bodies and in part diffused in the liquid. It occurs under conditions which vary with the concentration of these substances, the temperature, and the ionization of the suspending liquid. These conditions are governed by the general laws applying to the stability of colloidal solutions. With regard to *Br. melitensis* there is evidence to show that: (1) There is a substance which is flocculable by heat in normal saline, by acids and by non-specific sera, and from which one can free the suspension by adsorption with animal charcoal. This substance is

according to BURNET a superficial production of the microbe; (2) a substance which is flocculable by bases even after the action of animal charcoal; (3) a purely bacterial substance belonging to the genus Brucella which is flocculable by specific sera, which passes in part into the liquid to maintain equilibrium whenever a suspension of the organism is prepared. The flocculation of this substance is hindered by a sufficient concentration of the substance flocculable by heat.

ZELLER. Zur Schafrauschbrandfrage. [**Black-leg in Sheep.**]—*Deut. Tierärzt. Woch.* 1926. Dec. 4. Vol. 34. No. 49. pp. 847–849.

The author, as a result of his investigations, concludes that the organisms responsible for black-leg in cattle and sheep are closely allied. Morphologically, culturally, and in their effects upon guinea-pigs, cattle, and sheep they are alike. Nevertheless, they differ from each other in certain biological characters.

In immunizing cattle and sheep the appropriate strains should be used.

M'EWEN (A. D.). **Quarter-Evil and Braxy: Studies regarding Immunity.** —*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 253–283.

This paper is divided into two parts, dealing with the two types of nfection. In Part I the cultural characters of *B. chauvoei,* including fermentation reactions, agglutination tests, and various methods of conferring immunity, are described. In connexion with the cultivation of *B. chauvoei* the author describes a new and very valuable method of obtaining cultures which are quite free from the tissue débris always found in Tarozzi medium. Apart from this, however, the method renders possible the preparation of standardized suspensions.

The essence of the method is to place the requisite amount of animal tissue in a semi-permeable container which is immersed in the broth. The containers used are "Whatman's Diffusion Shells" of artificial parchment, and the technique of the preparation of the medium is as follows: Broth, containing sugars as required, is placed in conical flasks. The diffusion shells are soaked in water which is momentarily brought to the boil. The water is poured off, and minced liver to the extent of 1 gramme per cc. of broth placed in the shells along with one or two glass beads as sinkers. The shells are lowered into the broth, and broth is added (by means of a pipette) to bring the levels inside and out alike. Flasks thus prepared may be used without having recourse to the anaerobe jar by the addition of a layer of liquid paraffin. Sterilization is effected by autoclaving.

*B. chauvoei* gives evidence of growth in about 8 hours, if suitable sugar be present, and growth reaches its maximum in 16 hours. In such cultures cylindrical bacillary forms predominate. Swollen forms are rare and spores may not be found even after prolonged incubation.

Growth appeared to be most abundant in media at pH. 7·8 or 8.

The values of different sugars in promoting growth was determined by Gates' platinum loop density tests. Saccharose was found to be the best, and it was used in the place of glucose in routine work. Agglutination tests carried out with nine strains of *B. chauvoei* showed that they all belonged to one type.

Filtrates of *B. chauvoei* are capable of conferring a considerable degree of immunity upon animals, and they are non-toxic. A higher degree of immunity can, however, be conferred by the use of vaccines composed of *B. chauvoei* which have been killed by formalin. Twenty-hour cultures were used and these were sterilized by the addition of ·5 per cent. formalin. In connexion with the immunizing properties of germ-free filtrates it was found that 24-hour cultures were as valuable as older growths.

In contradistinction to the results obtained with *B. chauvoei*, it was found that non-toxic filtrates of *V. septique* conferred no immunity. Toxin was rendered inert by exposure to 65° C. for half an hour. Toxic filtrates on the other hand may, in relatively large doses, produce a considerable degree of immunity. For this reason, filtrates of cultures of *V. septique* are of less value than those of *B. chauvoei*. *V. septique* or its spores can be used as a safe and reliable vaccine when it has been killed by formolization. Small doses only are sufficient to confer immunity.

CLAVERIE (J.). Au sujet du charbon bactéridien et de la vaccination par la voie intradermique en Guinée française. [**Anthrax and Intradermic Vaccination in French Guinea.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 864–870.

Anthrax is known in Upper, Middle, and Lower Guinea, but there are no statistics regarding the frequency of occurrence. The author estimates that out of a cattle population of about 750,000, there are at least 750 deaths a year. It is exceptional to find any local lesion indicating the portal of entry of the virus in animals dead of anthrax. The disease occurs most frequently at the end of the dry season when grazing and water are scanty, and the cattle eat what grass there is right down to the roots and in so doing ingest a considerable amount of earth. There are some indications that overwork of draught oxen is a factor in the causation of anthrax.

In carrying out intradermal vaccinations it was found that the 2nd vaccine of the Pasteur Institute could safely be used in doses of $\frac{1}{4}$ and $\frac{1}{8}$ cc. for bovines and sheep, but that these doses were likely to be followed by a mortality of 50 per cent. in goats.

HRUSKA (Ch.). Recherches expérimentales sur le charbon. Production d'un sérum anticharbonneux actif par injections simultanées de liquide d'oedème et de bactéridies charbonneuses animalisées. [**Experimental Investigations regarding Anthrax. The Production of Anti-Anthrax Serum by the Simultaneous Injection of Oedematous Liquid and "Animalized" Anthrax Bacilli.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 72–81. With 2 text figs.

In hyperimmunizing animals for the production of anti-anthrax serum the amount of reaction produced by successive doses decreases although the dose of infective material increases. But if a hyperimmunized animal be injected with subcutaneous exudate from an animal dying as a result of subcutaneous inoculation with anthrax there is produced an oedema at the seat of injection which varies in

amount with the dose. Experiments are quoted to show that antiserum produced by the use of oedema as antigen is more efficient than antiserum produced in the ordinary way.

The active substance is filterable and thermostable. Extract of spleen in saline produces a similar effect to the oedema, but to a far less marked extent.

The injection of oedema into animals not hyperimmunized leads only to a rise of temperature.

FRIEDHEIM (E. A. H.). Sur l'action du sérum normal de cheval dans le charbon expérimental du cobaye. [**The Action of Normal Horse Serum in Experimental Anthrax in Guineapigs.**]—*C.R. Soc. Biol.* 1927. Jan. 28. Vol. 96. No. 3. pp. 187–188.

The author briefly summarizes the views which have been expressed regarding the comparative values of normal horse serum and specific anti-anthrax serum for the protection of laboratory animals against infection with anthrax, and gives details of some experiments carried out. He did not find that horse serum conferred any degree of immunity. Anti-anthrax serum from the Pasteur Institute did confer a certain amount of immunity.

BERTHELOT (A.), RAMON (G.) & AMOUREUX. Recherches biochimiques sur les toxines et leurs dérivés. I. Étude des facteurs qui influencent l'élaboration de la toxine tétanique et sa transformation spontanée en anatoxine. [**Biochemical Investigations of Toxins and their Products. I. The Factors influencing the Elaboration of Tetanus Toxin and the Spontaneous Change into Anatoxin.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 83–130. With 3 text figs.

Meat broth and spleen broth are equally good as regards the production of toxin, and the most favourable reaction is pH 6·7. The addition of mixtures of glucose and sodium pyruvate, or glucose and acid potassium phosphate, increases the amount of toxin to a greater extent than the addition of any of these separately. The addition of 8·3 g. of acid potassium phosphate, 2 g. of pyruvate of soda, and 5·5 g. of glucose per titre causes the pH to drop to between 5·5 and 5. Incubation for three months produces a pH of 6·5 to 5·5. The salts should be prepared in concentrated sterile solutions and added to the ordinary peptone broth. By the addition of 75 per 1,000 of tapioca cultures incubated for three weeks one obtains a toxin that is three or four times as powerful as that obtained in ordinary broth. Toxin is also formed in acid well buffered media.

PRIBRAM (E.). Die Gruppe des *B. septicaemiae haemorrhagicae.* [**The Haemorrhagic Septicaemia Group of Organisms.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1–3. pp. 78–79.

This is a reply to a charge made by CSONTOS that the author has worked with contaminated cultures.

NICOLAS (E.). Prévention et traitement des infections oculaires des animaux à l'armée française du Levant par les bouillons-vaccins de staphylocoques et streptocoques associés. [**The Prevention and Treatment of Diseases of the Eyes in Animals belonging to the French Army in the Levant by Vaccines of Staphylococci and Streptococci.**]—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 1075–1079.

This paper records reports received from veterinary officers regarding the treatment of suppurative conditions involving the eyes by vaccines prepared according to BESREDKA's technique.

Generally speaking, the results were distinctly favourable, and particularly in cases where there were wounds.

DIKOMEIT (B.). Ueber ein einfaches Verfahren zur Konservierung lebender Bacterienkulturen. [**A Simple Method of preserving Living Cultures of Bacteria.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. Jan. 3. Vol. 101. No. 4–5. pp. 290–304.

Three pages of this article are given over to references to literature regarding the conservation of bacterial cultures. The method used by the author is that described by NISSLE in 1924.

A mixture of equal parts of anhydrous lanoline and liquid paraffin is sterilized in plugged flasks.

Cultures are made on plates and the growth is scraped off with a large loop and placed on the wall of sterilized test tubes. The lanolin-paraffin mixture is warmed to 38° C. and poured into the tubes covering the culture placed on the wall. It rapidly sets and the tubes thus prepared are placed in cold storage. When subcultures are required the media to be inoculated are warmed to 37–38° C. as are also the conserved tubes. Then growth is lifted out with the needle and spread well over the culture medium. In this way the author has preserved streptococci unchanged for a year, and subcultures have possessed all the characters of the preserved organisms. Pneumococci have been kept for 6 months, meningococci for 31 days, diphtheria bacilli for 7½ months, typhoid and Shiga-Kruse bacilli also for the same period.

TURNER (A. W.). **Wattle Disease of Fowls in Victoria.**—*Jl. Austral. Vet. Assoc.* 1926. Dec. Vol. 2. No. 4. pp. 127–129.

Wattle disease, which was investigated by SEDDON in 1914, is a condition in which there is acute oedema of the wattles, followed by necrosis, suppuration and distortion of the structure.

A bipolar organism has been isolated repeatedly. This causes fatal septicaemia when inoculated subcutaneously into rabbits, but does not cause any disturbance of health in fowls so inoculated.

Inoculated locally into the wattles the typical lesions of the natural disease are produced. It is exceptional for death to occur from septicaemia in naturally infected birds.

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HAGAN (William A.). **The Value of Placental Examination for the Diagnosis of Infectious Abortion of Cattle.**—*Cornell Vet.* 1926. Oct. Vol. 16. No. 4. pp. 274–278. With 1 plate.

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## DISEASES DUE TO FILTERABLE VIRUSES.

NESER (C. P.). **Blood Studies: a Contribution to the Study of the Blood and Circulation in Horse-Sickness.**—*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 33–53. With 7 graphs.

In the advanced stages of dikkop the blood plasma acquires the property of causing the clumping of the red blood corpuscles. The poverty of the jugular blood in erythrocytes is probably accounted for by a combination of the agglutination of the corpuscles and enfeebled action of the heart. These favour retention of the red cells in the capillary system. This in turn reduces the peripheral resistance and allows the weakened heart to maintain a fairly bulky circulation in spite of the interference with its action by pericardial exudate. The dyspnoea is probably due to the inability of the heart to carry a sufficiently bulky circulation for oxygenation and the removal of waste products.

If oedema formation is rapid and extensive and if paralysis of the pharynx and oesophagus persist the jugular blood may become rich in cells, and the consequent increase in peripheral pressure may cause cardiac failure.

In peracute and mild cases, these changes are not observed, probably for the respective reasons that there is not sufficient time for the development of haemagglutinins or that a sufficient amount is not formed.

Leucocytes always tend to become reduced in number in the jugular blood, and their rate of reduction is an index of the severity of the disease.

MÉLANIDI (C.) & STYLIANOPOULO (M.). Notes sur la peste bovine en Grèce. [**Rinderpest in Greece.**]—*Rev. Gén. Méd. Vet.* 1927. Feb. 15. Vol. 36. No. 422. pp. 72–78.

In December, 1924, rinderpest made its re-appearance in Greece, and investigation indicated that it had been imported from Syria. It was admitted apparently that the quarantine regulations had not been rigidly enforced.

The authors note particularly that lesions occurred in many cases on the mucous membrane of the genital organs. The intestinal lesions were typical, but in no case were cutaneous eruptions seen.

Arrangements were made to prepare antiserum at once.

The disease was controlled by the slaughter of animals with visible lesions, the intravenous or intraperitoneal injection of 100–200 cc. of antiserum, and apparently healthy animals were given 30–50 cc. of antiserum subcutaneously.

In no case was piroplasmosis encountered as a complication among native animals, but in imported animals relapses to both *B. bigeminum* and *G. mutans* were met with.

The authors add details of certain other observations. Bone marrow preserved in cold storage was avirulent after two months and conferred no immunity. Two cubic centimetres of blood kept in cold store for nine days produced a mild thermal reaction only in a calf.

A calf which was housed in close contact with infected animals did not develop the disease until two months later. In one animal used as a

virus producer, the withdrawal of 5 litres of blood and its replacement with normal saline on the first day of fever, was followed by a temporary marked improvement in the animal. The next day the temperature rose again and the disease ran a typical course to a fatal termination.

RICHARDSON (U. F.) & CARMICHAEL (J.). **Epizootic of Rinderpest dealt with by Local Serum Production in an Outlying District of the Uganda Protectorate.**— *Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 311–317. With 2 text figs.

The outbreak occurred in an area known as West Nile, and populated by tribes breeding diminutive cattle of the zebu type. The cattle population is estimated at over 100,000 head. These animals are very susceptible to rinderpest. As Kenya Colony could not supply the serum required, it was decided to attempt production on the spot.

Three weeks sufficed to erect the four-roomed house with grass roof and cement floor, and the necessary equipment was transported from the Central Laboratory at Entebbe. The native suspicions were dispersed by demonstrations with 600 doses of serum available.

At first, naturally immune animals were used for hyperimmunization, but later, susceptible animals were used after they had been immunized by the simultaneous method. The technique varied a little from time to time as experience was gained. Virus producers were bled to death into citrate solution. This citrated blood was injected by gravitation intramuscularly (the gluteus maximus and longissimus dorsi. The blood was injected at 15 cc. per kilo. live weight. The average weight of the local breed was about 500 lb. The animals were bled for serum seven days after hyperimmunization. Serum producers were bled once a week for six weeks, and, after a week's rest, were hyperimmunized again. About 2½ litres of blood were taken at each bleeding. The blood was allowed 24 hours to clot and then a weight (500 grammes) was allowed to press the clot formed. The serum obtained was about 50 per cent. of the blood drawn. The serum was drawn off after a second 24 hours; for convenience it was stored in 25-litre wine flasks obtained from the Belgian Congo, with 1 part of 10 per cent. carbolic acid added to 20 parts of serum. After 2 months, 80 litres of serum were being produced weekly. Brews were tested on 5 to 10 susceptible animals in doses of 5 to 10 cc. per 100 lb. body weight with 2 cc. of virulent blood. A virus control was always included.

After eradication of the outbreak in cattle the danger of re-infection from game necessitated the double inoculation of over 35,000 animals in the northern part of the district. The southern part was protected by an immune belt.

The mortality following inoculation varied in different parts. In known clean cattle it was 2–4 per cent. In some areas it was as high as 9 per cent., but here other adverse factors were involved.

The titre of the serum varied considerably. The best serum was obtained from hyperimmunized naturally immune animals. 10 cc. of this was sufficient to block out a reaction in a 400–500 lb. animal.

The serum made from animals artificially immunized before hyperimmunization was not nearly so strong. It was given at the rate of 8 cc. per 100 lb.

*T. theileri*, *T. vivax* and *T. brucei* were recognized, and they appeared to be non-pathogenic until the vitality of the animals was lowered by inoculation.

KAKIZAKI (C.), NAKANISHI (S.) & OIZUMI (T.). **Experimental Studies on Prophylactic Inoculation against Rinderpest. Report III.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Dec. Vol. 5. No. 4. pp. 221–280.

The authors describe experiments with a vaccine prepared from spleen pulp by incubation at body temperature. The details are not given in this report as they have already appeared in earlier ones.

The spleens are used from 24 to 72 hours after the rise of temperature.

A single dose is said to confer immunity, but if the vaccine is given during the period of incubation, it does not prevent the development of the disease. No controls were used in any of the tests because the virus used is said to have been absolutely infective. The dose used is about 0·5 cc. per kwan (3·75 kg.). The vaccine remains effective when stored for periods up to 3½ years. Vaccine made from lymphatic glands was inferior to that prepared from spleen pulp.

GERLACH (F.) & MICHALKA (J.). Ueber die im Jahre 1925 in Österreich beobachtete Geflügelpest. [**The Outbreak of Fowl Plague in Austria in 1925.**]—*Deut. Tierärzt. Woch.* 1926. Dec. 25. Vol. 34. No. 52. pp. 897-902. With 12 text figs.

In 1925 an outbreak of fowl plague occurred in Austria, and it is suspected that the disease was introduced from North Italy. The imposition of strict regulations prevented the outbreak from spreading very widely. Fowls, turkeys, geese and other birds died.

Infective blood mixed with normal saline or with glycerin retained its virulence for eight weeks, and in sealed tubes for three months. Organs preserved in 50 per cent. glycerin retain their virulence for 3 to 5 months, but putrefaction causes a rapid disappearance of the virus.

The period of incubation ranges from 24 hours to a week, with an average of two days.

The clinical symptoms include: Fever, dullness, loss of appetite, ruffling of the feathers, squatting on the ground, oedema of the eyelids, head and neck, haemorrhages in the conjunctiva, mucous nasal discharge, diarrhoea. In some cases acute parenchymatous changes were found in the solid organs at the post-mortem. Haemorrhages were found in the gizzard.

The occurrence of inclusion bodies in the brains of infected geese was confirmed.

NAKAMURA (N.) & KAWAMURA (Y.). **An Experimental Study on the Virus of Fowl Pest. I. On the Susceptibility of the Pigeon.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Dec. Vol. 5. No. 4. pp. 281–294.

Provided sufficiently large doses are given, the virus is transmissible to the pigeon by feeding or by inoculation, but the disease does not spread by simple contact. The virus can be passed through pigeons in series and still remain infective for the fowl.

NAKAMURA (N.), FUTAMURA (H.) & WATANUKI (T.). **On the Practical Value of Several Serological Reactions for the Diagnosis of Contagious Pleuro-pneumonia of Cattle.**— *Jl. Jap. Soc. Vet. Sci.* 1926. Dec. Vol. 5. No. 4. pp. 296–318.

The authors find the precipitin and agglutination tests unsatisfactory, both because of failures to identify certainly infected animals, and because of positive reactions with healthy controls.

With satisfactory antigen the complement fixation test is reliable. The antigen was prepared as follows: A 10-day old culture on 3 per cent. horse serum agar (3 per cent.) was emulsified, after removal of the water of condensation in 3 cc. of saline. This was heated at 60° C. for three hours and then carbolized to the extent of 0·5 per cent.

MOHLER (J. R.). **Foot and Mouth Disease. With Special Reference to the Outbreaks in California in 1924 and Texas in 1924 and 1925.** *U.S. Dept. of Agric. Dept. Circular 400.* 1926. Dec. 82 pp. With 12 text figs.

This Circular gives particulars regarding the outbreaks of foot-and-mouth disease in California and Texas in 1924 and 1925.

The infection was traced in the California outbreak to feeding with garbage from the Mare Island Navy Yard, but it could not be traced to any particular ship. Many of these had obtained supplies in Eastern Ports and the garbage unloaded contained a great deal of meat. The spread of the disease and the methods used for control and eradication are described. Quarantine, slaughter and disinfection were relied upon. In handling large mobs of cattle these were driven into a trench dug with a steam shovel and there shot. All carcases were eviscerated, covered with quicklime, and then the trench was filled in.

In outbreaks occurring in packers' yards as many as possible of the animals were slaughtered for food in the usual way. Rigid ante- and post-mortem examinations were carried out.

The problem was complicated by the appearance of the disease in deer on the ranges and an attempt was made by a group of individuals to obstruct and even prevent the work of investigation and control among these animals.

Active work among infected deer was carried on from November, 1924 to July 1925, during which period 20,819 deer were destroyed. The percentage of those showing evidence of infection ranged from 8·9 to 37·25 weekly.

The lesions found in cattle and deer are described and there is also an account of lesions resembling those of foot-and-mouth disease.

The Texas outbreak began on September 27th, 1924, and in this case suspicion for the source of infection rested upon ships' crews coming ashore. There was some evidence to show that the tank water supply might have become infected through such men washing their clothing in it.

The outbreak was limited and was eradicated within 30 days of the expert control being instituted.

There was a recurrence 10 months later.

In discussing the general results of the work of eradication reference is made to the susceptibility of the guineapig to vesicular stomatitis, and it is emphasized that, in view of this, guineapig inoculation should not be relied upon alone for the recognition of the disease.

KÜNIKE (G.). Experimentelle Untersuchungen über die Möglichkeit der Uebertragung der Maul- und Klauenseuche durch Fliegen. [**Experiments regarding the Possibility of Flies carrying the Virus of Foot and Mouth Disease.**]—*Berlin. Tierärzt. Woch.* 1927. Feb. 25. Vol. 43. No. 8. pp. 123–126.

The experiments detailed show that flies are not specific hosts for the virus, and that as mechanical carriers of the infection their possible rôle is strictly limited.

LEVADITI (C.), GALLOWAY (I.) & NICOLAU (S.). Essais de culture du virus aphteux dans le cerveau de lapin. [**Attempts to cultivate the Virus of Foot and Mouth Disease in the Brain of the Rabbit.**]—*C.R. Soc. Biol.* 1927. Feb. 18. Vol. 96. No. 6. pp. 395–397. With 1 text fig.

The authors state that while the results of the intracranial inoculation of rabbits with the virus of foot-and-mouth disease have been usually negative, they have succeeded in one instance in carrying it on through three passages.

RUPPERT (F.) & ROTTGARDT (A.). Ueber eine neue Art der Herstellung von Maul- und Klauenseuche Antiserum und seine Wirksamkeit. [**A New Method of preparing Foot and Mouth Disease Serum and its Effectiveness.**]—*Berlin. Tierärzt. Woch.* 1926. Dec. 24. Vol. 42. No. 52. pp. 897–898.

According to the authors the virus of foot-and-mouth disease remains localized at the point of entry and does not gain the blood stream until five hours have elapsed. They hold that the period of infectivity of the blood is in reality longer than has been generally thought. The blood and the internal organs are, they believe, infective up to 3 or 4 days.

Blood in quantities of 6 and 8 litres respectively was drawn from two calves when at the height of a temperature reaction due to intravenous inoculation. The blood was citrated to prevent clotting, and injected intraperitoneally into two cows. A fortnight later the cows were bled and the serum obtained was mixed.

This serum was sent from the Argentine to Germany for test, and it was reported that 0·1cc. protected a guineapig against generalization. Testing the serum on a large scale, 19 bovines were given 10 cc., 21 received 20 cc. and 20, 30 cc. of the serum, and there were 40 untreated controls.

These animals were pastured where they were in close contact with infected herds. Within a few days 40 per cent. of the controls but none of those which had been given serum were infected. A similar test was carried out using 147 animals with 225 controls. Doses of 10, 20, and 30 cc. of serum were used as before. About 60 per cent. of the controls, 3 animals which had had 10 cc. and one which had had 30 cc. became infected on the tenth day.

In a third test 15 animals were used, 5 with each of the doses used before. These animals were mixed with 453 animals among which the disease was rife; none of the protected animals became infected.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). Recherches sur la rage. [**Rabies Investigations.**]—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 973–1069. With 1 plate in colour, 14 figs. 19 charts.

The authors believe that the virus of rabies is a micro-organism which resembles the Microsporidia of the Family Glugeidae. While it bears striking resemblances to *Encephalitozoon cuniculi*, it is not justifiable to conclude that the two are identical. They propose the name *Glugea lyssae* for the parasite.

The parasite passes through a complicated life cycle which is at present known only in part. The phase which is best known is the intracellular pansporoblast stage.

It is probable that there exists a stage of spores or amoeboid germs, which are the multiplicative forms and which are ultra-microscopic. Nothing is known regarding the morphology of this phase.

The pansporoblast phase is not essential; rabies can develop without it. The fixed virus is a variant of the parasite produced by mutation. It is probable that there are numbers of varieties of the parasite. The fixed virus is a strictly neurotropic variety for the species of animal in which the mutation has been effected.

It is important to establish that there may exist in nature strains of *Glugea lyssae* which possess the characters of the fixed virus. This may explain the mutability of street virus by passage through rabbits.

Finally, there appears to be a certain degree of antagonism between the fixed virus and the pansporoblastic variety of *Glugea lyssae* (street virus).

REMLINGER (P.). Note sur les virus de rue envoyés de Tanger à M. Levaditi. [**A Note on the Street Viruses sent to Levaditi from Tangier.**]—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 1070–1074.

This short paper gives the histories of 12 viruses sent to LEVADITI for his experiments.

MIESSNER (H.) & BAARS (G.). Immunisierung gegen Lyssa der Hunde mit Lyssin. [**Immunization of the Dog against Rabies by means of Lyssin.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1–3. pp. 79–108.

Since 1915 there has been a marked rise in the number of cases of rabies in Germany, particularly among dogs, and the number of persons undergoing inoculation is now about four times as large as it was at that date. Among the causes for this are the disorganization of the veterinary police services as a result of the war, and the increase in the dog population.

In countries having land frontiers, general protective inoculation of dogs against rabies would no doubt be the safest method of protection, but it would be too costly. The authors devote several pages to a review of the literature regarding protective inoculation against rabies before passing on to describe their own experiments.

The majority of these were carried out with fixed virus from Breslau, a strain that has been in use for many years for the protective inoculation of human beings.

From the results of experiments carried out on 53 dogs which were inoculated, in some cases once and in others twice, either intra-abdominally or subcutaneously, it was concluded that by this means protection can be conferred, that the degree of immunity varies with the virulence and dose of the virus used. The Breslau virus in doses of 1 to 1·5 g. did not produce rabies in any of the dogs small or large, and conferred a safe degree of immunity against subsequent intramuscular inoculation.

Forty dogs were inoculated with carbolized glycerinized virus. One of these died of rabies. None of the survivors died of rabies when inoculated with virus later. The dose, however, is large and, probably on account of the glycerin it contains, it not infrequently leads to abscess formation at the seat of injection. Further, vaccine prepared according to the Japanese technique cannot be used after two or three weeks.

The dry virus " Lyssin " is prepared as follows. The brain and cord of rabbits dead of fixed virus are ground up in a mortar with powdered chalk, the proportion being 5 of nerve tissue to one of chalk. This not only makes the grinding more effective, but it helps to remove the fat. Three volumes of normal saline are added and the resulting emulsion is strained through muslin. The filtrate is evaporated to dryness in 24 hours in a Faust-Heim exsiccator at 24° C. The temperature is important. The dried virus is pulverized and weighed. 0·364 g. of " chalk-lyssin " corresponds with 1 g. of the fresh fixed virus. This is stored in corked flasks the necks of which are paraffined. When required for use the powder is ground up with 3 times the quantity of normal saline.

Fifty dogs were inoculated with doses of Lyssin corresponding to 0·45 to 2·5 g. of fresh virus, and 70 received doses corresponding to 0·9 g. of fixed virus.

Two dogs which received 1·5 and 2·5 g. died of rabies.

After some of the animals had been set aside for later testing, 95 dogs were inoculated with street virus. Two of these died of rabies.

Lyssin can be used for periods of at least nine weeks after preparation, and experiments showed that the immunity lasts for at least a year.

Experiments failed to produce evidence that animals inoculated with Lyssin could infect susceptible dogs by biting, nor were their saliva and central nervous systems virulent when tested by inoculation.

COSTA (S.), BOYER & PLACIDI (L.). Essai de vaccination antirabique par un vaccin formolé. [**Attempts to vaccinate with an Anti-Rabic Formolized Vaccine.**]—*C.R. Soc. Biol.* 1927. Feb. 4. Vol. 96. No. 4. pp. 293–294.

The authors have prepared a vaccine in the following manner: The brain of a rabbit dead on the 9th day after intracranial inoculation with fixed virus is finely triturated with 10 cc. of normal saline. The emulsion is strained through gauze and formolized to the extent of 1 in 300. In half an hour the emulsion is sterile. Five cubic centimetres of this, which correspond to half the brain, are injected subcutaneously in the lumbar region. For intracutaneous vaccination the same vaccine is rubbed into a square decimetre of shaved skin on the abdomen and a square of gauze soaked in the vaccine is bound in place under a waterproof cover.

Other rabbits are given two injections of 2·5 cc. at a 5-days interval. When tested 15 days later by intracranial inoculation with fixed virus these animals all die.

Series of rabbits are given 4 subcutaneous inoculations of vaccine, prepared 30 hours before and kept at room temperature, in doses ranging from 0·5 to 2 cc. at varying intervals. When tested fifteen days later by intra-ocular inoculation, they resist infection, but die in the ordinary way, when inoculated intracranially later. Daily instillation of the vaccine into the eye for eight days, and intracranial injection of 1 cc. of the vaccine fail to protect against intra-ocular injection of the same virus.

Another method of preparing vaccine that has been tried is as follows :

The brains of two rabid rabbits are triturated with 40 cc. of normal saline. The emulsion is centrifuged for half an hour at 5,000. Twenty cubic centimetres of supernatant liquid is formolized to 1 in 1,000 (A). The sediment is shaken up in the remainder of the liquid and formolized to 1 per cent. (B). Series of rabbits inoculated (path not stated) 15 times with the two vaccines resist intra-ocular inoculation with fixed virus, and similar results are obtained after 8 injections of 2 cc. on every other day. Such rabbits succumb to intracranial inoculation.

PLANTUREUX (Edm.). Traitement antirabique des animaux par un vaccin formolé. [**The Antirabic Treatment of Animals by Formolized Vaccine.**]—*Rev. Gén. Méd. Vét.* 1926. Nov. 15. Vol. 35. No. 419. pp. 619–624.

A vaccine for veterinary use must not only be effective and free from danger, but must also fulfil the following condtions. It must require only a few injections, it must not be expensive, and it must be capable of being used at a distance from the laboratory.

The author has carried out experiments with a 10 per cent. emulsion of dog's brain (the dog having died from infection with fixed virus), in a 1 per 2,000 solution of formalin in distilled water. He had favourable results when the vaccine was given prior to infection, but they were less satisfactory when it was administered after infection. These latter he attributes to rabic toxin.

In preparing the vaccine the following technique has been finally fixed. The brain of the dog is emulsified after grinding in a mortar with 9 parts of 4 per thousand formalin. This is filtered through gauze, and kept for a week at 10–15° C. It is then centrifuged and the supernatant liquid is replaced by salt solution.

Experiments indicated that the immunity was to some extent proportional to the number of doses of vaccine given, and that there should be a fairly long interval between doses. Dogs which received 10 cc. followed at an interval of 17 days by 30 cc. were better protected than those which received 30 to 50 cc. in two or three doses at intervals of one or two days.

MARIE (A. C.). Pouvoir pathogène du virus rabique fixe. [**The Pathogenicity of the Fixed Virus of Rabies.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 45–48.

As a result of experiments carried out with rabbits and guineapigs, the author finds that the fixed rabic virus of the Pasteur Institute at Paris has not undergone any modification. A six-day cord is pathogenic for the guineapig by intracranial injection, but guineapigs and

not rabbits must be used for the test. The virulence does not always vary directly with the age of the cord. In guineapigs there is no prolongation of the period of incubation in proportion to the age of the cord.

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BARBIER (A.). Une epizootie de rage sur le renard. [**An Epizootic of Rabies in the Fox.**]—*Rev. Gén. Méd. Vét.* 1926. Nov. 15. Vol. 35. No. 41. pp. 609–618.

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## MYCOTIC DISEASES.

LAJOS (T. V.). La fórmula leucocitaria en la linfangitis epizoótica. [**The Leucocyte Formula in Epizootic Lymphangitis.**]—*Revist. Hig. y Sanidad Pecuarias.* 1926. Nov. Vol. 16. No. 11. pp. 765–768.

The following is a translation of the author's French summary :—

In 79·8 per cent. of cases the leucocyte formula of horses affected with epizootic lymphangitis is normal. In the others the count is below normal. The neutrophiles never number as many as 76 per cent. It is easy to distinguish between farcy and epizootic lymphangitis by comparing the leucocyte formulae. In epizootic lymphangitis the number of leucocytes never exceeds 12,000 per c.mm. In farcy it often reaches 20 to 60 thousand. The percentage of neutrophiles is also a clear indication. In epizootic lymphangitis it is normal, and in farcy it is much higher.

OCÁRIZ (J.). La autoseroterapia en el tratamiento de la linfangitis epizoótica. [**Autoserum-Therapy in the Treatment of Epizootic Lymphangitis.**]—*Revist. Hig. y Sanidad Pecuarias.* 1926. Dec. Vol. 16. No. 12. pp. 854–864.

The following is a translation of the author's French Summary :—

Autoserum-therapy is a valuable adjuvant in the treatment of epizootic lymphangitis, no matter what method of treatment is resorted to.

At least 800 cc. of serum should be injected at a dose, and even a litre may be exceeded without ill effect. An interval of at least 15 days should be allowed to elapse between doses, but the condition of the lesions is the best index as to when the serum should be repeated.

The serum should be injected in such a manner so as to form a barrier round the lesions.

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## MISCELLANEOUS.

ROSS (I. Clunies). **An Experimental Study of Tick Paralysis in Australia.** —*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 410–429. With 2 text figs.

The author has observed many experimental cases of tick paralysis in the dog, due in every instance to *Ixodes holocyclus*. These were reared from immature stages taken from bandicoots caught near Sydney.

The interval elapsing between attachment and symptoms is variable, depending apparently upon the degree of engorgement, and is never less than five days. The period of incubation tends to be longer in winter than in summer.

There are no premonitary symptoms. The first constant symptom is a slight degree of inco-ordination affecting the hind legs and this progresses so rapidly that within 2 or 3 hours the dog may not be able to stand. Gradually the whole body becomes involved. If food or water are swallowed there is violent retching, but vomition does not occur until the later stages.

Sensibility appears little affected, and consciousness is not impaired until the very late stages.

The cardiac function is little disturbed, and defaecation and urination are not affected while the dog can stand.

Death appears to be due to respiratory paralysis. The heart may go on beating for several minutes after respiration has ceased.

No recovery has taken place when the paresis was such as to prevent a dog from standing.

On post-mortem examination anatomical lesions are absent or inconspicuous.

Histological examination of the central nervous system shows only minor changes of a vascular nature.

The facts appear to suggest that the toxin does not act peripherally, but upon the motor neurones of the anterior horns and on the nerve cells of the cranial nerve nuclei.

Although tick paralysis is due to the adult female ticks only, certain pathological effects have been observed to follow infestation with immature stages of *Ixodes holocyclus* and other species.

Extensive infestation of man with larvae causes intense irritation, and in some cases head ache and nausea. In no case has paralysis been produced.

In the author's experiments he has been unable to discover any causal organism. Nor has he been able to produce the disease in dogs by inoculation. The facts do not appear to suggest an infective disease since the period elapsing before symptoms occur seems to depend upon the rate at which engorgement takes place. Further, if ticks are removed before symptoms occur, even when left until engorgement is nearly complete, attacks do not develop.

Experiments show that the host upon which the immature stages engorge themselves has no influence upon whether such a tick proves pathogenic or not as an adult. It is believed that a toxin derived from the salivary glands of the tick is the cause of the condition. The maximum amount of secretion is poured out by the salivary glands two days before engorgement is complete. An emulsion of salivary glands produced a rise of temperature and vomition when injected into a dog.

The mixing of an emulsion of salivary glands with blood delayed coagulation, but there was no evidence of haemolysin.

There is as little experimental evidence regarding the production of immunity, but what there is tends to suggest that an attack confers some degree of resistance.

COWDRY (E. V.). **A Group of Micro-Organisms transmitted hereditarily in Ticks and apparently unassociated with Disease.**— *Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 147–158. With 3 plates.

The organisms found resemble Rickettsia, but were definitely larger. Their distribution was limited to the malpighian tubules and although

they resembled the symbionts of certain lice and blood-sucking flies, they differed from these in that the latter inhabit the digestive tract.

The organisms are bacterium like, and intracellular in position. They are pleomorphic, gram-negative and stain less intensely than ordinary bacteria with basic dyes. They have been detected in the following species : *Amblyomma americana, Argas persicus, Boophilus decoloratus, Dermacentor variabilis, Dermacentor venustus, Haemophysalis leachi, Hyalomma aegyptium, Margaropus annulatus, Margaropus annulatus australis, Ornithodorus megnini, Ornithodorus turicata, Rhipicephalus appendiculatus, Rhipicephalus evertsi, Rhipicephalus sanguineus,* and *Rhipicephalus simus.*

Apart from physical distension of invaded cells there was no evidence of abnormality in the tissues affected.

Their detection in the eggs, larvae, and other stages of the life cycle indicates hereditary transmission.

COWDRY (E. V.). **Cytological Studies on Heartwater. I. The Observation of** *Rickettsia ruminantium* **in the Tissues of Infected Animals.** —*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 161–177. With 2 plates (1 coloured).

The experiments have been carried out with virus which was readily transmitted from animal to animal by inoculation. Cattle, sheep, and goats were used. The period of incubation is about 10 days. As controls there were the following : 3 sheep and 3 goats, which presented no appearance whatever of illness, 12 sheep bled out in the preparation of blue-tongue vaccine, 4 killed at an advanced stage of jagdsiekte, 2 cattle dead of snotsiekte, and 1 of lamsiekte. The appearance of the bodies in the spleen coincided with a phase of the febrile reaction. They were restricted to the endothelial cells, and the clumps were surrounded by a zone of rarefaction, and they were always disposed towards one side of the nucleus, and never surrounded it as intrinsic cellular granules do.

In no case did the presence of the organisms in the cells cause any abnormality of appearance other than simple distension. In a tabular statement the author draws comparisons between the Rickettsia of Mountain Spotted Fever, Typhus, and Heartwater.

The organism is most readily detected in the epithelium of the glomeruli of the renal cortex and in the capillaries of the cerebral cortex.

MALEVAL (E.). Contribution à l'étude du Lathyrisme chez le cheval et le mulet. [**Lathyrism in the Horse and Mule.**]—*Rev. Vét.* 1927. Feb. Vol. 79. No. 2. pp. 69–89.

According to the author all animals dead of lathyrism show evidence of asphyxia. If the disease has been in existence for not more than a month the larynx appears to be normal. In cases of two months standing there is " emaciation " of the muscles of the left side of the larynx. At four months atrophy of the muscles is complete. The author deals with the theories that have been put forward to explain the causation of the condition.

VAN ZYL (J. P.). **Note on the Decomposition of Diluted Polysulphide Dips.**—*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 139–143.

Although the tests carried out were not exhaustive, the indications were that the decomposition of the dip is neither so rapid nor of such a nature as to preclude its being used for both first and second dippings where flocks are small.

DOBELL (Clifford). **A Note on the Generic Name of the Spirochaete of Syphilis** (*Treponema pallidum* **Schaudinn, 1905**).—*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 368–369.

Since the spirochaetes are bacteria and not protozoa their nomenclature must be governed by Botanical and not by Zoological Rules. Three names were proposed for the spirochaete of syphilis in 1905, and these in order of priority were Spironema, Treponema, and Microspironema.

Since Spironema is already occupied in botanical nomenclature, the name Treponema stands.

BUREAU OF HYGIENE AND TROPICAL DISEASES

# TROPICAL VETERINARY BULLETIN.

VOL. 15.] September 1, 1927. [No. 3.

## DISEASES DUE TO PROTOZOAN PARASITES.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les piroplasmoses bovines. La " fièvre de la côte orientale " et la theiléríose nord-africaine (étude expérimentale comparative). [**The Bovine Piroplasmoses. East Coast Fever and North African Theileriasis.**]—*Ann. Inst. Pasteur.* 1927. May. Vol. 41. No. 5. pp. 489–506. With 3 text figs.

This paper contains an account of the authors' comparative studies of the two conditions.

The East Coast Fever strain used was obtained from THEILER and DU TOIT in infected ticks (larvae and nymphs of *Rhipicephalus appendiculatus*).

They have been able to infect a total of 13 animals by means of ticks and in some cases have transmitted the infection direct by inoculation with blood or emulsions of organs containing the parasite.

Twelve of the 13 animals died, and one was killed on the 6th day. In two instances a single female tick sufficed to transmit the infection. The course of the disease was typical in every instance. The period of incubation averaged 12 days, and the rise of temperature was sudden. The fever lasted from 13 to 20 days, and in some instances the temperature fell prior to death.

Both kinds of blue bodies were found in the superficial lymphatic glands, or in the internal organs in 11 to 13 days after the application of the ticks.

Nine animals showed blue bodies in the peripheral blood. They were present for periods ranging from 2 to 10 days, and the number found was proportional to the stage of the disease.

The intracorpuscular parasites were seen from 12 to 21 days after tick infestation. In one case they appeared before the rise of temperature.

A blood count carried out the day before death in one animal showed only about 2½ million red corpuscles per c.mm. Anisocytosis and polychromasia were seen in some cases.

Clinically the infection manifested itself by enlargement of the superficial glands, wasting, staring coat, diarrhoea, which was sometimes

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streaked with blood and petechiae were seen on the visible mucous membranes in the last stages.

The enlarged lymphatic glands were less haemorrhagic than is the case in North African theileriasis.

In four animals the spleen was of normal size. In three it was twice or thrice the normal size. There were sub-epicardial petechiae, and large ecchymoses under the endocardium. The liver was enlarged, numerous white infarcts were found in the kidneys, and there was ulceration of the abomasum, and sometimes of the intestine. There was no jaundice and no haemoglobinuria.

It is noted that in the North African disease the spleen is enlarged from the onset of fever.

The authors state that while in some of the carcases the findings were typically those of East Coast Fever, in others they were those of the North African disease, and that all intermediate forms were seen.

The authors have nothing to add to previous descriptions of the blue bodies. The intracorpuscular forms occurred in the following percentages:

| | |
|---|---|
| Anaplasma-like ... ... ... ... | 2·2 per cent. |
| Round forms ... ... ... ... ... | 12·3 ,, ,, |
| Elliptical forms ... ... ... ... | 3·8 ,, ,, |
| Rod forms ... ... ... ... ... | 81·4 ,, ,, |
| Cross forms ... ... ... ... ... | 0·3 ,, ,, |

In experimental transmissions by inoculation with blood twelve animals were used, and in three cases the result was positive.

Eighteen animals were inoculated with emulsions of organs, and again with positive results in three cases.

The authors compare the two diseases as regards their evolution, the morphology of the parasites, cross-immunity tests, and xeno-diagnostic test.

In their evolution the diseases present practically no differences of importance; they cannot, in fact, be distinguished on clinical grounds, or by their pathological anatomy. Under natural conditions East Coast Fever is distinguished by the heavier mortality caused by it, and swelling of the spleen in less constant and less pronounced.

Blue bodies are found with greater frequency in the glands than in the liver in the case of East Coast Fever, while the reverse holds good in *T. dispar* infections.

In *T. dispar* the anaplasma, round, and elliptical forms account for more than 90 per cent. of the parasites. Rod forms number only some 7 per cent. and cross-forms only 0·2 per cent. This distinction is so marked that the blood smears can readily be recognized.

The intra-corpuscular forms in *T. parva* are richer in chromatin than in *T. dispar.*

In three experiments calves infected by inoculation with *T. parva* were subsequently infected by *T. dispar.* Similarly five animals which had passed through an attack due to *T. dispar* were infected by means of ticks with *T. parva.*

Two calves infected by inoculation with *T. parva* had infected ticks placed on them subsequently, but failed to react. It appears to be certain therefore that the two parasites should be considered distinct species.

Larvae of *R. appendiculatus* fed upon bovines infected with *T. dispar* did not transmit the infection as nymphs. Larvae of the same batch fed upon bovines infected with *T. parva* regularly transmitted the infection.

COOPER (H.). **Some Recent Advances in the Protection of Cattle and Other Animals against Disease. VI. The Piroplasmoses of Cattle in India.**—*Agric. Jl. India.* 1926. July. Vol. 21. No. 4. pp. 313–317. With 2 text figs.

Up to the present two types of piroplasm, using the word in a general sense, have been found in the blood of cattle in India. One of these belongs to the genus *Babesia* and the other to the genus *Theileria*. The former is *B. bigemina* and the latter *Theileria mutans*. In infections with the latter species lesions resembling those found in Egypt were found, and " blue bodies " were detected.

Brief reference is made to *Plasmodium bubalis*. This has been encountered twice only during the last three years, although it is said to have been seen not infrequently between its discovery and 1922.

In both the cases encountered recently, the parasite was found in smears which were subjected to scrutiny after the animals were dead and the carcases destroyed.

COOPER (H.). **Tick-borne Diseases, with Some Remarks on the Diseases of Cattle caused by Protozoa.**—*Agric. Jl. India.* 1926. Mar. Vol. 21. No. 2. pp. 95–100.

The author notes the occurrence of *B. bigemina* and *T. mutans* in Indian cattle.

In connexion with the latter it is said that in certain circumstances the virulence may be so exalted that it may produce a disease similar to East Coast Fever. " Microscopic examination of lesions found post-mortem in animals infected with *T. mutans* has revealed structures indistinguishable from those associated with the African disease." By this the author presumably means that " blue bodies " have been detected. The infection is transmitted by *Hyalomma aegyptium*.

Attention is drawn to the economic loss resulting from tick infestation alone, and a brief account of the process of dipping is given.

DONATIEN (A.) & LESTOQUARD (F.). Specificité du Trypanbleu dans le traitement des piroplasmoses vraies des ruminants. [**The Specific Action of Trypanblue on the True Piroplasms of Ruminants.**]—*Rev. Vét.* 1927. Mar. Vol. 79. pp. 133–139.

The authors suggest that the efficacy of trypanblue against the true piroplasms should be classed as a generic character. They strongly disagree with YAKIMOFF and others who found the drug effective against *B. bovis* and less effective than ichthargan and protargol against *B. bigemina*.

In bovines affected with true piroplasmosis the authors find that the injection of 1 per cent. trypanblue in the proportion of 1 g. of the drug per 100 kilos body weight produces the following effects.—

There is a progressive destruction of the parasites in the peripheral circulation which is practically complete within 24 hours. Within an hour or two of the injection the temperature rises 0·5 to 1·8 ° C., and then falls to normal within six hours. Clinical symptoms, which are sometimes severe, make their appearance. There may be muscular tremors, and acceleration of respiration which may lead on to marked dyspnoea, caused by oedema of the lungs. These symptoms are due to

the liberation of toxin from the destroyed parasites and not to the direct toxic action of the drug. Injection into healthy or chronically infected animals does not cause such symptoms.

In treating severe cases, where a large amount of toxin would be liberated, one should aim not at clearing the circulation but at killing off sufficient of the parasites to enable the animal to fight for itself, so to speak.

The dangers associated with the administration of large doses may be reduced by the use of 0·1 to 0·2 g. By this means the parasites are destroyed more slowly and the fall of temperature is less rapid, but alarming symptoms are avoided. Another advantage arising from the use of the smaller doses is that it leads to less discoloration of the tissues.

DE KOCK (G.) & QUINLAN (J.). **Splenectomy in Domesticated Animals and its Sequelae, with Special Reference to Anaplasmosis in Sheep.**— *Union of S. Africa, 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 369–480. With illustrations, charts and tables.

Part I of this paper, covering some 5 pages, is devoted to an account of the operation of splenectomy.

Part II, covering some 25 pages, gives a general account of the experiments carried out.

The remainder of the paper gives the detailed protocols.

The authors conclude that a certain percentage of South African sheep become carriers of anaplasms, but the infestion has never been identified as a disease in them. The inoculation of sheep from some other centres in the Union with blood from such animals leads to the production of a mild form of anaplasmosis. This infection can be carried on in sheep by inoculation.

Splenectomy results, in such carriers, in the onset of severe symptoms of anaplasmosis. Some cases proved fatal.

Similar results followed splenectomy in equines infected with *Nuttallia equi*. The operation produced changes in the blood picture. There was marked oligocythaemia with the appearance of erythroblasts, normoblasts, and Jolly-bodies.

It would appear that the operation causes a condition of neutrophilia, and that a subsequent monocytosis is associated with the removal of damaged erythrocytes. The anaplasma of sheep was not transmissible to normal goats, but after splenectomy the goat could be infected. The period of incubation was prolonged.

No evidence could be found that anaplasmosis of sheep was associated with a filterable virus.

Anaplasma blood stored in citrate could retain its vitality for periods up to 5 weeks, and in one case for 9 weeks. No difficulty was experienced in differentiating between anaplasma and Jolly-bodies.

DE KOCK (G.) & QUINLAN (J. B.). **The Appearance of *Gonderia ovis* in the Blood of Splenectomized Sheep.**— *Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 255–256. With 1 plate.

*Gonderia ovis* has not been observed under ordinary circumstances in South Africa, but in the blood of splenectomized sheep that were carriers

of anaplasma typical Gonderia parasites were found. Cross-forms were rare, bacillary forms not common and ring-forms the most numerous. Transmission experiments to sheep and to a bovine failed.

KIKUTH (Walter). Piroplasmose bei Affen. [**Piroplasmosis in Monkeys.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Jan. Vol. 31. No. 1. pp. 37–41. With 1 coloured plate.

The only record of the occurrence of piroplasmosis in the monkey appears to be that by Ross in 1905 (Cercopithecus)

In the course of the examination of blood smears from a number of cercopithecus monkeys the author encountered parasites, apparently identical with that described by Ross, in one which, ten days before, had been subjected to extirpation of the spleen. Ring-forms and double pear forms were found. While in Ross's preparations parasites were scantily present, the author found, in the blood at the time of death approximately 30 per cent. of the corpuscles invaded. The infection was transmissible experimentally to *Macacus rhesus* and the period of incubation varied from a week to a month. In monkeys from which the spleen had been removed, there developed marked corpuscular evidence of anaemia. In a normal monkey the parasites rapidly disappeared from the peripheral blood. Five weeks later, during which time parasites were not discoverable in the blood, the spleen was removed and ten days later there was a relapse of piroplasmosis.

MARZINOWSKY (E.). Du développement de l'*Haemogregarina stepanovi*. [**The Development of** *Haemogregarina stepanovi*.]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. Vol. 5. No. 2. pp. 140–142. With 2 text figs.

*Haemogregarina stepanovi* is a parasite of the tortoise *Emys orbicularis*, and the intermediate host is *Hyalomma aegyptium*. No differentiation of sex can be seen in the parasites from the gut of the tick. Large vermicular forms can be found in the stomach of the ticks 24 hours after feeding.

ANDREWS (J. M.). **Coccidiosis in Mammals.**—*Amer. Jl. Hyg.* 1926. Nov. Vol. 6. No. 6. pp. 784–798.

The author finds that the incubative period is two to four days, and that symptoms are presented for periods not exceeding a week in cats infected with *I. felis* and *I. rivolta*. A primary infection is said to cause an immunity which persists for seven months and probably for life.

Andrews believes that human infections with Isospora are due to a parasite specific for man and that the disease is possibly more common than is generally believed.

YAKIMOFF (W. L.), GALOUZO (J. G.), RASTÉGAÏEFF (E. F.) & LOUKIANOFF (W. A.). A propos de la coccidiose des porcs en Russie. [**Coccidiosis of the Pig in Russia.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 215–218.

This paper contains tabular statements regarding the distribution of coccidiosis of pigs in different parts of Russia and comparative statements of the occurrence of the parasite in Germany, Holland and Russia. A third table shows the measurements of the parasites recorded by different authors.

YAKIMOFF (W. L.) & RASTEGAÏEFF (E. F.). Zur Kokzidiose der Hunde und Katzen in Russland. [**Coccidiosis of Dogs and Cats in Russia.**] —*Deut. Tierärzt. Wochenschr.* 1927. May. Vol. 35. No. 20. pp. 313–315.

The authors review the literature regarding these parasites, and tabulate the results.

No systematic examinations have been carried out, but two cases of infection in cats have been encountered. On account of the size of the parasites and their method of sporulation they are identified as *I. bigemina* and *I. rivolta*.

VAN HEELSBERGEN (T.). Coccidiosis. [**Coccidiosis.**]—*Tijdsch. v. Diergeneesk.* 1927. May 15. Vol. 54. No. 10. pp. 449–452.

This paper contains an account of the symptoms of coccidiosis in the fowl.

BEDFORD (G. A. H.). **Report on the Transmission of Nagana in the Ntabanana and Mhlatuze Settlements, Zululand.**—*Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 275–300.

The report is based upon a survey of blood-sucking insects found in the western section of the Lower Umfolosi Division of Zululand.

The paper contains an account of the area involved and of its opening up for settlement. It was thought that when the land was thrown open for settlement it had become fly and nagana free, but after opening it up in 1919, nagana made its appearance and from 1920 onwards most of the cattle succumbed. The survey showed that *Glossina pallidipes* was found at each point where systematic collecting was undertaken. It had previously been stated that glossina was not found South of the Mfolosi and Emseleni rivers.

Before settlement the disease was kept alive by game, but with settlement and the clearing off of the game, domesticated animals served to feed the flies and carry on the infection.

Although the distribution of the disease corresponds with the fly area there are reasons for thinking that glossina is not alone responsible. The cases of nagana are out of proportion to the number of tsetse. On the other hand cases of nagana and the number of flies increased as the game reserve was approached, and tabanidae and stomoxys are widespread but the distribution of nagana is limited and appears to coincide with that of glossina. The question of mechanical transmission is left more or less open.

The bulk of the paper is made up of a list of blood-sucking Diptera collected in the Ntabanana and Mhlatuze Settlements.

DI DOMIZIO (Giovanni). *Trypanosoma brucei* nella Somalia Italiana. [*T. brucei* **in Italian Somaliland.**]—*La Nuova Vet.* 1926. Oct. Vol. 4. No. 10. pp. 262–271; Nov. No. 11. pp. 290–297. With 4 plates and 11 text figs.

Dealing with the morphology of the trypanosome occurring in horses and cattle in Italian Somaliland, the author has used the graph form devised by BRUCE, and finds that the organism is polymorphic. He

distinguishes long, short, and intermediate forms. In the short stumpy type of parasite posterior-nuclear forms are encountered.

The smears used were fixed in methyl or ethyl alcohol and stained with giemsa. Four mules, two horses, a calf, and two dogs provided the blood for the smears, but approximately half of the 2,400 trypanosomes measured were in the blood of one of the horses. Only 100 trypanosomes from dogs were measured, and in none were posterior-nuclear forms found.

He concludes that the parasite belongs to the *brucei-rhodesiense-gambiense-nigeriense* group, and that it is actually *T. brucei*.

IWANOW (E.) & MESNIL (F.). Le trypanosome de la dourine traverse-t-il la peau ou les muqueuses saines ? [**Does the Trypanosome of Dourine pass through Sound Skin or Mucous Membranes ?**]—*Ann. Inst. Pasteur.* 1927. May. Vol. 41. No. 5. pp. 507–512.

The experiments recorded here were undertaken for the purpose of attempting to arrive at a definite conclusion as to whether *T. equiperdum* can penetrate sound skin and mucous membranes or not.

According to a number of authors, trypanosomes, and particularly *T. equiperdum*, can pass through sound mucous membranes, and NATTAN-LARRIER is of the opinion that they can penetrate sound skin.

Iwanow is of the contrary opinion. He holds that some lesion, however slight, is necessary for the penetration of *T. equiperdum*, even through mucous membranes. The positive results obtained by other investigators are, he believes, due to infection through minute injuries to the surfaces.

The experiments were carried out with rabbits, guineapigs and mice, and each animal was carefully examined with a lens for lesions of the skin or genital organs before it was used. No straw or hay, either of which, it is held, might occasion defects in exposed mucous membranes by pricking them, was used in the cages. Sawdust was used for bedding and the food was fresh lucerne. The mice were kept in glass jars covered with wire gauze. All animals were isolated for a fortnight before use, thus giving the opportunity to lesions which had escaped detection to cicatrize. Animals yielding negative results were used again.

Nine mice had citrated blood containing the trypanosome in large numbers placed on sound skin and none became infected.

Of 26 mice which had trypanosomes placed on the mucous membrane of the eye, one became infected. This infection is said to have resulted from an injury to the eyelid held by the forceps.

Four rabbits, two guineapigs, and nine mice had infective blood introduced into the vagina by sounds. None of the rabbits became infected. One guineapig contracted trypanosomiasis, but this was thought to be because the sound used was too large, and damage may have been done. Two of the mice became infected. In spite of the authors' statement that only animals with sound skins and mucous membranes were used in the experiments, it is recorded that one of these mice had eczema of the head and back, and that the skin was fissured. As the mice licked the blood exuding from the vagina it is suggested that the infection was carried to the diseased skin by the tongue in this instance. Seventeen mice had infective blood placed in the conjunctival sac. None became infected.

Seven mice had infective blood introduced into the vagina. One of these had the mucous membrane injured during the injection and this was used as a control. It was the only one to become infected.

Of eight guineapigs treated in the same way, two became infected. The vaginal mucous membrane was injured in both cases.

Four mice, two of which were suffering from eczema, had infective blood placed on the skin. The two with eczema became infected. The others remained healthy.

The authors suggest that the incidence of dourine in breeding establishments would be reduced by the introduction of artificial insemination.

KNOWLES (R. H.). **Trypanosomiasis of Camels in the Anglo-Egyptian Sudan: Diagnosis, Chemotherapy, Immunity.**—*Jl. Comp. Path. & Therap.* 1927. Mar. Vol. 40. No. 1. pp. 59–71 (to be continued).

The native name for the disease is "gufar." It occurs in a number of provinces and its distribution follows fairly closely the distribution of the tabanidae. It is probable that the disease is closely allied to, if not identical with surra and it is certain that it is the same as El Debab and Mbori of Northern and North-west Africa.

The symptoms are those of surra, but in no case have cerebral symptoms been observed. In one instance there was partial paralysis.

It is thought that the percentage of recoveries is very small and it is not known whether in such cases there is a complete disappearance of trypanosomes. It is probable that reputed recoveries are really cases in the chronic stage.

The sub-acute stage is most commonly encountered in animals that are well fed and are not worked hard. Such animals may remain in good condition. A large proportion of acute cases, however, occur under the same conditions.

*Tabanus taeniola* and *T. sufis* are thought to be the chief transmitters, but *Pangonia rupelli* and stomoxys are also possible agents. *Diagnosis.*—Microscopic examination of fresh blood is most useful in acute cases in which trypanosomes are seldom absent from the blood for more than a few days. It is practically useless in chronic cases in which the intervals may be very long.

Animal inoculation is the most reliable method, but it is not applicable to large numbers of animals under field conditions. In gerbils inoculated experimentally parasites generally appear in the blood within ten days, and the course is fairly acute or sub-acute. The formol-gel test has been investigated. The author's technique is to add two drops of formalin to 1 cc. of serum, and leave the tubes at room temperature (75–100° F.) for 24 hours. Diagnosis is based upon the presence or absence of gelation. Opalescence is not recorded. The author notes the necessity of sterilizing the needles used for bleeding to avoid transmission of the disease by inoculation.

In describing his observations in connexion with the test the following factors are taken into consideration by the author :—

(1) Do all infected camels react?
(2) The time required for the development of the power to react after infection.
(3) Do healthy camels fail to react?
(4) Do camels suffering from other diseases give the reaction?
(5) Do animals that have been treated successfully react?

Of 125 camels diagnosed by microscopic examination, 123 were positive to the formol-gel test.

In three control camels inoculated experimentally the periods elapsing between inoculation and the development of power to react ranged from 37 to 50 days. This, however, does not affect the reliability of the test, because work of this kind is not done before November (and should not be done before that month) because infection takes place during or after the rainy season.

Tests with healthy camels showed that the percentage error in the direction of incriminating healthy animals may be from 5 to 7 per cent., but as treatment is harmless the only drawback is the cost of treating such animals. Reactions in healthy animals are sometimes temporary.

The figures given by the author show that recovery following treatment is associated with the loss of power to give the formol-gel reaction, and the period required for the disappearance of the power is about the same as that required for its development.

There is little evidence to show that diseases other than trypanosomiasis may cause serum to give a positive reaction.

YAKIMOV (W. L.), AMANJOULOV (C. A.), ARBUSOV, JURAVLEV & CHERNOMORSKOV. [**An Experiment on the Prophylactic Use of Naganol (Bayer 205) in Camel Trypanosomiasis.**]—*Russian Jl. Trop. Med.* 1927. Vol. 5. No. 1. pp. 43–46. [In Russian.]

The authors have been engaged in a campaign against camel trypanosomiasis in the Ural region since 1923. The number of camels examined was 11,052, trypanosomes having been found in from 25 to 40 per cent., according to locality. The trypanosome referred to as "*T. ninae kohl-iakimoff*" [sic] probably represents a race of *T. evansi*. All attempts to check the frequent epizootics of trypanosomiasis by therapeutic means having failed, a commission was sent to the province with the view of testing the practicability of prophylactic treatment with "Bayer 205" ("Naganol"). For the experiment, 91 healthy camels were selected and divided into two batches, those in the first (53) receiving from 5 to 10 gms. of the drug subcutaneously, those of the second (38) serving as controls. The camels were then divided into four groups and placed on pasture in different localities. Three months later they were examined and their blood was inoculated into guineapigs. Trypanosomes were found only in a group of 7 control camels, whilst 14 of the same group treated prophylactically remained uninfected. No infection occurred in the remaining three groups.*

KASAI (K.) & AKAZAWA (S.). **The Prophylactic Action of "Bayer 205" against Experimental Infection with a Trypanosome of the Formosan Water Buffalo.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 97–100. Authors' English abstract.

Water-buffaloes, zebras, and dogs in Formosa suffer from a trypanosomiasis which is closely related to surra. This paper contains an account of experiments connected with the prophylactic action of "Bayer 205" in experimental animals. Mice, cattle, and horses have been used.

The subcutaneous injection of mice with ·005 g. conferred protection against inoculation for five months, after which the resistance declines and finally disappears. Trypaflavin, trypanblue, tartar emetic,

* Summarized by Mr. C. A. HOARE.

neotrepol, atoxyl, neosalvarsan, and silver salvarsan were without effect in corresponding doses, save that the last two protected for 3 days and one week respectively.

Doses of ·0001 g. of " 205 " protected for a week, and for some weeks after this the period elapsing between inoculation and death was prolonged. In some instances recovery took place. ·00003 g. proved to be about the minimum dose exercising any protective power.

In calves the subcutaneous injection of 1 g. per 100 kilos protected for 4 months. In horses 1 g. per 100 kilos. was not protective, but the duration of the disease was prolonged. Doses of 2 g. per 100 kilos. protected for 3½ months.

In a supplementary experiment it was found that doses of 4 g. did not exercise any inhibitory action in rinderpest.

BLANCHARD (M.), BROUDIN (L.) & BOREL (E.). Surra du chien. Traitement par " Bayer 205." Guérison (?). Expériences négatives de transmission de l'affection par *Rhipicephalus sanguineus* Latr. [**Canine Surra. Treatment with " Bayer 205." Recovery (?). Negative Experiments in Transmission with** *R. sanguineus* **Latr.**]—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 222–225.

These workers in Saigon describe a case of trypanosomiasis in a dog caused by a trypanosome with the morphology of *T. annamense* Laveran 1911. The animal had been ill for some time and showed dullness, difficulty of movement, oedema of the legs, etc. The blood contained large numbers of trypanosomes. *Rhipicephalus sanguineus* in various stages of development was present on the skin in large numbers. Treatment was begun with 0·5 cg. of " Bayer 205 " dissolved in 5 cc. of distilled water and injected subcutaneously. During the next few days there was a remarkable improvement in the dog's condition.

Paretic symptoms again appeared, but at what interval cannot be stated as the original paper appears to contain an error in a date. According to the dates given, the interval was about 5 weeks, but the authors state that it was on the 5th day. These rapidly disappeared and the dog a month later appeared to be in perfect health.

The authors took the opportunity of testing the possibility of the transmission of surra by the ticks. In the first place they examined the intestinal contents of nymphs and adults, and though they could readily detect red and white corpuscles they could find no trace of flagellates.

Ticks from the dog were placed upon rabbits and a puppy but no infection took place.

Finally, larvae hatched out from eggs laid by females obtained from the dog were placed upon white rats. No infection took place.

VINZENT (R.). Spirochétose de la souris blanche et infection mixte trypano-spirochétique. [**Spirochaetosis of the White Mouse and Mixed Trypanosome and Spirochaete Infection.**]—*Ann. Inst. Pasteur* 1927. Feb. Vol. 41. No. 2. pp. 131–147. With 8 graphs.

In a mouse inoculated with blood containing *T. somaliense* there was found a spirochaete. In sub-inoculations the spirochaete was separated from the trypanosome by keeping the blood used for inoculation for three days before use. In this period the trypanosome died only and the spirochaete survived.

Subsequently it was found by inoculation experiments that *T. somaliense* failed to develop in mice previously inoculated with the spirochaete while the spirochaete persisted, but the protection ceased with the termination of the spirochaete infection.

The author does not think that the action was a directly antagonistic one between the organisms.

CHANNON (Hilda A.) & WRIGHT (Hedley D.). **Observations on Trypanosomiasis of Rabbits, and its Natural Mode of Transmission.**—*Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 253–260. With 1 fig.

The observations recorded in this paper were made to determine the mode of transmission of a strain of trypanosomes accidentally found in the blood of a hutch rabbit in the course of an examination for other purposes.

Measurements of 300 parasites in blood smears from an experimentally infected rabbit showed that it averaged 24·17 $\mu$ in length by 1·35 $\mu$ in breadth, the latter excluding the undulating membrane. There was a free flagellum, which is included in the above measurement of length, about 9 $\mu$ long. These measurements are less than those given by JOLYET and DE NABIAS (30–36 $\mu$) and ASHWORTH and others (28·4 $\mu$).

The parasite appeared to be consistently monomorphic.

By intravenous injections it was found possible to carry the strain through 12 generations using 75 rabbits. Thirty-four became heavily infected, 21 showed a slight infection and in the remainder examination of moist blood from the ear failed to reveal infection.

Subcutaneous and intraperitoneal inoculations failed in the few cases in which they were tried. The results obtained with different infective doses were variable, and suggested that individual susceptibility rather than dose was the factor determining infection.

The period of incubation was 7 days, and parasites rapidly increased in numbers. A steady infection was maintained for an average of one month, but the upper and lower limits of this period were very wide apart. Complete recovery occurred.

Mice, rats and guineapigs appeared to be insusceptible.

An experiment showed that the parasite could be conveyed by the rabbit flea *Spilospsyllus leporis*.

Detailed examination of fleas indicated that the development of the parasite ran parallel with that of *T. lewisi* in the rat flea.

Experimental evidence was obtained that the injection of infected fleas causes infection. Injection of blood containing trypanosomes, on the other hand, does not.

Recovery leaves immunity, but the blood of recovered animals cannot be shown to contain any immune bodies.

Attempts to cultivate the parasite failed.

MAZZA (S.). Observación de infección espontánea del perro por el *Schyzotrypanum cruzi*. [**Spontaneous Infection in the Dog with** *Schizotrypanum cruzi*.]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 82–86. With 4 figs.

A very limited invasion of the blood by the parasite was found in a puppy ten months old. There was marked evidence of anaemia. The

blood count showed a little over two million red corpuscles and seventeen thousand white corpuscles. The usual corpuscular abnormalities were found.

BREINDL (V.) & JIROVEC (O.). Ueber einige Abnormitäten bei *Trypanosoma lewisi.* [**Abnormalities in** *T. lewisi.*]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. Feb. 5. Vol. 101. No. 6–7. pp. 417–418. With 2 text figs.

The authors figure and describe two abnormal trypanosomes found in the blood of a heavily infected rat. In one, a dividing parasite appeared to have no macronucleus and in the other, a particularly large parasite, there appeared to be a very large granular kinetonucleus near the macronucleus, the flagellum arising from a single small basal granule.

CHATTERJEE (G. C.), ROY (H.) & MITRA (A. N.). **Notes on** *Pentatrichomonas canis auri* **n. sp.**—Reprint from the *Jl. of the Depart. of Science.* 1926. Vol. 8. pp. 11–14. With 1 plate.

The authors figure and describe a Pentatrichomonas obtained from the caecal contents of an Indian jackal.

Cultures were obtained in saline containing peptone.

ARTAMONOFF (A. S.). Zur Frage der Verbreitung der innerlichen Leishmaniasis in Samarkand und die Heilung der Krankheit durch die Präparate des Stibiums. [**The Spread of Internal Leishmaniasis in Samarkand and its Treatment by means of Preparations of Antimony.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Jan. Vol. 31. No. 1. pp. 32–37.

After giving tabular statements regarding the incidence, duration, etc. of the disease, the authors state that in the treatment of the disease, they used 2 per cent. solutions of antimony potassium tartrate, neosalvarsan, stibosan and antimosan. The age of the patient does not appear to be a factor in calculating the doses required. Constitution and the severity of the disease are the important factors.

CURSON (H. H.). **Does a Species of Leishmania occur in the Goat ?**—*Union of S. Africa, Dept. of Agric. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 29–30. With 1 coloured plate.

Reference has already been made to the parasite detected in the blood of the goat by the author. The author discovered in a blood smear from a goat which had been used for the feeding of flies in some trypanosome investigations a group of parasites and a few isolated individuals having a morphology closely resembling that of Leishmania. They measured 2 $\mu$ to 5 $\mu$ in length by 1 $\mu$ to 3 $\mu$ in breadth.

The circumstances prevented any further investigation. The author suggests that provisionally the organism may be considered as a species of Leishmania and proposes the name *Leishmania caprae,* n. sp.

BENNETT (S. C. J.). **A Peculiar Equine Sarcosporidium in the Anglo-Egyptian Sudan.**— *Vet. Jl.* 1927. June. Vol. 83. No. 6. pp. 297–304. With 6 text figs.

The author describes a parasite which he believes to be a new species, and which, there is little doubt, was pathogenic.

The infection was detected in a nine-year-old country-bred pony.

The first symptoms observed were weakness, swelling of the legs, and eruptions on the skin followed by loss of hair in patches. The animal was rested and well fed and in three months was able to work again, but symptoms reappeared within a short time.

Blood examination for trypanosomes was negative, but sarcospores were found, and arrangements were made to send the animal to Khartoum for observation.

Throughout a month's observation the condition of the animal remained practically constant. It was a picture of extreme dejection, the coat was harsh, and the legs swollen and scurfy. The pulse and respiration were normal, there was no evidence of pain, and none of the superficial glands were enlarged. The appetite was good, but there was excessive thirst.

The temperature chart was that of a persistent irregular low fever. The blood picture was normal, save for the presence of the sarcospores. These were found daily in the smears.

At the post-mortem examination all organs and tissues appeared to be normal save the muscles and the mucous membrane of the laryngeal region.

The whole of the muscles were pale brown in colour, and so friable that even with a sharp knife it was almost impossible to excise a block of firm tissue for histological examination. No sarcocysts were recognisable with a hand lens.

The mucous membrane covering the whole of the larynx anterior to the glottis, the oval surface of the tip of the soft palate, and the glosso-epiglottic folds were studded with small whitish nodules rather less than a millimetre in diameter. No nodules were found in the pharynx, trachea, or oesophagus.

The sarcospores found in the blood were about 10 $\mu$ in length, by 4$\mu$ in width, but in the thicker parts of the smears, where they were always more numerous, they were rather more slender, and showed a greater tendency to be curved. In well-stained specimens a collection of rather purplish granules could be found near the centre of the body, the general cytoplasm staining pale blue.

Examination of sections from pieces taken from the neighbourhood of the larynx showed that the nodules were in reality sarcocysts. The following points are noteworthy. The sarcocysts were found almost entirely in the submucous connective tissue, and not in the muscular tissue. The cysts appeared to be spherical, and even the few found in the muscular tissue were of the same shape. There was no evidence of tissue reaction. The distribution of the cysts and the appearance of scars and degenerated epithelium at the surface suggested that there was a progressive movement of the cysts from within towards the surface as they increased in size. Microscopic examination of sections of skin revealed a picture practically parallel with that presented by the laryngeal mucous membranes. Signs of migration of the parasites outwards were found, and it would appear that the passage of the parasite through the epithelium was rapid when once the rete mucosum

had been reached. Healing wounds were frequently found in sections, but in a single instance only was a fresh rupture found.

Very large numbers of sections from various muscles were examined, but not a single sarcocyst was found. The muscular tissue was extensively affected with Zenker's degeneration.

LEVADITI (C.), with NICOLAU (M. & Mme.) & MANIN (Y.). Le tellure, nouvel élément agissant curativement dans la syphilis. [**Tellurium, a New Drug for the Cure of Syphilis.**]—*Ann. Inst. Pasteur.* 1927. Apr. Vol. 41. No. 4. pp. 369–442. With 1 plate in colour and 19 text figs.

The drugs tested by the authors were the following: Tellurite of sodium, tellurite of potassium, tellurium trioxide, biniodide of tellurium, iodo-tellurate of quinine, methyl-tellurid, diphenyl of tellurium, and 4- ethylcyclotelluropentanedione, tellurium in fine suspension, colloidal tellurium, and tellurate of bismuth. The organisms used in the experiments were *Treponema pallidum, Spirochaeta cuniculi, Spirochaeta gallinarum, Spirillum duttoni,* and the trypanosome of nagana. Experiments carried out with rabbits, fowls, and mice showed that the potassium and sodium salts were the most toxic. By the intramuscular path the methyl and diphenyl compounds were the least toxic. In fine suspension by intramuscular injection the element is ten times less toxic than the sodium salt, taking into consideration the amount of tellurium in the latter.

The toxity is not only a function of the amount of tellurium contained in the compounds, but also of the chemical composition. The iodo-tellurate of quinine is about ten times as toxic as the oxide or the iodide.

Soluble compounds are absorbed rapidly and completely, and are more toxic than the insoluble compounds.

The symptoms of intoxication are convulsions, generalized paralysis, salivation and haematuria.

Later it is stated that tellurium possesses haemolytic properties and that haemoglobin appears in the urine. *In vitro* experiments show that the presence of serum favours haemolysis. Administered in sufficiently small doses it produces no serious toxic effects, and does not disturb nutrition or the secretion of urine.

The drug is eliminated by respiration, sweat, bile, urine and in the faeces.

When a tellurium compound is injected intra-muscularly it undergoes a process of progressive dissolution. It is absorbed in the form of proteo-metallic derivatives. In the cells of the reticulo-endothelial system the cytoplasm and mitochondria cause it to undergo reduction. Other cells ingest the tellurium injected directly and transform it. In this form the drug circulates in the body and reaches the lymphoid tissues, which fix it while reducing it. The drug is secreted by the epithelium of the convoluted tubes and of the ascending loop of Henle.

Tellurite of sodium injected intra-muscularly at the same time as *S. gallinarum* exercises only a feeble protective action. The tolerated dose, which ranges from ·0015 to ·002 g. per kilo, causes the infection to be slight and of brief duration, but it does not prevent infection. *In vitro* tellurite of sodium in a 1 in 200 concentration immobilizes *S. gallinarum* in 2 hours at 37° C.

*Spirillum duttoni* infections in the mouse are not affected at all by intramuscular injections of iodo-tellurate of quinine. Tellurite of sodium in 1 in 10,000 solution immobilizes the trypanosome of nagana in three hours at 37° C. in the presence of rabbit serum, but neither tellurite of sodium nor iodo-tellurate of quinine prevent infection of mice with the parasite.

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Niño (F. L.). A propósito de las formas endoglobulares del *Schizotrypanum cruzi* en la sangre periférica de la lauchita blanca. [**The Endoglobular Forms of** *Schizotrypanum cruzi* **in the Peripheral Blood of the White Lauchita (? Mouse).**]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Apr. Vol. 2. No. 11. pp. 120–122. With 1 coloured plate.

Quiroga (S. S.) & Scasso (R.). Epidemia de Enteritis coccidiana en los pollitos. [**Epidemic of Enteritis due to Coccidia in Fowls.**]—*Revist. Zootech.* 1927. Feb. 15. Vol. 14. No. 161. pp. 35–40.

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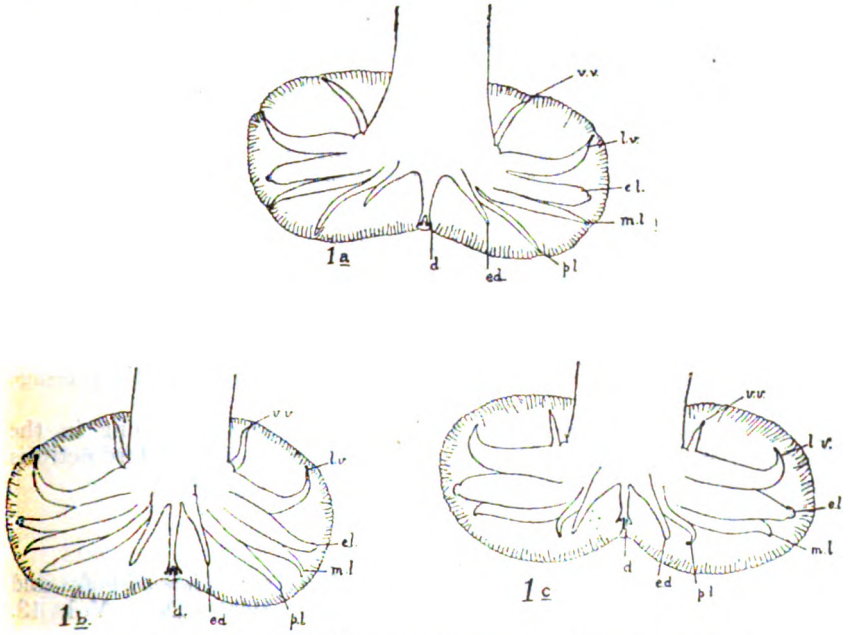
## DISEASES DUE TO METAZOAN PARASITES.

Monnig (H. O.). **The Life-Histories of** *Trichostrongylus instabilis* **and** *T. rugatus* **of Sheep in South Africa.**—*Union of S. Africa Dept. Agric. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 231–251. With 11 figs.

Nematodes of the genus Trichostrongylus are said to have become a serious menace in South Africa during recent years only.

*T. extenuatus*, which occurs in the abomasum, has been encountered by the author in his investigations but only occasionally.




Male Bursa of (*a*) *Trichostrongylus rugatus*; (*b*) *T. extenuatus*; (*c*) *T. instabilis*.

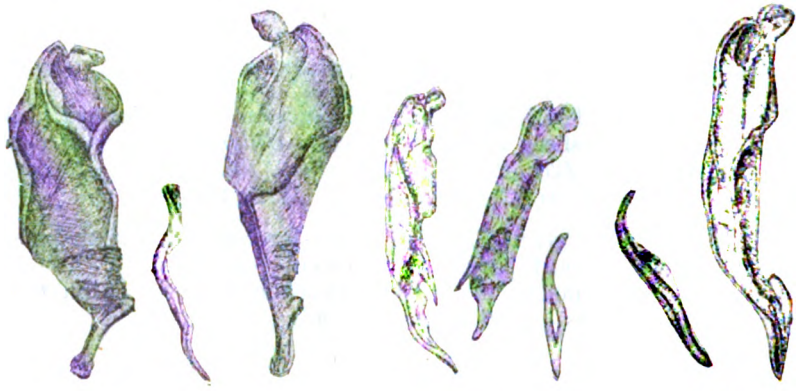
[**Reproduced from** *11th and 12th Reports of Director of Veterinary Education & Research, Union of South Africa.*]

*T. instabilis* and *T. rugatus*, which are found in the anterior 8 to 12 feet of the small intestine, are responsible for serious losses.

*T. rugatus* Monnig 1924 is figured and described, and an account of the life history is given.

It is practically impossible to distinguish the females of the species from those of *T. instabilis* as they differ only in their average size, *T. rugatus* being slightly larger.

The males are more easily distinguished. The spicules of *T. rugatus* are dissimilar, relatively broad at the anterior part and show ridges on their ventral surfaces. It differs from *T. instabilis* in that the postero-lateral ray of the bursa is longer. *T. rugatus* appears to differ from *T. falculatus* Ransom 1911 mainly in the details of shape of the spicules.




Spicules and gubernaculum of (*a*) *Trichostrongylus rugatus*; (*b*) *T. extenuatus*; (*c*) *T. instabilis*.

[Reproduced from *11th and 12th Reports of Director of Veterinary Education & Research, Union of South Africa.*]

The development of *T. instabilis* and *T. rugatus* follows the same general lines as those of other strongyles. There is a free-living stage divided into three periods by two ecdyses, and a parasitic stage in which two ecdyses occur before the worm reaches the adult stage. The free-living stages require about 60 hours, and an interval of about 25 days elapses between the ingestion of infective forms and the passage of eggs by the host.

The life-history is simple and direct, the worms remaining in the intestine, but the larvae enter the bowel wall to pass their third ecdysis there.

CALDWELL (F. C.) & CALDWELL (E. L.). **Are** *Ascaris lumbricoides* **and** *Ascaris suilla* **identical ?**—*Jl. Parasitol.* 1926. Dec. Vol. 13. No. 2. pp. 141–145.

The authors discuss the evidence regarding the identity or otherwise of the worms and from their own investigations conclude that their evidence supports the view that the two are not identical.

TAYLOR (E. L.). **The Administration of Draughts to Sheep and Cattle, with Special Reference to Treatment for Verminous Gastro-enteritis.** —*Ann. Trop. Med. & Parasit.* 1927. Mar. 25. Vol. 21. No. 1. pp. 27–34.

The author points out that little work has been done regarding the paths taken by drugs administered to cattle and sheep. He states that the value of sulphate of copper in the treatment of parasitic gastritis in sheep is well known, but that with cattle failures have been reported. Three possible explanations for this are offered: (1) That in cases where treatment fails the causal worm is not *Haemonchus contortus*, but probably *Ostertagia ostertagi* or some other small trichostrongyle; (2) that there is some difference in the swallowing process of the two genera; (3) that inadequate doses have been given.

A brief review is given of the work done in connexion with attempts to control the path by placing animals in different positions, and the conclusion is drawn that the results are very discordant.

The author's own experiments have been carried out with fourteen cattle from 1 to 2 years of age, and seven sheep of the same age.

A 1 per cent. solution of methylene blue was given in amounts ranging from 10 to 30 ounces to the cattle. In 11 instances the dose was 10 ounces. It is not stated what interval elapsed between dosing and slaughter, and the method of killing is not specified. In two cases only was any blue colour found in the abomasum, and in these the colour was deep. The rumen and reticulum received the bulk of the fluid.

Of the sheep used, one was dosed with 4 ounces through a stomach tube. There was stain in the rumen and a trace in the reticulum only. Four were dosed with 1 to 4 ounces in the normal standing position. In each case the contents of the abomasum were stained, but there was also staining in the rumen and reticulum. Two were dosed in a sitting position on their haunches and the doses were 4 and 8 ounces. In both cases stain was present in all four compartments.

No information is given regarding the interval elapsing before slaughter, or the position of the animal during post-mortem examination. The author states that his results appear to add to the existing confusion, and that his numbers are too small to allow the drawing of any definite conclusions. He does, however, specifically state in his conclusions that "Medicaments administered to yearling sheep, as draughts from a wine bottle, go direct to the abomasum, only a small portion going to the other compartments." He has found, as have others, that the position of the sheep is not material. In the case of cattle he concludes that drugs administered in solution rarely go direct to the abomasum.

SHEATHER (A. L.). **Experiments in the Treatment of Parasitic Gastritis in Lambs.**—*Jl. Comp. Path. & Therap.* 1927. Mar. Vol. 40. No. 1. pp. 37–59.

The experimental treatments have been carried out with lambs naturally infected with *Haemonchus contortus*, *Ostertagia circumcincta*, *Trichostrongylus extenuatus*, *Ostertagia trifurcata*, *Trichostrongylus vitrinus*, and *Trichostrongylus instabilis*. Some indirect evidence was obtained that the first of these was killed by VEGLIA'S mixture of sodium arsenite and sulphate of copper, but this was quite without effect upon the other species. The following substances were tested

against these without effect in any instance:—Bleaching powder, sodium bisulphite, carbon tetrachloride, iodine, Derris root powder, copper oleate, oil of chenopodium, thymol and lime and sulphur wash.

BLANCK (E.). Beitrag zur Kenntnis der Mikrofilariose im Blute beim Pferde. [**Microfilaria in the Blood of the Horse.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Apr. Vol. 55. No. 6. pp. 557–579. With 4 text-figs.

The author records the occurrence of microfilarial infection in a horse in Sweden. The animal was brought to the clinique of the Veterinary School at Stockholm because it was showing marked evidence of wasting. The horse was a recent purchase and unfortunately no very full particulars of its previous history were obtainable. During a period of one and a half months the animal was kept under observation, and although there was no improvement in condition the appetite was maintained. There were general signs of anaemia.

The pulse was weak but regular when the animal was at rest, but a brief period of exercise caused the drop of a beat about every fifth beat and sweating, and the animal was in danger of falling.

Rectal examination revealed slight enlargement of the spleen. Although the visible mucous membranes suggested anaemia, blood counts indicated that the corpuscular contents of the blood were practically normal. The condition really appeared to be one of oligaemia. While it was under observation the horse developed a nodular condition of the mucous membrane of the mouth. The small nodules subsequently became converted into erosions. Microscopic examination of a nodule removed surgically showed that small necrotic centres were present in the epithelium and that in many of these microfilariae could be found. Spontaneous recovery from the stomatitis occurred in 12 days.

While the animal was under observation the number of parasites discoverable in the blood increased from 1 to 3 per drop to 25–30. In the blood the parasites measured 250–300$\mu$ in length. Attempts to transmit the parasite by inoculation to rabbits and guinea-pigs failed.

At the post-mortem 52 specimens of *Filaria papillosa* were found in the peritoneal cavity.

No structural disease of the heart was discovered.

ITAGAKI (Shiro) & MAKINO (Rokuro). **Studies on the Treatment of Microfilaria immitis Infection by Intravenous Injection of Natrium Antimonyl Tartrate.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 15–23.

Preliminary experiments regarding the toxicity of the drug appeared to indicate that the susceptibility of dogs to the drug varied. In some cases ·01 g. per kilo. proved fatal, and doses of ·005 g. per kilo on 7 successive days in some cases proved toxic for healthy dogs. Two dogs tolerated ·004 g. per kilo. on 7 successive days, while in some instances ·004 g. per kilo. repeated on four days caused death.

It was found that the administration of 3 doses at the rate of ·003 g. per kilo. at intervals ranging from 1 to 5 days was sufficient to kill M. immitis in the circulation in one instance, but not in all. In most cases

symptoms of poisoning made their appearance. Seventeen dogs put under treatment were given doses ranging from ·003 to ·004 g. per kilo. at intervals of 1 or more days. The microfilariae disappeared from the circulation. Dogs kept under observation for several months failed to show any return of the parasites to the circulation although living worms were found in the heart on post-mortem. In one dog killed 8½ months after treatment no embryos could be found in the uterus of a female worm in the heart.

MARZINOWSKY (E.). Du développement de la Microfilaire du *Gymnodactylus fedschenki*. [**The Development of the Microfilaria of** *Gymnodactylus fedschenki*.]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 114-116. With 2 text figs.

The author describes the microfilaria and concludes that it is different from that described by DELANOË as occurring in *Agama colonorum*. Although eggs could be found in smears from the liver, the adult worm was not found.

FAUST (Ernest Carroll). *Thelazia* **Infection of Man and Mammals in China.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Jan. 31. Vol. 20. Nos. 5 & 6. pp. 365–369. With 2 plates.

Study of the original material of ocular nematodes from man and the dog in China, as well as material recently secured from a dog and rabbit in Peking leads the author to concur with LEIPER's view that the worms from man, the dog and the rabbit are all *Thelazia callipaeda*. *T. callipaeda* males are described for the first time.

The occurrence of *T. rhodesii* in cattle in China is recorded.

NEVEU-LEMAIRE (M.). *Protospirura hamospiculata* n. sp. nématode parasite d'un Pangolin africain *Manis* (*Pholidotus*) *temmincki*.—[*Protospirura hamospiculata* **n. sp. Parasite of** *Manis* (*Pholidotus*) *temmincki*.]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 107–113. With 1 text fig.

Examination of 116 nematodes contained in a bottle in the Parasitological Laboratory of the Faculty of Medicine, Paris, has enabled the author to give a detailed description of the worm and he finds that it is a new species. In the paper under review the worm is figured and described, and the distinguishing characters of the nine known species are given. The right spicule of the male terminates with a barb.

HENRY (A.). Distomatose pulmonaire chez le Vison. [**Pulmonary Distomatosis in the Mink.**]—*Rec. Méd. Vét.* 1927. Mar. 30. Vol. 103. No. 6. pp. 84–88. With 2 text figs.

Two cases have been encountered and in each the presence of the parasites in the lungs was the only assignable cause of death. It was remarkable that both animals died more or less suddenly. The parasite has been identified as *Paragonimus kellicotti* Ward, 1908. The minks in which the parasites were found were imported from the United States (Minnesota) and the author suggests that careful examinations of the faeces of imported animals should be carried out in order that infection may be detected. The life cycle of the parasite is not fully known, but

it must be borne in mind that the conditions necessary for its development may be available in France and there is a possibility that the parasite may establish itself there.

VAN HEELSBERGEN (T.). Echinostomiasis bij de duif door Echinostoma. [**Echinostomiasis in the Pigeon caused by Echinostoma.**]—*Tijdschr. v. Diergeneesk.* 1927. May. Vol. 54. No. 9. pp. 414–416. With 1 text fig.

The author figures and describes an Echinostoma causing serious disease in pigeons.

VAN HEELSBERGEN (T.). Echinostomiasis bij kippen door Echinoparyphium. [**Echinostomiasis in Fowls caused by Echinoparyphium.**]—*Tijdschr. v. Diergeneesk.* 1927. May. Vol. 54. No. 9. pp. 413–414. With 1 text fig.

The author figures and describes an Echinoparyphium which was responsible for serious enteritis in fowls in Holland.

FAUST (E. C.) & NISHIGORI (M.). **The Life Cycles of Two New Species of Heterophyidae, Parasitic in Mammals and Birds.**—*Jl. Parasitol.* 1926. Dec. Vol. 13. No. 2. pp. 91–128. With 4 plates & 4 text figs.

In this paper the authors describe the morphology and life history of *Monorchotrema taihokui* and *Monorchotrema taichui.*

The former has as hosts :—

1. Mollusc. *Melania reiniana* var. *hidachiens.*
2. Fresh water fish of various families.
3. Birds, dog, cat, rabbit, mouse, guineapig and man.

The latter has as hosts :—

1. Mollusc. *Melania obliquegranosa.*
2. Fish.
3. Birds (?), mammals, including man (experimental infection).

KIESSIG (W.). Uber die Behandlung der Leberegelkrankheit der Schafe. [**The Treatment of Fluke Disease in Sheep.**]—*Deut. Tierärzt. Wochensch.* 1927. Mar. 26. Vol. 35. No. 13. pp. 203–206.

The author finds that a remedy known as Serapis SB.444 is valuable.

JOYEUX (Ch.) & BAER (J. G.). Recherches sur quelques espèces du genre *Bothridium* de Blainville, 1824 (*Diphyllobothriidae*). [**Some Species of the Genus *Bothridium* Blainville, 1824.**]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. Vol. 5. No. 2. pp. 127–139. With 5 text figs.

The authors give descriptions of Bothridium found in pythons in Africa and Asia. They conclude that there are two species, *Bothridium ovatum* and *Bothridium pythonis*, but the specimen they describe differs from the latter in being smaller. They are not in a position to say whether the two are really distinct on this account and suggest the name *B. pithonis* Bl., 1824, var. *parvum.* nov. var.

BUGGE (G.). Uebertragung von *Linguatula denticulata* auf einen Hund. [**The Transmission of** *Linguatula denticulata* **to a Dog.**]—*Deut. Tierärzt. Wochensch.* 1927. May 28. Vol. 35. No. 22. pp. 345–349.

In five instances the author has detected larvae in the mesenteric glands of cattle. The parasites measured 5–6 mm. in length, and the number found varied from 10 to 44.

Sixteen larvae were given to a young sheep dog and 41 days later nine immature Linguatula were found in the nasal cavity.

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BEDFORD (G. A. H.). **Check-List of Muscidae and Oestridae which cause Myiasis in Man and Animals in South Africa.**—*Union of S. Africa, 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 483–491.

BEDFORD (G. A. H.). **A Check-List and Host-List of the External Parasites found on South African Mammalia, Aves, and Reptilia.**—*Union of S. Africa, 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 705–817.

JOYEUX (Ch.). *Diphyllobothrium mansoni* (**Cobbold, 1883**).—*Bull. Soc. Path. Exot.* 1927. Mar. 9. Vol. 20. No. 3. pp. 226–228.

MAZZA (S.), ROSENBUSCH (F.) & ANTEQUEDA (E.). "Microfilaria" sp.? de los perros del Norte. [**Microfilaria sp.? of the Dog.**]—*Bol. Inst. Clin. Quirúrgica.* Buenos Aires. 1926. Nos. 14, 15, 16. 8 pp. With 6 text figs.

ROBERTS (J. I.). **The Anatomy and Morphology of** *Hippobosca equina.*—*Ann. Trop. Med. & Parasit.* 1927. Mar. Vol. 21. No. 1. pp. 11–22. With 2 plates.

STUNKARD (H. W.). Sur l'*Unicaecum ruszkowskii*, trématode sanguicole des tortues d'eau douce de l'Amérique du Nord. [*Unicaecum ruszkowskii.* **A Blood-Sucking Trematode of Fresh Water Turtles of North America.**]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 117–126. With 3 text figs.

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## BACTERIAL DISEASES.

HARNACH (R.). Recherches sur le moment auquel apparait la bactériémie charbonneuse chez le boeuf. [**The Time at which Anthrax becomes Septicaemic.**]—*Rec. Méd. Vét.* 1927. Feb. 28. Vol. 103. No. 4. pp. 68–73.

It is generally agreed that anthrax bacilli are not present in the blood in large numbers until shortly before death. The older authors fixed the period at which the disease became septicaemic at a quarter of an hour to four hours before death. HUTYRA and MAREK state that the period may be as long as eighteen hours.

Similar differences of opinion have been expressed in connexion with small animals infected with anthrax.

The author has had the opportunity of making systematic examinations of the blood of animals grazing on land where cases of anthrax were frequent. He has examined 17 cattle and eight pigs. He finds that the onset of clinical symptoms does not synchronize with the appearance of the bacilli in the blood in large numbers. The duration of the septicaemia may vary within wide limits. In five cases of anthrax which he describes as subacute, it varied from 2 to 187 hours. But since all the animals either recovered without treatment or were successfully treated with anti-serum, it cannot be said that in all the cases this interval could be described as normal.

Further, the author states that serum therapy has proved useless when once septicaemia is established. It appears therefore to be doubtful whether septicaemia could have been fully established in the cases recorded.

NIEBERLE (K.) & STOLPE (B.). Zur Kenntniss des metastatischen Hautmilzbrandes beim Schwein. [**Metastatic Anthrax of the Skin in Pigs.**]—*Deut. Tierärzt. Wochensch.* 1927. Apr. 30. Vol. 35. No. 18. pp. 281–283.

The authors describe two cases of anthrax of the skin in pigs. The lesions appeared as areas of reddening or haemorrhage scattered over various parts of the body. They were irregularly rounded and about 0·5 centimetre in diameter. Each was surrounded by a pale red zone about 3 mm. in breadth. On sections the greater part of the infiltration was not in the skin itself, but in the subcutaneous tissue. Anthrax bacilli were sparingly present in the skin lesions, mesenteric glands, and blood.

FORGEOT (P.). Vaccination intradermique de la chèvre contre le charbon bacteridien. [**Intradermic Vaccination of the Goat against Anthrax.**]—*Bull. Soc. Path. Exot.* 1927. Mar. Vol. 20. No. 3. pp. 208–209.

CLAVERIE having drawn attention to the danger attending the vaccination of goats by the intradermal method on account of their greater susceptibility than that of sheep, the author, working in Turkey, where mixed herds are common, thought it well to carry out preliminary trials of the method. Two goats, of the breed reputed to be the least susceptible (Kara-kil breed) were inoculated intradermally in the tail with ½ cc. of 2nd Pasteur vaccine. There was no local reaction, but one showed a slight febrile reaction, similar to that sometimes shown by sheep after intradermal inoculation with ¼ cc. Since there was no untoward result five more goats were inoculated. One died during the same night. No lesions of anthrax were found, and bacilli were not demonstrable in the blood, but tubes of broth and agar showed colonies on the next day but one. Inoculation with these gave a positive result. [It is not stated what animal was used for this.]

On the second day after inoculation another goat died. Again there were no lesions and bacilli were demonstrable in the blood by cultivation only, and then only after 48 hours.

The author is not able to furnish any explanation of these curious results.

STOLYGVO (N.). Zur Frage über die Wirkung der Salvarsanpräparate, inklusive Stovarsol und Treparsol, beim experimentellen Milzbrand. [**The Action of Salvarsan Compounds, including Stovarsol and Treparsol, in Experimental Anthrax.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6–7. pp. 364–367.

The author was prompted to carry out experiments regarding the treatment of experimental anthrax by means of salvarsan because of the contradictory results published by others.

In most cases a fully virulent culture was used in the experiments. Dosage is a matter of some difficulty because strains vary in virulence and because variations occur with the same strain on different media. This difficulty was to some extent overcome by the inclusion of untreated controls.

Experiments showed that a safe dose of neosalvarsan was 0·1 g. per kilogramme. In the first series of experiments 10 guineapigs and four rabbits were inoculated intracutaneously with a sporulating agar culture. The neosalvarsan solution, in strength not exceeding 4·5 per cent. was injected in doses of 0·1 to 0·15 g. per kilog. Guineapigs were injected intracardially and rabbits into the ear vein. In no case was death prevented, but most of the animals survived considerably longer than the controls.

A reduction in the dose to ·03 g. per kilog. was without any effect at all.

In view of the extraordinary virulence of anthrax for rabbits and guineapigs the infective dose was reduced, but this did not influence the results to any extent, whether the dose were introduced intracutaneously, subcutaneously, or intraperitoneally provided the dose was rich in spores.

Quite different results were obtained when a fresh 24-hour broth culture containing a minimal number of spores was used. A loopful of this proved fatal by all the paths of inoculation to control animals in 36–48 hours, but injection of a sufficient dose of salvarsan saved the animals' lives.

It was found that the latest at which treatment could be applied with success was 6 hours after infection in guineapigs and 10–12 hours in rabbits.

Attempts were then made to reduce the dose, and it was found that in rabbits the minimum was 0·1 g. and in guineapigs 0·04 g. per kilog.

Treparsol and stovarsol were found to be ineffective even in large subtoxic doses.

BROUDIN (L.). La pasteurella aviaire de Cochinchine. Son bactériophage. La prophylaxie de la maladie. [**Avian Pasteurellosis in Cochinchina. Its Bacteriophage. The Prevention of the Disease.**] —*Bull. Soc. Path. Exot.* 1927. Apr. 13. Vol. 20. No. 4. pp. 315–318.

Fowl cholera is the most serious plague of birds in Cochinchina, and fowl diphtheria occupies the second place. The former occurs during the rains, but the later is encountered principally during the dry season.

Of 36 strains studied, 19 caused blackening in lead agar; practically all cause acid formation without gas in glucose, mannite, and sacchacose. Lactose and maltose usually remain unchanged. Indol is produced in almost all cases in peptone water.

The medium used for diagnosis is the yeast-water recommended by STAUB and TRUCHE. Bone marrow is used exclusively as seed material, as it almost invariably contains the bacillus in a state of purity.

The bacteriophage was first isolated in October 1925, by filtration through an L.3 candle of a broth culture of a strain which yielded abnormal colonies on agar. The best medium to use to obtain the bacteriophage is chicken broth neutralized to phenol phthalein.

Strains containing bacteriophage occur more frequently than is generally believed, particularly during the dry season when outbreaks are infrequent.

The lysates of lysogenic cultures may be dangerous when used as vaccines because secondary cultures may be produced after a time in animals vaccinated.

A vaccine prepared from non-lysogenic strains appears to be valuable. A single dose suffices.

DOYLE (T. M.). **Observations on *B. pullorum*. Infection of Cock Birds.**— *Vet. Jl.* 1927. June. Vol. 83. No. 6. pp. 305–309.

The author finds that as a general rule the agglutination titre of a "carrier" cock bird is lower than that of a hen bird, and he recommends taking 1 in 15 as the standard at which complete agglutination indicates infection, but a second test after a month is advised, since cock birds appear to overcome the infection more rapidly than hen birds. At the same time it appears to be a fact that the agglutinin content fluctuates. The author has isolated the bacillus from infected cock birds from the testes, spleen, wall of the gall-bladder, and heart muscle.

BENNETT (S. C. J.). **Haemorrhagic Septicaemia in Cattle in India.**— *Agric. Jl. India.* Vol. 21. No. 5. 1926. pp. 351–356.

Haemorrhagic septicaemia of cattle is a disease having a seasonal and regional distribution. The largest outbreaks occur during the summer monsoon. The cause is an organism of the Pasteurella group, and it is notable that under artificial cultivation the organism rapidly loses virulence, but this can be restored by animal passage. The organism can maintain itself and multiply outside the body in soil and water. There is no justification for thinking that the diseases of the bovine and buffalo are different; cases may occur more frequently in buffaloes than in bovines, but this is due to the different habits of life of the two types of animals. Infection is usually by way of the alimentary canal, but it is not improbable that biting flies may play a part.

Death generally occurs very rapidly, and in fact, symptoms of illness are often not noticed. In cases where death is delayed till the second day, there is usually a marked rise of temperature. Shivering and lameness are early symptoms. When these have appeared swellings develop on some part of the body. These are particularly noticeable about the head and neck. There is evidence of abdominal pain and at first constipation but subsequently diarrhoea sets in. In the later stages there is respiratory distress; salivation and lachrymation are well marked. Diagnosis is readily based upon examination of blood smears.

For prophylactic purposes vaccine is superior to serum since the period of immunity is longer, but as is generally the case the vaccine is slower in action than the serum. The vaccine is a dead one. It has been found inadvisable to use an attenuated living vaccine because of the risk of infection in highly susceptible animals, and because it is essential that nothing unexpected should happen to vaccinated animals and thus destroy the confidence of owners.

It may be possible to devise a simultaneous method.

GHEORGHIU (J.) & BARTH (C.). Epizootie provoquée chez les cobayes par un bacille du groupe "Salmonella." Essais de vaccination. [**Epizootic in Guineapigs caused by a Bacillus of the "Salmonella" Group. Attempts at Vaccination.**]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1182–1183.

The authors have previously described a disease in rats characterized by the formation of nodules of an adenomatous nature in the lungs, liver, spleen, and kidneys, and by ulceration and thickening of the intestines. This condition is caused by a Salmonella. Experimentally this disease is transmissible to the guineapig.

During the present year a natural outbreak of the disease occurred among guineapigs 15 days after these had been in contact with naturally infected rats. The mortality was at first light, but eventually 50 per cent. of infected animals died. Cultivations from the diseased organs showed that the same bacillus was present.

As no means of controlling the disease was known it was decided to try immunization.

At intervals of 5 days, 0·1 to 0·3 and 0·3 cc. of an emulsion of the organism were injected. An agar culture supplied 15 cc. of vaccine. It is not said whether the vaccine was of modified virulence, but presumably it was not. The mortality ceased after the first injection, but it caused abortion in pregnant females, and some of such females died.

TAHSSIN-BEY (S.). Untersuchungen über eine Meerschweinchenseuche. [**A Plague in Guineapigs.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. May 12. Vol. 102. No. 6–7. pp. 374–381.

The author describes the symptoms, pathological anatomy, the morphology and cultural characters of the causal organism, transmission and immunization of a naturally encountered disease of guineapigs.

The disease is a chronic one, and there is no great change in the general condition of infected animals. It is only in the last stages of the disease that the animals become dull and are disinclined to move. The appetite is generally well maintained.

At the post-mortem there are generally lesions of the mesenteric gland and of the sacral glands. These take the form of abscess-like structures with thick fibrous capsules. The contents are thick and creamy. As a rule they are sterile. In recent cases only can be found scattered bacilli in intact leucocytes. In the liver and spleen nodules up to the size of peas with soft centres are encountered. Usually it is easier to obtain cultures from these lesions than from those in the mesenteric glands.

In acute cases these lesions may be absent, and there may only be congestion of the intestinal mucous membrane, slight oedema of the mesenteric glands, and some dullness of the peritoneum.

Histologically there is a necrotic centre surrounded by a zone of reaction.

As already noted the causal organism is as a rule not demonstrable in the advanced lesions, and although it is present in the blood in acute cases, it cannot, as a rule, be recognized microscopically. The organism is a short stout bacillus measuring $2\mu$–$3\mu$ in length by $0{\cdot}5\mu$ in thickness. In smears from organs a thin capsule is generally demonstrable. The organism is non-motile.

In broth it produces general turbidity, with a heavy deposit after a few days. Milk is not coagulated by some strains (Strain A) but strain B causes coagulation.

A tabular statement gives the various cultural characters of the two strains.

The disease is readily transmissible by inoculation with cultures provided that the strain has not been cultivated for more than 3 generations.

The infection is not transmissible to the rabbit, except in so far that an abscess is formed at the seat of inoculation ; but death may occur nevertheless.

The mouse dies from septicaemia in 24 hours.

Inoculation with cultures killed by heat establishes immunity, and also with filtrate from a 15-day-old broth culture.

EDWARDS (J. T.). **Vaccination against Blackquarter in Cattle and Sheep.**—*Agric. Jl. of India.* 1926. Nov. Vol. 21. No. 6. pp. 419–420.

This is a brief note about germ-free filtrate vaccination.

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## MYCOTIC DISEASES.

CERNAIANU (C.) & SCHLENKER (T.). Les associations bactériennes dans la lymphangite épizootique. [**The Bacteria occurring in Lesions of Epizootic Lymphangitis.**]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1170–1172.

The authors state that prior to the war epizootic lymphangitis of solipeds was unknown in Roumania, and that it was introduced by the French army. Subsequently, it became rather widespread.

A number of investigations have shown that bacteria present in the lesions play a not inconsiderable part in rendering the disease difficult of treatment.

From recent unopened lesions, which have been reached by penetrating normal healthy skin, the authors have cultivated *Staphylococcus pyogenes* occasionally, and a streptococcus of the strangles type in a few instances. From lesions which are on the point of rupture, the above two bacteria have been obtained frequently, and then in order of increasing infrequence, *Micrococcus tetragenus*, Preisz-Nocard bacillus, a diplococcus and colon bacilli. As was to be expected the bacterial flora of opened lesions was more varied.

It appears that all the lesions examined were provided by a single case of the disease, and that the animal had given a reaction to the intradermal mallein test which was considered as very suspicious. There is no mention of the recovery of the glanders bacillus.

The case was treated on the lines advised by NAINSOUTA; that is to say, 10 intravenous injections of 0·1 g. of biniodide of mercury in 50 cc. of distilled water were given at intervals of two days. There was scarcely any improvement in the conditions of the lesions.

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## DISEASES DUE TO FILTERABLE VIRUSES.

WALDMANN (O.) & REPPIN (K.). Die Dauer der Infektiosität der Mundschleimhaut bei der Maul- und Klauenseuche des Rindes. [**The Period of Infectivity of the Oral Mucous Membrane in Foot and Mouth Disease in Bovines.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Jan. 16. Vol. 55. No. 4. pp. 407–429.

Two series of experiments were carried out. In the first the virulence of the saliva at different intervals after infection was tested upon guinea-pigs and in the second the persistence of the virus in epithelium from bullae was tested. Finally, parallel tests were carried out with saliva and epithelium from one and the same animal.

The results showed that the virus could be detected in the saliva nine hours after infection, and up till the 6th day but not later. When saliva and epithelial shreds were used for the guinea-pig inoculations the virus could be detected up to the 11th day, that is 8 days after generalization.

Experiments carried out in parallel showed that there was a connexion between the presence of epithelium and the infectivity of materials obtained from the mouth. Inoculation with material containing epithelium yielded 89 per cent. of positive infections, while in the case of saliva alone, the percentage was 22 per cent.

The time of disappearance of the virus from the mouth is marked by the complete removal of epithelial fragments from the lesions and by the appearance of granulations.

BEDSON (S. P.), MAITLAND (H. B.) & BURBURY (Y. M.). **Further Observations on Foot-and-Mouth Disease.**—*Jl. Comp. Path, & Therap.* 1927. Mar. Vol. 40. No. 1. pp. 5–36.

This paper is divided into three sections dealing with: (*a*) Experimental studies of immunity in guineapigs to Foot and Mouth disease; (*b*) The survival of the virus of Foot and Mouth Disease when dried upon various materials; (*c*) Foot and Mouth Disease in rabbits and rats. Sections *b* and *c* are by Burbury. It is impossible to compress into a brief extract the immense amount of detailed information contained in the original, which must be consulted by those interested.

The conclusions arrived at may however be summarized as follows.

The best results have been obtained by the intradermal inoculation of guineapigs. Ill-nourished animals may fail to develop well marked lesions and give a poor immunity response. Attempts to titrate the virus by intramuscular or intraperitoneal inoculation have failed.

It has been possible to show that different grades of immunity may be produced in guineapigs by infection and prophylactic inoculation. The lowest grade corresponds to insusceptibility to intramuscular inoculation. A higher grade is the absence of generalized lesions after a primary vesicle on the plantar pad. Complete resistance is indicated by a failure to react to intradermal inoculation.

Guineapigs which have recovered from infection accompanied by generalization are immune for several months against the homologous virus; this immunity is relative to the dose of test virus. The degree and duration of the immunity varies in different guineapigs.

The resistance of guineapigs can be exalted by intramuscular inoculation of living virus in sub-infective doses with or without immune

serum. Formalinized virus confers protection, but in preparing the virus incubation beyond the point at which the virus becomes non-infective should be avoided. The immunity is set up very rapidly. An increase in resistance can be detected within 48 hours, and the immunity has been observed to last for three months. Its duration has not been determined. Repeated intradermal inoculations with formalinized virus sets up complete immunity.

The vaccine retains its properties for periods up to 6 months in cold storage. Formalinized serum from infected guineapigs immunizes as well as formalinized vesicle fluid in proportion to the amount of virus contained in it. In infective blood, the greater part of the virus is in the serum.

Virus diluted 1 in 50, dried on glass slides, and kept in a dry atmosphere at 18° C. survived from 4 months to a year. Under the same conditions, except the temperature, i.e., at 37° C., it survived only 2 to 7 days. At 18° C. in atmospheres 50 and 70 per cent. saturated with water vapour the survival was also about 5 days. Similar results were obtained with undiluted defibrinated blood.

Virus dried on fabrics kept at 56°–60° F., and in an atmosphere 52 per cent. saturation survived 2 to 14 days. The longest period of survival was on bran and hay in the dark at 56°–60° F. Under these conditions the maximum was 20 weeks. Exposure to light through window-glass reduced the survival.

In experiments carried out with rabbits, wild, and white rats, these animals were found to be susceptible to infection with guineapig virus by inoculation. Natural infection is rare. Passage of the virus through rabbits and rats does not attenuate it for the guineapig.

BELIN (M.). Premières tentatives de vaccination anti-aphteuse réalisée à l'aide des complexes vaccino-aphteux. [**First Attempts in Anti-Foot-and-Mouth Vaccination by means of Vaccine-Foot-and-Mouth-Virus Complexes.**]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1116–1118.

The author claims that his vaccinia-foot-and-mouth-virus complex can be used without danger for the immunization of cattle against foot-and-mouth disease. It does not appear that the vaccination produces any negative phase. Second vaccines should not be given before the 20th day after the first.

The introduction of the complex causes the development of an abortive vaccinal eruption or even only a slight inflammation. The reaction does not affect the secretion of milk, the general condition or capacity for work.

The foot-and-mouth virus contained in the complex has never shown any tendency to return to its original virulence.

The number of animals used in the experimental observations does not appear to have exceeded 10 in any instance.

SPERANSKY (A.). Faits nouveaux sur la pathogénie et la prophylaxie de la rage. [**New Facts in connexion with the Pathogenesis and Prophylaxis of Rabies.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 166–188. With 5 text figs.

The author believes that rabies should be classed as a toxic encephalitis.

The dominant symptoms are the result of sub-cortical lesions in the brain.

In rabies caused by the fixed virus the first symptoms are those of inco-ordination. Then follows the stage of spasmodic paralysis and eight to twelve hours later the stage of complete paralysis. These symptoms are characteristic of sub-cortical lesions and are not specific. They appear in more or less pronounced form in any intoxication of the nervous system. During the first stage the animals retain the capacity to react to stimuli. The most striking feature of rabies caused by fixed virus, and one which distinguishes it from street rabies, is the extreme constancy of the train of symptoms. The author has had under observation a large number of dogs and rabbits, and has never noted any variation. The symptoms of street rabies are more variable and complicated, but symptoms indicative of sub-cortical lesions predominate. The period of excitement which is characteristic of the early stage of street rabies is practically absent in the disease produced in the laboratory. [Presumably the author refers to " fixed virus " rabies.] After this has passed, the symptoms of inco-ordination and subsequent paralysis appear, and during these phases there is no essential difference between the two conditions.

The excitement, the author believes, is due to reaction to stimuli. He found that a dog in the early stage of the disease would lie perfectly quiet, if left absolutely at rest. An observer could sit and watch the animal without causing any exhibition of excitement, provided he sat quite motionless, but the slightest movement or sound caused a reaction in the animal. This was also noted when the paralytic stage was supervening, and the dog was lying broadside. Touching the animal still elicited a response, the animal snapping at any object with which its body was touched, and then relapsing into a state of quietude.

The difference then in the symptoms of street rabies and fixed virus rabies is a quantitative one, and the latter condition proceeds to the paralytic stage at a greater rate than the former.

In one case, the subdural injection of a dose of anti-rabic serum, eighteen hours after the injection of a fatal dose of fixed virus, followed by a second dose of serum two days later, led to a prolongation of the period of incubation to double that of the fixed virus, and the appearance of a period of excitation.

Apart from the presence of specific changes in the cells such as Negri bodies, there always occur in toxic encephalitis of whatever sort perivascular infiltrations. This the author believes is not a defensive measure against a substance which is noxious to the nervous tissue and which circulates in the blood, since it occurs in brains subjected to local freezing. The author believes that the cerebro-spinal fluid is of importance in connexion with the development of the symptoms and lesions. He finds that withdrawal of this liquid prior to subdural injection with virus causes in dogs a delay of 15 to 24 hours in the development of symptoms as compared with the controls. Repeated withdrawal of the liquid after inoculation exercises no influence. The explanation offered is that the cerebro-spinal fluid acts as a distributor of the virus. The variations in the length of delay of the onset of symptoms depend upon the rate of regeneration of the liquid. This varies in different individuals. The author has attempted to restrict the action of the virus to a certain area of the cerebral cortex by inserting a ring composed of cotton and covered with celluloid between the brain and the dura mater and injecting the test virus into the area

isolated by this ring after allowing a period of some days to elapse in order to allow the ring to become adherent to the brain and meninges on either side. The result was a delay in the development of symptoms. In one case the delay was of three months' duration.

Acting upon these basal ideas the author has devised means for conferring immunity against rabies.

Anti-rabic sera, while generally very effective in *in vitro* experiments, are of little value in *in vivo* tests.

The failure of anti-serum by subdural injection is explained on the ground that thus injected it does not reach the virus. While it is believed that substances injected into the blood do not make their appearance in the cerebro-spinal fluid, those injected into the cerebro-spinal fluid rapidly make their appearance in the blood.

A claim is made that by withdrawing the cerebro-spinal fluid first and then injecting anti-rabic serum it has been found possible to protect dogs against infection. The virus and serum have been injected together or one after the other in both respects.

It is also stated that five cases of tetanus in man have been cured by the injection of anti-tetanic serum subdurally after the cerebro-spinal fluid has been withdrawn. It is essential that the withdrawal of the liquid should be complete. It must be actually aspirated. In no case has the operation on dogs been followed by accident, but it must be done under anaesthesia or else there is a risk of collapse as is seen in man when the pressure of the cerebro-spinal fluid falls.

The problem of obtaining local active immunity of the brain against the virus is complicated by the fact that the virus itself must be used for the immunization. It is therefore necessary to try to extract from the virus or from the brain of a rabid animal the material which would confer immunity.

In the investigation of toxic substances which make their appearance in the brain as the result of partial freezing attention was drawn to the essential part played by the cerebro-spinal liquid in the disintegration of nerve tissue. This occurs more or less rapidly while the other albuminoid substances are altered little or not at all.

Since rabies is a disease leading to damage being inflicted on the nervous tissue it must be admitted that there is a substance which is fixed by the tissue. As the results of the disintegration of the nervous tissue in the cerebro-spinal liquid the toxic agent would be freed.

To prepare a vaccine for active immunization the following methods have been used. The brain of a rabid rabbit was ground in a mortar with 5 to 10 volumes of ox cerebro-spinal fluid. The resulting emulsion was incubated at 37° C. for 27 to 36 hours. with frequent shaking. After centrifugation and filtration through a Berkefeld filter the liquid was stored in ampoules. Some of these were heated to 50° C. for an hour, and others were left unheated.

These vaccines were injected into the subdural space of rabbits, in doses of 0·5 to 1·5 cc., three or four doses being given at intervals of 24 to 48 hours.

Outlines of the results of subsequent inoculations with virus are given, but as only 13 rabbits have been used and clear-cut results have not been obtained the author expresses no opinion upon them.

In experiments with dogs doses up to 40 cc. of the unheated vaccine have been injected into the subdural space without causing rabies. The injection of large doses sometimes produces spasmodic symptoms sug-

gestive of the first phase of rabies, but similar symptoms and even more marked symptoms are sometimes produced by the injection of a similar material prepared from healthy brain tissue.

BABLET, ADVIER & SOUCHARD. Recherches expérimentales sur le virus rabique des rues en Cochinchine. [**Experimental Studies of Street Virus in Cochin China.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 199–200.

Two strains of virus of native origin capable of causing paralysis in rabbits in 13 and 15 days respectively have been tested. Desiccation did not affect the virulence of the virus up to the 7th day, but there was marked attenuation on the 9th day and complete loss on the 10th day. Fresh brain immersed in glycerin retained its virulence unaltered up to the 30th day, but subsequently the virulence was lessened and there was complete disappearance by the 34th or 35th day.

Medullas subjected to 2 days' desiccation were still virulent after 20 days in glycerin.

After 4 days' drying, they remained virulent for 10 to 15 days.

Cords dried for 5 or 6 days showed a marked reduction in virulence after 10 days in glycerin, and those dried for 7 or 8 days are slightly virulent after 5 days' immersion.

MARIE (A. C.). Variations de la cholestérine au cours de l'infection rabique. [**Variations in Cholesterin in the Course of Rabies Infection.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 195–198. With 1 chart in text.

The author has found that the cholesterin content of the blood increases during an attack of rabies until towards the end of the stage of paralysis it may be 3 to 4 times the normal or ·75 to ·8 g. per litre.

In the present note the author gives the results of the examination of the supra-renals and brain substance with regard to their cholesterin-content.

During the period elapsing between inoculation and the appearance of symptoms there is a general tendency to fall in the cholesterin content of the adrenals, and this is continued until the day prior to death when a rise occurs. In the brain, on the other hand, the cholesterin content tends to rise until the onset of symptoms, after which it falls, but rises again on the day of death.

GIESE (C.). Schutzimpfungsversuche gegen die Tollwut bei Hunden. [**Protective Inoculation of Dogs against Rabies.**]—*Arb. a. d. Reichsgesundheitsamte.* 1926. Vol. 57. pp. 410–444. With 1 chart in text.

The introductory part of this paper gives the distribution of the cases of rabies in the domesticated animals in Germany during the years 1910–1924. The second section of the paper summarizes the literature regarding the methods of inoculation which have been devised for the protective inoculation of dogs.

An account is given of experiments in which the carbol-glycerinized virus method of Umeno and Doi was tested, and also the intraperitoneal injection of fresh fixed virus.

The single subcutaneous injection method devised by the Japanese investigators is said to be effective for the immunization of dogs if given before infection. Care must be taken, however, in using fixed virus for this purpose, as it may result in the production of either furious or dumb rabies. In fact, every fixed virus is not suitable for immunization purposes. Intraperitoneal inoculation with fixed virus is not practicable on account of the large amount of brain material required.

No evidence was obtained that dogs immunized by the Japanese method either spread the virus or act as carriers.

SCHIEN (H.). Notes sur la peste bovine. Variations de réceptivité des sujets dues à l'âge. Variations d'activité du virus. [**Cattle Plague. Variations in Susceptibility due to the Age of the Subjects. Variations in the Activity of the Virus.**]—*Rev. Gén. Méd. Vét.* 1927. Mar. 15. Vol. 36. No. 423. pp. 140–144.

This paper is in the nature of a reply to a criticism by VAN SACEGHEM of experiments recorded by JACOTOT and Schien.

With regard to the variations in susceptibility according to age, the author thinks that the best way of expressing it is to say that "in a large number of centres of cattle plague, the adults are generally more resistant than young animals, but there are numerous exceptions to the rule." This form of expression is more exact, because resistance is a secondary phenomenon, a character which is acquired under the influence of external causes. It is absent when these causes are not in play and it is not hereditary.

The fatal hypersusceptibility of young animals appears to be a primitive character, but the variation of susceptibility of adults is such that the causes for variation may be sought out and investigated.

Generally speaking, in areas where cattle plague is unknown or has not occurred for a long time, adults and young animals are equally susceptible. In endemic areas, young and adult animals are equally resistant. In countries where outbreaks occur with intervals of a few years between them, adults have a higher degree of resistance than young animals.

The actual susceptibility of the animal population to the virus is that of the young, and the virulence of the virus should be gauged by its effect on them.

The author thinks that the virus varies but little.

JACOTOT (H.). Transmission expérimentale de la peste bovine à *Cervus aristotelis*. [**The Transmission of Rinderpest to** *Cervus aristotelis*.]—*C.R. Soc. Biol.* 1927. May 6. Vol. 96. No. 14. pp. 1134–1135.

A one-year-old female specimen of *Cervus aristotelis*, obtained from an area that had been free from cattle plague for three years, was inoculated with infective blood. There was an incubation period of 2 days. Between the 3rd and the 8th days there was a marked febrile reaction, but other clinical mainfestations were slight. There was then another rise of temperature, and clinical symptoms were more pronounced. From the 15th day onwards there was a gradual return to normal. Throughout there had been no loss of appetite.

Two calves were inoculated as controls. One passed through a typical attack and recovered. The other died. The virus recovered from the deer was not modified in virulence.

BELLER (K.) & TAHSSIN Bey (Süreya). Die Kultur des Lüngenseucheerregers und seine Uebertragung auf kleine Wiederkäuer (Schaf und Ziege). [**The Cultivation of the Pleuro-Pneumonia Virus and its Transmission to Small Ruminants (Sheep and Goat.)**]—*Arb. a. d. Reichsgesundheitsamte.* 1926. Vol. 57. pp. 484–502. With 5 text figs.

The authors thought it desirable to test the possibility of the transmission of the pleuro-pneumonia virus to small ruminants, because of the possibility of some parallel existing between that disease and rinderpest.

Outbreaks of the latter occur, particularly in the Caucasus, which cannot be explained on any other ground.

Cultures were prepared in Martin's broth containing horse, sheep, or goat serum, and also in meat infusion containing the same sera adjusted to pH8·0. Such cultures failed to cause any symptoms of pleuro-pneumonia in sheep. But in animals that were pregnant changes occurred which led to abortion.

Culture media were then prepared using the flesh of foetuses and in others the serum was replaced by amniotic fluid. Growth occurred more rapidly in these than in the Martin's broth or meat infusion, and on agar media prepared in the same way the colonies were larger. Inoculation of sheep showed that it was possible to produce infection in both sheep and goats. The virulence for the goat appeared to be enhanced by one passage through that animal. In sheep, the typical lesions were not produced, but only a local temporary reaction. A possible explanation of this, is that the strain of virus used was not freshly isolated, but a laboratory strain which had been maintained for some time.

In pregnant animals the virus appears to find a suitable medium for growth in the tissues of the foetus, and the disease was limited to the uterus and its contents. Abortion is a sequel.

Passage through the sheep leads to an exaltation of virulence. The virus can be isolated from the tissues of the foetus.

In controlling the disease the sheep and goat must be kept in mind as possible carriers of the virus.

ORSKOV (J.). Etude sur la morphologie du virus péripneumonique. [**The Morphology of the Virus of Pleuro-Pneumonia.**]—*Ann. Inst. Pasteur.* 1927. Apr. Vol. 41. No. 4. pp. 473–482. With 4 text figs.

The author describes the results of his experiments in the direct observation of cultures of the virus of pleuro-pneumonia. As culture media he used horse serum agar or ascitic agar. These media were made in plate form in Petri dishes. The media must be as clear as possible, and the layer of uniform thickness. For examination little pieces of the agar showing growth are cut out, placed on microscope slides, and subjected to examination under the microscope. It is essential to have a good source of illumination for examination under

high magnifications, and for high powers a coverglass must be used. A minute drop of moisture between the coverglass and the medium greatly facilitates the examination.

The primary form of the virus is a small oval or short rod-shaped element which gives rise to a ramified mycelium.

The virus had a tendency to autolysis and to form elements which vary in shape and which have lost their power of germination. Different strains of the virus show this autolysis at different times.

FINDLAY (G. M.) & LUDFORD (R. J.). **The Ultramicroscopic Viruses. I. Cell Inclusions associated with Certain Ultra-Microscopic Diseases—A Pictographic Review.**—*Brit. Jl. Exp. Path.* 1926. Oct. Vol. 7. No. 5. pp. 223–255. With 50 text figs.

In this paper the authors review in pictographic form the literature dealing with the ultramicroscopic viruses. Various systems of nomenclature, and even of classification, have been suggested, but the authors doubt whether, in the present state of knowledge, any of these are justified. The uncertainty lies in our ignorance of the nature of structures discoverable in certain cells in the course of the diseases. The following diseases are dealt with :—Variola and vaccinia, Sheep pox, Fowl pox, Scarlet fever, Molluscum contagiosum, Trachoma, Rabies, Distemper, Varicella, Herpes, Meningo-encephalo-myelitis of horses, Virus III, infection of rabbits, Paravaccinia, Infections of unknown etiology, Virus from guinea-pigs, Foot and Mouth disease, Warts, Polyhedral and other ultravirus diseases of Insects, Fowl plague, Swine fever, African horse sickness, and a disease of Fowls. Reference may be made to those of more specially veterinary interest.

Sheep pox.—Study has shewn that the viruses of pox in the different domesticated animals are closely related, if not identical, but little work has been done upon the cytology of these conditions. It has been found that Guarnieri-like bodies are present in the infected epidermal cells.

Fowl pox.—The nature of the large intracellular bodies found in the epidermal cells in this condition is obscure. They are partly of a lipoid character.

Rabies.—The authors hold that few people still believe the definitely protozoal nature of Negri bodies. The view that the " inner bodies " represent the real virus is to be discounted. Many observers have been unable to demonstrate them. Special degenerations within the nerve cells are held by some to be the cause of the formation of Negri bodies.

Distemper.—The authors suggest that there has been some confusion between a special form of encephalitis and distemper (nervous form) in dogs. LENZ, STANDFUSS, SINIGAGLIA, BABES and STARCOVICI, KANTOROWICZ and LEWY, and others have described cell inclusions in the nerve cells of dogs suffering from nervous distemper, but the structures described by some of these authors closely resemble *Encephalitozoon cuniculi.*

Borna disease of horses.—JOEST has described bodies in the cells of Ammon's horn closely resembling those found in experimental herpetic meningo-encephalitis in rabbits. Others have failed.

Cellular inclusion bodies in Guineapigs.—JACKSON, GOODPASTURE, KUTTNER and COLE, have found protozoon-like cells in the salivary glands of guinea-pigs.

Inoculation of the salivary glands of old guineapigs into the brains, testicles, and submaxillary glands of young guineapigs has given rise to fatal meningitis.

Foot and Mouth Disease.—The cell inclusions found by GINS in the experimentally produced lesions in guineapigs are reported by RUHLE to have been found by him in the epithelial cells from the tongue of normal guineapigs and of cows.

Warts.—The intranuclear inclusions in the cells of infective warts in man and dogs are probably stages in the degeneration of nucleoli.

Fowl Plague.—KLEINE and SCHIFFMANN record finding bodies resembling Negri bodies in the ganglion cells.

Swine Fever.—UHLENHUTH and BÖING described Chlamydozoa in the swollen epithelial cells of the conjunctiva.

Horse Sickness.—KUHN in 1911 described cell inclusions in the renal epithelium.

LUDFORD (R. J.) & FINDLAY (G. M.). **The Ultra-microscopic Viruses: II. The Cytology of Fowl-Pox.**—*Brit. Jl. Exp. Path.* 1926. Oct. Vol. 7. No. 5. pp. 256–264. With 15 text figs.

The earliest indication of infection of an epidermal cell is the formation of a small vacuole, to the periphery of which small granules are attached. Mitosis is common in cells containing such vacuoles. The " virus " vacuoles increase in size and in number, and as they become enlarged they become enclosed by a lipoidal lining and present a granular appearance internally. Many cells become hypertrophied and at an early stage of infection there is a complete reversal in the polarity of the Golgi apparatus. The " virus " bodies tend to coalesce, and in the superficial cornified layers occupy cavities in the keratin.

## MISCELLANEOUS.

METZGER (H. J.) & HAGAN (W. A.). **The so-called Stiff Lambs.**—*Cornell Vet.* 1927. Jan. Vol. 17. No. 1. pp. 35–44. With 3 figs.

The condition usually known as " Stiff Lambs " has been recognized for some years; and it has generally been assumed to be due to infections of the joints, tetanus, pneumonia, or post-natal weakness.

The disease is well known in the sheep-raising districts of New York. Some owners have lost lambs from it for a number of years in succession; others have encountered it only recently.

It occurs in lambs from two to eight weeks old. Accurate diagnosis is difficult in the early stages, and most of the clear-cut cases are seen in lambs from 4 to 8 weeks old.

It appears to occur most frequently in flocks soon after the lambs are turned out to pasture, but it has been seen in lambs still in barns or yards.

The symptoms are stiffness and difficulty in rising and a tendency to lag. Later, affected animals refuse to move. Usually the hind legs are affected, but the forelegs are sometimes involved. There is no evidence of disease of the joints, but in severe cases certain muscles appear to be rigidly contracted, and the legs may be partly flexed. By

traction the limbs may be straightened and this does not appear to cause pain, but on release the leg is quickly flexed again. The disease may become very marked within three or four days of onset, but more usually a week to ten days is required for the symptoms to become severe. There is no rise of temperature and no loss of appetite. Death is generally due to inability to move about for grazing.

Postmortem examination showed that certain muscles or groups of muscles which were rigid during life showed white streaks in section. It was noted particularly that the same muscles on both sides of the body were simultaneously affected.

The organs all appeared to be normal except the heart, and in this there were sometimes found whitish patches under the endocardium, usually in the right ventricle.

Bacteriological investigations of fresh carcases almost always yielded entirely negative results.

The earliest histological changes were found in muscles showing no gross evidence of disease. In these certain fibres appeared to have undergone a coagulative necrosis. In more advanced cases bundles of fibres were so affected and some of the fibres were in process of disintegration. A proliferation of the connective tissues is noted in these lesions.

No evidence was obtained that there was any concurrent disease of the joints and nerves supplying the diseased muscles.

The authors are unable to say whether the disease is the same as that described by HOBMAIER in Germany, in which acute nephritis was a constant lesion. They found naked eye evidence of disease in the kidney in one case only, and in this there was fatty degeneration of the epithelium of the convoluted tubes and dilation of the glomeruli.

LEPLAE (E.). Organisation et exploitation d'un élevage au Congo belge. i. Races Bovines. [**Organization and Development of Stock Breeding in the Belgian Congo. 1. Cattle.**]—*Bull. Agric. Congo Belge.* 1926. June–Sept.–Dec. Vol. 17. Nos. 2, 3 & 4. pp. 307–608. With numerous illustrations.

This volume is in the nature of a general report on the various aspects of cattle raising in the Congo. Feeding, hygiene, diseases due to diet, diseases due to parasites, internal and external, piroplasmosis, trypanosomiasis, pleuropneumonia, cattle plague, contagious abortion, anthrax, breeds of cattle both indigenous and imported, are dealt with from a general point of view. The report is copiously illustrated.

MITCHELL (D. T.). *Urginea macrocentra* (**Baker**) : **Its Toxic Effects on Ruminants.**—*Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 303–327. With 2 plates (1 coloured).

*Urginea macrocentra* is the so-called Natal slangkop (or snake head) and occurs along the coast belt and in the Natal Midlands. It is closely allied to the scillas. It grows in patches near swamps, but too much water prevents its growth. It is shallow rooted and easily dug out.

Cases of poisoning usually occur in the spring, and it is commonly thought that the toxicity varies inversely as the rainfall, but there is no experimental evidence to support the view. Probably there is a

greater chance of the plants being eaten in dry seasons. Young shoots of about 6 inches length appear to be the greatest danger. Cattle do not appear to eat the bulbs.

Naturally cases of poisoning occur in cattle only.

In the early stages dullness, depression, inappetence, tympanites and constipation are marked. In acute cases there may be acute diarrhoea, with abdominal pain. There is no elevation of temperature. Thirst is well marked. Polyuria is present to a varying extent. Death takes place in from four to fourteen days, and is preceded by a condition of coma.

Mortality does not, as a rule, exceed 5 per cent.

Sheep and goats may be poisoned by experimental feeding. In the former diarrhoea was not noted, but death may occur in 24 hours. The stems appeared to be more toxic than the other parts of the plant.

Approximate lethal doses are: Cattle (500 lb.), 1½lb. of stems or 2½ of leaves.

The lesions are congestion and oedema (slight) of the lungs, increase in the pericardial fluid, sub-epicardial haemorrhages. Thickening and hyperaemia of the mucous membrane of the alimentary tract generally are seen.

The kidneys are congested, particularly in the cortical and boundary layers.

In the matter of treatment, oleaginous purgatives appear to be superior to salines. The use of the trocar affords only temporary relief.

Prevention consists in fencing off dangerous areas and rooting out the plant. As the plant seeds easily rooting must be persisted in.

HENNING (M. W.). Krimpsiekte. [**Krimpsiekte.**]—*Union of S. Africa. 11th & 12th Repts. Director Vet. Education & Research.* Part I. 1926. Sept. pp. 331–365. With 33 figs.

This disease, which is characterized by symptoms implicating the nervous and muscular tissues, occurs annually in the arid parts of the Karoo. It appears during the spring and early summer and disappears when the stock are moved to summer grazing grounds. It continues to appear in stock kept on the Karoo in the summer, but its incidence is less if there have been good rains. The disease is most frequently seen among goats because it occurs in country suitable for goat-rearing only. Sheep exposed to the necessary conditions contract the disease, as do horses and ruminants. It has been reported in dogs as the result of eating Krimpsiekte carcases, and it has also been noted frequently in domesticated birds. Under the necessary conditions dogs are more susceptible than other species and succumb more frequently.

YAGI (K.). Untersuchungen über Geschwulste der Hübner in den Tropen. [**Tumours of Fowls in the Tropics.**]—*Taiwan Igakkai Zasshi.* (*Jl. Med. Assoc. Formosa.*) 1926. Nov. No. 260. 1–3.

Fibromata, lipomata, osteomata, sarcomata and carcinomata have been encountered in fowls. First generation transplants with osteoma and sarcoma succeeded, but subsequently transplantation failed.

COWDRY (E. V.). **Studies on the Etiology of Heartwater. III. The Multiplication of *Rickettsia ruminantium* within the Endothelial Cells of Infected Animals and their Discharge into the Circulation.**—*Jl. Exp. Med.* 1926. Dec. 1. Vol. 44. No. 6. pp. 803–814. With 1 plate.

The author's experiments show that the virus of heartwater, and presumably the Rickettsiae, is present in the blood stream during the febrile stages and for about 6 days after the temperature has begun to fall. Rickettsia has not been found in blood films, but that is probably because they do not occur in large numbers in the blood but only as individuals or small groups. Single individuals might readily be decolorized in differentiating, whereas large masses would not. They have been found within vessels in sections.

The Rickettsia of heart water appears to differ from other known species in that it does not produce vascular degenerative changes. Its power of penetration appears to be less.

Many clumps may be found in a single cell, but they do not fuse, and such clumps may be of different sizes. It is suggested that the smaller ones are young colonies.

Appearances seen in sections suggest that Rickettsia multiplies by fission. The invasion of endothelial cells does not appear to damage the cell in any way or to change its vitality; the presence of the parasite seems merely to lead to distension.

The appearances presented in sections of Rickettsia escaping from endothelial cells are not, in the author's opinion, due to artefacts. Such escape has not been reported in other diseases in which Rickettsia have been found.

YAMAGIWA (S.). Ueber die in Südmandschurei beobachtete Lungenseuche des Rindes. [**Pneumonia of Cattle in South Manchuria.**]—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 68. (Author's German abstract.)

As a result of the examination of three natural, and one experimental, cases of the disease the author concludes that it is a complicated pneumonia of a sero-fibrinous-purulent, haemorrhagic-necrotic type. It resembles the epidemic influenza pneumonia of man.

NEVEU-LEMAIRE (M.). Essai de mammalogie médicale. 1. Les mammifères réservoirs de virus des maladies infectieuses de l'homme. [**The Mammals which act as Reservoirs for the Viruses of Diseases transmissible to Man.**]—*Ann. Parasit. Hum. et Comp.* 1927. Apr. 1. Vol. 5. No. 2. pp. 143–176. (To be continued.)

As our knowledge of parasitology increases a number of facts regarding the evolution of parasitic diseases show how animals play a more or less direct part in their transmission. In this paper the author catalogues the animals which act as reservoirs of such viruses. The author points out that the rôle is not the same in all cases. Sometimes they are subjects of diseases proper to themselves which are transmissible to man, such as anthrax and glanders. Sometimes they harbour organisms in a kind of latent condition, themselves possessing more or less immunity against them. Such a case is the harbouring of plague

bacilli by rodents. In many cases mammals act as intermediate hosts of worms parasitic for man. Others are hosts of the same parasites as man and assist in their dissemination.

In the present paper the author does not deal with the part played by mammals in the dissemination of helminth infections. That is left for a future publication. This paper deals only with the part played by mammals in infectious diseases caused by bacteria, mycoses, protozoa, and viruses of a nature up to the present unknown. The manner of transmission of the diseases is also considered. These include simple contact, biting, ingestion, or by some intermediate agent.

The author deals with the mammals in zoological order, beginning with the lowest. He indicates the geographical distribution, gives a few words regarding their biology when it is thought necessary, refers to the organisms harboured, and indicates the manner of transmission to man.

No abstract can be usefully made of the substance of a publication of this kind, but the foregoing abstract of the introductory pages will indicate the nature and scope of the original.

QUINLAN (J.) & DE KOCK (G.). **Two Cases of Rhinosporidiosis in Equines.**—*South African Jl. Sci.* 1926. Dec. Vol. 23. pp. 589–594.

Case I. A mule showed a number of pink tumour-like growths with irregular surfaces on the nasal mucous membranes. The smallest were about 2 mm. in diameter and 1 mm. in height, and the larger, which appeared to be formed by the coalescence of smaller growths, measured 2 cm. in diameter by 1·5 cm. in height. On section the growths were found to be composed of a central core of connective tissue with a much-altered mucous covering. No foci of pus were found. Embedded in the stroma were numerous cysts and spore morulae of Rhinosporidium.

Case II. A mule, eight years old. This animal during life showed dyspnoea when trotting and made a snoring sound during respiration. There was an intermittent discharge from the left nostril.

Surgical interference revealed the presence of a large granulation-like mass practically filling the left nostril. Higher up in the fossa the membrane was studded with growths.

Histologically the growths removed resembled those found in Case I. A cure was effected by operation.

FLEMING (A.). **On the Effect of Variations of the Salt Content of the Blood on its Bactericidal Power** *in vitro* **and** *in vivo*.—*Brit. Jl. Exper. Path.* 1926. Oct. Vol. 7. No. 5. pp. 274–281.

The author finds that intravenous injections of hypertonic saline solution cause a temporary reduction in the bactericidal power of the blood, which is followed by a marked rise in that power above the normal.

In the human subject the injection of an amount of salt which would cause an increase in the salt content of only ·01 per cent. yielded a marked rise in the bactericidal power of the blood.

The reason for this has not been ascertained.

SHMAMINE (T.). Agar als Einschlussmedium für die Untersuchung im Dunkelfeld. [**Agar as an "Inclusion Medium" for Dark Ground Illumination Investigations.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. Jan. 3. Vol. 101. No. 4–5. pp. 279–281.

Three per cent. agar is liquefied and cooled to 40° C. A drop of this is placed on a warmed slide and the material for examination is mixed with it. A coverglass is placed in position and the melted agar is then rapidly cooled and the preparation is ready for examination. The effect is to slow down the movements of motile organisms and facilitate their study.

The preparations should be ringed with wax to prevent evaporation.

SUZUKI (S.). **On the Application of Papain for the Preparation of Culture Media.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Mar. Vol. 6. No. 1. pp. 63. (Author's English abstract.)

The object of the author was to render available a part at least of the nitrogenous materials lost when meat infusion is sterilized by heat.

He summarizes his results as follows :—

1. 450 g. of raw meat were boiled by direct heat with the addition of 0·5 g. of papain powder and 30–55 per cent. of the total protein was obtained in solution. The amount of water used is not stated.

2. Bacteria grow in a medium so prepared and almost as abundantly as in Teruuchi-peptone-broth.

3. Tetanus toxin was produced in almost as great a concentration as in Teruuchi-peptone-broth or Hida-peptone-broth.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 15.] December 1, 1927. [No. 4.

## DISEASES DUE TO PROTOZOAN PARASITES.

NIESCHULZ (Otto). Zoölogische bijdragen tot het surraprobleem. XI. Enkele proeven met *Haematopota truncata* **Schuurm. Stekh.**, *H. irrorata* **Macq. en** *Tabanus brunnipes* **Sch. Stekh.** [**The Surra Problem. Experiments with** *Haematopota truncata, H. irrorata,* **and** *Tabanus brunipes.*]— *Veeartsenijkundige Mededeeling. No. 61. Departement van Landbouw Nijverheid en Handel-Ned.-Indië,* 13 pp. With 3 text figs. 1927. Archipel Drukkerij-Buitenzorg.

In the early part of this year, during a fly survey in Sumatra, some surra transmission experiments were carried out with *H. truncata, H. irrorata,* and *T. brunipes,* flies which up till then had not been known to act as carriers of surra.

The first of these was used in three experiments. Direct transmission from a naturally infected horse to another horse and some guineapigs failed. Direct transmission from horse to horse (with 25 flies) was successful. With an interval of half-an-hour transmission from horse to guineapig failed.

With *H. irrorata* two experiments were carried out. An infected dog and guineapigs were used. Fifteen flies were used in each experiment and the transmission was direct. In one case the result was positive and in the other negative.

Five *Tabanus brunipes* transmitted the infection from an infected dog to two guineapigs.

KASAI (Kakuya) & AKAZAWA (Sasao). **The Prophylactic Action of "Germanin" ("Bayer 205") against Experimental Infection with a Trypanosome of the Formosan Water-Buffalo.**—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. I. p. 1095–1096.

Only a summary of the authors' experiments is given in this paper. Mice injected subcutaneously with ·005 g. of "Germanin" were protected against inoculation with the trypanosome causing the surra-like infection of water buffaloes for about 5 months. After this the resistance declined. Experiments with optochin, trypaflavin, trypanblue, tartar emetic, neotrepol, atoxyl, neosalvarsan, and silver salvarsan in doses approximately to half the tolerated dose showed that these drugs exercised little or no effect.

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With progressively smaller doses of " Germanin " the effects were progressively less marked, until at ·00001 g. the drug does not protect mice. Calves injected with 1 gramme are protected for about 3 months. The same dose given to horses is not protective, but the course of the disease is prolonged. This is the case even when the infective inoculation is given four months after the drug. It is to be noted that no information is given as to whether the doses referred to are absolute quantities or whether they are related to the body weight.

" Germanin " in doses of 4 g. per 100 kg. did not exercise any inhibitory action upon the development of rinderpest.

KAZANSKY (J. J.). Sur la résistance du *Trypanosoma equiperdum* vis-à-vis du " Bayer 205 " (Naganol). [**The Resistance of** *T. equiperdum* **to " Bayer 205 ".**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 413–415.

Following other investigators the author has tested the persistence of drug-resistance during passage through guineapigs.

The strain of trypanosomes used was obtained from a horse infected with dourine which had relapsed after treatment with " Bayer 205."

In this way the strain has been passed through eight passages utilizing 22 guineapigs.

The drug was administered subcutaneously in doses of 0·015 and 0·04 g. per kilo as a 1 per cent. solution in saline, and the doses have been repeated at intervals ranging from 9 to 60 days. In no case was a positive result obtained. Other guineapigs and rats were used as inoculation controls.

HALL (G. N.). Action de l'halarsine et du bisantol dans le traitement des trypanosomiases des bovins et caprins. [**Halarsin and Bisantol in the Treatment of Trypanosomiasis of Cattle and Goats.**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 535–545.

The author has tested " Halarsine " against *T. congolense* and *T. vivax*, the most important animal trypanosomes of Uganda.

In every case intravenous injection was resorted to, and the results controlled by daily examination of fresh and stained blood preparations. It is stated that the examination of centrifuged blood and cerebro-spinal fluid has also been resorted to.

Halarsine is said to be 4 oxy-3 amino-phenyldichlorarsine. Some samples were pale pink and others quite white. The powder was soluble in hot or cold water yielding a slightly acid solution. As is usually the case great care must be exercised in introducing the drug into the vein because it is irritant in subcutaneous tissue.

Experimental dosages showed that a safe dose for an animal weighing about 225 kg. was 2 g. (in 30 cc. of water). But this dose may apparently produce acceleration of respiration, contractions of the facial muscles, inability to rise, and attempts at vomition. The symptoms pass off in about half-an-hour.

A single injection into an ox infected with *T. congolense* caused a disappearance of trypanosomes in about 20 hours, but they reappeared in a week.

In a second case 4 injections were given, as trypanosomes appeared again in the circulation. The intervals of freedom from trypanosomes

were progressively shorter. After the fourth injection there was considerable swelling of the neck. An attempt was made to save the animal's life by tartar emetic injections, but without success.

A second animal treated in a similar way failed to recover. Failures are also recorded in attempts to treat cattle and goats infected with *T. vivax*. In no case was the circulation cleared for periods exceeding 15 days, and there was always a risk of producing serious lesions as a result of the drug gaining access to the subcutaneous tissues.

It is noted that in every case treated the introduction of the drug into the circulation was followed by an increase in the number of trypanosomes, and in two cases they actually made their appearance there when the blood had apparently been negative before treatment was begun. The results of a succession of injections appeared to indicate that the drug is excreted slowly and that intoxication may result.

Bisantol contains 47·5 per cent. bismuth and 13·6 per cent. antimony. It is readily soluble in water and may be sterilized by boiling without decomposition. It is as toxic as tartar emetic subcutaneously but far more toxic when given intravenously.

Bisantol was used in a 4 per cent. solution and 5 cc. of this was found to be a poisonous dose for a goat.

Bovines weighing 90 kg. stood doses up to 16 cc., but larger doses produced symptoms of intoxication. In an animal infected with *T. congolense* and treated with bisantol relapse occurred on the 6th day. A second dose given on the 12th day failed to clear the circulation and a third dose of 16 cc. on the 16th day proved fatal. Similar results were obtained with two bovines infected with *T. vivax*, and with three goats.

CARMICHAEL (J.). **Rinderpest Serum and the Pathogenicity of *Trypanosoma theileri*.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Nov. Vol. 20. No. 4. pp. 303–304.

After referring to the opinion generally held that *T. theileri* is of little importance as a parasite of cattle the author gives brief details of fourteen animals used for the preparation of anti-rinderpest serum at the field laboratory Arua, West Nile District of Uganda.

Of these nine died and five survived. It is suggested that the trypanosome was transmitted by the inoculation with virulent rinderpest blood in the process of simultaneous inoculation. The thermal reactions following were those normal to rinderpest, but it would appear that the febrile reaction reduced the resistance of the animals to this parasite which ordinarily is not pathogenic.

CERNIANU (C.). Rinderbabesiellose in Bessarabien und ihre erfolgreiche Behandlung mit Hexamethylentetramin. [**The Successful Treatment of Bovine Babesiellosis with Hexamethylenetetramine in Bessarabia.**]—*Berlin. Tierärzt. Woch.* 1927. May 27. Vol. 43. No. 21. pp. 343–345.

The author explains that up to the present no investigations have been made in Bessarabia regarding the type or types of parasites found in the red corpuscles of cattle, but JAKIMOFF and WASSILEWSKY have suspected that Babesiella is endemic there, and that possibly *B. bigeminum* also occurs.

The occurrence of *P. caballi* was established in 1923, the transmitting agent being *D. reticulatus* and the author has seen cases (1925) of infection in cattle with *B. bovis*.

Bones were frequently sent to him as being those of suspected cases of anthrax, but as negative results were frequently obtained he examined smears of marrow after removal of the fat, and found *Babesiella bovis* to be present.

Later he has been able to find the parasite in blood smears and smears from organs.

The parasites usually occupy a marginal position and the individuals of the twin organisms are disposed at a wide angle to each other. On an average 30 to 40 per cent. of the corpuscles are invaded, but occasionally 70 per cent. or more contain parasites.

The transmitting agent is *Ixodes ricinus*.

Dullness, diarrhoea, colic, anaemia, and haemoglobinuria are constant symptoms. When recovery takes place convalescence is slow.

The lesions are those general to severe acute anaemia. The spleen is enlarged—sometimes to twice the normal size. The liver is enlarged, the gall-bladder distended, the kidneys are haemorrhagic, and the bladder sometimes contains dark red urine, but is often quite empty.

For treatment the author used hexamethylenetetramine in 40 per cent. solution, injected subcutaneously. Forty to fifty cubic centimetres were given at a dose and two doses were given daily. Cases treated early, that is to say when there was only elevation of temperature and diarrhoea, were cured by two doses, but even marked cases recovered after treatment for 3 or 4 days at the most.

IAKIMOFF (W. L.) & BELAVIN (W. S.). Espèce nouvelle du Babesiella en Russie. [**New Species of Babesiella in Russia.**]—*Russian Jl. Trop. Med.* 1926. No. 8. p. 51. [Authors' French Abstract.]

The authors have detected a parasite in the blood of a cow in the Northern Caucasus which resembles *B. bovis* morphologically, but which differs from that parasite in that it is centrally placed in the corpuscles. It also resembles *Babesiella berbera* (Sergent). The name *Babesiella caucasica* n. sp. is suggested.

YAKIMOFF (W. L.), MARKOFF-PÉTRASCHEWSKY (E. N.) & RASTÉGAÏEFF (E. F.). Sur l'hémoglobinurie au cours de la babésiellose bovine. [**Haemoglobinuria caused by Bovine Babesiellosis.**]—*Bull. Soc. Path. Exot.* 1927. May. Vol. 20. No. 5. pp. 415–418.

The authors summarize briefly the attempts which have been made by investigators to explain the liberation of haemoglobin during attacks of piroplasmosis. They believe that the liberation is in some way connected with the multiplication of the parasites in the blood and this they think, with NUTTALL and GRAHAM-SMITH, is by a process of budding.

During the summer of 1926 they immunized some 200 animals against *Babesiella bovis* by infecting them and treating them with trypanblue. The blood of the animals was examined regarding the types of parasites present and this was correlated with the presence of haemoglobinuria.

The results are set out in tabular form. They find that from the examination of the blood of 172 animals 145 showed annular forms of parasites and of these 1·3 per cent. had haemoglobinuria, 16 showed a mixture of annular and pyriform parasites and of these 43·7 per cent. had haemoglobinuria, 11 showed pyriform parasites, of which 9 or 81·8 per cent. had haemoglobinuria. They conclude that the haemoglobinuria is connected with the arrival of the parasite at the pyriform stage.

YAKIMOFF (W. L.) & RASTEGAÏEFF (E. F.). Les maladies à protozoaires des animaux domestiques en Crimée. [**The Diseases of Domesticated Animals due to Protozoa encountered in the Crimea.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 418–419.

Late in 1924 the authors visited the Crimea for the purpose of investigating the animal diseases there.

Horses.—Dourine was encountered, and during 1924 its occurrence became widely spread. Piroplasmosis was said to occur there, but no cases were actually encountered. Microfilariasis of horses was not seen.

Cattle.—*Piroplasma bigeminum* and *Gonderia mutans* were found.

Neither *T. theileri* nor microfilaria were found in the blood of some of the 46 animals examined.

Coccidia were not detected in the faeces.

Camels.—There are only about a hundred camels in the Crimea. It is not stated how many blood examinations were made, but no parasites were found. Similarly, none were found in the blood of sheep and pigs. Five out of 13 of the latter were found to harbour *Eimeria debliecki*.

No piroplasms were found in 16 dogs, but there was one case of leucocytogregrarine infection and 6 of microfilariasis. Although a small number of domesticated birds were examined without the detection of spirochaetes, the authors believe that the disease occurs. A leucocytozoon was found in one turkey, and this may have been the cause of a recent epizootic.

CARPANO (M.). Le infezioni da emoprotozoi endoglobulari dei bovini in Italia. [**The Intra-Corpuscular Parasites of Bovines in Italy.**]—*La Clin. Vet.* 1927. July. Vol. 50. No. 6. pp. 389–400.

In this preliminary note the author gives a classification of the intra-corpuscular parasites of bovines and figures and describes briefly *Piroplasma bigeminum*, *Babesiella bovis*, *Gonderia mutans*, and *Anaplasma marginale*. In each case a few lines of description of the epizootiological data, the morphology of the parasite, the symptoms, and lesions are given.

VICREY. Les piroplasmoses atypiques. [**Atypical Piroplasmoses.**]—*Ret. Vét. et Jl. Méd. Vét.* 1927. July. Vol. 79. pp. 373–387.

The author describes cases of piroplasmosis which are atypical in their clinical manifestations. The paper is divided into two parts, the first delineating briefly the classical symptoms of the various forms of piroplasmosis—using the term in a general sense, and the second

containing accounts of specific cases in which the clinical symptoms were of an unusual character. In each case the diagnosis was made at the Pasteur Institute (presumably in Algiers).

ADLER (S.) & THEODOR (O.). **The Transmission of** *Leishmania tropica* **from Artificially Infected Sandflies to Man.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 89–104. With 3 plates and 2 text figs.

"Out of 28 attempts to transmit cutaneous leishmaniasis to man from artificially infected sandflies six gave positive results.

"The successful experiments were carried out with *L. tropica* which had developed eight days or more in *P. papatasii*. Nine experiments with *L. tropica* which had developed from 2 to 7 days in *P. papatasii* all gave negative results during an observation period of 5 to 15 months."

ADLER (S.) & THEODOR (O.). **The Behaviour of Cultures of Leishmania sp. in** *Phlebotomus papatasii.*—*Ann. Trop. Med. & Parasit.* 1927. July. Vol. 21. No. 2. pp. 111–134. With 2 plates and 3 text figs.

A detailed description is given of the means employed for feeding sandflies on culture. Essentially, this comprises two glass tubes, one for the culture and the other for the sandflies. The intercommunication between the two is covered with a piece of shaved rabbit skin through which the flies feed.

*P. papatasii* was infected experimentally in this way with cultures of *L. tropica*, *L. braziliensis*, and two strains of *L. infantum*. The cultures of *L. tropica* behaved in the flies exactly like parasites taken from natural sores. The culture forms of *L. tropica* acquired an exalted virulence by passage through sandflies.

Cultures of *L. infantum* (Paris strain) behaved similarly to *L. tropica* in *P. papatasii*. *L. braziliensis* and *L. infantum* (London strain) infected the stomach of the sandfly only.

PATTON (W. S.) & HINDLE (E.). **The Development of Chinese Leishmania in** *Phlebotomus major* **var.** *Chinensis* **and** *P. Sergenti* **var.**—*Proc. Roy. Soc.* 1927. May 2. Vol. 101. Series B. No. B 710. pp. 369–390.

Infected hamsters have been used as the source of infection of the flies. Negative results following experiments with human patients are explained by the extreme rarity of the parasites in the peripheral blood. When ingested by the flies the flagellates attach themselves in the mid gut and extend forwards, reaching the buccal cavity about the 6th day. The sandfly appears to remain infected for the duration of its life (10–12 days). It appears to be probable therefore that *P. major* var. *chinensis* is concerned in the transmission of the parasite in China.

With *P. sergenti* different results were obtained. The flagellates could be obtained in the midgut of the flies fed upon infected hamsters, but they appeared to die out in about four days unless the flies were re-fed. There was no development in the forward direction towards the buccal cavity. The flagellates were found in the broad posterior part of the midgut. The fly appears to be less likely to act as a vector, but it should not be entirely ignored.

## DISEASES DUE TO METAZOAN PARASITES.

BLACKLOCK (D. B.) & GORDON (R. M.). **The Experimental Production of Immunity against Metazoan Parasites and an Investigation of its Nature.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 180–224. With 1 plate and 2 text figs.

This paper deals with the investigation of the immunity which can be produced in guineapigs against the larvae of *Cordylobia anthropophaga*. It is divided into the following sections: (1) Introduction, (2) Technique, (3) The experimental production of metazoan immunity, (4) An investigation into the spread and persistence of immunity, (5) The nature of the immunity, (6) The immunity is a true immunity and not due to damage or athrepsis, (7) The immunity is a solid immunity, (8) Anaphylaxis, (9) Attempts to produce immunity by various skin treatments, (10) Summary and conclusions.

The authors believe that they have furnished proof of the existence of an acquired immunity which conforms to the following definition—" an immunity acquired as the result of previous infection or vaccination and involving the death of the metazoan parasite in the host within a specified time."

The idea of acquired immunity against metazoan parasites is not new but experimental proof of its existence is conspicuous by its more or less complete absence. In their experiments the authors do not deal with immunity resulting from age of the host.

The parasite used was *Cordylobia anthropophaga* and the host immunized was the guineapig. This type of immunity was shown to be capable of being produced by BLACKLOCK & THOMPSON in 1923.

The immunity is at first confined to areas of skin into which the parasite has previously penetrated or which have been vaccinated with larvae or emulsions of larvae. It appears that the specific immunity resides, so to speak, in the skin itself, since the majority of the larvae placed upon a protected animal are dead before they have penetrated the deeper tissues.

The immunity appears to spread from the site of penetration or vaccination to the rest of the skin. It lasts for three months and possibly longer. It is reproduced in new skin growing over an abraded immune area, but it does not persist in portions of immune skin removed and kept in vitro. There appeared to be no constant association between immunity and eosinophilia. No toxic or anaphylactic symptoms have been observed, nor has there been any visible reaction from the application of emulsions of larvae to the conjunctiva or skin of either immune or non-immune animals. Only a few experiments have been carried out with emulsions of larvae, and in these 1 out of 3 animals acquired immunity. Results were better when larvae were allowed to penetrate and were at once removed, and still better (although the number of tests is smaller) when the larvae were allowed to remain for 48 hours and were then killed.

LEGG (John). **Note on the Infestation of Sheep with Ticks.**—*Australian Vet. Jl.* 1927. Mar. Vol. 3. No. 1. pp. 12–14.

During a drought in Queensland last year sheep were moved down from areas where the cattle tick, *B. australis*, has never been seen to " cattle " country near the coast. There many of them have become

infested with the tick. As the sheep will be moved back to the sheep ground the problem arises as to what should be done regarding the infestation. It is the author's opinion that no steps need be taken as the tick will not survive the conditions prevailing in the sheep country. Had the country been suitable for the tick it would have appeared there long ago.

*Ixodes holocyclus*, or scrub tick, has caused serious losses among flocks sent to the Atherton Tableland. Sheep usually go down with paralysis four to six days after the attachment of the female tick, and if the ticks are not removed death takes place about the 8th day. If the ticks are removed when weakness is first noticed there is a chance of recovery. The tick usually attaches itself about the face. Ticks identified as *Haemaphysalis leachi* (?) were found on some sheep near Townsville.

STEWART (M. A.). **A Means of Control of the European Hen Flea** (*Ceratophyllus gallinae*, **Schrank**).—*Jl. Econ. Entomol.* 1927. Feb. Vol. 20. No. 1. pp. 132–134.

This paper states that a proprietary disinfectant prepared in the United States is effective for the destruction of the hen flea. No information is given regarding the nature or composition of the disinfectant.

WRIGHT (W. R.). **A Note on mounting Media for Parasitological Materials.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 179–180.

The author has used Euparal for mounting nematodes and insect genitalia with fairly good results. The specimens are transferred from 70 per cent. alcohol to phenol, and when cleared to Euparal.

For mounting nematodes from 70 per cent. alcohol without clearing in phenol the author uses a medium prepared as follows: Flowers of camphor and pure phenol are mixed in equal parts by weight. This yields a clear oily liquid. To this is added a " thin solution of gum sandarac in iso-butyl alcohol." The strength of this solution is not given. The proportion of phenol added may be varied according to the degree of clearing required. The medium is not recommended for blood films but it is good for haematoxylin and carmine stained specimens. The use of absolute alcohol and a clearing agent is obviated.

FAIRLEY (N. Hamilton). **Studies in the Chemotherapy and Immunity Reactions of Schistosomiasis.** (*Schistosoma spindalis* **and** *Schistosoma haematobium*).—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1926. Nov. Vol. 20. No. 4. pp. 236–267.

The author found that while intravenous injections of alcohol soluble extracts of cercariae into goats caused an increase in the antibody content of the serum, it exercised no influence on the course of the disease.

In aqueous solutions cercariae survived for three hours in 1 in 200 solutions of tartar emetic and emetine hydrochloride. The presence of

human serum greatly enhanced the destructive power of the drugs, for death took place in the same period in dilutions of 1 in 40,000 to 1 in 160,000. Tartar emetic was found to be capable of effecting a cure in goats infected with *S. spindalis* if doses of 3·9 to 5·5 m.g. per kg. body weight were given daily for 16 to 26 days.

About 50 per cent. of animals regarded as clinical cures were found on postmortem to be still affected, but there was evidence to show that the sex ratio of the parasites had undergone considerable modification. In some of the animals only male parasites were discoverable. The intravenous injection of emetine hydrochloride in doses of 0·7 to 1 mg. per kg. daily for 10 or 15 days was very efficient.

All the experimental animals developed antibody recognizable by complement fixation prior to the commencement of treatment, and in some of these it was found that the reactions became negative in one to four months after treatment was begun.

The fact that human beings who had been clinically cured of the disease by the administration of tartar emetic up to a year previously still gave positive complement fixation reactions suggests that in these the persistence of reaction is due to the survival of male parasites.

KIMURA (T.), TAGUMA (S.) & WADA (Y.). **Pathological Anatomy of the Bronchiectic Cavity of Cattle in Japan** (*Fasciolasis cystica pulmonum* **s.** *Bronchiectasis parasitaria*).—*Sei-I-Kwai Med. Jl.* 1926. Nov. Vol. 45. No. 5. English summary. pp. 1–7. With 2 plates. [In Japanese.]

The authors describe lesions found in the lungs of cattle slaughtered at Tokyo which are characterised by the presence of cavities with fibrous walls, trematodes being occasionally found within them.

The lesions vary in size from a bean to a fist and contain viscid creamy pus which is sometimes partly calcified. The cavities are irregular in shape and communicate with bronchi. The surrounding lung is collapsed or cirrhotic.

Parasites have been found in the smaller cavities but never in the larger ones.

Histological examination showed general cellular infiltration, mucoid degeneration and desquamation of the epithelium. The material in the cavities appeared to be mucus containing large numbers of degenerating leucocytes. There were sometimes layers of macrophages surrounding the mass of mucus. The walls were composed of dense fibrous tissue, and the surrounding tissues were cirrhotic.

A tabular statement shows the number of cases in which trematode invasion of the lungs occurred among cattle slaughtered in 1920.

The parasites are about 15 mm. long by 4–5 mm. in width. Examination of the parasites and eggs leads the authors to think that it is *Fasciola hepatica.*

SEDDON (N. R.). **The Treatment of Liver Fluke in Sheep.**—*Australian Vet. Jl.* 1927. June. Vol. 3. No. 2. pp. 60–63.

The author publishes a few results showing that carbon tetrachloride is an efficient agent. It may be given in liquid paraffin, and there is no need to starve the animals beforehand. One to 2 cc. is effective.

SOUTHWELL (T.). **Experimental Infection of the Cat and the Fox with the Adult** *Echinococcus.—Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 155–163.

The author draws attention to the frequent occurrence of *E. polymorphus* (*E. veterinorum*) in man and animals and the infrequence of occurrence of the *Echinococcus granulosus* (*T. echinococcus*) in dogs.

Evidence is produced that the fox may harbour the mature parasite under natural conditions and that both the fox and the cat can be experimentally infected.

GRANOUILLIT & THU. Sur une forme kystique anormale et rare dûe à *Cysticercus tenuicollis* chez les porcins en Cochinchine. [**An Abnormal Cystic Form of** *Cysticercus tenuicollis* **in Pigs in Cochinchina.**]—*Rev. Vét.* 1927. Aug. Vol. 79. pp. 444–446.

The peritoneal situation of *Cysticercus tenuicollis*, so frequently encountered in Europe, is rare in Indo-china. There the parasites are found embedded in the surface of the liver, but sometimes they are in the depth of the parenchyma of the organ. It was originally thought that such cysts were in reality Echinococcus, but microscopic examination showed that this was an erroneous view. By experiment *Taenia marginata* was produced in a dog.

The parasite is not encountered frequently. Thousands of pigs have been examined, but only about a dozen have been found infested.

LOPEZ-NEYRA (C. R.). Considérations sur le genre *Dipylidium* Leuckart. [**A Review of the Genus** *Dipylidium* **Leuckart.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 434–440

This paper is a detailed survey of the genus and does not lend itself to abstraction. It should be consulted in the original by those interested.

LAGAILLARDE. Contribution à l'étude des parasites intestinaux chez le cheval. Strongles, Oxyures, Ascaris. [**The Intestinal Parasites of the Horse, Strongyles, Oxyuris, and Ascaris.**]—*Rev. Vet.* 1927. Aug. Vol. 79. pp. 429–431.

For the treatment of horses infested with Strongyles and Oxyuris the author recommends

| | | | | |
|---|---|---|---|---|
| Turpentine | ... | ... | ... | 100 to 125 g. |
| Chloroform | ... | ... | ... | 20 to 25 g. |
| Castor Oil | ... | ... | ... | 300 g. |

This is the dose for a horse weighing from 370 to 400 kilos. To hasten the passage of the medicine through the intestine he advocates immediately after administration an injection of pilocarpine, or, better still, arecolin.

MIYAMOTO (T.). **On Diarrhoea of Young Pigs in Formosa caused by** *Strongyloides suis ?—Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa.* 1927. Feb. No. 263. p. 3. [Author's English Abstract.]

The author found larval nematodes in the faeces of young pigs suffering from diarrhoea which he believed to be those of *Strongyloides suis.*

KOSUGE (I.). Beiträge zur Biologie der Mikrofilaria immitis. [**The Biology of Microfilaria immitis.**]—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. 1. pp. 405–409.

The microfilariae of *Dirofilaria immitis* of the dog shows a daily periodicity. The minimum is between 6 and 10 a.m. and the maximum is in the evening. The periodicity is not, however, so sharply marked as that of *Microfilaria loa diurna.*

The microfilariae are more numerous in the venous than in the arterial system. The worms are, however, not limited to the blood vascular system, as they are to be found in lymph spaces both in the skin and in lymphatic glands.

No confirmation could be obtained of the view that the parasite is transmitted by the dog flea.

OGUNI (Hideo). **On the "Wahi" or "Kose" Disease, an Elephantiasis-like Disease in Cattle. First Report.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 188–190.

The disease occurs in animals from 3 to 7 years old, and is of far more frequent occurrence during the summer than the winter. It has been considered as a form of scabies, but the author has demonstrated a microfilaria which he considers to be causally connected with the disease.

The lesions generally involve the head, neck and back, and the earliest stage is the development of a number of small nodules on the skin. In some of these the surface is shed leaving a bright red moist spot. Gradually the number of nodules increases, the hair falls out, and the skin is thrown into thick folds.

There is constant irritation of the skin.

Microscopic examination of the skin shows that in the early stages there is extensive cellular infiltration in the corium. The majority of the cells are eosinophile leucocytes. Microfilariae are discoverable in these infiltrations and in the blood vessels.

In the second stage, when the surface epithelium has been rubbed off, granulation takes place and the eosinophilia is less pronounced. At this stage microfilariae are very scantily present.

The microfilaria is like the embryo of *Filaria immitis* but smaller. It is about 130$\mu$ in length. No sheath has been demonstrated. The anterior end is blunt and the posterior pointed.

Staining with alum haematoxylin reveals the presence of nuclei, the nerve ring, excretory pores, genital cells and anal pore.

FIELDING (J. W.). **Preliminary Note on the Transmission of the Eye Worm of Australian Poultry.**—*Australian Jl. Exp. Biol & Med. Sci.* 1926. Vol. 3. pp. 225–232. [From a Reprint.]

After discussing briefly the views held regarding the identity of the parasite, the author gives an account of his own experiments and observations.

He states that "worms have been recovered alive in the mouth, oesophagus, and crop; and the eggs in the mouth, oesophagus, crop,

along the alimentary tract, and in the droppings." These eggs hatched after varying periods from 24 hours upwards, and the adults have been kept alive in various solutions for a number of days under laboratory conditions. The blood has been examined for larvae with negative result. The " eye-fluid " was also examined without result.

The pus-like material which is found in the eyes of infected birds was found to comprise two kinds of matter, " a hard mass of old-standing material, and, secondly, a softer fresher material, both of which, in our opinion, are the result of the decomposition of the worms themselves." In the softer pus eggs were frequently found.

The ground in the infected yards, particularly in the shady parts, was riddled with filariform larvae. Examination of chickens and ducks showed the presence of the eye worms in the former at 10 days of age and in the latter from 14 to 21 days.

A search for an intermediate host appears to have shown that the cockroach, *Leucophaea surinamensis*, Linn., was responsible. Experiments in this connexion indicated that the cockroach ingests the larvae. These pass through the wall of the alimentary tract, and become encapsuled on its outer surface. Here changes occur and the worm reaches the infective stage, after which they leave the capsules and gain the body cavities. They have been recovered from the thoracic and abdominal cavities and from the legs. The infected cockroaches are eaten by poultry and the worms escape, it is believed, in the crop, pass up the oesophagus and gain the naso-lachrymal duct.

Points still requiring elucidation are the length of time required for the larvae to reach the infective stage, and the interval elapsing between the infestation of the birds and the commencement of egg-laying.

Trapping the cockroaches is the principal line of attack on the problem of control.

Treatment should include thorough cleaning and disinfection of the yards, the direct treatment of the birds by dropping a little turpentine into the eyes and washing it out after half an hour with warm water or boracic solution. Kerosene is said to give good results.

SCHULZ (R. E.). **On the Genus** *Aspiculuris* **Schulz, 1924, and Two New Species of it**—*A. dinniki* **and** *A. asiatica*, **from Rodents.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 267–275. With 7 text figs.

The author gives an emended description of the diagnosis of the genus Aspiculuris and describes and figures two new species. Both occur in the caecum and large intestine of rodents.

PETROW (A. M.). *Spirocerca arctica*—**a New Nematode Parasite of** *Canis familiaris* **and** *Vulpes lagopus* **in North Russia.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 261–266. With 3 text figs.

The worms described were obtained from tumours in the stomach of the hosts. The tumours projected from the serous membrane and were as large as peas.

THWAITE (J. W.). **On a Collection of Nematodes from Ceylon.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 225–244. With 7 text figs.

This paper deals with the nematodes found in a collection of helminths sent by the Director of the Colombo Museum, and refers mainly to specimens from fishes.

*Physaloptera musculi* n.sp. was found in the intestine of a domestic mouse. This parasite is the only new species from mammals which is figured and described.

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SPREHN (C.). Echinostomiden bei Tauben. [**Echinostomidae in Pigeons.**]—*Deut. Tierarzt. Woch.* 1927. July 9. Vol. 35. No. 28. pp. 451–455. With 3 text figs.

WERESCHTSCHAGIN (M. N.). Uber die Oxyuris des Schafes und der Ziege. [**The Oxyuris of the Sheep and Goat.**]—*Deut. Tierärzt. Woch.* 1927. July 9. Vol. 35. No. 28. pp. 455–456. With 1 text fig.

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## BACTERIAL DISEASES.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS. 1927. Aug. Vol. 49. No. 2. pp. 107–115. **The Relation of Mediterranean Fever to Contagious Abortion in Cattle.** [Editorial.]

This editorial contains a summary of the available information regarding the identity or otherwise of the organisms causing contagious abortion in cattle and undulant fever in man.

It is concluded that there is a fairly close relationship between the two organisms, but that the degree and nature of that relationship has not been determined.

The divergent results obtained suggest that there are variables which have not been taken into account.

" In view of the recent observations on the several antigenic components apparently to be found in varying quantities in different cultures from the same original stock and associated with properties of heat stability or lability, types of flocculation and characters of colonies, it seems possible that a study of variants of either or both of these organisms might enable previous work to be coordinated and discrepancies to be explained."

i. BIRCH (R. R.) & GILMAN (H. L.). **The Agglutination Test as an Aid in handling Bang Abortion Disease.**—*Rept. New York State Vet. Colleg.* 1925–1926. Legislative Document No. 28. 1927. pp. 81–85. J. B. Lyon Company. Printers. Albany.

ii. ——, ——. **Bang Abortion Disease in Cattle.**—*Idem.* pp. 86–102.

i. This paper is a summary of the general features of contagious bovine abortion and the application of the test in the control of the disease. It contains nothing new.

ii. This paper is a reprint, and contains much the same information as the foregoing, but in a rather more extended form.

HAGAN (W. A.). **The Value of Placental Examination for the Diagnosis of Infectious Abortion of Cattle.**—*Ann. Rept. New York State Vet. College.* 1925–26. Legislative Document. No. 28. 1927. pp. 125–130.

The author describes the changes occurring in the chorion in cases of contagious abortion, and points out that these are the only gross lesions which can be recognized definitely with the naked eye. In the infected chorion the part most markedly affected is the intercotyledonous membrane and not the cotyledons.

A good deal depends upon getting the cleansings in a fresh state, but even in putrid specimens the leathery condition of the membrane is said to be recognizable. It must be remembered that the area involved may be small or large.

CARPENTER (C. M.). **Agglutinins for** *Brucella abortus* **in the Blood Serum of Man.**—*Ann. Rept. New York State Vet. Coll.* 1925–26. Legislative document. No. 28. 1927. pp. 178–181.

The author examined twenty cases of illness in man which resembled undulant fever. An organism identified as *B. abortus* was isolated from the blood of five of these. But in two of the five agglutinins for *B. abortus* could not be detected. One of these gave a positive Widal and the other a Wassermann. The titres of the sera varied from 1 : 30 to 1 : 480.

It thus appears that the agglutination test cannot be relied upon to detect the presence of *B. abortus* infection in man.

LERCHE. Beitrag zum Spirillenabortus beim Rinde. [**Abortion caused by Spirillum in Cattle.**]—*Deut. Tierärzt. Woch.* 1927. July. 23. Vol. 35. No. 30. pp. 484–487.

Examination of various materials from 1,565 cases of abortion revealed the presence of the spirillum in 22 of them. Bang's bacillus was found 886 times. On the majority of farms where infection with spirillum was detected only a few cows aborted. In two cases only did the losses amount to 10 and 24·3 per cent.

There is evidence to show that the spirillum may occur alone or in conjunction with Bang's bacillus.

Abortion can be induced in guineapigs by inoculation with cultures of the spirillum, but rabbits and mice are less susceptible. In a single experiment with a cow the result was negative.

HENDRICKSON (J. M.). **The Differentiation of** *Bact. pullorum* **(Rettger) and** *Bact. sanguinarium* **(Moore).**—*Ann. Rept. New York State Vet. Coll.* 1925–26. Legislative Document No. 28. 1927. pp. 146–172.

The author deals at considerable length with the tests carried out with the two organisms. These tests were cultural and serological. Tabular statements are given showing the results obtained. In the fermentation tests it appears that the nature of the nutrient medium is of importance. In serum water the same carbohydrates were attacked by all strains of the organisms used, but *B. pullorum* A

produced gas in all, and *B. pullorum* B differed from *B. sanguinarium* only in that dextrin and dulcite were fermented more rapidly by the latter than by the former.

In meat infusion or meat extract media maltose, dextrin, and dulcite were readily fermented by *B. sanguinarium* but not, or hardly at all, by *B. pullorum.* The two types of *B. pullorum* (A & B) fermented the same sugars, but gas production was erratic.

The strains were mutually agglutinable, and the agglutinins were absorbed practically completely by homologous and heterologous strains.

PONS (R.) & ADVIER (M.). **Melioidosis in Cochin China.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 28–30. With 1 chart in text.

The authors place on record the occurrence of a case of melioidosis in a human being in Saigon. The organism was isolated from the patient's blood.

There was no evidence of the disease having been contracted from a human source, but the patient had been in contact with domesticated animals and rats and shrews were present in the dwelling. There had, however, been no deaths among the animals.

STANTON (A. T.) & FLETCHER (W.). **Melioidosis. Notes on a Culture of *B. whitmori* from Saigon.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 31–32.

An account is given of the strain isolated by PONS and ADVIER in Saigon. Plated on eosin-methylene blue agar two types of colonies developed, one of which was far more corrugated and wrinkled than the other. Both grew in broth and the latter type of colony yielded organisms which were far more motile than the former. On glycerin agar the corrugation appeared earlier with the more wrinkled type than with the ordinary type. Both fermented lactose, saccharose, glucose, mannite, dulcite, maltose and dextrin with the production of acid but no gas. Cultures from the ordinary type of colony were agglutinated to full titre by sera prepared from the Kuala Lumpur strains, while the more corrugated type was agglutinated to about one-third this extent.

The more rugose type appeared to be more virulent than the other. The former caused a septicaemic condition with death in a week. The latter caused death in three weeks and in addition to the area of necrosis at the site of inoculation, which was present in both animals, there was caseation of glands, and the formation of caseous nodules in the spleen.

STANTON (A. T.), FLETCHER (W.), & SYMONDS (S. L.). **Melioidosis in a Horse.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 33–35.

*B. whitmori* appears to be closely related to certain strains of glanders bacilli isolated in India and Java, but its relationship to strains of *B. mallei* in the National Collection is very remote.

The disease occurs naturally in man, rats, cats, dogs, guineapigs and rabbits, but it has not hitherto been recognized in horses.

Previous experiments indicated that horses were immune to melioidosis, but this appears to be incorrect.

From some thick, blood-streaked pus coughed up by a horse *B. whitmori* was isolated by guineapig inoculation. This isolation was repeated a week later from pus which was found dripping from the horse's nostril. Serum from the horse in question agglutinated the type strain of *B. whitmori* to 1 in 8,000. The sera of seven other horses in the same stable did not agglutinate it beyond 1 in 200. The horse did not lose condition or appear to be ill. It was given a course of treatment with arsenic and was actually run in a race. The discharge of pus from the nose was intermittent, and in the intervals *B. whitmori* could not be cultivated from material obtained from the nasal cavity.

Eventually the animal was killed, but no active lesions were discovered. Cultures from the blood, various glands and organs were negative, but the blood still agglutinated in high dilution.

The organism, which was isolated on a number of occasions, was agglutinated at 1 in 15,000 by serum prepared with the type strain (Ragaviah). The strain produced suppurating buboes in guineapigs and rats and death in less than a fortnight. The introduction of culture into the nostril of a guineapig caused death on the 25th day.

AGLIANY (M.). Deux Cas consécutifs de tétanos grave, guéris par la promenade forcée, sans aucun traitement medical. [**Two Consecutive Cases of Severe Tetanus treated by Forced Exercise alone.**] —*Rev. Vét.* 1927. Aug. Vol. 79. pp. 44–444.

The idea of trying the effect of exercise arose from watching two animals affected with tetanus attempting to eat. It was observed that as the animals persisted in their efforts the lips, jaws, and tongue became very gradually more mobile.

Two periods of exercise were given daily, each lasting about twenty minutes with frequent rests. On each occasion there was an appreciable improvement at the end of the period of exercise .

In both cases recovery was complete in about a month. No medicinal or serum treatment of any kind was given.

ZOELLER (C.). De la stabilité de l'immunité antitétanique réalisée par l'anatoxine. [**The Stability of the Immunity produced by Tetanus Anatoxin.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 879–882.

The duration of immunity in man to tetanus produced by the injection of anatoxin cannot be established by direct experiment, but some information will be obtained from the results of wounds in immunized soldiers.

The author has carried out experiments with guineapigs immunized with anatoxin and subjected to various adverse circumstances such as cold, heat, fatigue and injury. They were inoculated with cultures of tetanus bacilli and of other organisms. These experiments show that the resistance is maintained in all cases, and that the immunity is not only one against toxin, but also against infection.

BESREDKA (A.) & NAKAGAWA (S.). Immunisation passive contre le tétanos par la voie cutanée. [**Immunization against Tetanus by the Skin Path.**]—*Ann. Inst. Pasteur.* 1927. June. Vol. 41. No. 6. pp. 607–614.

In 1903 CALMETTE showed that powdering wounds infected with tetanus spores with dried antitetanic serum prevented the development of tetanus in guineapigs so treated. In the present paper the authors describe experiments designed to show that tetanus antitoxin can be absorbed by skin which has merely been shaved, and that under certain circumstances it can be absorbed by skin in which there is no wound and reach the circulation. The application of antitetanic serum to the skin as a dressing, particularly if it is in the form of a cream, is absolutely without danger. Whatever the hypersensibility of the animal the absorption of the serum is so slow that symptoms of anaphylaxis never make their appearance.

Antitetanic serum applied to the shaved abdomen of guineapigs 24 hours before an injection of toxin prevents the development of symptoms.

If the application be made from 1 to 3 hours after the toxin has been used a fatal result is prevented, but in some cases slight symptoms of tetanus are noted.

If the serum be applied as a liquid dressing its action is local, but if applied as a cream it is protective if the toxin be injected elsewhere. The cream or pomade is made by mixing two parts of anti-tetanic serum with one part of anhydrous lanoline.

RAMON (G.) & DESCOMBEY (P.). L'anatoxine tétanique et la prophylaxie du tétanos chez le cheval et les animaux domestiques. [**Tetanic Anatoxin, and the Prophylaxis of Tetanus in the Horse and Domesticated Animals.**]—*Rec. Méd. Vét.* 1927. May 30. Vol. 103. No. 10. pp. 191–204; and *Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 834–847.

In an introductory portion of the paper the authors point out that in certain places the risk of infection with tetanus is ever present, and that there are plenty of cases in which the portal of entry is not discoverable. It is impracticable to repeat injections of serum fortnightly, and there is therefore need of some method whereby a lasting immunity against tetanus can be conferred. Tetanic anatoxin furnishes the means of establishing this.

Before carrying out any experiments with anatoxin tests were made for the purpose of ascertaining whether there was present in the serum of the animals used any tetanus antitoxin. It is well known that both horses and men frequently yield sera that are definitely antagonistic to diphtheria toxin, but in no case have the authors found tetanus antitoxin in the serum of more than a hundred horses, in spite of the fact that two of the animals had recovered from attacks of tetanus.

From their experiments the authors gather that a single injection of anatoxin, of practically no matter what quantity, produces only a slight degree of immunity, but it enables the animal to respond more pronouncedly to a second injection.

They also found that the immunity following the second dose is stronger in direct proportion to the interval elapsing between the two doses. The interval should not be less than three weeks, and should, preferably, be a month.

The addition of tapioca powder to the anatoxin injected increases enormously the amount of antibody developed.

Slightly inferior results have followed the injection of an oily emulsion of anatoxin.

It has been found that the addition of a culture of streptococci killed by heat to the anatoxin also increases its value for the production of immune serum. The addition of atoxyl, tryparsamide and other drugs also increases the degree of immunity established by the injection of anatoxin, but not to the same extent as tapioca. The duration of the immunity has been ascertained by withdrawing blood at intervals and testing the serum against toxin. It is found that while serum drawn after two injections of anatoxin alone will neutralize in doses of 1 cc. 10 lethal doses of toxin (for the guineapig), at the end of a year it will still neutralize 3 lethal doses, and after eighteen months 1 lethal dose. The addition of tapioca to the anatoxin sends up the titre of the antiserum produced to 200 to 600 lethal doses. After years the serum is still effective for the neutralization of 40 to 80. Sufficient time has not yet elapsed since the experiments were carried out to see what is the actual duration of useful immunity.

The repetition of an injection of anatoxin and tapioca two years after the original doses have been given increases the titre of the serum enormously.

The simultaneous injection of anatoxin and anti-tetanic serum at different parts of the body reduces the immunity response to the former, but the use of antitetanic serum after the primary injection of anatoxin does not influence the course of the immunization.

NATTAN-LARRIER (L.), RAMON (G.) & GRASSET (E.). L'anatoxine tétanique et l'immunité antitétanique chez la mère et le noveau-né. [**Tetanus Anatoxin and Antitetanic Immunity in the Mother and the Newly-Born.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 848–861.

Experiments carried out with rabbits showed that the young of does immunized with anatoxin had tetanus antitoxin in their blood to practically the same extent as in the does.

It was further found that the immunity was of the passive type, but that it persists for about 2 months after birth. Young rabbits are, however, capable of reacting to the inoculation of or to ingestion of anatoxin by producing antitoxin. The amount of antitoxin is greater following subcutaneous injection than that resulting from the ingestion of anatoxin.

NATTAN-LARRIER (L.), RAMON (G.) & GRASSET (E.). Contribution à l'étude du passage des antigènes et des anticorps à travers le placenta. [**The Passage of Antigens and Antibodies through the Placenta.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 862–867.

The injection of anatoxin intravenously into rabbits forty-eight hours prior to parturition does not result in the presence of antitoxin in the serum of the young, and they possess no immunity.

The intravenous injection of tetanus toxin on the day of expected parturition does not lead to the passage of the toxin to the foetuses. If these are removed about 8 hours after the injection by caesarian section, bled out, and their blood used for the inoculation of guineapigs the latter show no symptoms. If some of the young are kept alive and put to a foster-mother they do not develop any symptoms of tetanus.

When large doses of tetanus toxin are injected intracardially into pregnant guineapigs a small amount appears to pass into the foetuses.

It was found, however, that anatoxin is capable of passing through the placenta.

RAMON (G.) & GRASSET (E.). Recherches sur le passage des toxines, des anatoxines, et des antitoxines à travers les parois du tube digestif. De l'immunité antitoxique active et passive par voie digestive chez l'animal d'expériences. [**The Passage of Toxins, Anatoxins, and Antitoxins through the Walls of the Alimentary Tract.**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 868–878.

Experiments showed that the alimentary canal of young animals is pervious to toxins and anatoxins, but the immunity resulting from the ingestion of the latter is weaker than that produced by subcutaneous injection.

In adult animals the absorption of a small quantity of bile or castor oil prior to the ingestion of the anatoxin leads to the production of results parallel to those obtained in young animals, but without the preliminary treatment negative results are obtained.

Passive immunity can be established by way of the alimentary canal if bile be given beforehand to render absorption more readily achieved, or simple dilution of the antiserum will achieve the same result.

The resulting passive immunity is of a much lower standard than that achieved by the subcutaneous injection of the antiserum.

The immunity so conferred is humoral or general and not local.

OTTEN (L.). Zur Differential-Diagnose zwischen den Erregern der Haemorrhagischen Septikaemien. [**The Differential Diagnosis of the Causal Organisms of Haemorrhagic Septicaemia.**]—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. 1. p. 1103.

This note is a résumé only. It is stated that a medium composed of 0·5 per cent. peptone water, with glucose in decreasing amounts and litmus as an indicator, yields clearly marked differences in colour reactions with the plague bacillus, bac. pseudotuberculosis rodentium, and bac. plurisepticus. No details are given.

VELU (H.). Vaccination contre le charbon bactéridien par inoculation intradermique en un temps. [**The Single Intradermal Vaccination against Anthrax.**]—*Ann. Inst. Pasteur.* 1927. June. Vol. 41. No. 6. pp. 615–647.

The author first draws attention to the difficulties of handling the semi-wild poor sheep of Northern Africa. Their value is such that the arrangement of proper buildings, etc., for handling the sheep, and the cost of going over the flocks more than once would be prohibitive.

They therefore determined to try intradermal inoculation in a single dose. They have already found that attempts to vaccinate by applying the vaccine to sound or to scarified skin are not successful.

A preliminary experiment showed that it was possible to confer a solid immunity on Moroccan sheep by a single intradermal injection of vaccine. The vaccine used was prepared from strains given by THEILER.

The injections were made into the anal folds because of the ease of the operation. Should the vaccine go through the skin serious results are not obtained as they would be if the injection were made behind the shoulder.

In pigs the dorsal surface of the ear was selected, and in horses, after a number of trials of other sites, the side of the neck. In the case of the latter animal there is a greater chance of the dose going into the subcutaneous tissue, but there will be no ill effect save a more or less pronounced local reaction, and a certain amount of delay in the development of the immunity. In sheep this method of vaccination establishes immunity within a very short time, and it can be practised even on sheep that are in the period of incubation. Experiments with horses showed a solid immunity is established in five days or less, and animals need not be taken off work while the vaccination is being carried out.

During the period 1924–1926 more than half-a-million animals were vaccinated in various French possessions, and it has been found possible to vaccinate without accident, even when there is an actual outbreak. In fact, by vaccinating while outbreaks are in progress these can be stopped within 48 hours.

One-fifth of the dose required for subcutaneous immunization is required by the intradermal method for the actual establishment of immunity, but since five times this dose are used the immunity must be very strong. As a general rule the immunity lasts for about 9 months, but in some cases for a year.

JANUSCHKE (E.). Ueber die Leistungsfähigkeit der Ascolireaktion bei der Milzbranddiagnose. [**The Applicability of the Ascoli Reaction to the Diagnosis of Anthrax.**]—*Seuchenbekämpfung.* 1927. Vol. 4. No. 1. pp. 58–61. [To be continued.]

In this short paper the author gives some account of the experiments of others regarding the limits of applicability of the Ascoli reaction to the diagnosis of anthrax.

The questions requiring an answer are as follow: What is the relationship between the number of bacilli present and the quantitative demonstrability of the precipitinogen? What is the minimal amount of precipitinogen which a precipitating anthrax serum will render recognizable? How and in what amount is the precipitinogen obtained from the organs and blood by the "thermo-extraction"?

ROTTGARDT (A.). Zur Rauschbranddiagnose. [**The Diagnosis of Blackquarter.**]—*Berlin. Tierärzt. Woch.* 1927. July 8. Vol. 43. No. 27. pp. 441–444.

The author points out the difficulties associated with the detection of the bacillus of blackquarter in materials that are not fresh as a result of the simultaneous presence of the vibrion septique, and describes a technique for the removal of these difficulties.

By mixing an antiserum prepared by immunizing sheep with a number of different strains of the vibrio with the material for diagnosis and incubating at 37° C. for periods ranging up to 2 hours he finds that the vibrio can be killed out, leaving the bacillus of blackquarter. This is then recovered by guineapig inoculation.

NELSON (J. B.) & SMITH (Theobald). **Studies on a Paratyphoid Infection in Guinea Pigs. I. Report of a Natural Outbreak of Para-typhoid in a Guinea Pig Population.**—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 353–363.

The outbreak occurred in a stock of guineapigs which had had no new animals introduced within a period of 5 years. The disease appears to have been that described by EBERTH in 1885 as pseudo-tuberculosis of the guineapig. The epidemic continued for about 8 weeks, and this was followed by an endemic phase which has continued.

The principal lesions were yellowish nodules of various sizes studded over the spleen. Similar lesions were sometimes found in the liver, which was in a condition of fatty degeneration. The gall bladder sometimes contained thin purulent fluid. There was congestion of the alimentary tract. The epidemic began abruptly, and throughout females were rather more frequently attacked than males. In adult animals the disease was not particularly acute, the lesions indicating that infection had been in existence for a week or two before death occurred. Unweaned animals sometimes died 2 or 3 days after birth without showing lesions, but the organism was recovered. The exact position of the organism in the Salmonella group was not decided, but it was closely allied to paratyphoid organisms derived from other rodents. It showed only a remote relationship to human paratyphoid B. and bacillus enteriditis.

SMITH (Theobald) & NELSON (J. B.). **Studies on a Paratyphoid Infection in Guinea Pigs. II. Factors involved in the Transition from Epidemic to Endemic Phase.**—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 365–377.

The authors consider various hypotheses which may explain the decline of the acute epidemic to the endemic stage. The hypotheses suggested and criticized are (*a*) that the outbreak was an attack upon a number of animals below the normal resisting power of the species which had accumulated during a period of years when there had been freedom from disease. This accumulation may have been due to fortuitous sexual selection or to spontaneous variations in resistance. Most of the susceptible individuals were wiped out during the epidemic phase, and the absence of recurrence of epidemic outbreaks supports this view; (*b*) an increase in specific immunity. This view is not well supported because a gradual decrease in mortality would have been expected and because a larger number of carriers would have been expected during the endemic phase; (*c*) a decline of virulence of the organism. Comparative tests with cultures isolated at different periods failed to give evidence that this had occurred.

SMITH (Theobald) & ORCUTT (Marion L.). **Vibrios from Calves and their Serological Relation to** *Vibrio fetus.*—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 391–397.

The authors describe tests carried out with vibrios isolated from the organs of calves of various ages after death. Agglutination tests were applied in various ways and the evidence obtained indicated that one of four was distinct from the *Vibrio foetus*, and the others were closely allied to but not identical with that organism.

NUTT (Muriel M.). **The Method of Division of the Rough and Smooth Type of Colonies among Bacilli of the Salmonella Group.**—*Jl. of Hyg.* 1927. Mar. Vol. 26. No. 1. pp. 44–48. With 8 text figs.

By a special technique the author has been able to watch the process of growth from single organisms isolated from rough and smooth colonies of organisms of the Salmonella type. The observations were made by dark ground illumination at intervals.

The results obtained are described and figured. In the multiplication of organisms from rough colonies the chain of bacilli is bent in a zig-zag fashion, while in the formation of smooth colonies the daughter organisms tend to become detached from each other and to slide up alongside, thus forming a more or less regular pattern.

THEILER (A.). **Lamsiekte (Parabotulism) in Cattle in South Africa.**—*Union of South Africa. 11th & 12th Reports, Director of Veterinary Education and Research.* Part II. 1927. January. pp. 821–1361.

This report is a record of the experimental work upon lamsiekte carried out since 1917, and VILJOEN, GREEN, DU TOIT, MEIER, and ROBINSON have collaborated with Theiler in its prosecution.

Lamsiekte is the name originally given to a disease of cattle characterised by paralysis and paresis, principally of the locomotor system, but sometimes also of the muscles of mastication and deglutition.

Naturally the disease affects cattle almost exclusively, but the symptoms can be produced in other species experimentally. Horses are less susceptible than ruminants, and poultry still less so. Dogs and pigs are practically immune.

A survey is given of the views that have been held at various times as to the nature of the condition, of which the most important was the " deficiency of lime " theory.

In 1919 Theiler saw a case of lamsiekte following the deliberate ingestion by cattle of the skeletal débris of a carcase, and found that material from the same carcase was capable of producing the disease experimentally. This led to the conception of a toxin-producing saprophyte being the cause of the disease.

The sequence of events which leads up to the production of the disease is then as follows. Phosphorus deficiency in the soil leads to a similar deficiency in the pasture and in the animal. As one of the manifestations of the last of these cattle develop a craving for the ingestion of bones. Ordinarily the ingestion of bones causes no harm, but should these bones be infected with the Bacillus parabotulinus, which produces a very powerful toxin, then the symptoms

of the disease are developed. As expressed in this paper a number of factors are linked in the production of this disease, and the whole sequence of events terminating in lamsiekte can be broken by breaking one link.

Phosphorus deficiency in the soil leads to cattle acquiring the habit of eating bones. Bones are supplied by carcase débris, but these are harmless unless they are contaminated with the toxin producing saprophytic organism. The symptoms of lamsiekte are produced by the ingestion of such contaminated bones, the toxin elaborated by the bacillus in the bones acting on the nervous system of animals susceptible to it.

The habit of eating bones can be broken by using phosphatic manures, or by feeding bone meal or some phosphorus-rich supplement. The intoxication can be prevented by clearing away carcase débris.

OGURA (K.). Ueber eine Modificaktion der Giesselfärbung und die Giesselform der Bakterien. [**A Modification of the Staining and Form of Flagella of Bacteria.**]—*Jl. Jap. Vet. Soc.* 1927. June. Vol. 6. No. 2. pp. 162–165.

A suspension of a 24-hour culture (presumably from a solid medium) is made in distilled water. This should be just opalescent. To this are added a few drops of 2 per cent. " Osmium " solution. A loopful of the mixture is spread on a clean cover-glass and allowed to dry slowly in the incubator. Fixation is effected by slight heating over the flame. The specimen is then covered with a Loeffler's mordant, which has the following composition :—

20 per cent. tannic acid, 10 cc.

Saturated iron sulphate solution, 5 cc.

Saturated alcoholic fuchsin, 1 cc.

This must be freshly prepared for use as it becomes ineffective within a few days. The coverglass is quickly warmed until the mordant boils, and then thoroughly washed under a fairly strong stream of water. The dried mordant is carefully wiped from the edges of the coverglass and the specimen is treated for a few seconds with hydrochloric acid alcohol, and again washed.

The specimen is stained with dilute fuchsin and then covered with 1 to 3 per cent. ammoniacal silver nitrate solution and quickly warmed to boiling.

To make preparations more permanent they should be immersed for 20 seconds in fixing solution (presumably hyposulphite of soda), washed, and dried.

Using this method the author has been able to find two types of flagella in some organisms, a fine and coarse spiral. Of B. paratyphoid B. 28 strains showed coarse spiral and six fine spiral flagella. Twenty-five strains of *B. abortus equi* had coarse and 6 fine spiral flagella. In the case of *B. suipestifer* the relationship of the types was 5 to 1. Occasionally both forms of flagella may be found in a single organism.

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VAN HEELSBERGER (T.). Een Geval van echte " Gasbrand " (*Bac. phlegmonis emphysematosae* E. Fränkel) bij bet Paard. [**A True Case of Gas Gangrene** (*Bac. phlegmonis emphysematosae*) **in a Horse.**]—*Tijdschr. v. Diergeneesk.* 1926. Feb. 15. Vol. 53. No. 4. pp. 156–159.

## MYCOTIC DISEASES.

THEILER (A.). Die Diplodioses der Rinder und Schafe in Süd-Afrika. [**Diplodiosis of the Ox and Sheep in South Africa.**]—*Deut. Tierärzt. Woch.* 1927. June 18. Vol. 35. No. 25. pp. 395-399. With 4 text figs.

Diplodiosis is the name used for the disease which results from the eating of maize infected with the mould *Diplodia zeae.*

Although maize was for some years suspected of being in some way connected with the causation of the disease, definite proof of the causal connection was furnished by MITCHELL working in Natal.

At first only cattle were thought to be affected, but subsequently the same condition was observed in sheep.

The disease does not make its appearance every year, but its incidence is connected with rainfall. Outbreaks are favoured by wet seasons.

It occurs during the winter months of June to August when maize feeding has to be resorted to.

The maize crops are dealt with as follows. The cobs are picked and the stalks and leaves are left standing to serve as feed later. Diseased cobs are either left on the stems or thrown away. Cattle and sheep often show a preference for them.

The causal mould invades the whole of the cob, and the author gives an account of its morphological characters. It can be cultivated artificially on sterilized maize where it forms at first a white woolly layer which subsequently becomes black. Under natural conditions the disease is seen in cattle and sheep only, and experimentally it has not been found possible to produce it in horses or pigs.

Considerable quantities of infected cobs or of artificial cultures are required to produce symptoms in experimental animals, but the amount required appears to vary from animal to animal. In experimental cases smaller quantities given for shorter periods have sometimes produced the condition when larger amounts have not.

The most pronounced symptom is ataxy and all stages of uncertainty of gait are observed. Loss of control is generally most pronounced in the hind quarters. The fore-legs are sometimes moved with a high stepping action. In more advanced cases animals are unable to rise. Lachrymation and salivation are commonly observed. Muscular tremors occur. The appetite is not lost and rumination continues. Defaecation is normal, and the faeces are not fluid. In severe cases there may be constipation and a considerable amount of mucus is passed. When the infected food is stopped recovery takes place within a day or two. There is no fever at any stage of the disease. Little is known regarding the pathology of the condition.

LEWIS (P. A.). **A Filterable Yeast-like Microorganism** (*Schizosaccharomyces filtrans*, **n. sp.**)—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 277-290. With 1 plate.

The organism described was probably a saprophyte and an accidental contaminant arising in a series of cultures primarily directed towards the study of the filterable virus of hog cholera.

The organism appeared to be pleomorphic in that certain forms were visible under the microscope while others were not recognizable.

Cultures visible to the eye were obtained in solid and in liquid media. Under certain conditions forms capable of regenerating the complete culture were filterable through a Berkefeld N filter.

The essential point is that in dealing with filterable viruses growths obtained in culture media which are visible to the naked eye should not be disregarded on this score alone.

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## DISEASES DUE TO FILTERABLE VIRUSES.

SCHERN (K.). Postinfektionelle Immunisierungsversuche sowie Immunisierungsversuche in Verdachtsfällen gegen Tollwut unter den Bedingungen der Praxis. [**Post-Infectional Immunization and Immunization in Suspected Cases of Rabies under the Conditions of Practice.**]—*Berlin. Tierärzt. Woch.* 1927. May 6. Vol. 43. No. 18. pp. 298–300.

The author gives tabular statements of dogs and other animals inoculated after they had been bitten by rabid dogs.

The first table shows 18 dogs which were inoculated with protective vaccine derived from rabbits within 2 to 8 days after having been bitten. The inoculations were made from 11 months to a year and five months prior to the date of writing. None of the dogs had developed rabies. There are no controls, but it is said that some of the dogs bitten by the same rabid dogs died of rabies or were destroyed. In a second table details are given of 12 dogs treated, but in these cases there was no certainty that the dogs biting them were rabid or not. None of them developed rabies.

The third table contains details regarding the protective inoculation of seven cows, a mare, a calf, and a sheep, all of which had been bitten by rabid dogs. One of the cows died suddenly from an undetermined reason, and one died of rabies.

SCHNÜRER (J.) & DAVID (H.). Kutane Immunisierung von Hunden gegen Lyssa. [**The Cutaneous Immunization of Dogs against Rabies.**]—*Berlin. Tierärzt. Woch.* 1927. Apr. 29. Vol. 43. No. 17. pp. 274.

The authors have used two materials as vaccine, namely Vienna fixed virus and a carbolized virus prepared in the manner described by UMENO and DOI.

The process of vaccination was carried out as follows. The hair on the left side of the neck was removed by means of a depilatory and 12 to 14 scratches were then made on the skin. The scratches were made just deep enough to bring traces of blood at places. The vaccine was applied with a brush and rubbed in carefully. A light bandage was then placed over the vaccinated area to prevent the dogs licking each other.

One series of 6 dogs was treated in this way with Vienna fixed virus No. 200, and a second series of two dogs was done with the carbolized virus. Control rabbits inoculated intracranially remained healthy.

Two of the first series of dogs died of enteritis. Their brains were found free from virus by inoculation.

After three months' interval all the surviving dogs and six normal controls were inoculated with street virus. Three of the controls

died of rabies, one died of distemper, but was proved to be free from the virus, and two remained perfectly healthy. All the vaccinated dogs survived without showing any symptoms.

BAILLY (J.). Pratique de la vaccination antirabique des solipèdes par le virus-éther (Methode de Remlinger). [**Procedure for Anti-Rabies Vaccination of Solipeds by Remlinger's Virus-Ether Method.**] —*Rev. Gén. Méd. Vét.* 1927. May. Vol. 36. No. 425. pp. 254–258.

The author reports the results of vaccinating 4 horses and 2 mules by REMLINGER'S method. He states that altogether 60 animals have been treated, but the bulk of them would appear to have been ruminants.

Three vaccines are used and they are prepared by macerating the brains of rabbits killed with fixed virus in sulphuric ether for 25, 20, and 15 hours respectively.

He gives an account of the symptoms presented by a pony affected with furious rabies. As the clinical picture was so clear the animal was destroyed, but rabbit inoculations were not carried out. During crisis this pony had bitten a number of people, some dogs, two horses and two mules. These mules and horses were vaccinated together with two other horses bitten by a dog which died suddenly after exhibiting the typical symptoms of furious rabies. In the case of 4 of the animals treatment was begun on the day following the bites, and in the other two at 3 and 7 days interval. None of the animals developed rabies during periods of observation ranging from 5 to 9 months.

The average dose given was 8 grammes of brain substance at each injection. There was no general disturbance of health following the injections, but equines, and apparently equines only, may develop at the site of inoculation large oedematous swellings. These, however, disappear quickly and cause no harm.

The vaccines are prepared as follows. The fresh or preserved rabbit brains are placed in sulphuric ether for 25, 20, or 15 hours, depending upon the vaccine it is desired to produce. It is then emulsified in 40 cc. of salt solution. This is quite readily achieved, because brains which have been soaked in ether are friable and readily miscible with water. The emulsion is strained through muslin and injected immediately. All manipulations must, of course, be carried out with due precautions, and all apparatus must be sterile.

The vaccine can be prepared for use away from the laboratory by replacing the salt solution by either 50 per cent. glycerin or by salt solution formolized to 1 in 1,800. In these media the vaccine remains good for a week at summer temperature.

CRAWFORD (M.). **Four Cases of Equine Rabies with Failure to protect with Anti-Rabic Vaccine.**— *Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 140–144.

Five horses, a cow, and a dog were bitten by a rabid dog. It was decided to vaccinate some of the horses. Both the rabid dog and the dog bitten were destroyed. Three horses each received daily 10cc. of a 5 per cent. emulsion of brain of rabbits dying as the result of inoculation with fixed virus.

Two of these developed symptoms after 28 and 35 days interval respectively. Two which were not vaccinated developed symptoms after 45 and 48 days. The remaining horse which was vaccinated is alive and well. The cow was not vaccinated, and did not develop symptoms.

The symptoms presented by the first animal to develop them, and which the writer did not see, appear to have differed from those presented by later cases. Restlessness, a startled appearance, and subsequent paralysis of the hindquarters were seen.

The other cases showed evidence of great excitement. One animal seized the bars of the door with its teeth and shook them violently. If approached it fell to the ground, and when down rolled and kicked violently. There was no marked salivation.

The biological examination of one of the brains showed that the animal had developed street rabies, and that the disease had not been set up by the fixed virus inoculated.

BENNETT (S. C. J.). **A Note on the Nature of the Rabies Virus in the Anglo-Egyptian Sudan.**—*Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 123–126.

The author briefly discusses the papers which have appeared regarding the nature or type of the rabies virus occurring in Africa, and particularly in West Africa.

With regard to rabies in the Sudan, the author points out that the virus reaches the Sudan via Kordofan Province, and it must come from Central Africa. It was not an imported strain since the importation of dogs, save from the British Isles, is prohibited.

It is of importance too, in view of the descriptions given of the disease in some instances in West Africa, to note that all cases observed in animals were of the furious type. The diagnosis has been established in a calf, dog, donkey, and camel. Human beings were affected, and though a definite statement cannot be made it is probable that only one strain was involved since all the cases occurred in one district within a period of three months.

Two strains were received and both were passed through rabbits in series until the series broke down. The first strain, from a dog, broke down after the 4th passage, and the second, from a calf, after the 10th.

Negri bodies were found in all rabbits of both series, but these appeared as coccus-like cell inclusions after the second passage. The dog strain was fatal to rabbits in periods ranging from 9 to 29 days. The calf strain was far more regular in its action killing in from 11 to 15 days. In neither case did passage lead to exaltation of virulence.

From these results it would appear that the behaviour of the virus in rabbits should be discarded as an indication of the existence of a special African virus.

BLONDIN, WILBERT (R.) & DELORME (M.). Contribution à l'étude de la rage en A.O.F. [**Rabies in French West Africa.**]—*Bull. Soc. Path. Exot.* 1927. May 11. Vol. 20. No. 5. pp. 404–407.

With a view to adding to existing knowledge regarding the geographical distribution of rabies in French West Africa the authors report cases which have come to their notice.

A survey of existing literature would tend to imply that the distribution of the disease is not even. It appears to be rare in Dahomey and Guinea, and there appear to be no records of it in the Ivory Coast.

In 1918 one of the writers had his own dog become infected, and he gives a detailed description of the clinical symptoms observed.

As means for making a post-mortem examination were not available the diagnosis was based upon the symptoms presented. This case occurred at Ouagadougou.

In 1919 a second case was encountered at Niafunké. This animal was brought in by natives who had killed it. The brain was placed in glycerine and sent to Bamako for diagnosis. A rabbit inoculated subdurally died with paralysis on the 12th day.

A third case was found at Labé in 1925. An inoculated rabbit at the Pasteur Institute at Kindia developed symptoms on the 21st day, and died paralysed on the 23rd day.

OLITSKY (P. K.) & BOËZ (L.). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. I. Description of the Strain of Virus used. Titration and Centrifugation Experiments.**—*Jl. Exp. Med.* 1927. Apr. 1. Vol 45. No. 4. pp. 673–683.

The strain used was recovered from a cow. It was carried on in series in guineapigs through over 250 passages, and it could be put back through cattle and pigs and again brought to guineapigs. No naturally immune guineapigs were encountered. Intradermal inoculation of the pads was found to be the most certain methods of infection for the production of generalized disease. The virus was active in dilution of 1 in 10,000,000. This shows the minuteness of the active agent and the necessity of special technique. It is also of great importance in connexion with the question of cultivation tests.

A number of viruses were titrated as to the limit of infective dilution, and it was found that the factor between the extremes tested was 25. (1 in 10,000,000; and 1 in 400,000).

The severity of the disease and the period of incubation depended upon the concentration of the virus. The rate and energy of the action is therefore proportional to the concentration. No evidence could be obtained that the virus could be concentrated by centrifugation.

Centrifugation was also used in attempting to free the liquid from a hypothetical body which might be an inhibiting factor in cultures, such as fragments of tissues or cells. No evidence of this was obtained.

OLITSKY (P. K.) & BOËZ (L.). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. II. Cataphoresis and Filtration.**—*Jl. Exp. Med.* 1927. Apr. 1. Vol. 45. No. 4. pp. 685–699.

Cataphoresis tests showed that in an electric field the virus is electropositive if at a pH below 8 and electronegative if at a pH above 8. At about pH 8 it is isoelectric.

There was the production of a haziness at the pole opposite to that at which the virus accumulated. The virus has an unusually high isoelectric range and is under ordinary conditions electro-positive.

This does not contraindicate a possible protein or living nature, for though bacteria are generally electronegative in charge spirochaetes as a genus and trypanosomes carry positive charges.

The determination of the charge was of the greatest importance in interpreting results of ordinary and molecular filtration experiments, and gave indirectly some indication of the relative dimensions of the causal agent. Seitz, Berkefeld and Chamberland filters of different grades, and Bechhold's ultrafilter with different percentages of acetic collodion were employed.

For reasons given by the authors it cannot be held that the whole of the " incitant " is adsorbed to minute particles of the same size.

Adsorption by filters is due to the fact that all filters carry an electro-negative charge while the virus has an electro-positive one. In some filters the pores are extremely small and the electro-negative charge is very strong. There may, therefore, occur complete adsorption. Counteraction of the adsorption action allows the passage of particles. In this way an estimate can be formed of the size of particles passed by various filters.

Experiments appear to indicate that the active agent of the virus of foot and mouth disease is at least larger than the molecule of haemoglobin, which as computed by Bechhold is 3·6 m$\mu$. Collodion membranes were found unsuitable for the filtration of the virus for more than half the membranes presented recognizable holes before testing, and the authors could not convince themselves that microscopic holes were not absent in the remainder.

But it was found that collodion membranes permeable to colloids containing particles in size of the order of blue litmus and to crystalloids were not permeable to the virus.

Bechhold ultrafilter membranes were found to be satisfactory. These are prepared by impregnating Schleicher and Schüll filter papers with acetic collodion concentrations ranging from 1½ to 7½ per cent. Discs of this kind were used in Seitz filter cups. The discs are electro-negative and to eliminate adsorption virus and test materials were employed in the same condition. The ability of the discs to adsorb a positively charged substance was shown by the adsorption of the electro-positive dye, night blue. The negative pressures used for the filtrations varied with the membranes employed. The results obtained indicate that the size of the virus is relatively between 20 and 100 m$\mu$. The notion of a fluid virus is refuted. The comparative ease with which virus and collargol particles filtered through 1½ per cent. membranes and the difficulty with which colloidal arsenic trisulphide traversed similar discs indicate that the size of the virus may be nearer the minimal than maximal reading.

Kii (N.) & Kasai (H.). **On the Ovinised Vaccine.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 159–161. (Authors' English abstract).

Variola vaccine used for the inoculation of sheep in series produces vesicles up to the 8th generation. From the 9th to the 14th generation there is only slight desquamation of the inoculated area. After this there is gradual recovery of virulence which reaches a maximum at the 23rd generation.

Ovinized lymph used for the inoculation of calves produces vesicles up to the 8th generation, and after the 11th none are produced. Completely ovinized lymph is not pathogenic for calves. Similarly the lymph from successive sheep gradually fails to be inoculable to rabbits.

Ovinized lymph of the 20th generation was used for the inoculation of two children who were at the same time done with ordinary lymph. The ordinary lymph produced typical reactions. The ovinized lymph produced none.

Vaccine from early passages of sheep inoculated with variola protects against variola inoculation, but not against ovinized vaccine. That obtained from subsequent generations does not protect against variola but does immunize against sheep-pox.

While ovinized variola vaccine immunises against sheep-pox, the immunity is not strong enough for practical application of the method.

Sheep recovered from sheep-pox are not immune to variola inoculation, but they are to ovinized vaccine.

KII (N.) & KASAI (H.). **Transformation of the Sheep-pox Virus into the Vaccinia Virus by means of Testicular Passage of Rabbits.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 135–136.

This summary of the authors' paper in Japanese states that by passing the sheep-pox virus into the testicle of the rabbit and then maintaining it in rabbits in series, the virus acquires the power of infecting bovines at the 2nd to 4th generation, and that it produces absolutely typical lesions of cow-pox in calves. Further, the lymph collected from calves so infected will produce a typical vaccine reaction in human beings.

Later passage rabbits inoculated with sheep-pox were immune to cow-pox, and calves inoculated with the same virus were also immune.

The passage of the sheep-pox virus through rabbits reduced its virulence for the sheep. Sheep so inoculated could be infected by intravenous inoculation with unchanged sheep-pox virus.

KAKIZAKI (C.), NAKANISHI (S.) & NAKAMURA (J.). **Experimental Studies on the Economical Rinderpest Vaccine.**—*Jl. Jap. Soc. Vet. Sci.* 1927. June. Vol. 6. No. 2. pp. 107–120.

The authors record the results obtained by using emulsions of different organs as vaccine against rinderpest.

The emulsions were prepared by mixing with glycerine in the proportion of 1 to 2 or 3 and adding 10 per cent. toluol. In some cases the viscosity of this mixture rendered further dilution essential.

The emulsions of the infected organs were tested singly and in combination.

Thymus and tonsil are said to give the best results. Lymphatic glands were inferior to these; spleen gave useful results, but lung was of little or no value.

Doses used ranged from ·005—1 cc. per kwan (3·75 kilos or 8¼ lb.)

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MELLO (U.) & POGGIO (C.). La vaccinazione antirabbica dei bovini. [**The Antirabic Vaccination of Bovines.**]—*Annali d'Igiene.* 1927. Jan. Vol. 37. No. 1. pp. 9–27.

## MISCELLANEOUS.

COWDRY (E. V.) & MARSH (H.). **Comparative Pathology of South African Jagziekte and Montana Progressive Pneumonia of Sheep.**—*Jl. Exp. Med.* 1927. Apr. 1. Vol. 45. No. 4. pp. 571–585. With 3 plates.

In this paper the authors correlate their findings regarding the two diseases referred to in the title of the paper. The conditions have been investigated independently, but comparison of the results indicate a close similarity.

The paper is based upon the examination of material collected from 33 sheep in South Africa and 46 cases of the American disease.

A long tabular statement draws comparisons between the two conditions, dealing with the epidemiology, symptoms, prognosis, prophylaxis, etiology, and pathology.

The lesions of the two diseases very closely resemble each other. The primary changes occur in the interalveolar tissues of the lungs in a focal manner. There is engorgement of the capillaries and an interstitial accumulation of macrophages and lymphocytes. Exudation of these takes place producing a typical chronic catarrhal pneumonia. At the same time there is a proliferation of the epithelial cells of the alveoli and bronchioles. Subsequently extensive fibrosis takes place. Nothing is known regarding the exact etiology of the diseases, and until that has been settled it cannot be said that they are identical, but it is extremely doubtful whether it is possible to distinguish between them.

MIEGEVILLE. Le pseudo-ecthyma contagieux des lèvres du mouton et de la chèvre et la stomatite contagieuse des agneaux et des chevreaux au Maroc. [**Contagious Pseudo-Echthyma of the Lips of the Sheep and Goat and Contagious Stomatitis of the Lamb and Kid in Morocco.**]—*Rev. Vét. et. Jl. Méd. Vét.* 1927. June. Vol. 79. pp. 313–319.

1. *Contagious Pseudo-echthyma of the lips of the sheep and goat.*

This condition is characterized by the formation of greyish white false membranes on the lips and gums. The membranes form small circular patches surrounded by an inflammatory zone.

The author does not consider the condition to be contagious, the occurrence of a number of cases simultaneously being due to a common cause.

The condition is bacterial in origin, but predisposing conditions play a great part in it. Among these the author gives parasitic invasions, which lower bodily resistance, insufficient food, hard, dry food, which injures the mucous surfaces, etc.

Sheep are more susceptible than goats, and both sheep and lambs are equally affected. Among the latter the disease is more serious and, the author thinks, actually becomes contagious.

2. *Contagious Stomatitis.* This disease is more common and more serious than the foregoing, and it is generally contagious. Miegeville looks upon the condition as in reality a general disease which has a principal localization on the mucous membranes. The cause of this condition has not been definitely established. When first observed

the lesions present themselves as whitish patches on the mucous membrane of the mouth. These have a tendency to spread and coalesce. If such necrotic looking lesions are detached a raw surface is exposed. Not infrequently the lesions extend to the outer surfaces of the lips where they become covered with brownish crusts. In very severe cases practically the whole of the mucous surface of the mouth may be involved and there may be gangrene of the tongue.

That there is general disturbance of health is shown by the fact that there is fever and diarrhoea. In occasional cases death may occur within a few days, as if the disease were actually a septicaemia. More generally the course of the disease is slower, and death results from inanition.

At the post-mortem examination there is gastro-enteritis with, not infrequently, ulceration of the bowels. The liver may contain miliary abscesses, as may also the lungs. Portions of the lung are sometimes gangrenous. There may be peritonitis, and abscess formation may occur in the lymphatic glands.

Control of the disease follows general lines. A very careful watch must be kept for fresh cases and strict isolation of the sick must be practised. Local treatment consists in antiseptic dressings to the discoverable lesions.

BULL (L. B.). **Notes on Swelled-Head or Big-Head in Rams with a Discussion on Photosensitization.**—*Australian Vet. Jl.* 1927. June. Vol. 3. No. 2. pp. 53–59. With 4 text-figs.

According to a sheep-station manager of experience big-head attacks only an occasional sheep and such animals die. There is no evidence of disease in the internal organs. It occurs only during the later summer months. The swelling begins at the face and lips and gradually extends. Death is due to suffocation from closure of the nostrils. The swelling is generally bilateral, but in some cases it begins unilaterally and then extends to the opposite side.

The condition has been known in New South Wales for some years, but it has only recently been detected in Western Australia. It appears to be unknown in Queensland. It attacks rams only and may occur at any age, but it is most frequently seen at one year. It has been held to be associated with lucerne feeding, but the writer has encountered it in animals that have not had lucerne. Similarly, it has been believed to be confined to merinos, but cases in both a Dorset and a Suffolk ram are known.

In seasons when the disease occurs a number of cases may follow the first one, but it may not appear for several seasons in succession. The incidence seldom exceeds 5 per cent. of the rams. When the swelling is extensive death usually occurs in about 48 hours, but there are undoubted mild cases in which recovery takes place.

Post-mortem examination reveals the presence of a clear liquid in the subcutaneous tissues. This clots readily on exposure. No oedema of the tongue or glottis has been noted, but the mucous membrane of the turbinated bones is congested and swollen. Hydrothorax is generally present.

Nothing has been discovered regarding the etiology of the condition, but attention is drawn to the resemblance it bears to photosensitization.

STURGESS (G. W.). **Osteitis Febrosa (Osteoporosis).**—*Administ. Rept. Govt. Veterinary Surgeon.* 1926. Colombo: Govt. Printer. 1927. pp. 3–4.

Under the heading "Miscellaneous" the Government Veterinary Surgeon reports a tentative experiment designed to supply information regarding the following points:—

1. Could osteitis fibrosa develop without contact, either direct or indirect, with pre-existing cases?
2. The influence of feeding upon the production of the disease.

Six ponies were obtained from Delft Island, off the north-west coast of Ceylon. Pony breeding has been carried on there for over 100 years, but no case of the disease has ever been noted. Every step was taken to prevent contact of any sort with other equines, and the boats and vehicles used for transport had not been used for horses.

At Colombo the ponies were housed in stables which had not been used for six months and which had recently been cleansed and lime-washed. They were kept here for two months and then taken to the Government Dairy, Colombo, where no horses were kept. When the experiment was begun the ponies had been under observation for three months and all appeared to be perfectly healthy.

The ponies received different diets designed to contain varying amounts of calcium and phosphoric acid, and with adequate amounts of protein, fats, and carbohydrates. The vitamin content also varied.

The animals were housed under one roof separated from each other only by bamboo poles. As they were unbroken they could only be exercised by lunging. They were all of the same sex and approximately of the same age. Diet was the only difference in treatment. At the time of writing the experiment was not complete, but certain tentative conclusions appeared to be justified. Four of the ponies had developed the disease. The vitamin requirements of horses appear to be very low, and their presence or absence does not seem to be related to the occurrence of the disease. A pony on bran with 2 ounces of sterilized bone meal daily remained healthy and improved in condition, while one receiving bran and 10 lb. of fresh green grass daily developed the disease. Bran is deficient in vitamins A and B, and C is absent. The bone meal was autoclaved at 125° C. four hours on two days before feeding and apparently contained no vitamin.

Guineapigs fed upon this diet died in less than a month.

The calcium oxide requirement of ponies appears to be about 20 grammes a day, but if there is an excess of phosphoric acid in the diet this amount is insufficient. A deficiency of calcium appears to be a causal factor, particularly when there is an excess of phosphorus.

A full report is promised.

DELORME (M.). Association fuso-spirillaire (ulcère phagédénique tropical) chez le chien. [**Fuso-Spirillary Association in a Dog (Tropical Phagedenic Ulcer).**]—*Bull. Soc. Path. Exot.* 1927. June 8. Vol. 20. No. 6. pp. 548–553.

A fox terrier bitch at Kindia (French Guinea) developed an ulcerating lesion on the abdominal wall just in front of the pubis. This lesion had a prominent rim, and its base was covered with a greyish diphtheroid membrane. Microscopic examination showed *Bacillus fusiformis* and *Sp. vincenti*. As stovarsol and novarsenobenzol were not available "189"

(aminophenolarsenate of soda) was used in powder form to dust over the lesion after thorough cleansing. This caused some amount of pain. At the same time 0·25 g. of the drug was injected subcutaneously into the flank. The local dressing was repeated daily for a week, and this effected a vast improvement in the condition of the wound. A second injection of "189" was given, the dose being 35 cg. and this effected a cure. A third dose of 50 cg. was given, however, as a prophylactic.

ALLEN (H.). **Heat-Stroke and Heat-Syncope.**—*Vet. Jl.* 1927. Mar. Vol. 83. No. 3. pp. 120–22.

Pathological effects of high temperature are only evident when there is a marked amount of atmospheric humidity. In heat-stroke there is extremely high fever, and in heat-syncope symptoms of collapse and low body temperature occur.

It is the heat rays and not the ultra-violet rays which cause ill-effects.

In cases of death from heat-stroke the essential pathological change is the partial coagulation of the globulin found in the cells of the body. This takes place in voluntary and cardiac muscle and causes respiratory and cardiac failure, while later changes occur in the nerve cells.

The general symptoms are a loss of appetite, progressive dullness, depression, fixed eyes, dilated pupils, laboured and accelerated respiration, and in some cases epistaxis. The mucous membranes in the early stages are congested. Later they become paler and may assume a yellowish tinge. The temperature may be 106–107°, but this under treatment may fall in a few days. In one case observed there was laminitis in all four feet. Sometimes inco-ordination of the hind-quarters develops.

A liberal supply of water and green food with some bran was given. Enemata of cold water appeared to be valuable.

If the high temperature persisted hydrobromate of quinine was injected, and camphorated oil similarly injected was used as a cardiac stimulant.

WOLLMAN (E.). Recherches sur la bactériophagie (phénomène de Twort-d'Herelle). [**The Bacteriophage (the Twort-d'Herelle Phenomenon).**]—*Ann. Inst. Pasteur.* 1927. Aug. Vol. 41. No. 8. pp. 883–918. With 6 text figs.

This paper comprises two main sections dealing respectively with (1) The properties of the bacteriophage; and (2) the modifications in bacteria which have been acted upon by the bacteriophage; and resistant bacteria. The author sums up the facts which have to be explained and then deals with the theories that have been formulated to furnish the explanations.

Experiments in which extreme dilutions of the bacteriophage are mixed with very weak suspensions of susceptible organisms supply evidence in favour of the corpuscular or "discontinuous" nature of the bacteriophage. Further evidence in the same sense is furnished by the phenomenon of sterile areas in surface cultures, particularly when these are done in series, the number of sterile areas being proportional to the dilution of the bacteriophage. The number of corpuscles

of bacteriophage cannot, however, be deduced because the same dilutions acting upon different susceptible organisms produce different results.

Experiments with anti-shiga and anti-typhoid bacteriophages show that in heterologous mixtures the action is less pronounced than in homologous mixtures. This is shown by working down to the minimum effective dilution. Passage of the bacteriophage with a heterologous organism does not alter its titre for that organism, but it reduces it for the homologous organism.

The size of the bacteriophage corpuscles is a matter regarding which there has been considerable dispute. But there is agreement among some investigators that some portion of the bacteriophage can pass through certain collodion filters. There is, however, considerable loss. The filters used are impermeable to serum proteins and to haemoglobin.

The study of the antigenic properties of the bacteriophages has yielded some interesting results. BORDET and CIUCA showed that it was possible to obtain an antibacteriophage serum. It was subsequently shown by a number of investigators that only an antibacteriophage serum could neutralize the bacteriophage, anti-bacterial sera, prepared with the same organism being without effect. In fact, experiments indicate that the bacteriophage antibody has no affinity whatsoever for the normal bacterial substance, nor has an anti-bacterial serum any anti-bacteriophage properties.

The sum of these observations goes to show that the bacteriophages are new antigenic entities which do not exist in normal bacteria.

Lysis, while it is the most striking phenomenon connected with the action of bacteriophage, is not the only evidence of its effects. Bacteria may grow normally in the presence of bacteriophage, and on the other hand lysis having been primed, so to speak, by bacteriophage or some other mechanism, may continue without its intervention and without any increase in the lytic titre.

Alterations in morphological and biological characters may result from the action of bacteriophage, and among the most important of these is the development of resistance to the bacteriophage, but by colony selection, say, of cultures of *B. coli*, cultures resistant to the bacteriophage can be obtained without the intervention of that principle.

The author describes a number of cross-agglutination tests carried out with various lytic and non-lytic antisera, and resistant and non-resistant strains of organisms and finds that the change in the organisms which produces the condition of resistance to lysis is very irregular in its effects upon the morphological and biological characters of the organisms.

The objections that the author raises to the parasitic theory of bacteriophage are as follows: Their behaviour in the presence of certain physical and chemical agents. Their constant presence in septic media in which many bacteria of the same group or sensitive bacteria are present, but in which the sensitive bacteria themselves may be absent. Their definite inactivation by antibacteriophage sera. The conditions of reproduction of the bacteriophage which require the presence not only of living bacteria, but bacteria which are actively multiplying. The reappearance of bacteriophages in cultures which have appeared free from them for some generations.

Most other theories regarding the nature of bacteriophage envisage it as either a derivative of the bacteria themselves, or as diastases. That is to say, these theories support the view of autogenous development. But the question is not yet settled.

The author puts forward the theory of " Hereditary Factors."

Work of recent years has lent support to the view that acquired characters may be transmitted, and the accurate forecasts possible upon a mendelian basis indicate that some " representative particles " or " factors " must be the vehicles for such characters. He appears to view the independent existence of these " factors " as a possibility.

He quotes the experimental production of the phenomenon of paragglutination *in vitro*, the transference of the thermo-agglutination from one species of bacterium to another, and other phenomena as being examples of extra-cellular transference of characters through the medium of factors.

SMYLY (H. Jocelyn). **The Administration of Tartar Emetic by Various Routes.**—*Ann. Trop. Med. & Parasit.* 1927. July 22. Vol. 21. No. 2. pp. 171–178.

Experiments are recorded in which different routes of administration of tartar emetic to infants were tried. In infants the intravenous route is impossible.

Rectal administration was found to fail, because the drug is absorbed in amounts that are insufficient to effect a cure, but in amounts which may result in making the parasite resistant to it.

The objections to intra-muscular injection are that it is painful and causes necrosis.

One case is recorded in which a cure was effected in a child six months old by intraperitoneal injection.

Special emphasis is laid upon the necessity of observing every possible precaution against accidental contamination of the liquids or instruments used. A technique which would lead to no ill-effects in intravenous injection might lead to serious consequences in intraperitoneal injection.

Injections are made in the middle line just below the umbilicus because the peritoneum is here firmly adherent, and should an adhesion form between a loop of bowel and the abdominal wall this will not have time to organize firmly because injections are made at intervals of two days.

Chemically pure sodium antimonyl tartrate in 2 per cent. solution in sterile double-distilled water is used.

In the case of the child the dose was 12 mg. of the drug and the amounts of solution containing this was mixed with 60 cc. of 0·02 per cent. saline solution and injected with a syringe. The fluid was injected as the needle penetrated the peritoneum so as to push the bowel out of the way. The injections were repeated thrice weekly for two months and the total amount of the sodium antimonyl tartrate given was 264 mg.

LANDSTEINER (K.) & VAN DER SCHEER (J.). **Experiments on the Production of Wassermann Reagins by Means of Trypanosomes.**—*Jl. Exp. Med.* 1927. Mar. 1. Vol. 45. No. 3. pp. 465–481.

The authors found that the injection of dead trypanosome suspensions into rabbits caused the sera of these animals to become strongly

Wassermann positive. A number of questions regarding the mechanism of the reaction still await solution, but it appears to be likely that the antigenic activity of the microbes or their products plays a part in the production of the Wassermann reagins in infections with spirochaetes and trypanosomes.

KOUWENAAR (W.). **Intoxication by Carbon Tetrachloride.**—*Trans. 6th Congress Far Eastern Assoc. Trop. Med. Tokyo. 1925.* Vol. 1. pp. 1001–1009. With 1 plate.

The author records some of his experiences in the treatment of human beings with carbon tetrachloride and comes to the conclusion that it is not a safe remedy. He is unable to offer any explanation of the apparent variations in the toxic effects, but is inclined to think that indulgence in alcohol is to some extent to blame.

JONES (F. S.) & LITTLE (R. B.). **The Bactericidal Property of Cow's Milk.**—*Jl. Exp. Med.* 1927. Feb. 1. Vol. 45. No. 2. pp. 319–335. With 1 chart in text.

As a result of their experiments the authors find, in agreement with others, that milk does possess the power of inhibiting the growth of certain organisms for more or less definite periods. Their tests were carried out with a non-haemolytic mastitis streptococcus isolated in 1917 and since then kept on horse-blood agar or on plain agar. The bactericidal action of the milk was tested with samples from four groups of cows. The first group comprised cows which had been in the herd for many years and had no history of mastitis. These were classed as resistant. The second group had been injected four times with killed cultures of mastitis streptococci. The third was composed of young animals at their first lactation, and the fourth had had many attacks of mastitis. The findings were the same in all the groups. The inference therefore is that the property is an inherent one. As the bacterial flora of the normal udder is a strictly limited one, and as bacteria have numerous opportunities of gaining access to the udder via the teats it may be held that the property is of practical importance. The property survives in drawn milk for periods ranging up to about 8 hours. With a calf sucking the udder would be emptied at intervals less than this, and it is possible that the usual 12-hour interval between milkings in dairies may render the property inoperative to an important extent.

The observations made appear to suggest that the property or substance is not of blood origin. That it is not blood alexin is indicated by the fact that whereas alexin is destroyed by an exposure to 56° C. for 20 minutes, milk may be heated to 62° C. for the same period without destroying its inhibitory power. In fact, it is not completely inactive at 65° or 70° C. The authors' experiments suggest that the substance is developed within the udder, and that it is not in the nature of a specific antibody since by incubating raw milk with one organism the inhibiting power for another may be absorbed.

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MAGALHÃES (O.). Peste dos "Polmões." [**Abscess Disease.**]—*Mem. Inst. Oswaldo Cruz.* 1926. Vol. 19. No. 2. pp. 227–230. With 4 plates.

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Compiled by MISS M. H. JAMES.

*Note.*— Incidence, Treatment, &c., are indexed only under Diseases, and not under Animals affected by the Diseases.



* The numbers in heavy type refer to the titles of papers summarized.

# TROPICAL VETERINARY BULLETIN

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SECTIONS.

## ERRATUM.

Vol. 16. No. 2. p. 69. The correct reference to NAINSOUTA'S paper is *Bull. Soc. Path. Exot.* 1927. Oct. Vol. 20. No. 8. pp. 829-830, not *Sept.* as printed.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

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## DISEASES DUE TO PROTOZOAN PARASITES.

CHANNON (Hilda A.) & HEDLEY (D. Wright). **Observations on Trypanosomiasis of Rabbits, and its Natural Mode of Transmission.**—*Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 253–260. With 1 fig.

Measurements indicate that the parasite *T. nabiasi* or *T. cuniculi* is monomorphic and the average length of 300 parasites in dried blood films was 24·17 $\mu$, the body itself averaging 15·21 $\mu$.

The strain has been carried through 12 generations by intravenous inoculation, but in only 73 per cent. of inoculated animals did the infection establish itself. In order to transmit the parasite the blood used must contain large numbers of organisms. Experimentally, evidence was furnished that the rabbit flea is the intermediate host of the trypanosome. The incubation period was about a week, and the period of infection ranged from a fortnight to about 3 months.

The cycle of development was not followed, but it appeared from examinations to correspond with that of *T. lewisi* in the rat flea. No stomach forms, such as were described by MINCHIN and THOMSON, were found.

The ingestion of infected flea faeces would seem to be the natural mode of infection. The bites of infected fleas do not convey the infection. Immunity resulting from infection appears to last about 6 months.

It was not found possible to infect rats, mice or guinea-pigs.

DI DOMIZIO (G.). *Trypanosoma brucei* nella Somalia Italiana. [*Trypanosoma brucei* **in Italian Somaliland.**]—*La Nuova Veterinaria.* 1927. Apr. 15. Vol. 5. No. 4. pp. 84–95.

As the result of a large series of inoculation tests, and comparisons with other published accounts, the author comes to the conclusion that the polymorphic trypanosome occurring in cattle in Italian Somaliland is *T. brucei*.

SAVINO (E.). Tripanosomas y glucemia en los animales con "*Trypanosoma equinum.*" [**Trypanosomes and Glycaemia in Animals affected with** *Trypanosoma equinum.*]—*Revist. Instituto Bacteriológico del Dept. Nacional de Higiene.* 1926. Mar. Vol. 4. No. 4. pp. 429–440. With 8 text figs.

[Author's English Abstract.]

1. Insulin diminishes the number of trypanosomes to 70 per cent. in the blood of dogs experimentally infected with *Trypanosoma equinum.*

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2. This reduction is not due to the action of the insulin on the metabolism of the carbohydrates, because if glucose be injected at the same time to prevent hypoglycaemia the number of trypanosomes increases when the glycaemia rises above the initial value.

3. Hyperglycaemia produced in dogs by injecting glucose increases the number of trypanosomes to 120 per cent.

4. Insulin injected into dogs infected with *T. equinum* is less active than in normal dogs.

5. The physiological variations in the glycaemia during the period of infection are not related to the number of trypanosomes in the blood.

CLARK (H. C.). **Equine Trypanosomiasis in Colombia (Rengera or Derrengadera).**—*United Fruit Company, Medical Department, 15th Annual Report.* 1926. pp. 263–265.

The author investigated a disease of horses which had been causing losses in the remote parts of the plantations in January 1926. The disease spread gradually and assumed epidemic proportions in places.

Blood examinations were made by the thick film method of 162 mules, 81 asses, 127 horses and 10 dogs. Five horses only were detected as infected with trypanosomes. Ten horses, 3 mules, and 7 dogs were found to be suffering from piroplasmosis. The author states that equine trypanosomiasis is known to exist in South America, Africa, and Asia, and suggests that the variety of names used to describe the disease in different parts of the world leads to confusion. He implies that one name should be used for surra, nagana, dourine, mal de caderas and other trypanosome infections of equines.

The trypanosome found corresponds to *T. hippicum* (Darling).

"The species of horse-fly credited with being an insect vector in Venezuela is *Tabanus importunus*, Wiedemann. Many important mechanical conveyors of the disease also exist. Any species of fly, while its legs are still wet with blood from a sore or wound on an infected animal, can easily implant the disease on a sore or wound of another animal. Saddles, bridle bits, harness, ropes, etc., that have been in contact with such sores are also potential conveyors."

In a mule artificially infected the author found trypanosomes three weeks before the stable-boys reported the animal as sick.

Trypanosomes are abundant in the peripheral blood every 7 to 10 days; hence the necessity for repeated blood examinations. Bayer 205 is said to have been very satisfactory in the acute stage of the disease, but no details are furnished.

SANI (Luigi). Tripanosi naturale osservata a Milano in un cane proveniente dalla Somalia. [**Natural Trypanosomiasis observed at Milan in a Dog imported from Somaliland.**] — *La Nuova Veterinaria.* 1927. Sept. 15. Vol. 5. No. 9. pp. 209–212.

An account is given of the clinical symptoms presented by the dog—a fox-terrier. Rabbits, guineapigs, rats and mice were infected experimentally.

The author believes that the parasite was *T. evansi.*

KLIGLER (I. J.) & RABINOWITCH (G.). **Susceptibility and Resistance to Trypanosome Infections. III. The Relation of Dosage to the Course of Infection.**—*Ann. Trop. Med. & Parasit.* 1927. Oct. 10. Vol. 21. No. 3. pp. 375–380.

"The literature dealing with experimental studies of trypanosome infections in animals contains many diverse statements regarding the incubation period, course of infection, duration of illness, etc. These differences have been, as a rule, attributed to differences in virulence of the infecting organism. Often differentiation of species has been based on such differences in the manifestation of the reaction in experimental hosts."

The authors have found that the condition of the animal plays an important part in these variations. It would seem that variations are not necessarily due to differences in virulence.

The results of infecting animals with varying numbers of trypanosomes have been recorded. Doses ranged from some millions of trypanosomes to a few thousands, and in all cases there was an increase in the duration of illness as the dose was reduced.

Tests to show whether the effect of a given dose remains constant yielded confirmatory results.

LEDENTU (G.) & VAUCEL (M.). La formol-gélification dans la trypanosomiase humaine. [**The Formol-Gel Test in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 601–607.

The authors do not find the test to be of very great value in natives, but they have obtained some interesting results in sleeping sickness.

In untreated cases the gelification is very rapid in the first phase of the disease—a few minutes sufficing for the reaction to occur. It is somewhat slower during the second phase, and still slower, about 2 hours, in cases which present changes in the cerebro-spinal fluid without the presence of trypanosomes.

In treated cases the reaction occurs far more slowly and may not take place at all.

But a prognosis cannot be based upon the speed of the reaction. For example, trypanosomes may reappear in the blood when the reaction is negative, and on the other hand an increase in the speed of the reaction is not certainly an index of a relapse. In other words the reaction is of no value for the detection of relapses, nor for the confirmation of recovery. The test has, however, a certain presumptive value as a means of diagnosis.

In an area where the disease is endemic, to obtain a reaction in 30 minutes with the blood of a native raises a suspicion of trypanosomiasis and is an indication that thorough examination should be made.

In Europeans the method has a quasi-diagnostic value.

LE DENTU (G.). Quelques résultats éloignés du traitement de la maladie du sommeil par la tryparsamide. [**Results of Treatment of Sleeping Sickness with Tryparsamide.**]—*Ann. Inst. Pasteur.* 1927. Sept. Vol. 41. No. 9. pp. 982–1001.

The author records the results of treatment of patients in the second phase of trypanosomiasis who have received no treatment for at

least nine months. Sixty-four cases have been followed, and of these 40 have apparently recovered, 5 show improvement, 12 have relapsed, 4 show ocular lesions of long standing, and 3 have died. For an individual weighing 50 kg., about 25 g. of the drug are required.

Whereas atoxyl produces only a weak degree of arsenic resistance in trypanosomes, it is far more marked with tryparsamide. The relapses are thought to be due as a rule to insufficient treatment.

FARAG (Basili). Die Wirkung von Naganol (Bayer 205 vet.) auf *Trypanosoma dromedarum* in Aegypten. [**The Action of Naganol on *Trypanosoma dromedarum* in Egypt.**]—*Therapeut. Monatsheft.* 1927. Aug. Vol. 1. No. 2. pp. 33–36.

The author records the results obtained in two experiments involving the use of 11 rats in all. 1·5 mg. per 20 g. body-weight was found to be efficient.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Études expérimentales sur les piroplasmoses bovines d'Algérie (deuxième mémoire). [**Experimental Investigations of the Bovine Piroplasmoses of Algeria. (Second Memoir).**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1175–1188. With 3 text figs.

In this paper the authors give a resumé of their campaigns against bovine piroplasmosis (sensu lato) during the period 1924–1927.

In 1924 a batch of animals "premunised" against piroplasmosis, babesiellosis, anaplasmosis and theileriasis, was exposed to natural infection. This batch comprised 46 animals, 34 imported from France and 12 either pure bred or cross bred animals born in Algeria. As controls there were 7 pure-bred animals imported from France and 56 Algerian country-breds or half-breds. Some of these were probably immunized by natural infection before they were utilized.

Of the French controls all died of theileriasis.

Of the Algerian controls 24 were sick and 13 died. Theileriasis was almost exclusively responsible.

Of the vaccinated animals two were attacked and both died. They were young calves which were just recovering from acute anaplasmosis when they became infected with Theileria.

1925.—During this year animals vaccinated in the field under ordinary conditions, animals vaccinated at the laboratory, and controls were exposed to natural infection.

Of 131 vaccinated 25 contracted theileriasis and 2 died.

Of 49 controls 46 became infected and 20 died. Again theileriasis was mainly responsible. Six of the controls were pure-bred French animals, and of these 5 died.

It is to be noted that vaccination was responsible for 8 per cent. of deaths.

1926.—271 animals of all kinds and ages were vaccinated in the field and exposed to natural infection. The inoculations were carried out in three groups, with a mortality of 2·6 per cent.

Some of the animals were dealt with in hill country, and the remainder on low-lying land.

Of 271 on the low ground 84 were vaccinated against all four diseases and 187 against theileriasis only. Nine country-bred calves served as controls. The mortality, from theileriasis, among the vaccinated was 1·8 per cent., and 5 of the 9 controls died of the same disease.

It is noted that stalled milch cows of the fine breeds may react violently to vaccination.

1927.—506 animals of all kinds were exposed to natural infection. About a half of them had been vaccinated under field conditions for the first time and the remainder were re-vaccinated. These had already been exposed to infection in 1926.

The animals were inoculated in two batches. The first comprised 445 animals and each of these received blood containing piroplasma, babesiella, and anaplasma. Owing to a delay in transport the mixed viruses were exposed to ordinary external temperatures for two days. The vaccination produced no incident worthy of note, and there were no deaths.

At the second inoculation 474 animals were vaccinated against Theileria. Of these 427 had been vaccinated or revaccinated. Two animals developed severe reactions and died.

506 animals were exposed to infection in the plains during 1927. 471 had been vaccinated in the field and 35 at the laboratory. 424 had been vaccinated against all four organisms, and 82 against Theileria alone. There were 11 controls. Three vaccinated animals died of theileriasis and 5 of the controls.

In carrying out the vaccination experience has shown that inoculation with piroplasma, babesiella, and anaplasma can be done at one time. The reaction to the first two is subsiding when that due to anaplasma is beginning.

There should be an interval of three months before the inoculation with Theileria is carried out.

Although in most cases the vaccinations are not marked by any untoward incident, watch must be kept for accidents.

It is recommended that animals be treated as young as possible, because in them the reactions are almost always weak. It is advisable to repeat the inoculations annually.

Each type of parasite is supplied by an animal having a pure infection. In the case of *P. bigeminum* and *B. bovis* the blood is obtained from an animal that has been infected not less than 3 months and not more than a year previously. The doses are 2–10 cc. and 5–10 cc. respectively. The Anaplasma virus vaccine is obtained from an animal still in the incubation stage, that is to say, 5 to 6 days after it has been inoculated from a chronic case. The theileria vaccine-virus is blood taken from animals in the acute stage, when blue bodies are present in the liver in large numbers. This virus-vaccine retains its efficacy for at least 48 hours at ordinary temperature (18° C.).

The Theileria virus is maintained at the laboratory by passage through pure-bred French animals. Two are inoculated each time, and the inoculations are carried out at intervals of 17 to 20 days.

BROCHET. Piroplasmose et hémoglobinurie. [**Piroplasmosis and Haemoglobinuria.**]—*Rev. Gén. Méd. Vét.* 1927. Sept. 15. Vol. 36. No. 429. pp. 507–508.

The author of this note is in Persia. He states that equine piroplasmosis is not very rare, but that the infection is usually a latent one

in the native horses. The disease may, however, become obvious when some other influence arises. In such cases haemoglobinuria is the most prominent symptom. This makes its appearance suddenly, persists for a few days, and then disappears again. He issues a note of warning against the automatic diagnosis of all cases of haemoglobinuria as being piroplasmoses, and details a case which was really one of the so-called Azoturea.

CUILLÉ (J.) & DARRASPEN (E.). Formes atypiques et formes chroniques de la piroplasmose du chien. [**Atypical and Chronic Forms of Canine Piroplasmosis.**]—*Rev. Gén. Méd. Vét.* 1927. Aug. Vol. 36. No. 428. pp. 433–443.

The authors hold that in the past errors of diagnosis have been made as a result of insufficient examination of blood smears. NOCARD pointed out in 1902 that a negative result of the examination of the blood on two or three days is not sufficient to warrant a negative diagnosis.

As a result of their own observations, which have been made during the last three years, the authors are in a position to state that canine piroplasmosis occurs far more frequently in the neighbourhood of Toulouse than has been thought. They quote the figures from the Statistics of the Veterinary College at Toulouse showing that between 1910 and 1926 (omitting the war period) the number of cases detected rose from 2 to 41.

They have been struck with the variations in the symptoms present, and they are certain that the majority of the diseases would not have been definitely diagnosed but for careful and persistent examination of the blood in all cases showing anaemia and discoloration of the urine.

The abnormal symptoms which may mask the classical symptoms of the disease involve the respiratory, digestive, nervous, or muscular systems.

Apart from these acute atypical cases, there are chronic cases in which diagnosis is extremely difficult, but a symptom which is rarely absent is the white porcelain appearance of the mucous membranes. Bile staining is exceptional.

The examination of the urine is of great importance. Bile pigments may be detected, and rarely haemoglobin. Bile salts are almost invariably absent. Corneal opacity may be found.

It is suggested that some of these abnormal cases of the disease are really due to a combination of bacterial and protozoal infections, but the authors state that they have not found any evidence that this is so.

YAKIMOFF (W. L.). La lutte antipiroplasmique dans le gouvernement de Pétrograde (Léningrade) en 1926. (Note préliminaire). [**The Anti-Piroplasmosis Campaign in Petrograd in 1926.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 595–597.

During 1926 the disease was very severe, mortality reaching 50 to 60 per cent. Shortage of food during the winter and spring was partly responsible for this.

A tabular statement shows the numbers of native and imported animals which were treated with various drugs and combinations of them. Of 608 animals treated 61 died. Of those treated with ichthargan 7·1 per cent. died. It is to be noted that nearly half the total number were treated with this drug.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.) & MARKOFF-PETRASCHEWSKY (E. N.). Zur Frage der Blutveränderungen bei Rinder-Piroplasmose. [**The Blood Changes in Bovine Piroplasmosis.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilkunde.* 1927. Oct. 26. Vol. 56. No. 5. pp. 452–475.

Cattle infected with *B. bovis* show the following changes in the corpuscular elements of the blood.

(*a*) A reduction in the number of red corpuscles, and histological changes in them.

(*b*) An alteration in the leucocyte formula involving an increase in the mononuclears and a reduction in the neutrophile polynuclears, together with the appearance of abnormal forms.

(*c*) A displacement of Arneth's formula to the left.

The authors publish their observations on the blood changes in 743 animals infected with piroplasmoses, with that of 100 healthy animals as controls.

They tabulate the enumerations of the white and red blood corpuscles given by various writers and then give a number of tables showing counts of normal and infected blood, the latter at different stages of the disease and in some cases after treatment with various drugs.

Their conclusions are given above.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY & RASTEGAIEFF (E. F.). Über die Bedeutung der Polychromatophilie, und der getüpfelten Erythrozyten bei Babesiellosis des Rindes. [**The Significance of Polychromatophilia and Stippled Red Corpuscles in Bovine Babesiellosis.**]—*Deut. Tierärzt. Woch.* 1927. Oct. 29. Vol. 35. No. 44. pp. 712–714.

The authors have carried out examinations of blood films of 27 animals affected with Babesiellosis. They found that in 8 out of 17 polychromatophilia made its appearance before punctate basophilia. In the remaining 9 both types of corpuscles appeared simultaneously.

In naturally-contracted cases the punctate basophilia appears 3 or 4 days after the urine has become blood tinged. They believe that the appearance of the corpuscles has some prognostic value.

DE ASÚA (F. J.), DIOS (R. L.), ZUCCARINI (J. A.) & KUHN (M. J.). Studien zur Tristezafrage [**Tristeza.**]—*Beiheft. z. Arch. f. Schiffs- u. Trop. Hyg.* 1927. Vol. 31. No. 5. pp. 5–34.

The authors began their work by making a systematic examination of the blood of normal cattle.

They found the number of red corpuscles to range from 6 to 12 million, with an average of ten. The haemoglobin content varied from 65 to 37 with an average of 57 (Sahli).

The red corpuscles were less resistant to hypotonic salt solution than those of man.

In films stained by May-Grünwald-Giemsa a variable amount of anisocytosis was detected. A small number of Jolly bodies may be present in the blood of normal animals. Vital staining with brilliant-cresyl-blue reveals no granulo-filamentous or metachromatic substance in the red corpuscles.

The number of leucocytes ranged from 7,200 to 16,800, with an average, taken from 32 counts, of 11,500.

Three types of leucocytes are recognisable in smears stained with May-Grünwald-Giemsa—granular leucocytes, lymphocytes, and monocytes.

The granular leucocytes are of three kinds: The small neutrophile granular forms, those containing eosinophile granules, and those with basophil granules. The latter frequently appear to resemble degenerated leucocytes.

Two kinds of lymphocytes occur, but they were enumerated together; namely, smaller forms which closely resemble the lymphocytes of man, and larger ones which were sometimes difficult to distinguish from Monocytes.

The monocytes resemble those of man's blood, but are rather larger.

The enumeration of the forms yielded the following figures.

| | Average. | Maximum. | Minimum. |
|---|---|---|---|
| Leucocytes with small granules ... | 34·5 | 54·0 | 22·0 |
| ,, ,, . eosinophile granules | 1·0 | 6·0 | 0 |
| ,, ,, basophile granules | 0·25 | 0·5 | 0 |
| Lymphocytes ... ... ... ... | 58·25 | 71·5 | 38·0 |
| monocytes ... ... ... ... | 6·0 | 10·5 | 3·5 |

The animals were infected by intravenous inoculation with blood taken from animals at different stages of infection, and subsequently blood smears and "thick drops" of blood were prepared daily in order to detect changes in the numbers of parasites present.

At these blood examinations the red corpuscles were enumerated, their osmotic resistance to hypotonic salt, vital staining with brilliant cresyl blue, changes in the red corpuscles in stained smears, and the number of white corpuscles were determined.

The incubation stage, after intravenous inoculation, ranges from 3 to 5 days, and parasites multiply rapidly in the blood and reach a maximum 5 to 8 days after inoculation. There is a rapid reduction in the number of red corpuscles. This may amount to as much as 4 million on the day when parasites are most numerous. There is also a reduction in osmotic resistance. The sudden haemolysis is shown by marked haemoglobinuria with large quantities of urobilin and urobilinogen in the urine. The maximum degree of haemoglobinuria coincides with the maximum number of parasites in the blood. The production of both red and white corpuscles is in abeyance for a time, and leucopenia is one of the most constant symptoms of the disease.

When death takes place at this stage, it is due in the authors' opinion to heart failure and not to the acute anaemia. If the animal survives there is a rapid diminution in the number of parasites. On the 6th to 8th day the animal body attempts to repair the blood lesions by a very rapid production of red corpuscles, and the abnormal forms associated with this type of anaemia make their appearance. These, however, are not produced as a rule in sufficient numbers to compensate for the reduction, and the oligocythaemia persists until the 9th to 15th day.

Recovery from the disease begins about the end of the second or third week. During this period the cell count of the blood slowly approaches the normal, and the haemoglobin content is restored, or may even exceed the normal.

In anaplasmosis the symptoms appear first when recovery from piroplasmosis is nearing completion, that is to say, on the 20th to 30th day. This results in an interruption of the regeneration of the blood. There is a second fall in the number of red corpuscles. Haemoglobinaemia and haemoglobinuria are not observed, but bilirubinaemia and urobilinuria are recognizable. There is no reduction in the number of white corpuscles, but actually an increase.

Recovery from anaplasmosis is very slow. The author has had cases under observation in which the blood had not returned to the normal three months after the attack. The author emphasizes a distinction between piroplasmosis and anaplasmosis by pointing out that in the former the invasion of the blood by parasites is much more rapid than in the latter.

The macroscopic and microscopic characters of the lesions are briefly described, and the changes occurring in the haematopoietic system are dealt with at some length.

As a result of the blood destruction the reticulo-endothelial system shows pronounced changes. Sections of the spleen, during the early days of infection show pronounced hyperaemia and richness in pulp cells. The monocytes form a kind of zone around the follicles, but do not penetrate into them. These cells never reach a large size. They occur in the intralobular capillaries of the liver, but it is not known whether these are derived from the spleen or produced locally.

Pigments derived from haemoglobin occur in the spleen and elsewhere. In the spleen it occurs in the pulp cells, but it is also found in Kupffer's cells, the interfollicular cells of the lymph glands, and the perivascular cells of the kidneys. Nothing definite is known regarding the nature of the pigment. Haemosiderin also occurs in the cells of the reticulo-endothelial system where it is present as yellow rounded granules of various sizes. This pigment is distributed through the protoplasm.

The extensive destruction of the red corpuscles leads to the formation of haemoglobin cylinders in the renal tubules, and stasis in the bile capillaries in the liver.

In the lymphoid system only slight changes are observed. Of these the most pronounced is an apparent reduction and deformation of the cells of which the Malphigian bodies are composed. This is possibly a purely passive phenomenon. Little of special importance is to be seen in the bone marrow.

The authors draw special attention to cells which are to be found in smears from the liver, spleen, and lymph glands. These are rounded cells from 3 to 15$\mu$ in diameter which contain balls or masses of a substance which stains in a manner resembling chromatin staining. The significance or nature of these is not known, but the authors state that they have found similar cells in smears from the organs of dogs poisoned with haemolytic poisons. In a chapter devoted to a consideration of the cause of Tristeza the authors review the various theories that have been put forward regarding the nature, etc., of anaplasms, and they appear to favour the view that anasplasms are not in reality parasites, but only symptoms, so to speak. The authors also discuss at some length the influence of the reticulo-endothelial system upon the course of the disease, but they reach no definite conclusions.

NOELL (R.). Le trypanbleu dans le traitement de la piroplasmose vraie. [**Trypanblue in the Treatment of True Piroplasmosis.**]—*Rec. Méd. Vét.* 1927. Sept. 15. Vol. 103. No. 16. pp. 529–530.

The author has frequently noticed that trypanblue in doses of 1 g. per 100 kilos given to animals at the height of an attack of piroplasmosis may lead to alarming clinical symptoms. To obviate this LESTOQUARD and DONATIEN advise much smaller doses.

Noell has recently had an opportunity of testing the smaller doses on a case of true piroplasmosis in a mare.

The diagnosis was confirmed by microscopic examination, but prolonged search was required for the detection of the organism. 25 cg. of trypanblue were given dissolved in 30 cc. of distilled water. Clinical symptoms of a mild nature appeared almost immediately, but these passed off in about a quarter of an hour. There was an uninterrupted recovery.

LEGG (John). **Can the Cattle Tick** *Haemaphysalis bispinosa* **act as the Carrier of Piroplasmosis** (*Piroplasma bigeminum*)**?**—*Austral. Jl. Exp. Biol. & Med. Sci.* 1926. Dec. Vol. 3. No. 4. pp. 203–216.

Experiments failed to produce any evidence that *H. bispinosa* can convey *B. bigeminum*. Ticks in all stages of development were fed upon recently recovered animals, were allowed to engorge upon susceptible animals, but failed to transmit the infection. The animals used were subsequently infected by inoculation.

HIBINA (A. M.). Coccidiosis bij het Rund. [**Coccidiosis in the Ox.**]—*Tijdsch. v. Diergeneesk.* 1927. Oct. 15. Vol. 54. No. 20. pp. 945–947. Author's English Summary.

The author finds that spontaneous recovery occurs in both slight and severe cases. Treatment is of value only in the early stages when the animals are still resistant and blood has not appeared in the faeces. He used tannoform.

YAKIMOFF (W. L.). Le traitement de la coccidiose des bovidés par l'ichtargan. [**The Treatment of Bovine Coccidiosis by Ichthargan.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 588–589.

Infected animals are treated with 1 gramme dissolved in 1 litre of water (not in salt solution) twice daily. The author claims that he has treated several dozen animals with success in every instance. Two or three days suffice to effect a cure.

One case is specifically referred to and in this instance 3 species of coccidium were recognisable in the faeces—*E. zürni*, *E. smithi*, and a third of large size.

ANDREWS (Justin M.). **Host-Parasite Specificity in the Coccidia of Mammals.**—*Jl. Parasitology.* 1927. Mar. Vol. 13. No. 3. pp. 183–194.

In carrying out cross infectivity tests three points must be borne in mind, viz., the natural coccidial parasites of the animals, the interference of an acquired immunity, and mechanical carriage. The

author holds that infection confers an appreciable immunity save in the case of the rabbit, where continual re-infestations are held to occur.

Summarizing the literature the author finds that it is a very general rule that cross infectivity tests do not succeed. Details of experiments are given the results of which tend to indicate that *I. felis* and *I. rivolta* are infective for both the cat and the dog.

Selective digestion appears to be a factor in the mechanism of host-parasite specificity, for the results indicated that in a foreign host sporozoites are not released from ingested oocysts.

HOARE (C. A.). **On the Coccidia of the Ferret.**—*Ann. Trop. Med. & Parasit.* 1927. Oct. 10. Vol. 21. No. 3. pp. 313–317. With 2 plates.

The author describes the exogenous stages of two species of *Eimeria* and one of *Isospora* found in ferrets. The former were more frequently encountered. Infection did not appear to be responsible for ill-health in any way.

*Isospora laidlawi*, n. sp. Only 35 to 40 specimens of this parasite have been seen. They ranged from 32$\mu$ to 36·8$\mu$ in length by 27·2$\mu$ to 30·4$\mu$ in breadth. Development at room temperature in 0·5 per cent. chromic acid required four days. There is no oocyst residual body, but a large sporocyst residual body.

In the sporocyst the sporozoites are arranged all lying in one direction and not "head to tail." The author gives his reasons for concluding that the parasite is a distinct species.

The two forms of *Eimeria* were found in a fair proportion of the animals examined and always in large numbers.

The large parasite measured 18·4$\mu$ to 27·2$\mu$ by 12·8$\mu$ to 20·8$\mu$, and the zygote in the freshly passed parasite is rather elongated, measuring about 15$\mu$ by 12$\mu$, but later becomes spherical.

There is no residual body in the oocyst, but there is a large granular one in the sporocyst. In an experiment oocysts appeared in the faeces 7 days after feeding with sporulated oocysts. The name *E. ictidea* is suggested. The second *Eimeria* was a more or less spherical one ranging from 11·2$\mu$ to 14·4$\mu$ by 10·4$\mu$ to 12·8$\mu$. Complete development requires 5 to 6 days. There appears to be no oocystic residual body, but there is a small one in the sporocyst.

Oocysts were passed 6 days after feeding. The name *E. furonis* is suggested.

BLANC (Georges) & CAMINOPETROS (J.). Nouvelle enquête sur la répartition du Bouton d'Orient en Grèce. Un foyer continental en Laconie-Péloponèse. [**An Inquiry into the Distribution of Oriental Sore in Greece.**]—*Ann. Inst. Pasteur.* 1927. Sept. Vol. 41. No. 9. pp. 1002–1021. With 3 text figs.

The author finds that there is an area in Laconia where the disease is endemic and where it has probably existed for a long time; it certainly appears to have been present before the influx of refugees from Asia Minor.

REES (C. W.). **Balantidia from Pigs and Guinea-pigs: their Viability, Cyst Production and Cultivation.**—*Science.* 1927. July 22. Vol. 76. No. 1699. pp. 89–91.

The trophozoites of Balantidia from pigs remain normal in appearance and reactions when cooled to room temperature, and they may remain alive for 10 days in this condition. This is contrary to the findings of McDONALD.

Trophozoites that infect the pig may pass through the stomach of the guineapig and reach the caecum, where they are normal after 18 hours. Trophozoites are frequently passed in the faeces, but the factors determining cyst production are not known. Barret and Yarbrough's medium can be used for cultivation. The addition of rice starch improves the medium, and it is an advantage to replace the 0·5 per cent. sodium chloride with Ringer prepared without dextrose. Sulphuretted hydrogen appears to be non-toxic to the Balantidium of the pig.

KLARENBEEK (A.). Een Leptospirose als oorzaak van Icterus van den Hond. [**A Leptospira as a Cause of Jaundice in the Dog.**]—*Tijdsch. v. Diergeneesk.* 1927. Nov. 15. Vol. 54. No. 22. pp. 1041–1046.

The author confirms the occurrence of a form of jaundice in dogs caused by a leptospira.

In his English summary he states that in his experience the disease most frequently occurs in dogs less than two years old. The symptoms are dullness, jaundice, haemorrhages of the skin, mucous membranes and other organs, particularly the lungs. There is often vomiting, and the faeces contain blood.

The spirochaete can be found by microscopic examination in the blood and in the kidneys.

The parasite is transmissible to the guineapig by inoculation. The blood of an infected dog agglutinated a leptospira recovered from a man suffering from Weil's disease in a dilution of 1 in 50,000.

KLARENBEEK (A.). Présence de spirochètes du type *Leptospira* dans les reins des chiens atteints d'ictère et de fièvre typhoïde. [**The Presence of Spirochaetes of the Leptospira Type in the Kidneys of Dogs affected with Jaundice and Typhoid Fever.**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1156–1165. With 5 text figs.

The author figures and describes spirochaetes detected by silver impregnation technique in the epithelial cells and in the lumen of the renal tubules in cases of jaundice and of Stuttgart disease.

He gives a guarded opinion as to whether these represent the actual causes of the condition.

WILBERT (R.) & DELORME (M.). Sur une spirochétose ictéro-hémorragique du chimpanzé transmissible à l'homme. [**An Ictero-Haemorrhagic Spirochaetosis of the Chimpanzee transmissible to Man.**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1139–1155.

The spirochaete was detected in a number of chimpanzees which died (23 out of 24) as the result of a veritable epidemic of the disease.

The first case occurred in a chimpanzee imported from the Ivory Coast, and having spread through this batch it extended to others which had been obtained from other parts of West Africa. In the early part of the epidemic the disease ran its course in 1 to 4 days, but the later cases ran from 4 to 11 days.

A full account of the symptoms is given. The manner in which the disease was spread has not been elucidated. A number of attempts were made to transmit the infection to other species, but success was achieved in one series of guineapigs and with two chimpanzees only. One of the authors (Wilbert) contracted the disease. An account of his symptoms is given, and the infection was transmitted from him to a chimpanzee by inoculation. The chimpanzee died. Wilbert has no recollection of having wounded himself during post-mortem work, but he was constantly being bitten by anopheles and stegomyia.

No treatment of the chimpanzees was found that was of any value.

GWÉLESSIANY (J.). Recherches sur le passage des spirochètes à travers les muqueuses et la marche des infections mixtes spirochéto-trypanosomiennes. [**The Passage of Spirochaetes through Mucous Membranes, and the Course of Mixed Spirochaete-Trypanosome Infections.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 653–664.

The author questions whether a good deal of the work carried out in connexion with this subject holds good because there is a possibility that the technique employed by various authors has not left the mucous membrane or the skin, as the case may be, actually intact.

As indicating the probability that the spirochaete of relapsing fever can infect through sound mucous membranes the author recounts the incident recorded by SERGENT in 1913 when two out of three persons were accidentally infected through having infective blood splashed on their faces. The third persons possibly owed his escape to the fact that he wore glasses.

Experiments were carried out with spirochaetes and trypanosomes either separately or together. In one experiment in which *T. brucei* and *Treponema duttoni* were placed in the eye and in the mouth without touching the tissues in any way, so as to avoid the slightest injury, 10 mice were used. All became infected with the spirochaete, but only two with the trypanosome.

This experiment was repeated. Again, all of the mice contracted spirochaetosis, but in this case none became infected with the trypanosome.

*T. equiperdum* and *Treponema crocidurae* were used for an exactly similar experiment. None became infected with the trypanosome.

DESCHIENS (R.), LIMOUSIN (H.) & TROISIC (J.). Eléments présentant les caractères d'un protozoaire sanguicole observés chez le chimpanzé. [**Structures possessing the Characters of a Protozoon in the Blood of a Chimpanzee.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 597–600. With 1 text fig.

The first observation of this type of body in the blood of a chimpanzee was made in December 1925, but it was thought advisable that confirmation should be obtained before anything was published.

DELORME, of the Pasteur Institute of Kindia, to whom the authors showed a photograph of their blood film, stated that he had seen identical bodies in blood smears from chimpanzees.

In a blood film stained with May-Grünwald-Giemsa the structure appears as a vermiform body with square-cut ends measuring 21$\mu$ by 1$\mu$. At one end there are two granules separated by a clear area and staining a purple-red colour. Posterior to these are two masses measuring 8$\mu$ and 5$\mu$ in length and also separated by a clear area. Posteriorly again there is a clear area.

The possibility of its being a foreign body superposed upon the film is discounted by the fact that it is in the same plane with the red corpuscles. And the observation of DELORME indicates that it is not a contamination of the drop of blood used for spreading.

The authors survey the possibilities as to what the structure may be and come to the conclusion that though it differs to a somewhat considerable extent from that body, it most closely resembles *Sergentella hominis* (Brumpt 1903), and in the meantime they name it *Sergentella anthropopitheci*.

QUÉMÉNER (E.). Contribution à l'étude de la " formol-gélification " dans la syphilis et le kala-azar. [**The Formol-Gel Test in Syphilis and Kala Azar.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 600–601.

The authors state that in carrying out this test they have observed that the rate of separation of serum from clot appears to vary with the virulence of the infection. In badly infected cases this takes place in two hours, and longer in less severe cases.

At ordinary temperatures reactions are generally clear in 24 hours; but strongly positive ones in 15 minutes.

The reaction is negative for 25 days after the appearance of chancre or in syphilitics under treatment. It is positive in about 50 per cent. of secondary or tertiary syphilis, and always positive in untreated cases of kala azar.

The conclusions are based upon 200 cases.

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FRANCHINI (G.). Su di un plasmodio pigmentato di una scimmia. [**A Pigmented Plasmodium in a Monkey.**]—*Arch. Ital. Sci. Med. Colon.* 1927. April. Vol. 8. No. 4. pp. 187–190. With 1 plate.

FRANCHINI (G.) & CADEDDU (A.). Su di una trypanosomiasi dei cammelli a Giarabub in Cirenaica. (Seconda nota.) [**Trypanosomiasis of Camels at Giarabub in Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1927. April. Vol. 8. No. 4. pp. 191–193.

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## DISEASES DUE TO METAZOAN PARASITES.

PETER. Eine wirksame Methode zur Bekämpfung der Dasselfliegenplage. [**A Practical Method of combating the Gad-fly.**]—*Berlin. Tierärzt. Woch.* 1927. Nov. 18. Vol. 43. No. 46. pp. 769–773.

The author introduces his subject by pointing out that none of the methods of attacking this pest are completely satisfactory. Certain oily preparations are credited with being efficacious as a result of

closure of the tracheal openings. In the author's view, if that alone was responsible for the success obtained, any fat or oil should be equally effective. This is not the case.

Peter obtained some evidence that the specific action of one of these oils was due, at least in part, to absorption of the phenol contained in it. An ointment was compounded by a commercial firm for the author's use, but the composition is not given.

It is claimed that the ointment not only kills the larvae in all stages of their development under the skin, but also greatly assists the healing of the lesions which result from the invasion.

The ointment is rubbed in three times, with an interval of three days between each. Many of the larvae which have been killed are said to be evacuated from the subcutaneous tissue during the process of inunction.

BROCHET. Larves d'hypodermes chez le chevre à Téhéran. [**Hypoderma Larvae in Goats in Teheran.**]—*Rev. Gén. Méd. Vét.* 1927. Sept. 15. Vol. 36. No. 429. pp. 508.

Although it is generally held that hypodermosis is of rare occurrence in the goat, the author states that it is very frequently detected at the abattoir at Teheran during the autumn. Approximately one-third of the carcases are so parasitized with 20 to 30 parasites each. By December most of the larvae have made their escape.

The larvae are whitish in colour and measure about 13 mm. long by 2·5 mm. in diameter. They show 10 double rows of spines. The stigmatic plate shows two large black spots.

The author has no information about the imago.

PETER. Weitere Untersuchung chemische Präparate auf ihre Brauchbarkeit im Kampfe gegen die Dasselfliegenlarve. [**Further Experiment with Chemical Substances in the Control of Bot-fly Larvae.**]—*Berlin. Tierärzt. Woch.* 1927. Sept. 30. Vol. 43. No. 39. pp. 645–648.

The author gives tabular statements showing the effects of a number of substances containing sulphur and chlorine, naphthalin, and some mixtures containing tobacco upon larvae expressed from skin lesions.

None of these was very satisfactory.

DUNN (L. H.). **Notes on Two Species of South American Ticks,** *Ornithodorus talaje* **Guerin-Mene., and** *Ornithodorus venezuelensis* **Brumpt.**—*Jl. Parasitology.* 1927. March. Vol. 13. No. 3. pp. 177–182.

These ticks are shown to be capable of transmitting relapsing fever, and it is believed that the latter is the principal agent in tropical America.

The larvae of *O. talaje* are commonly found on rats, and presumably the other stages infest animals. Man is apparently only a host of necessity.

GRANOUILLIT, THU & KHOAN. Contribution à l'étude de la résistance des oeufs et des larves hexapodes d'Ixodidés à l'action des vapeurs d'antiseptiques.—Utilisation pratique des vapeurs d'ammoniaque. [**The Resistance of the Eggs and Hexapod Larvae of the Ixodidae to the Action of Antiseptic Vapours. Practical Utilization of Ammoniacal Vapours.**]—*Rev. Vét. et Jl. Méd. Vét.* 1927. Nov. Vol. 79. pp. 615–619.

Large numbers of ticks (Haemaphysalis) in all stages were collected in sterile tubes. It was found that the larvae died in 20–25 days, the nymphs in 25 to 28 days, and the adults in 30 to 33 days.

Female ticks were placed in pipettes with a bulb which were closed at the upper end with cotton wool. Larvae hatched out in 22 to 25 days. In pipettes containing a little sterile water at the lower end hatching was hastened somewhat. In the experiments described pipettes with two bulbs, about 15 centimetres apart were used. About 1 cc. of the antiseptic selected was placed in the lower bulb and the end of the tube was sealed. The eggs were introduced into the upper bulb and the tube was then plugged.

Ether, " mentholated oil," " formalized water," petroleum, carbolic acid, nitric acid, and ammonia were tried. Carbolic acid and ammonia alone prevented hatching.

These were then tested for varying lengths of time, and it was found that ammonia prevented hatching when exposure was for only an hour. Hatching occurred after exposure to the vapour of carbolic acid for one hour.

In a second experiment ammonia vapour was found to be fatal to hexapod larvae in 4 minutes.

The vapour has not the same effect upon the adult.

GROZA (Marian P.). Distomatoza ovina. Si tratamentului cu Distol, Serapis, Filinol si Parazitin. [**Ovine Distomatosis, Treatment with Distol, Serapis, Filinol and Parazitin.**]—*Arch. Véterinaria.* 1927. Vol. 20. No. 1-2. pp. 3–53. [Author's French Summary.]

Distol may be considered as a specific in distomatosis. In the dose prescribed it is non-toxic and safe. All the parasites are destroyed, and it does not cause abortion.

Only one death occurred among 351 lambs treated, and in this case the animal was probably too far gone to be treated with success.

Distol is without effect upon *D. lanceolatum.*

Serapis Sb 444. The therapeutic dose of this drug sometimes produces marked systemic disturbance. If used on advanced cases it may prove toxic, and provoke a mortality up to 11 per cent. In the doses prescribed it is not certainly fatal to all the parasites present. It does not cause abortion. There is some evidence to suggest that it has a noxious effect upon *D. lanceolatum.*

Filinol in therapeutic doses causes severe systemic disturbance, and there may be a mortality of more than 25 per cent. in advanced cases. The drug is fatal to Fasciola, but is without effect upon Dicrocoelium. Abortion occurred in three pregnant ewes.

Parazitin caused diarrhoea and loss of condition. The medicinal dose approximates to the toxic dose, and a 30 per cent. mortality may occur. It is fatal to nearly all the Fasciola present, but is without effect upon Dicrocoelium. Two pregnant sheep aborted.

MAREK (J.). Neuere Beiträge zur Kenntuis der Leberegelkrankheit, mit besonderer Berücksichtigung der Infektionsweise, der Entwicklung der Distomen und der Therapie. [**Recent Additions to Knowledge regarding Fluke Disease, with Special Reference to the Methods of Infection, Development and Treatment.**]—*Deut. Tierärzt. Woch.* 1927. Aug. Vol. 35. No. 32. pp. 513–519.

The author brings evidence to show that in wet years encapsuled cercariae can persist in hay for eight months and possibly longer, and cause a fatal infection when the hay is fed.

He is not of the opinion that invasion of the liver is direct from the peritoneal cavity. In his view, this invasion takes place via the portal blood vessels. The flukes require about three months to come to maturity in the liver.

Experiments with a modified form of " Distol " are described. This drug was effective when capsules were given on four consecutive days in some 80 per cent. of cases.

DE BLIECK (L.) & BAUDET (E. A. R. F.). Tetrachloorkoolstof als Middeltegen Distomatosis bij Schapen. [**Carbon Tetrachloride for Distomatosis in Sheep.**]—*Tijdsch. v. Diergeneesk.* 1927. Sept. 1. Vol. 54. No. 17. pp. 825–830.

The author finds that a dose of 1 cc. is efficient, and he does not appear to have experienced any untoward results. Emphasis is laid upon the necessity of having the pure drug. The best times for treatment are July, October, December and February.

GERMAN (S.) & PAPKOVA (L.). **Infestation of Camels by Trichostrongylus in Saratovsky Region.**—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 2. English summary. pp. 261–262. [In Russian, pp. 182-183].

The authors examined the faeces of 34 camels and found Trichostrongylus eggs in all of them. The technique of KOFOID & BABER was used.

It is not clear whether any post-mortem examinations were carried out. There is no specific identification of the worm.

FOLEY (H.), CATANEI (A.) & VIALATTE (Ch.). Microfilaires du sang de quelques animaux d'Algérie. [**Microfilariae in the Blood of Certain Animals in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Dec. Vol. 4. No. 4. pp. 485–518. With 7 plates & 6 text figs.

Microfilariae have been found in the blood of lizards, birds and domesticated animals in the Saharan portion of Algeria.

The study of these worms is fraught with some difficulty for many reasons. It must not be assumed that only one species is present, the adult worm must be found and the embryos present in the blood must be compared with those in the terminal part of the uterus of the female. The animal host must be specifically identified.

Nevertheless, observations, records, and measurements as accurate as possible must be made when microfilariae are discovered by chance

in the blood of animals. In this paper the authors figure and describe microfilariae from the following animals: (1) *Tarentola mauritanica*, *Uromastix acanthinurus*, sparrow, *Elephantulus deserti*, hare, dog, (*M. immitis*, *M. auquieri*), horse, donkey, dromedary.

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A ROYO (C.). Un caso de habronemosis con eosinofilia hemática (Nota preliminar). [**A Case of Habronemiasis with Eosinophilia in the Blood.**]—*Revist. Hig. y Sanidad Pecuarias.* 1927. Oct. Vol. 17. No. 10. pp. 735–736.

CHARRIER (H.). Note préliminaire sur les mouches de la région de Tanger. [**The Flies of the Tangier Region. A Preliminary Note.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 619–622.

HENRY (A.) & LESBOUYRIES. Strongle des vaisseaux dans l'oeil d'un chien. [*Haemostrongylus vasorum* **in the Eye of a Dog.**]—*Rec. Méd. Vét.* 1927. July 30. Vol. 103. No. 14. pp. 263–265.

HOEPPLI (R.). Ueber Beziehungen zwischen dem biologischen verhalten parasitischer Nematoden und histologischen Reaktionen des Wirbeltierkörpers. [**The Relationship between the Biological Characters of Parasitic Nematodes and the Histological Reactions of the Animal Host.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Vol. 31. No. 3. 88 pp. With 24 figs. in text & 1 coloured plate.

MARX (Alberta). *Trigonomonas diplostomum*, **n. sp. from the Intestine of the Frog.**—*Jl. Parasitology.* 1927. March. Vol. 13. No. 3. pp. 173–176. With 1 plate.

ROSS (I. Clunies). **A Clinical Note on Habronemiasis in Australia.**—*Vet. Jl.* 1927. Oct. Vol. 83. No. 10. pp. 516–521.

SKRJABIN (K. I.) & ISAITSCHIKOFF (I. M.). **Four New Species of the Family** *Dicrocoeliidae* **from the Livers of Birds.**—*Ann. Trop. Med. & Parasit.* 1927. Oct 10. Vol. 21. No. 3. pp. 303–12. With 212 plates.

TUBANGUI (M. A.). **Worm Parasites of Philippine Chickens.** [Reprint from *Philipp. Agric. Rev.* 1926. Vol. 19. No. 4. 43 pp. With 19 figs. & 2 plates.

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## BACTERIAL DISEASES.

CARPENTER (C. M.) & PARSHALL (C. J.). **A Study of Milk from Cows showing no Agglutinins for** *Brucella abortus* **in their Blood Serum.** —*Cornell Vet.* 1927. Apr. Vol. 17. No. 2. pp. 234–235.

The authors have carried out tests " to find out whether, if the blood serum from a cow is negative and she has not aborted or had retained placenta, her udder will be free from *Brucella abortus* infection, especially when she is constantly in contact with animals harbouring the disease."

The authors consider complete agglutination in 1 in 60 with serum as indicative of infection.

The following technique was adopted:

Half a pint of milk was centrifuged at high speed for 20 minutes. The layer of cream was removed and placed in sterile Petri dishes. The remaining liquid was discarded and the sediment saved. One guineapig was inoculated with 1 cc. of cream and one with 1 cc. of sediment; the guineapigs were examined from 6 to 12 weeks later.

Cultures were made from the spleens, and blood was collected for an agglutination test.

Milks from eighteen animals were used. These all gave negative results to agglutination tests, and all had a normal breeding record although they had been associating with a group of infected cows for two or three years. In no case was any evidence of infection of the udder obtained.

CARPENTER (C. M.) & BAKER (D. W.). **A Study of *Brucella abortus* Infection in Milk from Fifty Herds supplying the City of Ithaca, New York.**—*Cornell Vet.* 1927. Apr. Vol. 17. No. 2. pp. 236–247.

The authors' investigations have been prompted by the diagnosis of a number of cases of illness in human beings as due to *Brucella abortus*. The examinations involved market samples from 50 herds.

Guineapigs were inoculated from the cream and sediment yielded by a pint of the milk as delivered. Many died in a month or less, but survivors were killed at 5 to 6 weeks.

Detailed postmortem examinations were made. Samples of blood were also tested by agglutination. The serum was diluted directly in the antigen to give 1 : 15, 1 : 45, 1 : 135. The density of the emulsion was 3·5 on Gates' scale. The tests were incubated for 9–12 hours at 37° C. and then read off.

The cream is said to contain more organisms than the sediment.

Six male guineapigs were fed with sediment containing the organism for 6 days and two developed lesions.

In one herd of 14 animals individual tests of milk were made and the milk of 9 were found to be passing the organism. Guineapig inoculation showed that the bacilli from two of these were more virulent than those from the remainder.

Similar results were obtained in a second herd, specially virulent strains being discovered.

Forty-eight other herds were subjected to tests, but in none of these were specially virulent strains detected.

It has already been recorded by SMITH that porcine strains are more virulent than bovine strains. Experience has shown that the majority of strains recovered from man possess a pathogenic power for the guineapig resembling that of the porcine strains. The possibility is suggested that passage of the bovine strain through man leads to such an exaltation of virulence.

The authors' observations lead them to the conclusion that the number of organisms present in the medium used for inoculation is a determining factor to some extent regarding the extent of the lesions produced.

VAN SACEGHEM (R.). Le formol-vaccin contre l'avortement épizootique des bovidés. [**Formol-Vaccine against Contagious Bovine Abortion.**]—*Bull. Méd. du Katanga.* 1926. Dec. Vol. 3. No. 6. pp. 164–166.

No details are given in this short note, but the author states that large doses of formol-vaccine have to be repeated at short intervals.

He says that experience shows that this vaccine is superior to vaccine killed by heat. The strength of formalin is 2 per 1,000, and it is said that 48 hours are required to cause the death of the organism.

The injection of the vaccine into infected animals produces a local and general reaction.

The vaccine is prepared by washing off the growth from glycerin agar and the formalin is added while the emulsion, which should be rather thick, is repeatedly shaken. The vaccine is incubated for 5 days at 37° C. It is then diluted until the density corresponds to ten million organisms per cubic centimetre. 0·5 per cent. carbolic acid is then added.

The dose is 20 cc. and six injections at intervals of ten days are recommended. If intervals of 15 days or more elapse anaphylactic symptoms may develop. [This method of vaccination would not appear to be suitable for use in this country.—ED.]

VAN SACEGHEM (R.). L'avortement épizootique des bovidés propagé par le chien. [**Bovine Epizootic Abortion spread by Dogs.**]—*Bull. Méd. du Katanga.* 1926. Dec. Vol. 3. No. 6. pp. 166–167.

In this brief note the author states that on some farms in the Belgian Congo he has noted abortion among dogs and cows simultaneously, and that serum from an aborted bitch caused agglutination of Bang's bacillus. No details are given.

SCHILLING (S. J.) & BLEECKER (W. L.). **An Investigation on the Production of** *B. abortus* **Aggressin.**—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 469–475.

The author found that the injection of a virulent strain of *B. abortus* into the peritoneal cavity of guineapigs resulted in the early death of the animals with an accumulation of purulent exudate in the cavity. The origin of the strain is not given.

Injections with exudate which, should it contain agressins, should hasten the development of infection in animals simultaneously inoculated with culture, failed to produce any such effect. Nor did injections of exudate confer any recognizable immunity.

FLEISCHHAUER (G.). Beitrag zur Züchtung der Abortus-Bang-Bazillen aus dem Tierkörper mittels verschiedener Methoden. [**The Cultivation of the Abortion Bacillus by Different Methods.**]—*Deut. Tierärzt. Woch.* 1927. Oct. 15. Vol. 35. No. 42. pp. 676–678.

The author has carried out comparative tests using Nowak's, Stafseth's, and Goerttler's methods in parallel, with a view to ascertaining whether any one was superior to the others, but it does not appear that he found any one of them more constantly successful than the others. He finds Goerttler's method disadvantageous on account of the time required to carry out the technique, and he does not find that the use of Petri dishes in this method offers any advantages over the tubes used in the others.

BÜCHLI (K.). Preventive Behandeling van Runderen tegen besmettelijk verwerpen, met levende, virulente culturen van abortus bacillen. [**The Protective Inoculation of Cattle against Contagious Abortion with Living Virulent Cultures of the Abortion Bacillus.**]—*Tijdsch. v. Diergeneesk.* 1927. Oct. 1. Vol. 54. No. 19. pp. 897–904.

The number of inoculations recorded by the author is too small to furnish evidence of much value.

He concludes that inoculation with living culture is free from danger. He states that abortion bacilli are passed out via the vagina by inoculated cows for a period of two weeks after they have been inoculated.

HUDDLESON (I. F.) & WINTER (O. B.). **Magnesium Ammonium Phosphate Crystals in Aerobic Cultures of** *Brucella abortus* **and** *Brucella melitensis.*—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 476–478.

The authors have observed the formation of crystals in a medium having the following composition: Beef liver infusion, bacto-peptone, sodium chloride, shredded agar, tap water and brom thymol blue indicator (reaction pH 6·6) when inoculated with *B. abortus* and *B. melitensis*. As growth at 37° C. takes place the pH figure rises, and at about 7·2 to 7·4 i.e., about the 4th day, crystals develop. If the tubes are sealed, or if 10 per cent. of the air is replaced by carbon dioxide there is little or no change in the pH of the medium. If the original pH of the medium lies between 6·8 and 7·4 the medium gradually becomes more acid under these conditions and no crystal formation occurs. If the tubes be unsealed or the carbon dioxide be removed the medium becomes alkaline and crystals form.

Crystals were removed for examination, but as they could not be obtained perfectly free from medium quantitative tests were not resorted to. Tests, chemical and optical, showed that the crystals were magnesium ammonium phosphate ($MgNH_4\ PO_4\ 6H_2O$).

CERRUTI (C.). **On the Relationship of** *M. melitensis* **and** *B. abortus.*—*Jl. Trop. Med. & Hyg.* 1927. Sept. 15. Vol. 30. No. 18. pp. 230–231.

With a view to helping to clear up the question of the relationship of these two organisms the author has carried out experiments between the two organisms with homologous agglutinins isolated in an indifferent medium, and he claims to have succeeded in "eliminating the interferences which may take place amongst the various compounds of the immune serum, and may alter the action of the agglutinating antibodies contained in it."

The sera were obtained from rabbits by inoculating them with killed organisms, with organisms attenuated by heat and chemicals, with living organisms, and also by inoculating with both organisms at the same time.

The technique used was Ogata's modification of that of Hahn and Trommsdorff.

The organisms agglutinated by their homologous sera are treated with 1 per cent. N caustic soda. The organisms agglutinated were washed with 10 per cent. saccharose to remove the immune serum. "To help the separation of the agglutinins the test tubes containing

the agglutinated organisms are kept in suspension in 10 per cent. saccharose solution containing 1 per cent. N alkali in an incubator at 42° C."

After 2 hours' incubation the tube is centrifuged and the agglutinating strength of the supernatant fluid is analysed, having taken care to neutralize and to bring the solution to 0·85 per cent. sodium chloride. Usually it is possible to isolate a percentage of 10 to 20 per cent. of agglutinins contained in the immune serum.

The author was not able to distinguish the organisms by using agglutinins so isolated.

VIDAL MUNNE (Jose). El aborto epizoótico y sus relaciones con la fiebre de Malta del hombre (Trabajo premiado por la Real Academia de Medicina y Cirugia de Barcelona). [**Contagious Abortion and its Relation to Undulant Fever in Man.**]—*Rev. Hig. y Sanidad Pecuarias.* 1927. Apr. Vol. 17. No. 4. pp. 265–281. [97 refs.]

This article is a review of the relations of *B. abortus* and *M. melitensis*, and thus consists chiefly of a summary of views put forward in the last few years. The author regards milk as a very important vehicle of infection with *B. abortus*, and states that the majority of cases of undulant fever in man where no caprine source can be found may be due to the contaminated milk of cows and, in a later section, that undulant fever is an enzootic which may affect animals and man; thirdly, that there is no valid method at present known of distinguishing the two organisms, the bacillus isolated by haemoculture from man or goats being designated *B. melitensis*, while, if isolated from the cow or other animal, it is called *B. abortus*.

From 90 cases whose sera agglutinated in a titre of over 1 : 200, the highest being 1 : 10,000, he found :—

| | |
|---|---|
| Sera agglutinating in equal titre *B. melitensis* and *B. abortus* ... ... ... ... | 41 or 45·5 per cent. |
| Sera agglutinating *B. melitensis* in higher dilution | 11 or 12·2 per cent. |
| Sera agglutinating *B. abortus* in higher dilution ... | 16 or 17·7 per cent. |
| Sera agglutinating *B. melitensis* only ... ... | 11 or 12·2 per cent. |
| Sera agglutinating *B. abortus* only ... ... | 11 or 12·2 per cent. |

He also examined the sera of 256 cows killed at the slaughter-house of Barcelona and found 35·15 per cent. which agglutinated " la brucella " [*B. melitensis*] in a dilution of over 1 : 200, a close approximation to the figures of STUART (*Trans. Roy. Soc. Trop. Med. & Hyg.* June, 1925), where 31·2 per cent. of 542 sera examined agglutinated the *B. abortus*.

He has repeated the experiments of VERCELLANA & ZANZUCCHI on non-specific agglutination, but thinks that this method is valueless for differentiation of the organisms. A good and fairly comprehensive bibliography is appended.*

GRÄUB (E.). Infektionen beim Menschen durch den Bazillus des infektiösen Abortus Bang. [**Two Cases of Infection in Man due to Bang's Bacillus.**]—*Schweiz. Arch. f. Tierheilk.* 1927. July. Vol. 69. No. 7. pp. 394–395.

The author states that two cases are known to him of a disease of a typhoid nature in which a definite diagnosis was not established, but the serum of the patients agglutinated Bang's bacillus in a 1 : 1,200 dilution. No details are given.

* Summarized by Dr. H. Harold Scott.

CHURCHMAN (J. W.). **The Structure of** *B. anthracis* **and the Reversal of the Gram Reaction.**—*Proc. Soc. Exp. Biol. & Med.* 1927. May. Vol. 24. No. 8. pp. 737–739.

The author finds that the addition of a loopful of 1 per cent. acriviolet or gentian violet to ½ cc. of a heavy acqueous suspension of *B. anthracis* causes the organism to become gram negative in a period ranging from 2 to 19 hours depending upon the strain. He gives indications to show that *B. anthracis* is in reality gram negative internally and gram positive externally. The ectoplasm is removed by the acriviolet. Gram-negative anthrax bacilli are always more slender than gram-positive ones.

DESCAZEAUX (J.). Controle des vaccins anticharbonneux. [**Control of Anti-Anthrax Vaccines.**]—*Rev. d' Hyg. et de Méd. Préventive.* 1927. Aug. Vol. 49. No. 8. pp. 601–610.

Anthrax is one of the greatest scourges of stock in South America, and particularly in Chili, and the only hope of combating it with any degree of success lies in annual vaccination. In consequence of this there is a very large sale for anthrax vaccines both of local and of foreign production.

The State Veterinary Research Service has to test the value and efficacy of all vaccines, sera and biological products used. It has the power to forbid the use of vaccines proved to be of no value or dangerous in use. Some other countries appear to have a similar service. The State Control covers the suitability of the method of dispensing the vaccines or sera, purity, virulence, and immunity produced. In connexion with the first of these the author gives a few details of the manner in which the various liquid, and pill-form vaccines are put up.

With regard to tests of purity, these aim at ascertaining whether the bacillus of anthrax is actually present, and whether any contaminations have gained access to the vaccine. This is done both by microscopic examination and by plate cultivation, and if necessary by animal inoculation. The virulence of vaccines is tested by inoculation, using mice, guineapigs and rabbits. There appears to be some evidence to show that the power possessed by a vaccine to confer immunity is not necessarily directly related to its virulence. This is perhaps not to be wondered at, because it must be borne in mind that some of the immunizing principles may be present in the culture medium as distinct from the organisms themselves. The best vaccines are certainly those which comprise whole cultures. They are superior to emulsions of spores.

The presence of contaminations sometimes leads to a marked reduction in virulence of the vaccine. Some vaccines containing *B. subtilis* are entirely avirulent.

The author details the method of testing the immunizing power of vaccines. The standardization of anti-anthrax serum presents some difficulty, and animal inoculation with graduated doses followed by a virulent inoculation is the only method at present available.

A tabular statement gives details of tests of 9 vaccines, while a second gives details of tests of sera.

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1926. Dec. Vol. 4. No. 4. pp. 580–583. Essais d'immunisation des moutons algériens contre la fièvre charbonneuse au moyen des vaccins pastoriens. [**Vaccination of Sheep in Algeria with Pasteurian Vaccine.**]

Experiments carried out on sheep confirm results obtained elsewhere indicating that the intradermal inoculation of a single dose of 0·2 cc. of Second Vaccine confers a high degree of immunity.

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1926. Dec. Vol. 4. No. 4. pp. 584–585. Immunisation anticharbonneuse de bovins français, croisés et indigènes par inoculation intradermique du 2e vaccin d'emblée. [**Anti-Anthrax Immunization of French Cattle, Cross Bred and Native Cattle by the Intradermal Path.**]

As the result of experiments it has been found that 0·4 cc. of Second Pasteur Vaccine injected intradermally protects all three types of animals.

MORRIS (H.) & RILEY (H. K.). **Growing Plants as Possible Carriers of Anthrax.**—*Louisiana Sta. Bull.* 196 (1926) pp. 4–16. Ex. *Exp. Station Record.* 1927. Feb. Vol. 56. No. 2. p. 173.

The authors found that under laboratory conditions anthrax spores were carried from artificially inoculated soil by germinating and growing plants, including corn, oats, rice and beans. A few tests also showed that spores were carried by Bermuda grass and bull grass. The spores were on the surface and not in the tissues of the plants, and washing plants with water for three consecutive days failed to remove the whole of the contamination from them.

VELU, BALOZET & BIGOT. Étude de l'immunisation contre le charbon symptomatique par la voie intradermique ou cutanée. [**Immunization against Black Quarter by the Intradermic or Cutaneous Path.**]—*Rec. Méd. Vét.* 1927. July 30. Vol. 103. No. 14. 284–288.

If the immunity produced by local immunization is a function of the receptivity of the tissue or organ, it is legitimate to put the hypothesis that no immunity can result when the tissue or organ is not receptive.

The authors have tested this view in experiments with black-quarter vaccine.

THEILER (A.) & ROBINSON (E. M.). Parabotulism des Equidés. [**Parabotulism in Equines.**]—*Rev. Gén. Méd. Vét.* 1927. Apr. 15. Vol. 36. No. 424. pp. 193–199.

The authors describe a condition which has come under their notice at times during the last ten years and which was thought to be a motor paralysis with cerebro-spinal meningitis. It occurred in horses and mules, but more usually in the latter, which were in daily work and were stabled. Mortality was high. As a rule the onset was sudden, and the disease disappeared within a few days of its appearance. Cases were recorded in the Transvaal, Orange River Colony, and the Cape. Outbreaks at Onderstepoort enabled the authors to investigate the condition.

The first outbreaks suggested that the disease was of a contagious nature, but experiments of various kinds furnished no positive evidence of this and the idea was discarded.

In only two cases did the injection of blood taken from mules dead of the disease produce infection, and in these death took place within 24 to 48 hours. These deaths were considered as accidental, but complete solution of the nature of the disease furnished an explanation for them.

As already mentioned, the disease appears as a motor paralysis and death occurs within 48 hours with symptoms of asphyxia. There is no elevation of temperature. In cases which survive recovery is exceedingly slow.

Post-mortem examination revealed no lesions which could be held responsible.

The organism held responsible by the authors is a specific one which they propose to call *Clostridium parabotulinum equi*. It is closely related to the organism which causes Lamziekte in cattle, and it is not distinctly related to *B. parabotulinus* (Seddon) and *Clostridium urciliae* (Bargsten).

The toxin is not found in all decomposing rat carcases. The authors have so far, with the exceptions of the original case, been able to detect it in the carcases of those which have actually ingested cultures. Similarly, horses which have eaten foodstuffs tainted with the carcases of rats have remained free.

When outbreaks occur among horses they are to be attributed to rats which are occasionally infected.

DACK (G. M.), STARIN (W. A.) & WERNER (Marie). **Growth of *Cl. botulinum* and *Cl. sporogenes* in Veal Infusion Broth under Reduced Pressure.**—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 525–532.

At air pressures of 4 cm. or less growth was regular and occurred in most cases in two or three days. At pressures above this it was irregular, and no growth at all was obtained at pressures greater than 16 cm., and there appeared to be no difference between spores and vegetative elements at reduced pressures. Toxin was not demonstrated in greater dilutions where 0·8 cm. pressure was used than when 5 cm. was employed. Oxygen pressures of 5 and 10 cm. prevented growth (period of observation 3 months). Carbon dioxide pressures up to 50 cm. did not inhibit growth in any way. Maximum development took place during the first day and toxin was at its greatest concentration by the 5th day.

HARE (T.) & GLYNN (E.). **Observations on Lamb Dysentery.**—*Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 473–502. With 1 fig. & 4 graphs.

This paper is largely concerned with statistical enquiries regarding the disease. The lesions are described and the etiology is discussed. Comparisons are drawn between this disease and melaena neonatorum. The authors do not agree with GAIGER'S findings that *B. welchii* (or an allied organism) and *B. coli* are causally connected with the disease.

IAKHNIS (B.). La prémunition des nouveau-nés par le B C G. [**The Protection of the Newly-Born with B. C. G.**]—*Ann. Inst. Pasteur.* 1927. Oct. Vol. 41. No. 10. pp. 1045–1062.

This paper deals entirely with the immunization of human beings. The vaccine was administered by the mouth in three doses of ·01 g. on the 3rd, 5th and 7th days after birth. Four hundred and four of 472 treated remained under observation. It is too early to judge results, but in no case did the administration of the vaccine cause any disturbance of health.

TURNER (A. W.) & DAVESNE (J.). Rôle du *B. oedematiens* dans l'étiologie de l'hépatite infectieuse nécrosante (Braxy) du mouton australien. [**The Part played by** *B. oedematiens* **in the Causation of Infectious Necrotic Hepatitis (Braxy) in Australian Sheep.**]—*Ann. Inst. Pasteur.* 1927. Oct. Vol. 41. No. 10. pp. 1078–1096. With 2 text figs.

The condition resembles the disease known in Great Britain as braxy, but it is apparently not identical with it. In order to avoid misunderstanding ALBISTON has suggested the name infectious necrotic hepatitis.

The condition is widespread in Australia, and its incidence varies in different parts. In New South Wales the majority of cases occur during the autumn, in Victoria from the end of the summer to the onset of the winter rains. The distribution of the disease varies locally. In some places certain farms are specially dangerous. Statistics regarding the extent to which the disease occurs cannot be collected with any pretence at accuracy, but it appears to be a fact that very young lambs are less frequently affected than those of nine months or more.

Symptoms are seldom observed, but they can be detected if a batch of lambs, comprising some sick ones are driven, as there is a marked tendency to lag behind on the part of those that are affected, and they are quite apathetic, offering no resistance to handling or examination. Death generally takes place within half-an-hour of an animal lying down. There is generally but little rise of temperature.

It is said that the best members of the flock are generally seized. On removing the skin the subcutaneous tissue is found to contain a pink jelly-like material which rapidly becomes dark in colour and the vessels are congested. The peritoneal cavity contains a variable amount of clear exudate. The spleen, kidneys and abomasum are slightly congested but one never finds oedema or necrosis of the mucous membrane of the fourth stomach. The mesenteric glands may be slightly inflamed, but the intestines themselves appear to be normal.

The liver is slightly enlarged, and of a dark red colour, and shows greyish white or dirty yellow areas of necrosis. These are firm, irregularly circular in outline, and range from ¾ to 5 centimetres in diameter.

In very exceptional cases no visible necrotic areas may be found.

Histological examination reveals a necrotic centre to the lesion surrounded by a zone showing marked cellular infiltration. The bacilli form a felted ring round the necrotic centre. A remarkable lesion is the presence of a variable amount (50 to 100 cc.) of clear lemon yellow exudate in the pericardium. This liquid readily coagulates. Ecchymoses may be found on the ventricle walls. The lungs are usually normal.

The authors have isolated a bacillus, the chief characters of which are as follows. The organism is variable in size, and in cultures may form short chains. The ends are rounded, and individual bacilli may be straight or curved. The cytoplasm rapidly becomes granular.

Although the authors have not been able to see any evidence of motility they have been able to demonstrate cilia. Spores are oval, subterminal and cause slight distension of the body. The bacillus is gram-positive, but shows two or three dark bands across it.

The authors found great difficulty in getting the organism to grow in artificial culture, but they eventually succeeded by growing it in shake cultures in nitrate or glucose agar. Details of the appearances of cultures in different media are described. Peptone liver broth appeared to be the best. In shake cultures in agar gas production occurs, and colonies of various kinds may be found: lenticular, budding, and filamentous.

In peptone water glucose, laevulose, lactose, saccharose, are attacked within 24 hours, and galactose in 3 days. Maltose, dulcite, mannite, glycerin and inulin are not attacked.

Very small doses (0·1 cc.) introduced intramuscularly or subcutaneously prove fatal to guineapigs in 16 to 24 hours. There is a subcutaneous oedema, which is non-putrid. There may be congestion of the stomach, spleen, and intestines. The kidneys, suprarenals and liver are always markedly congested and sometimes there are spots of necrosis under the capsule of the liver. These, however, are sterile. There may be an exudate in the pleural cavity, but it is not found in the pericardium.

Liver broth cultures yield a toxin which is fatal to the mouse in a dose of 1/200 cc. The toxin is markedly haemolytic, 0·1 cc. of culture haemolyses 0·4 cc. of a 1/20 suspension of sheep corpuscles. The toxin is completely destroyed by exposure for an hour to 60° C., but the haemolysin is not completely destroyed by the same exposure.

The authors give information regarding the neutralization by anti-oedematiens serum of cultures of Albiston's organism, but they do not appear to have tested this serum with the organism they have isolated themselves.

BRANCH (A.). **Spontaneous Infections in Guinea-Pigs. Pneumococcus, Friedländer Bacillus and Pseudotuberculosis** (*Eberthella caviae*).—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 533–548. With 3 text figs.

During the period February to June 1926 the author investigated the causes of death among a stock of some 400 guineapigs of which 114 died. 56 were infected with Friedländer's bacillus, 36 with pneumoccus, 5 with *B. bronchisepticus*, 3 with streptococcus, 3 with *Eberthella*. In the remainder the cause of death was not determined.

DACHENA (G.). Sulla diagnosi biologica delle setticemie emorragiche per cuti-scarificazione. [**The Diagnosis of Haemorrhagic Septicaemia by Cuti-Scarification.**]—*La Nuova Veterinaria.* 1927. Sept. 15. Vol. 5. No. 9. pp. 212–214.

KOULIKOFF (V.) & SMIRNOFF (P.). Nature physico-chimique de la toxine et de l'anatoxine diphtériques. [**The Physico-Chemical Nature of Diphtheria Toxin and Anatoxin.**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1166–1174. With 2 charts

## DISEASES DUE TO FILTERABLE VIRUSES.

NAINSOUTA (R.). Note sur la peste du cheval au Sénégal. [**Horse Sickness in Senegal.**]—*Rev. Gén. Méd. Vét.* 1927. Nov. 15. Vol. 36. No. 431. pp. 644–646.

The distribution of horse-sickness in Africa is far wider than was at one time thought, and it appears to be certain that the disease occurs in Senegal. Locally-bred equidae, although resistant to the disease, are of little value on account of their small size. Imported animals are almost certain to succumb. The problem therefore is to find some method of protective inoculation. The cavalry in Senegal are mounted for the most part on Algerian animals, and these pay a heavy tribute to the disease annually between October and January. French horses are even more susceptible. Sahal and Soudanese animals present a fair degree of resistance.

The author states that a good opportunity presented itself to investigate the subject when he was at St. Louis in 1923, but the authorities would not take the risks. He suggests that investigations should be carried out on the following lines :—

In the first place, attempts should be made to infect indigenous animals by intravenous inoculation. After they have recovered large doses of virulent blood should be given with a view to hyperimmunising them. Sero-vaccination should then be tried on susceptible races of horses beginning with the less susceptible and working up to the most susceptible (French) horses. A few experiments on these lines have been carried out.

Two native-bred animals were each given 5 cc. of blood from an Algerian horse which died of the disease two days later. Five days later they showed dullness, depression, rapid respiration, deep colouration of the mucous membranes, and rapid rise of temperature. There were no local manifestations of the disease. Recovery was complete in about 3 weeks.

Three weeks later these animals were again inoculated intravenously with 5 cc. of blood from an Algerian horse in the acute stage of the disease. Ten days later one of these was given 200 cc. of blood from a French mare which had died from a peracute attack. An Algerian horse which had recovered from a mild attack about a month previously was given 5 cc. of blood from the same mare. There were no reactions of any kind. It therefore appears to be justifiable to suppose that one attack immunizes.

Two Moorish horses were given 5 cc. of virulent blood subcutaneously, and one of them was also injected with 60 cc. of serum from one of the two country-bred horses originally inoculated. The other received no serum. The latter reacted on the 8th day, while in the case of the former the period of incubation was 11 days.

The disease was, however, of about equal severity in both animals. The hyperimmune serum was taken before any large dose of virulent blood had been given and it is suggested that prolongation of the hyperimmunization might furnish a more potent serum or that a larger dose might have been more effective.

OLITSKY (P. K.) & BOËZ (L.). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. III. Resistance to Chemicals.**—*Jl. Exp. Med.* 1927. May 1. Vol. 45. No. 5. pp. 815-831.

The authors publish experiments to show that the apparent resistance offered by the virus of foot-and-mouth disease to the action of alcohols of various strengths, acetone, etc., is in reality due to protection of the virus by coagulation of the proteins around them. While the virus survives in undiluted lymph to which alcohol is added, if it be first filtered to remove as much as possible of the protein and then subjected to the action of alcohol the latter is found to be responsible for death of the virus in 1 to 15 minutes, depending upon its concentration.

By adding alkali, in itself insufficient to kill the virus, but in amount sufficient to prevent coagulation of the protein on the addition of 60 per cent. alcohol, the virus was acted upon by the alcohol without any protective protein coagulum and was promptly killed.

Experiments showed that perchloride of mercury, cresol and compound cresol which cause coagulation of protein act in the same way as alcohol and the virus is protected by the coagula formed. On the other hand, 1 per cent. antiformin and 2 per cent. sodium hydrate which cause no coagulation are promptly fatal to the virus, more promptly indeed than they are to staphylococci.

OLITSKY (P. K.) & BOËZ (Louis). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. IV. Cultivation Experiments.**—*Jl. Exp. Med.* 1927. May 1. Vol. 45. No. 5. pp. 833–848.

Part of this paper is taken up with a discussion of the evidence brought forward to show that the virus is not a fluid virus, but actually particulate, nor of an inanimate nature. In their experiments they have not been able to get any evidence of success in cultivating the virus.

They find that the optimum pH is 7·5 to 7·6, a strict anaerobic atmosphere is favourable, and the temperature should be below 37° C. A semi-solid medium such as ¼ per cent. agar or 10 per cent. gelatin appears to be advantageous. The latter is the better of the two, it should be as pure as possible and the reaction should be adjusted with potassium hydroxide and not with buffer phosphate.

OLITSKY (P. K.). **Physical, Chemical, and Biological Studies on the Virus of Vesicular Stomatitis of Horses. Comparison with the Virus of Foot-and-Mouth Disease.**—*Jl. Exp. Med.* 1927. June 1. Vol. 45. No. 6. pp. 969–981.

There is evidence to show that the viruses of foot-and-mouth disease and vesicular stomatitis of horses resemble each other to some extent, but they are sharply distinguished by cross immunity tests and by their natural pathogenic range. But it must be remembered that there are strains of foot-and-mouth disease virus which are not mutually protective, and further there are some strains which will not infect guineapigs. In the absence of any method of cultivating filterable viruses available information is limited, but it must be concluded at any rate for the time being, that the viruses are very closely related.

Experiments regarding the effects of wave-length and energies of monochromatic ultra-violet light indicate the probability that the chemical nature of the virus approximates to that of bacteria.

PLANTUREUX (E.). Recherches sur la rage. Nouvelles méthodes de traitement antirabique. [**Rabies. New Methods of Treatment.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Dec. Vol. 4. No. 4. pp. 528–572.

Rabies is extremely wide-spread in Algeria, and in Algiers itself scarcely a week passes without cases in dogs and herbivora coming under notice.

The various methods of treatment employed for human beings bitten by rabid dogs are not applicable in veterinary practice because they involve too many injections, and the simpler methods hitherto tried have not yielded the results expected. The author has therefore carried out investigations with a view to finding some simple and efficacious method of protective inoculation.

The paper under consideration is divided into three sections. The first summarizes the principal methods already utilized, the second deals with research regarding systems of vaccination, and in the third the author gives results obtained from experiments designed to furnish a simple method of protective inoculation which can be applied to animals.

In the first part the author classifies the methods which have been employed as follows :—

I. Inoculations with normal virus—
   (*a*) intravenous injections ;
   (*b*) intraperitoneal injections ;
   (*c*) subcutaneous injections with fixed virus.
II. Inoculations with modified virus—
   (*a*) by passage through monkeys ;
   (*b*) by desiccation ;
   (*c*) by heat ;
   (*d*) by antiseptics, phenol, glycerin, and ether.
III. Serum-therapy, sero-vaccination, and mixtures of serum and virus.

The author points out that although there are to be advanced reasons for and against the treatment of rabid dogs, and according to French law all such dogs must be killed, there is nothing to prevent attempts to save herbivora.

The essential characters of a vaccine which is to be of service are :—

1. It must be reasonably cheap.
2. Few inoculations must suffice.
3. It must be capable of transmission to a distance from the laboratory.
4. It must be simple in application.

Rabies vaccines differ from vaccines in general in that they produce neither local nor general reactions. They are also peculiar in that they can be used during the period of incubation. In these cases it is really a matter of a race between the vaccine and the virus. In any case it is one of the essentials that treatment be begun as soon after the animal has been bitten as possible. Both PASTEUR and HÖGYES showed that the whole series of their vaccines could be injected in the course of a single day. The author considered that it might be possible

to inject a sufficiently large dose of fixed virus to ensure the rapid production of immunity if it were incorporated with a fatty medium to reduce the rate of absorption. Lanoline in conjunction with olive oil was tried, but had to be abandoned because of the frequent development of abscesses. It is also stated that intracerebral and intra-ocular inoculation appeared actually to make the animals more susceptible to infection. The oil was then replaced by 33 per cent. solutions of dextrin. Weaker concentrations did not always prevent the development of rabies, and stronger solutions tended to result in abscess formation. Emulsions in dextrin must be used at once, as they lose virulence rapidly, but this defect was overcome. In experiments with rabbits it was found that the dextrin-virus conferred some immunity if given before infection, but as a method of treating after infection it failed. Two injections given to dogs before infection conferred protection, as did also injections given after infection. Intra-ocular inoculation appeared to break the immunity down. The results of experiments with goats and sheep indicated either that these animals acquire immunity more readily than dogs or that the street virus used was less virulent for these species.

In one experiment comprising nine goats the results of vaccinating with dextrin virus after inoculation with street virus were favourable.

The harmlessness of the virus treated in this way must be thoroughly investigated before the method can be recommended, but in any case it is advised that three doses be given on the 1st, 3rd, and 5th or 6th days.

In seeking a method which could be employed by practitioners it was decided to use brains preserved in carbolized serum and dextrin solution. Since the dextrin appears to cause attenuation, these two could be sent out to practitioners separately with instructions regarding the mixing. The emulsion in carbolized serum was prepared by emulsifying one part of brain (preserved in glycerin for several days to kill contaminations) in 19 parts of a mixture containing 400 cc. of normal saline, 1 g. of carbolic acid and 200 cc. of horse serum. This forms the third vaccine, and is used for preparing a 1 per 1,000 dilution and a 1 per 150 dilution for the first and second vaccines respectively. Although the author looks upon the dextrin-virus as an advance on other methods he has in mind the production of a vaccine containing killed virus. This would be capable of preservation for long periods, would require no special technique for injection and would be the only vaccine standing any chance of being used in practice.

Formalin was tried as a means of killing the virus, but in no case using different concentrations of formalin were favourable results obtained when the mixture was incubated at 37° C. He had more favourable results when the 4 per 1,000 formalin solution was allowed to act for a week at room temperature. Dogs, sheep and goats were given 3 to 6 injections of doses ranging from 70 to 100 cc. with intervals of 1 to 4 days. In some of the experiments a vaccine which was nearly 7 weeks old was used with success.

GERLACH (F.). Die internationale Lyssakonferenz in Paris. [**The International Rabies Conference in Paris.**]—*Prag. Arch. f. Tiermed. und vergl. Path.* 1927. June 15. Vol. 7. Pt. B. No. 6. pp. 167–173.

The Conference was held in Paris from April 25th to 30th. Four committees were set up to consider the four questions : (*a*) The nature

of the virus; (*b*) the technique of protective inoculation; (*c*) post-vaccinal ill-effects; (*d*) vaccination of animals.

The committee was unable to express a view regarding the nature of the bodies demonstrated by LEVADITI and MANOUELIAN. The nature of Negri bodies is still a matter of uncertainty. Subcutaneous inoculation with fixed virus is generally harmless in man, but occasionally it causes infection. Attenuated viruses (either by phenol or ether) are more generally employed.

Exact explanation of the paralytic symptoms sometimes following anti-rabic treatment could not be furnished. These symptoms less frequently follow the use of carbolized or glycerined virus.

There was no agreement as to whether antirabic treatment should be compulsory, but the majority were of the opinion that it should be compulsory where infective saliva has gained access to a mucous membrane.

It was recommended that the question of the plurality of street viruses should be investigated. It was suggested that Institutes should from time to time submit their viruses to a particular Institute for comparative examination. At all Institutes certain particulars should be noted in every instance. In particular detailed descriptions should be kept of all cases of paralysis.

With regard to the immunization of animals and particularly of dogs the Commission recommended that investigations be prosecuted. The vaccine should be a virus which was not pathogenic for the dog by subcutaneous or intramuscular inoculation. The inoculation should be repeated annually and in the first instance should be carried out at a recognized Institute.

With regard to other species. Vaccination of the other domesticated animals should only be carried out in districts where the disease is of frequent occurrence. Inoculation should not be practised unless it can be done within 4 days of an animal being bitten, or at the very latest 10 days.

KASAI (H.). **An Additional Study of Caprina, the Prophylactic Vaccine for Sheep-Pox.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Sept. Vol. 6. No. 3. pp. 271–272. [Author's English Abstract.]

1. The passage of the sheep-pox virus was made through goats in 15 successive cutaneous inoculations with almost similar eruptions in every generation and we found neither gradual increase of the virulence against the goat as recorded by Konew nor gradual decrease of virulence, as the author found to be the case when cow-pox virus was passed through sheep.

2. Animals used for the passage of sheep-pox maintain perfect immunity against the introduced virus and remain refractory to revaccination with sheep-pox, but they are susceptible to cow-pox virus. Caprinized sheep-pox virus produces typical eruptions in normal sheep, but no reaction is observed with sheep previously immunized against sheep-pox. The sheep-pox virus seems, therefore, to be stable with its immunogenic property even after caprinization inoculating cutaneously through many goats.

3. The sheep-pox virus passed through goats by cutaneous inoculation shows a remarkable decrease of virulence for the sheep, i.e., it produces no lesions by any path of inoculation, and passage through the sheep does not exalt the virulence again.

BLANC (G.), MELANIDI (C.) & STYLIANOPOULO (M.). La variole des chèvres en Grèce. [**Variola of the Goat in Greece.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 583–587. With 2 text figs.

Variola of the goat appears to have made its first appearance in Greece during the war.

Rare isolated cases were recognized in a number of places in November 1926, but after this it became epizootic in character.

Only goats were attacked, although these grazed alongside sheep.

It generally takes from three to five months for an outbreak to work itself out in a herd, and the mortality is from 5 to 15 per cent. of the animals attacked.

The period of incubation is 2–3 days, and it is marked by fever, loss of appetite, and dullness.

The eruptive stage of the disease is characterized by the appearance of red patches, which are of course most easily seen on hairless parts. These become papules, which in turn, by a process of thickening, become hard dermal nodules as large as nuts, which are painful on pressure. Friction readily removes the surface of these, leaving weeping sores which become covered with yellow crusts which subsequently turn black. In some cases lesions developed in the nasal cavities, larynx and trachea, but lesions have not been observed in the buccal cavity. In a good many cases unilateral or bilateral specific keratitis occurs. When death occurs it is almost always due to pulmonary complications.

The skin lesions run their course in about three weeks and leave characteristic scars.

The evidence so far obtained from observation and from a small number of experiments indicates that the disease is transmissible to neither man nor the sheep.

LEWIS (Margaret A.) & ANDERVONT (Howard B.). **The Adsorption of Certain Viruses by means of Particulate Substances.**—*Amer. Jl. Hyg.* 1927. July. Vol. 7. No. 4. pp. 505–513.

Vaccine virus, in dilutions of 1–100, was adsorbed by means of carmine, baked kieselguhr, kaolin, and charcoal. It was inactivated by carmine, baked kieselguhr and kaolin when these substances were added in amounts greater than 10 per cent. It was inactivated by kaolin in amounts greater than 2·5 per cent. India ink sometimes inactivated the virus in amounts of 5 and 2·5 per cent. and always in amounts of 50 and 75 per cent. Fowl-pox virus was adsorbed by 20 to 50 per cent. of baked kieselguhr, by 20 per cent. of kaolin, and 20 per cent. wood charcoal. It was inactivated by 75 per cent. India ink, 50 per cent. baked kieselguhr and 20 per cent. kaolin.

Chicken tumour virus was not adsorbed (save in one instance) by kieselguhr, kaolin, or India ink. It was adsorbed and inactivated by carmine when more than 1·25 per cent. of carmine powder was added to a 1–10 per cent. extract of tumour.

KELSER (R. A.). **A New Vaccine for Rinderpest Immunization.**—*Milit. Surgeon.* 1927. July. Vol. 61. No. 1. pp. 31–33.

The author first refers briefly to Boynton's vaccine—a heated, glycerinized and phenolized mixture of blood and finely ground tissues

taken from animals in the acute stages of the disease. This has to be kept in a refrigerator for two to three months before it can be used with safety, but thereafter it must be used within a short period or it loses its potency. This vaccine, apart from the disadvantages attaching to its nature and method of preparation, is said to have been found to possess considerable merits.

"The Research Board has shown that the blood entering into the preparation of Boynton's vaccine is of no value as an immunizing agent. Thus, the active portion of the vaccine is diluted with a substance which, because of its nature, detracts very materially from the keeping qualities of the vaccine which is not a sterile product. The high glycerin content further dilutes the product 33⅓ per cent.

"As a result of research work conducted by the Medical Department Research Board, working in co-operation with the Insular Bureau of Agriculture, a new vaccine has been prepared which overcomes the shortcomings of the Boynton product."

Susceptible cattle are inoculated with 2–10 cc. of fresh citrated blood taken at the height of reaction. When the thermal reaction begins to subside the animals are bled to death and the spleen, liver, kidneys, testicles and various glands [apparently lymphatic glands are referred to] are removed with aseptic precautions and placed in sterile covered retainers. The mesenteric glands are not taken, as they are frequently found to contain pathogenic sporulating organisms.

The fat and fascia are trimmed from the organs which are then placed in 5 per cent. phenol solution for 15 minutes. They are then rinsed in two changes of sterile water.

The tissues are cut in pieces of suitable size to put through a large sterilized food chopper, the ground material being collected in a sterile container as it comes through the machine. This ground tissue is then carefully covered to prevent contamination and placed in an ice-box (at 2° C.) till the following day. After thus standing the tissue grinds better.

This minced meat is then reground in a special grinder, which will so reduce it that it can readily be worked through a forty-mesh sieve. The tissues are put through this machine 6 times. Sterile salt solution is added in the proportion of 1 cc. per gram. This has added to it ·75 per cent. chloroform and it is thoroughly shaken. The stoppered bottles are then dipped in 10 per cent. liquor cresolis compositus and placed in the refrigerator.

The tissue must be very finely ground up so that the chloroform may kill the virus within a few hours, but it is not detrimental to the immunizing constituent of the vaccine.

In most of the experiments the author states that the vaccine has been used within 24 hours of preparation.

The dose is 20 cc. and three doses are given at intervals of a week. The test animals have been infected (sic) with 2 cc. of virulent blood a fortnight after the third dose. Such tests are said to have demonstrated that the animals are fully immune.

It is suggested that it may be possible to reduce the dose and the number of doses.

A full report is promised.

In a footnote to this paper the Surgeon General U.S. Army disclaims responsibility for the opinions expressed and the conclusions reached.

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## MISCELLANEOUS.

KLUKHINE (E.). Du rôle de la peau dans la production des anticorps, de l'anaphylaxie et de l'antianaphylaxie. [**The Part played by the Skin in the Production of Antibodies, Anaphylaxis and Antianaphylaxis.**]—*Ann. Inst. Pasteur.* 1927. Oct. Vol. 41. No. 10. pp. 1108–1113.

The author sets out to answer two questions. Under what conditions are heterologous proteins absorbed by the skin? Under what conditions may such absorption cause an anaphylactic shock?

By applying sheep corpuscles or an ointment of lanoline containing killed Eberth's bacillus the author found by serological tests that the antibody production was in proportion to the alterations occurring in the skin as a result of the shaving of the area treated. Where no visible alteration occurred the absorption was unrecognizable. In a second series of experiments various antigens such as horse serum, dead cultures, etc., were applied to the skin, and then sensitization was tested by inoculation. Only in the case of horse serum did the test inoculation produce shock, and then the shock was in proportion to the alterations occurring as a result of the shaving of the skin.

Animals sensitized to horse serum by parenteral injection do not exhibit symptoms of shock when antigen is applied to shaved skin.

Sensitized guineapigs can be vaccinated antianaphylactically by application of the protein to the skin.

NIIMI (K.). **Experimental Studies on Osteomalacia in the Horse. First Report. Etiological Significance of Calcium Deficiency in the Diet. Part. I.**—*Jl. Jap. Vet. Sci.* 1927. Sept. Vol. 6. No. 3. pp. 273–283.

Two horses were fed upon barley, which the author finds to be very deficient in calcium, and after about 5 months symptoms of osteomalacia developed.

The symptoms were licking, gastro-intestinal catarrh, and loss of appetite. There was gradual loss of condition, and the bones, particularly those of the face, became slightly swollen. There was evidence of pain in the bones. Neutrophil polynuclear leucocytes increased in numbers, and there appeared at first an increase in the basophil leucocytes. The amount of urine was increased in both animals, and it had an acid reaction. As the animals lost condition the amount of phosphorus pentoxide present in the urine increased.

On post-mortem examination complicated phenomena of resolution, absorption, new formation, and proliferation of bone tissue were observed in the spongy calcareous trabeculae of the ribs.

BOURBON & CHOLLET. Accidents de photosensibilisation chez le mouton à la suite d'administration d'extrait éthéré de fougère mâle. [**Photo-Sensitization in Sheep resulting from the Administration of Ethereal Extract of Male Fern.**]—*Rec. Méd. Vét.* 1927. Sept. 15. Vol. 103. No. 16. pp. 530–532.

The flock was treated with 5 grammes daily mixed with edible oil. The first day was cloudy, but the second sunny. Two hours after

dosing had begun the shepherd noticed that some of the animals had swollen heads. This was very pronounced in some cases. Manipulation showed that the swelling was doughy.

The animals recovered when housed, and no further symptoms were observed during the following week, while the treatment was continued, but the animals were kept indoors. There was no evidence to suggest that any plants ingested had caused the photosensitization.

DICKINSON (C. G.). **King Island "Coasty" Disease.**—*Aust. Vet. Jl.* 1927. Sept. Vol. 3. No. 3. pp. 82-85.

There are grounds for thinking that "Coastiness" or "Coasty" disease of King Island is similar to, if not identical with, the "bush sickness" which occurs on the pumice lands in New Zealand (Rotura District).

"The symptoms are those of a progressive anaemia—lachrymation, scouring, wasting, dry harsh coat, etc."

The disease makes its appearance in cattle which have been grazed for about 6 months on the land running along the west side of the Island. This land is separated in some places from sound country—grazing on which cures the disease—by a road or a fence only.

Comparative analyses of "coasty" and "sound" soil reveals a remarkable deficiency of iron in the former. Sound soil contains 5 to 7 times as much oxide of iron and alumina. Further, a high percentage of alkaline carbonates in the coasty soil probably renders the iron still less available.

Points of similarity between "Coasty" Disease and "Bush Sickness" are as follows:—

(1) In both cases there are symptoms of progressive anaemia. (2) Diseased cattle may be cured by grazing on "sound" country. In King Island there is grazing ground which will neither cause nor cure "Coasty" Disease. This is classed as "semi-ground." (3) In both cases cured cattle do not, although cured, improve in general condition until grazed again on "coasty" or "bush" grazing. (4) In both cases the soils of affected runs are of a loose, non-binding nature. (5) It requires about 12 months to produce the symptoms in "bush" disease, but the symptoms of "Coasty" disease usually develop in about 6 months. In experiments in New Zealand the dressing of the land with carbonate of lime decreased the period requisite for the development of symptoms. In other words, this addition caused the New Zealand soil to approximate more closely in composition to that of King Island.

On King Island the practice is to graze the animals for a few months at a time in the coasty and sound country alternately, finishing them off on the coasty soil. This country, although it produces the disease, also has the best grazing.

With dairying cattle the problem is more complicated.

It was decided to try a treatment used in New Zealand, namely, to provide a lick of iron ammonium citrate 2 ounces to 4 lbs. of brown sugar. Brown sugar masks the bitter taste of the iron.

In an experiment in which four calves were used the results indicated that this lick would prevent the disease and also would cure it. In a second experiment the amount of lick actually necessary was controlled

—the lick having been given regardless of cost in the first. The results obtained indicated that it will probably cost less to supply the drug and sugar than to send animals away to sound land.

It is also suggested that in the case of dairy herds it may be possible to administer the salt in the drinking water.

JONES (F. S.) & LITTLE (R. B.). **An Infectious Granular Vaginitis of Cows.**—*Jl. Exp. Med.* 1927. Mar. 1. Vol. 45. No. 3. pp. 519–528.

This condition is stated to be one of the common diseases of cows in the United States. It is described as an acute inflammation of the vaginal mucous membrane and terminating in the formation of raised red nodules.

The cases, to the number of over 100, were encountered in the course of an epidemic of the disease in a herd which lasted from November 1925 to February 1926. Sporadic cases were seen subsequently. The vulva was swollen and tender, and the mucous membrane was congested and sprinkled with tiny indistinct greyish white areas which coalesced to form plaques of greyish or yellowish white exudate. When this was forcibly removed a greyish red surface was exposed. In some cases there was mucopurulent exudate, and when the " exudate sloughed " a granulating surface was exposed. Round red nodules 1–2 mm. in diameter appeared in the mucous membrane.

There was no evidence of disease elsewhere and the general health of the animals remained normal. The yield of milk was unaltered.

By staining smears of exudate with giemsa or with dilute fuchsin it was found possible to demonstrate a considerable number of minute bacilli with polar granules.

Cultures on ordinary media failed to develop this organism, but cultures were obtained upon blood agar. For the first few generations growth was limited to the condensation liquid. In later cultures the bacilli are longer and stain more deeply than those found in the smears or in earlier cultures. Later generations will grow in the condensation of plain agar containing sterile animal tissue. A number of sugars were tested but no fermentation was observed. Milk is not altered in appearance, but it is not stated whether growth actually takes place in this medium.

Rabbits weighing 2 kg. withstand 2 cc. of blood broth culture injected intravenously, and 0·5 cc. injected intraperitoneally into guinea-pigs causes no disturbance of health. 2 cc. produces a peritonitis which is fatal in 24 hours. At death the organism can be cultivated from the blood.

Acute inflammation resulted from the introduction of culture into the vagina of heifers with the subsequent production of " granules."

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CORDIER. Le pH Sanguin. [**The pH of the Blood.**]—*Rec. Méd. Vét.* 1927. Aug. 15. Vol. 103. No. 15. pp. 467–479 (to be continued).

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## REVIEWS AND NOTICES.

LEESE (A. S.) [M.R.C.V.S., Captain Late R.A.V.C., Camel Specialist to the Govt. of India, 1907 to 1913, etc.] **A Treatise on the One-Humped Camel in Health and in Disease.**—382 pp. With 20 plates, 3 charts & 9 figs. 1927. Stamford, Lincolnshire: Haynes & Son, Maiden Lane. [16s.]

All interested in the camel owe a deep debt of gratitude to Captain Leese for the publication of this book which is the fullest and most up-to-date general treatise ever published on the subject. As the author states in the preface, the book is not primarily written for the scientist, although it is unlikely that any one exists who could not learn a great deal from a perusal of its pages. The language employed throughout is such as to be understood by non-professional men dealing with camels, and the author goes to great pains in explaining technical details in a simple, straightforward manner.

The book comprises 36 chapters and 382 pages, and is divided into two parts, the first of which deals with the history, anatomy, breeds; management, both under civil and military conditions; breeding, watering, feeding and other matters. In a work so full of detail and sound common sense, it is difficult to stress any special part, but we would like to draw attention to the chapters on feeding and pack work, which if carefully studied and adhered to, will prevent untold losses to owners and suffering to camels.

The second part deals with more strictly veterinary subjects, and the author describes in detail the chief surgical diseases met with in camel practice and his method of dealing with them. The chapter on Trypanosomiasis is a comprehensive résumé of all recent work on the subject, and the author considers that there are at most probably only two distinct types of trypanosome affecting the camel, and holds that the differences described by some workers whereby several species have been named, are more apparent than real. Under this head he describes symptoms, methods of diagnosis, staining of blood films and treatment of affected camels in great detail, but it would appear to me that he puts rather too much faith on the ability of the layman to diagnose the condition. I refer to the following: where in dealing with anthrax he says, "If a camel dies suddenly without obvious cause, its blood should be examined for trypanosomes; and, if none are found, and both plant-poisoning and snake-bite can be eliminated, a smear of blood should be taken and sent for examination to the nearest veterinary surgeon." The other specific contagious diseases are dealt with in a special chapter. I am fully in accord with Captain Leese in questioning the occurrence of cattle plague and foot-and-mouth disease in the camel, although various authors have considered it to be susceptible. All known parasites, internal and external, are dealt with and the book concludes with chapters on poisonous plants and the examination of camels for soundness.

The author quotes freely from other authorities, but the bulk of the subject matter is the fruit of his experience and personal observations, and he holds very decided opinions on many points. Captain Leese has chiefly studied the camel in India; thus Indian conditions are dealt with most fully, but he has also worked and travelled extensively in other camel countries and gives us a general survey of the one-humped camel wherever found. In describing the camels of Arabia and the Sudan, the author makes no mention of the "wasms" or tribal brands by which camels bred by different tribes are marked, and on which the greatest importance is placed by Arabs, nor under surgical diseases, does he mention the occurrence of stringhalt or that troublesome condition of popliteal abscess, the results of which frequently cause so much difficulty in "barracking." The use of chloral

hydrate as an intravenous injection for producing anaesthesia, which was extensively used during the war, is not alluded to, but these are, however, but small omissions and the general opinion of the reader must be that Captain Leese is the master, both of his subject, and of the art of expounding it to others. Although other camel experts may not agree with all the opinions expressed, the author gives a good reason for his statements.

There are 20 original plates, exceedingly well reproduced, the paper used is good, but it is unfortunate in my opinion that the print of the book is so small as to be somewhat trying to the eyes of the reader. Captain Leese, however, explains that this is unavoidable as it was essential to reduce the bulk of the book so as to render it more serviceable to the camel-master who is usually "on the move." A good index and a glossary of vernacular terms are included. The book must be obtained direct from the author, c/o the Publisher, and we would call attention to the very moderate price making it available to everyone dealing with the camel, for without it his equipment cannot now be complete.

D. S. Rabagliati.

KNOWLES (Robert). [B.A. (Cantab.), M.R.C.S., L.R.C.P., Lt.-Col., Indian Medical Service, Fellow of the Asiatic Society of Bengal, Professor of Protozoology. Calcutta School of Tropical Medicine.] **An Introduction to Medical Protozoology with Chapters on the Spirochaetes and on Laboratory Methods.**—pp. xii+887. With 174 text figs. and 15 coloured plates. 1928. Calcutta: Thacker, Spink & Co. [Rs. 25.]

Like many others, as indeed he says in his preface, the author of this volume found that the absence of a suitable text-book in English was one of his chief difficulties when he began teaching medical protozoology to post-graduate students at the Calcutta School of Tropical Medicine in 1921, and the present volume is intended to obviate that difficulty.

The author regrets that so little of the volume is original and so much of it is, as he tersely describes it, 'loot,' but it may be said that the looting has been done with skill and discrimination. All the books dealing with medical protozoology have been utilized in the compilation of the volume, and the result is a very practical book. WENYON'S "Protozoology" is the greatest contributor by far.

The book is divided into three parts, namely, Part I, Lectures on Protozoology; Part II, Laboratory methods; and Part III, References to Literature.

The first part covers some 600 pages, and its contents are divided into 19 lectures. The author in his last three lectures goes outside the bounds of strict protozoology and deals with the spirochaetes, spirilla, trepone-mata, rickettsia bodies, the chlamydozoa, and finally adds some notes on rabies.

The volume has been put together within the incredibly short space of nine months, but it shows little or no evidence of rapid preparation. No doubt the large contributions made to it by the works of other authors materially assisted in shortening the period required for the production of the volume. An occasional slip catches the eye here and there. For example, on Plate IX, facing page 218, the figures referring to figs. 2 and 3 appear to have been reversed. In Plate X the reference letters F and H would appear to have been transposed, the figure 9 is missing from the page number on page 339, and on page 344 there is a misprint in the spelling of *Lynchia maura*.

The volume is clearly printed and profusely illustrated with line drawings, half-tone blocks, and coloured plates, taken as the author states very largely from other works.

It is perhaps to be regretted that so large a book should be bound in covers which appear to be scarcely robust enough.

The publishers request that mention may be made of the fact that copies of the work can be obtained from Messrs. W. Thacker & Co., 2, Creed Lane, E.C.4.

The price of the book in England is £2 1s. 8d., and in India it is Rs. 25.

A. L. Sheather.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 16.] June 1, 1928. [No. 2.

## DISEASES DUE TO PROTOZOAN PARASITES.

NIESCHULZ (O.). Ueber die Möglichkeit biologischer Surrabekämpfung. Zoologische Beiträge zum Surraproblem Nr. XIII. [**The Possibility of the Biological Control of Surra. Zoological Contribution to the Surra Problem. No. XIII.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* Vol. 26. (Series D. Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 380–385. [From a reprint.]

The introduction of Bayer 205 has rendered possible a reduction in the outbreaks of surra among horses, but the eradication of the disease is still a problem on account of the presence of infected cattle and buffaloes which are clinically healthy.

Nieschulz, during a tour of Java and Sumatra, considered the possibility of tackling the problem on biological lines.

In the first part of this brief paper the author summarizes our knowledge regarding the transmitting agents of surra, and concludes that the place of prime importance must be given to the Tabanidae, although it must be admitted that other insects play some part.

An attack upon the problem from a biological basis must therefore be aimed at destruction of Tabanidae.

In the second part of the paper the possibilities of achieving this in our present state of knowledge are touched upon. The Tabanidae are susceptible to attack in various stages of development, but it is admitted at once that attack upon the adult fly is out of the question altogether. So far, no one has been able to devise any practical and economical means of protecting animals against the bites of flies. In Java at least it is not practicable to paraffin the drinking places, nor can fly lime be spread on trees with any certainty of effect.

The natural enemies of the Tabanidae play a very small part in their destruction.

It is not practicable to collect the egg packets. Infection of eggs with Phanurus plays some part in their destruction, but in nature there appears to be a balance struck between the eggs and the parasite.

Generally speaking, so far as our present knowledge goes there is no biological method of attacking the problem of surra.

(K 3478) Wt P20/262 700 6/28 H & Sp Gp 52 4

NIESCHULZ (O.) & PONTO (S. A. S.). Zoölogische bijdragen tot het surraprobleem. XVIII. Over meervoudige infecties met *Tabanus striatus* Fabr. [**The Transmission of Surra by** *Tabanus striatus* **Fabr.**]— *Veeartsenijkundige Mededeeling No. 63. Dept. van Landbouw, Nijverheid en Handel.-Ned.-Indië.* 8 pp. 1927. Archipel Drukkerij-Buitenzorg.

Infected horses were used for the feeding of the flies, and guineapigs were used as test animals.

Flies were allowed to feed for 1 to 3 minutes, and they were then transferred to guineapigs. After a few seconds they began to feed. At the end of 45 seconds to a minute the feeding was interrupted again, and the flies were transferred to fresh guinea-pigs. Feeding was resumed within 7 seconds, and after 45 seconds to one minute feeding was again interrupted and the flies were transferred to a third lot of guineapigs.

In the first experiment 20 flies fed on the first guineapig, 14 on the second and on the third. Only the first two became infected.

In the second experiment 30 flies fed on the first, 18 on the second, and 12 on the third guineapig. All three became infected.

In the third test 30 flies fed on the first, 24 on the second and 17 on the third guineapig. All became infected.

In the fourth and last experiment the numbers of flies feeding on the three guineapigs were 20, 16 and 11. The first and third became infected.

NIESCHULZ (O.). Zoölogische bijdragen tot het surraprobleem. XIX. Overbrengingsproeven met Stomoxys, Lyperosia, Musca en Stegomyia. [**Experiments in the Transmission of Surra with Stomoxys, Lyperosia, Musca, and Stegomyia.**]— *Veeartsenijkundige Mededeeling No. 64. Dept. van Landbouw, Nijverheid en Handel.-Ned.-Indië.* 20 pp. 1927. Archipel Drukkerij-Buitenzorg.

The species of flies used in these experiments were *Stomoxys calcitrans*, *Lyperosia exigua*, *Musca inferior* and *Musca crassirostris* (belonging to the Philaematomyia group) and *Aëdes* (*Stegomyia*) *albopictus*.

Wild flies were used after they had been starved for ½ day to 1 day.

Native horses infected with trypanosomes which had not been passed through experimental animals were used for infective meals, and horses were used as test animals. 250 *Stomoxys calcitrans* were fed for 3 to 5 minutes, and after an interval of 10 to 60 seconds were fed for 2 to 7 minutes on a healthy animal. In a second experiment 250 flies were fed for 3 to 3½ minutes on an infected horse, and then after an interval of 19 to 90 seconds were transferred to a healthy animal, where they fed for 3 to 6 minutes.

The result in both cases was negative.

One hundred *Lyperosia exigua* were fed for 5 to 7 minutes on an infected horse, and after an interruption of 10 seconds to 2 minutes the flies were allowed to feed for 3 to 9 minutes on a healthy horse. The result was negative. An experiment in which 40 *Musca inferior* were fed for 7–8 minutes, and after an interval of ½ to 2 minutes on a healthy horse for 4 to 11 minutes yielded a negative retult. A second parallel experiment also had a negative result.

No transmission followed an experiment in which 40 *Musca crassirostris* were used in a similar manner.

Two experiments with *Aëdes* (*Stegomyia*) *albopictus* failed.

AKAZAWA (S.), ITO (Sadataka) & KASAI (Katuya). **The Vacillation of the Wassermann and Sachs-Georgi Reaction in the Experimental Trypanosomiasis of Animals.**—*Jl. Jap. Soc. Vet. Sci.* 1928. Jan. Vol. 7. No. 1. pp. 83–85.

Horses, cattle and rabbits were inoculated with a trypanosome isolated from a water-buffalo in Formosa, which the authors believe is probably identical with *T. evansi*. The blood was tested weekly by the Wassermann and Sachs-Georgi methods. The two tests were found to give practically parallel results.

Complement-fixation tests generally give positive results about 10 weeks after inoculation. Variations in the complement-fixation occur during the course of the disease.

The Sachs-Georgi reaction appears far earlier after infection (about one week), and persists for a greater length of time. Some variations in degree are observed.

VAN DEN BRANDEN (F.), CLÉVERS (Mlle.) & MOREELS (M.). Essai de traitement de la trypanosomiase humaine et des infections animales à *T. congolense* par le " 2754 " Hoechst. [**Treatment of Human Trypanosomiasis and of** *T. congolense* **Infected Animals with " 2754 " Hoechst.**—*Bull. Soc. Path. Exot.* 1927. Oct. 12. Vol. 20. No. 8. pp. 734–737.

" 2754 " is a compound of pentavalent arsenic and contains 27·2 per cent. of arsenic. For the treatment of human trypanosomiasis it is put up in ampoules containing 1, 2 or 3 g. and for animals 8, 10 and 12 g.

Two mules infected with *T. congolense* have been treated.

Case I. On June 10th 1927 the blood was found to contain large numbers of trypanosomes. 8 grammes of the drug were dissolved in 50 cc. of distilled water and injected subcutaneously. On June 14th trypanosomes were still present and the injection was repeated. Three days later the mule had convulsions accompanied by haematemesis and dyspnoea. Trypanosomes were present in large numbers all the time. The animal died the following day.

The second case had a parallel history, but no symptoms followed the injections. Trypanosomes persisted throughout. Subsequently, treatment with Naganol was resorted to.

JAKIMOFF. Ueber die prophylactische Anwendung von Naganol (Bayer 205) bei Kamel-Trypanosomiasis im Ural-Gouvernement. [**The Prophylactic Use of Naganol in Camel Trypanosomiasis in the Ural.**]—*Therapeutische Monatshefte.* 1927. Dec. Vol. 1. No. 6. pp. 189–194.

The campaign against camel trypanosomiasis in the Ural began in 1923. The average mortality amounts to about 25 per cent., but in some places it is as high as 40 per cent.

The principal centres of disease were along the Ural River down to the Caspian, but later the disease made its appearance at widely

distributed centres. The disease has only been known among camels during recent years, and it was probably introduced by the purchase of diseased animals from other parts of the country. An attempt to control the disease by Naganol failed. The author gives two reasons for this failure, namely, that all diseased animals could not be removed during the fly season, and because relapses occurred among camels which had not received sufficiently large doses.

A number of experiments were carried out with a view to testing the prophylactic properties of Naganol, and it was found that doses of 5 to 10 cc. of 15 per cent. solution protected for three months.

KUHN (P.). Ueber die Wirkung von Salvarsan im Futter Durine-infizierter Mäuse. [**The Action of Salvarsan in the Food of Dourine Infected Mice.**]—*Abhandl. a. d. Gebiet d. Auslandskunde. Hamburg. Univ.* Vol. 26. (Series D. Med. & Vet. Vol. 2.) [Festschrift NOCHT.] pp. 256–267.

Although it has been very generally held that salvarsan when administered by the mouth is without effect, results have been obtained which appear to indicate that the contrary is the case. Further investigation is still necessary, but the results so far obtained warrant publication.

The bulk of the paper is made up of tabular statements showing the various experiments carried out. Rats which were inoculated with Dourine and were fed daily for 5 days on bread soaked in a solution of neo-salvarsan containing one milligramme failed to become infected. In the second experiment only half-a-milligramme was administered. This experiment was interrupted, but some of the mice developed fatal trypanosomiasis. Similar results were obtained when the dose was 0·25 mg.

With old salvarsan given in doses of 1 mg. some of the mice became infected and some escaped infection. Similarly, with doses of 0·5 and 0·25 mg. of old salvarsan. In the latter case all the mice became infected.

The experiments were controlled.

Experiments were also carried out in which the drug was not given until the day after inoculation. To some neo-salvarsan was given and to others old salvarsan. The majority of the mice became infected.

A single dose of 1 mg. of either neo-salvarsan or old salvarsan failed to protect any of the mice when given on the day of inoculation.

PARROT (L.) & DONATIEN (A.). Le parasite du bouton d'Orient chez le phlébotome. Infection naturelle et infection expérimentale de *Phlebotomus papatasi* (Scop.). [**The Organism of Oriental Sore in Phlebotomus. Natural and Artificial Infection of** *P. papatasii.*]—*Arch. Inst. Pasteur d'Algérie.* 1927. Mar. Vol. 5. No. 1. pp. 9–21. With 4 plates.

Of 181 female *Phl. papatasii* examined only one was found to contain flagellates in the stomach. Here they occurred in hundreds. Observations in Africa and in Palestine show that the percentage of infected flies is less than 0·1.

The experimental infections of the flies were carried out by allowing them to feed upon lesions of the tail of white mice. The mice were enclosed in fly-proof cages so that only the tails were available to the flies.

GILBERT (S. J.). **A Note on the Experimental Transmission of Theileriosis (Egyptian Fever).**—*Jl. Comp. Path. & Therap.* 1927. Dec. Vol. 40. No. 4. pp. 293–298.

The author briefly summarizes the literature regarding the occurrence of infections due to Theileria in the Mediterranean coast countries, and draws attention to the discordant views that are held regarding the inoculability of the parasite.

In the course of work designed to test the possibility of inoculating against *Anaplasma marginale* in Palestine the opportunity occurred of inoculating pure-bred imported stock with blood containing Theileria, and keeping the animals under observation. Two sets of inoculations were carried out, the blood being obtained from two Jersey bulls which probably contracted theileriasis by tick infection.

The bulls arrived in Palestine in August, 1924, and about a month later were found to be tick infested. All of these were removed, as far as possible, and on examination were found to be *Boophilus annulatus*. Since that time imported animals have been dipped at five-day intervals.

Theileria were first seen in one of the bulls on February 2nd, 1925 and the animal died two days later. With blood from this bull a native yearling was inoculated, the dose being 200 cc. There was a febrile reaction which began a fortnight later. This animal survives and repeated examinations of its blood have shown that the parasite persists in small numbers.

From this calf three shorthorn calves were inoculated on June 7th, 1926. In each of these *B. bigeminum*, *B. bovis*, Anaplasma and Theileria appeared in succession. One of these survives and Theileria is present in its blood in small numbers. In one Theileria appeared on August 16th, 1926 and death took place from tuberculosis and theileriasis on January 29, 1927. The third showed Theileria on August 15th, 1926 and died of sub-acute theileriasis on November 8th, 1926.

The second bull which was naturally infected first showed Theileria on March 20th, 1925, and it passed through an acute attack. It was subsequently slaughtered. From this bull four shorthorn calves were inoculated, one on March 21st and three on May 27th, 1926. One of these died of chronic theileriasis on April 20th, 1926, one of acute theileriasis on September 28th and two of anaplasmosis on June 12th and 26th, 1926.

As a result of these experiments and field observations the author finds that theileriasis as it occurs in Palestine may be acute, sub-acute, and chronic in its manifestations. Blue bodies have only been found in the very acute infections, in which some 90 per cent. of the corpuscles are invaded, but they have not been found in the circulating blood.

In only one of the experimental animals was enlargement of the superficial glands detected, and no Theileria could be found in smears from these.

BOYNTON (W. H.). **Observations on *Anaplasma marginale* (Theiler) in Cattle of California.**—*Cornell Vet.* 1928. Jan. Vol. 18. No. 1. pp. 28–46. With 3 text figs.

Anaplasmosis was first detected in California in 1925, and since then has been detected in seven counties in the State. These localities are free from Texas fever.

The disease was first detected in a herd which had been formed by purchase after the original herd had been slaughtered out on account of foot-and-mouth disease.

Eight animals had died in the course of about 6 months before accurate investigation was begun, and anaplasmosis was suspected by Boynton because of the similarity between the lesions found and those of cases of anaplasmosis which he had examined in the Philippines.

Examination of blood smears from a sick cow revealed the presence of the parasite and evidences of anaemia. Two attempts at infection of other animals by inoculation with blood containing the parasite failed.

Cases occurred on a neighbouring farm the following year and 16 animals died. *Anaplasma marginale* and *centrale* were found.

From this outbreak successful experimental transmissions were made.

The period of incubation was found to be approximately 18 days. Physical symptoms and temperature reaction are not observed until about a week after the appearance of the parasite in the blood. During the febrile period corpuscles may be invaded up to 50 per cent.

The most prominent symptoms of the disease are anaemia, jaundice, constipation, muscular tremors, inappetence, fever and rapid emaciation.

The mortality observed has been high, particularly among milking cows.

The natural transmitter of the disease has not been identified.

SCHILLING (Cl.) & MEYER (K. F.). Piroplasmosen. [**Piroplasmoses.**] —Reprint from *Kolle and Wassermann's Handbuch der pathogenen Mikroorganismen.* 3rd Edit. (Edited by KOLLE, KRAUS & UHLENHUTH.) 1927. Vol. 8. 94 pp. With 34 figs. (7 coloured) & 4 coloured plates.

This reprint from the larger volume gives a digest of existing knowledge regarding piroplasmosis. As the whole subject is covered in eighty-eight pages it will be realised that the subject matter is greatly condensed, more especially as a not inconsiderable number of pages are given up to references.

The paper is illustrated by text figures in half-tone and in colour and by a set of coloured plates.

The authors deal with the piroplasms in general and with the transmitting ticks before proceeding to deal with each disease specifically.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY (E. N.) & RASTAGAIEFF (E. F.). Zur Frage über die Hämoglobinurie bei Rinderbabesiellosis. [**Haemoglobinuria in Bovine Babesiellosis.**]—*Berlin. Tierärzt. Wochensch.* 1927. Sept. Vol. 43. No. 36. pp. 601–602.

The authors co-relate the existence of haemoglobin in the urine with the type of parasite present in the blood, and they find that it occurs

almost exclusively when the pear-shaped organisms are present, or when pear-shaped and ring forms are simultaneously present. It is not seen when only ring parasites occur in the blood.

STIRLING (R. F.). **Trypanblue and certain Dithio-Aniline Derivatives: Some Clinical Observations upon their Efficacy in the Treatment of Piroplasmosis and other Affections in the Central Provinces, India.**—*Jl. Comp. Path. & Therap.* 1927. Dec. Vol. 40. No. 4. pp. 274–281.

Examination of blood smears of all the animals accessible in a number of villages taken at random shows that 75 to 80 per cent. harbour piroplasms of some kind. As a rule, clinical symptoms are not present, but the animals are in a poor condition, and a not inconsiderable number are extremely emaciated. The most common blood parasites of cattle appear to be *B. bigeminum* and *Th. mutans*.

In dogs the intracorpuscular parasites encountered are *B. canis* and *P. gibsoni*.

Dipping is out of the question in the Central Provinces for various reasons. The owner would not understand the necessity for applying dipping in a thorough manner, and would evade it if enforcement were attempted, the veterinary staff is not adequate to cope with the supervision necessary, and finally, proper dipping cannot be carried out in circumscribed areas where circumstances might otherwise permit it, and it would actually be a source of danger.

The writer therefore decided to try to control the piroplasmoses by drug administrations. Trypanblue was used in 2 per cent. solution. The dye was dissolved by grinding into a paste with a small amount of water, and the bulk was then made up. This solution was filtered through paper and autoclaved at 120° C. for 20 minutes.

The doses used were 40 cc. for horses and cattle and 5 to 6 cc. for dogs. Larger doses frequently caused dyspnoea and some amount of collapse.

The amounts issued have increased from about 10,000 cc. in 1922–3 to 250,000 cc. in 1926–27.

At first injections were given subcutaneously, but subsequently the intravenous path was employed. Abscess formation commonly follows the subcutaneous injection in dogs when it is given on the inner face of the thigh, but when given on the side of the neck, or intramuscularly into the gluteal muscles there is little or no tendency to abscess formation.

The results are judged upon reports submitted by Veterinary Inspectors and assistants, and from these the following extracts are taken :—

Trypanblue is of great value as a general tonic. In milking cows the quantity and quality of milk is increased and better butter is produced. In acute cases of piroplamosis an injection brings down the temperature and clears the circulation of parasites. Even if the circulation remains free a second dose should be given in a week. In chronic cases three doses should be given.

In acute cases early treatment with trypanblue is effective in 95 per cent. of cases. Emphasis is laid on the value of the drug in cases of skin disease.

In foot-and-mouth disease injection of the drug during the acute febrile stage produced rapid improvement.

Six ponies, twelve cattle, three buffaloes, and seventeen dogs were treated by injections of intramine. Blood smears were examined daily and temperatures were recorded. The drug was given in 1 per cent. solution both subcutaneously and intravenously. Parasites disappeared from the blood within 24 hours, and in most cases there was no relapse.

It appeared to be without effect upon trypanosomes.

PICARD (W. K.). Coccidiosis. [**Coccidiosis.**]—*Nederl.-Indisch. Blad. v. Diergeneesk.* 1927. Dec. Vol. 39. No. 6. pp. 468–475.

It has been found that coccidiosis is a common cause of loss among native poultry and pigeons.

MATHIS (C.). Réceptivité des animaux de laboratoire vis-à-vis du Spirochète récurrent humain de Dakar. [**The Susceptibility of Laboratory Animals to the Spirochaete of Recurrent Fever at Dakar.**]—*Bull. Soc. Path. Exot.* 1927. Sept. Vol. 20. No. 8. pp. 826–829.

The author gives an account of animal inoculations with spirochaetes from five cases of recurrent fever. The cases occurred in two Europeans and three natives. All were contracted in the same district and the probability was that it was a single virus. In the absence of a sufficient number of white mice the local grey mouse was used. There is no reason to suppose that this animal is ever naturally infected. In grey mice the strains have been passed through from 9 to 55 passages. As a rule, the inoculations were subcutaneous, but the infection can be transmitted by intraperitoneal or conjunctival inoculation. The period of incubation is about 24–36 hours, and the parasites reach their maximum in the blood in 4 to 5 days. There is no regular periodicity. As a rule recovery is complete in 45 days. The disease runs a course of variable intensity and proves fatal in some cases.

Rabbits can be infected, but they show no visible signs of being diseased. There is not even a rise of temperature. Parasites are very scantily present in the blood.

Cynocephalus and Cercopithecus monkeys have been found susceptible to three of the strains. The others have not been tested, but there is no evidence of illness, and only slight and irregular rises of temperature occur.

HALL (G. N.). **Spirochaetes in the Blood of a Goat.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Feb. 25. Vol. 21. No. 5. pp. 423–425. With 2 text figs.

Spirochaetes were found in small numbers on two successive days in the blood of a goat which was under experiment in connexion with *T. rhodesiense.* The organism appeared to be shorter and more slender than that which is occasionally seen in the blood of sheep. Inoculation of sheep intravenously failed to transmit the parasite. The author proposes the name *Spirochaeta caprae.*

DAPRA (Tullio). Notedi Patologia Veterinaria tropicale. La Spirillosi aviaria. [**Avian Spirillosis.**]—*La Clinica Vet.* 1927. Dec. Vol. 50. No. 12. pp. 741–743.

NOHMI (S.). **Nutritive Observation of Chicken Coccidiosis.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Dec. Vol. 6. No. 4. pp. 360–363. With 2 plates.

PARROT (L.). Sur un parasite intraglobulaire pigmenté de *Tarentola mauritanica* (L.). [**An Intracorpuscular Pigmented Parasite of *Tarentola mauritanica*.**] —*Arch. Inst. Pasteur d'Algérie.* 1927. March. Vol. 5. No. 1. pp. 1–8. With 2 plates.

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## DISEASES DUE TO METAZOAN PARASITES.

VALADE. La Cysticercose bovine en Syrie. [**Bovine Cysticercosis in Syria.**]—*Rec. Méd. Vét.* 1927. Nov. 15. Vol. 103. No. 19. pp. 813–822.

Cysticercosis of bovines is of very frequent occurrence in the Levant, and constitutes a serious menace to the troops there. The condition may be described as generalized when there is an extensive invasion of the body and localized when only a few cysts occur in one or two organs or muscles. Naturally, there is no sharp line of demarcation between the two and, further, there is no doubt that cases of invasion of the muscles escape detection.

Statistics for the year 1925–26 show that of 615 carcases 16 showed generalized invasion and 100 localized invasion. The figures for the localized invasion are not to be considered exact for the reason given above.

The predilection seats are the diaphragm, psoas, heart, masseter, and pterygoid muscles, and to this list the author feels justified in adding the adductors of the thigh and the deep muscles in the upper part of the neck.

The following tables show the percentage distribution of the infestation :—

| Generalized Cysticercosis. | |
|---|---|
| Heart (surface) | 68·75 |
| Diaphragm, Psoas, Adductors of the thigh | 62·5 |
| Heart (myocardium), Superior cervical muscles | 50 |
| Masseters | 31·25 |

| Localized Cysticercosis. | |
|---|---|
| Diaphragm | 34 |
| Masseters | 27 |
| Heart (surface) | 26 |
| Psoas, Adductors of the thigh | 21 |
| Superior cervical muscles | 14 |
| Heart (myocardium) | 9 |

The cysts vary from 1 to 2·5 cm. and they appear either as projecting from the surface of muscles or they are deeply placed.

Their liquid contents are ordinarily translucent, but when the condition is generalized and vesicles are numerous, they sometimes have a pinkish tinge.

Carcases affected with the condition in a generalized manner are condemned, as are those with localized infestation if the general condition of the animal is poor. A slight degree of localized infestation does not warrant condemnation.

The causes of the frequency of the infestation are: (1) The large number of the population harbouring *T. saginata*; (2) Ignorance of the elementary principles of hygiene; and (3) Insufficient control of the meat trade.

Meat inspection properly carried out is capable of checking the invasion of the human population, particularly among the troops, but it is a matter of extreme difficulty to tackle the problem from the human aspect. The apathy of the oriental in such matters is well known.

VALADE (P.). L'echinococcose en Syrie. [**Echinococcosis in Syria.**]—*Bull. Soc. Path. Exot.* 1927. Dec. Vol. 20. No. 10. pp. 1004–1019.

The author has been prompted to investigate the problem of echinococcosis in Syria by the publications of DÉVÉ, BAROTTE and VELU, and SENEVET and WITAS regarding this parasite in Northern Africa.

His paper is divided into five sections dealing with (1) abattoir statistics regarding the parasite in bovines and sheep, (2) the occurrence of *T. echinococcus* in carnivora in Syria, (3) the occurrence of human echinococcosis in Syria, (4) proposed sanitary regulations, (5) attempts to diagnose infestation in cattle by an intra-palpebral reaction.

(1) The abattoir statistics have been collected at Homs only. The carcases for the troops have been examined day by day over a period of a year.

The lesions are classified in three groups: extensive lesions, moderate lesions, and slight lesions. These are more or less self expressive.

Of 615 bovines killed during the year about 35 per cent. were infested with cysts. Slight infestations accounted for about 13 per cent., moderate for about 12, and extensive infestations for about 9 per cent. In moderate and severe cases the liver and lungs were involved, and in slight cases the lungs were most frequently invaded.

In the case of sheep the percentage of infested animals was much lower, namely, about 13·5. Moderate lesions were found in about 6·5 per cent., and severe and slight lesions each in about 3 per cent.

Camels are eaten by the Syrians, and the author found that about 50 per cent. of these were invaded by the parasite.

In this species the cysts present peculiar characters. They are usually isolated, seldom exceed in size that of a small plum and are generally not larger than a nut. The cyst wall is almost always thickened—either fibrous or calcified.

The conditions obtaining at the slaughter houses ensure that the multitude of stray dogs in their neighbourhood have every opportunity of becoming infested. Similarly, in the semi-desert country surrounding the towns dogs are used as guards for flocks and herds and have likewise a great chance of becoming infested because animals which die are left where they lie.

An attempt to determine the degree of infestation of the dogs with the tapeworm was begun, but local troubles prevented it from being brought to fruition. Only fifteen dogs were examined post-mortem,

and in none of these was *T. echinococcus* found. Examination of the faeces is of no value in this connexion as the eggs have no specific characters. Enquiries have been put through the medical authorities regarding the frequence of echinococcosis in man in Syria. Generally speaking, they do not encounter many cases of infestation, and their knowledge of the occurrence of the parasite in man is very limited. In the first place the assistance of the surgeon is seldom sought and in the second post-mortem examination is against religious prejudice.

As measures of prophylactic value the author agrees that the proposals of DÉVÉ are valuable. Destruction of as many stray dogs as possible, the construction of proper slaughterhouses, destruction of diseased organs, and regular inspection of meat are the main factors in the control of the disease. None of these can be rendered as effective as the problem demands.

The author has repeated tests upon the lines suggested by LANFRANCHI, using cyst liquid for intradermal tests.

One cubic centimetre of cyst liquid is injected into the skin of the lower eyelid. A positive reaction consists in the appearance, about 2 hours after injection, of an oedematous plaque about the size of a fowl's egg. This extends until it may be sufficiently extensive to cause deformation of the face, as viewed from the front. The swelling persists for 12 hours.

Of 63 animals tested 21 were found to be infested and of these only 7 reacted. The 14 which did not react all showed slight infestations only. One animal which reacted was apparently free from the parasite when examined post-mortem.

WOODLAND (W. N. F.). **On Three New Species of *Avitellina* (Cestoda) from India and the Anglo-Egyptian Sudan, with a Re-Description of the Type-Species *A. centripunctata* (Rivolta), 1874.**—*Ann. Trop. Med. & Parasit.* 1927. Dec. 31. Vol. 21. No. 4. pp. 385–414. With 4 plates.

Avitellina, like Stilesia, occur commonly in South-Eastern Europe, North and South Africa and India, and is apparently restricted, as regards hosts, to sheep and other ruminants.

In addition to the redescription of *A. centripunctata* the author gives an account of *A. lahorea*, n. sp. *A. soudania*, n. sp., and *A. chalmersi*, n. sp.

A key to the specific diagnosis of the five known species of Avitellina is given. The paper is illustrated with four plates.

WALTON (C. L.) & WRIGHT (W. R.). **Further Observations and Experiments on the Control of Liver Fluke.**—*Jl. Ministry Agric.* 1927. Nov. Vol. 34. No. 8. pp. 734–739.

It has been shown that copper sulphate, applied in a variety of ways, is effective for the destruction of the snails, but information is lacking regarding the circumstances which are adverse to the eggs of the snails. The experiments here briefly described deal with some of these points.

*Limnaea truncatula* is self-fertile. Oviposition begins about March and continues through the summer. The egg masses contain on an average about a dozen eggs, and may be laid on mud or on leaves. The average period required for hatching is about 3 weeks.

In laboratory experiments egg masses were sterilized by 0·1 per cent. sulphate of copper solution within 48 hours. Drought proved to be the chief natural controlling factor both for snails and eggs.

Egg masses which were allowed to dry naturally could resist desiccation up to 12 hours, while those on the point of hatching resisted desiccation up to 24 hours.

Freezing eggs for a period of three hours failed to inhibit hatching when they were thawed out again.

In an experiment in which natural conditions were simulated, *Limnaea truncatula*, *L. pereger*, *L. palustris*, *Aplexa hypnorum*, and *Planorbis spirorbis*, were used to test the effect of drought. The results showed that *L. truncatula* could survive drying for a longer period than the other species.

*L. truncatula* and the other species all showed marked resistance to freezing.

AUGUSTINE (D. L.). **Development in Prenatal Infestation of** *Belascaris.*—*Jl. Parasitology.* 1927. June. Vol. 13. No. 4. pp. 256–259.

The author reviews the literature and describes two experiments carried out with bitches, and from one of these it appears that in prenatal infection the development and migrations of the larvae in the foetuses is held up until parturition after which the processes proceed. At parturition the larvae are found in the livers of the foetuses. From one to three days later they are in the lungs, and at 6 days in the intestine.

There appeared to be evidence to suggest that with increasing age an immunity to the parasite develops.

THWAITE (J. W.). **The Genus** *Setaria.*—*Ann. Trop. Med. & Parasit.* 1927. Dec. 31. Vol. 21. No. 4. pp. 427–466. With 20 text figs.

The examination of material in the museum of the Department of Parasitology of the Liverpool School of Tropical Medicine and of material collected by the author in Uganda affords sufficient data for a revision of the genus.

Worms from the following 16 hosts have been available for examination: horse, ass, ox, buffalo, bush buck, eland, waterbuck, impala, reedbuck, puku, topi, hartebeeste, Uganda kob, oribi, duiker bok, klipspringer. Fourteen species are described, of which five are new. Description is also given of 8 species, all named Filaria, which are insufficiently known, but which probably belong to the genus.

BAUDET (E. A. R.). Trichostrongylosis bij kalveren. [**Trichostrongylosis in a Calf.**]—*Tijdsch. v. Diergeneesk.* 1928. Feb. 1. Vol. 55. No. 3. pp. 115–120.

The author describes the post-mortem findings of a calf which died of wasting and diarrhoea. There were parasitic invasions in both the lungs and the alimentary tract. *Cooperia oncophora* was identified among the worms found in the intestine.

BAUDET (E. A. R.). Trichstrongylosis bij den Haas. [**Trichostrongylosis in the Hare.**]—*Tijdsch. v. Diergeneesk.* 1928. Mar. 15. Vol. 55. No. 6. pp. 275–278. With 3 text figs.

The author describes the occurrence of *Trichostrongylus retortaeformis* in large numbers in the intestines of hares in Holland. He ascribes emaciation to their presence, and states that hitherto this parasite has not been found in Holland.

NAIYAMOTO (Tosinoru). **Strongyloidosis Intestinalis of Farrow in Formosa.**—*Jl. Jap. Soc. Vet. Sci.* 1928. Jan. Vol. 7. No. 1. pp. 43–52.

The "white diarrhoea" of young pigs in Formosa is due to the presence of Strongyloides. Two species have been found, *T. suis* (the parasitic generation) or the parthenogenetic females, and *S. westeri* Ihle.

BUXTON (P. A.). **A Parasitic Fibroma on Equines in Samoa.**—*Parasitology.* 1927. Sept. Vol. 19. No. 3. p. 352. With 1 plate.

The dense fibroma-like masses occur frequently on horses and donkeys in Samoa. The predilection seats are the fetlocks and pasterns and less frequently on the face between the eye and the nostril. Deep tissues are not involved in the growths.

In the examination of sections pieces of a nematode are occasionally seen, but this has not been identified. It has not the characters of Onchocerca. The worm may not be causally connected with the growth, but it appears to be probable that it is caused by some parasite since its occurrence seems to be localized to certain parts of the island, and because of the predilection seats in the host.

The disease cannot be native to Samoa since horses were not imported until 1840, and the only native mammals are three species of bat and one rat. The disease is not known to occur in Fiji or in the New Hebrides.

VAN HEELSBERGEN (T.). Helminthiasis bij Kippen. [**Helminthiasis in Poultry.**]—*Tijdschr. v. Diergeneesk.* 1928. Jan. 1. Vol. 55. No. 1. pp. 6–25. With 13 text figs.

This paper is a review of the helminths occurring in poultry, with suggestions regarding treatment.

ROGER, JOUVEAUX & PLATEAU. Mode d'administration pratique des anthelmintiques. [**A Practical Method of Administering Anthelmintics.**]—*Bull. Acad. Vét. de France.* 1928. Jan. Vol. 1. pp. 43–46.

The authors find that horses will take anthelmintic drugs simply mixed with bran mash. In this way they have given doses of 25 g. of carbon bisulphide, 100 g. of carbon tetrachloride, 18 cc. of oil of chenopodium, oil of turpentine 80 to 100 cc. The doses are given twice—morning and evening. The drugs are first thoroughly mixed

in about four litres of water, then bran is added by handfuls and thoroughly stirred with a stick. Six or seven litres of bran are added in this way.

Patients should be on a " sloppy " diet before treatment is begun and they should be starved for 36 hours immediately before.

The rate at which animals take the medicated bran varies considerably. Some—and these form the minority—eat it up quickly, while others eat only a little at a time, and thus may require two hours or more to finish the meal.

Generally, the second feed is eaten more quickly than the first. Animals which will not eat bran containing vermifuges may be persuaded to do so by continuing the starvation and by administering a saline purgative each day. There is no risk attaching to even long starvation if a purgative is given daily.

For oxyuris the authors have given arecolin hydrobromide mixed with powdered charcoal.

HALL (M. C.). **Parasitological and other Observations in Central America.**—*Cornell Vet.* 1928. Jan. Vol. 18. No. 1. pp. 1–18.

In Panama city the following parasites were found at the abattoir: *Cysticercus cellulosae, Macracanthorhynchus hirudinaceus* and *Setaria labiato-papillosa. Haemonchus contortus* was not found. *Cysticercus bovis* was very rarely encountered. The wild pig and domestic swine harbour *Stephanurus dentatus.*

It is remarked that in spite of the fact that *Cysticercus cellulosae* is of common occurrence (5 per cent. of swine) and *Cysticercus bovis* of very rare occurrence (about 0·1 per cent.) the tape-worms of man examined were almost all *T. saginata.*

At Pouonomé there were collected from cattle *Boophilus annulatus, Setaria labiato-papillosa,* and an amphistome not yet identified.

From horses *Amblyomma cajennense,* " cyclicostomes and pinworms."

From pigs, *Cysticercus cellulosae, Hyostrongylus rubidus, Physocephalus sexalatus, Arduenna strongylina,* Oesophagostomum, the kidney worm, and coccidia.

In Nicaragua the parasites found included the following. " From cattle, *Amblyomma cajennense* and the filarid of the body cavity. From the horse—*Dermacentor nitens* and *A. cajennense,* spirurid stomach worms, pinworms, Strongylus spp. and cyclicostomes. From the pig, *A. cajennense, Cysticercus cellulosae,* the red stomach worm, the spirurid stomach worms, kidney worms and nodular worms." No ascarids were found. It is noted that the same condition of ascarides being common in man and rare in pigs prevails in the Philippines.

At San Salvador a goat was found with a light infestation of *H. contortus,* the only case encountered of infestation with this parasite.

WALTON (C. L.). **The Control of Tick Infestation and a Related Disease of Lambs in North Wales.** With Appendix by ROBERTS (R. Alun). —*Parasitology.* 1927. Sept. Vol. 19. No. 3. pp. 265–273.

For many years certain farms have been known to be tick-infested, the tick being *Ixodes ricinus.* The disease of lambs which has been associated with the tick has always made its appearance about a week after these have been sent to certain hill pastures.

Montgomerie says, regarding the disease, " The disease appears essentially to be a pyaemia caused by a mixed infection, the organisms having a predilection for sites in the region of joints. Only lambs are infected and the first symptom may appear eight or nine days after the lambs have been turned to the hill pasture. Abscess formation in the region of one or more joints causes severe lameness. The abscess does not tend to point but develops to a cold abscess. Death may occur in the more acute stages of the disease, but lambs which survive that stage may have recovered by the late autumn." After preliminary failures to burn off the hill sides owing to the wetness of the ground, short interval dipping was resorted to.

It was decided to try to clear the flock by dipping and to eradicate the tick by series of dippings at 5-day intervals. A special " short interval " arsenical dip was used, the dipping was done in the spring, and, when possible, in the autumn also. During 1924, the more experimental period, six dippings were carried out. Prior to dipping a count of ticks from a small number of ewes and lambs showed that the average number per animal was 121. After the 6th dipping, the average number was 2·1. As it was thought possible that the dipping might damage the wool only lambs were dipped up to shearing time in 1925. It was intended to dip all the flock after this, but shortage of water at the end of June made it impossible.

The average number of ticks (for 12 sheep examined) before dipping was 10·16. After dipping the number was 8·9.

In 1926, the average number of ticks per animal prior to dipping was 15·46. The lambs were dipped 5 times and the ewes twice. After dipping the average was 0·96.

SALING (T.). Die Kriebelmückenschäden in Preuszen während die Jahre 1925–1926. [**The Losses due to Gnat-Bites in Prussia in 1925-1926.**]—*Deut. Tierärzt. Wochensch.* 1928. Mar. 3. Vol. 36. No. 9. pp. 133–135.

In 1925 losses were experienced in three areas in Eastern Prussia, and in two in Hanover, and in 1926 in two areas only, one in Brandenburg and one in Hanover. Study of these outbreaks does not furnish any new information regarding the clinical manifestations which follow the bites of the gnats.

SMIT (Bernard) & DU PLESSIS (S.). **The Distribution of Blow-Flies in South Africa, with Special Reference to those Species that attack Sheep.**—*Union of South Africa. Dept. of Agriculture, Bulletin No.* 13. 1927. pp. 1–19.

Myiasis of sheep first made its appearance along the coastal belt in the Eastern Cape Province, but it has now spread all over the country, and it is generally agreed that the state of affairs gets worse every year. The improved quality of the wool is partly held to be responsible for the spread, and it would appear that the habit of attacking live sheep has been acquired by sheep maggot flies in the course of the development of the wool industry. It is not impossible that other flies of allied genera may develop the habit.

The flies are a source of danger as being responsible for the conveyance of diseases both to man and animals.

One species, *Wohlfahrtia euvittata*, or spotted grey locust fly, is beneficial since its maggots are deposited in the egg pockets of the brown swarm locust (*Locustaria pardalina*) and destroy them.

Locust nymphs, while soft after ecdyses, are also attacked by the maggots.

Details are given of the method of collecting data regarding the flies. Eleven species of flies are commonly attracted by decaying meat, and three species have been found to attack sheep.

The only species which have been reared from maggots collected on sheep are *Chrysomyia chlorogyga*, *Lucilia sericata*, and *Chrysomyia albiceps*.

Flies attack sheep during the summer months of October to January, and again during March and April. These are the periods when they are most abundant.

NITZULESCU (Virgil). Contribution à l'étude de la pompe salivaire des Tabanidés. [**The Salivary Pump of the Tabanidae.**]—*Bull. Soc. Path. Exot.* 1927. Nov. Vol 20. No. 9. pp. 846–851. With 4 text figs.

The author's résumé is as follows :—

The salivary pump of the Tabanidae is similar to that of the Simuliidae, but it is rather more complicated in that there is lateral enlargement of that portion of the salivary tube which acts as the body of the pump; the more posterior position which it occupies separates it from the hypopharynx.

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KOTLAU (A.) & HIRT (G.). *Hyostrongylus rubidus* (Hassall and Stiles) als Urheber einer mit Knötchenbildung einhergehenden Magenenzundung beim Schwein. [*Hyostrongylus rubidus* **as a Cause of Nodular Gastritis in the Pig.**]—*Deut. Tierärzt. Wochensch.* 1927. Jan. 21. Vol. 36. No. 3. pp. 37–40. With 5 text figs.

SUGIMOTO (M.). **On the Nematode Parasite** (*Streptocara crassicauda*) **in the Gizzard of Formosan Domestic Duck.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Dec. Vol. 6. No. 4. pp. 384–386.

TSCHERWAKOW (W. F.). Die parasitischen Cestoden und Nematoden der Hunde in Weissrussland. [**The Parasitic Cestodes and Nematodes of the Dog in White Russia.**]—*Arch. f. Schiffs- u. Tropen.-Hyg.* 1927. Sept. Vol. 31. No. 9. pp. 436–437.

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## BACTERIAL DISEASES.

SOLOVIEFF (N.). De la cuti-immunisation du cobaye contre le charbon par le procédé de Besredka au moyen des vaccins Cienkovsky. [**The Cuti-Immunization of Guineapigs against Anthrax by Besredka's Method using Cienkovsky Vaccines.**]—*Ann. Inst. Pasteur.* 1928. Feb. Vol. 42. No. 2. pp. 200–205.

The author states that a number of attempts have been made by Russian investigators to repeat the experiments of BESREDKA in the immunization of animals against anthrax by the cutaneous path, but with indifferent success. It appeared to be possible that the vaccines were at fault. He has therefore carried out a series of experiments using Cienkovsky vaccines—which are practically the only ones used in Russia—prepared at the Veterinary Institute at Kharkoff.

In the first experiment 22 guineapigs were used. These were injected intracutaneously with 0·1 to 0·5 cc. of first vaccine. They were then tested with 0·1 cc. of second vaccine (origin not stated). Although the local phenomena were less pronounced in the vaccinated animals than in the controls, and the period of survival was longer, all eventually died.

It was also noted that the evidences of reaction to the vaccination produced by the Russian vaccine were less marked and less persistent than those produced by the Pasteur first vaccine.

Numerous authors have drawn attention to the fatalities that have occurred at different times following the use of the Cienkovsky second vaccine.

As the first vaccine was possibly too weak to be effective, a second experiment was carried out with 38 guineapigs, each of which received several injections of 1 to 2 cc. of first vaccine into the skin.

When these were tested with 0·1 cc. of second vaccine there were 19 survivors.

Five guineapigs which were inoculated subcutaneously instead of intracutaneously all died when tested with second vaccine. The author thinks that the large dose, which was introduced intradermally, and the weight of the guineapigs are important points in determining the results.

Four guineapigs out of five were successfully immunized by giving first increasing doses (0·1, 0·25, 0·5, 1·0 cc.) of first vaccine followed by doses of 0·01, 0·05 and 0·1 of second vaccine.

In one experiment 15 guineapigs which resisted the second Cienkovsky vaccine were tested with 0·1 cc. of 24 hours culture of virulent bacilli in broth, which was fatal to sheep in 0·1 cc. in 48 hours, to a yearling colt in 65 hours, and to guineapigs in 24 to 36 hours.

Of 6 protected guineapigs tested with 0·1 cc. of virulent culture only one died.

The author concludes that the Cienkovsky vaccine protects as well against the virus as against the second vaccine.

DONATIEN (A.), LESTOQUARD (F.), RAMPON (L.) & HILBERT (D.). Immunisation des bovidés contre la fièvre charbonneuse. [**The Vaccination of Bovines against Anthrax.**]—*Arch. Inst. Pasteur d'Algérie.* 1927. Mar. Vol. 5. No. 1. pp. 38–40.

It has been found that the intradermal injection of 0·4 cc. of the second Pasteur vaccine is very effective for the protective inoculation of cattle, whether French, cross-bred, or Algerian. Further experiments were undertaken to see whether the dose could be reduced to 0·25 cc.—the usual dose of the vaccine for cattle.

In a laboratory experiment 0·2 cc. of the second vaccine injected intradermally was found to protect two calves against a virulent inoculation.

It has also been used in the field. Anthrax broke out in a herd of 27 crossbred cows and calves, and three cows died and two were ill. 0·25 cc. of second vaccine was injected intradermally into the caudal fold and the outbreak stopped at once. There were no signs of local or general reaction. In all, 441 animals have been inoculated in this manner and with this dose, and with excellent results. Vaccination against blackquarter can be done at the same time.

KRISHNAMURTI AYYAR (V.). **Studies in Bovine Lymphangitis.**—*Memoirs Dept. Agric. India. Vet. Series.* Vol. 4. No. 2. 1927. Oct.

In the author's view the probability is, but evidence is not forthcoming, that this disease is transmitted by lice. He briefly reviews the possible methods and excludes all save infection via the skin. In his experience the disease is not always associated with the presence of any wounds such as yoke-galls. He attributes the prevailing distribution of the lesions in the superficial glands to the infection via the skin and the relative frequency of the lesions in the various superficial glands to the relative size of the skin area drained by these glands.

He finds that the disease is caused by a small bacillus of the pasteurella type, and he has no difficulty in detecting the organism in smears from early lesions in the glands. The difficulty of finding the bacillus in smears of pus increases with the age of the lesion.

In his description of the lesions the author states that " in the early stages one finds the gland considerably enlarged, tense and indurated. Sections cut from it at this stage when examined microscopically, reveal a great increase in the bands of its reticulum and a gradual conversion of the glandular tissue into a mass of fibrous tissue." When the gland tissue has been almost completely replaced by fibrous tissue suppurating foci are said to appear and to extend into the fibrous tissue. [The pathology of this condition appears to present some anomalous features.—Ed.]

In some cases embolisim of the lungs occurs, and catarrhal pneumonia results. Abscess formation also takes place in the lungs.

Details are given of 17 cases treated with a killed vaccine, but it is difficult to judge of the efficacy of this as no account is given of controls. It may be noted that some animals were discharged as cured after 3 doses, while others required as many as 11. In the latter case the injections were spread over some four months.

KASAI (K.), KOHANAWA (C.), OGURA (K.) & ITO (S.). Ueber den auf der Insel Hokkaido im Norden Japans ausgebrochenen infektiösen Stutenabort. [**The Outbreak of Mare Abortion in the Island Hokkaido, Japan.**]—*Zeitschr. d. Zentralen Veterinär. Gesellschaft Japans.* 1927. Vol. 39. No. 7. pp. 619–668.

The following is taken from a German summary of the paper.

Mare abortion was first investigated by INIWO in 1916. The disease is known to have existed since 1921 in Hokkaido.

It was typical of the 1921 outbreak that the mares aborted suddenly without any premonitary symptoms.

From slipped foals the authors isolated a short bacillus, bacillus coli, and a streptococcus. The bacillus was identical with the Salmonella abortivo-equina isolated in Europe and America. The bacillus tended to be polymorphic in culture. It was gram-negative. In films lightly stained with basic dyes small granules could sometimes be seen in the bacterial bodies. The number of flagella possessed by the organism was somewhat variable and some strains appeared to possess none. The bacillus grew well in media containing bile, urine or faeces. Blood agar was haemolysed, and rabbit corpuscles were more susceptible to haemolysis than horse corpuscles.

In primary cultures colonies were smooth and glistening, but in subcultures they gradually became dry-looking, but this was not absolutely constant. Transference of strains to blood agar caused the colonies to become glistening, and if the organism were grown in liquid media until surface scum formed and then transferred to solid media strains previously giving smooth colonies yielded dry colonies. Subsequently, smooth and rough colonies could be grown which could be kept true to type.

The strains isolated were tested with 29 sugars, and with following results: *positive* mannite, arabinose, xylose, dextrose, laevulose, galactose, mannose, maltose and *negative* erythrite, adnit, dulcite, inosite, rhamnose, tehalose, melibilose, saccharose, lactose, raffinose, soluble starch, dextrin, inulin, glycogen, salicin, phlorizin, saponin, amygdalin, and digitalin. Results with glycerin and sorbite were not constant.

The bacillus did not produce indol, or sulphuretted hydrogen.

The organism retained its vitality in agar at room temperature for 18 months. The addition of glycerin shortened the period of vitality, and the shortening was in proportion to the amount of glycerin added.

The organism was killed in 5 minutes at 60°, in 30 minutes at 56° C.

Carbolic acid in 1·5 per cent. strength was fatal in 5 minutes; and 0·01 per cent. caporit, and 0·001 per cent. sublimate were effective in the same length of time.

Both agglutination and complement-fixation tests were applicable to the diagnosis of the disease.

Four varieties of the organism could be distinguished on the grounds of sugar fermentations.

VAN SACEGHEM (R.). L'avortement épizootique des bovidés au Katanga (Congo Belge) et son traitement. [**Contagious Abortion of Bovines in Katanga and its Treatment.**]—*Bull. Agric. Congo Belge.* 1927. June. Vol. 18. No. 2. pp. 295–302.

The author briefly reviews our knowledge regarding contagious abortion.

He recommends vaccination with living culture for both pregnant and non-pregnant animals, but states that special technique must be employed. A number of injections are to be given at intervals of ten days. His view is that infected animals as a rule abort repeatedly, but that the abortion takes place at a progressively later period of pregnancy.

He recommends a formolized vaccine. Details are not given, but formalin is added in such amount that it proves fatal to the organism only after 48 hours incubation.

TURNER (A. W.). Hépatite infectieuse nécrosante (Braxy, Black Disease) du mouton Australien. Rôle pathogène du *B. oedematiens* (Weinberg et Séguin); reproduction de l'infection; vaccination par l'anaculture. [**Infectious Necrotic Hepatitis (Braxy, Black Disease) of the Australian Sheep. Production of the Disease, Vaccination by Anaculture.**]—*Ann. Inst. Pasteur.* 1928. Feb. Vol. 42. No. 2. pp. 211–224. With 2 text figs.

The disease known as braxy or black disease among sheep in Australia resembles the braxy of Europe only in its clinical and

epidemiological aspects. The Australian condition is a strictly localized disease involving the liver.

In his previous experiments the author had been able to isolate the *B. oedematiens* from cases of the disease in sheep, but had failed to produce the condition experimentally. The strains he isolated were strongly toxigenic, but weakly pathogenic. After numbers of passages of the Australian strain of the bacillus through cultures in nitrate glucose agar a strain was obtained which was highly virulent but feebly toxigenic.

This strain when grown in liver broth proved fatal to guineapigs in doses of 0·25 cc. with the production of a considerable amount of oedema.

There was abundant pleural and peritoneal exudate, and congestion of the organs. The bacillus was discoverable in smears from the oedema, exudates, and organs, and by culture in the heart-blood.

In one out of a batch of 10 guineapigs there was discovered a localized necrosis in the liver. The necrotic centres were from 2 to 3 millimetres in diameter. Histological examination of sections showed that there was marked active congestion of the liver. The liver cells were granular. Here and there areas of coagulative necrosis were recognizable. Here the cells showed no nuclei, the cytoplasm was granular and in many places packed with a brown pigment. In sections stained to show the bacilli these were found almost exclusively in the necrotic areas. They were not, however, disposed round the margin of the necrotic area, nor was there any evidence of a leucocyte barrier. It is suggested that in the natural disease the condition develops more slowly, and thus time is given for the mobilization of the defences. Thus a leucocyte barrier is formed around the necrotic foci.

Details are given of one sheep inoculated with a toxic broth culture in which two large necrotic foci were found in the liver. For some reason which is not given a complete examination was not made of this animal, but smears from the liver showed bacilli like *B. oedematiens*, and the liver sections were very interesting. There was slight active congestion of the liver and granular degeneration of the cells. The necrotic tissue presented the ordinary appearance of coagulation necrosis. Large numbers of gram-positive, non-sporulating bacilli were found in the capillaries in the necrotic centres; they were scantily present elsewhere. Following the lines of investigation laid down by WEINBERG and RAMON the author tested the value of a formolized culture (anaculture) of Albiston's strain of *B. oedematiens* for the protective inoculation of guineapigs and sheep.

Experiments showed that anatoxin prepared from a culture of low toxicity was of no value for protective inoculation. It was found that Weinberg's meat-liver broth was the best medium for the production of toxin.

The preparation of the medium is as follows: 2½ kg. of ox liver, 2½ kg. of beef and 3 kg. of pig's stomach are minced and mixed with 25 litres of tap water and 250 cc. of pure hydrochloric acid in an earthenware pot (enamelled vessels should not be used as the enamelling is often defective). This is heated to 48°–50° C. for 24 hours, and then brought to 80° C. for a few minutes. The following day the liquid is decanted and filtered through Chardin paper. It is distributed to flasks which are filled to the neck and heated to 100° C. for 15 minutes. In this state it keeps well. When required for use a quantity is heated

to 80°–90° C., alkalinized, and autoclaved at 120° C. for 15 minutes to precipitate the phosphates. It is filtered and distributed in deep flasks, so as to give a high column of liquid and again autoclaved at 120° C. for 15 minutes. Incubation should not be prolonged beyond 48 to 50 hours as the toxicity decreases after this.

A small quantity of the culture is withdrawn, filtered through a Pasteur-Chamberland L filter and titrated for toxicity upon mice. The rest of the culture is then centrifuged for 20 minutes at 3,500 in a large centrifuge which is capable of dealing with 4 litres at a time. After centrifugation the supernatant liquid which is not absolutely devoid of organisms is formolized at 3 per 1,000, and then incubated for 10 days at 37° C. It is then tested for innocuity on guineapigs. 10 cc. intramuscularly should not produce more than a transitory swelling.

The culture used by the author when filtered had a minimal fatal dose of ·01 cc. for the guineapig and ·00025 cc. for the mouse. The experiments in connexion with the immunization of guineapigs were to some extent discounted because a considerable number of them died of intercurrent disease, but they showed that there was extreme variation in the degree of resistance to experimental infection even when the same method of immunization was used. But it appeared that 3 injections of anatoxin at intervals of eight days yielded a higher degree of resistance than a single injection.

In experiments with sheep, 5 animals received 3 doses (0·5, 2·0 and 5·0 cc.) of anatoxin at fortnightly intervals. 5 were given a single dose of 5 cc. and 5 untreated controls were included. Two of each batch and two controls were tested with 0·5 cc. of toxic culture 23 days after the last dose of vaccine, and the remainder two days later. The sheep receiving only a single protective dose withstood 2 m.l.d., while those given three doses resisted 2, 4, 4, 10 and 20 m.l.d. There was some variation in the severity of the reactions, but all the sheep had recovered within 4 days.

Of the controls one showed marked oedema but recovered. One died in four days. Of the second batch of controls two died in 2 days and one in three days.

It appears therefore possible that anaculture may prove very valuable.

HUBER (F. L.). Over de immunisatie tegen septicaemia haemorrhagica, in het bijzonder bij den Indischen buffel. [**Immunization of the Indian Buffalo against Haemorrhagic Septicaemia.**]—*Nederlandsch-Indische Bladen voor Diergeneesk.* 1927. Dec. Vol. 39. No. 6. pp. 438–447.

Vaccine B, which is described as a bouillon-aggressine vaccine, and which is prepared at Buitenzorg, is effective in a 5 cc. dose for the immunization of buffaloes. The immunity persists for about a year. It is desirable to have a number of strains of the organism incorporated in the vaccine.

The Indian buffalo is a good producer of anti-serum, and the serum is very effective for cutting short outbreaks. It is said to have curative properties.

HOUDEMER. Sur quelques cas de tuberculose observés chez des animaux domestiques ou sauvages du Tonkin. [**Cases of Tuberculosis in Domestic and Wild Animals in Tonquin.**]—*Bull. Acad. Vét. de France.* 1928. Jan. Vol. 1. (Published by the *Receuil de Méd. Vét.*)

The author has encountered tuberculosis in the following animals in Tonkin: An ox, a dog, a pig, three monkeys, three cats, and one pheasant. The ox had been imported from China.

GÖTZE (R.). Tetanus beim Rinde. [**Tetanus in a Bovine.**]—*Deut. Tierärzt. Wochens.* 1928. Jan. 21. Vol. 36. No. 3. pp. 36–37. With text figs.

The author describes a case of tetanus in a seven-months-old calf. There was marked tympany which was relieved by passage of a trochar.

On the third day of the disease 40 cc. of tetanus anti-toxin were given, but without recognizable effect.

NAKAGAWA (S.). Antivirusthérapie et anesthésie locale. [**Anti-Virus Therapy and Local Anaesthesia.**]—*Ann. Inst. Pasteur.* 1928. Feb. Vol. 42. No. 2. pp. 196–199.

The author has carried out, at the suggestion of BESREDKA, a small number of experiments to test the effect of local anaesthesia upon local immunization. The details of three experiments, in which streptococcus antivirus and novocaine were used, are given.

Experiment I. Three guineapigs received into the skin of the abdomen 2 cc. of 0·5 per cent. solution of novocaine. Three were injected with salt solution as controls.

The whole were then dressed with streptococcus antivirus made up in a mixture of lanoline and vaseline.

The following day each was given 0·25 cc. of a serum broth culture of the streptococcus subcutaneously. This culture was fatal to guineapigs in 1 cc. doses in 48 hours.

Two days after the injection a large abscess had formed in each test guineapig.

In the controls the infiltration preceding abscess formation was less pronounced and the abscesses which formed were far smaller.

In the second experiment the same conditions were repeated save that a third batch of guineapigs was added. These received neither salt solution nor novocaine prior to dressing with the anti-virus ointment.

The results were similar to those obtained in the first experiment, and the two control batches of guineapigs responded in a parallel fashion.

In the third experiment the aim was to test whether the effect was purely local.

One batch received novocaine in the skin of the abdomen, and the other in the skin of the back. The controls received no novocaine. The whole were inoculated under the skin of the abdomen.

The results indicated that the injection of novocaine into the skin of the back did not prevent the anti-virus ointment establishing some immunity.

## DISEASES DUE TO FILTERABLE VIRUSES.

REMLINGER (P.). Sur la vaccination antirabique au moyen de moelles glycérinées fraîches (méthode de Calmette-Remlinger). [**Anti-Rabic Vaccination with Fresh Glycerinated Spinal Cords. The Calmette-Remlinger Method.**]—*Bull. Soc. Path. Exot.* 1927. Nov. Vol. 20. No. 9. pp. 843–846.

The author states that the method which he described in 1924, namely, the use of glycerinated spinal cords which have been kept in glycerin without any preliminary desiccation is the same as that described by ISABOLINSKY and ZEITLIN, who investigated the method, under the name " Method of Remlinger and Calmette."

The spinal cords of rabbits dying of fixed virus are cut into segments about 1 centimetre in length and plunged into sterile glycerin. They are kept on ice until required. In the Tangier Institute it has been found that cords so treated suddenly become avirulent on the 24th or 25th day, but the power of conferring immunity persists after this, and it appears to be possible that this may be used as a practical method of immunizing.

Treatment of people bitten is begun with injections of avirulent cords which have been in glycerin for 25 to 30 days. And these are followed by injections with cords which have been in glycerin for less than 25 days, the exact dosage, etc., depending upon the number, situation, and severity of the bites.

This method of preparation of the vaccine is a far simpler and more economical one than the older Pasteurian method. ISABOLINSKY and ZEITLIN have tested the method at Smolensk, and of 3,500 persons vaccinated the method has failed in 5 cases only. No case of paralysis has been observed. The author quotes some figures for comparative tests of different methods carried out by ISABOLINSKY and ZEITLIN. The methods of Fermi, Philipps, Hoegyes, Gamaleia and Calmette-Remlinger were those selected, and the results (in each case with 6 rabbits tested) indicated the superiority of the last-named.

MINETT (F. C.). **Immunity in Foot and Mouth Disease.**—*Jl. Comp. Path. & Therap.* 1927. Sept. Vol. 40. No. 3. pp. 173–195.

This paper is divided into two main parts dealing respectively with (1) the standardization of immune serum and (2) the nature of the immunity in foot-and-mouth disease.

The first of these is again subdivided into four sections which deal with (*a*) the production of immune serum, (*b*) standardization *in vitro*, (*c*) standardization by animal experiment, and (*d*) a discussion of the methods available for the standardization of immune serum.

Standardization by *in vitro* methods has not been found to be a method of any great value. Flocculation and complement-fixation, using in the latter case a large variety of antigens, both failed. In the present state of knowledge animal inoculation (guineapigs) is the only valuable method of standardizing the serum. The value of such serum may be expressed either in terms of its virus-neutralizing capacity *in vitro*, or of its capacity to prevent the development of infection *in vivo*.

In the latter experiments the serum and virus were used in a variety of ways. The method most generally employed has been the injection of a series of guineapigs with a series of graduated doses of serum followed by intradermal inoculation of guineapig virus. With a view

to discounting the variations which are inevitable in biological tests reliance must not be placed upon the results of such a series of tests if a single guineapig is used for each dose. Three should be used at least. This is more important when testing ox immune serum as results in this case tend even more to variation.

Storage at a little above freezing point did not appear to reduce the potency of guineapig serum for periods up to a month. With ox serum the potency of the serum stored under the same conditions was not altered up to about 5 months.

Part II. The author briefly describes the conditions of " complete " and " partial " immunity and gives an account of the views held by a number of authors regarding this state of affairs.

WALDMANN and TRAUTWEIN admit that antibodies are produced early, but state that a certain degree of skin immunity can be demonstrated which disappears before that of the blood, since the skin can be re-infected if the proper moment be chosen to produce a local lesion only.

The author puts forward the following explanation of this fact. When the antibody titre is on the wane the skin, being a predilection seat of the virus, would be the first part of the body to regain its susceptibility, but the residual antibody in the blood would prevent the " overflow " of the virus from the local lesion.

" If the view is correct that immunity of the skin may arise from the presence of immune bodies in the blood, then methods which have the effect of increasing the immune bodies without at the same time producing vesicles should also increase the immunity of the skin. There is evidence to show that this is in reality what does happen."

The greater susceptibility of the skin is probably due to the confinement of the virus in tissue spaces from which absorption is comparatively slow, but apart from this it appears to be a fact that certain areas of cutaneous epithelium are specially suitable for the growth of the virus.

This view furnishes an explanation of the appearance of lesions on the hind pads of partially immune guineapigs following intradermal inoculation. And it was found possible to adduce evidence in support by reducing the dose of inoculum used for partially immune guineapigs to the point at which lesions failed to develop, while the same or smaller doses produced lesions in controls. There is evidence to show that a certain degree of skin immunity can be produced by the injection of hyperimmune serum.

The author therefore holds the view that " partial " and " complete " immunity are relative expressions applicable to the same condition of insusceptibility and that there is no reason for postulating a true cellular immunity confined to the skin epithelium.

WAGENER (K.). Experimentelle Untersuchungen über die Tenazität des Virus der Maul- und Klauenseuche in häuslichen und gewerblichen Abwässern und ihre Bedeutung für Hygiene und Veterinär polizei. [**The Persistence of the Foot-and-Mouth Disease Virus in Waste Water from Domestic and Industrial Sources, and its Importance from the Hygienic and Veterinary Police Points of View.**] —*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Nov. 30. Vol. 56. No. 6. pp. 481–493.

The experiments recorded by the author were designed to furnish information regarding the behaviour of the virus of the disease outside the body, and particularly in waste water from laboratories, slaughterhouses, and serum preparation stations.

The results indicated, as has been found by TRAUTWEIN and others, that the virus is not one that readily loses vitality outside the body, but that if tissue is present the virus may retain its vitality for long periods. At temperatures ranging from 17 to 21° C. the virus can remain virulent in water for 14 to 21 days. At temperatures ranging from 13 to 18° C. the virus persisted for periods up to 7 weeks. At still lower temperatures (4–13° C.) it may survive for more than 15 weeks.

It is not only the temperature that plays an important part in connexion with the persistence of virus in waste water, for with higher temperatures bacterial growth is favoured and this appears to affect the vitality of the virus adversely.

The virus also survives better in a medium which approaches to neutral in reaction than in either an acid or an alkaline one.

WAGENER (K.). Infektion und Immunität bei der experimentellen Aphthenseuche des Meerschweinchens. [**Infection and Immunity of Experimental Foot-and-Mouth Disease in the Guineapig.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Nov. 30. Vol. 56. No. 6. pp. 494–504.

The author records eight series of experiments in which infective material was administered to guineapigs by different paths. The resulting infections and the immunity caused thereby were studied. As infective material epithelial shreds were taken from lesions in guineapigs at the height of the reaction and ground up in normal saline. The following methods of infection were tested: by way of the stomach, trachea, subcutis, cornea and conjunctiva and by peritoneal, intracutaneous, intracardiac, and intramuscular injection. The virulence of the material used was controlled in every case. Similarly, the material used for the immunity tests was controlled by intraplantar inoculation. The results showed that the cutaneous and intracutaneous inoculations were the most certain methods of infection, as the inoculations succeeded in every instance.

Other methods of inoculation showed success as follows: Intracardiac 86·6 per cent., subcutaneous 76·6 per cent., intramuscular 76, and intraperitoneal 71·9 per cent. In animals inoculated subcutaneously and intraperitoneally, which developed no evidence of infection, no evidence of immunity could be obtained. On the other hand, 6 per cent. of the animals inoculated intramuscularly without producing visible lesions showed some immunity, as did also one out of fifteen inoculated intracardially. Ingestion of the virus produced visible disease in only 3·3 per cent. and intratracheal injection in only one animal out of twelve.

It appears to be a rule of more or less general application to both large animals and guineapigs that the development of visible lesions is essential to the production of immunity.

TRAUTWEIN (K.). Die Pluralität des Maul- und Klauenseuchevirus. [**The Plurality of the Foot-and-Mouth Disease Virus.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Nov. Vol. 56. No. 6. pp. 505–555.

This paper is divided into two main parts, one dealing with the variability of the filterable viruses in general and of that of foot-and-mouth disease in particular, and the other with the author's own experiments.

The second part of the paper is subdivided into three parts, dealing respectively with the transmission of virus types to guineapigs. The third part covers experiments regarding the specific characters of the types of virus.

In all 76 strains have been tested and the author finds that they can be grouped into three groups (A, B and C). So far as is known at present the basic difference between the types is a difference in their antigenic properties. This difference can also be demonstrated in passive immunity; that is to say, an antiserum contains antibodies against its homologous antigen only. The serum of animals which have been infected with all three types of virus is plurivalent.

In guineapigs infected successively with the three types of virus positive results approximate to 100 per cent. In pigs about 84 per cent. react to the second inoculation, and 72 per cent. to the third. In cattle the figures were 58 and 37 per cent. respectively. These figures are in the reverse order of the natural susceptibility of the species.

Serologically an analogous condition is seen. While guineapig-immune serum is strongly monovalent against the homologous virus, in cattle 14 days after infection heterologous antibodies were found in 58 per cent., and in pigs in 33 per cent.

The heterologous immune bodies disappear from the serum far more rapidly than the homologous immune bodies.

It is impossible to distinguish between the types on the grounds of virulence, incubation, and clinical manifestations either in naturally susceptible animals or in guineapigs.

PIOT-BEY. Hémosérotherapie de la peste bovine en Egypt et dans le Grand Liban. [**Haemoserotherapy of Cattle Plague in Egypt and Great Lebanon.**]—*Rec. Méd. Vét.* 1927. Oct. 30. Vol. 103. No. 18. pp. 306–310.

The author describes the manner in which he responded to a request from the Government of Great Lebanon to take charge of the protective inoculation of cattle against rinderpest, and gives a brief account of the work done.

In the concluding paragraphs he emphasizes the necessity of maintaining an Institute for the preparation of anti-rinderpest serum in Egypt.

KNOWLES (R. H.). **Contagious Bovine Pleuro-Pneumonia Immunisation.**—*Jl. Comp. Path. & Therap.* 1927. Sept. Vol. 40. No. 3. pp. 230–241.

Inoculation with 0·1 cc. of natural " lymph " into the subcutaneous tissue near the tip of the tail confers immunity, but it has serious disadvantages. It is uncertain in action. It may cause high mortality or it may cause necrosis and sloughing of the tail—a serious matter in a country where flies are numerous.

Inoculation of the virus in cultures has the following advantages. The virulence can be reduced so as to render inoculation safe, without

loss of antigenic properties. Vaccine can be prepared in any amount desired, and freedom from contamination can be assured.

The most suitable " seed " material for culture purposes is pleural exudate. Exudate from the lungs is more turbid and more liable to be contaminated. It is generally unnecessary to filter pleural exudate before using it for the inoculation of culture media.

Marten's broth was used at first for the cultivation of the virus, but the difficulty of getting pig's stomachs rendered a search for a simpler medium desirable.

It has been found that the virus can readily be grown upon ordinary plain broth containing 2 per cent. peptone and 10 per cent. ox or horse serum. Of these two horse serum is the better. The medium is standardized to pH8. New strains can be isolated in this medium.

Knowles's findings regarding the virulence of cultures are at variance with those of WALKER. Knowles finds a decrease in virulence from the first subculture and complete avirulence at the 13th. Evidence is brought to show that the tests carried out with the vaccine were satisfactorily controlled since 17 out of 19 bulls used as controls were markedly susceptible.

At first double vaccination was practised as in Kenya. The first dose, 0·5 cc., was given into the tail and the second 1·0 cc. behind the shoulder. It was found that when the culture virus had become avirulent 2 cc. could be given behind the shoulder with safety.

Experiments are being carried out to test the period required for the development of immunity and its duration. The available facts appear to indicate that a period of four to six weeks is required for the development of strong immunity.

As already noted, cultures became avirulent at the thirteenth generation, but there appeared to be no loss of antigenic power up to the 66th generation. This point has not been thoroughly investigated and further work is required. There is no information at the moment whether the immunity produced by an avirulent culture is as lasting as that produced by an attenuated one.

Cultures used as vaccine were eight days old.

Information is lacking at present how long culture vaccine remains viable.

1,775 animals were vaccinated in the field with only two severe reactions. Statistics are not available to show the effect of these vaccinations upon the incidence of the disease.

FUTAMURA (H.) & WATANUKI (T.). **On the Antigen for Complement-Fixation Test in Contagious Pleuro-Pneumonia in Cattle.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Dec. Vol. 6. No. 4. pp. 364–378.

The authors describe experiments in which a variety of antigens were tested. It is a little difficult to gather exactly what the authors mean at times, and this militates against accurate abstraction.

The authors found that the best antigen was prepared by emulsifying surface colonies obtained on serum agar, and that a glucose-serum-broth culture was also good.

The antigens could be kept at room temperature for periods up to 16 months without losing antigenic power.

TANIGUCHI (T.). **On the Morphology of the Virus of Contagious Peripneumonia of Cattle** (Demonstration).—*Japan Med. World.* 1927. July 15. Vol. 7. No. 7. p. 191.

The author states that the following method of staining gives very satisfactory results. Apparently cultures are used. Films are prepared and fixed "in the usual manner." They are immersed in 5 per cent. chromic acid for one minute. Wash thoroughly. Stain with giemsa made up with 2 drops per cc. for 3 hours or more. Alternatively, the slide may be heated to 55–60° C. for 5–10 minutes and then cooled on ice for 5–10 minutes. Wash and dry. "The organisms are stained intensively bichromatic." They are round, oval or coccobacillary in shape and measure from 0·2–0·4$\mu$ in diameter. They may be arranged as single organisms, diplococci, or clusters of various kinds. In old cultures the spiral or vibrio-like forms are found.

FINDLAY (G. Marshall). **Immunological and Serological Studies on the Viruses of Fowl-Pox and Vaccinia.**—*Proc. Roy. Soc.* Series B. 1928. Feb. 1. Vol. 102. No. B718. pp. 354–379.

The author's conclusions may be summarized as follows :—

Three strains of fowl-pox have been studied. Two of these were pathogenic for the fowl only and one for the fowl and the pigeon. Attempts to render these strains pathogenic for rabbits, rats, calves and ducks failed. The three strains of fowl-pox were mutually protective, but pigeons were only partially immunized against the strain virulent for the fowl and pigeon by previous inoculation with fowl strains.

Inoculation with fowl-pox confers immunity and hyperimmunization produces a viricidal serum, but such a fowl-pox anti-serum acting on a virus pathogenic for the fowl and the pigeon destroyed its pathogenicity for the fowl only.

Vaccinia virus and fowl-pox virus show no cross immunity, and the former cannot be transformed into the latter. The respective antisera are not heterologically viricidal. Fowl-pox virus passes through a Berkefeld V filter readily, but vaccinia virus does not.

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REPPIN (K.). Die Infektiosität des Blutes simultangeimpfter Meerschweinchen bei Maul-und Klauenseuche. [**The Infectivity of the Blood of Simultaneously Inoculated Guineapigs in Foot-and-Mouth Disease.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1927. Nov. 30. Vol. 56. No. 6. pp. 556–563.

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## MYCOTIC DISEASES.

DAUBNEY (R.). **Bovine Lymphangitis or Tropical Actinomycosis.**—*Jl. Comp. Path. & Therap.* 1927. Sept. Vol. 40. No. 3. pp. 195–216. With 8 text figs.

The author gives a review of the rather scanty literature regarding bovine lymphangitis and then describes an outbreak which occurred in 1925. Clinically, the cases encountered in Kenya did not differ from those described by other authors, and some slight cases recovered after surgical treatment. Four severe cases came under detailed

observation at the laboratory. These cases are described at length. From three of them—no detailed examination was made of the fourth —a streptothrix was isolated which Daubney identifies as an Actinomyces, probably *A. farcinicus* (Nocard 1888).

The organism was detectable in smears and sections stained by Ziehl Neelsen and Carl Spengler's stain, but it was rarely present in large numbers. It shows slight thickening of the ends of the filaments but no large club-formation. The organism is aerobic and grows fairly well on common media. The first colonies make their appearance in about 3 weeks. Young colonies are white, but later become fawn-coloured. A rather dry medium favours growth and cultures remain viable for months. Glycerin-potato-agar is said to be the most suitable medium. The organism does not blacken lead acetate, nor alter the reaction of litmus milk.

Experimental inoculation of guineapigs produced lesions similar to those described by NOCARD as caused by the Guadeloupe strain, and a typical case was produced in one out of two cattle inoculated with culture.

NANSOUTA. Au sujet du traitement de la lymphangite épizootiqué par le biiodure de mercure. [**The Treatment of Epizootic Lymphangitis with Biniodide of Mercury.**]—*Bull. Soc. Path. Exot.* 1927. Sept. Vol. 20. No. 8. pp. 829–830.

The author has tested a method suggested by PLANTUREUX of combining the administration of the drug per os with subcutaneous injections, a method which he claims is superior to the subcutaneous method of treatment devised by Nansouta.

Only one case has been treated in this way. The animal was given 10 centigrammes of the drug in bolus daily for 12 days, and the treatment was repeated after an interval of a week. Recovery took place without other treatment in a month.

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## MISCELLANEOUS.

NICOLAU (S.) & GALLOWAY (I. A.). **Preliminary Note on the Experimental Study of Enzootic Encephalo-Myelitis (Borna Disease).**—*Brit. Jl. Exp. Path.* 1927. Aug. Vol. 8. No. 4. pp. 336–341. With 4 figs. on 3 plates.

The authors have worked with a strain of virus isolated by ZWICK from horses and with one obtained from sheep by MIESSNER, and they are of the opinion that the two are identical.

The virus cannot be sedimented by centrifuging, and it is rendered inactive by a few minutes exposure to ultra-violet rays.

In rabbits the weight of the animal appears to be the determining factor in connexion with receptivity.

A point of special importance in infected animals is the loss of weight, which may be half the original weight of the animal. Inoculation with the virus produces no fever, but there may be a fall in temperature prior to death. The only constant alteration found in the blood is a marked increase in the number of lymphocytes.

Contrary to the findings of ZWICK and MOUSSU, the authors have been able to produce the typical train of symptoms by intrasciatic inoculation—these symptoms being preceded by paralysis of the inoculated leg. Intratesticular inoculation is successful. Intra-ocular and intravenous inoculations are uncertain, and intratracheal injection appears to fail to infect.

Inoculation by scarification failed, but if the brain were simultaneously irritated by an intracerebral injection of sterile saline infection occurred. If the saline were injected into the spinal cord skin scarification did not lead to localization in the central nervous system.

The guineapig is susceptible, but the period of incubation is far more variable than in the rabbit. The longest period observed was 130 days. Rats are susceptible, but young ones are far more resistant than old ones. Mice are more resistant than rats.

Passage through rats or guineapigs appears to exalt the virulence of the virus for the rabbit.

Successful inoculations into monkeys were made (*Macacus rhesus*).

In infected rabbits the authors find the lesions described by other writers in the central nervous system, but also infiltrative and degenerative changes in the spinal ganglia and peripheral neuritis.

It is possible to confer a durable immunity upon rabbits by intracerebral inoculation with attenuated virus.

A fuller account of the disease is promised in a complete memoir.

NURNI (K.) & AOKI (M.). **Experimental Studies on Osteomalacia in the Horse. Second Report. Etiological Significance of Calcium Deficiency in the Diet. Part II.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Dec. Vol. 6. No. 4. pp. 345–359. With 4 plates.

In a previous report the authors showed that osteomalacia could be induced by a diet comprising barley alone. In the experiments recorded here two groups of horses were used. To one of these a diet of barley was given, while the other received in addition calcium salts. The animals were not exercised and were deprived of sunlight. The content of the blood serum in calcium and inorganic phosphorus, and the calcium, phosphoric acid and magnesium contained in the urine and faeces were ascertained. After post-mortem examination ribs were subjected to chemical analysis.

The metabolism of the horses fed upon barley only showed profound changes as evidenced by the analysis of the urine and faeces, while the addition of calcium carbonate to the diet of barley resulted in the metabolism being normal.

ROSE (A. L.). **Osteomalacia in Cattle in New South Wales.**—*Australian Vet. Jl.* 1927. Dec. Vol. 3. No. 4. pp. 122–127.

Osteomalacia occurs enzootically in New South Wales, and analyses of soils and grasses have shown that the phosphoric acid content of these is definitely lower in areas where osteomalacia occurs than elsewhere.

"Bone-chewing" as seen in Australia is the first symptom of osteomalacia, but the depraved appetite also shows itself by the chewing of things other than bone.

The disease is always more manifest in milking cows than in other stock, the drain on the animal's system affording a natural explanation of this. The deficiency shows itself, as is also to be expected, in the calves.

The evidence regarding the seasonal occurrence of the disease is conflicting, but generally speaking, it is most marked in the coastal areas in late winter and early spring. Rainfall does not appear to be a determining factor.

The geographical distribution of the disease cannot as yet be defined with certainty, but there is more information regarding this in connexion with the coastal areas which have been farmed for milk for many years than in the inland pastoral districts. The disease is most evident in the granite districts, and least in the basalt and volcanic areas. All flat river country is sound.

The post-mortem reveals lesions in the bones only, and it is noticeable that although the ribs are not weight-bearing bones they are frequently the site of fractures. After the ribs the defect is most pronounced in the transverse processes of the lumbar vertebrae, the pelvic bones, and those of the limbs. The sequelae may be mechanical in origin, such as choking with pieces of bone or other foreign body, pericarditis and pleurisy following the swallowing of nails, wire, etc., and, finally, parabotulism.

It has been suggested that sterility may result from phosphorus deficiency, but field inquiries do not tend to support that view.

Preventive and curative measures involve the supply of the deficiency in the diet whether that be phosphorus or lime or both.

The ideal way of combating the disease is by top dressing with superphosphate at the rate of one hundredweight per acre. This not only affects the health of the animals, but ensures an abundance of better feed and increases the carrying capacity of the farm. All fodder crops should also be dressed with superphosphate. If superphosphate is not used a ration of 2 lbs. of bran per day will prevent bone chewing. Alternatively, a lick containing the required minerals may be provided, and bone meal is the best form in which to supply these.

PHISALIX (M.). Indépendance des propriétés antirabiques et antivenimeuses du sang des Couleuvres Aglyphes appartenant au genre *Coluber* Lin. [**The Independence of the Antirabic and Antivenom Properties of the Blood of Snakes belonging to the Genus** *Coluber.*] —*Bull. Soc. Path. Exot.* 1927. Dec. Vol. 20. No. 10. pp. 986–988.

Madame Phisalix has compared the serum of *Coluba helena*, *C. porphyriacus*, *C. aesculapii* and *C. scalaris* from the point of view of their venom, antivenomous and rabicidal properties.

She finds that the powers are independent.

STOCKMAN (Ralph). **Soya Meal as a Cattle Food.**—*Jl. Comp. Path. & Therap.* 1927. Dec. Vol. 40. No. 4. pp. 266–273.

In 1916 Stewart STOCKMAN reported on a fatal outbreak of illness in cattle which he attributed to feeding upon Soya bean meal from which the oil had been extracted. The matter was left in a somewhat indeterminate condition.

The subject has been taken up again by Ralph Stockman, who has carried out experiments with guineapigs and rabbits.

Before resorting to animal experiment a very thorough chemical examination was made of the beans and meal used. No alkaloids or other active principle and no poisonous albumose could be detected. The beans used contained 20 per cent. oil, 4·4 per cent. ash, and the meal 1·1 per cent. oil, 10·5 per cent. water, and 5·6 per cent. inorganic ash.

Emphasis is laid upon the fact that guineapigs are especially susceptible to scurvy and require large quantities of anti-scurvy vitamin, while rabbits have so far proved to be immune to scurvy on any experimental diet.

Both rabbits and guineapigs become emaciated very rapidly if suitable proteins are not supplied in sufficient amount, but in the absence of growth promoting vitamins (A and B) the most favourable ration fails to serve its purpose and nutrition and health suffer. While the results obtained with one species of animal upon a certain diet cannot be held to be applicable to other species on the same diet certain helpful indications may be gleaned from such experiments.

Guineapigs, when fed exclusively on soya beans or meal, died in two to five weeks from malnutrition and showed lesions of scurvy. Rabbits died in two to three months, but there were no lesions of scurvy.

In comparative experiments made with oats, lathyrus grains, and bran, death took place in guineapigs in about the same time, but signs of scurvy were exceptional.

Rabbits fed upon lathyrus throve, while those fed on bran lost weight and died of inanition. There was no evidence of scurvy.

Reckoned as protein, fat, carbohydrate, and salts these substances appear nourishing, but there must be some inherent defect in them which renders them insufficient as diet. By the addition of anti-scorbutics, such as orange juice, or cabbage juice, to the soya diet, scurvy was prevented in guineapigs, but death occurred as before.

Germination of soya beans also prevented the development of scurvy, but did not make the beans a diet that would maintain health. Fresh cabbage added to soya beans made a proper diet, but boiled cabbage failed to correct the defects of the soya. The fresh cabbage must contain a nutrition promoting substance. This substance was found by experiment to be absent from substances containing vitamins A, B and D, orange juice (vitamin C).

The protein of soya bean, although unsuitable for rabbits, and proteins of cereals, beans, soya, turnips and potatoes have been shown to contain too little of the amino-acids lysin, cystin and tryptophane. So far as guineapigs and rabbits are concerned these deficiencies can be made good by the addition of fresh cabbage.

In the cases recorded by STOCKMAN (S.) scurvy was produced and was the cause of death. The diet was soya meal, oats, bran, and hay. The fact that the animals fed on grass in the open for a short time daily does not invalidate this conclusion. The grass feeding occurred in the winter, when there would be no antiscorbutic weeds.

The fact that pigs and sheep did not suffer is explained by the fact that the diet was suitable to their needs, and they are not liable to develop scurvy.

The absence of cases in cows not in milk is explained by the fact that antiscorbutic vitamin is excreted in milk.

SEDDON (H. R.). **Bone Chewing and Carrion Poisoning (Osteophagia and Botulism and Parabotulism).**—*Australian Vet. Jl.* 1927. Dec. Vol. 3. No. 4. pp. 136–141.

In this paper the author deals briefly with the conditions governing the appearance of bone chewing. Analyses are given showing the $P_2O_5$ present in the soil and vegetation in affected and non-affected areas.

Tabular statements show the results of experiments in which calves were fed with and without bone meal, and after a time the rations were changed over, those which had the bone meal at first being deprived of it, and those which did not have it receiving it. In each case there was a very marked increase in weight of those receiving the meal. The daily ration of bone meal was 30 grammes (about an ounce). In another experiment the effect was tried of bone meal alone as compared with bone meal together with salt and sulphate of iron. Controls received no minerals.

It was not evident that the addition of iron and salt had any effect.

The author reviews the investigations which led to the incrimination of the *B. parabotulinus* as the determining cause of the paralytic symptoms following the ingestion of bones and decomposing animal matter. Cases of carrion poisoning occur without antecedent osteophagia. Botulism has been observed in horses fed with hay or chaff from mouse-infested stacks, and it has been shown that dead mice in such stacks furnish the conditions necessary for the growth of the bacillus.

BARLOVATZ. Les petits grossissements en microscopie pratique. [**Low Magnifications in Practical Microscopy.**]—*Bull. Soc. Path. Exot.* 1927. Oct. 12. Vol. 20. No. 8. pp. 753–758.

Whereas in the laboratory the microscope is used for the thorough examination of organisms, its use in general diagnostic work is something quite different. Here the aim is the rapid detection of organisms whose presence is suspected. In the field, where large numbers of examinations have to be made, minutes are of importance.

Clearly in the examination of any preparation the more fields that have to be searched the longer the time necessary, and the rapidity with which a specimen can be searched is inversely proportional to the square of the diameter of the field of the microscope, provided, of course, that the time necessary to search individual fields remains constant. When it is necessary to search the fields carefully for the detection of parasites the saving is less obvious than when parasites can be detected at a glance. If the magnification be reduced still further the parasites may be readily recognizable when found, but it may be difficult to detect them. Another advantage of working with low magnifications is that they entail less fatigue to the eyes.

When the light is poor it is easier to work with low powers than with high ones.

By the use of two huygenian oculars (I and IV) and two objectives (No. 3 and No. 6) it is possible to get a range of four magnifications which are appromately 50, 100, 225 and 450. For the great majority of intestinal parasites a magnification greater than about 100 is not necessary. The eggs of helminths and protozoa can be detected readily in the faeces under this power.

Malarial parasites, and particularly in thick films do not require a magnification higher than 225, if the preparations are well stained.

It is rather more difficult to detect trypanosomes in gland juice, and, further, in such preparations trypanosomes disappear rapidly. It is a constant rule that if a slide be examined twice with an intervening interval of 5 minutes, fewer trypanosomes will be found at the second examination than at the first.

Examinations of moist preparations have shown that the number of trypanosomes detected in a given time is approximately the same whether the magnification be 225 or 450. With a magnification of 100 the number detected is fewer. If cells are numerous in the films the figure given by a magnification of 100 only will be still smaller.

A magnification of about 200 is also recommended for the enumeration of leucocytes in cerebro-spinal fluid.

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## REPORTS.

VELU (H.) & BALOZET (L.). Rapport sur le fonctionnement du Laboratoire de Recherches du Service de l'Elevage au Maroc pendant l'année 1927. [**Annual Report of the Research Laboratory, Morocco, for 1927.**] (Type-written copy.)

The research work has been hindered by shortage of staff, multiplicity of routine duties, and insufficiency of experimental animals.

*Rabies.* It has been found that the Japanese method of inoculation confers a certain amount of immunity upon dogs, provided the vaccine used is freshly prepared. The immunity is not sufficiently strong to permit the general use of the method in Morocco. But advantage has been taken of the immunity thus established to inject dogs with fresh fixed virus and thus establish a solid resistance.

*Blackquarter.* An outbreak occurred in the Ksiri region in which vaccinated animals died. It would appear that the strain responsible for this outbreak is a particularly virulent one.

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## REVIEWS AND NOTICES.

MALKMUS (B.). Grundries der klinischen Diagnostik der inneren Krankheiten der Haustiere. [**Clinical Diagnosis of the Diseases of Animals.**] 10th Edition. Bearbeitet von Dr. Th. OPPERMANN.—pp. vii+243. With 66 text figs. & 1 coloured plate. 1928. Leipzig: Dr. Max Jänecke, Verslagsbuchhandlung. [8·60 R.; Bound 9·50 Rm.]

That this book has passed through ten editions since it was first published in 1898 is evidence of its usefulness. Contrary to what is the case with some books, the successive editions have not very greatly increased in size, and the present volume is still literally a " handbook."

The primary object of the book is to ensure that diagnosis shall be based upon a collection of information ascertained by systematic examination of the patient, and it is pointed out that by proceeding in this it is possible to arrive at three kinds of diagnosis, namely, a definite diagnosis, a probable diagnosis, and a possible diagnosis.

The generalities of the subject are first dealt with, and in the later portions of the book the examination of the various organs and systems is dealt with in detail. The correct method of performing each examination is described and the significance of the various observations made explained. The illustrations are for the most part to the point. The diagrams indicating regional anatomy, in connexion with the information to be gained by percussion, are useful. A few of the illustrations are perhaps of less value, as for example, that showing the eggs of *Distomum hepaticum* in the faeces of the sheep (p. 153), and that showing a horse with chronic hydrocephalus (p. 197). In the section devoted to the detection of parasitic invasions it is noticeable that old nomenclature is still adhered to.

To the erratum that is given at the end of the index referring to the various degrees of fever in the horse, ox, and dog, there should be added one regarding the cellular content of the blood of the different domesticated animals, for on pp. 226–226 the figures for red and white corpuscles are given as for a cubic centimetre of blood instead of a cubic millimetre.

The book can be recommended strongly as being a good guide to that systematic examination which can alone lead to results which will stand.

A. Leslie Sheather.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 16.] September 1, 1928. [No. 3.

## DISEASES DUE TO PROTOZOAN PARASITES.

CURSON (H. H.). **A Note on the Trypanosomes of Nagana in South Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Aug. 31. Vol. 21. No. 2. pp. 109–112. [16 refs.]

Although the work of ROUBAUD and BRUCE has cleared up many of the difficulties regarding the trypanosomes of man and animals in Africa, the three types of trypanosomes responsible for nagana have not yet been recorded in the four territories south of the Zambesi, where glossinae are found. All these, namely *T. congolense*, *T. vivax*, and *T. brucei* occur in Zululand, Bechuanaland, S. Rhodesia, and Mozambique.

*Zululand.*

*T. brucei.**—The organism, originally sent to England in a dog by BRUCE in 1895, was not, as was thought at the time, the strain responsible for nagana in cattle, but one which it is now known is exceedingly pathogenic for equines and canines.

*T. congolense.*—This trypanosome is now known to be responsible for the majority of cases of nagana in cattle. It is probable that BRUCE saw *T. congolense*, as in one of the plates of his original report trypanosomes suggestive of this type are shown. Curson states that he has encountered a particularly virulent strain of *T. congolense* in the pig, reminding him of *T. simiae*, Bruce.

*Bechuanaland Protectorate.*

*T. congolense.*—The occurrence of trypanosomes of this type was recorded by ANDREWS in 1912.

*T. vivax.*—Was recorded by Curson in 1925.

*T. brucei.*—In blood smears from fly-struck dogs Curson found *T. brucei* in December, 1926.

*Southern Rhodesia.*

*T. brucei.*—According to SINCLAIR (1927) this parasite was first found in donkeys by BEVAN in 1905, but BEVAN did not make this clear in papers published in 1910 and 1912.

* It appears to be clear from BRUCE'S report that he was aware that the trypanosome sent to England in the dog was more virulent for horses and dogs than cattle. [Ed.]

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*T. congolense.*—Was also first recognized by BEVAN in 1909.

*T. vivax.*—Was seen by BEVAN in 1913, and *T. caprae* in a goat. (SINCLAIR, 1927).

*Mozambique.*

*T. brucei.*—BOTELHO (1927) states that *T. brucei* was first recorded by SANT' ANNA in 1908.

*T. congolense* was recorded by THEILER in 1909. *T. vivax* was recognized by Curson in 1925. JOWETT first saw *T. vivax* in Mozambique in 1910, but failed to identify it as he was dealing with a mixed *congolense-vivax* infection.

CURSON (H. H.). **Meteorological Conditions and the Seasonal Prevalence of Nagana in Zululand.**—Reprint from *S. African Jl. of Sci.* 1927. Dec. Vol. 24. pp. 377–381.

The author gives the general impression regarding the prevalence of nagana by quoting HUTYRA and MAREK 1922: "In accordance with the part played by glossina, the disease (nagana) prevails, usually in moist low-lying areas, in the warm time of the year during the wet season. Domesticated animals are infected chiefly during the day while in the vicinity of swamps, pools, ditches and rivers."

The object of this paper is to point out that although stock may be bitten by glossinae during the wet season, in Zululand the disease manifests itself chiefly during the dry season.

During 1921–23 the author recorded observations regarding rainfall, temperature, humidity, sunshine, barometric pressure, cloud, etc.

There are three topographical regions in Zululand—Lowlands, Midlands, and Highlands. The latter are free from glossina as they are free from bush. The main factor in the seasonal occurrence of nagana is the deterioration of pasture, which occurs during the dry season. The prevalence of the disease is influenced not so much by the total annual rainfall as by the monthly records.

In Zululand the wet period is from October to March, and the dry season April to September. The further from the coast the greater the rainfall during the wet season. Rainfall, temperature and humidity are interdependent, and records show that most of the cases of nagana are diagnosed during the period April to September. The disease disappears after the onset of the spring rains (i.e., October). This marks the improvements in the pastures, particularly as regards their nutritional value.

SCHWETZ (J.). Notes sur les trypanosomiases animales du Haut-Katanga. [**The Animal Trypanosomiases of Upper Katanga.**]—*Ann. Soc. Belge de Méd. Trop.* 1927. Nov. Vol. 7. No. 2. pp. 135–145. [2 refs.]

During 1925 and 1926 there was no case of trypanosomiasis encountered in animals in the neighbourhood of Elizabethville, and this was no doubt due to the disappearance of tsetse flies, and particularly of *G. morsitans.* Outbreaks, however, occurred at some distance (85 kilometres or more) from the capital.

In two instances *T. congolense* was found. Neither the examinations of the herds, nor the treatment (with tartar emetic and atoxyl) were carried out in a systematic manner, and consequently the records are

not given. The reasons for this were, lack of time and personnel, and distance from headquarters.

Certain points, however, may be observed. In the first place, there appears to be a marked difference in the resistance offered by indigenous cattle to that offered by pedigree animals.

With one or two exceptions trypanosomes were always scantily present in both gland juice and the peripheral blood. Consequently there is no doubt that some animals which were in reality infected escaped detection.

Tsetse were very rare in the areas in which the outbreaks occurred, but *G. palpalis* was found in one, and *G. morsitans* in the other. There was possibly also direct transmission by Stomoxys and Tabanus. Treatment, as has been said, was carried out very irregularly, but it is noted that only one-quarter of the animals survived.

*T. theileri* was found in a number of blood smears from these animals.

Examination of blood smears of a number of wild animals has failed to reveal a single trypanosome in any of them.

WALRAVENS (P.), VAN SACEGHEM (R.), NOKERMAN (E.) & MISSAL (F.). Contribution à l'étude du *Trypanosoma rodhaini*. [**Study of** *Trypanosoma rodhaini*.]—*Ann. Soc. Belge de Méd. Trop.* 1927. Nov. Vol. 7. No. 2. pp. 171-173.

The authors describe cases of trypanosomiasis in two pigs due to the parasite which they have named *T. rodhaini*.

The symptoms presented were dullness, loss of appetite, temperature about 40° C., constipation and weakness of the hind legs. Respiration was laboured.

Actively motile trypanosomes were found in the blood.

The animal died about three weeks after it was seen to be ill.

At the post-mortem examination the precrural gland was found to be enlarged and oedematous; there was pleural effusion and evidence of chronic pleurisy. The liver was degenerated. The stomach showed intense inflammation and the spleen was enlarged; there was intense lobar pneumonia, with encapsuled abscesses. A pig, the blood of which was examined four times without trypanosomes being discovered, was inoculated with blood from the above animal. Trypanosomes appeared on the fourth day and death took place a week later.

At the post-mortem there was found exudate of blood in the muscular coat of the stomach round the pylorus. The liver was enlarged and there was slight but diffuse inflammation of the caecum and large intestine.

A rabbit, a guineapig, and an ox inoculated with blood, failed to become infected.

A cercopitheque monkey inoculated with blood from the naturally infected pig, was found to be infected on the 5th day, but presented no symptoms. A month later symptoms of extreme depression developed and death occurred a fortnight later.

An excess of pericardial fluid was the only lesion found.

Nothing is known regarding the method of transmission, but the authors are certain that it can take place in the absence of glossina.

The authors are of the opinion, which is contrary to that held by HORNBY, that *T. rodhaini* cannot be confused with *T. uniforme*, Bruce.

Apart from morphological differences the trypanosome is not pathogenic for cattle, whereas *T. uniforme* is, and the latter has not been shown to be pathogenic for the monkey.

KELSER (R. A.). **Transmission of Surra among Animals of the Equine Species.**—*Philippine Jl. Sci.* 1927. Oct. Vol. 34. No. 2. pp. 115–141. With 2 plates.

The author briefly reviews the literature regarding the transmission of surra and then details experiments in which *Stomoxys calcitrans* (laboratory bred), *Lyperosia exigua* (laboratory bred), *Tabanus striatus*, Mosquitoes (*Aëdes aegypti*), Ticks (*Boophilus australis* and *Dermacentor reticulatus*) were used.

The fullest work was done with *T. striatus*, as a natural outbreak occurred among army horses near Manilla, and full details of their movements, contacts, etc. were obtainable.

For the detection of carriers among carabaos, Kelser used the complement-fixation test, using an antigen prepared in the manner described by WATSON for the diagnosis of dourine.

The author concludes that in the Philippines surra is mechanically transmitted by *T. striatus* to horses, but the possibility is not denied that there may be a cyclical transmission among animals which may act as reservoirs for the virus.

When a horse becomes infected the disease is spread to others by mechanical infection.

COLLIER (W. A.). Sind Trypanosomen filterpassierbar? [**Are Trypanosomes Filterable?**]—*Deut. Tierärzt. Wochenschr.* 1928. May 26. Vol. 36. No. 21. pp. 363–364.

The author finds no evidence that *T. equinum* either in blood or organ emulsion are capable of passing through Seitz filters.

DAVIS (L. J.) & BROWN (H. C.). **The Adhesion Phenomenon, a Specific Serological Reaction occurring in Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Aug. 31. Vol. 21. No. 2. pp. 113–124. [16 refs.]

In 1917 RIECKENBERG working with *T. brucei* showed that the blood of rats which had recovered from an infection or had been cured caused masses of blood platelets to become adherent to trypanosomes *in vitro*. He found that the reaction was specific, not only for the species of trypanosome, but also for certain strains employed. He was able to differentiate starting and relapsing strains.

KRITSCHEWSKI and TSCHERIKOWER (1925) using *T. equiperdum* found that the specific character of the reaction did not reside in the platelets. They considered that the reaction depended upon a specific principle in the fibrinogen (thrombocytobarin) as the reaction took place with plasma and not with serum. The antibody is thermostable, and the reaction requires the presence of complement.

These authors later found (1926) that the antibody could be produced by dead trypanosomes, and that immune plasma could be diluted to a considerable extent without weakening the reaction. They could not get the reaction with serum expressed from blood clot, but they obtained it with serum from defibrinated blood and with citrated plasma.

KRAUTZ worked with *Treponema duttoni* and found that the rôle played by the platelets was mechanical and that bacteria would serve as indicators equally well. Serum from clotted blood gave a definite reaction with this organism.

YAKIMOFF (W. L.), AMANSCHULOFF, ARBUZOFF, SCHURAVLEFF, & CHERNOMORSKOFF. Versuch der prophylaktischen Anwendung von Naganol (Bayer 205) bei Trypanosomose der Kamele. [**The Use of Naganol as a Prophylactic in Camel Trypanosomiasis.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Nov. Vol. 31. No. 11. pp. 536–541.

Examination of the blood of some 11,000 camels in the Ural (since 1923) has shown that on an average 25 per cent. are infected with trypanosomiasis and that in some districts the percentage is as high as 40.

Originally the disease occurred along the Ural River only, but of recent years it has spread to other districts.

Treatment of infected camels with naganol has not prevented the spread of the disease. The prophylactic value of naganol was tested on four sets of premises where the natural conditions varied. In each case some of the camels were injected with naganol and an approximately equal or a rather smaller number were kept as controls. The dose used ranged from 5 to 10 grammes and it was injected either subcutaneously or intravenously. After the injection of the drugs the camels were allowed to mix with others in the district. Examination of over 500 of these animals showed that about 10 per cent. were infected. In all, 53 animals were treated, and 33 were kept as controls.

Subsequently the camels were examined at intervals, and the conclusion was drawn that naganol protects for about 3 months.

A dose of 6 grammes appears to be effective.

MOSCKKOWSKI (Sch.). Zur Frage des Wirkungsmechanismus von Germanin (Bayer 205) auf Trypanosomen. [**The Mechanism of the Action of Bayer 205 on Trypanosomes.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Nov. Vol. 31. No. 11. pp. 541–552. [13 refs.]

The experiments were carried out with *T. brucei* and the trypanosome of the camel disease Su-auru.

The first series of experiments was designed to discover whether the action of 205 is such that it hinders the process of division of the trypanosomes.

Blood smears were examined at intervals before and after treatment of guineapigs and mice, and 500 trypanosomes were examined. These were grouped according to the appearances they presented into ten groups, (1) normal trypanosomes, (2) double blepharoplasts, (3) 2 nuclei, (4) 2 nuclei, 2 blepharoplasts, (5) twin parasites, (6) almost completely divided, (7) triple parasite, (8) 3 nuclei and 3 blepharoplasts, (9) parasite without blepharoplasts, (10) bizarre forms.

Tabular statements show the results obtained with 9 guineapigs. There is no evidence of an increase in the percentage of dividing forms after treatment. A small series of experiments was carried out to test the view which has been expressed by MAYER & ZEISS and others,

that trypanosomes which are present on the day following treatment have lost their virulence. No evidence confirming this view was obtained. Possibly it is a matter of dosage.

In connexion with the trypanosome of Su-auru experiments were carried out to test the effect of " Bayer 205 " *in vitro.*

In a concentration of 1 per 1,000 the drug was found to be responsible for a prolongation of the period of incubation, the exposure to the drug lasting half an hour.

There appeared to be little or no difference between the amounts required to sterilize *in vitro* and *in vivo*, as the dose necessary to sterilize the blood of infected guinea pigs was about $\frac{1}{3000}$ of the animal's weight.

If a sufficiently large dose be not employed for the treatment of infected guineapigs the acute phase of the disease is survived and it passes into a chronic form, death taking place, often without parasites being discoverable in the blood, with general symptoms of cachexia and paralysis.

VAN HOOF (L.). Therapeutique de la maladie du sommeil et des trypanosomiases animales africaines. [**The Therapeutics of Sleeping Sickness and Trypanosomiasis of Animals in Africa.**]—*Bull. Agric. Congo Belge.* 1927. Sept. Vol. 18. No. 3. pp. 376–416.

This paper is in the nature of a review of the drugs which have been tested in the treatment of human and animal trypanosomiases.

THEODOR (Oskar). **On the Occurrence of a Non-Pathogenic Trypanosome in the Goat and its Transmission by** *Lipoptena caprina* **Austen. Preliminary Note.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Mar. 31. Vol. 21. No. 6. pp. 489–490.

The parasite was discovered by cultivating goat's blood in Myajima's blood broth, with dextrose added, but originally the question as to whether goats harboured a trypanosome in their blood arose on account of the discovery of crithidia in the gut of *Lipoptena caprina*—the Hippoboscid living on goats.

Cultures were positive after 7 days' incubation, and the flagellates measured 20 $\mu$ to 45 $\mu$ by 2 $\mu$ to 4 $\mu$. Only a few were trypanosomes, the majority being crithidia with well developed undulating membranes.

The relationship between the flagellates in the insects and in the goats was established by using laboratory bred flies, and also flies raised from pupae of wild flies. In both naturally infected flies and in flies infected on goats, the flagellates were found in the lower third of the mid-gut above the pyloric valve. In exceptionally heavily infected flies, the whole gut was involved up to its narrow anterior part. No parasites were found in the mouth or oesophagus. The organisms were in crithidial form and ranged from 11 to 34 $\mu$ in length, and they were attached by their flagellar end.

In the hind gut free and attached forms were found. The latter were short pyriform bodies 4 to 7 $\mu$ in length.

Two young goats which gave negative culture during one month's observation, were fed on an emulsion of wild infected flies. Eleven days later blood culture of one of these yielded a positive result.

PARROT (L.), DONATIEN (A.) & LESTOQUARD (F.). Notes expérimentales sur le bouton d'Orient et sur la leishmaniose canine viscérale. [**Experimental Notes on Oriental Sore and Canine Visceral Leishmaniasis.**]—*Arch. Inst. Pasteur d'Algérie.* 1927. June. Vol. 5. No. 2. pp. 120–130. With 9 figs. on 4 plates.

The greater part of this paper deals with experiments in connexion with the transmission of oriental sore to macacus, attempts to vaccinate macacus against the parasite and a study of the immunity conferred by a first attack of leishmaniasis. The last and shortest section of the paper describes experiments in which the virus of cutaneous leishmaniasis and that of visceral leishmaniasis of the dog are compared. In the experiments with monkeys the infective material has been obtained from mice inoculated intratesticularly, and the monkeys have been inoculated intradermally on the forehead. Proceeding in this way, eleven monkeys have been infected without difficulty.

The period of incubation ranged from 7 to 17 days, and the lesion persisted for two to 5½ months. The same series of changes was observed in every case. The lesion first developed as a papule, and then became converted into a nodule about as large as a pea. This was not adherent to the subjacent tissues. Desquamation and crust formation then occurred at the surface. The incrustation covered a round or oval ulcer with raised margins. Subsequently cicatrisation occurred under the scab.

In one instance there was slight extension of the lesion with the formation of secondary nodules.

In experiments designed to confer immunity it was found that the subcutaneous injection of virus killed by heat at 56° C. for half-an-hour, was quite useless, and similar results followed the intradermal inoculation of killed virus.

Five monkeys were used in experiments to test whether recovery from an experimentally produced infection left any immunity. Two which had recovered a month previously failed to become infected when re-inoculated. Two which had recovered one month and four months respectively developed abortive lesions, and one which had recovered two months previously, developed normal lesions when re-inoculated.

Three monkeys were inoculated intradermally with virus from visceral lesions from dogs, and the result was the development of a cutaneous lesion. This, however, did not progress to ulceration as in the case of lesions produced by virus of human origin.

Cross immunity tests indicated that the canine virus immunizes to some extent against the human virus, the second inoculation leading to the development of an abortive lesion only. A previous attack of cutaneous leishmaniasis was found not to immunize against a subsequent inoculation with canine virus.

HEGNER (Robert) & RATCLIFFE (Herbert.). **Trichomonads from the Mouth of the Dog.**—*Jl. Parasit.* 1927. Sept. Vol. 14. No. 1. pp. 51–53. With 1 text fig. [1 ref.]

The authors describe and figure a Trichomonad found in the mouths of 22 out of 23 dogs, at the laboratory kennels. The animals were kept in separate cages, but during cleaning of the cages they were allowed to come into contact with each other. It is suggested that the

parasite was spread in this way. Twenty specimens from each of three dogs were examined and these showed no significant differences. The organism appears to be distinct from that occurring in man, and the name *Trichomonas canistomae* is suggested.

SERGENT (Edm.), DONATIEN (A), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Etudes expérimentales sur les piroplasmoses bovines d'Algérie. [**Experimental Investigations of the Bovine Piroplasmoses of Algeria.**]—*Ann. Inst. Pasteur.* 1927. July. Vol. 41. No. 7. pp. 721–784. With 23 figs.

In a paper which appeared in the Annales of the Pasteur Institute in 1924, the authors published the results of their first systematic investigations of the bovine piroplasmoses occurring in Algeria. The conclusion arrived at was that five types of disease occur, namely :—

(1) True piroplasmosis due to *P. bigeminum* ; (2) Babesiellosis caused by *B. berbera*, n. sp. ; (3) Anaplasmosis caused by *A. marginale* ; (4) Theileriasis due to *T. dispar*, n. sp. ; and (5) Infection with *Gonderia mutans*. The last of these was held to be non-pathogenic.

Typically the first three of these are characterized by an acute primary attack and a prolonged stage of chronic infection during which the animals are in a "premunized" condition. Theileriasis is characterized by an acute attack which confers a true immunity, and by complete recovery. Infection with *Gonderia* generally leads to a chronic afebrile condition, and involves neither immunity nor premunition.

The authors have formed the opinion that although the method requires perfecting, vaccination against the piroplasmosis has been tested on a sufficiently large scale to warrant its application.

I. Piroplasmosis due to *P. bigeminum*.—The authors confirm their previous finding that they can isolate this organism by rapid animal passage, e.g., five passages within 3 weeks. They also find that intravenous inoculation in series exalts the virulence, while subcutaneous inoculation leads to attenuation.

Trypanblue is the drug *par excellence* for the treatment of the condition, but the classical dose of 1 g. per 100 kg. body-weight may cause alarming symptoms. These are in proportion to the number of parasites present and the size of the dose, and are apparently due to the liberation of toxin. It is therefore inadvisable to push dosage to a maximum, but to give doses which will check multiplication to a degree sufficient to allow the animal to make a recovery without attempting to produce complete destruction of the parasites. The authors find that much smaller doses effect this. For animals weighing from 200–300 kg., 10 to 20 centigrammes of the drug are sufficient to control the severe symptoms. Further, intravenous injections of such doses cause far less staining in the tissues. Finally, the administration of the smaller doses is much simpler as the quantity of solvent is only about 20 cc. and a syringe can be used.

The condition of premunization lasts from about 15 to 22 months, and the resistance is very marked.

Cross immunity tests show that strains of *P. bigeminum* from different parts of Northern Africa protect against each other.

The production of immunity by natural infection has led to the investigation of methods for immunization by intervention.

It is the authors' experience, based upon thousands of observations, that great risk attaches to the immunization of animals with blood taken from an infected animal during the acute phases of infection, or even up to three months after the acute stage since a severe attack may be set up. The reaction obtained is satisfactory if the blood be drawn from the infected animal eight months after the acute attack. If an interval of 20 months has elapsed the virus may not be present in the blood in sufficient amount to produce immunity with certainty. If the reaction which occurred when the virus producer became infected was a weak one, the question of the interval elapsing between attack and the withdrawal of blood for immunizing purposes is of less importance. In this connexion it is noted that trypanblue is a valuable aid to checking the severity of the attack of the disease, so that one may have on hand, so to speak, virus producers in which the disease was kept in check to the requisite degree by means of the drug.

The subcutaneous path is that selected for the injections. By other routes immunity may be established, but they are open to objections of a practical nature.

By experiment it has been found that a suitable dose lies between 1 and 10 cc.

II. Babesiellosis.—This disease, it is generally agreed, cannot be controlled by the use of trypanblue; the drug is in fact without effect upon the parasite.

Conditions regarding the production of immunity are parallel with those obtaining in connexion with *P. bigeminum*, and recovery from an attack leaves a durable immunity.

For vaccination purposes blood should be withdrawn from the donor three or four months after the attack. A precaution must be taken in drawing blood for vaccination purposes. It is well known that Babesiella may be present in large numbers in the organs, and if a large amount of blood be withdrawn this may lead to an increase in the number of parasites in the blood and in consequence in the immunizing dose.

*Piroplasma bigeminum* and *Babesiella berbera* retain their vitality outside the body in citrated blood for several days. Thus vaccine blood can be sent out from laboratories for use in the field.

III. *Anaplasma marginale.*—This organism can be obtained in a state of purity from blood containing other protozoa by passage through the sheep as indicated by LIGNIÈRES. The authors have however, encountered cases of pure anaplasmosis in bovines in Algeria.

The period of incubation in anaplasmosis may vary in experimental cases. In one instance of an animal inoculated with ·2 cc. of blood taken from a chronic case the period was 80 days. As a rule when an acute attack of anaplasmosis occurs during an acute attack of one of the other piroplasmoses the latter disappear from the blood and reappear when the acute stage of the anaplasmosis is over.

It has not been found possible to transmit anaplasmosis to either the donkey or the goat, nor does the virus survive in them. In a few cases sheep inoculated with anaplasma have retained the parasite in their blood for a short time (up to two months).

On the grounds of experimental results which the authors describe, they conclude that the Algerian strain of anaplasma is identical with the Argentine strain.

So far no satisfactory treatment of anaplasmosis has been discovered. An attack confers immunity, or, as the authors describe it,

" premunizes." A re-inoculation may cause a multiplication of the parasites in the blood, but there is no fever or systemic disturbance. The " premunized " state lasts at least 21 months.

Contrary to what is the case in piroplasmosis and babesiellosis, it is not always a certain method of immunizing to inject an animal with blood from a chronic case. The inoculation may fail to cause any infection. The authors find that the severity of an attack of anaplasmosis produced experimentally depends upon the stage at which the parasite is in the blood used. The sooner the blood is taken after inoculation, i.e., during the period of incubation, the less severe the reaction in the animal inoculated. Further the severity of the attack is influenced by the period during which the virus is stored before use.

The authors consider that the best time at which to take blood for premunization is the 5th or 6th day after the donor has been inoculated. At a temperature of 12–21° C. the virus retains its vitality for about 3 days outside the body. It can thus be despatched from laboratories for use in the field.

A few experiments have been carried out in which the " vaccine " blood was exposed to a solution of methylene blue for varying periods prior to use. While some information was obtained that the effect was to reduce the virulence of the blood the results were not constant.

IV. Theileriasis.—The authors have succeeded in isolating *T. dispar* both by rapid passage *in vivo* and by the use of trypanblue when it was associated with *P. bigeminum.* The purity of the strain is tested by re-inoculating with other piroplasms after recovery. The test virus must be taken as nearly as possible at the acute stage of infection.

In their original account of *T. dispar* the authors stated that the infection closely resembled that due to *T. parva* in that the immunity conferred was a complete one and that the parasite disappeared completely from the immune animal's body. They now change their view in that connexion. They believe that the virus may persist for months in the bodies of infected animals either before or after an acute attack without causing any clinical manifestation. They have come to the conclusion that the resistance offered by recovered animals is dependent upon a condition of chronic infection. In their recent experiments the authors found that the period of incubation varied from 12 days to 13 months, and that it was inversely proportional to the amount of virus used. Their description of the evolution of experimental theileriasis therefore requires emending.

If the virus be taken during crisis the attack resulting from inoculation with it is an acute one, and the period of incubation varies from 12 to 24 days. This result is so constant that the authors suggest that virus taken at this stage should be called " fixed virus." There are, however, very occasional exceptions to this in which the attack resulting from inoculation with blood taken at the onset of the disease is delayed in its development. Conservation of the " fixed virus " for periods ranging up to 48 hours before using it for inoculation causes prolongation of the period of incubation.

Inoculation with blood taken during the incubation period or during the chronic phase which follows the primary attack causes infection with, as a rule, a very long period of incubation.

Experiments show that the virus persists up to four months after an acute attack. If the blood be taken for inoculation of other animals during either the incubation period or the post-febrile chronic stage, the virus may remain " latent " in the animals and produce an

acute attack after a period of incubation which is generally prolonged. It may be as long as 13 months. The authors state that these long periods are not to be explained upon the supposition that the attacks are actually due to infection by means of ticks accidentally introduced.

No relapse has ever been observed among the more than 500 animals which have recovered from theileriasis.

Puncture of liver, spleen and lymphatic glands during life and the examination of smears from the same organs after death show that blue bodies occur more frequently in the liver than in the lymphatic glands, and rather more frequently in the lymphatic glands than in the spleen. But in animals inoculated intravenously the bodies appear sooner and in greater numbers in the spleen than in the liver.

The detection of blue bodies in the peripheral circulation is characteristic of the acute stage of the disease, and indicates a probability that the attack will be a very severe and possibly fatal one. As a general rule "blue bodies" are discoverable in smears from organs during the febrile period only; they are absent or extremely difficult to find when the acute stage has passed.

Intracorpuscular forms are always found in severe attacks of theileriasis, but they may be absent in mild cases even though blue bodies are discoverable in smears from the organs, and the authors believe that the febrile attack is due to the multiplication of "agamonts" and the formation of "gamonts;" blue-bodies being in fact the essential pathogenic element in theileriasis.

Cases of theileriasis occur in which there is no apparent disturbance of health. Young bovine animals may have a high temperature, and parasites may be numerously present in their blood, and yet they appear to be in good health. It is quite certain that during the hot weather the actual number of cases of theileriasis is larger than an ordinary clinical examination reveals. Such cases are held to be responsible for the sudden deaths which occur not infrequently. Abortion is a common complication.

In cases of pure theileriasis haemoglobinuria, without haematuria, may occur.

Sometimes embolism of vessels by parasites leads to the production of areas of dry gangrene of the skin or of the eyes. The authors figure a case of the latter lesion. It has been noted that when the blood does not show a reaction—the appearance of anisocytosis punctate basophilia, nucleated red cells, etc.—the prognosis is bad.

A case of congenital theileriasis has been seen in a calf.

Nothing that is of any value for the treatment of the disease has, as yet, been found.

The authors give their reasons for believing that *Theileria dispar* is distinct from both *Gonderia mutans* and from *Theileria parva*.

It was thought at first that an attack of theileriasis due to *T. dispar* produced complete immunity, but further experiments lead the authors to conclude that this is not so, and that slight attacks may occur after re-inoculation. The chances of a reaction to second inoculation increase with the duration of the interval between the first and second inoculation. No reaction has been observed when that interval is less than four months, and it is very remarkable that far more second reactions have been produced by subcutaneous inoculation than by any other route. Provided the strain of virus used for the second inoculation is a virulent one, the dose does not appear to be of

any importance. It is particularly noted, however, that not all strains appear to be capable of setting up a second reaction.

It appears to be possible to establish a state of resistance by inoculating with a strain of low virulence. No success has attended efforts to attenuate viruses, and various attempts to modify the virus for immunizing purposes have not met with success.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les theilérioses bovines. Etude comparative de *Theileria parva* de l'Afrique du sud et de *Theileria dispar* de l'Afrique du nord. [**The Bovine Theileriases. A Comparative Study of** *T. parva* **of South Africa and** *T. dispar* **of North Africa.**] *Arch. Inst. Pasteur d'Algérie* 1927. June. Vol. 5. No. 2. pp. 161–187. With 5 figs.

This paper has appeared in a somewhat condensed form in the *Annales de l'Institut Pasteur*, and is summarized above.

THEILER (A.) & DU TOIT (P. J.). Theilériose sud-africaine expérimentale transmise par le sang. [**Experimental South African Theileriasis transmitted by Blood.**]—*Bull. Soc. Path. Exot.* 1928. Feb. Vol. 21. No. 2. pp. 121–132.

The authors received from SERGENT, prior to their publication, a copy of his reports regarding the experimental transmission of theileriasis by inoculation with blood.

In this paper Theiler and du Toit report the results of the repetition of certain experiments carried out by SERGENT and his collaborators. These include the following :—

1. Intrajugular inoculation.
2. Subcutaneous inoculation.
3. Intraganglionic inoculation.
4. Intradermal inoculation.
5. Intraperitoneal, intraganglionic and intradermal inoculation.
6. Intraperitoneal and intradermal inoculation.
7. Subcutaneous and intradermal inoculations.

SERGENT used 12 bovines in his experiments, and the result was positive in three instances only. In these cases the animals were inoculated by two or three paths.

Theiler and du Toit, considering the Northern African animals as being in all probability more susceptible than those of South Africa decided to use the same doses as those used by SERGENT, but to employ a larger number of animals for each test.

The history of the donors of blood for the experiments is first given, and then follow the details of the experiments.

Of four animals inoculated intraperitoneally, one died of East Coast Fever, one gave a doubtful reaction, and two survived. Three animals inoculated with blood taken on the 6th, 9th and 13th days were inoculated subcutaneously, intradermally, and into the glands.

None of these reacted. A heifer inoculated with blood taken on the 16th day had a temporary febrile reaction, the nature of which was not determined.

A heifer inoculated with the blood used in the first experiment contracted the disease and died.

Five animals were given transfusions of blood of 1,000 and 2,000 cc. and one was given 100 cc. from different donors. None contracted the infection.

Of seven animals inoculated subcutaneously with 250 cc. of blood, one only gave a positive reaction.

Ten animals were given intradermal inoculations of doses ranging from 2·5 to 10 cc. One contracted an infection which terminated fatally, which may have been East Coast Fever.

Four animals were inoculated subcutaneously, intraperitoneally, intradermally, and into the glands with blood taken on the 6th, 9th, 13th and 16th days. The last of these yielded a positive result after a period of incubation of 15 days; the fever lasted 11 days. Ten animals were inoculated subcutaneously and intradermally. Blood taken on on the 9th and 11th days gave negative results. Blood taken on the 6th and 15th days gave positive results. The animal inoculated with 6th day blood died and the other (15th day blood) recovered.

Of two animals inoculated in the same manner with 12th day blood of a different donor one gave a doubtful reaction and recovered, while the other gave a definitely positive reaction and was killed.

Four were inoculated with 10th day blood of another donor, and all gave positive reactions and one died.

In all, 48 animals were used, and of these 11 reacted. Five of the reactors died, five recovered and one was killed. There was one doubtful reaction among the remaining 37.

The method of inoculation which yielded the greatest proportion of successes was subcutaneous and intradermal. With this method infection occurred in 70 per cent. of the test animals.

It is suggested by the authors that this result may have been connected with the particular blood used because it gave positive reactions in every instance in which it was used even when the inoculation was a simple subcutaneous one. It would appear then that the controlling factor in the experiments was the blood used for inoculation, and in this case the blood was from an animal which had itself been infected by subcutaneous inoculation.

In the experiments in Northern Africa with a smaller number of animals success was obtained in 25 per cent. of cases, and the disease produced was less severe.

DIXON (R. W.). **Enquiry and Report into Conditions affecting African Coast Fever.**—*Rhodesian Agric. Jl.* 1928. May. Vol. 25. No. 5. pp. 522–536.

The author details a tour undertaken with the Chief Veterinary Surgeon, and gives a survey of the outbreaks that have occurred in the various districts since 1904. He suspects that Coast Fever has existed in two areas (Umtali or Melsetter and Bulawayo with Matodo and Umzingwane) ever since the disease was introduced in 1902, and that these centres have been responsible to a large extent for the spread of the disease to other districts.

He believes that the disease can be eradicated with three -and five-day dipping. The difficulty is to be perfectly certain of the detection of the last case in a district, for on this is calculated the subsequent period of 15 months' quarantine. The author holds that after release from quarantine, with regular and proper 7-day dipping a farm which was not actually free may remain infected for a year or even two.

Every area released from quarantine should be kept under exactly the same supervision as if it were infected for a further period of a year. If supervision is not maintained and a case occurs, it is generally not detected, and it is only the second or third case that is recognized. In the mean time, the infection may have been spread.

Fencing is of little or no practical value when once the disease has been detected. As a preventive measure fencing should go in advance of, and not follow a disease like East Coast Fever. Dixon holds that the Veterinary Staff should not be responsible for the superintendence of the erection of fences.

Slaughter is recommended where no facilities exist for regular dipping, and where outbreaks occur with heavy mortality in remote areas, but it is not practicable as a method of eradication for economic reasons. Dipping should be persisted in until the infection remaining has been reduced to a minimum. It might then be possible to complete eradication by slaughter.

DSCHUNKOWSKY (E.). Einige Bemerkungen ueber "Anaplasma." [**Some Observations regarding Anaplasma.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Dec. Vol. 31. No. 12. pp. 562–573. With 4 text figs.

The author puts forward the view that the name anaplasma is used for structures which are not all of the same kind.

He points out that bodies called Anaplasma have been variously recognized as : (*a*) nuclear remains ; (*b*) actual parasites (anaplasma) ; and (*c*) developmental stages of other parasites (Anaplasma and Theileria).

In the blood corpuscles of animals in a febrile condition, glistening rounded or oval bodies may be found. These the author believes to be parasitic in nature, and states that they can be transmitted to other animals by inoculation. These bodies do not take any stain and the author calls them "Achromatic Luhs bodies" or "Achroma Luhsi."

In tropical theileriasis the gamonts of *T. annulata* may be present in the circulating blood in anaplasma like forms, and they may undergo their schizogonous development. Ring-shaped parasites may therefore be schizonts or sexual forms.

The intracorpuscular parasites may lose their cytoplasm and thus appear as Anaplasma. These may multiply and produce a generation of anaplasmatic forms.

*T. annulata* loses its cytoplasm very readily.

The author holds that the name *T. annulata* should stand, and that the name *T. mutans* should be dropped as it is a synomym, and its continued use leads to misunderstanding. Similarly it is held that *T. dispar* is not other than *T. annulata*.

CARRÉ (A.). Toxémies parasitaires des Agneaux. Coccidiose aigue et paraplégie enzootique (Giardiose). [**Parasitic Toxaemias of Lambs. Acute Coccidiosis and Enzootic Paraplegia.**]—*Bull. Acad. Vét. de France.* Paris. 1928. Apr. Vol. 1. pp. 109–116.

As a general rule diseases due to animal parasites are chronic in type, but there are exceptions.

Coccidiosis of the sheep is generally described as a chronic condition causing progressive anaemia. It occurs in animals some months at least after weaning. At the post-mortem there are the usual lesions associated with anaemia and general cachexia and in the small intestine, which is alone involved,the localizations of the parasites in the mucous membrane are recognizable with the naked eye as small white spots.

The author describes cases of coccidiosis in lambs only one to two months old, i.e., before they are weaned.

At the commencement of an outbreak among young lambs one or two are generally found dead, without any symptoms having been observed. Careful observation of the flock on the move will reveal the fact that some of the lambs are lagging. Manipulation of the abdomen causes pain. There is no diarrhoea. Respiration is rapid, and the heart beats are " tumultuous." At post-mortem examination the carcase appears normal: there are no serous transudates, the heart and lungs are normal.

The small intestine appears pale in colour, and pink or yellowish in tint; the capillary arborizations are very distinct. On handling the intestine feels very stiff, and when it is divided, the walls are found to be so thickened that the lumen is almost occluded.

The contents are thick and almost pus-like, and have the appearance of digested milk. In reality they are composed exclusively of oocysts and desquamated epithelium. There is always marked albuminuria.

As the outbreak progresses the course of the disease becomes slower, but not less severe, and diarrhoea becomes a marked symptom.

Bacteriological examinations exclude other possible causes of death such as infection by way of the navel or from the intestine.

Under the name of cerebro-spinal meningitis (Savigné & Leblanc) and enzootic paraplegia (Moussu) there has been described a fatal disease of lambs, the nature of which has up to the present remained entirely unknown. For many years the author has carried out bacteriological investigations and has attempted to produce the disease experimentally, but without success.

The condition of the carcase in these cases is exactly the same as that seen in acute coccidiosis.

At the post-mortem examination carried out immediately after slaughter and complete bleeding the findings are as follows: The rectum is distended with gas and contains normal faeces, and the caecum contains a semi-liquid green mass. The duodenum is distended with gas and contains a yellowish-green viscous fluid. The rest of the small intestine appears to be empty, but in reality contains a small amount of yellowish or pink puriform material. If this be examined directly under a high power dry lens it is found to contain immense numbers of Giardia, both motile and encysted.

The symptoms produced by infection with Giardia are different from those caused by coccidia.

Giardia causes symptoms of cerebral and medullary disturbance and death occurs after several days' illness.

The author has never found Giardia in cases of acute or chronic coccidiosis in lambs, but in lambs heavily infested with Giardia he has sometimes found a few coccidia.

In connexion with prophylaxis the author suggests that small vermin should be destroyed if it is shown that these may act as reservoirs.

Certain cresyl compounds (which are not specified) are said to be of value for the treatment of coccidiosis.

SEDDON (H. R.) & CARNE (H. R.). **Incidence of Coccidiosis in Australian Rabbits as determined by Faecal Examinations.**—*Dept. Agric. N.S. Wales Sci. Bull. No. 29.* 1927. July. Vet. Res. Rept. No. 3. pp. 33–41.

As a result of their examinations of wild rabbits the authors conclude that these harbour both *E. stiedae* and *E. perforans*.

In investigating the incidence of the disease the authors examined rabbit faeces from 62 districts—the material in most cases being faeces collected from the neighbourhood of rabbit burrows, and in no case collected from burrows where rabbits had been observed to be ill.

The examination was carried out by the sugar flotation method.

Ninety-two per cent. of the districts furnishing faeces were found to be infected with the disease to some extent, and *E. stiedae* was found in 73 per cent. of these and *E. perforans* in 65 per cent.

CARNE (H. R.). **On the Preservation of Rabbit Faeces for Transmission. Examination as to the Presence of** *Eimeria perforans* **and** *Eimeria stiedae*.—*Dept. Agric. N. S. Wales Sci. Bull. No. 29.* 1927. July. Vet. Res. Rept. No. 3. pp. 43–45.

It has been found by the author that it is difficult to obtain faeces of rabbits in a suitable condition for examination from some districts because desiccation is very destructive to the parasites before they have time to sporulate and thus become more resistant to external conditions.

A number of methods were tried and the most satisfactory was the preservation of the rectum with its faecal contents in 5 per cent. formalin.

KLARENBEEK (A.). Leptospirae (*Spirochaeta Ictero-uraemiae canis*) als Oorzaak van Icterus, Nephritis en Uraemie van den Hond. [**Leptospirae as a Cause of Jaundice, Nephritis and Uraemia in Dogs.**] —*Tijdschr. v. Diergeneesk.* 1928. Mar. 1. Vol. 55. No. 5. pp. 227–235. With 3 text figs. [Author's English abstract.]

The author considers organisms of the leptospira type to be the cause of Stuttgart disease in dogs, the organisms occurring in the kidney tubules and in the urine. An acute leptospira infection of dogs resembling Weil's disease occurs sporadically in young dogs in Holland. Symptoms of an acute toxic jaundice with albuminuria are not always seen.

Agglutination tests indicate that the organism is related to the spirochaete of Weil's disease.

It is suggested that the dog may infect man with Weil's disease.

## DISEASES DUE TO METAZOAN PARASITES.

JOHNSON (W. B.) & RAWSON (P. H.). **Use of the Precipitin Test to Determine the Food Supply of Tsetse Flies; a Preliminary Note.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Aug. 31. Vol. 21. No. 2. pp. 135–149. [4 refs.]

The work reported upon in this paper has been greatly handicapped by lack of a laboratory properly equipped, and by the absence of any method of cold storage.

Fowls were used for the production of antisera, using blood from man, baboon, monkey, roan, bushbuck, duiker, oribi, reedbuck, gazelle, kob, sheep, goat, warthog, donkey, jackal, fox, hyaena, serval, civet, bush rat, domestic rat, rodent ("Vorgu") and hedgehog. Many failures were recorded in the earlier experiments on account of inexperience in the handling and treatment of fowls, the use of too large doses of blood, which caused serum shock, and the use of citrated blood instead of serum.

It was found that individual sera varied greatly in their power to produce antisera, and that there were probably idiosyncrasies among the fowls used.

The most satisfactory technique of producing antisera was to start with a small dose (1 cc. intraperitoneally) and then give a series of 6 further doses gradually increasing up to 10 cc., the whole process being spread over about 3 weeks.

A distinction is made between positive and specific reactions by SUTHERLAND and MITREN. A "positive reaction" is a group reaction and a "specific reaction" explains itself.

The present authors aimed rather at the former than the latter.

No satisfactory method of preserving or storing serum was devised, and this was the more regrettable because in a field laboratory contaminations readily occurred during collection and storage. The absence of any cold store increased the difficulties, as at a temperature of 40° C. (the maximum reached in the laboratory) even sterile sera gradually deteriorated. Under field conditions the only satisfactory plan was to use each batch of serum as it was produced.

The technique of the test was as follows :—

The serum to be tested (whole blood dried on filter paper) was dissolved in 1·8 per cent. saline to make roughly a 1-500 dilution, producing a fine froth with small bubbles on shaking. To 0·3 cc. of this in a Dreyer tube was added 0·5 cc. of antiserum, and the resulting haze or precipitate was noted after half-an-hour and 24 hours. As controls serum dilutions alone, and antiserum with saline have been used. The readings were by transmitted light.

The amount of blood in the gut of a wild fly is usually small, as gorged flies are rarely caught in the net. After feeding the fly rapidly extrudes the serum from the blood. The authors have found that the average quantity of 1-500 serum dilution which can be obtained from a single fly gut is about 3 cc. Using 0·3 cc. for each test sufficient is obtained to test against 9 antisera, using one portion as a control. With experimentally fed *Glossina morsitans* the amount of serum obtained after 2, 6, 24 and 54 hours was 28 : 23 : 6 : 1. In experiments in which the faeces of flies were tested only very weak results were obtained with powerful anti-sheep serum after 24 hours.

In order to limit the number of sera against which each blood had to be tested, the bloods were divided into 2 groups according to the size of the erythrocytes as measured from a smear made at the time of dissection of the flies.

Erythrocytes exceeding 6·2 $\mu$ come from man, baboon, monkey, horse, donkey, dog, pig, hyaena, fox, jackal, rodents, hedgehog and other small mammals.

The small cell group, i.e., those erythrocytes which measure less than 6·2 $\mu$, includes cattle, sheep, goat, antelopes, and wild cats.

The grouping is rough, and it is recognized that red corpuscles become changed during digestion. Blood of the pig and donkey may fall into

either group, and antisera of such blood should be tested against both groups.

In the first tests 26 *G. tachinoides* and 44 *G. morsitans* containing mammalian blood were examined. Of these 8 from the former and 7 from the latter fell into group I. Six of the samples from *G. tachinoides* and 5 of those from *G. morsitans* were positive to man.

The tests of the second series were not satisfactory as no strong antelope sera were available, but as group reactions were obtainable they were put up against goat, sheep, and serval.

Thirteen samples from *G. tachinoides* and 37 from *G. morsitans* were used. The marked reactions were 7 and 31 respectively, and the slight reactions were 6 in both cases. No negative results were obtained.

At the place where these tests were carried out (Sherifuri) cattle are not available as food for flies, and goats and sheep seldom come into contact with them.

The second series of tests was carried out at Matyoro and here only bloods in Group I were tested with a view to determining the relative frequency of the bloods of man, baboons, and monkeys.

The authors give a short survey of the general conditions of the country where these tests were carried out, and these are such that during the dry season the fly have little opportunity of feeding upon antelope, and it would be expected that of the two species *G. tachinoides* would remain better nourished than *G. morsitans*, which is so largely dependent upon ungulates.

A table shows the condition of *G. tachinoides*, *G. palpalis* and *G. morsitans* in the Matyoro Valley, January to March, 1927, and this furnishes support to this expectation.

It was also found that bloods of Group I were found in an unusually high proportion of cases in *G. tachinoides* and *G. morsitans*. The percentage in the former was twice as large as in the latter.

A table shows the results obtained and it is noted that owing to pressure of field work, the readings were taken at 4 and 24 hours instead of at ½ hour and 24 hours. This increased the amount of group reaction in the early reading.

| Species. | No. of Bloods tested. | Positive reaction to: | | | Negative to man, baboon, monkey. |
|---|---|---|---|---|---|
| | | Man. | Baboon. | Monkey. | |
| | | Per cent. | Per cent. | Per cent. | Per cent. |
| *G. tachinoides* ... | 22 | 6 = 27·3 | 13 = 59·1 | 2 = 9·1 | 1 = 4·5 |
| *G. palpalis* ... | 1 | 0 | (1 = 100) | 0 | 0 |
| *G. morsitans* ... | 21 | 8 = 38·1 | 4 = 19·0 | 0 | 9 = 42·9 |

The large proportion of bloods of Group II from *G. morsitans* which proved negative to the man-baboon-monkey group is of interest, and the source of this blood was not discovered.

Horses, donkeys, and dogs do not come into contact with flies in this district.

Baboons were known to be present in the district in large numbers and these served as food supplies for both the species of flies, and they can to some extent replace ungulate blood. The small monkeys appear to be more difficult to feed upon.

It has been found that the blood obtained from flies can be preserved indefinitely when dried on strips of filter paper, and the test is likely to be of real value in determining the food of flies.

Antisera can be prepared and stored in a properly equipped laboratory, and the tests can be carried out there of bloods collected from flies in field tests.

JACK (R. W.). **Ticks infesting Domestic Animals in Southern Rhodesia.** —*Rhodesian Agric. Jl.* 1928. May. Vol. 25. No. 5. pp. 537–556. (To be cont.).

This paper is intended as a handy guide to stockmen and others.

HEYDON (G. M.). **Observations on the Larvae of** *Onchocerca gibsoni* **(Cleland and Johnston) in the Skin of Infected Cattle.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1927. June 16. Vol. 4. Pt. 2. pp. 61–68. With 1 plate. [10 refs.]

The authors record the discovery of larvae resembling the microfilariae of *Onchocerca gibsoni* in the superficial layers of the dermis of cattle having nodules of *Onchocerca gibsoni* in the brisket. It is pointed out that the possibility was not excluded that the animals might also harbour *O. gutturosa* and *O. lienalis.*

The larvae can be obtained by soaking pieces of skin after mincing in normal saline and then centrifuging.

On another occasion pieces of skin were removed at slaughter and small discs were cut from it with a leather punch. These were placed without mincing in saline and, after 24 hours at room temperature, were washed with fresh saline. The whole of the liquid was centrifuged and thick films made of the sediment with the addition of a little serum.

Examinations were made ot skin taken from different parts, and larvae were found in the skin taken from practically all parts of the body.

No observations were made regarding the methods of escape of the larvae from the skin during life, but in the cases of pieces of skin immersed in saline it appeared to be probable that escape took place via the cut edges. It is possible that the percentage of cattle with larvae in the skin is greater than that showing nodules. In sections of infected skin larvae were found in the superficial layers of the dermis; the deepest one found was 0·6 mm. below the basal layer of the epidermis.

No direct observations or experiments have been made regarding transmission.

WOODRUFF (H. A.). **Occurrence of** *Onchocerca gibsoni* **(Worm Nodule) in Cattle in Gippsland, Victoria.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1927. Dec. Vol. 4. Pt. 4. p. 271.

The author records the widespread occurrence of the parasite in territory hitherto thought to be free.

So far it has been found along a strip of coast land centering on Foster, and measuring about 60 miles long by 12 in width.

FIELDING (J. W.). **Further Observations on the Life History of the Eye Worm of Poultry.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1927. Dec. Vol. 4. Pt. 4. pp. 273–281. [1 ref.]

Although living larvae have been detected in the oviduct of female worms and also living larvae have been noted up to 25 days in culture, there would appear to be no continuity of larval life under experimental conditions, and it is now generally considered that larvae hatch from eggs in the gut of the cockroach.

A larva was observed emerging two days after the last possible ingestion of eggs by the cockroach, and they have been found in the gut 6 days, and in the body cavity up to 6 days and 9 days after the last infective meal. Seventeen days after the initial feed encapsuled larvae, twice as large as those newly hatched, have been found. Larvae were found to be non-infective 46 days after infective feeding of the insect, but infective 52 days after. The female begins laying eggs 38 days after entering the definitive host. Pigeons can be infected by cockroaches and worms introduced into the eyes of guineapigs can continue their development, but they are incapable of reaching the eye from the alimentary canal.

ROBERT. L'echinococcose. Rôle des Carnassiers dans sa transmission. [**Echinococcus Disease. The Part played by Carnivora in its Transmission.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. May. Vol. 80. pp. 270–279.

In Morocco practically every ruminant may be said to be infested with this parasite.

It is generally held that the dog and the jackal are the usual hosts of the tape-worm, but it is a point of extreme importance whether or not there may be other hosts.

There is practically no exact information regarding the extent to which dogs in Northern Africa are parasitized by the tape-worm, and only systematic post-mortem examinations can furnish that information, since examination of faeces is valueless. Although the dogs in the towns have less chance of becoming infected than those outside, owing to the system of meat inspection and to destruction of infected organs, it cannot be said that they have no chance of acquiring the parasite because by no means all the invaded organs are seized and destroyed.

The author has examined 85 dogs post-mortem and of these has found 72 harbouring tape-worms. *T. echinococcus* was found only once, and *T. serrata*, *T. coenurus*, and *T. marginata* were each encountered less than 10 times. *Dipylidium caninum* was found on 64 occasions.

The one animal in which *T. echinococcus* was found harboured about a dozen, and these were found attached to the mucous membrane of the small intestine about the middle of its length.

These dogs were all town dogs.

The author asks whether it is not possible that there is a season (towards the beginning of winter) when the chances of infestation are greater—this period being that during which the largest losses occur among animals. He asks whether it is not possible that the chances of infestation are greater in the sheep-raising districts, as the hydatids in this species are more frequently fertile. Nothing is known regarding the conditions under which fertile segments are detached, nor how frequently this occurs.

The author three times attempted to infect dogs experimentally by feeding them respectively on infested liver and lung, and though the dogs were left for 40 and 60 days before they were subjected to post-mortem examination they were not found to harbour the parasite.

He makes the suggestion that man himself may possibly act as a host to the tape-worm, but admits that there is no evidence to support the theory.

The jackal has been held to be a host of the *T. echinococcus*, but, again, there is no evidence to support this view. The author has had the opportunity of making post-mortem examinations on five jackals, but *T. echinococcus* was not found.

One experiment has been carried out in which a jackal was fed with infested organs. The animal was kept for 102 days and was killed 42 days after its last contaminated meal. The tape-worm was not found.

BUGGE (G.). Ueber den Invasionsweg an *Fasciola hepatica* bei der Distomatose der Kinder und Schafe. [**The Path of Invasion of *Fasciola hepatica* in Hepatic Distomatosis in Cattle and Sheep.**]—*Berlin. Tierärzt. Wochenschr.* 1928. Mar. 23. Vol. 44. No. 12. pp. 189–195. With 14 figs. in 1 plate.

Three views have been held regarding the path by which *Fasciola hepatica* reaches the liver, viz. : (*a*) via the bile ducts ; (*b*) from the peritoneal cavity direct into the liver ; (*c*) via the portal vein.

As the result of his own investigations, the author states that he has been able to find young distomes in organs other than those already reported. He has found them in the liver, in the mesenteric glands of cattle, in minute haemorrhagic centres in the lungs, in the spleen of the sheep, and in the form of small swellings underneath the peritoneum covering the abdominal side of the diaphragm.

In the author's view the occurrence of very small parasites in haemorrhagic centres in various organs indicates that they reach these places via the circulation. Their occurrence in lymph glands without evidence of haemorrhage is an indication that they may also pass by the lymphatics.

DE BLIECK (L.) & BAUDET (E. A. R. F.). Hexachlooraethaan als middel tegen Distomatosis bij het Rund. [**Hexachlorethane for the Treatment of Distomatosis in the Ox.**]—*Tijdschr. v. Diergeneesk.* 1928. May 1. Vol. 55. No. 9. pp. 429–435. [Author's English Summary.]

As carbon tetrachloride sometimes poisons cattle, the authors have carried out experiments with hexachlorethane for the treatment of fluke in cattle. Satisfactory results were obtained. The dose is 10 grams per 25 kg. body weight, and the dose is given in capsules and distributed over four days.

Each morning the animals are given ¼ of the dose before any food is given, and all food is withheld for two or three hours afterwards. During treatment oily substances should be avoided.

## BACTERIAL DISEASES.

Ross (G. R.). **A Serological Study of Undulant Fever in Southern Rhodesia.**—*Jl. of Hyg.* 1927. Oct. Vol. 26. No. 4. pp. 403–419. [24 refs.]

In surveying the literature regarding the relationship between *Br. abortus* and undulant fever, the author points out that there has been much neglect in testing cases in countries where it appears to be assumed that because there is no great goat population, undulant fever does not exist. It has been assumed that the epidemiology of undulant fever is connected with goats only. He also points out that it does not appeared to have been considered as a possibility that undulant fever may be caused by both *Br. melitensis* and *Br. abortus*, although the epidemiology of the conditions may not be exactly parallel.

Emphasis is laid upon the part played by BEVAN in Rhodesia in first calling attention to the possible danger to man arising from the use of milk from cows affected with contagious abortion. It is generally agreed that on morphological and biological grounds the two organisms cannot be distinguished, but the results obtained with serological tests are rather confusing. This is perhaps partly explained on the grounds that prior to 1924 any organism isolated from a human patient and possessing the morphological and cultural characters of *Br. melitensis* was definitely identified as that organism. It is not impossible that some of these are actually *Br. abortus*. This emphasizes the necessity of a thorough investigation of all type strains of *Br. melitensis*.

The author s own investigations were aimed at confirming the serological differences stated to exist between *Br. melitensis* and *abortus*, and to obtain information regarding the nature of the strains isolated from cases of undulant fever in Rhodesia.

The morphological and cultural characters of the strains used were not investigated beyond ascertaining that they belonged to the Melitensis-abortus group of the Alcaligenes.

Nine strains of organisms were used, including 5 *Br. melitensis*, 3 *Br. abortus*, and 1 *Br. paramelitensis*. The strains included some of English origin and some of South African origin.

By direct agglutination the organisms could be divided into two groups, but such separation was incomplete, because one of the groups included both melitensis and abortus strains, and the second all three strains. To obtain further differentiation the agglutinin-absorption test was used.

By using a number of sets of tubes it was possible to determine: (1) whether the organism was agglutinated or not by unabsorbed serum; (2) whether all agglutinins for the homologue were removed or not by the absorption of the serum with the test organism; (3) whether absorption had been complete and had removed from the serum all agglutinins, if any were present, for the test organism. An additional test with normal rabbit serum was put up to see whether auto-agglutination occurred with any strain.

The results of these tests permitted the formation of two groups of organisms. Group I contained four strains of *Br. melitensis* and two of *Br. abortus*, while Group II contained one *Br. melitensis*, one *paramelitensis*, and one *Br. abortus*.

Investigations were carried out with strains of organisms isolated from cases of undulant fever occurring in Rhodesia. Eight strains were used. These, after a few months' subcultivation, could not be classified in any way upon morphological grounds, although at first subculture most of them had been distinctly bacillary. Their pathogenicity for the guineapig was established, but in no case was the infection fatal; in some of the animals there was found enlargement of the spleen seven months after inoculation : the animals appeared to be quite healthy.

Absorption agglutination tests were carried out with each strain against some of the sera of strains of *Br. melitensis* and *Br. abortus* with which the preliminary tests were made. The reactions of 6 out of the 8 showed that they were characterisitc of those of *Br. abortus*. The remaining two strains did not resemble either typical *Br. abortus* nor *Br. melitensis*, but were found to be identical with *Br. para-abortus*.

These results indicate that *Br. abortus* is an important factor in the causation of Rhodesian undulant fever.

The results obtained in these experiments indicate that a distinction can be made between *Br. melitensis* and *Br. paramelitensis*, and *Br. abortus* and *Br. para-abortus*. The similarities between *Br. melitensis* and *Br. abortus* and between *Br. paramelitensis* and *Br. para-abortus* are greater than those between *Br. melitensis* and *Br. paramelitensis* and between *Br. abortus* and *Br. para-abortus*.

It is suggested that the melitensis-abortus group represent the " S " normal types and the paramelitensis-para-abortus group the " R " mutant types.

McALPINE (James G.) & SLANETZ (Charles A.). **Studies on the Metabolism of the Abortus-Melitensis Group. 2. Further Observations on Nitrogen Metabolism.**—*Jl. Infect. Dis.* 1928. Jan. Vol. 42. No. 1. pp. 66–72. With 2 charts in text. [5 refs.]

The authors are able to confirm their finding that bovine strains of *Br. abortus* differs from porcine and human strains of the organism and from *Br. melitensis* in their nitrogen metabolism.

Ten per cent. carbon dioxide stimulates growth of the bovine organism and inhibits the others. This holds good whether plain or glucose-containing media are used.

The bovine strain would appear not to utilize sugar, while the other strains do. The bovine strain gave a slightly decreasing value for non-protein nitrogen throughout incubation, while the others did not, and, in fact, gave slightly increasing values. On the grounds of these experiments it is suggested that the proposed generic name Alcaligenes is incorrect.

The production of ammonia by the bovine strains runs parallel with the incapacity exhibited by these strains of utilizing glucose.

The authors conclude that *Br. abortus* (bovine) can be differentiated from the porcine and human strains, and from *Br. melitensis* by the different amounts of the nitrogenous fractions in culture medium over a 14-day period of incubation. This difference is apparent only in glucose-containing media.

McALPINE (James G.) & SLANETZ (Charles A.). **Studies on the Metabolism of the Abortus-Melitensis Group. 3. Glucose Utilization.** —*Jl. Infect. Dis.* 1928. Jan. Vol. 42. No. 1. pp. 73–78. With 1 chart in text. [5 refs.]

This report elaborates the previous one regarding the ultilization of glucose or otherwise by *Br. abortus* bovine, porcine, and human and by *Br. melitensis.*

It is repeated that in view of the results obtained in their experiments the generic name, Alcaligenes, suggested for this group would be erroneous. There is little doubt that all the types of this group with the exception of *Br. abortus* bovine are able to split sugars, while the exception is not.

*Br. melitensis* strains do not appear to give such low pH values as *Br. abortus* of porcine and human origin.

Exceptional strains may be encountered among those isolated from bovine sources, and it is not improbable that these infections in bovines have been derived from porcine sources. Porcine strains are more virulent for guineapigs than bovine strains.

It is, further, not improbable that infection in human beings is from porcine sources.

VAN SACEGHEM (R.). L'avortement épizootique des bovidés au Katanga (Congo belge) et son traitement. [**Bovine Abortion in Katanga and its Treatment.**]—*Ann. Soc. Belge. de Méd. Trop.* 1927. Nov. Vol. 7. No. 2. pp. 157–164.

The substance of this paper has appeared elsewhere, and has been dealt with.

CÉSARI (E.). Prophylaxie de la fièvre mediterranéenne. Diagnostic de l'infection melitensique chez les animaux. [**Protection against Mediterranean Fever. The Diagnosis of the Infection in Animals.**] —*Rev. Gén. Méd. Vét.* 1928. Jan. 15. Vol. 37. No. 433. pp. 1–9.

The area in which undulant fever is endemic in France is slowly but surely increasing, and in some parts the disease is a veritable plague. At the same time our knowledge regarding animal carriers of infection becomes more exact, and it is now realized that the goat is not alone to blame.

It is quite clear that the measures hitherto recommended to prevent infection of man are inadequate.

Whatever point of view we take regarding the possibilities of intervention with a view to controlling and preventing infection in man, the important point is diagnosis. The author summarizes the difficulties encountered in the matter of the application of agents designed to give diagnoses.

VAN DEN HODEN (J.). De Abortusbacterie van het Rund (*Bact. abortus infectiosi* Bang) Ziekteverwekker bij den Mench. [**The Bacillus of Bovine Contagious Abortion as a Cause of Disease in Man.**]—*Tijdschr v. Diergeneesk.* 1928. Mar. 1. Vol. 55. No. 5. pp. 209–226. [Author's English Abstract.]

It is important that, in investigating the pathogenicity of the abortion bacillus to man, the work should be carried out at places where undulant fever has occurred.

It is not sufficient to prove the existence of agglutinins in human sera.

A case is cited of a baker in a Dutch village who has been suffering for six months from a disease which clinically resembles undulant fever closely. His serum tested with Bang's bacillus is positive to 1 in 6,400, while with *Br. melitensis* the titre is 1 in 800. Heating the serum for half an hour at 56° C. does not destroy the agglutinin. Absorption tests with *Br. abortus* and *Br. melitensis* positive.

No abortion bacilli have been isolated from either the blood or urine as yet.

The man appears to have become infected through a wound while delivering an infected cow of a dead foetus.

Three of the cows react to the agglutination test.

The man has never been out of Holland, and no goats have been imported into the district. Abortion among goats is unknown there.

ALBISTON (Harold E.). **Infectious Necrotic Hepatitis of Sheep in Victoria. A Braxy-like Sheep Disease.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1927. June. Vol. 4. Pt. 2. pp. 113–123. [4 refs.]

The author describes a condition encountered in sheep in Victoria, closely resembling black disease, described by DODD. Although it is called a braxy-like disease, it is distinct from braxy as seen in Scotland.

The essential lesion of the disease is a focal necrosis of the liver.

In Victoria the disease appears in the late summer and continues until the first heavy winter rains. Apart from lagging behind the flock, there appear to be no symptoms during life.

An anaerobic bacillus can be cultivated from the necrotic liver tissue, but not from elsewhere. This organism bears a close resemblance to *B. oedematiens* (Weinberg).

It has not been found possible to establish immunity artificially. The organism produces a toxin in cultures which reaches its maximum concentration after about eighteen hours' incubation.

TAKASAWA (T.). **Preliminary Report on the Experiment of the Aerobic Culture of the Black-Leg Bacillus and its Protective Value.**—Paper published by the Serum Institute for the Diseases of Domesticated Animals, Tarhoku, Formosa, 1927. (Author's English Summary.)

The following medium is prepared :—

| | |
|---|---|
| Peptone (Witte) ... ... ... ... | 5 g. |
| Grape sugar ... ... ... ... | 5 g. |
| Sodium chloride ... ... ... ... | 0·5 g. |
| Water ... ... ... ... ... | 100 cc. |

It is a little difficult to understand the author's exact meaning in the further steps in the process of preparation of the medium, and the paragraph is therefore quoted.

" To above media added some quantity of fresh sterilized pieces to chicken liver, and then alkalified it to 0·2 per cent. of natrium carbonicum anhydricum (pH 7·611) ; then the blackleg bacillus inoculated to the above prepared media ; and they cultivated to the incubator within 24–48 hours at temperature of 37° C.

" Next, the above original culture being subcultured on the common agar, they variate to the aerobic, though seldom, one or two colonies out of about 60 tubes of the agar."

Growth is apparently slow at first, but becomes accelerated with repeated sub-cultivation.

The author claims to have cultivated the bacillus of malignant oedema in this way, and is experimenting with tetanus.

Three to five cubic centimetres of an emulsion of the aerobic blackleg bacillus prepared by adding a loopful of agar culture to 5 cc. of normal saline was found to confer immunity after a lapse of two weeks.

The first generation of aerobic culture is fatal to guineapigs, but the third is not.

"The blackleg bacillus which variated to the aerobic of which agar cultivation advanced its generation to a certain degree, enables to revert to the anaerobic in vice versa; at the same time, its virulency can be restored."

Both aerobic and anaerobic types can be isolated from the heart blood of a guineapig killed with the first generation of aerobic cultures.

KUDRJAWZEW (G.) & ROMANOW (D.). Zur Frage der Serodiagnostik bei Milzbrand. [**The Serum Diagnosis of Anthrax.**]—*Ztschr. f. Infektionskr. d. Haustiere.* 1927. Nov. 23. Vol. 32. No. 1. pp. 57–62.

The authors draw attention to the important part that can be played by the precipitin test in the detection of raw materials such as hides that are contaminated by anthrax. But they have experienced a difficulty in preparing an antiserum of high titre. The principal reasons for this appears to be that animals vary greatly in their power to react, and the authors instance cases reported by others of their difficulties in this respect. SCHUTZ and PFEILER succeeded in obtaining a good serum from one rabbit out of thirty immunized.

The authors themselves failed to prepare a satisfactory serum from a horse and two foals, and they subsequently used protein obtained from the bacillus in place of the organism itself. The following is an outline of the technique employed for the preparation of this reagent. Cultures were prepared of Zenkowski anthrax vaccine I on agar, and these were incubated for 12 hours at 37° C. The growth from each culture flask was washed off in 10 cc. normal saline. This was then diluted with 100 cc. of distilled water. The suspension obtained from 10 flasks (1 litre in all) had then added to it 10 cc. of saturated salt solution, and 6 or 7 drops of 50 per cent. acetic acid. The flask was then steamed for 20 to 30 minutes to coagulate the albumen. On cooling, the albumen was collected on filter paper and pressed between filter paper to dry it until it acquired a doughy consistence. It was then rolled into small cylinders 2–3 cm. in length and placed in toluol. In this way it could be preserved for a year or more in good condition. For use 0·02 g. of the albumen was ground up in 2 cc. of normal saline and injected intravenously. Wethers were used and they were given injections at intervals of one to three days for a month. Intravenous and intraperitoneal injections were given.

As precipitinogen extracts were made of various tissues and organs of guineapigs dead of anthrax; fresh spleen, formalin-preserved liver, skin, and extracts of 24-hour cultures of Zenkowski vaccine I were used.

The antiserum was so active that positive results were obtained in less than five minutes.

In November 1926 a foal was immunized with the albumen. The first dose was 0·02 g. in 2 cc. of salt and with intervals of two or three days between injections. This was gradually increased until 0·5 g. in 100 cc. were given. Blood drawn a month after the first injection yielded a serum which gave the reaction with extract of the Zenkowski vaccine and with spleen extract in four minutes.

A second foal was immunized in a similar manner and a very active serum was obtained.

Tests with extracts of putrid organs and tissues yielded quite satisfactory results.

The authors have used the following techniques for the purpose of obtaining extracts of hides suspected of anthrax contamination. The first method was to cut pieces of hide into very small pieces and soak them in normal saline for 15 to 18 hours in the refrigerator, and the second was to heat the hide in saline over boiling water for 5 to 10 minutes, in each case filtering afterwards through an asbestos filter.

CLAUSSEN. Vergleichende Untersuchungen über das Verhalten von Essigsäure und Karbolsäureauszügen beim Milzbrandnachweis an Häuten durch das Präzipitatinsverfahren nach Ascoli. [**A Comparison between Acetic Acid and Carbolic Acid Extracts in the Precipitin Test for the Detection of Anthrax in Hides.**]—*Ztschr. f. Infektionskr. d. Haustiere.* 1928. Feb. Vol. 32. No. 3. pp. 252–261.

The author finds that extracts of skin prepared by soaking the fragments in 0·5 per cent. acetic acid and autoclaving for 10 minutes at 120° C. are not superior to those prepared with 0·5 per cent. carbolic acid in normal saline without autoclaving. The latter are more transparent and are more easily rendered clear.

The reactions given are not specific as they can be obtained with normal hides and normal sera.

STANDFUSZ (R.) & POHL (G.). Disinfektionsversuche an ausländischen Mitzbrandhäuten. [**The Disinfection of Foreign Anthrax-Infected Hides.**]—*Ztschr. f. Infektionskr. d. Haustiere.* 1927. Nov. Vol. 32. No. 1. pp. 23–56.

At a meeting of the Berlin Veterinary Asosciation in February 1927 MÜSSMEIER showed that the great majority of cases of anthrax in Germany were due directly to infected materials of various sorts imported into the country. It is therefore a matter of extreme importance that means should be devised for the disinfection of these materials without lessening their commercial value.

Hides are one of the important vectors of anthrax infection, and their disinfection has been the subject of investigation by a number of authors, but complete success has not as yet been achieved. Three factors have to be taken into consideration. In the first place the method must be successful from the point of view of the disinfection, secondly the hides must not be adversely affected, and in the third place the cost of the process must not be prohibitive.

Details are given by the authors of a number of experiments in which different expedients were resorted to.

In the first series attempts we made to destroy the contamination by heat after the spores contained in the leather had germinated.

Pieces of hide were soaked in water at 37° C. for 24 hours ; and the temperature was then raised to 60° C. and maintained at that for 2 hours. After three days at room temperature a part of the liquid was poured off and the remainder was centrifuged with the sediment which had fallen on standing. The sediment after centrifuging was mixed with a small amount of saline, roughly filtered and used for the inoculation of mice. Twenty were used and 13 died of anthrax.

This method was then modified by incubating at 37° C. for 13 hours only and then heating to 70° C. for two hours, these processes being repeated. After being left at room temperature for 4 days the technique described above was followed. Ten mice were used and one died of anthrax.

A sporulating anthrax agar culture was washed off in saline, incubated for 24 hours at 37° C. and then heated to 60° C. for 2 hours. These processes were repeated and the culture was then used for the inoculation of mice. Three out of ten died of anthrax.

When the incubation and heating were repeated three times two out of ten mice died of anthrax.

In the second series of experiments an attempt was made to utilize the antagonism between *Bacillus pyocyaneus* and the anthrax bacillus. This antagonism was first demonstrated by BOUCHARD in 1889, and in the following year BLAGOWATSCHENSKY showed that it was due to the products of metabolism of *B. pyocyaneus.*

In the first of the experiments 8 out of ten mice died of anthrax. In the second, although 9 of the mice died it was not due to anthrax in any instance. The technique in this case was as follows.

The pieces of hide were incubated at 37° C. for 24 hours, and a 24-hour pyocyaneus culture was then added. This was allowed to stand at room temperature for 5 days and then the temperature was raised to 60° C. for two hours. The purpose of this was to kill off the pyocyaneus culture. Subsequently the materials were left to stand for 4 days at room temperature.

The subsequent steps were as before.

The experiment was repeated with a control in which pyocyaneus was not used. In this case all the mice died both in the test and in the control, but in the test three died of anthrax, and in the control 7.

This experiment was repeated three times, but the results failed to reveal any difference between the hide treated with bacillus pyocyaneus and those that were not.

Other experiments embodying the same idea, but differing in details were carried out. None of these furnished any indication that the pyocyaneus method was likely to prove of any value.

Oil of mustard which has been credited with the power of destroying anthrax spores was found by the authors to be ineffective.

A proprietary substance " Glawelin " was tested and it was found to be effective for the destruction of anthrax contamination in 4 to 5 days in 1 to 3 per cent. solution but with this exposure damage was done to the hides. A 5 per cent. solution of commercial sodium sulphide was found to be destructive to cultures of the anthrax bacillus, but it was not certainly destructive for the contaminations present in hides.

The chemically pure salt was tested in 5, 8 and 10 per cent. watery solution on infected hides, and it was found that these solutions were destructive to the organisms in from 8 to 10 days. A large series of experiments supported this conclusion. The disinfection was not

complete in every case, but it was successful in the great majority of them.

Chloramin was found to be inefficient for the disinfection of hides.

POHL (G.). Weitere Versuche zur Frage der Disinfektion milzbrandiger Trockenhäute. [**Further Investigations in Connexion with the Disinfection of Dried Anthrax Hides.**]—*Ztschr. f. Infektionskr. d. Haustiere.* 1928. Apr. 2. Vol. 32. No. 4. pp. 304–337.

The author's experiments have been carried out with the following substances: Chloramine, bleaching powder (25 per cent. active chlorine), commercial sodium sulphide, sulfoliquid, tetralol, bromtetralol, tetratresorcin, hydrochloric acid and salt, soda lye and hydrochloric acid, and perchloride and formic acid.

Details of experiments are given in which silk threads contaminated with anthrax spores and pieces of hide similarly contaminated were treated in various ways with the above substances. The only satisfactory results obtained followed the use of sodium sulphide and the hydrochloric acid and salt process.

Chloramin and bleaching powder effected superficial disinfection, but their action in the deeper parts was very slight.

Commercial sodium sulphide containing 60–62 per cent. $Na_2S$ was used as the chemically pure drug was too expensive. This was found to be soluble in water after it had been reduced to a rough powder. The pH of the solution was 7·6. The 10 per cent. solution used in the experiments was 10 grammes of the commercial product in 100 cc. of water, so that in reality it was only 6 to 6·2 per cent. $Na_2S$.

Pieces of skin were soaked in the solution for 8 days at room temperature, and were then washed four times with water in the course of two days.

In all, 50 mice were inoculated and although all but 6 died, none of them could be shown to have died from anthrax.

In the experiments in which contaminated silk threads were soaked for 8 days in the 10 per cent. solution, 22 out of 25 mice inoculated died, and in two instances death was due to anthrax. Anthrax bacilli were cultivated in four out of 5 cases from the centrifuge sediment of the water used for washing the threads.

The hydrochloric acid and salt " pickle method " was recommended by SCHATRENFROH in 1911. The mixture contained 2 per cent. hydrochloric acid and 14 to 16 per cent. salt and this was allowed to act for 24 hours at 22° C. Alternatively 1 per cent. hydrochloric acid and 8 per cent. salt were allowed to act for 2–3 hours at 40° C. A number of authors repeated the experiments and confirmed the results, and various modifications of percentage, exposure, and temperature were sugg sted. The question of cost has also been investigated, as this, along with the absence of deleterious effects upon the hides is one of the prime factors in any process used.

Three series of experiments were carried out with officially recommended formulae. In the first of these, 10 per cent. salt and 2 per cent. hydrochloric acid were allowed to act for 40 hours at 20° C. Five out of 25 mice died of anthrax, and none of the others survived.

In the second series the solution was kept at 40° C. and was allowed to act for 9 hours. Three of the mice died of anthrax, 21 of other conditions and one survived.

One per cent. hydrochloric acid in 10 per cent. salt was allowed to act for 15 hours at 40° C. Five of the 25 mice inoculated died of anthrax. The experiments were all carried out with threads soaked in sporulating cultures.

Although there was considerable destruction of the contamination it was in no case complete, and the results of the three processes were practically identical.

SEDDON (H. R.) & CARNE (H. R.). **The Occurrence of** *B. botulinus*, **Type B, in Rabbit Carrion.**—*Dept. Agric. N. S. Wales Sci. Bull. No. 29.* 1927. July. Vet. Res. Rept. No. 3. pp. 22–25.

The authors record an outbreak of botulism which involved the death of five animals in all—2 cows, 2 steers, and an aged horse. These deaths had been spread over a period of some two years.

The farm was in a " bone-chewing " district, and the cows after milking used to eat from a pile of rabbit carcases, of which about 400 had been trapped some twelve months previously.

Cultures were made from some of the rabbits and an organism was isolated which when tested with various antitoxins was identified as *B. botulinus* B.

SCHOENHOLZ (P.). **Surface Colony Types of** *Cl. botulinum* **on Blood Agar.**—*Jl. Infect. Dis.* 1928. Jan. Vol. 42. No. 1. pp. 40–47. With 9 figs. on 1 plate. [5 refs.]

Stock strains of *Cl. botulinum* were plated on 2 per cent. veal infusion agar containing 1 per cent. glucose and 10 per cent. defibrinated sheep blood.

Five different types of surface colonies were obtained and it was found that the strains varied in their haemolytic powers.

SEDDON (H. R.). & BELSCHNER (H. G.). **Bacterial Infection associated with Grass Seed Infestation in Sheep.**—*Dept. Agric. N. S. Wales. Sci. Bull. No. 29.* 1927. July. Vet. Res. Rept. No. 3. pp. 26–30.

The outbreak occurred on a farm of some 8,000 acres carrying 5,400 sheep, and most of the losses occurred among weaners (5 to 8 months old). Lameness was the prominent symptom, and the only lesion constantly found was the presence of an abscess involving the skin and subcutaneous tissues—the largest of these was about the size of a tennis-ball. The smaller lesions were definitely associated with the presence of grass seeds.

Abscesses in the lungs occurred in some cases ; none of these were very large, and none were encapsuled. They appeared to be in reality suppurating centres in areas of croupous pneumonia. There was some amount of pleurisy.

Bacteriological examination appeared to incriminate the Preisz-Nocard bacillus. The authors believe that the dipping to which the sheep were subjected had a harmful influence as the process would have caused seeds which had partly penetrated the skin to swell and thus enlarge the opening in the skin.

LECLAINCHE (E.) & VALLÉE (H.). Sur la Vaccination contre le charbon symptomatique. [**Vaccination against Black Quarter.**]—*Rev. Gén. Méd. Vét.* 1928. Feb. 15. Vol. 37. No. 434. pp. 65–68.

The authors have completely given up filtered cultures for the protective inoculation of animals against blackquarter. They state that in 1900 they pointed out that filtration deprives cultures of the greater part of the soluble active principles. The strong acidity of cultures accentuates the reduction of active substances resulting from filtration. Supercentrifugation, employing a Sharple machine, yields far more active germ free liquids for immunizing purposes. This machine runs at about 50,000 revolutions, and renders the supernatant liquid almost sterile. Complete sterilization can be effected by the addition of small quantities of formalin.

The antigenic properties of such vaccines are immensely improved by using a number of different strains. Formolized whole cultures were shown by the authors in 1925 to be far superior to filtrates.

By using centrifugation followed by the addition of formalin a liquid antigen which can be concentrated is obtained.

## DISEASES DUE TO FILTERABLE VIRUSES.

GREENWOOD (M.). **Some Epidemiological Observations on Foot-and-Mouth Disease, with Special Reference to the Recent Experience of Holland.**—*Jl. of Hyg.* 1927. Oct. Vol. 26. No. 4. pp. 465–489. With 1 map.

This paper is the work of a statistical epidemiologist, and its nature is such that it does not lend itself to abstraction. It contains an immense amount of valuable statistical information regarding the prevalence and distribution of foot-and-mouth disease in this country and in Holland.

The author comes to the conclusion that the facts and figures given regarding the occurrence of the disease in Holland over a number of years do not support the conclusion that the slaughter policy has had any effect upon the epidemiological history of the disease. But he says that it is quite a different question as to how far this policy is logically applicable to this country. The two countries are quite differently situated with regard to frontiers.

The author is inclined to think that all outbreaks are not necessarily due to importation of virus. He suggests that carriers may exist and that the importation of non-immunes is as important as the importation (into any centre) of infected animals. The possibility of the occurrence of infection without clinical manifestation with subsequent persistence of virus may be responsible for some outbreaks. In this connexion variations in rapidity of spread and severity of attacks are of importance.

HORNBY (H. E.). **The Distribution of Rinderpest Virus in Infected Blood.**—*Jl. Comp. Path. & Therap.* 1928. Mar. Vol. 41. No. 1. pp. 17–24. [10 refs.]

The author passes in rapid review the opinions that have been expressed regarding the filterability of the rinderpest virus, and discusses

the interpretations placed upon their experiments by the various investigators of the subject. He draws special attention to the importance of the minimal infective dose determination. Hornby's experiments regarding the passage of the virus present in the blood through filters leads him to conclude that the virus does pass but that its concentration in the filtrate is greatly reduced. A large dose of filtrate is therefore necessary to furnish a minimal infective dose.

Experiments in which solutions of acid fuchsin and basic fuchsin were used furnished support to KRAMER's view that positively charged particles are adsorbed by earthenware filters.

Reference is also made to the investigations carried out by OLITSKY and BOEZ regarding the importance of the pH of liquids containing foot-and-mouth disease virus in connexion with filtration.

Hitherto in experiments connected with the filtration of the virus of rinderpest the question of electrical adsorption does not appear to have been considered.

In Hornby's experiments allowance was made for this by diluting blood with neutral and with alkaline buffered solutions.

In the first experiment it was shown that when neutral and alkaline filtrates are used, the filtrate from at least one hundred times the minimal infective dose is avirulent.

Using alkaline filtrate the dose was doubled in the next experiments and it was then found that the filtrate was infective. So that alkaline filtrate from more than two hundred times the minimal infective dose contained the virus in an infecting amount.

A similar result was obtained when the blood was diluted with neutral buffered saline.

Filtration through a Berkefeld filter therefore reduces the virulence of blood in the proportion of about 200 to 1. Since the result was the same whether a neutral or an alkaline medium was used the inference is that the great bulk of the virus is attached to infilterable particles of the blood—namely leucocytes, erythrocytes, or platelets.

With a view to finding out to which of the blood elements the virus is attached diluted blood was filtered through cotton wool. The detailed technique of the operation is described. Counts were then made of the filtrate and of the diluted blood prior to filtration. These experiments were carried out with a number of samples of blood and it was found that while the red corpuscles and platelets were reduced on an average by 15 and 50 per cent. respectively, the leucocytes were reduced to less than 1 per cent. by the filtration.

Since both leucocytes and virus are reduced to approximately the same extent, and since the reaction of the filtrate (whether neutral or alkaline) does not affect the filtrability of the virus it is reasonable to conclude that the virus is attached to the unfilterable leucocytes.

Finally, a comparison was made of the minimal infecting dose of plasma and washed leucocytes, on the same lines as the experiments carried out by SCHEIN.

The leucocyte count of the whole blood was 8,000 per c.mm. and the minimal infective dose of the whole blood was below 0·02 cc. This would contain about 0·01 cc. of plasma. In the experiment the smallest amounts of plasma and leucocytes to give rise to reactions were 0·7 cc. of plasma and 120,000 leucocytes. 0·7 cc. of plasma is about 70 times the amount of plasma present in a minimal infective dose of whole blood, and 120,000 leucocytes represents approximately the number present in a M.I.D. of whole blood.

REMLINGER (P.) & BAILLY (J.). La vaccination locale dans la rage. [**Local Vaccination in Rabies.**]—*Ann. Inst. Pasteur.* 1928. Apr. Vol. 42. No. 4. pp. 349–355. [5 refs.]

The experiments recorded in this paper were carried out at the suggestion of BESREDKA, and their object was to ascertain whether animals treated with anti-rabic vaccine applied to shaved areas are protected against (1) fixed or street virus applied to the same area of skin, and (2) intramuscular inoculation with 3 cc. of a thick emulsion of fixed or street virus.

Guineapigs were thoroughly and closely shaved over the anterior part of the abdominal wall, and thick emulsions of rabic cords which had been dried, four, three and two days and then preserved in glycerin were then energetically rubbed into the skin with a tooth-brush. The animals were kept on the operating table until the area was perfectly dry. This required about half an hour. This treatment was carried out five times with intervals of a few days. A fortnight afterwards these animals with six controls were inoculated by friction in the same way with virus. One of the vaccinated animals died of rabies and the whole of the remainder survived.

Later, another test was carried out on the five survivors, along with six new controls.

Two controls only died of rabies.

A month later they were tested with street virus, fixed virus having been employed in the earlier tests. Six new controls were used. Two of the vaccinated guineapigs and the whole of the controls died of rabies.

In a second experiment 18 guineapigs were vaccinated by friction with cords dried for two to four days. Eight of these were tested with fixed virus along with eight controls and the remaining ten were tested along with ten controls with street virus. Of the group of ten, four and all the controls died of rabies. Of the batch done with fixed virus all survived while two of the controls died.

Seven of the vaccinated guineapigs were subsequently tested with street virus with six fresh controls. One of the vaccinated died accidentally four days after inoculation. All the controls died.

In experiment 3, eight guineapigs were vaccinated by friction, eight times with etherized fixed virus (12 hours to 6 hours). They were inoculated with street virus along with four controls. Of the vaccinated two died of rabies (36 and 63 days). All the controls were still alive and well after five months.

These furnish evidence of the existence of local immunization.

An experiment in which guineapigs were treated with fresh unaltered fixed virus by friction on three occasions and then tested with street virus of low virulence was inconclusive, because all the animals including the controls survived.

Five guineapigs were treated with an ointment containing 2 g. of vaseline, 4 g. of lanoline and 8 g. of fixed virus. Three treatments were given. When tested with controls, using very active street virus all died, but the vaccinated died a day or two later than the controls.

It would appear that a more satisfactory degree of resistance is established when a larger number of vaccinating treatments are given, than when the number is smaller.

In the second series of experiments the test inoculation was given by intramuscular injection.

In the first batch eight guineapigs each received eight frictions with etherized virus (exposure to ether 12 to 6 hours). They were then inoculated intramuscularly with 3 cc. of a thick emulsion of fixed virus. Two of the treated animals and three out of four controls died. In the second experiment of this series the number of vaccinating frictions was reduced to three. When tested by intramuscular inoculation, three out of four vaccinated guineapigs and four controls all died of rabies and there was no difference between the periods elapsing between inoculation and death in the two groups.

When the vaccinating virus was applied as an ointment, the experiment was a complete failure.

ANNALES DE L'INSTITUT PASTEUR. Supplément publié par l'Organisation d'Hygiène de la Société des Nations. Conference Internationale de la Rage. Rapports de MM. MARIE, REMLINGER, et VALLÉE. April 25–29. 1927.

A summary of the proceedings of this conference has already been taken from other sources.

DONATIEN (A.) & LESTOQUARD (F.). La peste du porc en Algérie. Sérothérapie spécifique. [**Swine Fever in Algeria. Specific Serum Therapy.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. May. Vol. 80. pp. 257–267.

Both swine fever and swine erysipelas are important diseases of the pig in Algeria. Pneumonia due to a pasteurella or a streptococcus and enteritis caused by a Salmonella occur as complications of these, but are only very rarely seen as primary conditions.

Of the two diseases swine fever has the wider distribution, but it does not occur with equal severity in all parts of the country. It occurs as outbreaks which sometimes have long intervals between them. The outbreak of 1925–26 was so serious that many farmers have ceased to keep pigs, although the country is eminently suitable for them.

The only hope of controlling the disease lies in individual immunization.

BREINL (F.). **Effect of Concurrence of Typhus and Rocky Mountain Spotted Fever Infections in Guineapigs.**—*Jl. Infect. Dis.* 1928. Jan. Vol. 42. No. 1. pp. 48–55. With 6 figs. [12 refs.]

These experiments have been carried out on the lines suggested by the effects produced in syphilis by infection with malaria and other concomitant infections.

The present experiments have been carried out with typhus and Rocky Mountain spotted fever viruses.

When these are injected simultaneously into guineapigs they apparently exert no influence upon each other, and immunity to each is established.

If the virus of typhus be injected first, and the spotted fever virus be injected during or immediately after the febrile reaction caused by the former, the second injection modifies the course of the disease caused by the first virus.

If the spotted fever virus be given first it protects a guineapig against a smaller dose of typhus virus given on the first day of the

febrile reaction, but this protection is not specific and is transitory. If larger doses of typhus virus are given there is a response but the infection runs a mild course.

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## MISCELLANEOUS.

SCHELTENKOW (A.). Sterilisierung und Konservierung des Blutes, Serums, und der Aszitesflüssigkeit für die Nährböden. [**The Sterilization and Preservation of Blood, Serum, and Ascitic Fluid for Culture Media.**]—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 3. German summary pp. 381–382. [In Russian pp. 342–345.]

The author uses glycerin for the purposes named in the proportion of 40 per cent. Provided the materails are not seriously contaminated, sterilization can be effected at 5° to −10° C. in 7 to 10 days.

Heavily contaminated liquids with 40 per cent. glycerin can be sterilized in 10 to 20 days at 17° C. Except for haemolysis no change occurs in the liquids.

In using the preserved liquids for the preparation of culture media the amounts added should be such that the percentage of glycerin does not exceed 2.

It is an advantage to have such media handy and ready for use. The mixtures can be made in bulk and then put into small flasks.

NIKANOROV (S.). **A New Principle in the Construction of Coloured Differential Media.**—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 3. English summary pp. 374–375. [In Russian pp. 280–282. With 9 figs.]

The author suggests that instead of using media containing carbohydrates and an indicator, carbohydrate-free Martin's broth and indicators may be used. He gives the composition of a medium which he has used for the differentiation of *B. pestis* and *B. pseudotub. rodent.*

| | |
|---|---|
| Martin's yeasted (carbohydrate-free) broth ... ... | 100·0 |
| Cresol red ... ... ... ... ... ... | 0·01 |
| Agar powder ... ... ... ... ... ... | 20 |

(There appears to be an error in this formula, either in the amount of broth or of agar.)

There is no change of colour with *B. pestis*, while the *Bac. pseudotub. rodent.* causes it to assume a deep red colour.

The author suggests that methyl green may be used as an indicator.

GRACE (A. R.). **A New Method for the Preparation of Bacteriological Culture Media containing Agar.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1927. Dec. Vol. 4. Pt. 4. pp. 269–270. With 1 text fig.

"It has been experimentally established that the lower the temperature of filtration of agar medium, below 100° C., the less nutritive the resultant medium; also the less heating to which the medium has been subjected the higher the growth factor of the end product.

"The following method was devised to give a clear medium from unwashed agar filtered above 100° C. There is little heating, but the method is simple and gives uniform results with little loss of nutritive value and bulk.

"The method involves making two stock preparations—a clear agar jelly and nutrient broth."

In making up a litre of nutrient agar the following plan is adopted.

Two pieces of fine gauze about a foot square have placed between them a layer of cotton wool a few millimetres thick. The centre of this filtering pad is pushed down into the neck of a 1 litre Erlenmeyer flask. Twenty-seven grams of granular agar are placed in the depression so formed, and the gauze is then tied tightly above the agar forming a bag. The excess of gauze is cut away. The bag of agar is then lowered down into the flask, the string supporting it being held by a rubber band round the neck of the flask.

750 cc. of distilled water are then poured in and the bag is allowed to float freely. The whole is autoclaved at 120° C. for 25 minutes, and when cooled again, to 100° C., it is removed from the autoclave. The bag is then raised above the level of the liquid and the flask is autoclaved again at 110° C. for 10 minutes. The agar drains out of the bag, and when the medium is set a clear jelly is formed. The reaction is then adjusted. [It would appear that the reaction should be adjusted before setting takes place.—ED.]

Quadruple strength meat extract broth is added in the proportion of 250 cc. to 750 cc. of agar jelly.

The quadruple strength broth is prepared in the usual way, save that only one quarter of the usual amount of water is used in the making.

ZEISS (Heinz). Ein Beitrag zu den Tropenkrankheiten der Haustiere in Südostrussland. [**The Tropical Diseases of Domesticated Animals in South Eastern Russia.**]—*Deut. Tierärzt. Wochenschr.* 1927. June 4. Vol. 35. No. 23. pp. 364–367. With 3 text figs.

Three diseases are described in this paper, namely, filariasis of the camel, "Sarbun" of the Kirgiz sheep, and "Siburlak" of the horse. Filariasis of the camel was first described by JAKIMOFF, and the author is of the opinion that JAKIMOFF'S description leaves something to be desired. A full report is promised in conjunction with ILOVAISKY, who collected material during investigations in South Eastern Russia in 1922–23. Filariasis of the camel is not associated with any clear clinical picture. The swelling of the glands of the neck may be associated with Su-auru and not with the filariasis. This question, however, requires investigation. The percentage of camels affected would appear to range from 0·25 to 0·5 per cent.

"Sarbun" is the name given to a disease which affects sheep irrespective of age or sex when at pasture in summer. The name means "yellow joint." It is not known whether the disease is contagious or not. The disease appears at intervals only, and does not seem to be connected with wet or dry seasons. Little is known regarding the geographical distribution of the condition, but the author believes that it occurs on both sides of the Ural river.

The first symptom is stiffness of gait, one or more limbs may be affected and show painful swelling of one or more joints. Appetite is lost, and as a result of their inability to move about and graze loss of condition is very marked. Death generally takes place in about a month if the animals are not slaughtered.

Examination of affected limbs shows that the tissues surrounding affected joints are saturated with a clear yellow exudate. The joints

themselves may contain a similar liquid or they may contain thick pus. In some cases the joints burst and the pus escapes. Sometimes the joints of the spinal column are affected. The pericardium contains an excessive quantity of clear yellow liquid. Nothing is known as yet regarding the cause of the disease.

" Siburlak " or grass poisoning of horses is a disease caused by the ingestion of *Centaurea picris*, Pall.

Symptoms make their appearance in 1 to 4 hours after the fresh plant has been eaten. Affected animals show rigors and sweating, and then loss of co-ordination. Later, convulsions occur and finally death takes place. The mortality is about 75 per cent., and all horses introduced into the Ural district are likely to be affected. Native horses appear to acquire an immunity. The plant is harmless for camels, cattle and sheep.

Dogs, mice, and frogs were used in experimental investigations, but watery infusions or alcoholic mixtures introduced either into the stomach or under the skin failed to cause any symptoms.

MARSH (C. Dwight) & ROE (G. C.). **Wild Tobaccos (*Nicotineana trigonophylla* Dunaal and *Nicotineana attenuata* Torrey) as Stock Poisoning Plants.**—*U.S.A. Dept. Agric. Tech. Bull. No. 22.* 1927. Dec.

Both plants are poisonous to cattle, horses and sheep, producing typical tobacco symptoms. These appear soon after feeding and may continue for a considerable time.

The plants are more likely to produce fatal results in cattle than in other species, and cattle were found to be far more susceptible to their action than sheep. The plants occur in the western part of the States, and in Mexico. *N. attenuata* extends further north than *N. trigonophylla*, but the latter in turn occurs further south than *N. attenuata*.

In the case of *T. trigonophylla* the toxic and lethal doses are as follows:

| Species. | Min. Toxic Dose. | Min. Lethal Dose. |
|---|---|---|
| Cattle | 0·5 per cent. body weight | 2 per cent. body weight |
| Sheep | 1·42 ,, ,, | 3·25 ,, ,, |
| Lambs | 1·5 ,, ,, | Not determined. |
| Horse | 0·68 ,, ,, | ,, ,, |

MOUSSU (G.). Distomatose et accidents causés par l'extrait éthére de fougère male. [**Distomatosis and Accidents caused by Ethereal Extract of Male Fern.**]—*Rec. Méd. Vét.* 1928. May. Vol. 104. No. 5. pp. 257–263.

The author quotes a number of instances in which accidents occurred following the use of extract of male fern to give point to his demand that greater care and accuracy sbould be used in manufacture of the extract, and that every attempt should be made to prepare the pure active principles.

DONATIEN & LESTOQUARD. L'élevage algérien et les principales maladies microbiennes de l'Algerie. [**Animal Breeding and the Principal Microbial Diseases in Algeria.**]—*Receuil Méd. Vét. Exot.* Paris. 1928. Jan.-Mar. Vol. 1. No. 1. pp. 24–29.

This paper is a brief summary of the activities concerning animals bred in Algeria and of the diseases due to bacteria, protozoa, and filterable viruses which affect them.

SCHEIN (H.). Les principales maladies contagieuses du betail en Indochine. [**The Principal Contagious Diseases of Animals in Indochina.**]—*Receuil Méd. Vét. Exot.* Paris. 1928. Jan.-Mar. Vol. 1. No. 1. pp. 6–23.

This paper is an abstract of a report published in October 1926. It is a survey of the diseases occurring in Indochina, their economic importance, control, etc.

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## REVIEWS AND NOTICES.

CHOPRA (R. N.) [M.A., M.D. (Cantab.), Major, I.M.S., etc.] & CHANDLER (Asa C.) [M.Sc., Ph.D., Professor of Biology, Rice Institute, Houston, Texas.] **Anthelmintics and their Uses in Medical and Veterinary Practice.**—pp. xii+291. With 65 figs. on 5 plates. 1928. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden, W.C. 2. [22s. 6d.]

The authors point out that no book dealing exclusively with the subject of anthelmintics has hitherto been published; the work under review has been compiled to fill this gap. Whereas, in many text books, treatments are mentioned, such information is very scattered and much must also be sought for in a multiplicity of periodicals. Those acquainted with modern literature will not anticipate a wealth of new material; in presenting their own views the authors have adopted a broad outlook and have quoted the work of other observers in an impartial manner. Perhaps for this reason the student will experience some confusion in selecting a treatment for a specified condition and more especially the veterinarian, since the authors speak more authoritatively on human than animal posology.

The medical and veterinary aspects are contrasted, a procedure of benefit to the reader and one may here draw attention to the high and varying toxicity of carbon tetrachloride towards human and animal life. A more detailed account of the, as yet, unexplained deaths in cattle and sheep following its use would have been welcomed and the omission of a caution in this respect is to be regretted.

On page 87 reference is made to keratine coated pills, a method of doubtful value.

One sees no reference to the sugar floatation method of detecting worm infestation.

The administration of cocaine to cats to prevent vomition, page 93, will not find favour in Great Britain.

The numerals appended to the key on page 49 would have been more easily understood had there been an explanatory footnote.

The index is clear and allows the reader to find his subject with the minimum of trouble.

The publishers have turned out the edition in their customary, pleasing style and in correlating and condensing the present-day knowledge of this extensive subject into a concise volume the authors are to be congratulated. Both investigators and clinicians will welcome the publication.

A. R. Smythe.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL VETERINARY BULLETIN.

VOL. 16.] December 1, 1928. [No. 4.

## DISEASES DUE TO PROTOZOAN PARASITES.

LIGNIÈRES (J.). Sur la vaccination des bovidés contre la piroplasmose, la babésiellose et l'anaplasmose. Comparaison des procédés employés en Argentine et en Algérie. [**Vaccination of Bovines against Piroplasmosis, Babesiellosis, Anaplasmosis.**]—*Bull. Soc. Path. Exot.* 1928. May 9. Vol. 21. No. 5. pp. 371–378.

In this paper the author compares the methods employed in the Argentine and Algeria.

He points out that in the Argentine the important point is that it is not a question of protecting ordinary animals, even though they be of excellent quality, but of immunizing extremely valuable pure-bred imported animals. It would be a mistake, he says, to use the methods which are successful with Algerian bovines, or even animals imported into Algeria, for the Shorthorns, Herefords, and Polled Angus animals of the Argentine. The French investigators in Algeria do not suggest that the methods of immunization described by them are applicable to all other countries. No reference is made to Theileria infections, as Lignières has not encountered them in the Argentine.

According to the French authorities, it is unsafe to use blood from an animal which has recovered from an attack less than three months previously, and twenty months after recovery the blood may not immunize. This method cannot be used in the Argentine, for 5 or 10 cc. of blood from an animal recovered 20 or more months previously causes a high mortality in pure-bred animals. In the Argentine a strain of Babesia which is of low virulence is used, and trypanblue is used to check any reactions which appear to be dangerous. The weakly virulent strain is kept running in calves. When this method is carried out properly, the losses are practically nil.

In the case of Babesiella the facts are similar. In Algeria blood from an animal which has recovered three or four months previously is used, but such a procedure in the Argentine would lead to enormous losses. Lignières has seen the blood of an animal which had recovered from babesiellosis 26 months previously produce most acute and virulent infections in pure-bred cattle.

In immunizing against Babesiella Lignières first injects *B. bigeminum* which, while not conferring immunity against Babesiella,

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exalts the resistance of the animal, and then injects a selected strain of Babesiella, controlling severe reactions by quinine and antipyrine.

In Algeria immunization against anaplasma is achieved by inoculating blood taken from an animal 5 to 6 days after injection, long before any symptoms of anaplasmosis develop.

Experience in the Argentine has shown that this method is dangerous, and successful immunization against anaplasmosis has been achieved by passing the parasite through sheep or goats in series. At least six such passages are necessary to reduce the virulence of the parasite sufficiently to allow it to be used for the immunization of pure-bred cattle. Emphasis is laid on the point that while piroplasmosis and babesiellosis have a wide distribution in the Argentine, anaplasmosis is more restricted. Immunization with anaplasma passed through sheep, while giving a good immunity, obviates the risk of introducing a highly virulent strain into a district previously free.

LIGNIÈRES (J.). A propos des expériences comparatives faites en Algérie entre anaplasma argentin et anaplasma algérien. [**Comparative Tests with Argentine and Algerian Anaplasma.**]—*Bull. Soc. Path. Exot.* 1928. May 9. Vol. 21. No. 5. pp. 378–380.

The French investigators in Algeria have come to the conclusion that the strains of anaplasma from the Argentine and from Algeria are identical, but Lignières finds himself unable to agree completely with this view.

He points out that while in one experiment calves immunized against the Algerian strain were resistant to the Argentine strain, a calf immunized against the Argentine strain showed a slight increase in the parasites in its blood which lasted for 16 days when it was inoculated with the Algerian strain.

Lignières admits that a single experiment is insufficient to base any definite conclusion upon, but such as it was, the evidence was not in favour of complete identity of the parasites.

Analogous cases are not rare. Lignières points out that 25 years ago he showed that *Babesiella argentina* confers a good immunity against very virulent strains of *Piroplasma bigeminum*, but that the immunity conferred by the latter against the former is infinitely weaker.

There are, however, other factors which appear to Lignières to distinguish the two parasites. The results obtained by the French investigators showed that the goat is refractory to Algerian anaplasmosis and that while sheep could sometimes be infected, attempts to transmit it in series in sheep failed.

In the Argentine goats can invariably be infected, and it can be carried on in goats in every instance. Sheep also can be infected by intravenous infection and they continue to harbour the parasite for years.

Experiments carried out in Algeria with the Argentine strain support Lignières' contention. The Argentine strain sent to Algeria was derived from two sheep, one of the second passage and one of the third, brought by Lignières to Alfort.

Before definitely deciding whether the Algerian and Argentine strains of anaplasma are identical or not, it will be necessary to show that the differences are not due to the goats and sheep used in Algeria. It will also be necessary to test calves immunized against the Argentine strain with the Algerian anaplasma.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les piroplasmoses bovine d'Algérie. Deuxième mémoire. Méthodes de prémunition. [**The Bovine Piroplasmoses of Algeria. 2nd Memoir. "Premunization" Methods.**] —*Arch. Inst. Pasteur d'Algérie.* 1927. Sept. Vol. 5. No. 3. pp. 245–468. With 57 figs.

The whole of this number of the *Archives de l'Institut Pasteur d'Algérie* is taken up with an account of the authors' work in connexion with protective inoculation against the various intracorpuscular parasites of bovines occurring in Algeria, and as the memoir covers more than 200 pages a detailed abstract is out of the question.

The period covered by the report is 1924–1927. The report is divided into two main parts. The first of these contains accounts of further experimental work regarding the nature, evolution and treatment of each of the diseases, and of the experiments in connection with "premunization." The second part contains the results of immunizations carried out in the field during the four years under review.

Finally, the general conditions governing immunization against Algerian piroplasmoses are laid down.

Infections due to *P. bigeminum*, *Babesiella berbera*, *Anaplasma marginale*, *Theileria dispar*, and *Gonderia mutans* are described.

Of these the last only is not pathogenic.

The essential parts of these investigations have been published before and have been dealt with.

YAKIMOFF (W. L.), et al. Contribution à l'étude de l'immunisation vis-à-vis de la piroplasmose (babésiellose) des bovidés. [**Immunization against Babesiellosis in Bovines.**] Première partie. Essais d'immunisation expérimentale des animaux [YAKIMOFF, MARKOFF-PÉTRASCHEWSKY (E.N.), LOUKIANOFF (W.L.) & WOITZEKHOWSKY.] Deuxième partie. Immunisation par le trypanobleu (trypanobleunisation). [YAKIMOFF, MARKOFF-PÉTRASCHEWSKY, RASTEGAIEFF (E.F.) & GNIEDINE (A.N.).] Troisième partie. Immunisation d'après le procédé de Theiler (theilérisation). [YAKIMOFF, MARKOFF-PÉTRASCHEWSKY & RASTEGAIEFF.] —*Ann. Inst. Pasteur.* 1928. Mar. Vol. 42. No. 3. pp. 282–319.

Among the possible measures which may be utilized for the control of piroplasmosis immunization appears to be the most practical.

The authors deal briefly with the attempts which have been made to establish immunity by means of (1) blood from a recovered animal, (2) blood attenuated by storage in a cold chamber, (3) inoculation with crushed ticks, and (4) by means of what the authors call vaccination by trypanblue.

The authors detail a few cases in which immunization was effected by subcutaneous inoculation with virulent blood followed by treatment with trypanblue immediately the parasites appeared in the blood. They found that a solid immunity was established.

Three heifers were given an injection of 1 gramme of trypanblue and at intervals ranging from 21 days to 2 months they were inoculated with blood containing the parasite. Piroplasms appeared in the blood in all three cases.

The authors state that they propose to call methods of immunization in which the virus is attenuated by chemical means chimio-immunization. The method of injecting trypanblue only they term "trypano-

bleunisation." The injection of virus followed by trypanblue is called theilerisation, and immunization against a number of parasites simultaneously they term lignièresisation.

When put into practice in the field the simple injection of trypanblue did not appear to be very effective as a process of immunization. Yakimoff finds that immunization can be effected against *Babesiella bovis* by injecting the virus and following this with trypanblue (theilerisation). In a small number of cases the virus and drug were injected simultaneously. Most of the animals suffered from a mild attack and recovered.

VIEREY (F.). Traitement des piroplasmoses bovines. [**The Treatment of Bovine Piroplasmoses.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. July. Vol. 80. pp. 384–393.

Treatment to be effective must be given early; if delayed results are less satisfactory and, further, it is a point of economic importance that smaller quantities of the drugs are required when the disease is treated promptly. The author uses glucose, which is dissolved in an isotonic solution, and is obtainable in ampoules containing 125, 250, and 500 grammes (apparently of the solution).

In most cases the author finds that 3 ampoules of 250 grammes are sufficient. When treatment is delayed as many as 6 such ampoules may be required.

When treatment is begun early the contents of one ampoule is injected subcutaneously behind the elbow at intervals of 24 hours.

Intravenous injection has not been found to be superior to subcutaneous injection. More than a hundred cases have been treated in this manner, and it is claimed that recovery took place in 82 per cent. Of the failures 12 per cent. were attributable to delay in beginning treatment.

Brief details of a dozen cases are given. The treatment generally results in a rapid fall of temperature after the first dose of glucose. There may be a slight rise again, but this is rapidly checked by the second dose. In all cases in which treatment was begun early, but which nevertheless relapsed, evidence of serious involvement of the lungs was promptly forthcoming.

The author puts forward certain theories to explain the beneficial effects produced by the injections of glucose.

COLLIER (W. A.). Zur Therapie der Piroplasmose mit Bayer 1037 (Asuntol). [**The Treatment of Piroplasmosis with Bayer 1037 (Asuntol).**]—*Berlin. Tierärzt. Wochensch.* 1928. Apr. Vol. 44. No. 15. pp. 247–248.

The author records the results of a very small number of experiments carried out in the Argentine.

The drug was used as a 5 per cent. solution in water. One cow weighing about 660 lb. was given 8 g. intravenously and was inoculated intramuscularly at the same time with *P. bigeminum*. There was no evidence of infection. No controls were used either for the blood used for inoculation or to test the result of the inoculation of the animal treated.

One animal in which the disease had been produced by intramuscular inoculation was treated with the drug. 12 g. were given of which

half was injected intravenously and half subcutaneously. Immediately after the animal developed severe symptoms of piroplasmosis, but it eventually recovered.

GISH (A. H.). **Anaplasmosis in Cattle, or a Similar Disease.**—*Veterinary Med.* 1928. Mar. Vol. 23. No. 3. pp. 106–109.

The author describes a disease which he encountered in Kansas, which he believes to be anaplasmosis.

DUKE (H. Lyndhurst). **On the Effect on the Longevity of *G. palpalis* of Trypanosome Infections.**—*Ann. Trop. Med. & Parasit.* 1928. June 12. Vol. 22. No. 1. pp. 25–32.

The author has collected data available in his laboratory regarding the duration of life of laboratory-bred flies both infected and non-infected. "The data presented are very limited and their statistical value cannot be great."

It has been estimated that the probable average duration of life of *G. palpalis* in Uganda is 2 to 3 months, and under laboratory conditions flies frequently survive up to 50 days, so that it would seem that there is no great difference between the two. There is no evidence to suggest that the presence of cyclical stages of development in the flies causes either a reduction or prolongation of the period of life of the fly.

KLIGLER (I. J.). **Susceptibility and Resistance to Trypanosome Infections. IV.—The Duration, Specificity and Hereditary Transmission of Resistance acquired after Cure with "Bayer 205" (Germanin).**—*Ann. Trop. Med. & Parasit.* 1928. June 12. Vol. 22. No. 1. pp. 21–23.

It has been shown that animals cured of trypanosomiasis with "Bayer 205" develop a resistance to infection which lasts about 5 months, and that this resistance appears to be cellular, since no humoral antibodies can be detected, and blocking the endothelial cells with oil, or their destruction by means of benzol, causes a breakdown in immunity.

The present paper reports experiments bearing on the specific nature of this resistance and its intra-uterine transmissibility to offspring.

Details of the experiments are given and from these it is concluded that: (1) Guineapigs infected with *T. evansi* and cured with "Bayer 205" are as resistant to re-infection with *T. gambiense* as with the homologous trypanosome. The converse also holds good. (2) The resistance to re-infection is not transmitted to offspring born while the mother is in a state of solid resistance.

RICHARDSON (U. F.). **Notes on Trypanosomiasis of Cattle in Uganda.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Aug. 22. Vol. 22. No. 2. pp. 137–146.

In the early days of veterinary work in Uganda it was assumed that most of the varieties of trypanosomes found in cattle were pathogenic and caused a fatal infection.

It was early suspected that *T. brucei* was not frequently responsible for fatal disease in cattle, and that *T. congolense* was not markedly pathogenic for horses and donkeys. The restocking of Sesse in 1922 confirmed the non-fatal nature of *T. brucei* infections, and threw doubts on the pathogenic powers of *T. vivax*. Later, doubt began to arise whether *T. congolense* was invariably fatal to cattle, and it is becoming more and more apparent that animal trypanosomiases cannot be regarded as a single disease—nagana. It is probable that each trypanosome differs from others in its pathogenicity, reaction to drugs, and natural manner of transmission. The author has had a batch of experimental animals under observation for a period of about five years, and in this paper he records the results of his observations.

*T. theileri.*—This trypanosome has rarely come under observation save in animals in the process of immunization against rinderpest. The inoculation appears to produce a relapse of trypanosomiasis, and the combination may cause a fatal termination.

*T. brucei* is rarely encountered in cattle save in *G. palpalis* areas, and the evidence available indicates that it is not pathogenic to the cattle of the country.

*T. vivax* has been detected in 24 animals at the laboratory and in a considerable number in the field. At the laboratory no death could be ascribed to it.

In the field mortality varies in different outbreaks. Highly virulent strains or environment and conditions may have been responsible, and the possibility of virulent strains occurring cannot be ignored. The evidence collected in Uganda suggests rather that the latter are the more important determining factors in fatal outbreaks.

*T. vivax* and *T. brucei.*—Animals exposed to *G. palpalis* on the Sesse Islands became infected with *T. brucei* and *T. vivax* within a few months, but the loss did not exceed 10 per cent. In grade animals the loss was higher, but other factors, such as tick-borne diseases, had to be taken into consideration.

The experience gained on the Sesse Islands indicates that the loss of 10 per cent. at first is mainly due to *T. vivax* and *T. brucei* complicated by changes of conditions and grazing. The animals remain poor for about a year and then make a complete recovery.

*T. congolense.*—Strains of this trypanosome obtained in the field proved virulent for cattle for two passages and then apparently became practically avirulent.

In field experience where the absence of tsetse was assured it has been noted that usually most of the adult cattle die. Cases with a different history have been noted. In one instance in a natural outbreak only 12 out of 79 became affected and of these only seven died. The disease then disappeared without any measures of segregation.

It seems not improbable that such outbreaks are not reported, and that they are more common than is supposed.

It is suggested that these outbreaks are due to a strain which has been passed mechanically through a number of generations and has lost not only virulence but eventually power to infect.

It appears that strains of a trypanosome may vary in virulence, but upon what this variation depends is not known. The author is of the opinion that *T. brucei* and *T. theileri* are non-pathogenic for Uganda cattle unless they are associated with other diseases, and, further, that *T. vivax* is far less virulent than has been thought.

Serious results in cases of *vivax* infections are largely due to contributory causes.

The variations in the virulence of *T. congolense*, which is usually very pathogenic, are considerable. Certain strains appear to be avirulent, but it is uncertain whether such strains can be produced at will, and whether such avirulence can be maintained in all subsequent passages.

Animals may be infected with *T. brucei*, *T. vivax* or *T. congolense* (avirulent strains) and show only an occasional trypanosome in their blood, even when daily examination of moist films is carried out for periods of a year or even two. That these occasional appearances do not represent re-infections in animals possessing some immunity is indicated by the fact that when re-infection, experimentally produced, occurs the blood swarms with the parasites.

In seven attempts to re-infect animals which have apparently recovered from *T. congolense* infections success has been achieved once only, and then in an animal previously treated with tartar emetic. On the other hand, in seven attempts to re-infect with *T. vivax* there has been only one failure. In successful experiments the blood swarms with the parasite for about three days from the tenth day after inoculation. Exposure to *G. morsitans* or *G. pallidipes* will usually cause an outbreak of *congolense* infection, while exposure to *G. palpalis* will cause one due to *T. vivax*. The field evidence suggests that *G. palpalis* does not ordinarily transmit *T. congolense*.

Two experiments indicate that *T. congolense* can be transmitted naturally in the absence of tsetse flies. In each case the period of contact between infected and non-infected animals in a tsetse-free place was seventeen to nineteen days before infection occurred.

It has been noted repeatedly that when an outbreak of trypanosomiasis occurs in the absence of tsetse flies animals under two years of age escape infection.

It is not known what fly acts as the mechanical carrier of the infection. Experiments with wild stomoxys have all yielded negative results. In Uganda outbreaks occur in which, so far as can be ascertained, no tsetse fly is involved and no introduction of possibly infected stock has taken place. The tendency is to explain these outbreaks on the idea that the immunity of a "premunized" animal has broken down and that spread by mechanical transmission has followed.

A reliable test for the detection of "premunized" animals is urgently needed. The formol-gel test gave some positive results with *vivax* infections, but with *congolense* infections the results were negative.

The most satisfactory treatment for *T. congolense* infections is the administration of 1 gramme of tartar emetic intravenously on four consecutive days. This will not effect a cure in every case, but it has a high factor of efficiency.

In a laboratory experiment it was found that the administration of the drug during the period of incubation was without effect. No drug has been found as yet which will effect a cure in the case of *vivax* infections.

BEVAN (Ll. E. W.). **A Method of Inoculating Cattle against Trypanosomiasis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Aug. 22. Vol. 22. No. 2. pp. 147–156.

Bevan gives a brief survey of his experiments in the treatment of trypanosomiasis in cattle which have been carried on during the last

twenty years, and he acknowledges that the good results which have been achieved with potassium antimonyl tartrate in Southern Rhodesia must be attributed more to luck than judgment, as for a long time information was lacking as to the manner in which the drug acted, nor was anything known regarding the correct dose, and time or manner of administration.

For many years 1 g. of the drug dissolved in 100 cc. of boiled water has been the amount used, and this has been injected intravenously. In Southern Rhodesia the ill-effects recorded by HORNBY have not been noticed. They may have occurred, but they have not been of practical importance. The objections to this method are that the dose is very large, the escape of any of the solution into the subcutaneous tissue leads to abscess formation, and the time and labour necessary for the operation.

It appears to be a fact that while some investigators have attempted to obtain complete sterilization of the animal as regards trypanosomes by drug treatment, such complete sterilization is never achieved, and it appears to be unnecessary, for practical purposes, to obtain complete sterilization. The results obtained in piroplasmosis by means of trypanblue suggested that the potassium antimonyl tartrate might act in a similar manner in trypanosomiasis, that is to say, by killing off the organisms, liberating toxins, and stimulating the formation of antibodies and thus keeping the trypanosomes remaining in check. That the drug does not effect a change in the trypanosomes themselves is indicated by the fact that the disease produced experimentally with trypanosomes derived from a successfully treated animal behave in the normal way. The recovery is then due to the resistance developed by the animal. A further point is that recovered animals are very resistant to re-infection.

Field tests showed that it was not necessary to put animals through a long course of treatment, for success was often obtained when only one, two, or three injections were given. In the course of a considerable number of years Bevan has inoculated imported animals against the tick-borne infections. The method used is the injection of " standardized " strains of the parasites passed through native calves until attenuated strains were arrived at. These, when used for the inoculation of imported animals, produced mild attacks from which they recovered. Excessive reactions to piroplasmosis infections were controlled by trypanblue injections.

It was decided to attempt to devise a method of inoculating against trypanosomiasis on the same lines. It was thought that if cattle could be inoculated with a known virus, and treated appropriately before being exposed in fly areas, the necessity for treating animals every month in the hope of catching newly infected animals would be done away with.

Experience has shown that in treating trypanosomiasis success depends to some extent on careful " timing." A number of strains of *T. congolense* were studied and it was found that the period of incubation was about ten days, with trypanosomes numerous in the peripheral blood by the 14th day. These disappeared on the injection of 1 gramme of potassium antimony tartrate in 50 cc. of sterile water, and remained absent for seven to eleven days. In all cases they had reappeared by the 14th day after the injection. A second injection on that day resulted in their disappearance again, but as a rule thay had reappeared

14 days later. A third injection given a month after the second caused their disappearance again, and they only reappeared in very small numbers. On the first appearance of parasites the temperature rose, the animals were dull, with hanging head, drooping ears, lachrymation and a staring coat. This condition persisted until about a fortnight after the second injection. From this time onwards improvement set in and the lost condition was rapidly regained. To test the resistance to re-infection a highly virulent strain was produced by passage through rats. The duration of the disease was reduced by this means from 21 to 9 days. The resistance of the protected animals did not break down when they were inoculated with large doses of this strain, or with blood from cattle dying of infection in fly areas where the inoculation strain originated. Bevan proposes to carry out a large scale experiment by subjecting protected animals to natural infection.

One failure demonstrated a point of practical importance. A number of treated animals were sent into a belt to become infected naturally. All died of piroplasmosis. The fact was overlooked that the area where these animals were born and reared had been freed from ticks by systematic dipping, and the animals were susceptible to tick infection.

This drew attention to the danger of transmitting other diseases, and it was overcome by using sheep as virus carriers.

It is not claimed that the system is perfect, but it has yielded good results in practice in Rhodesia, and it is suggested that parallel tests may be made elsewhere.

CORSON (J. F.). **A Note on Some Inoculations of Animals from Cases of Sleeping Sickness** (*Trypanosoma rhodesiense*) **in the Ikoma District of Tanganyika Territory.**—*Jl. Trop. Med. & Hyg.* 1928. Sept. 1. Vol. 31. No. 17. pp. 214–216.

Little is known regarding the incidence of polymorphic trypanosome infections of domestic animals in the Ikoma District. Six local sheep of the sleeping-sickness area inoculated with blood from five untreated cases of sleeping sickness all died. The average period of survival was about two months. Rats were infected from the sheep and lived about 40 days. Three sheep and three goats of a fly-free area were inoculated with three strains of *T. rhodesiense* conveyed in white rats from the sleeping-sickness area. Two pairs died, but the third strain failed to infect either animals.

The author confirms the findings of KLEINE and WENYON and HANSCHELL regarding variations in morphology of different strains, and variations in the proportions of posterior nuclear forms at different times. No posterior forms were seen in the long slender trypanosomes.

In the course of a number of experimental inoculations it was observed that virulence for experimental animals was not necessarily associated with polymorphism or with the presence of numerous posterior-nuclear forms, but posterior-nuclear forms appeared to be more common in guineapigs than in white rats.

The results of experiments with blood from relapsed cases after treatment were inconclusive.

KNOWLES (R. H.). **Trypanosomiasis of Camels in the Anglo-Egyptian Sudan: Diagnosis, Chemo-Therapy, Immunity.**—*Jl. Comp. Path. & Therap.* 1927. June. Vol. 40. No. 2. pp. 118–143. With 1 text fig.

Knowles describes experiments with naganol either alone or in conjunction with potassium antimony tartrate or the sodium salt. Naganol was given in 10 per cent. solution in water intravenously by gravitation. The antimony salts were given in 2 per cent. solution by the same route.

Naganol is non-irritant, so that it is immaterial if a little passes into the connective tissue, and it is not necessary to inject saline solution.

The experiments were controlled by microscopic examination of the blood over long periods, by animal inoculation, and by the formol-gel test.

In the doses used naganol is quite non-toxic even when the circulation is swarming with trypanosomes.

From the results obtained in a considerable number of cases treated the author concludes that naganol is a specific for the treatment of trypanosomiasis in camels, and that the intravenous injection of 10 grammes in 10 per cent. solution brings about the destruction of all the trypanosomes in the body.

In view of the efficacy of the formol-gel test and of the satisfactory results obtained with naganol it was determined to attempt to eradicate trypanosomiasis from a group of animals.

The animals selected belonged to the camel company of the Eastern Arab Corps at Kassala. The formol-gel test showed that of 196 animals 74 were positive.

Seventeen of the 74 were found infected by a single microscopic examination. Twelve of these were selected for treatment with naganol and tartar emetic and 60 of the remainder were treated with naganol alone. Of the latter batch 56 improved greatly in condition and were negative to the formol-gel test. The remaining four died of other diseases.

Of the 12 treated with the combined drugs 11 made good recoveries and the remaining one, although apparently cured of trypanosomiasis, died of another infection. Prior to this experiment there had been an annual slaughter of about a dozen camels for advanced trypanosomiasis every rainy season. After the treatment no animals were slaughtered and no cases were detected. A considerable number of animals have been treated on the results of clinical examination alone, and there has been great improvement in condition, although the animals were at work.

Figures are also given of the results of treatment in a smaller camel unit. They are equally satisfactory.

The object in testing naganol in combination with tartar emetic was to try to reduce the cost of treatment by reducing the amounts of naganol necessary.

The author confirms the appearance of symptoms of intoxication if tartar emetic be injected when trypanosomes are numerous in the blood. In using this drug therefore either there must be a delay before it is injected or naganol must be given the day before to clear the circulation.

Experiments with this form of treatment are as yet not very numerous but the results are good. Thirteen animals have been treated

and all have become negative to the formol-gel test, have returned to good working condition and have remained so for nine months.

A small number of experiments with full controls have been carried out to test whether animals cured with naganol acquire any immunity to re-infection, and the results indicate that this is the case. A similar result does not appear to be obtained when cures are effected by means of tartar emetic.

DAUZATS (H.). Essais de traitement des trypanosomiases des équidés dans le Nord-Camérоun. [**Attempts to treat Equine Trypanosomiasis in the North Cameroons.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. Aug. Vol. 80. pp. 431–439.

The author found that the intravenous injection of aniline emetic in 2 per cent. solution is liable to give rise to alarming symptoms of incoordination and collapse.

The strength of the solution used was reduced to 1 per cent., and it has been used in conjunction with atoxyl.

The author claims 15 recoveries out of 17 animals treated. Both drugs were given intravenously and alternately with varying intervals. From the details of three cases given it appears that the period required to effect a cure varies from a few weeks to several months.

As the result of his experiments the author proposes the following scheme of treatment.

As aniline emetic is depressant treatment is begun with atoxyl. This drug is not only trypanocidal but has a stimulating effect upon the defensive powers of the body. To prevent any cumulative action atoxyl is given at 10-day intervals, and doses of 0·6 to 1·5 g. of aniline emetic in 1 per cent. solution are given in the intervals. If such doses are well tolerated larger quantities are given up to 2·2 g.

The author was not in a position to determine what trypanosomes were present in the horses treated.

Treated animals were able to return to work, but it is not certain that definite cures were obtained, as sudden attacks of weakness or fatigue were observed in some of them.

The author suggests that, as a result of his own rather limited experience, one injection of 5 grammes of atoxyl before entering a fly area and a repetition of the injection every 10 days affords effective protection against infection.

AKAZAWA (S.), SADATAKA (I.) & KATUYA (K.). **The Vacillation of the Wassermann and Sachs-Georgi Reaction in the Experimental Trypanosomiasis of Animals.**—*Jl. Jap. Soc. Vet. Sci.* 1928. Jan. Vol. 7. No. 1. pp. 83–85. [Authors' English Abstract.]

The trypanosome used in the experiment was that isolated from the Formosan water buffalo, and was probably *T. evansi*. Cattle, horses and rabbits were used in the tests.

Of 8 Korean calves all showed a strikingly positive reaction to the Wassermann and Sachs-Georgi tests. "The vacillation of reaction was noted in all cases and ran almost parallel in both tests."

The Wassermann reaction in cattle generally appears about 10 weeks after inoculation. The capacity to react varies from time to time.

The Sachs-Georgi reaction can be obtained within a week of infection, and it can be obtained for a longer period than the Wassermann

reaction. Variations in the degree of reaction are observed, but they are not so pronounced as in the case of the Wassermann test.

The variations in the reactions do not appear to be connected either with the severity of the symptoms or with the presence of trypanosomes in the blood.

GALLIARD (H.). Guérison spontanée de l'infection mixte à *Trypanosoma brucei* et *Treponema crocidurae* chez la souris blanche. [**Spontaneous Recovery from a Mixed Infection with** *T. brucei* **and** *Treponema crocidurae* **in the White Mouse.**]—*Bull. Soc. Path. Exot.* 1928. Apr. 18. Vol. 21. No. 4. pp. 315–316.

The author has carried out experiments with *Trypanosoma brucei* and *Treponema duttoni*, *T. crocidurae* and *T. hispanicum*.

With *T. duttoni* and *T. hispanicum* mixed infections of comparatively short duration have been obtained, but with *T. crocidurae* survival is much longer, and in two cases complete recovery has taken place.

The course of the disease was practically the same in the two cases. The spirochaetes appeared in the blood on the second day and persisted in varying numbers until the 14th day. Trypanosomes were discoverable for three days and then completely disappeared. The blood of one of the mice was used for inoculation of a number of rats. All failed to become infected. The two original mice were still alive 134 and 147 days after inoculation.

In a third case the mouse died in a cachectic condition on the 88th day without showing any parasites in its blood.

HOARE (C. A.). **Studies on** *Trypanosoma grayi* : **the Effect of Goat's Blood.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1928. Aug. 22. Vol. 22. No. 2. pp. 131–136.

The experiments described in this paper were carried out for the purpose of checking a statement made by MINCHIN and his collaborators to the effect that *T. grayi* was acted upon unfavourably by goat serum. Hoare is not able to find any evidence that this is the case.

MAROTEL. Recherches thérapeutiques sur deux maladies parasitaires : la coccidiose et la trichostrongylinose. [**Experiments in the Treatment of Coccidiosis and Trichostrongylosis.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. Apr. Vol. 80. pp. 204–207.

The author claims as the result of experiments carried out with eight bovine animals affected with trichostrongylosis, and six bovines and five rabbits affected with coccidiosis, to be in a position to advise systems of treatment which, if followed carefully, will effect cures in both categories of diseases.

Bovine coccidiosis.—1. Remove all bovines healthy and diseased from the pasture where the infection is being picked up, and utilize the grazing for horses and sheep.

2. Infected animals are to be housed, while the healthy are to be placed on dry ground, as there will be no risk of infection since moisture is necessary for sporulation of the coccidia.

A mixture of 10 to 15 grammes each of thymol and tannoform is given to each animal daily for 5 days. It is advised that the powdered drugs be sandwiched between slices of beetroot or mangold. Animals are said to eat this greedily.

Also each animal is to be given morning and evening for 5 days a rectal infection of 2 litres of 1 per cent. sulphate of copper solution.

Re-infection is prevented by careful collection and burial of faeces, and disinfection of the standings with boiling water twice a week.

All green food and stagnant water must be strictly avoided.

For parasitic gastro-enteritis of bovines the treatment advised is as follows :—

1. Remove the animals from infested pasture.
2. Diseased animals are to be isolated and their faeces destroyed. The faeces of apparently healthy animals are to be similarly dealt with as they are certain to contain eggs.
3. 300–500 cc. of 1 per cent. sulphate of copper is to be given before food in the morning " every 5 days for 15 days " and no purgative. For the sheep the dose is 50 to 100 cc.

The faeces are to be destroyed.

The author gives no details regarding the methods by which he was able to assure himself that the treatments he advises are really effective. He only states that his diagnoses were based upon microscopic examinations. He states that trichostrongylosis in bovines is caused by *Haemonchus contortus*, *Hematodirus filicollis*, *Trichostrongylus instabilis*, Cooperia, and Ostertagia. He recognizes that some of these are readily detectable with the naked eye and others are not, but he gives no indications of the steps he took to ascertain which species were present in the small batch of animals which he had for treatment.

ARAGÃO (H. de B.). **Tegumentary Leishmaniosis and its Transmission by Phlebotomi.**—*Mem. Inst. Oswaldo Cruz.* 1927. Vol. 20. No. 2. pp. 187–195. With 1 plate.

Observations and experiments carried out at Rio de Janeiro in 1921 and the following years indicate that Phlebotomus flies, and particularly in this outbreak *P. intermedius* Leitz and Neiva, act as the transmitting agents.

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## DISEASES DUE TO METAZOAN PARASITES.

DAVIS (L. J.). **Note on a Filarial Embryo in the Blood of a Sudanese Ox.**—*Ann. Trop. Med. & Parasit.* 1928. June 12. Vol. 22. No. 1. pp. 59–61.

The embryo was found in the blood of a bull which was suspected of trypanosomiasis. The animal had been brought from the Nuba Mountains Province.

In moist films the parasite showed active movement which did not result in much translation. In live films the embryos measured 300$\mu$ by 7·5$\mu$ and in fixed films 240$\mu$ by 4·5$\mu$.

Throughout the greater part of the length nuclei are closely packed, but at the anterior end there is an area devoid of nuclei. There is a break in the column of nuclei at about $\frac{1}{5}$ its length from the anterior end, and a second less pronounced one at about $\frac{1}{3}$ the length from the anterior end. From the mid-point backwards for some distance is a clear area which contains only a few nuclei.

In many specimens a loose sheath with delicate transverse striations could be seen.

The microfilaria shows a distinct nocturnal periodicity, parasites being about 12 times as numerous at midnight as at midday. A blood count showed :—

| | | | |
|---|---|---|---|
| Polymorphonuclears | ... | 16·6 per cent. | |
| Lymphocytes | ... ... | 76·6 | ,, ,, |
| Eosinophiles ... | ... ... | 6·8 | ,, ,, |

YANO (A.). **Findings in the Kidney of the Dog infested with** *Filaria immitis*, **and Experimental Studies on the Toxic Substance of** *Filaria immitis*, **Microfilaria and the Egg. Parts I to III.**—*Japan Med. World.* 1927. Sept. 15, Oct. 15 & Nov. 15. Vol. 7. Nos. 9, 10 & 11. pp. 263–266 ; 292–296 ; 324–327.

The author brings evidence to show that the changes in the kidney are due to the action of a toxin, and are not produced mechanically.

ERSCHOW (W. S.). Drei Thelaziaarten aus der Conjunctiva des Rindes in der U.S.S.R. [**Three Species of Thelazia in the Conjunctiva of Cattle in Russia.**]—*Deut. Tierärzt. Wochensch.* 1928. Aug. 18. Vol. 36. No. 33. pp. 553–556. With 9 text figs.

The author gives a detailed description of *Thelazia rhodesi* (Desmarest 1827), *Thelazia gulosa* Railliet and Henry 1910, and *Thelazia skrjabini* Erschow, 1928. Figures of the salient features are given.

TROISIER (J.), DESCHIENS (R.), LIMOUSIN (H.) & DELORME (M.). L'infestation du chimpanzé par un nématode du genre *Hépaticola*. [**Infestation of a Chimpanzee by a Nematode of the Genus** *Hepaticola*.]—*Ann. Inst. Pasteur.* 1928. July. Vol. 42. No. 7. pp. 827–840. With 2 text figs., and 1 coloured plate.

The authors have encountered two cases in which the eggs of a parasite belonging to the genus *Hepaticola* have been detected in the liver of chimpanzees.

The eggs measured on an average 51·5 by 29$\mu$. They were double contoured and showed an orifice at each end. The outer layer of the shell was 4$\mu$ thick, brownish in colour and radially striated. The inner layer was about 2$\mu$ thick at the equator of the eggs and thinner towards the poles.

In the first case very few eggs were discoverable, and these were surrounded by a more or less dense fibrous capsule, external to which there were a few lymphocytes and plasmocytes. Apart from this lesion the liver appeared to be perfectly healthy.

In the second case the lesions were far more diffuse, and it appeared to be clear that they varied in age, as in some the eggs were quite fresh and in others marked degeneration had occurred, and they were surrounded by cicatricial tissue. The adult parasite was not found.

MIYAMOTO (T.). *Strongyloidosis intestinalis* **of Farrow in Formosa.**—*Jl. Jap. Soc. Vet. Sci.* 1928. Jan. Vol. 7. No. 1. pp. 43–52.

White diarrhoea is a common disease of young pigs in Formosa, which is one of the principal pig-rearing countries of Japan, and it is

generally considered that parasites of the genus Strongyloides are the cause of the condition.

Two species of Strongyloides have been detected, viz., the parasitic generation of *S. suis*, and that of *S. westeri*.

The author states that the effects of infestation may be directly due to the parasites or to secondary infections.

JOYEUX (Ch.). Recherches sur la faune helminthologique algérienne (cestodes et trématodes.) [**The Cestodes and Trematodes found in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1927. Dec. Vol. 5. No. 4. pp. 509–528. With 1 text fig.

This paper is a continuation of one published in 1923 in the *Archives de l'Institut Pasteur de Tunis.*

The author gives an account of the adult and larval cestodes and describes *Oochoristica erinacei* Meggitt 1920, n. var. *rodentium.*

A table gives parasites and hosts.

The cestodes of poultry are dealt with and finally the larval forms of trematodes found.

## BACTERIAL DISEASES.

RUPPERT (F.). Beitrag zur Diagnostik des Milzbrandes. [**The Diagnosis of Anthrax.**]—*Berlin. Tierärzt. Wochenschr.* 1928. Apr. 13. Vol. 44. No. 15. pp. 245–247.

The author points out that the diagnosis of anthrax is not a simple matter in every case. Examination of a film prepared properly is sufficient in a very large proportion of cases, but he has encountered instances in which the results obtained by microscopic examination, artificial culture, animal inoculation, and precipitin tests are not in agreement. In some cases microscopic examination has been definitely positive while culture and experimental inoculation have not afforded confirmation. Cultivation has failed in about 25 per cent. of cases in which the presence of anthrax was proved by other methods. Experimental inoculation yields far more accurate results than artificial cultivation.

CERNAIANU (C.). Die Pathogenese des Milzbrands und die Milzbrandschutzimpfungen in Lichte der neuesten Forschungen, sowie die Erfahrungen mit Kutivakzination in Bessarabian. [**The Pathogenesis of Anthrax and the Protective Inoculation against the Disease. The Results of Cuti-Vaccination in Bessarabia.**]—*Berlin. Tierärzt. Wochensch.* 1928. July 13. Vol. 44. No. 28. pp. 465–469.

The author considers that infection can take place only in the skin, and therefore immunity can only be produced by establishing a skin immunity.

He finds the cuti-vaccination superior to the subcutaneous injection method.

VELU (H.) & VAYSSE. Durée de l'immunité consécutive à la vaccination intradermique en un temps contre le charbon bactéridien. [**The Duration of the Immunity against Anthrax produced by a Single Intradermal Vaccination.**]—*Bull. Soc. Path. Exot.* 1928. Apr. 18. Vol. 21. No. 4. pp. 294–295.

Investigators who have carried out experiments regarding the production of immunity against anthrax by intradermal inoculation have been inclined to lay stress upon the solidity of the immunity produced rather than upon the duration of that immunity. The latter point is of the utmost importance to the clinician.

The authors report a case in which fourteen pure-bred and cross-bred animals were vaccinated by the single intradermal method in March, 1927. In February, 1928, 20 Moroccan cows were brought for service by the pure-bred bull, and three weeks later two of these died of anthrax. All the animals were vaccinated at once, including those which had been done a year before, and it would have been an interesting test of the immunity if those previously done had not been re-vaccinated, but their value made it impossible to take the risk. No case of anthrax occurred among those originally vaccinated.

The authors conclude that this shows that the immunity lasted a year.

MÉLANIDI (C.) & MYLIANOPOULO (M.). Accidents anaphylactiques sur des vaches à la suite de l'injection du sérum anticharbonneux. [**Anaphylactic Accidents in Cows injected with Anti-Anthrax Serum.**]—*Rev. Gén. Méd. Vét.* 1928. June 15th. Vol. 37. No. 438. pp. 312–314.

In November, 1925, three cows out of a herd of 25 died of anthrax at premises standing next to a tannery in the neighbourhood of Athens. The remaining animals were given anti-anthrax serum (of equine origin) and were afterwards inoculated with Pasteur vaccine. Each animal had 25 to 30 cc. of serum without any ill-effect of any kind.

Six months later two of the cows which had been vaccinated died of anthrax. Serum injections were again given and a triple anthrax vaccination was carried out using a double dose of the second vaccine for the third injection.

While the majority of the animals showed no disturbance, three cows and a bull showed signs of anaphylactic shock fifteen to twenty minutes after the injection of the serum. The symptoms included restlessness and kicking, gnawing with their teeth, and scratching with their feet on account of the pruritus. There was intense congestion of the skin and mucous membranes, and the lips of the vulva became markedly oedematous. Salivation and lachrymation were severe. Evacuation was frequent and the faeces became fluid after a time. Two cows showed urticaria and one had marked dyspnoea. The train of symptoms reached their maximum about a quarter of an hour after their onset, and they gradually decreased until at the end of an hour they had completely disappeared. The only sequel was some loss of appetite and reduction in the milk secretion during the next 24 hours.

Three months later the owner requested that his animals should be re-vaccinated as a precaution. As new animals had been bought and anthrax was known to be endemic in the district, injections of serum were again given prior to vaccination.

To reduce the risk of shock to each animal it was intended to give 2 cc. of serum and the remainder of the dose three-quarters of an hour later. But within 10 to 30 minutes, and while the last of the batch of animals were being injected, the whole of the animals, including those which had developed symptoms on the previous occasion, showed the symptoms described above.

It is especially noted that, although several of the cows were pregnant, not one aborted. The author suggests that a homologous anti-anthrax serum should be used.

DUNKIN (G. W.). **A Diagnostic Agent for the Detection of Johne's Disease and its Method of Preparation.**—*Jl. Comp. Path. & Therap.* 1928. June. Vol. 41. No. 2. pp. 94-108.

Those interested must consult the original of this paper for the preparation of this agent.

The technique of applying the test is the same as that for applying the intradermal tuberculin test.

BASSET (J.). Vibrion septique et *B. chauvaei* chez le cheval. [**Vibrion septique and** *B. chauvaei* **in the Horse.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. Feb. Vol. 80. pp. 65–75.

The author describes the effects of inoculating horses with the two organisms.

He finds that by intramuscular inoculation the results run parallel with those produced in guineapigs. Cultures of the vibrion are about fifty times as pathogenic as those of *B. chauvaei*.

BATES (L. B.). **Blackleg on the Canal Zone.**—*Proc. Med. Assoc. Isthmian Canal Zone.* 1921–1926. Vol. 14. pp. 9–13.

The author explains that the Board of Health Laboratory has always done a certain amount of animal pathology and bacteriology for two reasons: The veterinary services have no general laboratory and the personnel and equipment of the Board of Health Laboratory can readily be applied to the study of animal disease. Secondly, it is quite essential from the public health standpoint that the Health Department have first-hand information of disease occurring in the animal population for the protection of human health.

The present paper is to record the occurrence of blackleg in the Canal Zone. Three cases have been detected.

HUDDLESON (F.) & ABELL (Elizabeth). **Rapid Macroscopic Agglutination for the Serum Diagnosis of Bang's Abortion Disease.**—*Jl. Infect. Dis.* 1928. Mar. Vol. 42. No. 3. pp. 242–247.

This paper describes a detailed technique for the preparation of a special antigen, and apparatus for carrying out the agglutination test for abortion, and it must be studied in the original by those interested.

HOLTUM (A. W.). **A Double Intradermal Test for the Diagnosis of Bovine Contagious Abortion.**—*Jl. Comp. Path. & Therap.* 1928. Mar. Vol. 41. No. 1. pp. 25–53. With 5 figs. & 5 charts; June. No. 2. pp. 79–93. [15 refs.]

The author prepares an antigen for intradermal injection as follows:—

Subcultures on agar slopes (pH 7·6–7·8) are incubated for 72 hours at 37° C. and then left in the dark at room temperature for 12 days. The growth is washed off in normal saline containing 0·5 per cent. carbolic so as to make a "thick suspension." The suspension is heated in a water bath at 65° C. for half an hour.

The suspension is then standardized to correspond with Brown's standard opacity tube No. 10. Gates' method gave a reading of 6 mm.

The technique of the test is as follows:—

An area of skin on the side of the neck is shaved and wiped with alcohol. 0·2 cc. of antigen is injected intradermally. In some instances this suffices to produce a reaction, which is a diffuse warm painful swelling. The skin is measured before and during the test with ball-pointed calipers having an arc graduated in millimetres.

A thickening of the skin to twice its original measurement is considered positive.

Where there is no thickening a second dose is injected at the same place, and the first dose is looked upon as a sensitizing dose. Sometimes the injection produces a small amount of necrosis of the skin. This, however, resolves itself. The bulk of the paper is made up of detailed accounts of tests carried out, and the author compares his results with those yielded by the agglutination test, greatly to the favour of the intradermal test.

## DISEASES DUE TO FILTERABLE VIRUSES.

OLITSKY (P. K.), TRAUM (J.) & SCHOENING (H. W.). **Report of the Foot-and-Mouth Disease Commission of the United States Department of Agriculture.**—*United States Dept. Agric. Technical Bull.* No. 76. 1928. June. 172 pp. With 4 text figs.

This report does not lend itself to brief abstraction as it runs to some hundred and seventy pages, and a list of its contents would convey little or nothing.

It may be noted that the outbreak which occurred in the United States in 1908 was traced to small-pox vaccine imported from Japan. Animals inoculated with this vaccine generally developed vaccinia only, but in some instances the lesions of foot-and-mouth disease developed. In another outbreak the infection was spread through the medium of infected hog cholera serum. This was obtained from pigs which showed no evidence whatever of infection at the time the blood was collected. In this case proof of the infectivity of the serum was not obtained until over sixty animals in all had been inoculated.

The work of the members of the Commission was carried out in European laboratories, and mainly at Strasburg.

In connexion with the question of the virus persisting in recovered animals, that is to say, the "carrier" problem, the authors failed to obtain any evidence of the existence of such carriers.

Attention is drawn to the vesicular stomatitis of horses and cattle in connexion with differential diagnosis and the disease is dealt with at some length in the report. At the onset of a disease characterized by vesicle formation resort should be had to experimental inoculation for the purpose of establishing a definite diagnosis of either foot-and-mouth disease or vesicular stomatitis. Guineapigs are not suitable, as they can be infected with both viruses. Cattle should be used, and they should be inoculated by scarification of the gums and also intramuscularly. If the disease is vesicular stomatitis the intramuscular inoculation will, in the authors' experience, fail to cause infection. Inoculation of horses should be carried out at the same time, as they are very resistant to infection with foot-and-mouth disease.

The occurrence of at least two types of virus is confirmed, as is also the fact that each protects only against its homologous type.

After infection solid immunity appears to last for about 3 months, but after about 7 months local resistance is lost, and after 18 months practically all immunity has disappeared.

There is no method known at present of producing immunity without causing actual infection.

Hyperimmune serum and " convalescent " serum in the few tests carried out appeared to be of about the same value prophylactically. The immunity conferred is, like all passive immunities, of brief duration lasting for one to two weeks.

The authors summarize the methods of control which are in force in the various countries in Europe visited by them.

With regard to the filtration of the virus the authors found that the charge carried by the virus is positive, and cataphoresis tests have shown that its isoelectric point is about pH=8.

By the use of standardized Bechhold collodion filters the authors have been able to calculate that the diameter of the virus particles lies between 20m$\mu$ and 100 m$\mu$.

There is no evidence to show that the virus is actually a fluid.

The American investigators found themselves in agreement with English research workers regarding the effects of various chemical substances upon the virus. The virus is not readily acted upon by agents which cause coagulation. It appears to be protected against them by the coagula owing either to its minute size or its positive electric charge.

The virus can be destroyed as readily as bacteria such as staphylococci by substances which do not cause coagulation such as antiformin or sodium hydroxide. It cannot therefore be stated definitely that resistance to chemicals is evidence of inanimate nature.

No success attended efforts to obtain artificial cultures of the virus.

The authors claim that under completely anaerobic conditions the viability of the virus is prolonged to at least twice the time obtained under aerobic conditions, and they state that the disagreement between their results in this respect with those of English investigators is probably due to difference in technique, it being held that while Böez apparatus permits of the production of complete permanent anaerobiosis, the English methods do not. For preservation of the virus the authors found the following factors to be favourable: A pH of 7·5 to 7·6 throughout the period of observation, strict anaerobic conditions, a temperature below 37° C., a semi-solid medium such as 0·25 per cent. agar or 10 per cent. gelatin, more particularly the latter. No satis-

factory results were obtained in experiments designed to test the respiration of the virus.

The general results obtained from experiments designed to test the survival of the virus outside the body under approximately normal conditions showed that it readily survives a month or more.

VALLÉE (H.), CARRÉ (H.) & RINJARD (P.). Sur la vaccination anti-aphteuse. [**Vaccination against Foot-and-Mouth Disease.**]—*Rev. Gén. Méd. Vét.* 1928. May 15. Vol. 37. No. 437. pp. 257–259.

It has been shown that virus treated with formalin can be used for immunizing purposes, but the practical difficulty encountered in the application of this method is the provision of virus on a large scale for the preparation of the vaccine.

Since success has not as yet attended efforts to obtain the virus in artificial culture, resort must be had to culture *in vivo*.

It is well known that in guineapigs infected intradermally the blood is rich in virus between the twenty-fourth and the forty-eighth hour. The authors think therefore that at this stage not only the blood but the entire animal represents a valuable source of virus. They have therefore minced up an entire guineapig after removal of the skin, skeleton, stomach and intestines, gall-bladders and urinary bladder. From a 400 g. guineapig 80 grammes of mince were obtained.

To the mince normal saline was added so as to make a volume of 500 cc. Formalin was then added to the extent of 0·5 per cent. and after incubating at 20° C. for 48 hours an absolutely harmless antigen was obtained. They believe that the problem of vaccination against foot-and-mouth disease would be economically and practically solved if 50 cc. of such formalized vaccine were used for each bovine. This is the maximum dose that they have used in their experiments.

Seven animals ranging from 8 to 18 months old have been vaccinated subcutaneously, some with 50 cc. in one dose and others with 25 cc. doses at an interval of a fortnight. There was a fairly marked local reaction.

All the animals were tested together 50 days after the first injection along with one bovine control and sixteen large guineapigs. The test dose was a very severe one, representing 100,000 minimal infecting doses of a dilution of virulent lymph. The infection was by the intradermal path. None of the vaccinated animals showed any sign of infection.

It is suggested that smaller doses of vaccine may be effective.

Vaccine prepared in this way preserves its activity for at least forty-five days in cold storage. Experiments which are in the process of being carried out show that the sheep and the pig can be utilized in a similar way for the production of vaccine.

LECLAINCHE (E.). La stomatite vésiculeuse des bovidés. [**Vesicular Stomatitis of Cattle.**]—*Rev. Gén. Méd. Vét.* 1928. June 15. Vol. 37. No. 438. pp. 305–312.

A number of diseases characterized by the formation of lesions on various parts of the mucous membrane of the mouth have been described as occurring in cattle, but for the most part the descriptions are very vague.

Aphthous stomatitis, or, as it is termed in France, ulcerative stomatitis, occurs most frequently in lambs, other species being occasionally attacked.

Papular stomatitis has been given a number of names by different authors, and it is characteristic of this condition that vesicles are never formed. The lesions take the form of flattened papules ranging in size from a mustard seed to a lentil. Exfoliation takes place without vesicle-formation occurring.

These forms of stomatitis are fairly clearly defined, but most of the others that have been described are difficult to classify.

In 1925, COTTON, in the United States, described an outbreak of vesicular stomatitis among some young bovines. In no case did any of the animals show lesions on the feet, and, although the disease was suspiciously like foot-and-mouth disease, slaughter was postponed. Inoculation of six horses produced typical lesions and an elevation of temperature. The disease was therefore proved not to be foot-and-mouth disease.

COTTON has, however, placed it upon record that in vesicular stomatitis lesions involving the feet are not unknown.

In a country where foot-and-mouth disease is always present such cases would be unhesitatingly diagnosed as foot-and-mouth disease, but a doubt would arise regarding their nature in a country normally free.

The virus of stomatitis can be passed through bovines or equines in series without altering its virulence, and inoculated intradermally into guineapigs it produces lesions of the pads.

The blood of horses inoculated contains the virus during the first 24 hours, but it disappears after the formation of vesicles. This inoculability serves to distinguish the virus of vesicular stomatitis from that of foot-and-mouth disease, as the two conditions resemble one another very closely in other respects. That the two viruses are separate and distinct is indicated by the fact that there is no cross immunity. It is clear that the occurrence of vesicular stomatitis in a country ordinarily free from foot-and-mouth disease might cause serious loss if slaughter were resorted to.

The problem of what steps should be taken when an outbreak occurs and before definite diagnosis has been established is a difficult one, and one about which different views are held.

VALLÉE (H.) & CARRÉ (H.). Etudes sur la fièvre aphteuse. [**Foot-and-Mouth Disease.**]—*Ann. Inst. Pasteur.* 1928. Aug. Vol. 42. No. 8. pp. 841–869

This paper deals largely with the question of the plurality of the foot-and-mouth disease virus, and the authors' observations confirm the results obtained elsewhere. There are at least two types, A and O, which remain unchanged through numerous passages and can be distinguished from each other only by cross-immunity tests.

The authors find that the duration of immunity conferred by a natural attack averages about a year. On the whole the immunity conferred by virus O is longer than that conferred by A. In very exceptional cases it may not persist for more than a few weeks.

The authors appear to be inclined to support the idea of local immunity. The theory of plurality of the virus is not sufficient to explain all cases of relapse. In some cases repeated inoculations instead of producing hyperimmunity tend to produce increased susceptibility.

MAITLAND (H. B.), BURBURY (Y. M.), HARE (T.) & MAITLAND (M. C.). **Investigations on Foot-and-Mouth Disease by Means of Experiments with Small Animals during 1926-27.**—*Jl. Comp. Path. & Therap.* 1928. June. Vol. 41. No. 2. pp. 123–159.

This paper is divided into six sections dealing respectively with (1) Vaccine prepared from foot-and-mouth virus; (2) The methods of demonstrating immunity to foot-and-mouth disease; (3) The determination of the immunological types to which the different strains of virus belong; (4) The duration of infectivity of the tissues of guineapigs following infection by intradermal inoculation; (5) Experiments on the passage of foot-and-mouth disease in different species of animals; (6) Experiments on the localization of the lesions and on local immunity in foot-and-mouth disease.

It is impossible to abstract the mass of technical detail contained in these sections, and the general conclusions are therefore dealt with.

The work done in Section I leads the authors to conclude that in the preparation of a formalized vaccine the factors of temperature, time of contact with formalin and hydrogen ion concentration exert a marked influence on the quality of the vaccine. The best immunization has been obtained by using a vaccine prepared by killing the virus with 0·1 per cent. formalin at 26° C. for 48 hours, the pH being adjusted to 7·6.

Simple exposure of the virus to a temperature of 37° C. for 5 days at pH 7·6 produced a vaccine closely comparable to the above. Drying the virus at the same temperature rendered it valueless as a vaccine.

Sodium ricinoleate and crude castor oil soap destroy the virus.

Vaccines made by the formalin method from guineapig serum were superior to those prepared from vesicle fluid or epithelium.

When formalized normal guineapig serum or rabbit serum, casein, and plague vaccine were injected simultaneously with the vaccine, but into the opposite leg, the degree of immunity appeared to be higher than that produced by the vaccine alone.

The formalized vaccine retains its activity for several months at ±5° C. in the dark, but at room temperature marked deterioration occurs.

The immunity produced by the formalized vaccine is specific for the immunological type of virus. Unknown viruses can be typed by using them for the inoculation of guineapigs protected by formalized vaccines.

Section 2.—It is a matter of considerable importance to select a method for testing the immunity of guineapigs. Resistance in intramuscular inoculation represents an inferior grade of immunity than that which leads to a suppression of generalization following a primary lesion induced by intradermal inoculation. Complete immunity to intradermal inoculation represents a higher degree of immunity still, and this may be qualified by the number of minimal infective doses used in the test.

It is only the serum of animals possessing this high degree of immunity that can be shown by *in vitro* experiments to contain any antibodies. It is probable that they are present in the sera of other animals, but in amounts too small to be detected by present methods.

The immunity to foot-and-mouth disease can therefore be estimated quantitatively and the value of experiments depends upon the accuracy of the methods of estimation. Similarly, the strength of a virus can

be calibrated, so to speak, by the intradermal inoculation of guineapigs with successive dilutions.

The strength of an immune serum can be tested either by *in vitro* neutralization of virus or by passive immunization of guineapigs, but as the factor of susceptibility does not come into consideration in the former method, this is probably the more exact, and further both factors in the test can be measured with accuracy.

Guineapigs which have passed through an attack of the disease preserve their immunity to the same virus for months, but this immunity is relative to the amount of virus used in testing. In other words, by increasing the amount of virus in the test inoculation the resistance can be overcome.

A single dose of formalized vaccine will produce a degree of immunity which will protect against intramuscular inoculation and a higher degree of immunity which will prevent generalization after intradermal inoculation has produced a primary lesion.

Section 3.—Guineapigs can be used for the typing of viruses, and they are especially suitable because there is no risk of spontaneous cross-infection. It is important, however, that in comparing strains only viruses which have become adapted to guineapigs should be used. It has been the authors' experience that 8 to 13 passages from pad to pad are required to reach a fairly constant titre of 1 in 500,000 or more.

Strains of unknown type have been tested on guineapigs immune to the two types of virus found in this country. In preference to convalescent animals vaccinated guineapigs have been employed as this effects a saving in time.

Resistance to generalization after the development of a primary lesion has been taken to indicate immunity, and to identify therefore the strain being tested. Not less than eight guineapigs must be used for such a test, as it has been found that vaccine may not protect from 10 to 25 per cent. of the animals used in any test.

In England only strains recognizable as being identical with the strains O and A of Vallée have been encountered.

German authorities recognize three types which they refer to as A, B and C. Type C has not been encountered in England.

Section 4. The duration of the infectivity of tissues of guineapigs after intradermal inoculation.

Tissues were examined during life and after death. During life the heart blood, pad epidermis, saliva, and urine were tested. After death (killing by chloroform after withdrawal of heart blood) the heart blood, ear epidermis, epidermis of the abdomen, aqueous humour, eyeball, gastric juice and intestinal juice were tested. The results indicated that the epithelium from a pad lesion was infective up to the 5th day after infection, the epidermis of the ear up to the 10th day (at least) although no lesion of the ear could be detected. The gastric juice was not infective.

Section 5.—The passage of the virus in other species of animals.

Since the previous experiments, in which guineapigs, rabbits, wild and tame rats were used, were recorded, further tests have been carried on with these species, as it was thought that results might vary with different types of virus.

In the first set of experiments attempts were made to infect tame rats and rabbits with Type O virus direct from bovines, and similar experiments were carried out with Type A virus.

The third group of experiments in this section concerned the raising or lowering of virulence and possible change of type of virus by passage through animals of different susceptibility. It was found that neither the A nor the O type of virus was readily adapted to rats or rabbits, and these animals were very resistant to the O virus taken direct from a bovine.

No evidence of change of type could be obtained. It was noted that epithelium from rabbits is highly infective for guineapigs, and that their blood is very variable in its content of virus.

Vaccines prepared from rabbits protect guineapigs as well as those made from guineapigs.

In Section 6 the experiments were made to find the explanation of the localization of the lesions of foot-and-mouth disease. The survival and growth of the virus in muscle and the distribution of the virus in the internal organs were investigated, and attempts were made to obtain evidence of local immunity as distinct from general immunity. While it was not found possible to graft the covering of the pad on to other parts of the body, success was achieved when, by a plastic operation, the hairy skin of the leg was made to cover the area normally covered by the pad. This skin developed lesions when guineapigs were inoculated intradermally or intramuscularly.

It appeared to be possible that pressure played a part in the production of lesions, and support is lent to the view by the facts that lesions have been set up in unusual situations subjected to pressure. This was done by placing the animals in cages with wide wire flooring the meshes of which were large enough to allow the feet to pass through. This caused the animals to clutch the wires with their toes in walking and consequently to produce pressure. The result was the production of lesions on the toes.

Attempts have been made to produce lesions in other parts of the body by subjecting them to pressure, but satisfactory results have not been obtained as yet.

In guineapigs inoculated intramuscularly the virus could be detected in the muscle inoculated and not in the corresponding muscle of the other leg 18 to 20 hours later.

But it was found that in experiments in which inoculated muscle was ground up with sand a strong buffer solution had to be used because of the acidity produced in grinding up the muscle. In three cases muscle, both inoculated and uninoculated, contained virus in the same dilutions at 24 hours. The animals were bled out before the muscle was taken, and the authors say that it seems possible that the virus found was contained in residual blood. In experiments to test the distribution of the virus in the internal organs no regularity of occurrence was found. In different animals it was found in the trachea, lung, liver, spleen, kidney, but never in the heart muscle. The blood of all the animals was virulent and this may have accounted for the finding of the virus in the organs.

With a view to obtaining evidence as to whether a condition of local immunity as distinct from general immunity occurs, experiments were carried out in which guineapigs were vaccinated intramuscularly and then after a week intradermally on one pad. Three weeks later they were again inoculated intradermally on the pads, but on this occasion both feet were inoculated. The results indicated that the foot which was inoculated twice was less readily infected. It is suggested that

this may be due to specific local immunity or to changes resulting in the pad as the result of the original infection.

It was not found possible to demonstrate any substance antagonistic to the virus in pads whether they have been the seat of lesions or not. Further tests are being carried out using heterologous viruses for the two infective inoculations, as this should cut out the possibility of the resistance being due to specific immunity.

PUNTONI (V.). L'eliminazione del virus rabico per le vie digerenti e le lesioni gastro-enteriche nella rabbia. [**The Elimination of the Virus of Rabies by the Alimentary Tract and the Lesions of the Gastro-Intestinal Tract in Rabies.**]—*Ann. d'Igiene.* 1928. Jan. Vol. 38. No. 1. pp. 1–22.

Dogs affected with rabies present with considerable frequency symptoms of gastro-enteritis.

The mucous membrane of the duodenum and the proximal part of the ileum show congestion and not infrequently haemorrhages.

By isolating a loop of the intestine, by Thory-Vella's method, it can be shown that the virus is eliminated into the lumen of the bowel as it is by the saliva, and it is reasonable to attribute the lesions of the mucous membrane to the action of the virus. Similarly, the congestive phenomena seen in the mouth and throat are no doubt evidence of elimination of the virus.

KOLDAGEIV (B.). Ueber Glykämie bei experimenteller Wutkrankheit. [**Glycaemia in Experimental Rabies.**]—*Deut. Tierärzt. Wochensch.* 1928. June 2. Vol. 36. No. 22. pp. 384–385.

The author finds that glycaemia does not always occur in rabbits inoculated with fixed virus. It was found in about 50 per cent. of the animals on the last day of the disease.

BASSET (J.) & LABORDERIE. Rage chez un mulet. Observations sur le diagnostic expérimentale de la rage. [**Rabies in a Mule. Observations on the Experimental Diagnosis of Rabies.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. Feb. Vol. 80. pp. 76–85.

The mule was one recently imported from Syria. The earlier symptoms were not pronounced ; the animal pawed the ground, and frequently extended itself as if to urinate without doing so. These manifestations lasted about 10 minutes, and the were repeated at about half-hour intervals.

The following morning there was evidence of colic, and the symptoms appeared frequently throughout the day, becoming more marked towards evening. On the third day there was marked excitement and inco-ordination of movement. Periods of quietude were interspersed between the attacks, during which the animal could be examined without difficulty. The visible mucous membranes were very congested, the temperature 40° C. and the pulse 80. The lower jaw was paralysed and the mouth was held half open. There was paresis of the hind legs.

In a period of excitement the mule attempted to bite the man holding it, but could not close its mouth. The animal died when the paralysis had extended to the anterior limbs.

Paralysis of the jaw is not usual in equidae affected with rabies; in fact the authors suggest that it has not been recorded before. Only the bulb of the brain was examined and here perivascular infiltrations with rounded cells were found. These, however, are not special to rabies.

A rabbit inoculated with emulsion of the bulb showed symptoms of paralysis on the 22nd day, but these involved, not the hind, but the forelegs. The animal moved in a series of jumps, landing on its face or sternum each time. By the evening of the same day posterior paralysis was practically complete, and the animal died the following morning.

Two guineapigs were also inoculated intramuscularly into the thigh. The first symptoms of paralysis appeared in the inoculated leg of one of them on the 20th day. It affected the other hind leg within 24 hours later, and 30 hours after the appearance of symptoms paralysis of the hindquarters was complete, but sensation was not absent. By the fourth day paralysis had extended to the forelegs and neck.

The second guineapig failed to become infected. The authors recommend that guineapigs should be used in preference to rabbits for the diagnosis of rabies.

GALLI-VALERIO (B.). Symptômes rabiformes non rabique chez les carnassiers. [**Non-rabic Rabiform Symptoms in Carnivora.**]— *Schweiz. Arch. f. Tierheilk.* 1928. Feb. Vol. 70. No. 2. pp. 72–76.

Long experience convinces the author that in cases which have exhibited symptoms suspicious of rabies the whole carcase and not only the head should be sent to the laboratory. He is of the opinion that parasites, animal and vegetable, may be responsible for the production of such symptoms.

The author passes under review the diseases included in these groups. The nervous form of distemper may be characterized by violent excitement followed by symptoms of paralysis. A case is cited in which a dog showed symptoms of severe cerebral excitement, and at the post-mortem a flea was found in the brain.

Otacariasis may cause rabiform symptoms in dogs, cats, and foxes.

*Linguatula rhinaria* is given as a parasite which may be responsible for symptoms resembling those of rabies.

Ascarides are held responsible for the production of similar symptoms. The author states that heavy infestations in young animals may cause convulsions, and human beings may be bitten. *Eustrongylus visceralis*, *Filaria immitis*, and tapeworms are all held to be the cause of rabiform symptoms.

AYYANGAR (S. S.). **S.S. Inoculation for Rinderpest with Local Virus.**— *Indian Vet. Jl.* 1928. July. Vol. 5. No. 1. pp. 7–10.

The author records the use of virus from naturally infected animals for the serum simultaneous inoculation. Intravenous injection of tincture of iodine (15–20 cc. in 40 cc. of sterile water) was said to have reduced the temperature of infected animals, and to have assisted recovery.

DELPY (L.). Peste bovine atypique transmise par passages. Contribution à l'étude des porteurs de virus. [**Atypical Cattle Plague transmitted by Passage. The Question of Carriers of Virus.**]—*Rev. Gén. Méd. Vét.* 1928. May 15. Vol. 37. No. 437. pp. 259–264.

In the course of some experiments regarding the attenuation of the virus of cattle plague the virus became modified spontaneously and failed to produce typical rinderpest for several passages.

The condition was unlike any of the atypical forms described by other investigators save a single case described by BOYNTON in 1915.

At Bamako the virus is kept running in calves brought from areas which have been free from rinderpest for several years, and it produces in them, with a 1 cc. dose, the typical picture of the disease, viz., elevation of temperature on the fourth day, the appearance of lesions in the mouth between the 4th and 6th days, diarrhoea and death on the 10th to 12th day.

Starting with a calf which gave a typical reaction to inoculation, two calves were inoculated each with 1 cc. of blood which was taken when the temperature was at its maximum. One of these had a maximum temperature of only 40° C., with distinct buccal lesions, profuse diarrhoea, and death took place on the 8th day. The disease was therefore rapidly fatal but apyretic. The other calf, which was the subject of experiment and which was given a mixture of blood and tapioca, showed quite a different reaction. The temperature rose to 41·8° C. by the 5th day, and then fell rapidly. Death took place on the 8th day, when typical lesions were present in the mouth. To avoid loss of the virus a fresh calf was inoculated with 5 cc. of blood from each of these two animals.

This calf reacted atypically. The temperature rose to 40·5° C. on the fifth day and then fell slightly. It rose again to 40·8° C. on the 14th to 16th days and fresh rises occurred on the 23rd, 28th, and 44th days. Buccal lesions appeared on the 7th day and were present at the time of death. Repeated examinations of the blood failed to reveal the presence of either piroplasms or trypanosomes.

During the second rise of temperature 20 cc. of blood were taken for the inoculation of another calf. A slight rise of temperature occurred shortly after the inoculation and there were further rises on the 10th, 18th, 26th, 32nd, and 47th days. Buccal lesions appeared on the 10th day, and there was slight diarrhoea on the 12th day.

A similar form of the disease developed in four other calves inoculated.

It was thought that by chance an attenuated virus had been encountered, and two of the calves which survived for some weeks showing an occasional elevation of temperature were tested as to their immunity. One of these was given 10 cc. of blood containing new active virus recently obtained. It gave a distinct reaction, but the temperature gradually fell, profuse diarrhoea reappeared and death took place on the 9th day. The other was infected by contact. On the 8th day the temperature rose to 41·5° C. and death took place on the 12th day.

The atypical cattle plague therefore conferred no immunity against the typical disease. The question arises as to whether the animals were affected with a mild form of the disease or whether it was a very chronic form showing a slow course. The author thinks the latter view is correct, because, in the first place, the blood was virulent in the

atypical cases throughout the course of the disease, and secondly, because the disease terminated fatally in every instance.

The later members of the series of animals inoculated with this virus died earlier than the first few of the series.

PICARD (W. K.). **Pseudo-Fowlpest.**—*Dept. Agric., Indust., & Comm. Dutch East Indies. Vet. Bull. No. 65.*—46 pp. With 4 charts & 10 figs. on plates. Buitenzorg : Archipel Drukkerij.

Attention was first drawn to this disease in March, 1926, when very severe losses occurred among fowls in the neighbourhood of Batavia. Soon after this reports regarding its occurrence in other islands of the Archipelago were received.

The author describes the disease as being in all probability identical with the " Newcastle " disease described by DOYLE.

Picard obtained fowl plague virus from Utrecht for cross immunity tests.

The pseudo-pest virus is transmissible to fowls, native ducks, and pigeons. A small scale experiment with geese failed, but there is reason to think, from field observations, that the goose is susceptible.

Infection may take place by indirect infection, but the virus quickly loses virulence outside the body.

ARAGÃO (H. de B.). **Myxoma of Rabbits.**—*Mem. Inst. Oswaldo Cruz.* 1927. Vol. 20. No. 2. pp. 237–247. With 2 charts & 5 plates.

The author describes a contagious and fatal disease of rabbits which occurs in certain countries in South America. Reference was first made to the condition by SANARELLI in 1898, he having studied the disease in Monte Video.

The symptoms are as follows: Progressive bilateral blepharo-conjunctivitis accompanied or quickly followed by the development on various parts of the body, but mainly on the nose, ears, and extremities of small fairly tense tumours. These may increase in size, or remain about the size of a hazel nut. Swelling of the natural orifices. Death takes place in 8 to 15 days, and during the last stages dyspnoea with stertorous breathing, cyanosis, and coldness of the extremities.

At the post-mortem examination the tumours are found in the subcutaneous connective tissue. Sometimes they are discrete and at other times agglomerated into masses. On section they have a lardaceous appearance and are fairly vascular. A considerable amount of serous liquid drains away from the cut surface. There is marked congestion of the liver, and slight congestion of the spleen and kidneys. The bladder is always distended with clear albumen-free urine. The thoracic organs appear to be normal and there is no marked quantity of exudate in the chest cavity. The central nervous system appears normal. The disease is caused by a filterable virus, but it is held back by Chamberland and other fine grain filters. The virus, in cases of the disease, circulates in the blood and can be found there during the whole course of the disease, and it has the skin as a special predilection seat. The virus is transmissible after great dilution. It has been shown that a slight scratch with a platinum needle which has been stuck into a tumour will convey the disease.

The natural secretions are infective and contact is the normal mode of transmission. Experiment indicated, however, that fleas can

transmit the disease. The virus does not appear to be pathogenic for any species other than tame rabbits. By passage through rabbits it is possible to exalt the virulence of the virus so that it proves fatal in 5 days. This exalted virus does not provoke the formation of tumours and the disease becomes a "myxomatous septicaemia." By passage the virus will sometimes kill without the production of any evidence of oedema. At 8–10° C. the virus retains its vitality up to 3 months, and contaminations do not affect it adversely.

Dried virus keeps for a month at room temperature and for 3 months in vacuo or in hydrogen.

Incubation at 37° C. is fatal to the virus in 10 days.

The virus resists 3 per cent. carbolic acid, 2 per cent. sublimate, 5 per cent. "formaldehyde," 1 per cent. iodine and 0·2 per cent. permanganate solution for 6 hours.

Chloroform destroys the virus in 24 hours.

The author has found an organism similar to those of variola, molluscum, etc., and he calls it Strongyloplasma myxomae.

Attempts to cultivate the virus have failed, and it cannot be shown that the blood of recovered animals, which are very few in numbers, or of animals repeatedly injected with dead virus has any protective power. Recovered animals resist re-inoculation.

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## MYCOTIC DISEASES.

PLANTUREUX (E.). Essais de vaccination préventive contre la lymphangite épizootique. [**Protective Inoculation against Epizootic Lymphangitis.**]—*Rev. Vét. et Jl. Méd. Vét. et Zootech.* 1928. July. Vol. 80. pp. 382–384.

The difficulty of controlling epizootic lymphangitis in any large number of horses is well known.

NAINSOUTA'S suggestion that the disease can be dealt with by intravenous injections of biniodide of mercury presents practical difficulties, and as a protective can have only a very transitory effect against a disease which, as a rule, has a long period of incubation and is caused by a very resistant organism.

Plantureux tested the value of the drug per os giving 0·2 g. weekly for six weeks. It was without effect.

He then tested Boquet and Nègre's anticryptococcic vaccine (formalized) giving first a dose of 2 cc. and three weeks later 3 cc. Ninety mules (one-third of the total number) were inoculated. One mule was admitted to hospital three days after the first dose and another twelve days after the second. During the succeeding period of thirteen months no case occurred among the inoculated animals, while six cases occurred among untreated animals.

The author thinks these results worthy of record, but he adds a word of warning regarding the possibilities of happy coincidence.

The plan is being tested out in another unit in the army.

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## MISCELLANEOUS.

EDWARDS (J. T.). **The Acclimatization of Imported Stock.**—*Agric. Jl. India.* 1927. Sept. Vol. 22. No. 5. pp. 333–338. With 1 plate; and part 6. pp. 411–424.

Acclimatization is concerned with the characteristics relating to climate and soil, and, largely through the interaction of these two factors, the local resources of fodder supply.

The author believes that the main factor in connexion with acclimatization of imported cattle in India is parasitism. He points out that the diseases which are indigenous to India are for the most part capable of being controlled by intervention of man, when they make their appearance in imported animals, but that the propagation of western methods of domestication among imported and cross-bred animals leads to the appearance of those diseases which cause such enormous losses in Europe and other temperate countries.

The most important parasites concerned with acclimatization are the piroplasms. The author gives a brief account of Babesia and Theileria.

He states that steps are being taken to overcome the difficulty of transmitting these parasites while inoculating against rinderpest by means of the simultaneous method, by using rinderpest virus passed into goats which do not harbour the intracorpuscular parasites of cattle.

GUDSCHEFF. Die ansteckende Pleuropneumonie der Ziegen. [**Contagious Pleuropneumonia of the Goat.**]—*Therapeutische Monatshefte f. Veterinärmedizin.* 1928. Mar. Vol. 1. No. 9. pp. 324–327.

This brief paper deals rather with the treatment of this disease by means of salvarsan than with the disease itself. The author finds this drug very valuable, as of 746 animals treated 88·4 per cent. recovered and 11·6 per cent. died. The doses range from 0·2 g. for animals weighing from 8–15 kilogs, to 0·7 g. for animals weighing from 55 to 70 kilogs.

MARSH (C. Dwight), CLAWSON (A. B.) & ROE (G. C.). **Coyotillo** (*Karwinskia humboldtiana*) **as a Poisonous Plant.**—*United States Dept. Agric. Technical Bull. No. 29.* 1928. Feb. pp. 1–26. With 17 figs.

The plant occurs in south-west Texas and in Mexico, and has been reported as causing paralysis.

Experiments have shown that it affects cattle, sheep, goats, and chickens, and it can also produce symptoms in guineapigs. There is also evidence to show that horses and pigs may be poisoned by the plant.

The poisonous nature of the plant appears to have been known for over a century, as also the fact that an interval elapses between the ingestion of the plant and the development of symptoms. Further, it was thought that the seeds of the berry borne by the plant were the toxic portion of it.

In experimentally produced cases inco-ordination and dragging of the hind legs was first seen. In more pronounced cases a high-steppng action is observed. Control of the limbs is entirely disorganized and animals may go backwards instead of forwards, or may progress by a series of jumps. It may progress until the weakness is so great that complete collapse occurs. There seems to be no pain, and the appetite is maintained. Temperature, pulse, and respiration remain normal.

Experiments with leaves showed that these were also able to produce symptoms and death.

In chickens fed with the fruit the symptoms were in general similar to those produced in cattle and sheep, but sometimes the birds walked with a peculiar stilted action. The lesions found at post-mortem examination are very indefinite, but generally speaking the mucous membrane of the alimentary canal shows congestion.

Microscopically the principal change was found in the liver, where there was a condition of necrosis of the liver cells around the central vein. The kidneys showed a moderate degree of acute parenchymatous degeneration.

The lymphatic glands throughout the body were congested.

Since in many animals the symptoms do not make their appearance for some time after the plant has been ingested, and the illness produced is sometimes prolonged, exact information regarding the lethal doses is not available.

For sheep the minimum toxic dose is 0·15 per cent. of the animal's weight. For cattle the minimum toxic dose appears to be about 0·05 per cent. body-weight and the minimum lethal dose about three times this.

For goats the toxic dose appears to be a little larger than that for sheep.

For chickens the toxic and lethal doses are very close together, and about 0·3 per cent. body-weight may produce fatal poisoning.

In the experiments carried out the interval between feeding and the onset of symptoms ranged from two days to seven weeks. When symptoms occur they develop suddenly as a rule.

Prognosis is distinctly bad, and the data obtained so far give no indication that any treatment is of value.

LEVADITI (C.) with SCHOEN (R.) & SANCHIS-BAYARRI (V.). Le virus syphilitique comporte-t-il un cycle évolutif dont le *Treponema pallidum* n'est qu'une des phases connues? [**Has the Virus of Syphilis a Cycle of Development of which** *Treponema pallidum* **is the only one Phase which is known?**]—*Ann. Inst. Pasteur.* 1928. May. Vol. 42. No. 5. pp. 475–494. With 5 text figs.

In this paper the authors give an account of their work carried out during the past two years, and although they do not claim to have provided a complete solution to the question, they feel that progress has been made.

The authors agree with other investigators that the disease can be transmitted by inoculation with gland material which cannot be shown to contain the treponema.

When tissue containing the spirochaete is grafted the invasion of the tissues involved by the parasite can readily be followed, but when gland substance in which no treponema can be found is used there is a

phase lasting on an average some 45 days before spirochaetes can be detected. At this stage giant cells can be found, particularly at the periphery of the lesion.

The spirochaetes however can be divided into two types: one in which the organisms have retained their characteristic morphology and the other in which changes both in morphology and staining reactions are recognizable. Changes in the shape of the spirals, swellings along the length of the organisms, rings which may be completely closed or not, comma-shapes, and granules of various sizes are the principal abnormalities noted. The authors believe that these form a definite succession of alterations terminating in the production of almost ultramicroscopic granules.

The authors have not been able to obtain any evidence that the virus even in what they consider its granule form is filterable.

PANISSET (M.). Aperçu sur le système réticulo-endothélial. Constitution histologique. Rôle dans la défense de l'organisme. [**The Reticulo-Endothelial System.**]—*Rev. Gén. Méd. Vét.* 1928. July 15. Vol. 37. No. 439. pp. 364–368.

The reticulo-endothelial system comprises the endothelial cells of the spleen, the lymphatic glands, the bone marrow, the supra-renal medulla, and the venous capillaries of the liver. It also includes the clasmatocytes of the connective tissue. All these cells possess prolongations of a special character, and these form a kind of network in which the tissue cells of the parenchyma are embedded.

Apart from histology, the reticulo-endothelial system is characterized by certain biological characters. The distribution of the system may be demonstrated by injecting rabbits with lithium carmine.

All investigators agree that the system plays an important part in the defence of the animal against infections.

The intravenous injection of rabbits with colloidal solutions of silver or with chinese ink causes the cells of the system to become packed with granules. The same holds good for certain bacteria. If a pigeon be inoculated with the bacillus of swine erysipelas the cells of the reticulo-endothelial system are found crammed with the organisms, while they cannot be demonstrated in the parenchyma of the organs. Similar results may be obtained with Hansen's bacillus, the tubercle bacillus, and the anthrax bacillus.

In blood transfusion in the dog the transfused cells are collected in the endothelial cells.

The presence of these substances (chemical, microbial, etc.) within the cells of the system is evidence that their inclusion is the result of action on the part of the cells. They are, in fact, fixed phagocytes. Some view the cells of the reticulo-endothelial system as the forerunners of the leucocytes.

The conception of a reticulo-endothelial system affords an explanation of the benign results of splenectomy, other tissues of the system forming " spleen substitutes."

Endothelial cells are defensive not only against bacteria, but also against their toxins. Profound changes may occur in the vascular endothelium. If suspensions of fine particles such as chinese ink or trypanblue be injected intravenously the endothelial cells become charged with granules, and from a functional point of view they cease to exist. There is a condition of so-called " blockage." Blockage, with or without splenectomy, makes the production of active immunity

impossible, and, similarly, it prevents the formation of agglutinins and precipitins.

In connection with the part played by the reticulo-endothelial system in the production of antibodies mention must be made of numerous cases in which blockage alone is not sufficient, removal of the spleen is also essential.

It is known that certain poisons can produce inflammatory reactions in the reticulo-endothelial system. Pernicious anaemia in man and delay in coagulation of the blood are possibly attributable to defects in the system.

Certain French investigators do not agree with the views held by German and American authors regarding the functions of the reticulo-endothelial system. They point out that the phenomena of blockage quickly disappear before the disappearance of the inhibitory impregnation of the cells, and before supplementary tissues can come into existence.

SERGENT (Edm.), PARROT (L.), DONATIEN (A.) & LESTOQUARD (F.). L'état de prémunition et la vaccination prémunitive. [**The State of Premunition and Premunizing Vaccination.**]—*Arch. Inst. Pasteur d'Algérie.* 1927. Dec. Vol. 5. No. 4. pp. 469–474.

From the point of view of immunity diseases can be divided into two groups, namely, those an attack of which confers complete immunity with disappearance of the infecting organism and those in which a condition of equilibrium is established between the organism and the defences of the body, and the condition of resistance is associated with a persistence of infection.

The authors therefore distinguish between the two states and they use the terms premunized and premunizing vaccination to designate the latter condition.

LHEZ (B.). Le diagnostic différentiel des maladies rouges du porc. [**The Differential Diagnosis of the "Red Diseases" of the Pig.**]—*Arch. Inst. Pasteur d'Algérie.* 1927. Dec. Vol. 5. No. 4. pp. 538–566. With 4 figs. on 2 plates.

In all pig-breeding countries the contagious diseases called "red diseases" (maladies rouges) of the pig form a serious obstacle to progress. Differential diagnosis must be accurate if progress is to be made against these diseases. This, however, is far from being a simple matter, and the object of the paper is to bring into prominence the important points that have been gathered from the investigations of a number of research workers in various parts of the world.

With regard to swine erysipelas there is not much difficulty, but the symptoms are not always typical. In the acute forms the reddening of the skin in patches is pretty characteristic. In the chronic forms hurried respiration without cough, cutaneous necrosis, and arthritis are prominent features. At the post-mortem examination congestive inflammation with enlargement of the spleen are rather typical. In these cases microscopic examination is sufficient to settle the question.

In the case of swine fever the matter is not so simple. The epizootic character of the disease is the important point. Complications frequently supervene on swine fever, and these assist in diagnosis.

In acute swine fever the inflammation is of the haemorrhagic type.

When a single animal is affected laboratory assistance must be sought to prove the existence of the filterable virus.

In the case of contagious pneumonia the enzootic character of the disease is of importance because the disease is less contagious than swine fever.

GUPTA (M. C.). **Brief Notes on Diseases Common amongst the Working Elephants in Burma.**—*Indian. Vet. Jl.* 1928. July. Vol. 5. No. 1. pp. 17–28.

Under the heading " Worms," the author states that he has seen the heart and lungs attacked by bots, and that the organs were " perforated " as a result.

The author has had " no practical experience of surra," but states that the " method of infection is by ingestion, usually from the bites of arthropods (generally blood-sucking flies) which is the intermediate host of the flagellate form."

" Intra-rectal injection " of neo-salvarsan " should have good results " in the acute form of the disease.

" In the chronic form one ounce of Liqr. arsenicalis daily with Gupta's Tonic Powder and Epsom salt should be given."

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# INDEX OF SUBJECTS.*

## Compiled by MISS M. H. JAMES.

*Note.*—Incidence, Treatment, &c.. are indexed only under Diseases, and not under Animals affected by the Diseases.



*The numbers in heavy type refer to the titles of papers summarized.

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## REPRINTS AND PAMPHLETS.

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## REPORTS RECEIVED.

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