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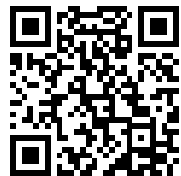
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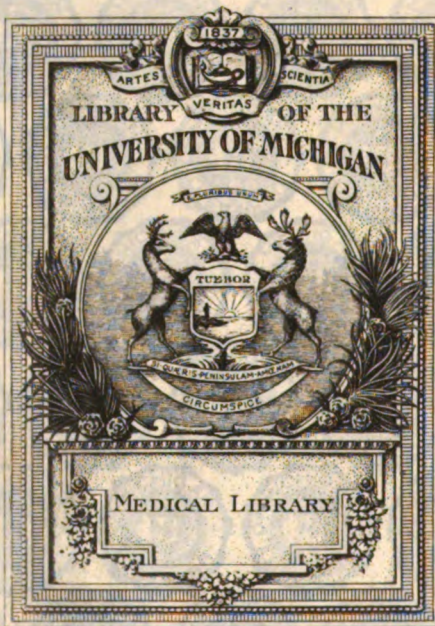
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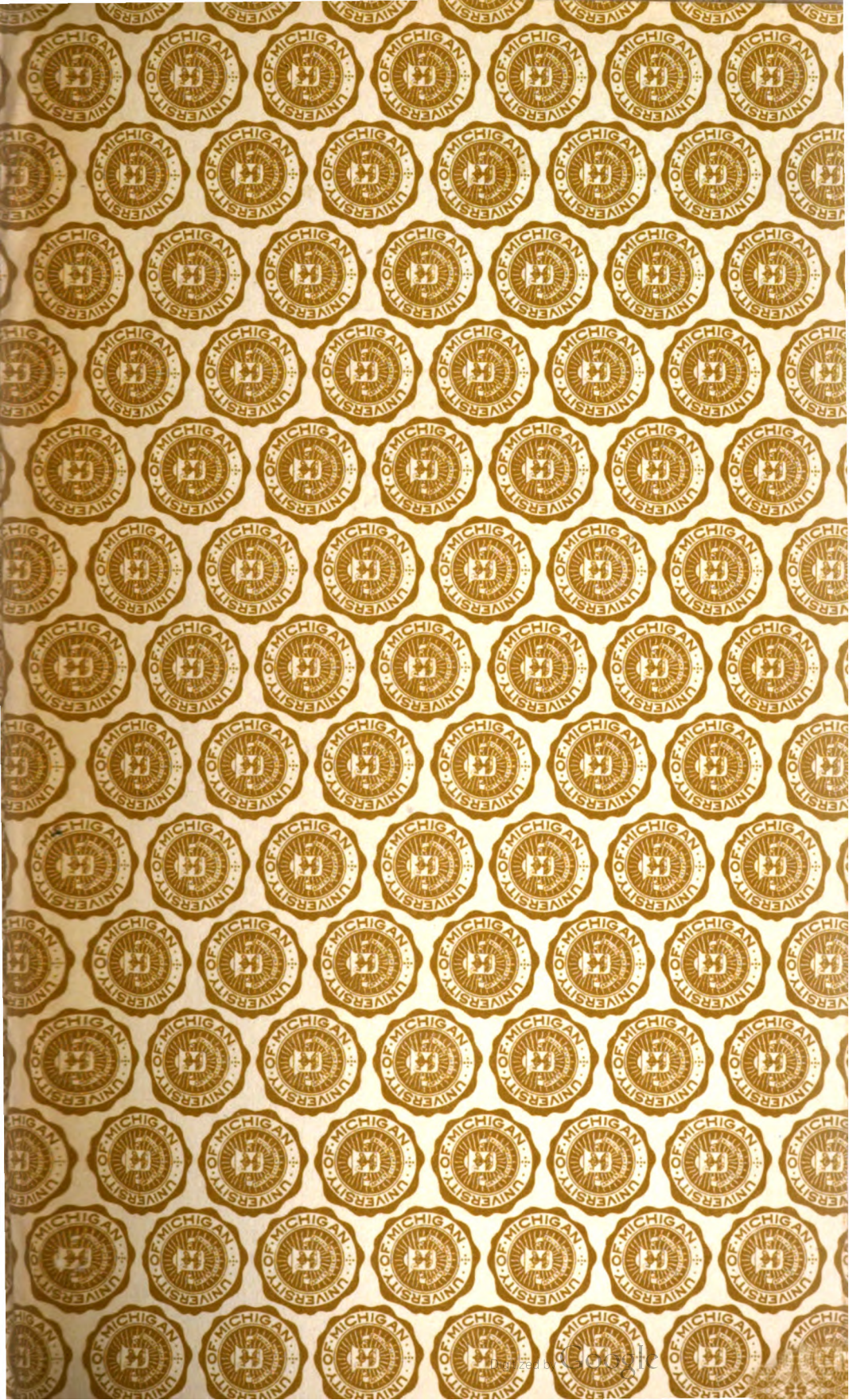




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ERRATA.

Vol. 13, No. 1, p. 1. Van der Elst Abstract, last line, and in title of Walraven's paper, for *Trypanosoma rodhain* read *Trypanosoma rodhaini*.

Vol. 13, No. 1, p. 6, 14th line from bottom, name of first author of paper on *Eimeria utinensis* for Lelau (U.), read Selan (U.).

Vol. 13, No. 1, p. 13. Thornton Abstract, line 5, for *Phaecocaeus* read *Phacochoerus*.

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TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

Vol. 13.]

February 28, 1925.

[No. 1.

DISEASES DUE TO PROTOZOAN PARASITES.

VAN DER ELST (O.). **Sur la transmission mécanique de la trypanosomiase.**
[The Mechanical Transmission of Trypanosomiasis.]—*Bull. Méd. du Katanga*. 1924. Aug. Vol. 1. No. 4. pp. 130–132.

The author records two outbreaks of trypanosomiasis, one among cattle and the other among pigs, in which the evidence appeared to indicate mechanical transmission. There was complete absence of *Glossina* and the outbreaks occurred during the season when *Stomoxys* and *Tabanidae* were numerous. Among the pigs abortion occurred. The deaths amounted to 30 per cent. Orpiment, atoxyl, and emetic alone or in conjunction failed to effect any cures, and, in fact, appeared to hasten death in many instances.

Seven bovines were found infected on the premises. These were slaughtered. In the pigs the parasite appeared to be *T. rodhain*.

WALRAVENS (P.). **La trypanosomiase chez le porc due au *Tryp. rodhain* (n. sp.)** [Trypanosomiasis in the Pig due to *T. rodhain* n.sp.]—*Bull. Méd. du Katanga*. 1924. Aug. Vol. 1. No. 4. pp. 132–133.

The trypanosome was found in pigs on the same premises as were visited by ELST.

In moist preparations the parasite executes wriggling movements, which do not involve much translation.

In stained preparations the parasite presents a long, very slender body, a central nucleus, a blepharoplast which is close to the margin of the body and quite close to the posterior end. The undulating membrane is poorly developed. There is always a long free flagellum. The parasite is invariably monomorphic. No measurements are given.

CURSON (H. H.). **The Causal Organisms of Nagana.**—MS. of a Note Communicated to the South African Association for the Advancement of Science at Capetown, July 1924.

“Nagana” is the Zulu name for a disease in domesticated animals (chiefly bovines) characterized by emaciation, progressive weakness, and terminating generally in death.

In 1894 BRUCE detected parasites, later designated *T. brucei* by PLIMMER and BRADFORD, “in the blood of certain animals.” In

1909 THEILER showed that *T. congolense* occurred in Zululand, and was responsible for a disease similar to that caused by *T. brucei*. Nagana should therefore not be applied solely to the condition caused by *T. brucei*. *T. congolense* is far more important economically in cattle than *T. brucei*, the condition set up by the latter being, comparatively speaking, mild. In 1921 Curson showed that *T. vivax* also occurs in Zululand, and is responsible for a condition closely resembling Nagana. This parasite has as yet been found in cattle only.

Nagana should be used as the term indicating the group of trypanosome infections, the symptoms of which are practically common.

VAN SACEGHEM (René). **Note préliminaire sur l'action du Bismoxyl dans les trypanosomiasés.** [Preliminary Note on the Action of Bismoxyl in Trypanosomiasis.]—*C. R. Soc. Biol.* 1924. Oct. 24. Vol. 91. No. 29. pp. 914-917.

The author has prepared bismoxyl by mixing in equal quantities a 1 per cent. solution of bismuth tartrate and an extract of ox liver. The latter was prepared by mixing one volume of liver pulp with two volumes of salt solution. The mixture is incubated at 37° C., and bismoxyl is precipitated.

Experiments in the treatment of trypanosomiasis have been carried out with the moist precipitate and with the drug in dry powder form. Two experiments were made with the drug in the former condition. The first animal, a cow infected with *T. congolense*, was given intravenously the precipitate obtained from 350 cc. of liver extract and 350 cc. of bismuth tartrate solution. The precipitate was washed several times and then injected in 700 cc. of normal salt solution.

As this failed to remove trypanosomes from the circulation, a second larger dose was given (precipitate from 450 cc. of each component in 850 cc.). The animal died, apparently from anaphylactic shock, during the injection. The second animal received the injection subcutaneously. Trypanosomes were not cleared from the circulation.

With the dry powder three animals were treated. The doses used were 7 to 9 grammes in the first instance. One animal also received a dose of 40 g. All the injections were given subcutaneously. In no case were trypanosomes cleared from the circulation.

VAN SACEGHEM (René). **Action de l'hexaméthylène-tétramine (Urotropine) dans les trypanosomiasés animales.** [Urotropin in the Treatment of Trypanosomiasis.]—*C. R. Soc. Biol.* 1924. Oct. 24. Vol. 91. No. 29. pp. 917-918.

Urotropin in a 40 per cent. solution has been used for the treatment of animals affected with *T. congolense* and *T. cazalboui* var. *vivax*, by intravenous injection.

Doses of 8 to 16 g. of the drug were used, and two or three doses were given. They were without effect upon the trypanosomes in the circulation.

VAN HOOFF (L.). **Action du "Bayer 205" sur les trypanosomiasés animales. (Note complémentaire.)**—*Ann. Soc. Belge. Méd. Trop.* 1924. Nov. Vol. 4. No. 2. pp. 255-256.

A trypanosome injection was found among some Dahomey cattle near Leopoldville. The parasite was dimorphic. "Some showed a

very short free flagellum, and others were stumpy without free flagellum." The author believes that the parasite was *T. dimorphon* Laveran and Mesnil. The first passages through the guineapig produced a moderately severe infection. The period of incubation was about three weeks, and the period of infection was at the most a fortnight. From the third passage the disease became far more severe. the period of incubation was reduced to 4 days and that of illness to 4 to 8 days.

The parasite was pathogenic for the goat (incubation 7 days, illness 15 days), and monkey (incubation 6 days, illness 18 days). A dose of 0.5 g. of trypanosan per kilo. caused the disappearance of the trypanosome in the monkey in 48 hours. The strain has been kept at the School of Tropical Medicine in Brussels, where the virulence has gradually become attenuated.

The parasite is not affected by Bayer 205 [no details are given].

SCHMIDT (Fritz). **Virulenzänderung des *Trypanosoma equinum* nach Behandlung mit "Bayer 205."** [Alteration of Virulence of *T. equinum* after Treatment with "Bayer 205."—*Arch. f. Schiffsu. Trop.-Hyg.* 1924. Sept. Vol. 28. No. 9. pp. 397-403.]

In the author's first experiments dogs were infected with Mal de Caderas and were treated per os with "205." Doses of 0.3 g. were given up to a total amount of 2.5 to 3 g. The effect was to clear the circulation for about 10 days. The parasites did not appear to have been "fast" to the drug by this treatment, for a single injection of 0.5 g. effected a complete cure.

Blood was taken from one of these dogs at the first appearance of trypanosomes after treatment per os, and was injected into a mule which had already been cured of an experimental infection with Caderas. Trypanosomes appeared on the 26th day. An intravenous injection of 0.5 g. of "205" was given, and for 42 days the circulation was free from parasites. A second injection was given, and a complete cure was effected.

Subsequent experiments performed with blood derived from animals which had been treated with "205" failed to yield any evidence that the trypanosomes acquire any degree of "fastness" to the drug.

LUENGO (E.) & DE BUEN (S.). **Pouvoir trypanolytique du sérum d'un malade traité par le "Bayer 205."**—*C. R. Soc. Biol.* 1924. Oct. 7. Vol. 91. No. 28. pp. 825-827.

Three experiments were carried out with the object of ascertaining whether the serum of a patient treated with "205" possessed any protective powers, and whether these were due directly to the drug itself or not.

The authors have been able to come to the provisional conclusion that the trypanocidal action is not due solely to the drug itself, but in part to properties developed by the serum, in part, perhaps, due to the destruction of the trypanosomes. The trypanocidal power of the serum appears to be variable with a certain periodicity.

If there is any immunity produced, as has been suspected, the object of treatment with "Bayer 205" should be the progressive destruction of trypanosomes rather than complete sterilization by the chemical direct.

KUDICKE (R.), STRAUSS (Ed.) & COLLIER (W. A.). **Versuche zur Gewinnung von trypanoziden Substanzen durch Hydrolyse von Eiweisskörpern.** [Attempts to obtain Trypanocidal Substances by the Hydrolysis of Albumens.]—*Zeitschr. f. Hyg. u. Infektions-Krankh.* 1924. Sept. Vol. 103. No. 3. pp. 622-639.

In the mixture of albumoses and peptones which results from hydrolysis of albumens there are substances which are capable of destroying trypanosomes *in vitro*. It is possible that products of further breaking down of protein may act in a similar way. The possibility suggests itself that similar substances are produced in the animal body and assist in the combat against the parasites.

QUIROGA (S. S.). **La prueba de fijacion del complemento en el diagnóstico del "Mal de Caderas."** [The Complement Fixation Test in the Diagnosis of Mal de Caderas.]—*Revist. Zootecnica.* 1924. July 15. Vol. 10. No. 130. pp. 195-203.

The author's conclusion is that the complement fixation test cannot replace existing methods of diagnosis.

KNOWLES (R.), NAPIER (L. E.), & SMITH (R. O. A.). **On a Herpetomonas found in the Gut of the Sandfly, *Phlebotomus argentipes*, fed on Kala-azar Patients.**—*Indian Med. Gaz.* 1924. Dec. Vol. 59. No. 12. pp. 593-597.

In ten out of eleven consecutive experiments female laboratory-bred *P. argentipes*, fed upon parasite-containing blood of Kala-azar patients, showed typical herpetomonad forms in the fore-gut and mid-gut at the third to the fifth day after the feed. No less than 25 out of 56 such fed flies showed herpetomonads, and in six instances the infection was a heavy one, although the patients' blood films showed only scanty *L. donovani* present.

2. On dissection and examination of 811 control sandflies, including both *P. minutus* and *P. argentipes*, the only natural infections encountered have been once a Rickettsia, three times a Bodo, and once a doubtful Spirochaete. Nothing resembling a Herpetomonad has been encountered.

3. On dissection and examination of 46 other control female *P. argentipes* fed upon persons not suffering from Kala-azar no protozoa were found.

4. It is concluded that *L. donovani* passes into its flagellate form in the gut of *P. argentipes* under suitable conditions of temperature and humidity. Any further conclusions with regard to the Kala-azar transmission problem, however, are at present carefully avoided.

AVARI (C. R.) & MACKIE (F. P.). **Canine Leishmaniasis in Bombay.**—*Indian Med. Gaz.* 1924. Dec. Vol. 59. No. 12. pp. 604-605. With 1 text fig.

A pariah dog was found having a superficial sore near the base of the ear. Films were made and leishmania-like parasites were found in fair numbers. A week later the sore was found to be healed and there remained a small nodule covered with a scab.

This was excised, broken up and rubbed into scarifications on a dog and a monkey. The result of this is not recorded.

Bombay is not an indigenous centre of human kala-azar, while Assam, Bengal and Madras are highly endemic areas. This is apparently the first case of canine leishmaniasis recorded from India. The facts appear to suggest that there is no connection between the canine and human diseases.

SERGEANT (Et.), GUEIDON (E.), BOUGUET (A.), & CATANEI (A.).

Existence de la leishmaniose cutanée chez le chien dans une localité du Tell algérien où le bouton d'Orient est endémique chez l'homme.

[The Occurrence of Cutaneous Leishmaniasis in Dogs in a District in which Oriental Sore occurs in Man.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 360-361.

Leishmania have been found to be present in large numbers in ulcers on a dog at a village in the Constantiné Department, where several cases of oriental sore have been recorded recently.

The dog was in good general condition. Below the right nostril there was a crater-like ulcer about 4 mm. in diameter. On the inner surface of the ears there were found scabs covering ulcers varying from 3-5 mm. in diameter. The scabs were thick and of a greyish yellow colour. Leishmania were found in exudate from these lesions.

Those found in the nasal lesion were round or oval, but many of those found in the lesions of the ear were fusiform. The parasites from the ears were smaller than those from the nose.

The parasite recorded by YAKIMOFF as occurring in cutaneous leishmaniasis in dogs in Turkestan were more than twice as large (7.8μ) as those found in Constantiné.

ADELHEIM (R.). **Über Leishmaniosis infantum et canina in Riga.**

[Infantile and Canine Leishmaniasis in Riga.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Sept. Vol. 28. No. 9. pp. 367-387.

The author records a case of leishmaniasis in a five-year-old girl at Riga. The family had been in Tashkent about three months previously and the child had been ill about four months. Blood preparation showed no malarial parasites, and the clinical picture of the case did not indicate malaria as the cause of the illness. Spleen puncture was resorted to, and Leishmania were found in large numbers.

No benefit accrued from any treatment until tartar emetic was given intravenously.

In the course of an inquiry as to possible means by which the girl became infected, it was ascertained that the family possessed a dog which had been brought to Riga with them. The animal, in spite of care and attention, was thin and ill. A blood smear was made, but no parasites were discovered. The dog was killed, and it was found to be affected with generalized leishmaniasis. There appears to be no doubt that the girl was infected either directly or indirectly from the dog.

An attempt was made to obtain cultures on slanting agar which had been smeared over the surface with rabbit blood, but no success was achieved. Mice, guineapigs, and rabbits were inoculated subcutaneously. No evidence of infection was found in the last two,

but the mice became infected, and some of them died in about 6 months. Others appeared to recover from the inoculation.

Evidence was also obtained that healthy mice can contract the infection when kept in close contact with diseased mice.

MÖLLER (Jens). **Kokzidien bei den Säugetieren des Zoologischen Gartens zu Berlin.** [Coccidiosis of Mammals in the Zoological Gardens, Berlin.]—*Inaug. Diss. Doct. Med. Vet. Berlin.* 1923. June 30. 23 pp. [Ex. *Bull. Inst. Pasteur.* 1924. Oct. 31. Vol. 22. No. 20. pp. 801–802.]

Apart from rabbits and goats, few of the animals in the Berlin Zoological Gardens harbour coccidia.

An *Eimeria* has been found in the squirrel of the Carolines. Oocysts 22–28 μ by 14–18 μ .

Two lion cubs were parasitized. The oocysts ranged from 36–48 μ by 28–34 μ . It was an *Isospora* and possibly identical with *Isospora felis*.

VORBRÖDT (Karl). **Zur Kenntnis der Schafkokzidiose.** [Coccidiosis of the Sheep.]—*Inaug. Diss. Doct. Med. Vet. Berlin.* 1923. 32 pp. [Ex. *Bull. Inst. Pasteur.* 1924. Oct. 31. Vol. 22. No. 20. pp. 802–803.]

According to the author, the portions of the intestine chiefly invaded are the duodenum and jejunum.

FRENZ (Otto). **Beiträge zur Kenntnis der Schweinekokzidiose.** [Coccidiosis of the Pig.]—*Inaug. Diss. Doct. Med. Vet. Berlin* (no date). 14 pp. [Ex. *Bull. Inst. Pasteur.* 1924. Oct. Vol. 22. No. 20. p. 805.]

The author believes that 75 per cent. of German pigs are infected with coccidia. The parasite is not responsible for serious illness save in young pigs. The parasite invades the jejunum and ileum. The oocysts measure 24–36 μ by 18–26 μ . Two species could not be distinguished.

LELAU (U.) & VITTORIO (A.). **Nuovo Coccidio nel cavallo (*Eimeria Utinensis*).** [A New Coccidium of the Horse. *Eimeria utinensis*.]—*La Clin. Veterinara.* 1924. Oct. Vol. 47. No. 10. pp. 587–592.

The parasite is described as having been detected in a fifteen-year-old horse which was brought to the abattoirs for slaughter on account of paralysis and general wasting. Ill-defined nodular lesions were present in the lungs, particularly in the apical lobes. The bronchi contained clots which incompletely filled the lumen, some white and some red.

The liver contained a few small nodules. These had calcified fibrous capsules and caseous contents.

Coccidia were found in material taken from the lesions in the lungs, bronchi, bronchial mucosa, and liver.

The authors give rough sketches of the parasites and interpret these as covering the complete cycle of the parasite. The sketches are not very convincing.

TRIFFITT (M. J.). **Note on an *Eimeria* n.sp. found in the Faeces of an Eland.**—*Jl. Trop. Med. & Hyg.* 1924. Aug. 15. Vol. 27. No. 16. pp. 223–225. With 1 plate.

The eland, *Oreas canna*, was imported from Durban into the Zoological Gardens, London.

Oocysts were numerous present in the faeces and measured from 23.5μ to 34μ in length by 16.5μ to 20μ in breadth.

The cyst wall comprised three layers. The outer was a very thin membrane, the middle one double contoured but reduced in thickness at the poles. Internal to this, and slightly separated from it, was a delicate membranous lining. A micropyle was found at one of the flattened poles.

In specimens fixed in Schaudinn the cyst wall became indented at the poles. The contents formed a protoplasmic ball about 15μ in diameter. It was found to be impossible to stain the intact cysts. At room temperature the organism sporulated in the faeces in twelve days. At 70° F. development was completed in five days.

The process of sporulation occurred in the typical way.

Attempts to infect two clean rabbits failed.

The author gives a table of the sizes of the principal species of *Eimeria* and comes to the conclusion that it is a distinct species. The name *Eimeria canna* is proposed.

CATANEI (A.). **Etude expérimentale de l'association de la spirochètose et du paludisme des oiseaux. Note préliminaire.** [The Experimental Study of the Association of Spirochaetosis and Malaria in Birds.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 535–538.

The author's investigations were undertaken with a view to ascertaining whether the infections when present simultaneously have any influence on each other.

The idea originated from the fact that simultaneous infections in man with the spirochaete of relapsing fever and malarial organisms have been encountered in Algeria on a number of occasions. Canaries have been used because they are susceptible to infection with *S. gallinarum* and *Pl. relictum*. Spirochaetes appear in the blood two days after inoculation, they persist for 3–4 days and then disappear. No symptoms are observed as a rule, and recovery leaves immunity.

The plasmodium infection has a period of incubation of 3 to 10 days. This is followed by an acute phase, which persists for about 9 days. Parasites become very numerous in the blood during this period and there is a mortality of 30 per cent. Parasites then decrease in numbers. Complete recovery does not take place, but the birds appear to be perfectly healthy. They are then immune.

Canaries infected with spirochaetosis during either the period of incubation or during the acute phase of plasmodium infection have developed severe forms of both diseases. Those inoculated with plasmodium on the last day of spirochaetal paroxysm developed an acute attack which followed a normal course.

Nine canaries which were infected with plasmodium were inoculated with spirochaetes at intervals ranging from 1 month to 3 years and 9 months after recovery from the acute infection. In six instances a relapse to plasmodium infection occurred. Ten canaries having plasmodium infection of 1 to 4 months' standing were inoculated with the blood of a canary which was suffering from acute spirochaetosis and chronic plasmodium infection. Nine showed relapses to plasmodium infection. One bird was reinoculated with spirochaetes after the recovery from the relapse and a second relapse occurred which proved fatal.

ADIE (Helen). **The Sporogony of *Haemoproteus columbae*.**—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 605–613. With 5 figs. & 2 plates.

Mrs. Adie draws attention to the fact that her researches in this connection, published in the *Indian Journal of Medical Research* in January 1915, have not been incorporated in some of the text books dealing with this subject. She has had the opportunity of demonstrating in Algerian flies the stages of development of *Haemoproteus columbae* observed in the Indian transmitting flies. Sporozoites reach the salivary glands 10–12 days after the infecting feed. The gametocytes appear in the blood 28 days after the injection of the sporozoites by the flies.

The cycle is therefore similar to that of the proteosoma parasite. It is another instance of the cycle of Ross.

LOGÉ & BIZARD (E.). **Sur 4 cas de piroplasmose équine (*Piroplasma caballi*) observés dans le département de la Loire-Inférieure.** [Four Cases of Equine Piroplasmosis (*Piroplasma caballi*) in the Department of Loire-Inférieure.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 347–354.

Case 1. An eighteen-year-old mare which came into close contact with American horses during the war was found to have parasites in its blood. Oval, ring, pear-shaped and twin forms were found. The number of infected corpuscles was about 1 per cent.

This animal was treated with novarsenobenzol. Parasites were present in the blood for three days after treatment, and death occurred on the fourth day.

At the post-mortem the principal lesions were enlargement of the spleen (6 kg.), enlargement of the liver (11 kg.), congestion of the intestines, pale pink pleural exudate, congestion of the lungs and kidneys.

Case 2. A four-year-old mare. Examination of this animal's blood showed that the parasites were far more scantily present than in the preceding case. The case was first seen when illness had been in existence for four days. An intramuscular injection of trypanblue was given. Two days later an injection of cacodylate of soda was given. Improvement set in and recovery took place.

Case 3. A six-year-old mare born at Limousinière and bought at Nantes in March, 1924. The animal was taken ill 15 days after arrival at Montoir. During this period it was grazed with two apparently

perfectly healthy horses in a pasture which had not had a horse upon it for ten years.

Parasites were found to be scantily present in the blood. An injection of novarsenobenzol was given. Recovery took place.

Case 4. Seven-year-old mare. This animal had been ill for about a week, and had been treated by a quack. When first seen the animal was down and could rise with difficulty only. There was marked jaundice, and the temperature was 40.4° C.

An intravenous injection of 5 g. of trypanblue was given. The following day there was considerable improvement in the animal's condition. Parasites were found to be scantily present in the blood. There was no haemoglobin in the urine, but a considerable amount of albumen.

All the animals presented the same clinical symptoms: fever, jaundice, dullness, uncertainty of gait. Ticks, *Dermacentor reticulatus*, were found on all of them. In no case was haemoglobinuria observed.

DONATIEN (A.), LESTOQUARD (F.), & SAUSSEAU (L.). **Piroplasmes et Jaunisse des Muletons du Poitou.** [Piroplasms and Jaundice in Mules in Poitou.]—*Rev. Vét.* 1924. Sept. Vol. 76. No. 9 pp. 529-531.

An account of this parasite has appeared elsewhere and has been abstracted in this *Bulletin*.

ANDERSON (Ch.). **Note concernant la Toxoplasmose du Gondi.** [Toxoplasmosis of the Gondi.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 354-355.

The author found toxoplasmosis in two gondis which died 29 and 34 days respectively after capture.

In connection with the possible transmission of the infection by ectoparasites the author records that he found *Dermanyssus gallinae* and *Laelaps stabularis*.

GALLEGO (A.). **Contribucion al estudio de las lesiones del higado en la tifohepatitis de los pavos.** [The Lesions of the Liver in "Blackhead."]—*Revist. Hyg. y Sanidad Pecuarias.* 1924. Sept. Vol. 14. No. 9. pp. 555-560.

The author describes the lesions found in a turkey. They did not differ in appearance from those described by other authors. In sections from apparently normal portions of the liver a perivascular infiltration was found, and in the lesions themselves there were areas of amyloid degeneration.

POPOFF (P.). **An Attempt at growing Pathogenic Protozoa by the Method of Collodion Sacks.**—*Jl. Trop. Med. & Hyg.* 1924. Sept. 15. Vol. 27. No. 18. pp. 247-248.

The author proposes a method of cultivating protozoa which is free from the objections of the method devised by BASS for malarial parasites. The objections which he raises to Bass's method are: (1) That the toxins remain in contact with the organisms; (2) that

in the natural condition the blood is always moving; and (3) that cultures are exposed to light.

He claims that he has overcome these difficulties as follows:—

The defibrinated blood containing malarial parasites has added to it 50 per cent. glucose. This blood is placed in collodion sacs, which are immersed in tubes of normal saline, Ringer's or Locke's Solution, and incubated at 37° to 41°. He states that he has used the method for malarial parasites of man, birds, and tortoises, and also for the parasite of a disease which he terms blackwater fever of cows. Dextrose is added every four hours, and the salt solution changed every four hours. No details are given of the results obtained, and the manner of adding the dextrose is not made more clear than is given here.

KŘIVÁČEK (O.). Spirochätenbefunde beim Hundetyphus. [Spirochaetes in Dog Typhus.]—*Zeitschr. f. Hyg. u. Infektionskrankh.* 1924. Sept. 20. Vol. 103. No. 3. pp. 529–532.

During an epidemic of Stuttgart disease during the autumn and winter of 1922–23 the author examined the viscera of 21 dogs dead of the disease.

Spirochaetes were demonstrated in 17 cases. The author is not certain that the four cases in which he was unable to find spirochaetes were actually cases of Stuttgart disease.

The most important place to look for the parasite is in the tubules of the kidney. They may be found there within the cells or in the lumen. The author has used LEVADITI'S original method of silver impregnation for the demonstration of the parasite.

They may occur in other organs, but very scantily. In three cases they were found in the deep layers of the wall of the stomach and intestine, and the author does not think that the organisms in these situations were saprophytes which had invaded the damaged wall.

GERLACH (F.). Geflügelspirochätose in Oesterreich. [Fowl Spirochaetosis in Austria.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1924 June 16. Vol. 92. Nos. 1-2. pp. 84–96. With 2 plates (one in colour).

The author records the occurrence of this disease in Austria, and gives particulars of the post-mortem appearances and pathological anatomy. He has been unable to find any evidence of developmental forms in the red corpuscles.

COUVY (L.). Note sur le traitement de la dysenterie amibienne par le stovarsol. [The Treatment of Amoebic Dysentery by Stovarsol.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 555–556.

ILOWAISKY (N. S.) & BOSCHENKO (W. P.). Posthume Materialien von S. A. Ilowaisky betr. experimentelle Trypanosomose Su-auru bei verschiedenen Tieren.—*Rev. Microbiol. et Epidemiol.* Saratov. 1924. Vol. 3. No. 3. In Russian pp. 166–181. German summary p. 181.

PHISALIX (M.). Note complémentaire sur *Cyclospora viparæ*, coccidie parasite de l'intestin de la Vipère aspic. [Note on *Cyclospora viparæ*, a Coccidium of the Intestine of *Vipera aspic*.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 559–562.

RODENWALDT (Ernst) & DOUWES (J. B.). **Ueber die Anwendung von "Bayer 205" bei der Surra des Pferdes in Niederländisch-Ostindien.**—*Arch. f. Schiffsh. u. Trop.-Hyg.* 1923. Oct. Vol. 27. No. 9. pp. 305-320. [1 ref.]

DISEASES DUE TO METAZOAN PARASITES.

CAWSTON (F. G.). **The Source of South African Trematodes.**—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 343-346.

South African trematodes develop most frequently in freshwater snails whose shells are from 15-20 mm. in length, but those species whose shells are only 4 to 6 mm. in diameter are occasional carriers of parasites and must not be overlooked.

General measures to be resorted to for the prevention of *Bilharzia* infection are :—

1. The introduction of domestic ducks.
2. The use of lime or some larvicide in small collections of water.
3. Drying up small collections of water for at least a week at a time.
4. Where possible, sea-water should be allowed to enter lagoons into which snails are brought by the rivers.
5. The collection and destruction of such species as *Melanoides tuberculata*, which has been found too stout for ducks to eat.

CAWSTON (F. G.). **Occasional Hosts of some South African Trematodes.**—*South African Jl. Sci.* 1923. Dec. Vol. 20. pp. 351-353.

This paper refers to the occasional occurrence of *Schistosomum bovis* in human beings. *Schistosoma mansoni* has been found in *Limnaea natalensis*, *Indora tropica*, and *Physopsis africana*.

Limnaea natalensis is the common host of *Fasciola gigantica* in South Africa, but its cercaria has been recorded in *Physopsis africana* in Natal.

DOLLFUS (R. Ph.). **Qu'est-ce que "Distoma subflavum Sonsino" ?** [What is "*Distoma subflavum* Sonsino" ?]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 572-576. With 1 text fig.

The author thinks it possible that *D. subflavum* Sonsino is identical with *D. allostomum* Diesing 1850.

PAYNE (Florence K.), ACKERT (James E.) & HARTMAN (Ernest). **The Question of the Human and Pig Ascaris.**—*Amer. Jl. Hyg.* 1925. Jan. Vol. 5. No. 1. pp. 90-101.

Summary :—

1. The host relationship of the human and pig ascarids was tested by the administration of embryonated ascaris eggs to pigs and primates.
2. Repeated feedings of infective human ascaris eggs were made to five young pigs, all of which suffered respiratory disturbances and

other systemic disorders. Subsequent post-mortem examinations showed no ascarids in the digestive tract of any of the pigs.

3. Infective pig ascaris eggs were taken by one monkey and by two human subjects. Faecal examinations made throughout periods of several months after the initial administration of the eggs failed to show the presence of any ascaris eggs.

4. The incidence of ascaris in north, central, and southern Trinidad, British West Indies, varied from 20 to 70 per cent. for the human ascaris and from 3.5 to 10.8 per cent. for the pig ascaris. In the vicinity of Arouca, one of the principal swine-raising regions, the incidence of human ascaris was 64.3 per cent., as compared with 10.8 per cent. for the pig ascaris.

5. The experimental results indicated that embryonated eggs of the human ascaris will not produce mature ascarids in pigs, that infective eggs of the pig ascarids will not produce mature ascarids in the adult primates, monkey and man, and that there is thus a physiological difference between the human and pig ascaris.

GOODEY (T.). **A Critical Review of Zebrowski's Preliminary Report on Hog Lung-Worms.**—*Jl. Helminth.* 1924. Sept. Vol. 2. No. 4. pp. 198-202.

Goodey's attention was drawn to ZEBROWSKI'S observations published in the proceedings of the Indiana Academy of Science for 1921, by a reference made to them in *Veterinary Medicine* for March, 1924, by HALL. Goodey has consulted the original publication and finds that it is of little value.

GOODEY (T.). **Observations on *Hyostrongylus rubidus* (Hassall and Stiles 1892) Hall 1921, from the Stomach of the Pig, with a Note on *Strongylus attenuatus* (Molin 1860).**—*Jl. Helminth.* 1924. Sept. Vol. 2. No. 4. pp. 191-197. With 9 figs.

The author has detected this parasite in the stomachs of pigs in England, previous records of its occurrence in this country having been published by BLACKWELL and PILLERS. Goodey elaborates the description of certain anatomical features not previously described in full, and gives an account of the rhabditiform and of the ensheathed infective larvae.

BLANCHARD (M.) & LAIGRET (J.). **Recherches sur la transmission d'*Onchocerca volvulus* par divers parasites hématophages.** [The Transmission of *Onchocerca volvulus* by Various Blood Sucking Parasites.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 409-417.

Microfilariae ingested by bugs were found to be digested rapidly. Those ingested by *Ornithodoros moubata* were found to be alive and motile for several days after the feed, in one case up to the 12th day. No development of the embryos was found to occur in the ticks, and the embryos withdrawn from infected human beings by the ticks were found to be incapable of penetrating shaved skin of the guineapig.

Ticks removed while feeding on an infected man and placed on a guineapig did not regurgitate any of the larvae ingested.

It is not claimed that any solution to the problem of transmission has been provided.

ILIESCO (G. M.). Hémorragies multiples cutanées, sous-cutanées et intra-musculaires chez le cheval, produites par une infestation en masse de la Filaire hémorragique. [Multiple Cutaneous, Subcutaneous, and Intramuscular Haemorrhages in a Horse caused by *Filaria haemorrhagica*.]—*Arch. Veterinara*. 1923. Vol. 17. No. 6. pp. 116–119. With 1 text-fig.

The horse was nine years old and in a state of advanced debility. Haemorrhagic lesions were present over the whole of its body and were so close to each other that the animal had the appearance of being covered with a continuous wound. The owner said the animal had been in his possession three years and no haemorrhagic wounds had been seen on it until about two months before the animal came under observation. It was kept for about a month, during which time, in spite of a liberal diet, wasting continued.

On post-mortem examination no lesions of the internal organs were found. Throughout the subcutaneous tissue, and in the superficial muscles, haemorrhagic centres were found. The skin was thickened round each of the lesions.

The lesions in the superficial layers of the muscles showed dark red centres, and slightly indurated margins. Their average size was that of a nut. Careful examination of divided lesions revealed the presence of worms in them. In some cases only one worm was found. In other lesions worms up to 6 in number were detected. Both males and females were found, and the parasite was identified by CIUREA as *F. haemorrhagica* Railliet 1885.

The author states that CIUREA detected cervical papillae which were provided with a small chitinous point which was directed backwards. This has not been described before. The male parasites measured 26–27 mm. and the females 50–57 mm.

THORNTON (H.). A Review of the Oesophagostomes in the Collection of the Liverpool School of Tropical Medicine.—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 393–408.

O. columbianium, *O. venulosum*, *O. radiatum*, *O. dentatum*, *O. eurycephalum*, *O. mwanzae*, *O. simpsoni*, *O. oldi*, are dealt with, and in the case of some of the more recently described parasites the descriptions are amended.

A new species, from the caecum and colon of *Phaecocaerus aethiopicus*, *O. yorkei*, is described. *Oesophagostomum ventri* from the stomach of a Brazilian wild cat is also described.

HANSON (KARL B.) & VAN VOLKENBERG (H. L.). Anthelmintic Efficiency of Carbon Tetrachlorid in the Treatment of Foxes.—*Jl. Agric. Research*. 1924. Apr. 26. Vol. 28. No. 4. pp. 331–337.

The chemically pure drug was administered either in hard gelatin capsules or in soft elastic globules to animals fasted for 16 to 20 hours.

No purgative was given before or after. Details are given of the treatment of batches of foxes at dosage rates of 0.1 cc. to 0.6 cc. per kilo.

The results obtained in some of the experiments appeared to indicate the advisability of withholding food and water for three hours after administration; otherwise dilution of the drug may occur in the stomach.

A high degree of efficiency was given by 0.2 cc. per kilo and upwards. Hookworms and ascarids were removed almost completely, as were also intestinal flukes and Physaloptera, but it appeared to be ineffectual for the removal of tapeworms. Neither the hard nor the soft capsules appeared to have any advantage over the other as a means of administration, but it appears that inhalation collapse is more likely to occur when the hard capsules are used. Of 13 foxes, for which hard capsules were used, one collapsed, but recovered when artificial respiration was resorted to. Of eighteen animals to which soft globules were given, none collapsed. In all four animals died, but the authors hold the drug responsible for three of these deaths only. Two fatalities occurred in pups one month old. These received the 0.3 cc. rate of dosage, and the indications are that this is too high for so young animals. Diet probably had something to do with the deaths.

It has been found by LAMSON and others that the greater susceptibility of puppies to carbon tetrachloride is due to the fat present as milk. Digestible fat appears to increase toxicity. The authors' experience, recorded elsewhere, is that susceptibility varies not only with individual foxes, but, as has been found when repeated treatments have been given, in the same animal at different times.

They hold that factors other than the magnitude of the dose are concerned in the causation of fatalities. Among these they include: Intestinal stasis, enteritis, and the nature of the food.

Although in the experiments here recorded no purgative was used, it is advised that the drug be used in conjunction with a saturated solution of Epsom salts. HALE and SCHILLINGER, in treating dogs, advise the simultaneous administration of the two medicaments. The drug becomes less dangerous and its efficacy is not impaired.

CIUREA (T.) & DINULESCU (G.). **Ravages causés par la mouche de Goloubatz en Roumanie; ses attaques contre les animaux et contre l'homme.** [The Ravages caused by the Goloubatz Fly in Roumania.]—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 323–342. With 3 plates.

The authors describe the serious losses among animals and the effects produced in man by the bites of the Goloubatz fly (*Simulium columbaczense* Schiner) in Jugoslavia.

The attacks of this fly are well known to the villagers, who ordinarily succeed in protecting their animals against the pest, but it occasionally happens that the flies appear in immense swarms. This occurred in the spring of 1923, when the venomous bites of the flies were responsible for the death of 16,000 animals.

It appears to be not improbable that the flies were carried long distances by the wind. They also travel parallel to streams. The flies settle on the mucous membranes and on the thinner parts of the skin and become engorged. This occupies about five minutes. Animals attacked may traverse some miles in their attempts to escape the pest. Sometimes they dash into water to avoid the flies. It has been observed that black skinned animals are more severely attacked

than animals of other colours. This appears to be the explanation of the fact that buffalos are the heaviest sufferers.

The flies appeared to take refuge in woods during the middle of the day, for they were observed to attack animals between sunrise and ten o'clock, and again from about four o'clock onwards.

The bite of the fly causes small haemorrhages, and where many bites are close together the area involved may be covered with blood. At the seat of a bite a little button-like swelling forms, and where these are close together large oedematous painful swellings are produced. Animals that have been heavily attacked present symptoms indicative of asphyxia. They move with great difficulty, the mouth is open and the tongue pendulous. The eyes have an anxious expression and respiration is difficult. Death takes place in a few hours. Animals which, although severely bitten, do not succumb within a few hours lose their appetite, show rigors and acceleration of pulse and respiration. The temperature is normal or slightly above normal. They become apathetic, pulse and respiration become almost imperceptible, the temperature falls below normal, and death takes place in about a week.

At the post-mortem examination the principal viscera, and particularly the heart, liver and kidneys, show congestion and degenerative changes. Protective measures include working during hours when the flies are not biting, placing the animals in darkened stables, the use of smoke either to prevent the entrance of flies into the stables or to protect animals while at work. Various decoctions are applied to the vulnerable parts of the skin, among which are absinthe leaves, walnut leaves, hazel-nut leaves, tobacco infusion, mixtures of mineral or vegetable tar with lard, or lard alone.

External applications to bitten areas should be alkaline, and internally cardiac stimulants are used.

BLANC (Georges) & CAMINOPETROS (J.). La Tick Paralysis observée sur les moutons de la région de Sitia (Crète). [Tick Paralysis in Sheep in Crete.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 378-381.

Tick paralysis appears to have been known to shepherds in Crete for thirty years. The disease appears at the end of the autumn and persists until March or April. Occasional cases occur at other periods. In some years the disease is severe, attacking one-third of the sheep.

Affected sheep show convulsions and progressive paralysis, and ticks are always found along the vertebral column. Immediately symptoms appear ticks are searched for behind the ears, and oil is used to detach them. It is said that when the ticks are removed at an early stage recovery takes place.

The authors have had a number of ticks for examination (not taken from diseased sheep) and found that two species, *Haemaphysalis punctata* and *Ixodes ricinus*, were represented.

VAN HOOFF (L.). Conservation du pouvoir infectieux de l'*Ornithodoros moubata* nourri sur reptiles et sauriens. [The Retention of Infectivity by *Ornithodoros moubata* fed upon Reptiles and Lizards.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 376-378.

The author's experiments were carried out as a control to those of RHODAIN, and concerned the retention of infectivity with *Spirochaeta*

duttoni. Van Hoof found that the virus was retained, probably because of its location in the sexual glands. There it would not be influenced by unusual alimentary material. He found that feeding the ticks on reptiles caused a high death rate among them, apparently because the blood is not readily digested.

CAMERON (A. E.). **Sarcoptes of Cattle.**—*Parasitology*. 1924. July. Vol. 16. No. 3. pp. 255–265. With 6 text figs.

In the introductory paragraphs of this paper attention is drawn to a point regarding the measurements of the mites. Parallel observations showed that the measuring of mounted parasites may yield results very different from those taken from the living parasite. A tabular statement shows the readings obtained from individual parasites. Mounted parasites are far larger than the living ones.

The sarcoptes of cattle differ from those of the horse in certain points, but it is impossible to indicate these without the author's figures.

BEDFORD (G. A. H.). **The External Parasites of Poultry, with Measures for their Control.**—*S. Africa. Jl. Dept. Agric.* 1924. Aug. Vol. 9. No. 2. pp. 123–140.

This paper deals with ticks, mites, lice, fleas, mosquitos, sand flies, and the pigeon fly.

BATHELLIER (J.). **Premiers résultats zoologiques de l'étude des rats et des puces à Phnom-Penh.** [First Results of a Zoological Survey of the Rats and Fleas at Phnom-Penh.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 372–375.

CHARRIER (H.). **Les Moustiques de la région de Tanger (Maroc).** [The Mosquitos of Tangier.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 570–572.

EVANS (A. M.). **Descriptions of New Mosquitos from South America.**—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 363–375.

INGRAM (A.) & MACFIE (J. W. S.). **The Mosquitos of Accra.**—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 263–264.

KOSUGE (I.). **Beiträge zur Biologie der Mikrofilaria immitis.**—*Arch. f. Schiffs- u. Trop.-Hyg.* 1924. Aug. Vol. 28. No. 8. pp. 340–351. With 1 chart. [14 refs.]

LEGER (A.) & COUPUT (A.). **Nasomyiase à Chrysomyia dux, Esch.** [Nasal Myiasis due to *Chrysomyia dux*, Esch.]—*Bull. Soc. Path. Exot.* 1924. May. Vol. 17. No. 5. pp. 375–376.

NÖLLER (W.) & SPREHN (K.). **Die Entwicklung des Leberegels bis zur Zerkarie in *Limnaea stagnalis*.** [The Development of the Liver Fluke up to the Cercarial Stage in *Limnaea stagnalis*.]—*Berlin. Tierärzt. Wochensh.* 1924. July 18. Vol. 40. No. 29. pp. 369–370.

PATTON (W. S.). ***Hypoderma crossii* sp. nov., parasitic in its Larval Stages in Cattle and Goats in the Punjab.**—*Indian Jl. Med. Res.* 1922. Oct. Vol. 10. No. 2. pp. 573–578. With 2 plates & 4 figs.

TAYLOR (E. L.). **On the Ascarids of the Dog and Cat.**—*Ann. Trop. Med. & Parasit.* 1924. Oct. 31. Vol. 18. No. 3. pp. 243–251. With 7 text figs.

BACTERIAL DISEASES.

SOBERNHEIM (G.) & MURATA (H.). **Vergleichende Untersuchungen über die Bedeutung des Infektionsmodus bei der experimentellen Milzbrandinfektion.** [The Comparative Importance of the Various Methods of Infection in Experimental Anthrax.]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1924. Nov. 10. Vol. 103. No. 4. pp. 691-698.

In investigating questions of this nature the dose of organisms used is of extreme importance. This point appears to have been overlooked in some of the recent work.

The authors' experiments have been carried out with exact doses of suspensions of agar cultures of virulent anthrax bacilli. The cultures used were 20-hour growths.

Intracutaneous inoculations were made on shaved areas on the abdomen. When other methods of inoculation were resorted to care was taken to avoid infection of the skin by injecting through a previously made wound in the skin which was held open during the inoculation. The exposed cut surfaces were then seared with a hot glass rod and painted with collodion. In all cases 4 to 6 animals were inoculated at the same time in order to exclude accidents.

The results in experiments with guineapigs showed that death followed inoculation in all cases, no matter what the seat of infection. Death usually occurred on the 2nd or 3rd day, and the post-mortem appearances were typical.

The results showed that there was no difference of any importance between the intracutaneous and subcutaneous paths. In the experiments performed intramuscular inoculation was actually the most fatal. By the intraperitoneal and intravenous paths the minimal lethal dose was somewhat higher.

Similar results were obtained with mice inoculated subcutaneously and intravenously.

Experiments were also performed in which capillary glass tubes containing definite amounts of bacterial suspension were placed under the skin and broken after the skin wound had healed. The value of these experiments was discounted, however, because of the possibility of fragments of glass damaging the under surface of the skin when the tubes were broken, and thus converting the inoculation into a cutaneous one. Another objection to this method is that the bacillus is actually being incubated in the subcutaneous tissue during the period required for the healing of the skin wound. In this way the dose may be very materially altered through multiplication of the organisms.

It has also been held that in any form of inoculation there is some wound of the skin, and that although contamination of that wound may be avoided at the time the inoculation is made, the bacilli may eventually reach it either by the blood or the lymph stream, and so cause a skin infection.

These objections are entirely removed by infection via the mouth.

The authors have used sporulating cultures and have administered these in measured quantities direct into the stomach through a tube passed down the oesophagus. Fatal results were obtained, although infection required a far larger dose than parenteral inoculation. Thus, while 1/100,000 part of a loopful of a certain suspension proved fatal by intracutaneous inoculation, the dose required to cause infection

by way of the stomach was 1/10 of a loopful. Death took place on the fourth day. The authors conclude that it is unjustifiable to assert that the skin is the only tissue susceptible to anthrax infection.

It is not difficult to understand why the lethal dose varies with the method of infection.

VELU. Immunisation du mouton et du bœuf contre le charbon bactérien par intra-dermo vaccination. [Immunization of Sheep and Cattle against Anthrax by Intra-dermo Vaccination.]—*Maroc Médical.* 1924. May 15. No. 29. 159-161.

The present communication has for its object the definition of a point of terminology and the specification of the operative technique of intra-dermo vaccination. The author points out that a number of terms have been used for various operations involving the implantation of test liquids such as tuberculin or of vaccines into the skin, and states that to avoid confusion he proposes to use the term intra-dermo vaccination for the method of vaccinating against anthrax.

His reason for resorting to intra-dermo vaccination is that simple cutaneous vaccination and transcutaneous vaccination (ARLOING & DUFOUR) do not permit of exact dosage.

Various parts of the body have been tried as the seat of vaccination, but final choice has rested upon the anal folds beneath the tail. The reasons for so doing were as follows: The anal folds require no preliminary preparation and are readily cleansed. The skin there is easily rendered immobile. By raising the tail the skin is made tense and the needle can be inserted into the skin. Should the needle be passed through the skin no harm results.

GRATIA (A.). Production d'Anticorps dans la cuti-immunité anti-charbonneuse. [The Production of Antibodies in Anti-Anthrax Cuti-Immunity.]—*C. R. Soc. Biol.* 1924. Oct. 7. Vol. 91. No. 3. pp. 795-797.

The author is unable to agree with BESREDKA that antibodies cannot be demonstrated in the serum of animals immunized against anthrax by the cutaneous path, and states briefly that he is able to demonstrate protective properties in the serum of guineapigs protected by cuti-vaccination.

He thinks that if anti-anthrax vaccination is actually more effective by the cutaneous than by the subcutaneous path it is because the skin, being more favourable to the multiplication of the organisms, allows the vaccines introduced to exercise their aggressive powers. The animal body responds with anti-aggressines, which are the real protective substances. Vaccines introduced subcutaneously are rapidly phagocytized and are unable to exert their powers of stimulation of antibody production.

LECLAINCHE (E.) & VALLÉE (H.). Charbon symptomatique et gangrènes gazeuses chez les bovidés. [Black Quarter and Gas Gangrene in Cattle.]—*C. R. Acad. Sci.* 1924. June 16. Vol. 178. No. 25. pp. 2024-2027.

This paper has appeared elsewhere and has been abstracted (see this *Bulletin*, Vol. 12, p. 134).

SMITH (Theobald) & LITTLE (Ralph B.). **Studies in Vaccinal Immunity towards Disease of the Bovine Placenta due to *Bacillus abortus* (Infectious Abortion).**—*Monographs of the Rockefeller Inst. Med. Research.* 1923. Nov. 15. No. 19. 124 pp.

The authors carried out a number of experiments with living and dead vaccines, but they are not able to add to our knowledge of the subject of immunization against contagious abortion.

FITCH (C. P.) & LUBBEHUSEN (R. E.). **A Study of the Presence of *Bact. abortus* in the Milk of Cows which react to the Agglutination Test.**—*Cornell Vet.* 1924. July. Vol. 14. No. 3. pp. 299-302. With 2 tables.

The results obtained by these authors run closely parallel with those obtained by others. They find that approximately 30 per cent. of reacting cows have abortion bacilli in their udders, and that there is no concordance between the agglutinin content of the milk and blood.

EDINGTON (J. W.). **The Bacteriological Study of Fowl Typhoid and Allied Infections with Special Reference to Three Epidemics.**—*Jl. Path. & Bacteriol.* 1924. Oct. Vol. 27. No. 4. pp. 427-437.

MYCOTIC DISEASES.

BIGOT (A.) & VELU (H.). **Contribution à l'étude anatomopathologique de la lymphangite épizootique.** [The Morbid Anatomy of Epizootic Lymphangitis.]—*Rec. Méd. Vét.* 1924. July 30. Vol. 100. No. 14. pp. 374-384.

The authors find that the lesions wherever they occur are structurally the same.

The invaded tissues react by a proliferation of the connective tissue cells, fixed and migratory, which tend to ingest the parasite. An inflammatory nodule is thus formed. An invasion of polynuclear leucocytes occurs more particularly when pyogenic bacteria gain access to the lesion. Three zones are recognizable in a lesion. There is an outer zone of fibrous proliferation, an intermediate zone of mononuclear celled infiltration, and a central area of pus cells and the causal organism, the latter often being present in zooglea.

The conclusion to be drawn is that surgical intervention is called for in the treatment of the disease, as well as specific vaccino-therapy.

BAROTTE (J.) & VELU (H.). **Essais d'isolement en cultures du cryptocoque de la lymphangite épizootique du cheval, par l'emploi de milieux à l'acide citrique.** [The Isolation of the Cryptococcus of Lymphangitis on Media containing Citric Acid.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 540-543.

The authors' recent investigations have led them to try media containing citric acid for the isolation of the cryptococcus.

The first attempts were made with broth, peptone water, and Sabouraud's agar containing 5 per mille citric acid. The latter medium, while proving unsuitable for the cultivation of the organism, did not act upon it injuriously, since subcultures on other media were readily obtained from the small amounts of growth obtained upon it.

The citric acid medium was also used for the cultivation of organisms frequently associated with the cryptococcus in lesions. No growth was obtained with a staphylococcus and mixtures of organisms such as are obtained from contaminated natural lesions. Cryptococci present in a mixture of bacteria did not grow, but subcultures on other media yielded pure growths, all the contaminations having disappeared.

Tests were carried out with a view to determining whether the citric acid exercised an actual sterilizing or merely an inhibitory action, and the results indicated that there was actual sterilization of the accidental organisms.

Further experiments are to be carried out to determine the minimum effective proportion of citric acid.

MIEGEVILLE. Note clinique sur la blastomycose oculaire de l'âne.
[Clinical Note on Blastomycosis of the Eye in the Donkey].—
Bull. Soc. Path. Exot. 1924. July. Vol. 17. No. 7. pp. 543-545.

Blastomycosis of the eye in the donkey is of frequent occurrence in the Beni-Mellal area, Morocco. In 88 per cent. of cases the lesion is unilateral and always in adult or aged animals. In all cases in which bilateral disease has been seen the lesion in one eye has been of recent origin and the other of long standing.

The lesion, which develops very slowly, appears to originate on the posterior border of the membrana nictitans, and takes the form of a little hard nodule. The membrana nictitans appears congested and oedematous, and slight conjunctivitis and keratitis make their appearance. Up to this stage the lesion usually escapes the owner's notice. The nodule increases in size and ulceration occurs. This results in the formation of a muco-purulent discharge which collects at the inner canthus and runs down the face. If the lesion is not attended to it continues to increase in size until it attains the size of a pigeon's or even a hen's egg. By this time it has almost entirely displaced the eye.

Later the maxillary sinus is involved by way of the osseous portion of the lachrymal canal, and a rarefying osteitis is produced with deformation and sometimes necrosis of the bone.

On four or five occasions the author has found the sinus apparently completely filled with a tumour-like mass, but he has never seen invasion of the nasal cavities. He has not been able to undertake serious bacteriological or histological examinations of the growths, but the smears that he has examined have invariably contained a cryptococcus which is possibly the cause of the disease.

There is evidence to show that the condition, if not contagious, is inoculable. Treatment follows general surgical practice, but relapse is frequent.

VELU (H.). La blastomycose des voies lacrymales de l'âne et son inoculabilité. [Blastomycosis of the Lachrymal Tract in the Donkey and its Inoculability.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 545-547.

Blastomycosis of the eye, which is of very common occurrence in all parts of Morocco, appears to be caused by an organism morphologically resembling *Cryptococcus farciminosus*. Up to the present all attempts to cultivate it upon media used for that organism have failed, but it has been found to be inoculable from donkey to donkey. The material used was an emulsion of one of the tumour-like growths, and the dose used was about 0.1 cc. inoculated under the conjunctiva.

Three donkeys were used. In one the reaction to the inoculation was very prompt, a lesion making its appearance six days later. In the other two the periods of incubation were 30 and 45 days respectively. The lesions developing after the shorter periods of incubation (6 and 30 days) behaved like normal lesions, but in the other animal the lesion remained small and after a time became sclerosed and shrunken. In the conjunctival secretions the organism exactly resembles the *Cryptococcus farciminosus*. In scrapings from the lesions the parasite occurs singly or in groups of 8 to 10 elements embedded in a mass of amorphous material. Impression preparations show that these zooglea may contain as many as three hundred individual elements.

Up to the present filamentous forms and ascospores are not known. The name *Cryptococcus mirandei* is proposed.

BIGOT (A.). Différents procédés de coloration des cryptocoques pathogènes en médecine vétérinaire. [Staining Methods for Pathogenic Cryptococci.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 547-551.

The author reviews the various methods which have been used for staining the parasite and concludes that none of them are very satisfactory.

He has devised a method which is said to stain the protoplasmic contents intensely, leaving the envelope refractile.

Fixing is of first importance, and only preparations fixed in Bouin-Duboscq have given good results.

Smears and impressions are fixed in Bouin for 20 to 24 hours. They are then washed in water, treated with lithium alcohol and again washed in water.

Tissues for sectioning are fixed in Bouin-Duboscq for 24 to 48 hours, according to their size. They are then treated in the lithium bath to effect decolorization. This decolorization of the section is repeated after passage to absolute alcohol and 90 per cent. alcohol.

Smears and impressions are stained with carbol violet for at least 4 hours. Sections must be stained for 24 to 30 hours. They are placed in Lugol solution for 5 minutes, then thoroughly decolorized. Eosin in water or eosin-orange may be used as counterstains. Staining troughs should be used to avoid deposits falling on the specimens.

Mann's stain gives good results if it be allowed to act for 16 to 24 hours for smears and 30 hours for sections. Aniline safranin should be applied for 5 to 10 hours to smears and 25 to 30 hours to sections. Haemalum requires 15 hours for smears and 30 for sections. Giemsa requires 20 to 30 hours.

BIGOT (A.) & VELU (H.). *Blastomycoose des voies lacrymales de l'Âne. Anatomie pathologique.* [The Morbid Anatomy of Blastomycosis of the Lachrymal Tract in the Donkey.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 551-553. With 1 plate.

Three zones can be made out in all the lesions examined.

Lymphocytes are most numerous in the outer zone, while plasmocytes are by far the most numerous in the middle and inner zones. The plasmocyte cells are generally isolated in vacuoles or on the surface of connective tissue fibres, and never present an appearance suggestive of a mass of epithelioid cells.

In the central zone vacuole-like spaces are found which contain masses of the parasite embedded in an amorphous matrix. Plasma cells are sometimes present on the surface of these masses. The lesion is non-vascular.

DISEASES DUE TO FILTERABLE VIRUSES.

AUSTRALIA (Commonwealth of). Dept. of Health. Service Publication (Veterinary Hygiene) No. 1. *Rinderpest in Western Australia in 1923*, by ROBERTSON (W. A. N.). pp. 1-58. With 9 plates and 5 maps.

This report contains a fully detailed account of an outbreak of rinderpest which occurred in Western Australia in November, 1923. The first cases occurred in a dairy herd in the Beaconsfield area, and within a short time a number of herds became affected. A second centre of infection was discovered at Belmont, and a quarantine area of 30 miles from Fremantle was proclaimed, and the border was patrolled to prevent all movement of cattle, food and vegetables.

On further confirmation as to the nature of the disease it was decided that inoculation of any kind was not indicated.

Veterinary assistance from other States was promptly forthcoming, and with Government assistance a campaign of eradication was carried out.

Details are given of a number of post-mortem examinations and of experimental inoculations. The latter were not carried to a conclusion as it was decided to be unwise to continue centres of infection.

All the affected herds could be shown to have been in contact to some extent.

The evidence appeared to incriminate sheep brought into Fremantle as live ship's stores (for Mohammedans) as the source of the infection. These were purchased by local butchers for slaughter.

The factors which assisted in the eradication of the disease were:—

1. The somewhat sparse cattle population.
2. Little interchange of stock.
3. The existence around Fremantle of a natural barrier in the form of desert country supporting no cattle.
4. The light, dry, sandy soil.
5. The season at which the outbreak occurred. Hot, cloudless weather.
6. The policy adopted of slaughtering all animals within a mile radius of an outbreak.

KAKIZAKI (C.). Experimental Studies on the Prophylactic Inoculation against Rinderpest.—*Kitasato Arch. Exp. Med.* 1924. Oct. Vol. 6. No. 2. pp. 139–197. With 13 charts.

The author has carried out a number of experiments with a view to determining under what conditions the rinderpest virus in splenic pulp can be attenuated by means of glycerin and the effects of such a vaccine.

His experiments cover an immense amount of ground, but it is a matter for regret that so few experiments have been carried out in each section. In many instances controls have been omitted completely.

The actual method of preparing the vaccine was described by the author in 1918 and is not included in this paper.

He finds that an emulsion of spleen in glycerin may retain its antigenic properties after it has become non-infective. Calves treated with two doses of vaccine were protected for 5–6 months, but calves treated with a dose of vaccine followed by virulent blood were protected for more than 12 months. An interval of 7–8 days must elapse between the use of the vaccine and the inoculation with virulent blood, or the calf may become infected. The method appears to be inferior to the serum-simultaneous method.

SCHEIN (H.) & JACETOT (H.). A propos de la vaccination contre la peste bovine par virus atténué. [Vaccination against Rinderpest by means of Attenuated Virus.]—*Rev. Gén. Méd. Vét.* 1924. Sept. 15. Vol. 33. No. 393. pp. 493–500.

The authors refer to the results claimed by VAN SACEGHEM in the attenuation of the virus of rinderpest and state that it is a matter for surprise that such good results should have been obtained. One of the authors carried out experiments on lines similar to those followed by VAN SACEGHEM in collaboration with YERSIN some 25 years ago. No good results were obtained and the method was abandoned. These experiments are recorded in the present paper as they have not been published previously. Recently, further experiments have been carried out on similar lines.

Ten calves were treated in the manner suggested by VAN SACEGHEM. Seven died, one contracted a rather severe attack of the disease, and the remaining two passed through mild attacks. Four goats so treated all died.

The virulence of the rinderpest virus does not appear to be capable of being modified by any of the ordinary means. Either it is killed or it is left unchanged. By passage through goats and buffalos it has appeared to be possible to modify the virulence for cattle to some extent. The varying mortality in outbreaks is due to variations in susceptibility rather than variations in virulence.

DOUTRESSOULLE. Rapport sur la recherche d'une méthode d'immunisation active des veaux non sevrés, provenant de mères réfractaires à la peste bovine. [Attempts to devise a Method of immunizing against Cattle Plague the Calves of Animals that are Resistant.]—*Rec. Méd. Vét.* 1924. Aug. 15. Vol. 100. No. 15. pp. 464–468.

It has already been shown that the calves of resistant cows become susceptible to rinderpest when they are weaned, the susceptibility increasing with age.

A small number of experiments have been carried out and these appear to indicate that the calves of refractory animals may be inoculated with virulent blood alone without much risk.

DE MAGALHAES (O. C.). **Peste dos Polmões.** [Abscess Plague.]—*Mem. Inst. Oswaldo Cruz.* 1923. Vol. 16. No. 1. (English Version.) pp. 185-286. With 51 illustrations.

The author describes a disease which appears to be a purulent lymphangitis of cattle, but he recognizes acute forms of the disease in which death is sudden and not preceded by any recognizable symptoms.

The author states that the pus obtained from unruptured abscesses always contained large numbers of bacteria of different types. For a long time he failed to obtain cultures from the pus, but finally discovered that this was because the organisms present were anaerobes.

The lesions present in the so-called "fulminating" cases are those of a septicaemia.

In the chronic form the skin is "riddled with abscesses of different sizes" which if they have not burst become enclosed in thick fibrous capsules.

When the muscles are involved the pus burrows into their substance and does not become encapsuled.

The cause of the disease is held to be a filtrable virus which is associated with the various organisms found in the pus.

It has to be admitted that it is difficult to obtain a clear idea of the subject from the author's English version of his work.

STAUDFUSZ (R.), SCHULTZ (E.), SCHNAUDER (F.), PETERS (W.), & FRENZEL (W.). **Untersuchungen über die ansteckende Blutarmut des Pferde.** [Infectious Anaemia of Equines.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. July. Vol. 51. No. 2. pp. 154-176.

The principal difficulty experienced in connexion with infectious equine anaemia is that of establishing a diagnosis. The authors bring forward further evidence to show that inoculation of rabbits with suspected blood greatly facilitates a diagnosis. A diagnosis can be made within a fortnight, based upon the reduction in the number of corpuscles in the test animal's blood.

They further show that the virus can be carried on in rabbits in series, and also obtained evidence that the virus is present in the saliva, urine and faeces of infected horses.

OPPERMANN. **Ziele und Wege der neueren Forschungsarbeiten über die infektiöse Anämie des Pferdes.** [New Investigations in connexion with Infectious Equine Anaemia.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. Sept. 1. Vol. 51. No. 3. pp. 260-279.

The author states that when experimental inoculation of rabbits with material from a case presenting suspicious symptoms either fails or yields a doubtful result, steps may be taken which will render a

subsequent test positive. This may be achieved by bleeding the horse, withholding water for 24 hours, and then watering copiously. Tests made with blood taken a few days later yield positive results.

Oppermann is opposed to the view that the disease is insect transmitted—the facts, in his opinion, do not lend support to this view.

It has been discovered that the serum of horses affected with anaemia in a minimum dilution of 1 in 20 is capable of agglutinating the red corpuscles of rabbits.

However, if the horse has been infected for a long period and is obviously ill the reaction does not take place. This is said to be due to the appearance of anti-agglutinins in the horse's serum.

Full details of technique are promised later.

SCHUCHMANN (K.) & KARMANN (P.). **Die Diagnose der infektiösen Anämie der Pferde durch den Kaninchenversuch nach Oppermann.** [The Diagnosis of Equine Infectious Anaemia by the Inoculation of Rabbits.]—*Berlin. Tierärztl. Wochensch.* 1924. Sept. 12. Vol. 40. No. 37. p. 497–502.

The authors confirm the value of rabbit inoculation as a means of diagnosis of infectious anaemia in equines, but point out that doubtful results are obtained in some cases.

The value of the method is somewhat reduced by the fact that repeated blood counts have to be made. This requires special skill, but at the same time is very tedious.

Until some more simple method of diagnosis is devised the application of the inoculation test will be limited.

HELM (R.). **Die künstliche Übertragung der infektiösen Anämie des Pferdes auf Meerschweinchen und Kaninchen.** [The Experimental Transmission of Infectious Equine Anaemia to the Guinea-pig and the Rabbit.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. Oct. 1. Vol. 51. No. 4. pp. 365–391.

The author claims to have been able to transmit infectious equine anaemia to guinea-pigs and rabbits.

In guinea-pigs the blood showed the changes characteristic of anaemia. Polychromasia was present in proportion to the severity of the symptoms shown.

The duration of the changes in the blood varied from a few days to a few weeks.

For the purpose of examining the blood changes films were dried in the air, fixed in alcohol and stained in alkalized Giemsa. In some specimens blood platelets were very numerous, and from some of the appearances observed the author came to the conclusion that they originate in the red blood corpuscles.

Detailed observations have not been made regarding the white corpuscles, but in all cases there was a more or less marked leucocytosis. In a few instances in which the blood changes were very marked there was a pronounced increase in the neutrophile polynuclear leucocytes. Of 67 guinea-pigs inoculated markedly positive results were obtained in 29, less marked results in 14, 7 were doubtful, 7 were negative, and 9 died a few days after inoculation. Of three guinea-pigs inoculated from another guinea-pig, two reacted and one gave a doubtful result.

A preliminary investigation showed that the average number of red cells in the guineapig is 5,000,000. Infection resulted in a reduction to 3,000,000 in some cases, but the figure never fell below that.

The amount of blood obtainable by ear puncture in the guineapig was not sufficient to permit of quantitative tests for haemoglobin being carried out. Infection in all cases was associated with a rise of temperature.

Microscopic examination of the organs of infected guineapigs showed that in most cases there were perivascular infiltrations in the liver.

In rabbits the period of incubation is variable, and in the author's experiments it ranged from one day to eight weeks. There was great variation in the severity of the symptoms presented.

Contrary to what is the case in the guineapig, the blood of infected rabbits does not present a typical appearance. On the other hand, the reduction in the number of red cells is very pronounced.

Clinically, the infection was characterized by a rise of temperature and catarrh of the upper air passages, and abortion in the case of pregnant animals.

In most cases the infection was transmitted by intraperitoneal inoculation, but in two instances the disease was transferred to healthy animals by the use of the same needle for bleeding the diseased and healthy rabbits, one immediately after the other.

The observation of JAFFÉ and SILBERSTEIN that passages through rabbits increases the virulence of the virus was confirmed.

DONATIEN (A.) & LESTOQUARD (F.). **L'anémie pernicieuse du mouton et de la chèvre.** [Pernicious Anaemia of the Sheep and Goat.]—*Rec. Méd. Vét.* 1924. July 30. Vol. 100. No. 14. pp. 386-391.

The authors find that this disease occurs among sheep and goats in Algeria. They have observed it among these animals purchased by the Pasteur Institute (Algeria) for other experimental purposes.

The disease is characterized by a very unsteady temperature, loss of condition, and death in a few weeks or months. Experimentally, it has been found that the disease is due to a filterable virus which can be transmitted to the sheep, goat, horse, ass, and calf. The principal lesions are to be found in the cortical portion of the suprarenal capsules. The cortical cells show homogeneous cytoplasm and vacuolation of the nuclei; oedema, haemorrhages and diapedesis are also seen.

RINJARD (M.) & DEGOIS (M.). **Hémo-vaccination et aphotisation sous cutanée au Centre national zootechnique de Vaux-de-Cernay.** [Haemo-vaccination and Subcutaneous Aphthisation in Foot-and-Mouth Disease.]—*Rec. Méd. Vét.* 1924. July 30. Vol. 100. No. 14. pp. 392-400.

On April 6th, 1924, a case of foot-and-mouth disease was detected in an animal at the National Zootechnical Centre at Vaux-de-Cernay. It occurred in a bull which had been placed in a stall at the Saint-Benoit farm the previous day. This animal, among others, had been shown at an Agricultural Show. These had not been distributed to the various farms until they had been under observation for eleven

days. Nothing had been observed during this period, but no temperatures had been taken and no examinations had been made of the buccal mucous membranes. The first case having been detected the day after the animals had been scattered to the various premises, there was a fear that others might be affected and distribute the contagion. Two days later the disease made its appearance on another farm.

Three years previously one of these farms had suffered from a severe visitation of foot-and-mouth disease. The prospects on the present occasion were more serious since there were larger numbers of more valuable animals on the premises.

About 150 litres of blood from convalescent animals were available for inoculation purposes and it was decided to inoculate immediately the calves and lambs, heifers, bulls, and those animals which had recently won prizes at the agricultural show.

The various activities of the Centre made it essential that the outbreak should be cut short and the losses reduced if that were possible.

The injections were given on the lines suggested by VALLÉE and CARRÉ, with the exception of three valuable bulls which were seriously ill. These were given several litres of the blood.

At the beginning each animal was injected subcutaneously with a mixed sample of blood obtained from, as a rule, 16 convalescents. Young animals received 2 to 3 cc. per kilo. live weight, and adults 1.5 to 3 cc.

This was followed 1 to 5 days later by an inoculation with mixed virulent sera. The lambs were given 2.5 cc., the cows 4 cc., and the other bovines 5 cc. The blood available sufficed for the injection of 236 lambs, 36 calves and 84 cows.

In the flocks only the lambs were treated and a risk of losses among the adult sheep had to be taken. The materials available were not sufficient to deal with all the animals. The sheep were selected because the results of the disease are made good far more rapidly in them than in bovines. In addition to this, it subsequently appeared that in sheep the disease became generalized in a benign form very rapidly.

At Saint-Benoit, the only farm upon which cattle were attacked at the moment, 14 animals were exposed to contagion for the double purpose of providing virus and to act as controls of the susceptibility of the herd.

Thirty-three animals which became infected at pasture were inoculated subcutaneously with 1 cc. of virulent serum, and at the same time all the animals in the uninfected stalls were similarly inoculated.

Two bulls and a cow which were inoculated after the development of the disease made uneventful recoveries. Eight animals which had received the convalescent blood developed the disease within 48 hours, and before any virus had been given. Thus the statement made by the Research Laboratory that the disease cannot be arrested if inoculations are given during the period of incubation was confirmed.

Nineteen calves which received blood and virus remained free from infection, although three of them were in the infected shed, and two of these received the blood inoculation only 24 hours before their dams developed the disease. They remained with their dams. The milch cows and the working oxen which were treated all resisted

infection. There was no loss of milk, and the oxen continued to work.

Ninety-five Southdown lambs were inoculated and none of them contracted infection even from the ewes, among which there were as many as thirty cases at one time.

The 33 animals which were inoculated subcutaneously with virulent serum passed through a mild attack of the disease.

On another infected farm 52 lambs were subjected to haemo-vaccination and all remained healthy although with infected ewes.

Haemo-vaccination was carried out on two farms where the possibility of infection was suspected, but where no cases had actually occurred.

On one of these 39 bovines were inoculated with blood and virus and remained healthy.

At the other 89 lambs were inoculated. These remained healthy when the disease broke out among adult sheep later. As blood was not available in sufficient quantities at the time 8 calves, 11 cows, and 6 oxen were left for several days before they were inoculated. Six animals were kept in contact with these with a view to ascertaining whether animals undergoing haemo-vaccination were a source of danger to others.

Unfortunately 4 of the cows and 1 calf which had been vaccinated developed typical symptoms of the disease. The disease also broke out among the control batch. In these it was far more severe than in the vaccinated animals.

The blood used in those inoculated was a mixture of only eight different samples. The protective power of such mixtures is less than when a larger number of bloods are mixed, and larger doses should have been used.

Of the animals left to test the susceptibility of the herd, and including those which were in the incubative stage before inoculation, 22 developed the disease in a severe form. Six escaped infection.

VALLÉE (H.) & CARRÉ (H.). **Sur l'obtention du sérum anti-aphtheux.** [The Preparation of Anti-Foot-and-Mouth Serum.]—*Rec. Méd. Vét.* 1924. July 30. Vol. 100. No. 14. pp. 359-363.

The authors have followed the lines laid down by LIGNIÈRES, but they failed to produce an effective serum.

FROSC (P.) & DAHMEN (H.). **Die Morphologie und Kultur des Maul- und Klauenseucheerregers.** [The Morphology and Cultivation of the Causal Organism of Foot-and-Mouth Disease.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. July. Vol. 51. No. 2. pp. 99-122. With 2 plates and 1 text fig.

This paper elaborates the earlier report of the discovery of the causal organism of foot-and-mouth disease. The claim is definitely made that cultures can be obtained on solid media and that these cultures are composed of minute colonies which are only visible when highly magnified. The morphology of the organism itself was revealed by photographic means alone. For this purpose ultra-violet light of a definite wave length was used. The organism is described as a short rod about 0.1 μ in length.

In the cultivation of the parasite Dahmen first passed the liquid through a Berkefeld filter to free it from accidental contaminations. All previous experiments in the cultivation of the virus had been carried out with liquid media, turbidity being as a rule the index of growth. Dahmen turned his attention to solid media so that the question of actual growth, by obtaining visible colonies, could be definitely settled, and also to avoid as far as possible the simple transference of virus from tube to tube without actual multiplication taking place. Further incubation was carried out at temperatures below that of the body, the argument in support of this being that the disease develops in superficial parts only, and at the extremities where the temperature is lower. Dahmen considers that the fluid in the bullae is a reaction product, and consequently inimical to the virus. It was therefore necessary to separate the virus from the fluid. It is claimed that this was found to be possible by prolonged centrifuging at high speed.

With the sediment so obtained tubes of culture media were inoculated and it is claimed that cultures were obtained. These were carried on in sub-cultures and the virulence of these was tested by guineapig inoculation. One strain was carried through 23 generations and another through 5.

GINS (H. A.) & FORTNER (J.). **Experimentelle Maul- und Klauenseucheinfektion und -immunität beim Meerschweinchen auf dem Fütterungs- und Luftwege.** [The Infection of Guineapigs with Foot-and-Mouth Disease and their Immunization against it by the Alimentary and Respiratory Tracts.]—*Zeitsch. f. Hyg. u. Infektionskrankh.* 1924. Nov. Vol. 103. No. 4. pp. 699-704.

In view of the ease with which foot-and-mouth disease spreads among cattle, and the readiness with which guineapigs may be infected experimentally, it is remarkable that the disease does not spread among guineapigs by contact. The authors have carried out experiments with a view to ascertaining whether it is possible to infect guineapigs either by the alimentary or respiratory tracts.

In the first experiments a dilution of infective lymph was introduced into the stomach by means of an elastic catheter passed down the oesophagus. Of 12 guineapigs treated in this way, 2 developed foot-and-mouth disease lesions, the period of incubation being 12 days. Two others although they showed no signs of infection were subsequently found to be immune.

It was desired to ascertain whether the virus entered the blood in the infective or in the immunizing form by daily inoculations of other guineapigs, but shortage of guineapigs prevented this from being carried out. Six guineapigs which failed to become infected also acquired no immunity.

For infection via the respiratory tract three methods of injection were used. It was introduced into the nasal cavity either as a spray or by means of a capillary tube, but by these methods there could be no guarantee that it did not reach the alimentary tract. In later experiments, therefore, it was introduced into the trachea direct. The results obtained showed that typical foot-and-mouth disease could be produced in guineapigs by direct spraying of the infective material on to the nostrils. The course of the disease in such cases

resembles that produced by intravenous injection, that is to say, the apthae appear simultaneously; at least there are no primary vesicles on the tongue or buccal mucous membrane. In one instance inhalation of virus produced very strong immunity. In five cases neither infection nor immunity resulted. The direct introduction of the virus into the trachea failed to set up infection or to produce immunity, and it would thus appear that the virus does not gain entry to the body by way of the epithelium of the lower parts of the respiratory tract.

Of four animals treated by the introduction of the virus into the nose, one developed the typical disease, one was firmly immunized, and the remainder did not react in either way. It is thus established that guineapigs can contract foot-and-mouth disease by way of the alimentary or respiratory tracts, but it is probable that this does not occur under natural conditions because the quantity of virus taken in is too small to set up either infection or immunity.

The question of the natural method of infection in cattle remains unsolved.

BEATTIE (J. M.) & PEDEN (D.). Rats as Possible Carriers of Foot-and-Mouth Disease.—*Jl. Path. & Bact.* 1924. Oct. Vol. 27. No. 4. pp. 415–424. With 4 figs.

The authors describe certain lesions of the feet, tongue and lungs which developed in rats inoculated from lymphatic glands taken from carcasses of cows slaughtered because they had been in contact with foot-and-mouth infected animals. They were unable to supply evidence that the disease was actually foot-and-mouth disease as they were unable to carry inoculation experiments out upon cattle.

The lesions found included vesicles and ulcers on the feet and tongues. Glandular lesions took the form of caseous degeneration.

REMLINGER (P.). Sur un virus de rue renforcé recueilli au Maroc. [A Reinforced Strain of Street Virus obtained in Morocco.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 538–539.

It is well known that the virus of rabies is very variable in virulence. Subdural inoculation of the rabbit usually causes death in about a fortnight, but the period may be shorter or considerably longer. Strong viruses may cause death on the 7th or 8th day, and when passed on in rabbits death constantly occurs after the same interval. They thus behave like fixed virus. Such cases are rare, and have been observed chiefly in Italy.

The virus obtained in Morocco had the following history:—

A fox, eighteen months old, had been in Tangier for about a year. It was born at Saffi, in Morocco. Once arrived in Tangier it had not left it again. The fox was found one day to have a bleeding wound on its nose. Three or four weeks later the typical symptoms of dumb rabies developed. Death occurred on the fourth day.

An emulsion of the medulla was used for subdural inoculation of a rabbit and rabies developed on the 8th day, with death on the 9th. The brain of this rabbit was used for the inoculation of a second. The disease appeared on the 6th day and death occurred on the day following. Eight subsequent passages were carried out and death

occurred in all between the 6th and 8th days ; there being one day's interval on every occasion between the appearance of symptoms and death. The virus would therefore appear to possess an exalted virulence. Naturally attenuated viruses have never been encountered by the author in Tangier.

GALLEGO (Abelardo). **Contribución al diagnóstico histológico de la rabia. Método rápido, sencillo y seguro para la coloración de los corpúsculos de Negri en los cortes.** [The Histological Diagnosis of Rabies. A Rapid, Simple and Certain Method of Staining Negri Bodies in Sections.]—*Rev. de Hig. y Sanidad Pecuarias.* 1924. Aug. Vol. 14. No. 8. pp. 499-502. With 2 figs.

The steps of the procedure are as follows :—

1. Fragments of the brain tissue, about 5 mm. thick, are fixed by boiling in 10 per cent. formaldehyde for 1-5 minutes.
2. Sections, 10-20 μ thick, are then cut by the freezing microtome and treated for half-a-minute in solution by (a) distilled water 10 cc., nitric acid 1 drop, liq. ferri perchlor. diluted 1 in 10, 1 drop.
3. Without washing, the section is stained for 5 minutes in solution (b) diluted 7.5 in 100 : distilled water 10 cc., Ziehl's carbol fuchsin 15 drops, acetic acid 1 drop.
4. Wash in water and treat for 5 minutes with (c) distilled water 10 cc., formol 2 drops, nitric acid 1 drop, liq. ferri perchlor. (diluted 1 in 10) 1 drop.
5. Wash in water and stain for one minute in (d) equal parts of 10 per cent. watery indigo carmine and saturated watery picric acid.
6. Wash, dehydrate, clear in carbol xylol, and mount in Canada balsam.

The nuclei of the cells are coloured violet, the protoplasm blue or greenish-blue, the ground substance of the Negri bodies green or greenish-red, their internal structure very pale violet. The whole process occupies only 20 minutes and the time may be even further reduced by using 30 drops of the fuchsin in stage 3 and staining for one minute only, and treating in stage 4 for one minute instead of five, but " these preparations have not the beauty of those made by the former detailed method."*

MICHALKA (J.). **Die Diagnose der Wut bei Tieren.** [The Diagnosis of Rabies in Animals.]—*Seuchenbekämpfung.* 1924. Vol. 1. No. 5-6. pp. 147-152.

This paper is a summary of the possible methods of diagnosis of rabies in animals which are applicable ante- and post-mortem. It contains nothing new.

PFEILER. **Bemerkungen zu verschiedenen Seuchenfragen, insbesondere zur Züchtung des Erregers der Maul- und Klauenseuche.** [Observations on Epidemics, particularly in connection with Foot-and-Mouth Disease.]—Reprint from *Der Praktische Landwirt.* 1924. June 6. No. 23.

* Summarized by Dr. H. Harold Scott.

MISCELLANEOUS.

ZWICK (W.) & SEIFRIED (O.). **Untersuchungen über die in Hessen gehäuft auftretende Seuchenhafte Gehirn- und Rückenmarkszündung (Bornasche Krankheit) bei Pferden.** [Investigations in connection with the So-called Borna Disease of Horses.]—*Berlin. Tierärztl. Wochenschr.* 1924. Aug. 29. Vol. 40. No. 35. pp. 465-471.

The disease has a rather wide distribution in Germany, but no references to its occurrence in Hesse have as yet appeared in the literature.

The disease as it occurs in Hesse presents the same picture as in other parts of the country.

Post-mortem examination reveals no macroscopic lesions save some hyperaemia of the cerebral convolutions. Actual haemorrhages have not been observed in either the substance of the central nervous system or in the meninges.

Microscopic examination reveals vascular and perivascular infiltrations in the brain and spinal cord with rounded cells. These lesions are more numerous in the anterior part of the brain, and gradually become more scanty as one examines the more posterior parts. It has been suggested that this is an indication that infection is by way of the nasal cavity.

Zwick and Seifried have found cellular infiltrations along the course of the optic nerve.

The authors are able to confirm JOEST'S statement that cell inclusions, which are perhaps of a specific nature, occur in the large ganglion cells in the brain, e.g., Amnion's horn, etc. It is noted that these may not be detected if the material examined is not fixed while in fresh condition. The inclusions appear to degenerate rapidly. These bodies were found by JOEST in an intranuclear position. Zwick and Seifried have seen them in extra-nuclear situations. An attempt was made to transmit the disease to a horse experimentally, but without success.

The cause of the condition has not been identified with certainty.

LOTES & PROFÉ. **Zur Aetiologie der Dürerer Krankheit.** [The Cause of Dürer Disease.]—*Berlin Tierärztl. Wochenschr.* 1924. Sept. 19. Vol. 40. No. 38. pp. 513-519.

The authors are of the opinion that the cause of this condition is in some way connected with the use of trichlorethylene for the extraction of soya beans, but they admit that they cannot state conclusively that this is so.

GRATIA (A.) & RHODES (B.). **Production d'Anticorps bacteriolytiques et hémolytiques par la voie cutanée.** [The Production of Bacteriolytic and Haemolytic Antibodies by the Cutaneous Path.]—*C. R. Soc. Biol.* 1924. Oct. 7. Vol. 91. No. 28. pp. 797-798.

The authors have repeated the experiments of CIUCA and BALTEANU regarding the protection of guineapigs against cholera by the intraperitoneal and cutaneous paths.

These authors were unable to demonstrate antibodies in the serum of the later animals. Gratia & Rhodes find no differences in the immunities possessed by the two groups.

MEYER (S.). **Die Blutmorphologie einiger Haus- und Laboratoriumstiere unter physiologischen und pathologischen Bedingungen.** [The Morphology of the Blood of Certain Domesticated and Laboratory Animals in Health and Disease.]—*Folia Haematologica*. 1924. Aug. Vol. 30. No. 3. pp. 195–229. With 2 plates in colour.

By examining the blood of a total of 173 animals, the author has added to our knowledge regarding the corpuscular elements in the blood of the horse, ox, dog, ass, pig, guineapig, rabbit, mouse and fowl. Some of the animals were normal and some diseased. For detailed reference the original paper should be consulted.

BOITEUX (R.). **Description d'une conserve à bouillon stérile non scellée à la lampe.** [An Apparatus for Storing Broth in a Sterile Condition.]—*Ann. Inst. Pasteur*. 1924. Oct. Vol. 38. No. 10. pp. 873–878. With 2 text figs.

The author figures and describes an apparatus in which broth can be stored in a sterile condition, but which allows quantities to be withdrawn as required without risk of contaminating the remainder. Since detailed description is requisite for the clear understanding of the apparatus it is impracticable to make an abstract or any value.

GERNEZ (C.). **Contribution à l'étude de la cuti-immunisation. Production d'anticorps par inoculation cutanée.** [The Production of Antibodies in Immunization by the Cutaneous Path.]—*Ann. Inst. Pasteur*. 1924. Oct. Vol. 38. No. 10. pp. 892–908.

With a view to throwing light upon the question of the presence or absence of antibodies in the general circulation of animals immunized by the cutaneous path, the author has carried out a number of experiments using blood corpuscles as his antigen. These were convenient to work with for the reasons that haemolysins are readily detected, dosage can be accurately graduated, their composition is constant, and penetration of the skin can be verified readily by histological examination. The rabbit was selected as the experimental animal for the reason that so many accounts have been published regarding the production of haemolysins in this species by subcutaneous, intravenous and intraperitoneal inoculation that there would be plenty of control records to check the results of intradermal inoculation against; the corpuscles used have been those of the goat and of man. It is easy to produce anti-goat haemolysins in the rabbit, but antihuman haemolysins are far less readily produced. Rabbit serum not infrequently contains anti-goat haemolysin, but very rarely anti-human haemolysin.

The corpuscles have been used for inoculation into the dermis and have also been applied as a dressing on shaven areas of skin. The later method is called epidermic inoculation by the author.

CANHAM (A. S.). **Ophthalmia of Sheep.**—*S. Africa. Jl. Dept. Agric.* 1924. June. Vol. 8. No. 6. pp. 581–582.

Ophthalmia of sheep is exceedingly infectious; great care therefore should be exercised in isolating all animals showing lachrymation.

Treatment is best carried out by instilling the following solution into the eyes with a fountain pen filler :—

Formalin	...	...	...	...	...	4 drachms.
Tinct. opii	...	...	...	...	...	1½ drachms.
Aqua	...	...	...	...	...	1 pint.

This should be used once daily while lachrymation persists.

Should ulceration occur, the solution used should be a 2 per cent. solution of hyposulphite of soda, to which tincture of opium has been added in the proportion of 10 minims per ounce.

After lachrymation a mixture containing equal parts of 1 per cent. atropine sulphate and 4 per cent. alum should be used to clear up the opacities that may be left.

Sheep apparently cured should be kept away from the healthy animals and carefully examined at short intervals for a fortnight.

MARSH (C. W.) & CLAWSON (A. B.). **The Meadow Death Camas (*Zygadenus venenosus*) as a Poisonous Plant.**—*U.S.A. Dept. Agric. Bull.* 1240. 1924. June 27. pp. 1-13.

Four species of *Zygadenus* occur in the Western States, and in the literature regarding poisonous effects there has been some confusion between them.

Sheep are the principal victims, but horses are not infrequently poisoned by it. The plant is toxic for cattle, but pigs probably escape through vomiting. *Z. venenosus* is probably of equal toxicity to *Z. gramineus* and these are many times more toxic than the other two species, *Z. paniculatus* and *Z. elegans*.

While the toxic doses of *Z. venenosus* and *gramineus* are about the same, the lethal dose of the latter is much smaller.

While the toxic dose of *Z. venenosus* is much smaller than that of *Z. paniculatus*, the lethal dose is about the same.

The symptoms are salivation, nausea, weakness, depression of temperature, and may be expected to appear on an average about two hours after the ingestion of the plant.

The principal organ affected is the kidney, where there is acute parenchymatous nephritis. It is noted, however, that only one animal was subjected to post-mortem examination.

The toxic dose of the plant for the sheep appears to vary from 0.3 lb. per 100 lb. body weight upwards.

GUNN (J. W. C.). **Slangkop Poisoning.**—*S. Africa. Jl. Dept. Agric.* 1924. Aug. Vol. 9. No. 2. pp. 141-142.

Slangkop is a name applied to different plants, but all belong to the Liliaceae. All that have been examined have the same action.

KENYA. **Report of the Proceedings of the Fifth Pan-African Veterinary Conference held at Nairobi, April 6th to 14th, 1923.**—pp. 128+2. With 9 illustrations. 1924. Nairobi: Govt. Press.

The Chairman proposed that the meetings should, as far as possible, take the form of a round-table gathering, delegates being permitted freedom of speech and questioning.

The proceedings were in the nature of a debate, papers in the ordinary sense of the term not being read.

The subjects dealt with were (a) Specific Diseases: (1) Pleuro-pneumonia; (2) Rinderpest; (3) East Coast Fever, Tick Destruction and Tick-borne Diseases; (4) Trypanosomiasis and Tsetse Bionomics; (5) Horse-sickness; (6) Anthrax; (7) Black-quarter; (8) Gallamziekte; (9) Contagious Abortion; (10) Avian Diseases; (11) Helminthiasis; (12) Skin Diseases; (13) Plant Poisoning; (14) Ulcerative Lymphangitis; (15) Swine Fever; (16) Rabies. (b) Pathological Research. (c) Disease Control. (d) Grazing and Water Facilities. (e) Stock Improvements. (f) Stock Economics.

DELANOË (P.). **Les diverses espèces de rats constatées dans les Doukkala et plus particulièrement à Mazagan. De la rareté du surmulot.** [The Species of Rats found in Doukkala, and particularly in Mazagan. The Rarity of the Norwegian Rat.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 584–589.

—. **Du nombre des mamelles chez le Rat d'Alexandrie.** *E. rattus* var. *alexandrinus* G. [The Number of Mammas in the Alexandria Rat, *E. rattus* var. *alexandrinus* G.]—*Bull. Soc. Path. Exot.* 1924. July. Vol. 17. No. 7. pp. 589–590.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). **L'étiologie de l'encéphalite épi-zootique du lapin, dans ses rapports avec l'étude expérimentale de l'encéphalite léthargique.** *Encephalitozoon cuniculi* (nov. spec.). [The Causation of Epizootic Encephalitis in the Rabbit and its bearing upon the Experimental Investigation of Lethargic Encephalitis. *Encephalitozoon cuniculi*, n.sp.]—*Ann. Inst. Pasteur.* 1924. Aug. Vol. 38. No. 8. pp. 651–712. With 2 plates & 18 text-figs.

STASSANO (H.). **De la stérilisation des liquides en circulation continue, sous couche mince. Évolution de la méthode et transformation successive des appareils.** [The Sterilization of Liquids in their Layers, and the Evolution of the Method.]—*Ann. Inst. Pasteur.* 1924. May. Vol. 38. No. 5. pp. 427–448.

REPORTS.

RHODESIA, NORTHERN. **Report of Chief Veterinary Officer for the Year ended March, 1924.** [MS. received through the Colonial Office.]

Rinderpest and foot and mouth disease are not known to exist. East Coast Fever, which has recently gained admittance, is confined to a district almost entirely surrounded by a fly belt. Pleuro-pneumonia has been eradicated from all parts with the exception of Barotseland.

The heaviest mortality is from anthrax. Very few districts are free from contagious bovine abortion. Headway is being made among European owned cattle in dealing with this disease. The policies of segregation and vaccination are both being tried. Many owners have used living vaccine on all female animals whether pregnant or not, and though a considerable number of pregnant animals aborted, the calf crops of the following year have been very good.

"Sweating sickness" in calves has been diagnosed for the first time. *Cysticercus cellulosae* is a very commonly occurring parasite of the pig and is of great economic importance. A disease termed tick pyaemia

is described as occurring in horses. It is characterized by the development of an abscess at the place where a bont tick has attached itself, this being followed by the development of abscesses all over the body. An attempt is being made to prepare an autogenous vaccine.

Horse sickness has been very prevalent.

Trypanosomiasis.—In using antimony tartrate for the treatment of trypanosomiasis the two Veterinary Officers in charge of the work use the posterior auricular vein in preference to the jugular for intravenous injections.

The results of treatment have varied. Sometimes improvement has been seen at once, at others it has been delayed. In a few cases death has followed the injections very promptly.

Abortion has been a not infrequent sequel to the injections.

Some animals appear to be antimony proof.

The Report contains a preliminary account of work done in connection with the so-called veld poisoning; as yet nothing very definite has emerged.

RHODESIA, SOUTHERN. Report of the Chief Veterinary Surgeon for 1923.—*Rhodesia Agric. Jl.* 1924. Aug. Vol. 21. No. 4. pp. 413-423.

The year was marked by an extensive spread of African Coast fever in the Charter District, and by a heavy mortality from horse sickness in all districts.

In connection with African Coast fever it is noted that when cattle are kept on infected veld and dipped every third day with the object of eradicating infection the mortality gradually decreases towards the end of the year, and invariably increases during the first few months of the following year. This is probably due to rains interfering with the efficacy of the dipping, but it does not appear to result in the dissemination of fresh infection, as in most cases mortality ceases within twelve months of the institution of three day dipping. Forty fresh centres of contagious abortion were discovered during the year. Vaccination with living or with "devitalized" vaccine was carried out in some cases, but no exact figures of the results are available. On one of the larger ranches 400 heifers were inoculated with live vaccine, and 3,000 with devitalized vaccine. The management reported no increase in the calf crop, nor did the vaccinated herds have a larger percentage of calves than the untreated.

RHODESIA, SOUTHERN. Report of the Director of Veterinary Research for 1923.—*Rhodesia Agric. Jl.* 1924. Aug. Vol. 21. No. 4. pp. 424-431.

The Director of Research calls attention to the criticism made elsewhere of the devitalized vaccine, and points out that in the absence of detailed information on many points, the vaccine cannot be condemned as a failure.

The death rate from horse sickness was about 34 per cent.

BOOK REVIEW.

REEKS (H. Caulton). [F.R.C.V.S.] **Diseases of the Horse's Foot.**—
Second Edition. pp. xii+568. With 193 figs. 1925. London :
Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden,
W.C. 2. [Price 21s.]

Nearly twenty years have elapsed since the first edition of this work appeared. It is a long interval, but it has been amply justified by the improved quality of the second edition, which is bound to enhance the reputation of the author for mature and reliable information on the diseases of the horse's foot. The anatomy and physiology of the foot, its conformation, method of examination, and the various operations that may be performed upon it are carefully described. A very full account is given of the diseases of the hoof-forming membrane, lateral cartilages, bones and joint of the foot, with all important details of treatment. In his observations the author is not dogmatic, and on points which are open to differences of opinion or of practice he is careful to state the published views of the better known authorities. Objection may be taken to the inclusion of so many reports of cases and their treatment, which in some instances appear to have no particular value, and of which at least one (p. 339) would seem to require further investigation.

J. Macqueen.

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DISEASES DUE TO PROTOZOAN PARASITES.

VAN SACEGHEM (R.). **Effets de l'inoculation de sang contenant des toxines trypanosomiques, dues à *Trypanosoma congolense pecorum*, sur les infections du *Trypanosoma cazalbouri* var. *vivax*.** [The Effects of Inoculating Blood containing Trypanosome Toxins due to *T. congolense pecorum* on Infections caused by *T. cazalbouri* var. *vivax*.]—*Bull. Agric. Congo Belge*. 1923. Dec. Vol. 14. No. 4. pp. 608-609.

In cases in which cattle are infected simultaneously with *T. congolense* and *T. cazalbouri* the latter always disappears from the circulation, while *T. congolense* persists, according to the author, and this, he believes, indicates an antagonism between the two.

He has inoculated intravenously cattle infected with *T. cazalbouri* with large quantities (one litre) of blood containing *T. congolense*, the trypanosomes having been previously killed by the addition of a trace of emetic. Such injections cause a rapid disappearance of *T. cazalbouri* from the circulation, but they reappear after several days.

To make quite sure that this result is not due to the emetic the defibrinated blood has been allowed to stand for 12 hours after the addition of the drug, which during this period undergoes decomposition, producing substances devoid of trypanolytic power. Blood similarly treated failed to cause any disappearance of trypanosomes when injected into animals infected with *T. congolense*.

Repeated injections cause the disappearance of the parasites from the circulation. If an interval of 20 days is allowed to elapse between injections anaphylactic shock is produced.

VAN SACEGHEM (R.). ***Trypanosoma congolense* dans l'Est Africain.** [*Trypanosoma congolense* in Ruanda.]—*C.R. Soc. Biol.* 1924. Dec. 27. Vol. 91. No. 37. pp. 1455-1456.

After summarizing very briefly the literature regarding the animals susceptible to inoculation with *T. congolense* van Saceghem gives details of four dogs which he inoculated with the parasite. The strain used was of bovine origin.

Dog No. 1. Was infected, but apparently made a complete recovery, and was re-infected.

Dog No. 3. Trypanosomes appeared in the blood about a month after inoculation, and death occurred a month later.

Dog No. 2. Was inoculated from Dog No. 1. The period of incubation was nine days, and death occurred on the 13th day after the appearance of trypanosomes.

Dog No. 4. Inoculated from Dog No. 1. Parasites appeared on the 19th day and death occurred a month later. In both of these animals (2 and 4) there was enormous enlargement of the spleen, and petechiae were found on the peritoneum.

VAN SACEGHEM (R.). **La formol-gélification et le diagnostic des trypanosomiasés chez les bovidés.** [The Formol-Gel Test for the Diagnosis of Trypanosomiasis in Cattle.]—*C. R. Soc. Biol.* 1925. Jan. Vol. 92. No. 3. pp. 193-195.

Van Saceghem gives tabular statements showing the results of adding 2 drops of commercial formalin to 1 cc. of serum obtained from infected and healthy cattle.

The sera from cattle which were believed to be healthy gelled in periods ranging from 25 minutes to 7 days. Bovines infected with *T. congolense* and *T. cazalbovi vivax* yielded sera which was gelled by formalin in periods ranging from 1 hour to a maximum of 9½ hours.

The author concludes that his results are in agreement with those obtained by HORNBV.

ILOWAISKY (S. A.) & STIEBEN (W. D.). "**Su-aurù**" **Trypanosomose bei Kamelen u. Pferden in der Kirgisensteppe u. im Uralgebiete.** ["Su-aurù"—Trypanosomiasis of the Camel and Horses on the Khirgiz Steppes and the Ural Area.]—*Rev. de Microbiol. et d'Épidémiol.* 1923. Vol. 2. No. 1/2. pp. 93-95; and 1924. Vol. 3. No. 3. pp. 222-223.

The authors' observations were made during an epidemic in 1922, when hundreds of animals died, but the occurrence of trypanosomiasis on the Steppes has been recognized for many years. The name "su-aurù" means "water disease," it being held to be due to the drinking of dirty water. It has also been said to be caused by a certain kind of grass.

One of the most characteristic symptoms is swelling of the inferior cervical lymphatic glands, although it is difficult to ascertain the size of these when they are normal. A subacute and a chronic form of the disease are recognized.

Experiments indicated that the disease in the horse and camel were identical.

In experimental infections the period of incubation ranges from 2 to 10 days, depending upon the amount of virus used and the species of animal from which it is taken. The course of the disease is usually rapid and death takes place after a short time. A painful swelling generally develops at the seat of inoculation, and this persists for three or four days. It was never found possible to detect trypanosomes in the enlarged glands prior to their appearance in the blood stream. Daily examinations of the blood showed that trypanosomes persisted

there from the time of their appearance until death took place. The original swelling of the cervical glands was very marked, but this was soon reduced in amount, but there was some degree of permanent swelling left. In experimentally-infected camels there was not always observed oedema. In all cases purulent conjunctivitis was observed. At the post-mortem examination of experimentally-infected camels no very distinct lesions were found.

ILOVAISKY (S.). **Su-auru der Pferde.** [Su-auru in the Horse.]—*Arch. f. Schiffs- u. Tropen-Hyg.* 1924. Dec. Vol. 28. No. 12. pp. 535-538.

In the first case of the disease—a trypanosomiasis of camels and horses in Kirghiz and Ural—the only symptoms observed were diarrhoea and wasting, and nothing at all indicative of trypanosomiasis. Investigations carried out in 1923 shewed that the percentages of camels and horses infected were 8·82 and 4·25 respectively in Kirghiz, but in the Ural area these percentages were 28·6 and 70·7.

As a result of extensive investigations the author formed the following views regarding su-auru in horses. The course of the disease is divisible into two distinct periods, and it is only during the second of these that definite symptoms are presented. The symptoms are: wasting, irregular fever, purulent conjunctivitis and keratitis, and jaundice. Oedema is not observed as a rule. The disease runs its course in six months to a year, and spontaneous recovery does not appear to take place. The disease appears to be distinct from surra.

WALRAVENS (P.). **Note concernant des cas de trypanosomiase chez le porc produits par le *Trypanosoma rodhaini* (n.sp.).** [Cases of Trypanosomiasis in Pigs caused by *T. rodhaini* (n.sp.).]—*Rev. Méd. de Angola.* (No. especial 1^o Congresso de Med. Trop. da Africa Occidental. Vol. 4.) 1923. Aug. No. 4. pp. 233-234.

The author describes a trypanosome found in the blood of pigs near Elizabethville in September, 1922.

The parasite was found to be incapable of infecting guineapigs and rabbits, but it was transmitted to a young pig.

The organism was distinguishable from *Cazalboui-vivax* morphologically and on the score of its feeble motility, which involved little or no translation. It appeared to differ from *T. simiae* by the invariable presence of a long free flagellum.

SERGEANT (Edm.) & DONATIEN (A.). **Debab et nagana chez le dromadaire.** [Debab and Nagana in the Dromedary.]—*Arch. Inst. Pasteur d'Algérie.* 1924. June. Vol. 2. No. 2. p. 162.

In a brief note the authors describe two experiments in which two dromedaries were inoculated with MESNIL'S strain of *T. brucei*. Both of these animals had previously been infected with Debab. One had apparently made a complete recovery, while the other occasionally showed trypanosomes in its blood. Both animals showed febrile

attacks after a period of five or six days, and trypanosomes appeared in the blood in considerable numbers.

The authors conclude that the trypanosomes are not identical, and also that the North African dromedary is susceptible to nagana.

SERGEANT (Edm.), DONATIEN (A.), & DEGUILLAUME (A.). **Notes sur le Debab, trypanosomiase des dromadaires : évolution, influence sur la gestation, prémunition.** [The Evolution of Debab and its Influence on Gestation in the Dromedary. Immunization.]—*Arch. Inst. Pasteur d'Algérie*. 1924. June. Vol. 2. No. 2. pp. 147-157.

During the incubative stage of infection abortion may occur, but in the acute stage abortion or the slipping of a dead foal always occurs. During the chronic phase accompanied by immunization (prémunition) foaling may be normal, but in some cases the foal dies.

The degree of immunity acquired protects dromedaries from re-infection, but it is not hereditary.

SERGEANT (Edm.) & DONATIEN (A.). **Existence aux confins algéro-marocains de l'infection équine due à *Trypanosoma marocanum* et considérations, à ce propos, sur l'épreuve des réinoculations croisées de Laveran et Mesnil.** [An Equine Infection in Morocco and Algeria due to *T. marocanum* and the Bearing of this upon the Cross-Immunity Test of Laveran and Mesnil.]—*Arch. Inst. Pasteur d'Algérie*. 1924. June. Vol. 2. No. 2. pp. 158-161.

The trypanosome was obtained for the experimental work from a guineapig inoculated from an infected horse in the Oudjda area.

A sheep was infected with *T. marocanum*, and by means of treatment with tartar emetic it was brought through the infection. The blood was infective for dogs up to 7 months after, but not at 13 months. Four months later it was given a second inoculation of virus. The sheep showed no clinical evidence of infection, but its blood was proved by the inoculation of dogs to contain trypanosomes. The sheep was therefore "prémunisée" but not immunized. A third injection of virus was given seven months after the second. The blood failed to infect two dogs inoculated 24 days later. The sheep was now immune to the *T. marocanum*. Two months later it was injected with the Oudjda virus, but it failed to become infected. A second injection was given four months later. After this two dogs inoculated from it failed to become infected.

A parallel experiment was carried out with a goat.

In a third experiment a sheep was immunized against the Oudjda virus, and then inoculated with *T. marocanum*. The inoculation failed to infect.

The conclusions drawn are: That the trypanosomes occurring in horses in Eastern and Western Morocco are identical; that it is wise in experiments of this kind to repeat the inoculations conferring the first immunity so as to make sure that the condition of "prémunition" is passed, and that of actual immunity established, before the cross test is carried out.

Sheep and goats, which are less susceptible to trypanosomiasis than the dromedary, may pass through the successive phases of infection and prémunition, and achieve complete immunity. The last of these is acquired in about two years. Its duration is not known.

LETONTURIER, DE MARQUEISSAC, & JAMOT. **La prophylaxie de la maladie du sommeil au Cameroun dans les secteurs du Haut Nyong et de Doumé.** [Sleeping Sickness Prophylaxis in the Cameroons.]—*Ann. Inst. Pasteur.* 1924. Dec. Vol. 38. No. 12. pp. 1053–1100.

Haut-Nyong and Doumé have been sleeping sickness centres for many years, and it is exceptionally contagious on account of the density of the population. There is little tendency to regression save in one area of the Doumé district, where it has practically disappeared. While the disease is not so fatal as in some parts of equatorial Africa, it is a serious factor in depopulation.

In dealing with the disease prophylactically detailed information is essential, and this can only be obtained by complete investigations in all the endemic or suspected areas. When the areas have been definitely located they must be circumscribed. All movement must be carefully controlled, and the infected must be prevented from going to clean areas.

Examination by lumbar puncture shows that approximately half the infected are in the first stage of the disease, and therefore curable. Efforts should be concentrated upon these cases, but to achieve success the work must be carried on assiduously for many years.

BATTAGLIA (M.). **Metodo per colorare i tripanosomi nei tessuti fissati.** [The Staining of Trypanosomes in Fixed Tissues.]—*Pathologica.* 1925. Jan. 1. Vol. 17. No. 387. p. 23.

The sections are stained for two hours in carbol gentian violet and then passed into iodine solution (Gram's) where they remain for an hour. Decolorization is then effected by absolute alcohol.

VELU (H.), BAROTTE (J.), & LAVIER (G.). **Le Bayer 205 dans la thérapeutique des trypanosomoses animales au Maroc.** ["Bayer 205" in the Treatment of Animal Trypanosome Infections in Morocco.]—*Ann. Parasit. Humaine et Comparée.* 1925. Jan. Vol. 3. No. 1. pp. 1–11.

The bulk of this paper is made up of detailed accounts of animals subjected to treatment with "Bayer 205." Two animals—a horse and a dog—were inoculated experimentally with *T. maroccanum*.

The dog, which weighed 2.5 kilograms, was given two injections of 0.5 g. of the drug 7 weeks and 10 weeks after it was inoculated and when infection was well established. Recovery took place.

The horse, which had been treated for dourine, and had made an apparent but not an actual recovery, was also inoculated with *T. maroccanum*. It received a dose of 5 g. six weeks after inoculation. During the next six months the animal wasted a great deal and a month later trypanosomes were found in the blood. Two doses of "Bayer 205" (5 g. and 2 g., at an interval of 24 hours) failed to effect a cure, and death took place. Six naturally contracted cases of dourine were treated. Seven grammes of the drug were given intravenously in two doses, at an interval of 48 or 72 hours. Three animals

showed toxic symptoms, and one died. In two instances the occurrence of oedema intermittently made it doubtful whether recovery had actually taken place, and in one case there was apparently a complete cure.

VELU (H.), BAROTTE (J.), BALOZET (L.), & LAVIER (G.). **Au sujet d'accidents consecutifs aux injections de Bayer 205 chez des étalons dourinés.** [Ill-Effects noted in Stallions infected with Dourine as the Result of Treatment with "Bayer 205."—*Ann. Parasit. Humaine et Comparée*. 1925. Jan. Vol. 3. No. 1. pp. 12-20. With 1 text fig.]

The stallion which died (see above) developed oedematous swellings on all parts of the body, ranging from a nut to an egg. They resembled in appearance the generalized subcutaneous sarcomata seen in horses, although they were softer to the touch. Oedema was particularly marked over the parotid region and lips, nares, and chin. The symptoms in the non-fatal cases were similar, but less pronounced. After the lapse of 36 to 48 hours the patches of oedema disappeared and gave place to erythema. Prostration was very marked, and the animals showed an intense desire to bite such parts as they could reach. In some cases a papular or vesicular eruption occurred. There was no rise of temperature. Appetite was entirely lost, and the animal became reduced to a skeleton. Bed sores developed rapidly. At the post-mortem the muscular tissue had the appearance of "fevered flesh." The liver was slightly enlarged, of a pale yellow colour, and was readily torn. The other organs showed only marked congestion of the vessels. The blood was imperfectly coagulated. The congestion of the vessels was the most striking feature.

This lesion led the authors to try the effect of subcutaneous injections of adrenalin. Twelve cubic centimetres were given in the evening after the "205" had been given in the morning, and three further injections of 10 cc. were given morning and evening. One stallion which recovered developed a curious lesion: this was an elongated area of oedema running down from the croup towards the hip in a symmetrical manner on each side. These areas were observed in the morning and gradually became less marked during the day. This was observed daily, but becoming increasingly indistinct for about a week. Subsequently there was an abundant desquamation of epithelium over these areas, and a growth of white hairs.

The authors review at some length the possible explanations of the toxic effects of the drug in these cases.

ILOWAISKY (S. A.) & ZEISS (H.). **"Bayer 205" bei experimentalem Su-aurù von Kamelen.** ["Bayer 205" in the Treatment of Experimental Su-aurù in the Camel.]—*Rev. Microbiol. et Epidémiol.* 1923. Vol. 2. No. 1/2. p. 95.

This brief note is in the nature of a preliminary publication regarding the use of "Bayer 205" in camels affected with Su-aurù. In one instance a single intravenous injection of 3 grammes of the drug appeared to effect a complete cure, as the animal was kept under observation for five months in apparently perfect health. In another animal a relapse occurred one month after the first dose, but this was cut short by a second dose of 3 grammes.

For naturally-infected animals it is suggested that a first intravenous injection of 2-3 grammes should be given, followed by a second of 4 grammes subcutaneously after an interval of 8-10 days.

VAN SACEGHEM. **Le 205 Bayer (Naganol) et le traitement des Trypanosomiases animales.** ["Bayer 205" and the Treatment of Animal Trypanosomiases.]—*C. R. Soc. Biol.* 1924. Dec. 27. Vol. 91. No. 37. pp. 1452-1454.

Injections of "Bayer 205" render the blood incoagulable. The fatal toxic dose for cattle is 15 grammes per 100 kilog. live weight. At the post-mortem the principal lesions are found in the intestine and kidneys. In the treatment of sleeping sickness in man the use of the drug leads to improvement if it be used during the first or second stages, but it is not yet established whether a radical cure is effected. In the third stage of the disease no results are obtained.

In animal trypanosomiases the drug is valueless against *T. vivax*; of little or no value in equine surra. Dourine and mal de caderas may be favourably influenced by it.

Van Saceghem has tested it against *T. congolense*, but has not had very encouraging results.

The sample of the drug used was of a pink colour which, when dissolved slowly in distilled water (to make a 20 per cent. solution), yielded a pink solution which subsequently became dark red. All injections were made intravenously.

Animals infected experimentally with *T. congolense* were given the drug at the rate of 5 grains per 100 kilog. This produced a temporary clearing of the circulation, which lasted at the most for four weeks. Tolerance to the drug is readily established. When used for the treatment of animals infected with *T. vivax* in the same dose the circulation was cleared of trypanosomes for a maximum of seven days only.

SMILLIE (W. G.). **The Treatment of Mal de Caderas with Tryparsamide.**—*Jl. Amer. Vet. Med. Assoc.* 1923. Sept. pp. 19-33. With 3 text figs.

Mal de Caderas is the biggest economic problem of the Paraguay Valley. In some places ranches lose the whole of their horses each year.

Mules are less susceptible, and may recover, but it is said that no horse which has developed paresis ever recovers. It is believed that the disease is transmitted in Brazil by the tabanid *Lepidoselaga lepidota*. Variable results have been obtained with "Bayer 205." MIGONE reports encouraging results, but in Upper Paraguay it is found that the drug is toxic in effective doses (3 g. intravenously). Smillie has had the opportunity of trying tryparsamide on a ranch where the disease occurs endemically in its severest form. Owing to difficulties of transport in Western Brazil it was possible to study the effects of single doses given to a few cases at widely separated places.

Diagnosis was based upon the examination of a few drops of liquid from the leucocyte layer obtained by centrifuging citrated blood in a hand centrifuge for three minutes. No specimen was considered negative until it had been searched fruitlessly for half-an-hour.

Doses of 5 grammes to 8 grammes of the drug were dissolved in 20 cc. of normal saline and injected intravenously.

Details are given of the various animals treated.

The transmitting fly is prevalent during the period November to February, and as the author's tour was made in March and April only a few were seen. He formed the opinion that the fly is not a carrier of the infection from season to season, but acts as the transmitting agent during the hot weather. He does not think that the capybara acts as the reservoir for the virus for the reason that this animal inhabits the river banks, while horses are on upland pastures many miles from the rivers. He believes that the horse, and possibly also the mule, are the reservoirs of the virus.

The disease appears to pass through two phases. In the earlier phase there is invasion of the blood. There may be fever and some loss of weight, but the animal continues to work. At this phase there is a chance of effecting a cure, and it is this phase which is the chief source of danger.

The second phase is marked by invasion of the nervous system, and the development of paralysis. This phase is not of importance either from the prophylactic or the curative point of view. In this phase parasites have largely disappeared from the circulating blood, and the animals are therefore not a source of danger to the rest. Control depends upon early diagnosis, as horses may be infected for weeks or months during the slack season, but, nevertheless, they may show no symptoms until the stress of work is brought into play.

Two plans are suggested for the control of the disease.

A. Microscopic examinations of the blood of all horses between December and January each year. Place infected animals on short-grass pasture. The temperatures of all apparently healthy horses should be taken every fortnight from January 1st, and all animals showing a temperature of 102° to be subjected to another blood examination. Temperature taking to be continued until April 1st.

Infected animals to be given (intravenously) 8 to 10 g. of trypanamide at intervals of 2 to 3 weeks. Healthy and treated horses may be brought to work with healthy animals from April 15th onwards. The difficulty of this plan is the necessity for skilled assistance in making the microscopic examinations.

B. The second plan, which obviates the necessity of microscopic examinations, is as follows:—

The temperature of all horses to be taken by December 15th. Animals showing a temperature of 102° or over to be isolated as suspicious. The temperature of these animals to be taken daily for five or six days. If the fever persists treatment should be resorted to. The temperatures of all horses to be taken once a fortnight, and all animals showing a rise to be treated as above.

Additional measures of a general nature are as follows:—

New horses should be bought from upland Caderas-free areas. It is unnecessary to carry out destruction of the capybara.

Horses should be kept away from brush and should be placed on short-grass pastures during the rainy season.

In the author's experiments it was found that 24 horses treated with two doses were still alive and well after nine months, while five untreated controls were all dead. No toxic effects were noted; there was, in fact, a general improvement in condition.

Treatment is of very doubtful value once the nervous system has become involved.

CURSON (H. H.). **Nagana and the Tartar Emetic Treatment.**—*Jl. Dept. Agric. Union of South Africa.* 1924. Oct. Vol. 9. No. 4. pp. 363-369. With 1 plate.

After dealing briefly with the nature, symptoms and course of the disease, the author gives a more detailed account of the methods employed in treatment with tartar emetic :—

Adult cattle may be given 1·5 grammes daily for 5 days.

Horses, mules and donkeys may also be given doses of 1·5 grammes.

Dogs of 25 lb. weight may be given 100 to 125 mg. with safety.

Discretion must be used with regard to repetition of the dose. The drug is given as a 5 per cent. solution in water, and for large animals the jugular vein is selected. In dogs, the saphena vein is the vessel of choice.

Care must be exercised that none of the drug is placed under the skin, as suppuration will occur.

It is to be noted that the author groups together infections caused by *T. brucei*, *T. congolense*, and *T. vivax* as nagana, and that tartar emetic appears to be valueless for the treatment of *T. brucei* infection.

SERGEANT (Edm), DONATIEN (A.), PLANTUREUX (E.), & DEGUILLAUME (A.) **Essais de traitement du Debab trypanosomiase des dromadaires. (3me Mémoire.)** [The Treatment of Debab in Dromedaries.]—*Arch. Inst. Pasteur d'Algérie.* 1924. June. Vol. 2. No. 2. pp. 166-177.

The authors give details of a considerable number of experiments in which emetic, atoxyl, either alone or in conjunction, novarsenobenzol, Product No. 189, trepol, oxycyanide of mercury, biniodide of mercury, salicylate of soda, sulphate of copper, and quinine were used.

As it is impracticable to make an abstract of the mass of figures given that would be of any value, the authors' conclusion may be quoted :—

The following drugs have been found to be very active against *T. berberum*, intravenous injections of a watery solution of emetic, and a combined method using emetic and atoxyl. In a single case an intramuscular injection of emetic in oil gave a result inferior to that given by the intravenous injections of watery solutions (7 cases). In two cases atoxyl was proved to be active, but the safety factor is too low. Novarsenobenzol appears to act like atoxyl, but is less toxic.

The following were found to be inefficacious: 189 (1 case), trepol (2 cases), oxycyanide of mercury (1 doubtful success out of two cases treated), biniodide of mercury (7 cases), salicylate of soda (2 cases), sulphate of copper (2 cases), and quinine (1 case).

GALLIARD (Henri). **Sur un cas d'infection à *Trypanosoma theileri* et *Piroplasma bigeminum*.** [A Case of Infection with *T. theileri* and *P. bigeminum*.]—*Ann. Parasit. Humaine et Comparée.* 1925. Jan. Vol. 3. No. 1. pp. 21-27. With 1 text-fig.

The trypanosome made its appearance in the blood of a cow inoculated experimentally with blood containing *P. bigeminum*, *P. argentinum*, and *Anaplasma marginale*.

NOGUCHI (H.) & LINDENBERG (A.). **The Isolation and Maintenance of Leishmania on the Medium employed for the Cultivation of Organisms of the Leptospira Group of Spirochetes.**—*Amer. Jl. Trop. Med.* 1925. Jan. Vol. 5. No. 1. pp. 63-67. With 1 plate.

Two strains of *Leishmania brasiliensis* have been isolated from lesions by cultivation in the following medium:—

0.9 per cent. saline	800 parts
Fresh rabbit serum	100 "
2.0 per cent. nutrient agar pH 7.2	100 "
Rabbit haemoglobin, made by laking 1 part of defibrinated blood with 3 parts of distilled water	10-20 "

The primary tubes were kept (through force of circumstances) for three weeks before subcultures were made. Sterile oil may be placed upon the surface of the medium to prevent evaporation. Primary tubes at room temperature yielded growths, but tubes kept at 26° C. failed.

HEUSER (G. F.). **Influence of Vitamines on Growth and Resistance to Coccidiosis.**—*Rel. Poultry Jl.* 31 (1924), No. 2. pp. 226, 228 & 232. [Ex. *Experiment Station Record.* 1924. Oct. Vol. 51. No. 6. p. 576.]

Experiments carried out with chicks led the author to the opinion that the addition of cod liver oil, green food and milk (skimmed) caused a great increase in weight and exalted the resistance of the chicks to coccidiosis.

NIESCHULZ (O.) **Zur Verbreitung von Isospora-Infektionen bei Hunden und Katzen in den Niederlanden.** [Isospora Infections of Dogs and Cats in Holland.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1925. Jan. 28. Vol. 94. No. 2. pp. 137-141. With 3 text-figs.

Nieschulz has examined the faeces and intestinal wall of 50 cats and 35 dogs for oocysts by Vajda's glycerin concentration method. *Isospora bigemina* was found in 1 cat, *I. rivolta* in 6 dogs and 6 cats, *I. felis* in 7 cats, and in 1 dog sporocysts of what is possibly a new species of *Isospora*.

In the latter case ripe free sporocysts were found in small numbers. These measured 14-17 μ by 8-10 μ . The spore membrane was double-contoured.

The dog had been dead one day before it was examined.

PÉRARD (C.). **Recherches sur les coccidies et les coccidioses du lapin.** [The Coccidia of the Rabbit.]—*Ann. Inst. Pasteur.* 1924. Nov. Vol. 38. No. 11. pp. 953-976.

As the result of his observations and experiments the author concludes that there are two coccidia commonly parasitic in the rabbit, *Eimeria perforans* which is responsible for the intestinal disease, and *E. stiedae*, which is the cause of hepatic coccidiosis. *E. perforans* measures on an average 25.5 by 15.5 μ , and *E. stiedae* 37.5 by 21.5 μ .

DE KOCK & QUINLAN. **A Short Preliminary Communication on Anaplasmosis of Sheep as observed in South Africa.**—*Bull. Soc. Path. Exot.* 1924. Oct. Vol. 17. No. 8. pp. 651–653.

Sheep at Onderstepoort subjected to splenectomy showed relapses to anaplasmosis with fever, icterus, and fairly acute anaemia.

Sheep from the Orange Free State showed no such relapses.

Anaplasmosis has been found as an independent specific disease in the sheep, and it has been maintained through six generations in sheep. It has been found impossible to transmit the infection from sheep to cattle by inoculation.

Similarly, experiments in which attempts were made to transmit bovine anaplasmosis to sheep have failed.

TORRES (C. M.). **Coccidiose, lésions de la moelle osseuse et réaction de Wassermann positive, non-spécifique, chez le lapin.** [Coccidiosis; Lesions of the Bone Marrow and Non-Specific Wassermann Reaction.]—*C. R. Soc. Biol.* 1924. Oct. 31. Vol. 91. No. 30. pp. 986–987.

The author has examined a number of rabbits and finds a positive Wassermann reaction has no connexion with the existence of coccidiosis, as has been suggested, nor with oedema of the bone marrow. Oedema of the bone marrow with atrophy of the adipose cells is sometimes seen in rabbits. This in its turn is not connected in any way with coccidiosis.

SCHMIDT (J.). **Kokzidienbefunde bei Tieren und ihre Deutung.** [The Importance of Coccidia in Animals.]—*Berlin. Tierärztl. Wochenschr.* 1924. Dec. 26. Vol. 40. No. 52. pp. 753–755.

The author and his co-workers have examined the faeces of sheep, lambs and goats, and they find that apparently healthy animals may pass coccidia. They also find that oocysts are not invariably passed by animals harbouring the parasite.

GILBERT (S. J.). **A Case of Theileria mutans Infection (Egyptian Fever) in Palestine.**—*Jl. Comp. Path. & Therap.* 1924. Sept. Vol. 37. No. 3. pp. 158–160.

The infection occurred in a Dutch bull 2½ years old, which was born in Palestine, at Benyamina, in the northern part of the coastal plain. The principal ticks found are *B. annulatum* and *H. aegyptium*. Cases of *bigeminum* infection and anaplasmosis have been found in imported cattle there.

The symptoms noted were loss of appetite, feebleness of pulse and accelerated respiration. The temperature rose to 42° C., and there was lachrymation and enlargement of the lymphatic glands. Constipation yielded to treatment. There was no jaundice, but red urine was observed on two occasions. Death occurred on the 13th day after symptoms were first noticed.

Five grammes of trypanblue were given subcutaneously on the first day of illness and 2 grammes intravenously on the 11th day.

At the post-mortem examination the mucous and serous membranes were deeply stained with trypanblue. The carcass was oedematous. The blood clotted feebly and slowly. The duodenum contained a quantity of dark yellow fluid. The abomasum showed a number of erosions. The kidneys showed no infarcts, but were intensely stained

with trypanblue. The spleen was somewhat enlarged, reddish brown in colour and soft. There was pericarditis, and the pericardium contained about a pint of fluid. The lungs were oedematous and the bronchi contained frothy mucus.

Parasites were first seen in the blood on the 3rd day. A smear obtained on the 11th day showed about 50 per cent. of the corpuscles invaded. Multiple invasion up to 4 parasites was seen. Round forms slightly predominated. About 10 per cent. were bacillary and a few cross forms were found. Cross forms were found in smears from the spleen and plasma bodies were identified in smears from glands, but none were found in the blood.

At the time there were 20 other imported cattle or their progeny in the building, but none became infected. The previous case of tick infection in this dairy had occurred two months earlier. This animal recovered. A few parasites resembling *Theileria mutans* were found in the blood.

DE MELLO (Froilano), with REBELLO (F.), PAES (S.), & D'ALMEIDA (C.). **Première contribution à l'étude des piroplasmidés de la province d'Angola.** [First Contribution to the Study of Piroplasmidae in Angola.]—*Revista Méd. de Angola.* (No. especial 1^o Congresso de Med. Trop. da Africa Ocidental. Vol. 4.) 1923. Aug. No. 4. pp. 517-525. With 1 plate in colour.

This publication is a classification of the Piroplasmidae.

DE MELLO (F.). **Deuxième contribution à l'étude des piroplasmidés de la province d'Angola.** [Second Contribution to the Study of the Piroplasmidae in Angola.]—*Revista Méd. de Angola.* (No. especial 1^o Congresso de Med. Trop. da Africa Ocidental. Vol. 4.) 1923. Aug. No. 4. pp. 539-543. With 1 plate in colour.

A small piroplasm found in blood smears from four cattle is figured and described. Pear-shaped, bacilliform, dividing forms and cross-shaped parasites were encountered. There were also crescentic forms which the author considers to be gametes, anaplasma-like forms and parasites which he considers to be transitional between anaplasms and piroplasms. In a short note the occurrence of a parasite of the bigeminum type is recorded. It was found in the blood of an ox which had recovered from redwater.

DE MELLO (F.) & CABRAL (E.). **Troisième contribution à l'étude des piroplasmidés de la province d'Angola.** [Third Contribution to the Study of the Piroplasmidae in Angola.]—*Revista Méd. de Angola.* (No. especial 1^o Congresso de Med. Trop. da Africa Ocidental. Vol. 4.) 1923. Aug. No. 4. pp. 547-549. With 1 plate in colour.

This short paper contains observations on the morphology of piroplasms found in sheep.

The observations were made on four blood smears, and the conclusion is arrived at that the parasite was *Gonderia mutans*.

The authors have found a similar parasite in very small numbers in the blood of 2 out of 12 apparently healthy sheep.

Ring-shaped, pear-shaped, dividing forms, anaplasma-like forms, transitional forms and gametes are described.

DE MELLO (F.), REBELLO (F.), PAES (S.), & D'ALMEIDA (C.). **Sur un piroplasmide parasite du *Bos brachycerus* d'Angola.** [A Piroplasma of *Bos brachycerus* in Angola.]—*Revista Méd. de Angola*. (No. especial 1^o Congresso de Med. Trop. da Africa Occidental. Vol. 4.) 1923. Aug. No. 4. pp. 527-529. With 1 plate in colour.

Pyriform, rounded, twin, cross forms, bacilliform, oval, crescentic shapes are figured and described. In smears from the muscles and liver large schizonts were found, but it was not possible to make out whether these forms were enclosed in blood corpuscles or not.

The parasite is provisionally named *Piroplasma (Achromaticus) brachyceri*.

DE MELLO (Froilano) & REBELLO (Frederico). **Anaplasmose du *Bos brachycerus* d'Angola.** [Anaplasmosis of *Bos brachycerus* in Angola.]—*Revista Méd. de Angola*. (No. especial 1^o Congresso de Med. Trop. da Africa Occidental. Vol. 4.) 1923. Aug. No. 4. pp. 531-532. With 1 plate in colour.

The blood contained a considerable number of parasites, as one or two invaded corpuscles were to be found in every field of the microscope. The parasites were centrally or peripherally placed in the cells and were surrounded by a pale halo. The blood showed no changes. Free forms were seen.

DE MELLO (F.) & PAES (S.). **Morphologie et cycle schizogonique d'un Piroplasmidé, parasite d'une chèvre de Calumbo.** [The Morphology and Schizogonic Cycle of a Piroplasm of a Goat at Calumbo.]—*Revista Méd. de Angola*. (No. especial 1^o Congresso de Med. Trop. da Africa Occidental. Vol. 4.) 1923. Aug. No. 4. pp. 533-536.

The authors examined the blood of the goat prior to death, and saw what they believed to be piroplasms. During the transport of the sick animal to Loanda it died, and the post-mortem examination revealed dilatation of the stomach, petechiae on the abdominal wall, intense congestion of the liver, enlargement of the spleen, pericarditis. Smears were made from the organs and from the blood. Parasites were found in the latter only.

There was evidence of marked anaemia, and more than 20 per cent. of the corpuscles contained parasites. These were markedly polymorphic.

The parasite was classified as *Gonderia ovis* (Babes) 1892 *emend.* Sergent.

STUART (G.), KRIKORIAN (K. S.), & GILBERT (S. J.). **Note on the Occurrence of Anaplasmosis in Palestine.**—*Jl. Comp. Path. & Therap.* 1924. Sept. 30. Vol. 37. No. 3. pp. 149-154. With 2 text-figs & 1 chart.

The authors place on record the occurrence of a case of anaplasmosis in Palestine, and also the experimental transmission of the disease to a calf.

For some time previously a disease resembling gall sickness had come under notice, but a definite diagnosis had not been established.

The disease was definitely diagnosed in a Beyrout cow imported into Palestine. The symptoms were fever, marked jaundice, loss of appetite, acceleration of pulse and respiration, but there was no haemoglobinuria.

The frequency of the parasite in the blood films is not mentioned, but it is stated that the blood corpuscles showed evidence of severe anaemia.

A native-born calf was purchased for experimental infection, and kept quite free of ticks. This animal was inoculated with 10 cc. of citrated blood from the cow. The calf's blood was carefully examined prior to inoculation, but no evidence of infection could be found. Anaplasma was first found in the blood 21 days after inoculation, and five days before there was any rise of temperature, and they were most numerous for a few days just before the temperature rose. They were scanty during the period of fever (a week). Mast cells were found in the blood for about a week before the parasite appeared.

The clinical symptoms were very inconspicuous.

VAN SACEGHEM (R.). **Les Theilérioses. Note préliminaire.** [The Theilerias. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1924. Oct. Vol. 17. No. 8. pp. 637-639.

Van Saceghem states that the disease described by SERGENT as being caused by *Theileria dispar* n.sp. occurs in Ruanda (E. Africa) and Kivu (Belgian Congo). He states, however, that, contrary to what is held to be the case by SERGENT, he has encountered chronic forms of the disease. He believes that the disease described by SERGENT is identical with that described by BRUMPT as being caused by *Th. mutans*.

The whole question of East Coast fever requires revision, and the view is put forward that the diseases caused by *Th. dispar* and *Th. mutans* are merely forms of a single disease, East Coast fever.

PLANTUREUX (Edm.). **Au sujet de la "formol-gélification" chez les dromadaires et chez les bovidés.** [The "Formol-Gel" Test in Dromedaries and Cattle.]—*Arch. Inst. Pasteur d'Algérie.* 1924. June. Vol. 2. No. 2. pp. 163-165.

Technique.—Clear, unheated sera only have been used, and on the day following the withdrawal of blood.

Twenty drops of serum were placed in tubes, and to these were added 1, 2, and 4 drops of "formol."

The samples were taken from bulls imported from France for experimental work, and ranging in age from 8 to 20 months. Of 14 animals which were healthy two gave positive reactions. Of 11 infected with piroplasmosis and 2 infected with anaplasmosis, 8 gave positive reactions.

The test cannot be relied upon for the detection of piroplasmoses in cattle.

CLARK (H. C.) & ZETEK (J.). **Tick Biting Experiments in Bovine and Cervine Piroplasmosis.**—*Amer. Jl. Trop. Med.* 1925. Jan. Vol. 5. No. 1. pp. 17-26.

Margaropus annulatus australis and *Amblyomma cayenense* are found on cattle and deer in Panama. White-tailed deer (*Odocoileus chiri-quensis*) have been found to harbour piroplasms, and the progeny

of ticks from one such infected deer caused a mild attack of piroplasmosis when placed on a half-bred calf. In an experiment of the reverse kind a mild attack of piroplasmosis was set up in a brocket deer (*Mazama satorii reperiencia*) by seed ticks of *Margaropus annulatus australis* from an ox.

The results appear to suggest that deer may act as reservoirs for cattle piroplasmosis.

BELITZER (A.). **Epizootie und Prophylaxis der Piroplasmose der Pferde, hervorgerufen von *Babesia caballi*.** [Epizootiology and Prophylaxis of Equine Piroplasmosis caused by *Babesia caballi*.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1925. Jan. 20. Vol. 94. No. 1. pp. 51–56.

Both types of equine piroplasmosis occur in Russia. That caused by *B. caballi* is found in Central and Southern Russia, while that due to *Nuttallia equi* is found in the south only. The former is transmitted by *Dermacentor reticulatus*, and the latter, in all probability, by *Hyalomma aegyptium*.

The disease has a seasonal and regional distribution. It occurs as an epizootic in May and June and isolated cases occur in September and October. The larvae and nymphs of *Dermacentor reticulatus* do not transmit the disease.

The adult ticks attach themselves during April and May. The larvae and nymphs appear to pass the summer months on small rodents. During the autumn the mature ticks appear, but these are not active, and only attach themselves to the large animals in very small numbers.

The disease is of great economic importance, as the animal loss is very heavy. On an average, 30 to 40 per cent. of affected animals die. Young animals do not suffer as severely as adults, but all are susceptible to infection.

Trypanblue does not effect a complete cure. In spite of the severity of the disease clinical recovery takes place very rapidly.

ROSEBUSCH (F.) & GONZÁLEZ (R.). **Garrapatización y Tristeza.** [Ticks and Tristeza.]—*Revista Med. Vet.* Dec. 1923 & Jan. 1924. Vol. 6. Nos. 15 & 16. pp. 683–703.

The common tick of the sheep (*Boophilus microplus*) transmits both piroplasmosis and anaplasmosis. The infectivity of the tick depends upon the external temperature.

In the spring ticks are not, as a rule, infective, but they become so when the temperature reaches 29° C.

Anaplasmosis is transmitted only when the temperature exceeds 34° C.

Since the temperature at Buenos Aires is moderate piroplasmosis alone is generally set up in experiments.

Immunity conferred by inoculation does not protect against infection carried by ticks, and that conferred by ticks is only effective in the same area. It does not confer protection against infection by ticks in other parts.

Anaplasmosis is not transmitted either by *Haematopinus* or by *Amblyomma*, nor by ingestion.

The infection is carried from generation to generation of the ticks in the case of both diseases.

LIGNIÈRES (J.). **Nouvelles preuves de l'inoculation de l'*Anaplasma* du boeuf au mouton, puis du mouton au mouton. Comparaison des résultats obtenus avec ceux publiés par l'Institut Pasteur d'Algérie.** [New Proofs of the Transmissibility of *Anaplasma* from the Ox to the Sheep and from Sheep to Sheep. Comparison of Results obtained with those of the Pasteur Institute, Algiers.]—*Bull. Soc. Path. Exot.* 1924. Oct. Vol. 17. No. 8. pp. 647–651.

Details are given of a number of inoculations of adult Lincoln sheep with anaplasma. Young animals are less susceptible. Inoculated sheep show no evidence of infection, and the parasite cannot be found in their blood, but its persistence can be proved even after a number of passages by the inoculation of bovines with the blood of the last sheep of a series. This has been proved up to 7 passages through sheep lasting 2 years altogether.

These results are very different from those obtained in Algeria, and the significance of the difference is not yet known. Cross immunity experiments are necessary.

LIGNIÈRES (J.). **Démonstration en France de la réceptivité des ovins à l'*Anaplasma argentinum*, par injection à des bovidés, du sang d'un mouton apporté de Buenos Ayres. Quelques réflexions sur les résultats obtenus.** [Demonstration in France of the Susceptibility of Sheep to *A. argentinum*, by the Injection of Cattle with the Blood of a Sheep imported from Buenos Ayres.]—*Bull. Soc. Path. Exot.* 1924. Oct. Vol. 17. No. 8. pp. 642–647.

In 1923 Lignières brought over to France two sheep which had been inoculated with anaplasma from a bovine. One was a first passage inoculation, and the other a fourth passage in sheep.

With blood from these animals bovines were inoculated successfully in France. It was noted that the Breton race of cattle used in these experiments presented a greater degree of resistance than shorthorns and Herefords in the Argentine. In using anaplasma which has been passed through sheep for the immunization of cattle, resistant breeds may be inoculated with the first or second sheep passage of the parasite, while susceptible animals should be inoculated with blood from sheep of the sixth or seventh passage.

LESTOQUARD (F.). **Deuxième note sur les Piroplasmoses du mouton en Algérie. L'anaplasmosé : *Anaplasma ovis*. nov. sp.** [Second Note on Piroplasmosis in Sheep in Algeria. *Anaplasma ovis*. n.sp.]—*Bull. Soc. Path. Exot.* 1924. Nov. 12. Vol. 17. No. 9. pp. 784–788.

Infection of sheep with anaplasms exists in addition to infections with *Babesiella ovis*, *Gonderia ovis*, and *Theileria ovis* previously described.

The parasite may be marginal, sub-marginal or central in position and is responsible for a disease the essential character of which is an anaemia. The condition is transmissible by inoculation and the

period of incubation varies from 8 to 40 days, with an average of 25. Parasites may appear before or after the first rise of temperature, and the duration of fever is irregular. About 7 per cent. of the corpuscles may be invaded; and the parasites may be discovered in the blood after the temperature has fallen. The loss of corpuscles may be from 5 to 10 million per cmm. That is, a drop from 12 to 15 million to 5 to 6 million. *Anaplasma ovis* is transmissible to the goat.

Attempts to cultivate the parasite have failed; although multiplication of the parasite has been observed in the primary tubes, subcultivation has failed.

FRANCHINI (G.). **Observations sur les hématozoaires des oiseaux d'Italie (2^e note)**, [The Haematozoa of Birds in Italy.]—*Ann. Inst. Pasteur*. 1924. June. Vol. 38. No. 6. pp. 470-515.

The author has examined 186 birds representing 23 species. The following parasites have been detected: *Halteridium danilewskyi* on 57 occasions; *Haemamoeba relictæ*, 9; *Leucocytozoon danilewskyi*, 21; Haemogregarina, 1; Toxoplasma, 2; Trypanosoma, 5; Spirochaeta, 1; and Microfilaria, 5.

Brief descriptions and text figures are given of these.

SMITH (Theobald) & FLORENCE (Laura). **Encephalitozoon cuniculi as a Kidney Parasite in the Rabbit**.—*Jl. Experim. Med.* 1925. Jan. 1. Vol. 41. No. 1. pp. 25-35. With 3 plates.

This parasite has been under observation in the author's laboratory since it was first seen in 1918. References are given to the descriptions of it that have appeared in print since the first published account by WRIGHT and CRAIGHEAD in 1922.

Since October, 1922, the authors have found 45 cases of infection out of 163 autopsies made.

Observations indicate that all individuals in a litter are not invaded sufficiently heavily to cause symptoms. The parasite has been found in young rabbits only (under six weeks).

The most frequent seat is in the epithelium of the collecting tubes near the tip of the papilla. It is sometimes seen in the loop of Henle, and but rarely in the convoluted tubes and Bowman's capsule. The invaded cells may contain large numbers of individual parasites. When large numbers are present the invaded cells swell up and finally burst. The individuals are 2.5 to 3 μ in length and 1.5 to 2 μ broad, and they have rounded ends. Certain appearances suggest that they are protozoal in origin. There are, for example, sometimes present forms which have the appearance of being pan-sporoblasts.

It is suggested that the parasite is a kidney parasite somewhat resembling *Klossiella*, and that several asexual generations are passed in that organ.

Whether the organism is a true parasite of the rabbit or an aberrant form from an insect host is a point still unsettled. The development of the parasite in tissues other than the kidney and in animals other than the rabbit suggest the latter, but the wide geographical distribution of the parasite in rabbits suggests the former.

LUKES (Jean). **Sur la présence de spirochètes chez les chiens atteints de gastro-entérite et sur le rôle pathogène possible de ces micro-organismes.** [The Presence of Spirochaetes in Dogs suffering from Gastro-Enteritis, and the Possible Pathogenic Rôle of these Parasites.]—*Ann. Inst. Pasteur.* 1924. June. Vol. 38. No. 6. pp. 523-528.

In 1922 the dogs in Brno suffered from a haemorrhagic gastro-enteritis accompanied by ulcerative stomatitis.

Silver impregnation methods were applied to the organs of a number of the cases and 17 out of 22 showed spirochaetes. In all cases the parasite was present in the kidneys, in 7 they were found in the liver, in 6 in the spleen, in 6 in the walls of the large vessels, and in 3 in the pancreas. The organs of three control dogs dead of other diseases showed none.

During 1923, 8 further cases came under observation, and the kidneys of 7 of these contained spirochaetes.

The parasite was readily transmitted to the guineapig. Thirteen were inoculated and 8 died. There is no rise of temperature at the beginning of the infection, but after a period of incubation of about a week the animals become dull and begin to waste. There is marked thirst and polyuria.

A few experiments have been carried out with dogs (4). One positive result was obtained by feeding with urine after neutralization of the gastric juice. Death took place on the 14th day from stomatitis and haemorrhagic gastro-enteritis.

The parasite is best seen in sections treated by Levaditi's method. They measure 5-20 μ in length, but some appear to be much longer and to be formed of two individuals jointed together by a slender thread. These appear to be dividing. The bodies have knob-like formation or rings at their ends. In the living state the spirochaetes do not show much movement of translation.

Attempts at culture have not been very successful, but the best results have been obtained by dropping fragments of the tissue containing the parasite into broth, and incubating the tubes for about 10 days at 37° C. The cultures have been contaminated as a rule. Subcultures have been made in broth or in diluted serum with the addition of renal extract. No paraffin has been used.

The lesions found are as follows: In one-third of the animals buccal lesions have been found, erosions and ulcerations. These may heal before death occurs.

The alimentary canal contains a blood-stained liquid, and the walls show haemorrhages and possibly ulcerations.

The liver is enlarged and hyperaemic, but there is seldom any jaundice. The pancreas is oedematous, and sometimes shows necrotic centres.

The kidneys are enlarged and congested. Microscopic examination shows that the epithelium of the convoluted tubes is disintegrated, the débris obstructing the lumen. In other cases the picture is one of acute interstitial nephritis.

Finally, in chronic cases, there are found urinary casts, proliferation of the cells, fibrinous exudate and proliferation and desquamation of the cells of Bowman's capsule.

The lungs may be healthy, but there may be congestion and oedema. The pleura, on the other hand, is the seat of lesions which appear to be specific; there are haemorrhages about the size of beans.

The aorta may show endarteritis, and on microscopic examination mononuclear infiltrations may be found.

The spleen pulp is congested and shows haemorrhages.

GERLACH (F.). **Geflügelspirochätose in Oesterreich.** [Avian Spirochaetosis in Austria.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1925. Jan. 20. Vol. 94. No. 1. pp. 45–51.

Spirochaetosis is more common in birds in Austria than has been supposed. Observations made during the last year indicate that it is very widespread. Possibly it has become more common since the war, but it is not unlikely that it was overlooked formerly.

The lesions are enlargement of the spleen and kidneys, yellowish or greyish centres in the liver, catarrh of the intestine, and occasionally pneumonitis and serofibrinous peritonitis.

Argas ticks were never found, but *Dermanysus* was present in large numbers.

No success followed attempts to cultivate the parasite.

Natural recovery frequently occurred, and recovered birds appeared to possess a high degree of immunity.

BÉDIER (E.). **Piroplasma de la mangouste d'Afrique** *Herpestes calera* **Erzleben.** [Piroplasma of the African Ichneumon.]—*C.R. Soc. Biol.* 1924. Feb. 22. Vol. 90. No. 6. pp. 415–417.

BLANCHARD (M.) & LAIGRET (J.). **Résultats éloignés du traitement de la maladie du sommeil par les fortes doses d'atoxyl. Traitement curatif et atoxyzisation prophylactique.** [Treatment of Sleeping Sickness with Atoxyl, both Curatively and Prophylactically.]—*Ann. Inst. Pasteur.* 1924. June. Vol. 38. No. 6. pp. 460–469.

FRANCHINI (G.). **Ricerche sui protozoi e sulle microfilarie nei cani in provincia di Bologna e di Ferrara.** [Canine Protozoa and Microfilariae in Bologna and Ferrara.]—*Pathologica.* 1925. Jan. 1. Vol. 17. No. 387. pp. 19–21.

VAN SACEGHEM (R.). **Le pouvoir empechant dans les trypanosomiasis.** [Inhibition in Trypanosomiasis.]—*Bull. Agric. Congo Belge.* 1923. Dec. Vol. 14. No. 4. pp. 610–612.

This note has appeared elsewhere and has already been abstracted. See this *Bulletin.* 1924. Vol. 12. p. 42.

SULDEY (E. W.). **Dysenterie amibienne spontanée chez le chimpanzé** (*Trogodytes niger*). [Spontaneous Amoebic Dysentery in the Chimpanzee.]—*Bull. Soc. Path. Exot.* 1924. Nov. 12. Vol. 17. No. 9. pp. 771–773.

DISEASES DUE TO METAZOAN PARASITES.

SCHWARTZ (B.). **Preparasitic Stages in the Life History of the Cattle Hookworm** (*Bustomum phlebotomum*).—*Jl. Agric. Research.* 1924. Nov. Vol. 29. No. 9. pp. 451–458.

At a temperature of 70°–80° F. the eggs of the parasite require about four days for hatching. Two periods of lethargy, each lasting about 24 hours, are separated from each other by two periods of vitality, each also lasting 24 hours.

In liquid cultures both cuticles are usually retained by the larvae, but in solid cultures the first cuticle is cast off.

The infective larvae are only moderately active at room temperatures, and they appear to be more resistant than the pre-infective larvae. They are positively thermotropic, turning the cephalic extremity towards a source of heat. In a solution of 1 per cent. basic fuchsin the infective larvae remain alive and apparently unaffected by it. After several hours' exposure the stain does not penetrate beyond the sheath. While desiccation is fatal, vitality is maintained where there is a small amount of moisture.

The larvae collect in the part of the culture medium where the light is strongest. They climb up the walls of containing vessels, but it is not certain whether this is the result of negative geotropism or the effect of light.

The larvae have not been found to show any tendency to penetrate skin.

SMILLIE (W. G.) & PESSOA (S. B.). Treatment of Hookworm Disease with a Mixture of Carbon Tetrachloride and Ascaridol.—*Amer. Jl. Trop. Med.* 1925. Jan. Vol. 5. No. 1. pp. 71-80.

The ideal treatment for hookworm infestations should possess the following characteristics:—

A single treatment should be efficient. It should remove other common intestinal parasites. It must be non-toxic, easy to administer, and inexpensive.

Carbon tetrachloride may be inefficient in small doses, 1 to 1.5 cc., and toxic in doses of 3-4 cc.

Ascaridol is next in efficiency.

Ascarides and male hookworms are especially susceptible to ascaridol, while the females resist this but are removed by carbon tetrachloride. A mixture of reduced doses may therefore be given without decreasing toxicity, but the mixture must not be allowed to stand for long because the carbon tetrachloride is volatile. If ascaridol, the active principle of chenopodium, is not available, carbon tetrachloride may be mixed with the oil of chenopodium in the proportion of 2 and 1.

WARE (F.). A Case of Habronemiasis in England.—*Jl. Comp. Path. & Therap.* 1924. Sept. Vol. 37. No. 3. pp. 160-162.

The animal, a thoroughbred, had never been out of England.

The history of the case was that the animal had been noticed to lose condition very suddenly about three weeks previously. It chewed small amounts of food, but did not swallow it, the faeces were normal in appearance, but only small amounts were passed. The urine was usually cloudy. The temperature was subnormal and the pulse slow. At times patchy sweating was observed.

The spleen, which was very dark in colour and resilient to the touch, weighed 18 lb. The whole of the other abdominal viscera appeared to be extraordinarily small. The mucous membrane of the last six feet of the small intestine was very oedematous, and the muscular coats were thickened. The sacculations of the first portion of the double colon contained small collections of dried ingesta which appeared to have had all moisture pressed out of them, and had thus been moulded into irregular shapes by the bowel.

The heart was flaccid. The other organs appeared to be normal.

On opening the stomach it was found to contain about a pint of yellow liquid and a pultaceous mass of green foodstuff. The mucous membrane was covered with a greenish yellow fibrinous exudate, and showed about a score of gastrophilus larvae. In the liquid there were found large numbers of *Habronema microstoma*.

It is of interest that this species, the occurrence of which in England is here recorded for the second time, requires *Stomoxys calcitrans* for the completion of its life cycle, whereas *H. megastoma* and *H. muscae* are transmitted by the common house fly, and one would therefore have thought that these species would perhaps have been met with not infrequently.

BOULENGER (C. L.). **The Filariid of the Camel, *Acanthocheilonema evansi* (Lewis).**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 419–423. With 4 text-figs.

The author supplements and corrects the account of this parasite given by BAYLIS and DAUBNEY.

GAYCHET (M. P.). **Ophtalmie vermineuse du boeuf.** [Verminous Ophthalmia in the Ox.]—*Rev. Vétérinaire*. 1924. Oct. Vol. 76. No. 10. pp. 598–600.

The author records the occurrence of a worm 2 centimetres long in the anterior chamber of the eye of a cow. After some delay the owner agreed to surgical interference and the aqueous humour was released by a transverse incision across the lower margin of the cornea. No information is given as to whether the worm was found in the liquid when it was released and whether it was examined.

BAYLIS (H. A.). **The Range of Variation of *Hymenolepis nana* in Rats and Mice.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 415–418.

The author gives reasons for believing that his species *H. longior* is not distinct, but a synonym of *H. nana*.

VAN SACEGHEM (R.). **Remarque sur la dispersion géographique de *Ornithodoros moubata*.** [The Geographical Distribution of *Ornithodoros moubata*.]—*Bull. Agric. Congo Belge*. 1923. Dec. Vol. 14. No. 4. pp. 612–613.

O. moubata is not found in the jungles of the Lower Congo (RODHAIN). Van Saceghem finds that it is absent in the volcanic areas of Ruanda and Kivu.

Kissenyi, on the northern shore of Lake Kivu, is of volcanic origin, and although numerous caravans pass through, and must bring the tick with them, the place does not become infested. It is suggested that the chemical changes which occur in the volcanic soil make it unfavourable for the parasite.

ROSS (I. C.). **The Bionomics of *Ixodes holocyclus* Neumann, with a Redescription of the Adult and Nymphal Stages and a Description of the Larvae.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 365–381. With 1 plate and 2 text-figs.

The work was carried out as a preliminary to research regarding the nature of the causative agent of tick paralysis. The tick is of economic importance along almost the whole coastal region of Eastern Australia as a cause of fatal paralysis in cats and dogs. Foals, calves and lambs are also said to be affected and authenticated cases of the disease in children are on record.

MACGREGOR (M. E.). **Tests with *Chara foetida* and *C. hispida* on the Development of Mosquito Larvae.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 382–387.

Experiments indicated that extracts of the plants had no useful application as anti-mosquito substances.

CHANDLER (A. C.). **New Filariae from Indian Birds.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 398–404. With 10 text-figs.

VAN CLEAVE (H. J.). **Additional Notes on the Acanthocephala from America described by J. E. Kaiser [1893].**—*Centralbl. f. Bakt.* 1. Abt. Orig. 1925. Jan. 20. Vol. 94. No. 1. pp. 57–60. With 5 text-figs.

CRAM (E. B.). **A New Nematode, *Cylindropharynx ornata*, from the Zebra, with Keys to Related Nematode Parasites of the Equidae.**—*Jl. Agric. Res.* 1924. May 17. Vol. 28. No. 7. pp. 661–672. With 8 text figs.

DIVE (G. H.) & LAFRENAIS (H. M.). **A Case of Deposition of the Eggs of *Hepaticola hepatica* in the Human Liver.**—*Jl. Royal Army Med. Corps*. 1924. July. Vol. 43. No. 1. pp. 1–4. With 2 plates.

HALL (M. C.) & SHILLINGER (J. E.). **Critical Tests of Miscellaneous Anthelmintics.**—*Jl. Agric. Res.* 1924. Oct. 1. Vol. 29. No. 7. pp. 313–332.

KORKE (V. T.). **On a New Microfilaria from the Dog, *Microfilaria lewisi* (N.B.).**—*Indian Jl. Med. Res.* 1924. Apr. Vol. 11. No. 4. pp. 1231–1237. With 1 plate.

— **Revision of the Type Species of Rudolphi in India.**—*Indian Jl. Med. Res.* 1924. Apr. Vol. 11. No. 4. pp. 1239–1243. With 2 text-figs.

LAGRANGE (M. E.). **Sur un Trichocephalidé du rat, à Shangai, *Hepaticola hepatica*, Hall 1916.** [A Trichocephalide of the Rat. *Hepaticola hepatica*.]—*Bull. Soc. Path. Exot.* 1924. Oct. Vol. 17. No. 8. pp. 658–659.

MACGREGOR (M. E.). **Special Apparatus and Technique for the Study of Mosquitoes and other Aquatic Insects.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 388–397. With 7 text-figs.

SENEVET (G.). **Description de la Nymphe de *Hyalomma mauritanicum* Senevet 1922.** [Description of the Nymph of *Hyalomma mauritanicum* Senevet 1922.]—*Arch. Inst. Pasteur d'Algérie*. 1924. June. Vol. 2. No. 2. pp. 233–234. With 4 text-figs.

— & ROSSI (P.). **Contribution à l'étude des Ixodidés (XII^e Note). Etude saisonnière des Ixodidés de la région de Bouira (Algérie).** [A Seasonal Study of the Ixodidae in the Bouira Area in Algeria.]—*Arch. Inst. Pasteur d'Algérie*. 1924. June. Vol. 2. No. 2. pp. 223–232.

STUNKARD (H. W.). **A New Trematode, *Oculotrema hippopotami*, n.g., n.sp., from the Eye of the Hippopotamus.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 436-440. With 1 plate.

WOODLAND (W. N. F.). **On the Development of the Human *Hymenolepis nana* (Siebold 1852) in the White Mouse; with Remarks on "*H. fraterna*," "*H. longior*," and *H. diminuta*.**—*Parasitology*. 1924. Dec. Vol. 16. No. 4. pp. 424-435.

BACTERIAL DISEASES.

SANARELLI (G.). **Charbon "interne" chez les animaux rendus "porteurs" de spores charbonneuses.** ["Internal" Anthrax in Animals that are Carriers of Anthrax Spores.]—*C. R. Acad. Sci.* 1924. Nov. 17. Vol. 179. No. 20. pp. 1100-1103.

It is known that guineapigs and rabbits can be fed with material containing anthrax spores without showing any evidence of infection, although cultures can be obtained from the organs of those animals after a lapse of some hours.

The effect of spores introduced into the lungs appears to be uncertain, partly because of the difficulty of assuring entire absence of wound infection. Sanarelli states that it is possible to introduce a suspension of anthrax spores into the lungs of a rabbit by using a syringe which is covered with rubber at the nozzle. This is inserted into one nostril, while the other is closed with the finger. The liquid in the syringe can be injected through the nasal fossa direct to the lungs. A dose of 50,000 spores suspended in 2 cc. of liquid injected in this way does not cause anthrax, but twice this dose does because the defensive cells of the body are not able to deal with so large a number. 150,000 spores may be placed in the nasal fossa without causing infection, but infection results if the same dose is injected into the lungs. The phagocytized spores behave like washed tetanus spores and in the course of time are digested. If a substance which produces cytolysis, such as arsenic, quinine, lactic acid, etc., be injected into one of the organs or even under the skin, before digestion has occurred, anthrax spores germinate and infection results.

MONOD (T.) & VELU (H.). **L'intradermovaccination en un temps contre le charbon bactérien et ses avantages.** [The Advantages of the Single Intradermo-Vaccination against Anthrax.]—*C. R. Soc. Biol.* 1925. Feb. 5. Vol. 92. No. 4. pp. 251-253.

During the year 1924 the following numbers of animals were vaccinated by the intradermal method: Cattle, 14,405; Sheep, 2,520; pigs, 4,640; and horses, 75. The veterinary officers carrying out the inoculations were requested to forward comments on the method. The process was not followed by any reaction, but in one herd pyroplasmiasis (not verified) made its appearance. Accidents of this kind have been observed before.

The conclusions drawn from the reports received were as follows:—
The single intradermo-vaccination confers a solid immunity, and protected cattle resist infection in heavily contaminated areas.

The vaccination can be carried out even during an outbreak without recourse to previous serum protection, in spite of the fact that there is a slight increase in susceptibility from the 24th to the 48th hour.

The method appears to be at least as effective as the subcutaneous inoculation, and resistance is promptly established.

VELU (H.). **Essai concluant d'intradermovaccination contre le charbon bactérien en milieu profondément infecté.** [Intradermo-Vaccination against Anthrax on Heavily Contaminated Premises.]—*Bull. Soc. Path. Exot.* 1924. Nov. Vol. 17. No. 9. pp. 767-770.

This paper contains the records of intradermo-vaccinations against anthrax carried out on premises where the disease regularly appeared four to five months or more after vaccination had been carried out in the ordinary way. Such failures to protect have been recorded in other countries, and they can be guarded against to some extent by the employment of a third vaccine which is only slightly attenuated. This, however, is not practicable in Morocco.

The intradermo-vaccinations were carried out with attenuated strains of the anthrax supplied by THEILER.

The results of experiments carried out on a considerable number of animals with a sufficient number of controls showed that the efficacy of the Pasteur vaccines is the same in Morocco as in France.

The vaccine prepared at Casablanca is at least as active as the Pasteur vaccines.

Intradermo-vaccination can be carried out, in colonial centres, even when an outbreak is actually in existence.

DESCAZEUX (J.). **Essais de cutivaccination anticharbonneuse.** [Anti-Anthrax Cuti-Vaccination.]—*Bull. Soc. Path. Exot.* 1924. Nov. Vol. 17. No. 9. pp. 765-767.

Experiments in vaccination by scarification have been carried out on a horse, an ox, and five sheep. The vaccine was prepared from a culture which is described as being slightly less active for laboratory animals than the No. 3 vaccine of the Pasteur Institute.

Two types of vaccine have been used. In one "diadermine" was the excipient and in the other lanoline.

A horse, an ox, and one sheep were treated with the "diadermine" vaccine which was applied to scarifications of the skin. The large animals had about $\frac{1}{2}$ cc. applied, and the sheep $\frac{1}{4}$ cc. Two sheep were treated with lanoline vaccine. One sheep had rubbed into a scarified area a triple dose of liquid vaccine. One sheep was kept as a control.

Six weeks later the ox and the horse were inoculated subcutaneously with $\frac{1}{2}$ cc. of virulent culture, and the 5 sheep received $\frac{1}{4}$ cc. of the same material. The control sheep died within 48 hours.

Two vaccinated sheep died the following day and on the following day the other inoculated animals presented alarming symptoms. Anti-anthrax serum was used with beneficial results.

STRÖSZNER (E.). **Ueber Milzbrandimmunität und Milzbrandschutzimpfung.** [Immunity and Protective Inoculation against Anthrax.]—*Seuchenbekämpfung*. Vienna. 1925. Vol. 2. No. 1/2. pp. 79-90.

This paper is a review of the present state of knowledge regarding immunity to and protective inoculation against anthrax.

SANFELICE (Francesco). **Intorno alle mutazioni del bacillo del carbonchio.**—*Bol. d. Istituto Sieroterap. Milanese*. 1924. Nov. Vol. 3. No. 6. pp. 341-352. With 1 plate. [6 refs.]

This article is divided into six sections. In the first the author describes previous work on the anthrax bacillus showing that by subcutaneous injection of cultures into dogs, or by the use of collodion sacs in their peritoneal cavity, a non-sporing, non-pathogenic coccobacillus is produced. In the white rat a Gram-negative, coliform organism results, denominated by ZIRONI *Bacterium anthracis colisimile*, which is capable of immunizing small laboratory animals against virulent anthrax. Part II gives an account of the conditions under which the anthrax bacillus becomes transformed *in vitro* into the coccobacillary form, the chief of which are the absence of spores and of oxygen. The latter is amplified in a later section, where it is stated that growth in depth of agar or under oil after 10 days at 22°-24° C. is completely transformed from *Bacillus anthracis* to *Bacterium anthracis colisimile*. He next discusses the morphological and cultural characters of this organism and its pathogenicity. It must, he says, be regarded as a new species and not a mere mutation, because there is practically nothing in common between it and the original anthrax bacillus. The organism is Gram-negative, does not liquefy gelatin, does not spore, occurs singly or in twos, not in chains, is not agglutinated by anti-anthrax serum, and does not cause death even when inoculated in considerable quantities beneath the skin of a guineapig or rabbit. Intravenously, it kills in 24 hours with swelling of the spleen and liver. The author did not confirm the immunizing power of this against the true *B. anthracis*.*

ZIRONI (A.). **Osservazioni sul lavoro del prof. F. Sanfelice "Intorno alle mutazioni del bacillo del carbonchio."**—*Bol. d. Istituto Sieroterap. Milanese*. 1924. Nov. Vol. 3. No. 6. pp. 352-354.

This is a brief reply to the paper of SANFELICE in which it is stated that the latter was unable to confirm Zironi's results that the *B. anthracis colisimile* would immunize laboratory animals against virulent anthrax. Dr. Zironi modifies the statement by saying that three rats previously inoculated with pus from another rat which, as a result of injection of anthrax bacilli, had developed the *colisimile* variety, survived injection of virulent anthrax organisms while control animals succumbed, but that rats, guineapigs and a dog inoculated with *Bacterium anthracis colisimile* in large or small amounts did not thereby acquire any immunity to virulent anthrax.*

* Summarized by Dr. H. Harold Scott.

BROCO-ROUSSEU, TRUCHE & URBAIN (A.). **Vaccination contre la typhose aviaire par la voie digestive.** [Vaccination against *B. gallinarum* by the Alimentary Tract.]—*C. R. Soc. Biol.* 1924. Dec. 5. Vol. 91. No. 34. pp. 1185-1187.

Experiments have been carried out with emulsions of the organism killed by means of alcohol-ether mixture. The emulsion was made so that 1 cc. represented 1 mg. of dried bacilli. In the first experiment six fowls were given on successive days increasing doses of emulsion by the mouth. They were then given living cultures after an interval by inoculation intravenously. Three survived. From two of the three which died the organism was recovered. In a second experiment two birds were used and these were given bile (ox) and were then tested by feeding (?) with culture.

The context appears to indicate that these two birds were two survivors from the previous experiment, but the use of different numbers would appear to imply that they were not.

SMITH (Theobald) & ORCUTT (Marion L.). **The Bacteriology of the Intestinal Tract of Young Calves with Special Reference to the Early Diarrhoea ("Scours").**—*Jl. Experim. Med.* 1925. Jan. 1. Vol. 41. No. 1. pp. 89-106. With 1 plate.

The following is an abstract of the authors' conclusions:—

New-born calves which receive no colostrum or receive it only after some delay may die of a septicaemia due to *Bacillus coli*; the diarrhoea being a local manifestation of this.

If the amount of colostrum is not sufficiently protective the calves may become affected with arthritis, nephritis, omphalitis, and possibly pneumonia.

There is a balance between certain strains of *Bacillus coli*, the mucous membrane and the digestive ferments which, if upset in favour of *B. coli*, causes diarrhoea.

There is a great increase in the number of *B. coli* in the terminal portion of the small intestine, and this spreads forwards. General intoxication results. The bacilli form layers attached to the top plates of the epithelial cells.

VIOLLE (H.). **Essais de vaccination cutanée contre *B. abortus* de Bang.** [Cutaneous Vaccination against the Abortion Bacillus (Bang).]—*C. R. Soc. Biol.* 1925. Feb. 20. Vol. 92. No. 6. pp. 421-422.

The experiments have been carried out with an American strain of *B. abortus*, and 3-day cultures on ordinary agar slopes have been employed. For the purpose of applying the dead cultures to the skin of the guineapigs an ointment was prepared with "axonge." Two guineapigs were carefully shaved on the abdomen so as to avoid any scarification. The ointment was then applied with friction over the shaved areas. Both guineapigs lost greatly in weight and died in about a month. Bacteria could be detected by the microscope in all the organs, and pure cultures of the bacillus were obtained on agar. The bacillus was agglutinated by specific serum obtained from BURNET (Tunis).

A second pair of guineapigs was inoculated in a similar manner, but before the live culture ointment was used they were treated three times at intervals of four days with ointment which had been sterilized by heating to 60° C. for one hour.

In this case there was no loss of weight save a very small one after three months. The animals were killed and both cultural and microscopic examination yielded negative results. It does not appear that there were any controls to show that the vaccine used was actually infective.

GAIGER (S. H.). **Anaerobic Infections in Animals.**—*Jl. Comp. Path. & Therap.* 1924. Sept. Vol. 37. No. 3. pp. 163-192.

MANNINGER (R.). **Beitrag zur Aetiologie und Prophylaxe des Rauschbrandes und des malignen Oedems der Wiederkäuer.** [The Etiology and Prophylaxis of Blackleg and Malignant Oedema in Ruminants.]—*Centrabl. f. Bakt.* 1. Abt. Orig. 1924. Aug. 22. Vol. 92. No. 5/6. pp. 418-424.

DISEASES DUE TO FILTERABLE VIRUSES.

ANDRIANI (S.). **Méthode simple et rapide pour mettre en évidence les corps de Negri dans la rage.** [A Simple and Rapid Technique for the Demonstration of Negri Bodies.]—*Ann. Inst. Pasteur.* 1924. June. Vol. 38. No. 6. pp. 520-522. With 1 text fig.

Thin slices (3 mm.) of Ammon's horn are fixed in acetone for one to two hours. These are embedded in paraffin by passing them through xylol, $\frac{1}{2}$ hour, xylol-paraffin, $\frac{1}{2}$ hour, and paraffin, 1 hour. Sections 5μ thick are fixed on slides or cover slips, and after the paraffin has been removed these are placed in the following solution for 5-10 minutes:—

Malachite green	...	...	...	...	20 centigrammes.
Orange G.	...	...	...	...	2 grammes.
90 per cent. alcohol	...	...	...	...	10 cc.
Distilled water	...	...	...	...	105 cc.

Without washing the slides are placed in the following solution:—

Chromic acid	...	...	...	...	50 centigrammes.
Potash alum	...	...	...	...	1 centigramme.
Distilled water	...	...	...	...	100 cc.

They remain in this for 2-3 minutes. After a brief wash they are placed in absolute alcohol, where the excess of green colour is removed and the sections acquire a pink tint. They are then passed through xylol and mounted in balsam.

The Negri bodies appear green. The cytoplasm and nuclei of the nerve cells are orange tinted and the neuroglia of a paler colour.

The specimens prepared in this way last for a considerable time.

KRAUS (R.). **Vorschläge zur Schutzimpfung gegen Hundswut.** [The Immunization of Dogs against Rabies.]—*Seuchenbekämpfung.* Vienna. 1925. Vol. 2. No. 1/2. pp. 71-74.

This short paper is divided into 2 parts.

The first part deals with the preservation of virulence of rabic material when it is placed in glycerin after a preliminary drying. This method results in an important economy being effected in materials.

The second part refers to the work which has been done in Japan in connexion with the immunization of dogs against rabies. The great increase in the number of dogs in Vienna during recent years has largely increased the danger of rabies. Muzzling has reduced the possibility of human beings being bitten, but by this means the disease cannot be stamped out.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). **La nature microsporidienne du virus rabique.** [The Microsporidian Nature of the Virus of Rabies.]—*C. R. Soc. Biol.* 1924. Feb. 22. Vol. 90. No. 6. pp. 398-402.

Examinations have been made of animals inoculated with fixed virus and street virus (Remlinger strain), and in no case have bodies resembling Negri bodies been found in those inoculated with fixed virus. A careful comparative examination has been made of the nervous system of a *Macacus cynomolgus* and material containing *Encephalitozoon cuniculi*.

The staining reactions, as shown by a number of different methods, of the two are very similar.

Treatment of specimens with hydrochloric acid prior to staining renders the membrane surrounding the parasite permeable to stains.

Negri bodies are found only in nerve cells the structure of which is not altered, and it appears to be probable that intact cells are necessary for their formation.

The authors believe that the microbe of rabies, which is filterable and ultraviolet, gains access to the nerve cells and there undergoes a process of development which results in the formation of pansporoblasts or cysts which are the Negri bodies. The development of *Encephalitozoon cuniculi* is parallel. This organism is unable to develop save in intact and unaltered cells. When death of the cell results development of the parasite ceases, and phagocytosis occurs.

DE KOCK (G.). **Beiträge zur Kenntnis des Erregers, zur Hämatologie, pathologischen Anatomie und Histologie der infektiösen Anämie der Pferde, wie sie in Südafrika beobachtet wird.** [The Cause, Haematology, Pathological Anatomy and Histology of Infectious Equine Anaemia as observed in South Africa.]—*Folia Haematologica.* 1924. Dec. Vol. 31. No. 1. pp. 13-34.

This subject has been dealt with by de Kock in the 9th and 10th Reports of the Director of Veterinary Research, S. Africa. (See this *Bulletin.* 1924. Nov. 30. Vol. 12. No. 4. p. 136.)

LEBAILLY (M. C.). **Les mouches ne jouent pas de rôle dans la dissémination de la fièvre aphteuse.** [Flies play no part in the Transmission of Foot and Mouth Disease.]—*C. R. Acad. Sci.* 1924. Nov. 24. Vol. 179. No. 21. pp. 1225-1227.

The author has carried out experiments which lead him to conclude that, in spite of popular opinion to the contrary, flies do not play any part in the dissemination of foot and mouth disease.

PANISSET (L.) & VERGE (J.). **Études sur la diphtérie aviaire. La réaction de Schick chez la poule.** [The Schick Test in Fowl Diphtheria].—*C. R. Soc. Biol.* 1925. Jan. 16. Vol. 92. No. 1. pp. 7-8.

Fowl diphtheria is a contagious disease of birds due to a filterable virus, although the condition is held by some authors to be identical with human diphtheria.

The Schick test was carried out with diphtheria toxin obtained from the Pasteur Institute and diluted 1 in 1,000. By carrying out tests on a small number of healthy birds the authors obtained evidence that there is no connexion between human and avian diphtheria.

SCOTT (J. W.). **The Experimental Transmission of Swamp Fever or Infectious Anaemia by Means of Secretions.**—*Univ. of Wyoming Agric. Exp. Station Bull.* 138. 1924. June. 62 pp.

This bulletin contains descriptions of experiments designed to provide an answer to the question whether infectious anaemia may be transmitted through the medium of secretions.

In the first experiment a horse, which was admittedly a poor subject for experimental inoculation, was given a number of subcutaneous inoculations with washings of the nasal chamber of a chronic case. The result was inconclusive. Some of the serum of this animal was used for the inoculation of another horse. Again the result did not permit of the expression of a definite opinion as to the success of the experiment.

Another horse was used in this experiment also, but in this case the nasal washings were sprayed into the nose. Infection followed, and blood of this animal was used for the inoculation of another. The resulting reaction again indicated a positive result.

Two horses were injected subcutaneously with filtered nasal washings.

There appears to be some confusion of dates in the record of one of these animals and it is therefore a little difficult to follow the course of events. In neither case was infection clearly established.

An attempt to transmit the disease by direct transference of secretion from the eye of one horse to the eye of another failed.

Similarly, an attempt to infect with an extract of Tabanid flies yielded no result.

"The tabanids used in those experiments were collected in the midst of a large alfalfa field at a distance of one-half mile or more from any pasture which contained horses. By taking this precaution we were satisfied that the tabanids had had no chance of becoming infected or contaminated with the virus of swamp fever before they were used in our experiments."

A control was carried out by injecting an extract of the flies. No infection resulted. Infection with pernicious anaemia during pregnancy may lead to abortion, but there is no satisfactory evidence as to whether an infected mare transmits the infection to a foal born at full term.

MISCELLANEOUS.

TRUCHE (C.). **Moyen simple et pratique de conservation des germes.** [A Simple and Practical Method of maintaining Bacteria.]—*Ann. Inst. Pasteur.* 1924. June. Vol. 38. No. 6. pp. 516–519.

Bacteriologists are familiar with the difficulties of maintaining strains of organisms outside the body.

Frequent transplantations are often necessary to keep the cultures alive, and very often their virulence is profoundly modified. Animal passage, which can be utilized in some cases, may also lead to modifications of this character.

In 1918 UNGERMANN published an account of his method of using rabbit serum, diluted or not, and heated to 60° C. for half-an-hour for the preservation of bacteria, the serum being covered with a layer of sterile paraffin.

Truche has devised a modification of the method described by LEGROUX (1920) in which formolized serum is used. The organism which it is desired to preserve is sown out on an agar or serum agar slant, and incubated for 48 hours. With a sterile pipette 2 cc. of formolized serum is then spread over the culture, which is detached into the liquid by careful manipulation of the pipette. The liquid is then withdrawn by means of the pipette and placed in a small sterile tube. The author has kept a strain of Strangle's streptococcus for three years in this way, transplants being made only once a year. Other bacteria have been kept for many months, among which is the bacillus of fowl cholera.

It is advised that when it is necessary to utilize cultures frequently one tube should be kept unopened until transplantation is required, a number of parallel tubes serving current purposes.

TWORT (F. W.). **Further Modifications in the Preparation of Neutral Red-Light Green Double Stain, and an Improved Method of Embedding Tissues in Paraffin.**—*British Jl. Experim. Path.* 1924. Dec. Vol. 5. No. 6. pp. 350–351.

The author recommends the use of normal propyl alcohol as the solvent for the solid dye. One gram is ground up in 100 cc. of the solvent and the solution filtered. When required for use an equal amount of water is added. To avoid the shrinkage and hardening of tissues caused by the use of clearing agents Twort recommends that these may be replaced by butyl alcohol. A further advantage is that butyl alcohol will mix with dilute ethyl alcohol, so that absolute alcohol may be cut out of the process. Tissues were fixed in formalin-Müller, washed and placed in dilute ethyl alcohol. They were passed into 60 per cent. ethyl alcohol and thence into pure normal butyl alcohol. This was changed several times in the course of 2–3 hours, and the tissue was then passed through several changes of paraffin.

VAN SACEGHEM (R.). **Milieu de culture à la gomme arabique.** [A Gum Arabic Culture Medium.]—*Bull. Agric. Congo Belge.* 1923. Dec. Vol. 14. No. 4. p. 610.

Van Saceghem has employed for the cultivation of *Pasteurella* and *Salmonella* organisms a modification of the medium described by

COSTA and BOYER. The modification is the substitution of gum arabic for gum tragacanth. He considers that the moisture and viscosity imparted to the medium are the factors favouring growth.

STAMMERS (A. D.). **Oedema of South African Cattle.**—*British Jl. Experim. Path.* 1924. Dec. Vol. 5. No. 6. pp. 313-317.

The disease occurs after a period of prolonged drought which usually occurs from June to September in the higher altitudes in South Africa.

Three animals were condemned as unsuitable for food at Johannesburg, and since it has been suggested that oedema may be a deficiency disease it was decided to investigate the chemical changes, if any, in bone, bone marrow, adipose tissue, and muscle.

Tabular statements show the results of these analyses, and the results of analyses of normal tissue are given for comparison.

In the analyses of bone there was a definite decrease in moisture and a deficiency of protein and fat. The total ash was reduced and there was a disproportionate decrease in the phosphorus content.

There was marked replacement of adipose tissue by moisture. The bone marrow showed a decrease in fat, and the muscle showed a reduced protein content.

A few experiments were carried out with rats in which an attempt was made to reproduce the condition seen in cattle. Some evidence was obtained that a diet deficient in phosphorus tends to bring about the same state as that seen in cattle.

SEDDON (H. R.) & CARNE (H. R.). **A Peculiar Disease affecting the Ear of Pigs.**—*Queensland Agric. Jl.* 1924. Nov. Vol. 22. No. 5. pp. 375-376.

This account of the work is taken from the *Agricultural Gazette of New South Wales*, June, 1924.

The disease is of common occurrence in Queensland, and is seen most commonly among young pigs from a few weeks to four months old.

It is characterized by a peculiar alteration in the carriage of the head and sometimes unsteadiness of gait. The head is rotated to one side or the other so that the affected ear is at a lower level than the other, and in walking the animal tends to turn towards this side. There is often discharge from the eyes and nose, and general poverty of condition. Examination of the ear reveals a brownish sticky discharge in its interior. Examination has shown that in these cases there is a collection of pus in the middle ear which tends to cause rupture of the drum.

In the note under review the cause of the disease is described rather indefinitely as follows: Examination of the pus shows the presence of bacteria such as are commonly met with in other suppurative conditions in the pig.

KIMURA (T.). **On "Orchidoma" or "Orchidoblastoma" of the Horse.**—*Sei-i-Kwai Med. Jl.* 1924. Dec. Vol. 43. No. 6. pp. 1-6.

This paper contains statistics of the number and type of tumours occurring in animals slaughtered for food in Japan during the period 1908-1915.

Over 77,000 horses have been killed during this period and tumours were found in 142. During the same period over 241,000 cattle and 477,000 pigs were slaughtered. Tumours were found in 15 and 3 of these respectively.

Of the animals showing tumours 114 were horses and 28 mares, and the tumours involved the testicles in 49 instances.

The tumours occur most frequently in stallions that are fifteen years or more old, and as a rule only one testicle is involved.

Microscopic examination shows that the growths arise as the result of proliferation of the epithelium of the seminiferous tubules. Metastases via the lymphatic system are frequently seen.

CAMERON (A. E.). **Some Further Notes on Buffalo.**—*Veter. J.* 1924. Nov. Vol. 80. No. 11. pp. 413-418.

The author gives an account of some of the anatomical features of the American buffalo. The details were gathered during the slaughter of a large number of animals at the Buffalo Park, Wainwright, Alberta.

MALONE (R. H.). **A Simple Method of preparing Collodion Capsules for Use in the Study of Biological Problems.**—*Indian J. Med. Research.* 1924. Apr. Vol. 11. No. 4. pp. 1227-1229. With 1 plate.

BOOK REVIEW.

KAUPP (B. F.). [B.S., M.S., D.V.M.] **Animal Parasites and Parasitic Diseases.** Fourth Edition, revised. xvi+250 pp. With 15 plates and 81 text figs. 1925. London. Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden. [Price 12s. 6d.]

We learn from the Author's Preface that the Fourth Edition of this work "has been thoroughly brought down to date, specially revising those facts dealing with the parasites of poultry, hogs, dogs and sheep, and the best means of medication and methods of eradication of these parasites."

This brochure is presumably intended for the clinician, who may find in it some useful hints as to treatment, but the same cannot be said with regard to the all-important matter of diagnosis. The nomenclature adopted is frequently not that of the present day, for we find such terms as *Uncinaria cernua* of the sheep and goat, *Taenia canina* and *Coccidium perforans* of the dog, and in some cases, owing to the absence of a synonymy, it is difficult to trace the exact parasite to which reference is made.

In addition, no rule appears to have been followed in the selection of parasites for mention. For instance, while quite a full description is given of such a rarity as *Simonsia paradoxa* of the pig, the only members of the Trichostrongylidae mentioned as inhabiting the alimentary tract of ruminants are *Haemonchus contortus* and *Strongylus ostertagi*.

The work contains chapters on the Ectozoa, Entozoa, and Protozoa, and is profusely illustrated. Some of the illustrations in the Ectozoa section are deserving of praise, particularly those of the Mange Acari, but most of the freehand work is crude, and the micro-photographs have the usual drawbacks of this method for illustrating Helminths.

F. Ware.

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TROPICAL DISEASES BUREAU.

TROPICAL VETERINARY BULLETIN.

Vol. 13.]

August 31, 1925.

[No. 3.

DISEASES DUE TO PROTOZOAN PARASITES.

ZEISS (Heinz). **Zur diagnostischen Hodenpunktion bei Trypanosomiasis.** [Puncture of the Testicle in the Diagnosis of Trypanosomiasis.]—*Arch. f. Schiffs- u. Tropen-Hyg.* 1925. Feb. Vol. 29. No. 1. pp. 35-39.

The author has infected guineapigs with dourine by way of the prepuce and has been able to find trypanosomes subsequently in the blood and in the testicles by puncture. A small number of experiments were also carried out with the parasite of Su-auru. In this case attempts to infect by way of the prepuce failed, and the subcutaneous path was used. Parasites could not be found in the testicles of two out of the four animals infected, and when they were discovered they were in very small numbers only. The author is of the opinion that coitus plays a greater part in the transmission of trypanosome infections than has been hitherto believed.

IWANOW (Elie). **Les Trypanosoma equiperdum peuvent-ils pénétrer à travers les muqueuses et la peau indemnes des animaux ?** [Can *T. equiperdum* penetrate Intact Mucous Membranes or Skin.]—*C.R. Soc. Biol.* 1925. May 8. Vol. 92. No. 15. pp. 1198-1200.

The author describes in general terms some experiments in which attempts were made to infect mice with dourine by dropping blood containing immense numbers of trypanosomes into the eye. Not one out of 12 became infected, while controls inoculated subcutaneously contracted the disease.

He is of the opinion that some lesion, slight as it may be, must be present to permit of the invasion of the body through mucous membranes or skin.

YAKIMOFF (W. L.) & MATWIEFF (W. N.). **Distribution de la dourine en Russie.** [The Distribution of Dourine in Russia.]—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. p. 54.

Dourine exists in practically all the studs in Russia, and in a tabular statement the authors show the number of cases occurring in 22 districts during the years 1908 to 1912. The total number was 232.

YAKIMOFF (W. L.). **A propos du traitement de la dourine des chevaux par l'atoxyl.** [The Treatment of Dourine by Atoxyl.]—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 55-57.

This paper contains tabular statements of cases treated during the period 1910-1913.

ROSENBUSCH (F.). **Diagnostische Untersuchungen über Mal de Cadera in Argentinien.** [Investigations regarding the Diagnosis of Mal de Caderas in the Argentine.]—*Arch. f. Schiffs- u. Tropen-Hyg.* 1925. Mar. Vol. 29. No. 3. pp. 128-135. With 3 text figs.

The microscopic examination of the sediment obtained by centrifuging the cerebro-spinal fluid of animals is superior to blood examination for the detection of parasites. The fluid was withdrawn at either the occipito-atlantal or the atlanto-axial joint with a fine trochar about 12 cm. in length, and 40-50 cc. of fluid were obtained.

DONATIEN (A.) & SALORD (Chr.). **Inoculation expérimentale de *Trypanosoma berberum* à l'âne.** [The Experimental Transmission of *T. berberum* to the Donkey.]—*Bull. Soc. Path. Exot.* 1924. Dec. Vol. 17. No. 10. pp. 887-888.

So far only dromedaries, horses, and dogs have been found suffering from debab; sheep, goats and donkeys apparently escaping infection. The susceptibility of the sheep and goat to artificial infection has been established.

The authors give details of a donkey inoculated experimentally with the parasite. They found that the course of the disease resembles that seen in dromedaries. After a brief acute phase the condition became chronic and infection was found to persist for more than three years.

YAKIMOFF (W. L.), MARCOFF (E. N.), OULASSEWITSCH (J. S.) & RASTEGAIFF (E. F.). **Sur la répartition géographique du *Trypanosoma theileri* en Russie.** [The Distribution of *T. theileri* in Russia.]—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. p. 57.

The authors add the Province of Petrograd to those in which the occurrence of *T. theileri* was already known.

DIOS (R. L.) & ZUCCARINI (J. A.). **Primera comprobación de *Tripanosomosis bovina* en la R. Argentina.** [Bovine Trypanosomiasis in the Argentine.]—*Rev. Inst. Bact. Dept. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 80-84. With 1 plate.

A trypanosome morphologically like *T. theileri* has been detected in the Province of Entre Rios, Argentina. Inoculation and culture experiments failed.

SCHOENING (H. W.). **Complement-Fixation Tests on Serums of Cattle harbouring *Trypanosoma americanum*.**—*Amer. Jl. Trop. Med.* 1925. May. Vol. 5. No. 3. pp. 247-249.

Seventeen out of 26 normal adult cattle were found by cultural tests, to harbour *T. americanum*. Complement fixation tests failed to reveal the presence of any detectable antigen.

NAUCK (E.). **Untersuchungen über die Wirkung des Trypanosomenheilmittels "Bayer 205."** [Experiments in the Treatment of Trypanosome Infections with "Bayer 205."]—*Arch. f. Schiffs- u. Tropen-Hyg.* 1925. Feb. Vol. 29. No. 1. pp. 1-16.

In this paper the author describes experiments carried out with mice and rabbits with a view to ascertain the manner in which "Bayer 205" effects cures. He concludes that the process is not a simple one. There is not only a change in the medium in which the parasites are—that is to say, a general effect on the body—but a direct action on the parasite itself. The latter action does not appear to be one of direct destruction, but one which prevents multiplication and produces a decrease in virulence. There is no evidence that the drug is stored up in the red corpuscles. The direct effect within the body is more marked than that produced by either atoxyl or tartar emetic.

DIOS (R. L.). **Ensayos de tratamiento preventivo y curativo con "Bayer 205."** ["Bayer 205." Curative and Protective Properties.]—*Revist. Inst. Bact. Dept. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 51-56. [English Summary.]

1. Experiments have given satisfactory results in horses and dogs inoculated with a very virulent strain of Mal de Caderas.

2. In one experiment a single dose of 4 grammes of "Bayer 205" prevented infection in a horse subsequently injected with 70 cc. of very virulent blood.

VAN SACEGHEM (R.). **Le "205 Bayer" (Naganol) et le traitement des trypanosomiasés animales.** ["Bayer 205" (Naganol) and the Treatment of Animal Trypanosomiasés.]—*Bull. Agric. Congo Belge.* 1924. Dec. Vol. 15. No. 4. pp. 694-697.

Intravenous injections of a solution of "Bayer 205" in doses of 5 g. of the drug per 100 kilogs. live weight in animals experimentally infected with *T. vivax* have cleared the circulation of trypanosomes for periods not exceeding seven days. Further doses administered after relapses have caused only a temporary disappearance of the parasites.

Doses of 15 grammes per 100 kilogs. live weight are fatal.

The cost of the drug, 30 francs per gramme, renders its use impossible.

BUBBERMAN (C.), DOUWES (J. B.), & VAN BERGEN (V. E. C.). **Over de Toepassing van Bayer 205 bij de surra van het paard in Nederlandsch Indië.** [The Use of "Bayer 205" in Equine Surra in the Dutch East Indies.]—*Veeartsenijkundige Mededeeling No. 50, Depart. v. Landbouw, Nijverheid en Handel, Buitenzorg.* 1925. Feb. 64 pp.

The authors refer first to the previously published experiments of RODENWALDT and DOUWES (ref. *Trop. Vet. Bull.*, Vol. 11, p. 45), and give the further history of five horses which were still under observation when that work was published. These further results (two deaths and three definite recoveries) served to confirm the conclusions at which RODENWALDT and DOUWES had already arrived, viz., that in

equine surra "Bayer 205" should not be given to animals which are seriously ill, and that this agent, used alone, is likely to effect a cure only in the early stages of infection, the treatment of relapses being useless.

In the experiments now recorded, the authors used (with only two exceptions) cases of natural infection, and all the animals but one were native horses, weighing 150-200 kilograms.

A. *Treatment with Fractional Doses.*

1. "*Bayer 205*" combined with *Tartar Emetic*.—Both given in 5 per cent. solution.

(a) Doses of $\frac{1}{2}$ gm. of each drug, given alternately, with one day intervals (*i.e.*, each drug given every second day).

Four horses; 2 died before treatment was complete, and 2 recovered (*i.e.*, discharged after more than 18 months observation).

(b) Doses of $\frac{1}{2}$ gm., given alternately, with intervals of 2 days.

Four horses; 1 died before treatment was complete, and 1 about 4 months after treatment. Of the other 2, 1 recovered and the other was still under observation (7 months since last relapse).

(c) Doses of 1 gm., alternating, with intervals of 4 days.

Six horses, of which 1 died during treatment, 1 (with nervous symptoms) soon after treatment, and 1 had to be destroyed (being infected with glanders) before the period of observation was complete. Of the others, 2 relapsed and died, and 1 recovered, but died from colic more than a year later (sub-inoculations negative).

(d) Doses of 1 gm., alternating, with intervals of 7 days.

Eight horses, of which 4 died long before treatment could be completed, 1 died soon after treatment (with nervous symptoms), and 1 after showing relapse. One horse was discharged as cured, and the eighth animal, still under observation, had been free from trypanosomes in the peripheral circulation for 13 months, and appeared to be cured.

Of 22 horses treated in this way, 8 (nearly all advanced cases) died during the treatment. Five horses were discharged as cured, and 2 were in good health, but still under observation; 1 of the latter was probably cured, but the other, which had relapsed twice, would probably break down again.

The remaining 7 horses all died after treatment; one death appears to have been due to glanders, and the animal concerned was under observation for only a short time—no trypanosomes were seen after the treatment. Three animals showed definite relapse before death, and 3, before death, suddenly developed symptoms involving the nervous system; no sub-inoculations were made from these 3 animals, but experience of other cases leads the authors to ascribe the deaths to persisting surra infection.

All those horses which recovered had received a total dose of 10 gms. of "Bayer 205" and, with one exception, 10 gms. of tartar emetic. The total doses of both drugs were less than 10 gms. in 5 of the 6 horses which died of surra after treatment; in the sixth case the doses of both reached 10 gms., but they were relatively small, as the patient, an Australian mare, was much larger than the native horses.

The authors conclude that within limits the size of the fractions into which the total dose is divided, and the length of the intervals

between their administration, are not of primary importance, but that the total doses of "Bayer 205" and emetic should not be less than 10 gms. for native horses.

Five of the 22 horses showed symptoms of Bayer intoxication; individual susceptibility varied greatly, one animal developing symptoms after receiving 2 gms., while in another the symptoms appeared only after 6.5 gms. had been given.

2. "Bayer 205" combined with *Atoxyl*.

Three horses were treated, but 1 (an advanced case) died soon after treatment commenced. Of the other two, 1 died from tetanus soon after treatment, but sub-inoculations of blood, cerebro-spinal fluid, etc., gave negative results.

The third animal, an early case, received 10 gms. of each drug within 2 months—at first in doses of 2 gms., but later in 1 gm. doses; a year later it was in good health.

B. *Treatment with Large Doses.*

Practical considerations suggested the testing of the drugs in single larger doses.

3. "Bayer 205" combined with *Atoxyl*.—Of each, one dose of 3 gms.

The injection of *atoxyl* appeared to have the same effect, whether it was given subcutaneously or intravenously, and the order of administration of the two drugs did not seem to affect the result. The interval between the two inoculations varied from 8 to 14 days, and in 3 cases the second injection was given only when relapse occurred, and trypanosomes reappeared in the blood.

Of the 5 horses treated (3 early and 2 bad cases), 1 had to be killed (as glandered) a week after the second (Bayer) injection, and sub-inoculations gave negative results. Another horse died from the effects of a severe Bayer intoxication, combined with those of an extensive eczema. The other 3 animals were in good condition, and had shown no relapse, after 9, 9 and 7 months respectively.

4. "Bayer 205" combined with *Tartar Emetic*.

Experiments on 4 horses showed clearly that, where trypanosomes are present in the peripheral blood, one should not *begin* treatment with emetic, although the doses given may be considerably smaller than those quite well tolerated by horses not suffering from surra, although poor in condition. Three of the animals reacted severely to the emetic, and died or had to be killed; in the fourth case trypanosomes reappeared in the blood, but the early onset of death appears to have been due to the effects of the emetic.

The authors suggest that emetic kills the trypanosomes more quickly than the other drugs, and so causes a rapid liberation of toxic decomposition-products.

In 4 other horses, the emetic was given only after "Bayer 205" had cleared the peripheral circulation of trypanosomes—in 2 cases only 24 hours later—and no ill-effects were seen. All 4 horses showed some symptoms of Bayer intoxication, in one case so severe that death ensued. The other 3 horses were in good condition, and had shown no relapse, after 9, 8 and 7½ months respectively.

5. *Simultaneous Treatment with "Bayer 205" and Atoxyl.*

At first the atoxyl was given subcutaneously, but it was later found to be quite safe to give it intravenously, at the same time as the "Bayer 205."

Three early cases were treated in this way, and all 3 showed some symptoms of Bayer intoxication, but recovered. After the lapse of 8 months they were all in good condition, and had shown no signs of relapse.

In 5 other horses, all moderately advanced or bad cases, the simultaneous inoculation of "Bayer 205" and atoxyl was followed, after 24 hours, by the injection of emetic (1 gm. per 100 kgs. bodyweight). All developed more or less severe Bayer intoxication, and one animal, which appears to have been hyper-sensitive as well as in poor condition, died.

One horse died after developing nervous symptoms, and positive sub-inoculations showed that relapse had occurred. The treatment obviously failed in this case, and the authors admit the possibility that some of the other animals may yet relapse similarly; they believe, however, that in this case the horse was in too advanced a stage of the disease when treated, and that very advanced cases should not be treated at all.

A third horse succumbed, and post-mortem examination revealed a general degeneration of the organs; it appears not to have been infected (negative sub-inoculations).

At the time of publication, 8 months after treatment, the other 2 horses were in good health and condition, and one of them was at work.

Although the numbers involved are small, the results seem to indicate that the three-fold treatment is less promising than the combination of "Bayer 205" and atoxyl; they suggest also that atoxyl may exercise a favourable influence on the appearance of symptoms of Bayer intoxication.

The authors conclude that, although it is not yet possible to pronounce a final judgment on its value, the most promising treatment for surra appears to be the simultaneous administration of "Bayer 205" and atoxyl, both in non-lethal but slightly toxic doses.*

BAKKER (S.). **Een en ander over Surra in den ambtskring Padang Sidempoean.** [Notes on Surra in Padang Sidempocan.]—*Ned. Ind. Bladcn v. Diergeneesk. en Dierenteelt.* 1925. Apr. Vol. 37. No. 2. pp. 153-177.

In Padang Sidempoean and neighbouring areas there is much evidence to suggest that transmission of surra from buffalo to buffalo occurs much more readily than from buffalo to horse. In some districts a number of buffaloes succumb, but in Padang Sidempocan there are fewer deaths, although a considerable proportion of the buffaloes harbour the trypanosome; most of these carriers are in excellent condition, and can perform their work without difficulty. The author considers that in this area one cannot say with certainty that any buffalo is free from the infection.

The cases in horses occur sporadically, in widely separated places, and infection must come from the buffalo, but if infected horses are allowed to remain alive, infection seems to spread quickly and easily to other horses. The number of sporadic cases in horses increases greatly in the second half of each year.

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

The author suggests that transmission is commonly effected in buffaloes by insects that have a distinct preference for buffalo blood, and in horses by others that tend to confine themselves to equine blood. He suggests also that in the second half of the year some insect appears which is particularly liable to transmit from buffalo to horse, and considers that these indications might be made the basis of useful entomological work on the problem.

He believes that dogs are more commonly attacked than is known, and emphasizes the importance of the symptoms connected with the eyes.

In considering the question of eradication, he emphasizes the difficulties of diagnosis in ruminants, and the impossibility of detecting all the carriers among the buffaloes. Moreover, to slaughter all the buffalo carriers, even if one could pick them out, would be impossible economically and not justifiable; and to quarantine apparently healthy carriers would obviously be useless.

The presence of the buffalo carrier renders eradication quite impossible, and he advises measures of limitation and control, as follows:—

When surra appears amongst horses, all horses in the district should be injected with 1 gm. of Bayer 205, and horses from outside the district should for a time not be admitted unless they are also inoculated. The animals could still be used, so that ordinary business would hardly suffer, and they would be protected from infection for a month (RODENWALDT & DOUWES). With a few injections one could protect the animals for 2 or 3 months, and from the practical point of view the outbreak could then be regarded as suppressed.

Outwardly healthy buffaloes would not need to be injected, where only equines had died; but where deaths did occur amongst buffaloes, all should be injected, or they should be isolated in a dark stable until $1\frac{1}{2}$ months after the last death. Carriers should be slaughtered only when in bad condition (where infection is widespread, as in Padang Sidempoean).

The author tried this prophylactic injection with Naganol (Bayer 205), inoculating intravenously with 1 gm. in 5 per cent. solution. Altogether he inoculated 321 horses, in 7 batches varying in number from 26 to 71; the inoculation of one batch of 51 animals was repeated after a month. Many of these horses were from places where cases of surra were actually present at the time; the others were from places where surra had been causing losses, although there had been no cases for 10–12 days before the injections. None of the injected horses developed surra, and there were no complications; in no case did the Naganol cause anything more than a slight oedema, which disappeared spontaneously.

Four infected animals were treated, two with Naganol and tartar emetic, and two with atoxyl in addition to these two drugs. The Naganol was given in amounts varying from 1 to 4 gms., the total quantities administered varying from 4 to 9.2 gms., and the emetic in $\frac{1}{2}$ or (usually) 1 gm. doses, with total amounts of from 3 to 4 gms. Atoxyl was given in doses of $2\frac{1}{2}$ or 3 gms., with totals of 3 and $5\frac{1}{2}$ gms. One of the horses died after nearly 2 months, showing paresis, etc.; a dog was inoculated with blood drawn from it on the 35th day of the treatment, but it did not become affected, and no trypanosomes reappeared in the horse's circulation; another of the horses was in good condition, etc., more than 2 months after treatment, but showed some signs of paresis in rising, and prognosis was doubtful. The

other two horses were in good condition, and showed no parasites in the blood, months after the treatment started. The animals were native horses weighing 140–150kg. No serious effects were caused by the drugs administered.

The author admits that it is still too early to judge the value of the treatment, but considers it hopeful. He emphasizes the fact that the public were keen on the drug treatment, either prophylactic or curative, whereas they are always hostile to measures involving slaughter.*

MOSCHKOWSKY (Sch.). **Über die Einwirkung von Germanin ("Bayer 205") auf Leishmanien.** [The Effects of "Bayer 205" upon Leishmania.]—*Arch. f. Schiffs- u. Tropen-Hyg.* 1925. Feb. Vol. 29. No. 1. pp. 40-44.

The author details experiments in which "Bayer 205" was used *in vitro* on cases of oriental sore and of kala azar. In no case did the drug exert any effect.

ROSENBUSCH (F.) & GONZALEZ (R.). **Beitrag zum Studium der Tristeza. I. Mitteilung.** [A Contribution to the Investigation of Tristeza.]—*Arch. f. Protist.* 1925. Apr. 1. Vol. 50. No. 3. pp. 443-485. With 1 map & 8 charts in text.

The authors use the term Tristeza to cover infections with Babesia and Anaplasma in cattle.

The greater part of the paper is taken up with an account of the distribution of Tristeza in the Argentine and details of experimental inoculations. Babesiasis and anaplasmosis occur in all the tick areas. The two infections may be separated from each other experimentally by taking advantage of the fact that the incubation periods are markedly different.

Babesia infection, set up by inoculation, shows an incubation period ranging from 3 to 18 days, while in the case of anaplasmosis it varies from 17 to 35 days.

In Babesia infections intravenous inoculation shortens the periods of incubation, but the dose of infective blood given does not influence it. On the other hand, the greater the amount of blood given the shorter the period of incubation in the case of anaplasmosis, but the path of infection exerts no influence upon it.

It has not been found possible to recognize any constant morphological differences between Babesia virus from different Provinces.

After recovery from Babesiasis cattle usually harbour the parasite for from 5 to 12 months, after which recovery is complete; but in the case of anaplasmosis it would appear that infection is life long. The authors have established the infectivity of blood from an animal which was infected six years previously.

The serum from blood containing anaplasma is non-infective, the virus being present in the corpuscles only. The addition of hypotonic salt solution, leading to haemolysis, rapidly destroys the anaplasma.

The serum of cattle having latent Babesia infection has a lytic action on Babesia, but there is no similar action in Anaplasma infections.

The facts appear to suggest that while the anaplasmosis of the

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

Argentine is all of one type, the Babesiasis is not. Animals recovered from Anaplasmosis cannot be re-infected with any strains, but immunity to Babesiasis in one area does not protect animals against virus from other parts.

FONSECA (A.) & BRAGA (A.). **Noções sobre a Tristeza parasitaria dos Bovinos.** [Bovine Tristeza.] 216 pp. With numerous text figs. & charts. 1924. Rio de Janeiro: Oficinas Typographicas do Ministerio da Agricultura.

This publication, which issues from the Veterinary Experimental Station of Rio de Janeiro, is a full account of tristeza, which, according to the authors, covers piroplasmosis and anaplasmosis.

CERNAIANU (C.). **Sur une épizootie de piroplasmose vraie du cheval et son agent vecteur.** [An Epizootic of Equine Piroplasmosis and the Transmitting Agent.]—*C.R. Soc. Biol.* 1925. Mar. 13. Vol. 92. No. 9. pp. 730-731.

The author describes an outbreak of equine piroplasmosis caused by *P. caballi* in Balti (Roumania) and the neighbouring villages. The epizootic lasted about two months, from April 15th to June 10th. A second outbreak occurred in October.

The only ticks found were *Derma-centor reticulatus*.

YAKIMOFF (W. L.), WASSILEWSKY (W. Z.) & ZAWIALOFF (B.). **La piroplasmose des bovidés dans le gouvernement de Pétrograde en 1923. (Note préliminaire.)** [Bovine Piroplasmosis in Petrograd in 1923. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 48-49.

In 1923, 100 milch cows were imported into the Louga district from Yaroslav, which is free from piroplasmosis. Twelve days after they were put at pasture 11 cases of piroplasmosis occurred, and of these seven proved fatal. Haemoglobinuria was observed on the 2nd or 3rd day after the rise of temperature. Diarrhoea, which was seen in the early stages, was followed by constipation on the 3rd or 4th day. The blood count fell to about 3,000,000, and more than 30 per cent. of the red corpuscles contained parasites.

Cases were treated with trypanblue, ichtargan, and luargol. The last of these appeared to cause the most rapid disappearance of parasites from the blood (72 hours), and the urine cleared within 24 hours of its administration.

In 25 per cent. of the cases there was a relapse in 17 to 35 days after treatment with a reappearance of parasites. These, however, were benign, and recovery took place without further treatment.

The parasite was *B. bovis*.

YAKIMOFF (W. L.). **La lutte anti-piroplasmique dans le gouvernement de Pétrograde en 1924. (Note préliminaire.)** [The Campaign against Piroplasmosis in Petrograd in 1924. Preliminary Note.]—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. p. 50.

In 1924 the average loss from piroplasmosis in the Province of Petrograd was 31 per cent.

In four selected districts trypanblue, ichtargan and luargol were used

intravenously. The great majority of animals (309) were treated with the first of these, 271 animals receiving treatment on the 1st or 2nd day of illness, the remainder on the 3rd to the 5th day. The mortality was 8 per cent. Seven animals were given 1 gramme of ichtargan and three luargol. All of these recovered.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.), IWANTSCHIKOFF (M. F.), RASTEGAÏEFF (E. F.), OULASSÉWITSCH (J. S.) & ZAWIALOFF (B. W.). **Action de l'ichtargan et du luargol dans la piroplasmose bovine.** [The Action of Ichtargan and Luargol in Bovine Piroplasmosis.]—*Bull. Soc. Path. Exot.* 1925. Jan. 14. Vol. 18. No. 1. pp. 51-53.

This paper contains a detailed account of nine animals treated with Ichtargan and four with Luargol during the outbreak of Piroplasmosis in the Province of Petrograd during 1923 and 1924. A single dose was given intravenously in each case, and ranged from 0.4 to 1 gramme.

A tabular statement shows that after Ichtargan haemoglobinuria disappeared within 12 to 48 hours, and recovery took place within 24 to 72 hours. In the case of Luargol the haemoglobin disappeared from the urine in 24 to 72 hours and complete recovery occurred within the same periods.

JAKIMOW [YAKIMOFF] (W. L.), WASSILEWSKAJA (W.), BENDINGER (G.), IWANTSCHIKOW (M.), MARKOWA (E.) & ULASSEWITSCH (V.). **Zur Frage über die russischen Rinderpiroplasmen. III. Verhältnis der nord-westlichen Piroplasmose zu anderen von demselben Typus. IV. Veränderungen des Blutes bei nord-west Piroplasmose.** [The Russian Piroplasmoses.]—*Rev. Microbiol. et Epidemiol.* 1925. Vol. 4. No. 1. pp. 84-85.

Yakimoff, in this brief German abstract of a paper in Russian, states that "our north-west piroplasma (*B. bovis*) is identical with *B. divergens*."

Regarding the changes observed in the blood in these cases, the following details are given:—

There is a reduction in the number of red corpuscles. Anisocytosis, polychromatophilia, poikilocytosis, and normoblasts are observed.

After treatment, macrocytes with basophil stipplings make their appearance, generally about the 3rd day, and usually prior to the disappearance of the parasites.

The leucocyte count on the 1st day of haemoglobinuria in two cows was found to be normal. There is a rise when relapses occur. The leucocyte formula changes in the direction of an increase in mononuclears.

KINGSBURY (A. Neave). **On the Occurrence of *Piroplasma (Babesia) canis* in Malaya.**—*Parasitology.* 1925. May. Vol. 17. No. 2. pp. 190-191.

The author records the occurrence of canine piroplasmosis in Malaya. In the first case a microscopic examination of the blood revealed the parasite. In the second case parasites were not recognizable in the blood, but the inoculation of a puppy caused the disease.

The transmitting agent is in all probability *R. sanguineus*.

BEVAN (Ll. E. W.). **East Coast Fever—the Theory of Latency.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1924. Nov. 20 & Dec. 11. Vol. 18. Nos. 5 & 6. pp. 328–335.

Steps are being taken to ascertain whether GONDER'S account of *Theileria parva* and its life history—more particularly in the vertebrate host—is accurate in every particular. Practical experience appears to indicate that, contrary to what has been held for a good many years, complete recovery does not always occur when an animal survives an attack of East Coast fever. There would appear to be some reason for supposing that the parasite may persist in the ox in some unrecognized form or in some organ, and that such parasites may be the cause of recrudescences of the disease.

RHODESIA. **Report of Veterinary Conference held at Bulawayo on the 4th, 5th and 6th November, 1924.**—Issued by Authority of the Minister of Agriculture. Salisbury: Argus P. & P. Co., Ltd. pp. 2–44.

The main discussions of this Conference centred about the question as to whether an animal which has recovered from East Coast fever is entirely free from the causal organism or not.

LESTOQUARD (F.). **Troisième note sur les piroplasmoses du mouton en Algérie. La piroplasmose vraie: *Piroplasma* (s.str.) *ovis* (n. sp.). Comparaison avec *Babesiella ovis*.** [True Piroplasmosis of Sheep in Algeria. Comparison between *Piroplasma ovis* and *Babesiella ovis*.]—*Bull. Soc. Path. Exot.* 1925. Feb. 11. Vol. 18. No. 2. pp. 140–145. With 12 text figs.

Piroplasmosis in sheep appears to have been generally accepted as a single entity caused by one type of parasite only, but it appears to be not improbable that this is in reality an error.

Lestoquard has been able to identify the parasite known as *Babesiella ovis* in Algerian sheep, and now describes *Piroplasma* (sen. str.) *ovis*.

The parasite belongs to the genus *Piroplasma* and sub-genus *Piroplasma*. Typically, it occurs in the twin form, the parasites forming an acute angle with each other, and each having a length exceeding, or at least equal to, the radius of the red corpuscle. The average length is 3 microns.

The parasite is readily inoculable. It causes an acute attack which is followed by a prolonged chronic infection.

The period of incubation in experimental cases depends upon the source of the virus. If it is taken from an animal that has been infected for a long time, it, as a rule, exceeds a week, but by progressive rapid passage this period may be reduced to 3–6 days, or even less.

When infection occurs the temperature rises, and remains elevated for 4 to 8 days, parasites appearing in the blood at the same time. In some cases parasites persist in the blood in recognizable numbers after the temperature has fallen, but this is not usually the case. On an average only 1 per cent. of the corpuscles become invaded.

In experimental cases the destruction of red corpuscles may amount to 50 per cent. Jaundice and haemoglobinuria do not as a rule occur, but both may be observed.

Recovery, as a rule, takes place, but not invariably. In fatal cases anaemia and splenomegaly are the principal lesions.

The infection occurs naturally in, and can be experimentally transmitted to, the goat.

Trypanblue has a marked curative effect. It is administered intravenously in 1 per cent. solution; the dose being 0.01 g. per kilogram live weight.

In addition to the twin-pear-shaped forms, rounded, oval, and irregularly shaped parasites occur.

The parasite does not cause any increase in size of the corpuscle in the sheep, but in the goat infected corpuscles become enlarged. This is no doubt due to the fact that normally the corpuscles of the goat are distinctly smaller than those of the sheep.

The following differences are noted between *Piroplasma ovis* and *Babesiella ovis* :—

P. ovis is larger than *B. ovis*. In *P. ovis* pear-shaped forms predominate. In *B. ovis* round forms are most numerous. Where twin forms occur in *B. ovis* they form a very obtuse angle with each other. By passage it is easier to obtain an exaltation of virulence with *P. ovis* than with *B. ovis*. The anaemia which results from infection with *B. ovis* is the more severe, although the percentage of parasites invaded is smaller.

There is no cross immunity.

Trypanblue is effective in cases of infection with *P. ovis*, but is without effect in cases of infection with *B. ovis*.

PÉRARD (H.). **Recherches sur les coccidies et les coccidioses du lapin.**

Prophylaxie des coccidioses. [Investigations regarding Coccidia and Coccidiosis of the Rabbit. Prophylactic Measures.]—Thèse pour le Doctorat Vétérinaire. Ecole Nat. Vét. Alfort. 1925. pp. 5-71. With 5 text figs.

The difficulties in the way of exact experimentation in connection with Coccidiosis in rabbits are very great, since practically every adult rabbit harbours parasites, and it is extremely difficult to obtain young rabbits—which alone are suitable for experiment—which have not been exposed to infection, and which can be kept free from infection. A further difficulty is to obtain a pure strain for infection. The author finds that *E. stiedae* and *E. perforans* are separate entities. The average size of *E. stiedae* is $37.5 \times 21.5 \mu$, while that of *E. perforans* is $25.5 \times 15.5 \mu$. The majority of the oocysts of *E. perforans* fall within $24-30 \mu$ in length, and of *E. stiedae* 90 per cent. are from $35-40 \mu$ in length.

The cyst wall of *E. stiedae* appears to be a little thinner than that of *E. perforans*.

A far greater percentage of parasites belonging to *E. stiedae* show micropyles than is the case with *E. perforans*. It is noticeable that when the micropyle is open the oocysts acquire a yellowish tint.

Sporulation occupies about the same length of time in the two species. Some of the parasites sporulate within two days, but the majority require 8 to 10 for the process.

In *E. perforans* the so-called residual body is always present as a fifth body in the sporulated oocyst. This structure the author believes is partly composed of a reserve of food material since it decreases in size with age, but it never disappears. In *E. stiedae*

there is no separate residual body in the oocysts, but a corresponding structure is found in each of the sporocysts. The wall of the sporocysts in *E. stiedae* is relatively thicker than that of *E. perforans*. A number of experiments have been carried out with a view to infect white rats and mice, dogs, sheep and goats with the parasites of the rabbit, but without success.

The influence of temperature upon sporulation: At 0° C. no segmentation takes place. At 5-6° C. segmentation begins about the 5th day and is complete by the end of the 2nd week. At 18-20° C. the process may be more rapid. Some of the parasites will have sporulated by the end of the 2nd day (*E. perforans*). At 38° C. *E. perforans* may be completely sporulated in 30 hours. *E. stiedae* does not sporulate at the temperature. Under no conditions, apparently, is sporulation complete in *E. stiedae* in less than 60 hours.

While at 38° C. *E. perforans* may develop within 30 hours, it is observed that a considerable proportion of the parasites do not complete the process; it appears to be arrested. Moisture is necessary, since parasites contained in faeces left exposed in the laboratory are not viable after the 3rd day.

Experiments show that exposure to air is necessary for the process of sporulation. Bacterial growth hinders or stops segmentation of oocysts.

A large number of substances have been tested with regard to their sterilizing effects, either chemical or physical, upon sporulated coccidia. Cresyl, lysol, and ammonia were found to be the most effective. 2 per cent. cresyl kills all the oocysts in 36 hours. In a 5 per cent. solution the majority are killed in 2 hours, but a period of 36 hours is required for the certain destruction of all of them. Lysol gives slightly inferior results. Ordinary "antiseptics" favour the process of sporulation by checking bacterial growth.

A 10 per cent. solution of ammonia proves fatal in about 24 hours.

The physical effects of desiccation, heat dry and moist, and cold were investigated. Desiccation alone is ineffective until a temperature of 38° C. is reached. At this temperature the question of heat comes into consideration. At 40° C. the oocysts are killed. As the temperature rises death takes place early. At 45° an hour's exposure is sufficient. At 55° C., 15 minutes exposure proves fatal.

The results obtained with moist heat were comparable to those given by dry heat. At 55° C. all oocysts were dead after 30 minutes. At 80° C. 5 to 10 seconds was sufficient.

While dry heat causes shrinkage, oocysts exposed to moist heat retain their normal appearance.

At low temperatures — 10 to — 15° C. oocysts directly exposed to the refrigerant are mostly killed, but in the centre of faecal pellets only about 50 per cent. of both *E. stiedae* and *E. perforans* are killed. The period of exposure does not appear to be mentioned. While most of the experiments were carried out with non-sporulating oocysts, because of the ease with which it could be ascertained whether they were killed or not, the point had not to be lost sight of that it is in the sporulated condition that the parasite remains in the outer world. The presence of a double protective layer—oocyst and sporocyst—in this phase might influence the vitality of the parasite and its powers of resistance.

The general inference drawn by the author is that sporulated oocysts are more resistant to disinfectants than non-sporulated parasites.

Prophylactic measures are largely based upon a knowledge of the life-history of the parasite, and essentially comprise the removal of the faeces as frequently as possible. In the case of small animals cages with gratings as floors are advisable so that the faeces may fall through, and thus may not contaminate the foodstuffs. A similar result may be achieved by moving the animals to fresh cages at required intervals. In the case of the larger animals—sheep and goats—the same principle is acted upon. Disinfection is best carried out by heat either moist or dry, that is to say, with boiling water or with a flame. The use of sulphates and other chemicals on infected pastures is useless.

SPIEGL (A.). **Ein bisher nicht bekanntes Kokzid beim Schaf.** [A Hitherto Unknown Coccidium of the Sheep.]—*Zeitsch. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1925. May 1. Vol. 28. No. 1. pp. 42-46.

The parasite described in this paper was found in two separate flocks in different districts in Saxony.

The oocysts measured 42 to 50.4 μ in length by 30.6-36.0 μ in breadth. The colour was a dark yellowish brown, and the contents were less clearly seen than in the common parasite of the sheep *E. faurei*. The oocyst wall was remarkably thick, measuring 3.6 μ , and was composed of two distinct layers. The inner was smooth, but the outer showed a delicate net-like wrinkling. No intermediate forms between this parasite and *E. faurei*, which was also present in large numbers, could be found.

The name *Eimeria intricata* is suggested.

MITCHELL (D. T.). **Coccidiosis in Poultry.**—*Jl. Dept. Agric. S. Africa.* 1925. May. Vol. 10. No. 5. pp. 408-416.

This paper was read before the South African Poultry Association Conference, Kimberley, January 7, 1925, and is in the nature of a résumé of our knowledge on the subject.

TRIFFITT (M. J.). **Observations on *Gastrocystis gilruthi*, a Parasite of Sheep in Britain.**—*Protozoology* (a Supplement of the *Journal of Helminthology*). 1925. May. No. 1. pp. 7-18. With 2 text figs. & 26 figs. on 2 plates.

This paper confirms and elaborates the description of the parasite given by GILRUTH (1910) and CHATTON.

The writer has examined 138 stomachs (abomasum) and the parasite has been detected in 92 per cent. of these by macroscopic examination. As early infections are probably not recognizable without microscopic examinations the actual percentage of infected animals is probably higher.

The parasites have been detected in the mucosa of the abomasum only. The largest are recognizable as whitish bodies embedded in the mucous membrane approximately 1 mm. in their longer diameter. Intact cysts could be extruded by slight pressure.

On microscopic examination the cysts were found with their long axis parallel with the gastric glands lying from 0.3 to 0.7 mm. below the surface of the membranes. They were surrounded by a small

celled infiltration. The cyst wall comprises two distinct layers with a thin zone between them in the case of the younger cysts. The outer part of the outer layer had a brush-like appearance owing to the presence of hair-like processes measuring some 18μ in length.

The cyst wall contains a single large nucleus measuring from $80-100\mu$ by $40-60\mu$ situated between the two layers.

The contents of the cysts are plasmodial in the young stages with a number of scattered nuclei. Subsequently, a number of cytoplasmic spheres are formed and from these spores develop. There is a residual mass of cytoplasm.

The spores are elongated slightly curved bodies with one end rounded and the other tapering. The mature ones measure 12μ by 2.5μ . Examination failed to show any evidence of cellulose in the structures.

Success did not attend attempts to cultivate the parasite, but changes were produced in spores when placed in 1 per cent. glucose similar to those described by MACGOWAN as occurring in spores of *Sarcocystis tenella* when placed in the same liquid.

It is suggested that *Sarcocystis tenella* is an aberrant form of *Gastrocystis gilruthi*, the invasion of the muscular system having been brought about by the escape of spores into the blood stream.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.), ZWIETKOFF (N. A.).

Influence du chlorure de sodium sur les cultures de protozoaires.

[The Effect of Sodium Chloride upon Cultures of Protozoa.]—*Bull. Soc. Path. Exot.* 1925. Mar. 11. Vol. 18. No. 3. pp. 261-265.

An excess of sodium chloride is injurious to protozoa in culture. For the best results it should not exceed 0.25 per cent. For some organisms, e.g., *Oicomonas*, a concentration of 0.01 per cent. is sufficient.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.), & ZWIETKOFF (N. A.).

Sur la culture des protozoaires de l'intestin.

[The Cultivation of Intestinal Protozoa.]—*Bull. Soc. Path. Exot.* 1925. Mar. 11. Vol. 18. No. 3. pp. 260-261.

The authors find that the best medium is that described by FROSCH & SCHARDINGER, viz., ordinary broth, 10, water, 90, agar, 1-2.

On this medium *Oicomonas*, *Piromonas*, *Prowazekia*, *Colpoda*, and other organisms from the intestines of animals have been cultivated. This medium is not suitable for *Lambliia*, *Chilomastix*, *Trichomonas*, *Octomitus*, *Trichomastix*, and *Spirochaetes*.

BOSCHENKO (W. P.). **Infusorien des Darmtrakts des Kamels.**

[The Intestinal Infusoria of Camels.]—*Rev. Microbiol. & Epidemiol.* 1925. Vol. 4. No. 1. pp. 90-91.

This abstract contains a brief account of an infusorian which the author places in the Family Isotrichidae and order Holotricha. It was found in the faeces of camels. The name given is *Infundibulorium cameli*, n. g., n. sp.

BONNE (C.). **Comparaison du spirochète des rats d'Amsterdam avec une souche française de spirochètose ictéro-hémorragique.** [A Comparison between the Spirochaete of Rats from Amsterdam and a French Strain of the Ictero-haemorrhagic Spirochaetosis.]—*Ann. Inst. Pasteur.* 1925. Jan. Vol. 39. No. 1. pp. 35–44.

In culture—diluted rabbit serum—the rat strain at first grew rather sparingly, but subsequently the cultures were as rich as those given by the other organism. The majority were 7 to 10 μ in length, but forms measuring up to 50 μ were occasionally seen. Morphologically the two strains could not be distinguished.

Both strains were very virulent for the guineapig, but jaundice was not invariably produced. The interval elapsing between inoculation and death was 4 or 15 days. In very rare cases guineapigs which had developed jaundice recovered. In a single batch of guineapigs which have died it is sometimes possible to find the organism in the liver in large numbers, and in other cases they cannot be detected either microscopically or by inoculation of further animals. The strains have been tested by agglutination with sera from a number of cases of infection in human beings, but no definite differences have been found.

The spirochaetes were found to be mutually protective.

OKELL (C. C.), DALLING (T.), & PUGH (L. P.). **Leptospiral Jaundice in Dogs (Yellows).**—*Veter. Jl.* 1925. Jan. Vol. 81. No. 1. pp. 3–35.

Enzootic jaundice occurs in all parts of Britain, but is more common in the country, and among kennels of sporting dogs, than in towns. It may be very fatal, the mortality reaching 95 per cent.

Clinically, hyperacute haemorrhagic and icteric types of the disease can be distinguished, but all gradations between may be observed.

The hyperacute type is characterized by its sudden onset, high temperature, which falls before death, depression, pain in the muscles of the neck and abdomen, bronchial catarrh and epistaxis, herpes of the lips and bleeding from the gums, vomiting, great thirst, blood-stained soft faeces, swelling of the face below the eyes, enlargement of the cervical glands, petechiae of the skin, conjunctivitis, but, as a rule, no jaundice.

Icteric type.—The onset may be acute or insidious. When there is well marked jaundice the temperature is generally 102° to 103° F. This falls below normal before death. Depression becomes more marked as the disease progresses. There may be bronchial râles and epistaxis is only seen occasionally. Vomiting is fairly constant, and blood may be present in the vomit. Constipation is marked, and the faeces are clay-coloured. Intussusception is frequently the immediate cause of death. The urine is dark in colour and contains albumen. Pruritus is common, and there may be conjunctivitis. Associated with acute cases there are sometimes observed cases in which there is slight fever and transient gastro-intestinal disturbance. Proof is as yet lacking that these are mild cases of the same disease. In naturally-occurring cases there is a variable amount of jaundice, but in the hyperacute cases this may be absent. There may be catarrh of the eyes and nose, and blood-stained saliva may escape from the mouth. The serous membranes may show petechiae or haemorrhages. Similar lesions may be present in the stomach. The

intestines may be severely inflamed. The liver and kidneys vary in appearance. They may be congested or pallid. The lungs show haemorrhages scattered over the surface.

In 3 cases out of 10 a leptospira was isolated which appeared to be identical with a rat strain of *L. icterohaemorrhagiae*. To explain some of their experimental results the authors invoke the theory of granule or ultra-visible forms of the parasite.

In the kennels from which natural cases were obtained rats were present, and in two outbreaks virulent leptospira were isolated from rats on the premises.

Protective serum has been prepared and used, and in nine cases it has been reported that a cure has been effected by its means.

KLARENBECK (A.). Uraemie, Stuttgarter Hundeseuche en Spirochaeten. [Spirochaetes in Uraemia and Stuttgart Disease in the Dog.]—*Tijdsch. v. Diergeneesk.* 1925. Mar. 1. Vol. 52. No. 5. pp. 222-223. With 1 plate.

The author records the occurrence of spirochaetes in the kidney in a case of uraemia in a dog.

SCHMID (G.). Beobachtungen über eine ansteckende Hautkrankheit bei Ferkeln Verursacht durch Spirochäten. [A Contagious Disease of the Skin of Pigs caused by a Spirochaete.]—*Berlin. Tierärztl. Wochensh.* 1925. May 29. Vol. 41. No. 22. pp. 340-342.

The author describes a disease occurring in South West Africa in which lesions of the skin of pigs are associated with the presence of spirochaetes. Tumour-like swellings were found in different parts of the body, but usually on some portion of the head.

In the case recorded by the author one pig out of seven affected was available for examination. There was a large ulcerating swelling on the side of the face, and the deeper structures had become involved, so that when the bones were boiled out the alveoli of the incisors were found to have become exposed, allowing the teeth to drop out. Microscopic examination of smears showed that the bacteria present were greatly outnumbered by spirochaetes. Subsequently, he received for examination a live pig affected with the disease. This was a sow-pig about four months old. Between the eye and the ear on the left side there was a tumour-like growth involving the skin, which was covered with a dry grey scab. On removing this there was found a deep defect in the tissues filled with a greasy glutinous material. The margins of the lesions were swollen and bled readily. While the animal was under observation the lesion steadily extended.

A few days after the pig was first seen by the author a hard painful swelling developed in the upper lip, and this in the course of a few weeks attained the size of a hen's egg. This soon came to a head; a grey glutinous pus was obtained from it. During the 5 months that the animal was under observation its general condition remained fairly good. There were occasional rises of temperature and some dullness, but these symptoms were intermittent. Spirochaetes were present in immense numbers in the material obtained from the lesions. They were never in a state of purity, but they always greatly outnumbered the bacteria present. Spirochaetes were never discovered in the blood, nor were there any signs of anaemia, as described by DODD in South Africa.

Treatment with doses of 2 to 5 cc. of 5 per cent. solution of atoxyl continued for about a month effected a practically complete cure of the skin lesions, but before healing was complete the pig unfortunately died unexpectedly. At the post-mortem examination, apart from a slight increase in the amount of cerebro-spinal fluid and marked congestion of the dura mater, no lesions were discovered in the internal organs. In the frontal sinus small collections of caseous pus were found. The bones in the areas involved were greatly reduced in thickness, and in some places actually destroyed.

- BRUNI (N.). **Recherches sur quelques phytoparasites de nature protozoaire.** [Some Protozoan Parasites of Plants.]—*Bull. Soc. Path. Exot.* 1925. Mar. 11. Vol. 18. No. 3. pp. 251-256. With 3 text figs.
- DESCHIENS (R.). ***Giardia cati* (n. sp.) du chat domestique.** [*Giardia cati* (n. sp.) of the Domestic Cat.]—*C. R. Soc. Biol.* 1925. May 15. Vol. 92. No. 16. pp. 1271-1272.
- FRANCHINI (G.). **Piroplasmose chez un petit loir (*Myoxus avellanarius*).** [Piroplasmosis in a Dormouse.]—*Bull. Soc. Path. Exot.* 1924. Dec. Vol. 17. No. 10. pp. 881-883. With 1 text fig.
- FRANCHINI (G.). **Hématozoaires particuliers d'un oiseau (*Hypoleis hypoleis*).** [Haematozoa of *Hypoleis hypoleis*.]—*Bull. Soc. Path. Exot.* 1924. Dec. Vol. 17. No. 10. pp. 884-885. With 1 text fig.
- GERLACH (F.). **Über die Geflügel spirochätose in Oesterreich.** [Avian Spirochaetoses in Austria.]—*Seuchenbekämpfung.* 1925. Vol. 2. No. 3-4. pp. 189-195. With 5 text figs.
- HEGNER (R. W.). ***Giardia felis* n. sp. from the Domestic Cat and *Giardias* from Birds.**—*Amer. J. Hyg.* 1925. May. Vol. 5. No. 3. pp. 258-273.
- IWANOW (Elic). **Les *Trypanosoma equiperdum* dans le corps des chenilles de *Galleria mellonella*.** [*Trypanosoma* in the Bodies of Caterpillars of *Galleria mellonella*.]—*C. R. Soc. Biol.* 1925. May 15. Vol. 92. No. 16. pp. 1286-1287.
- NIESCHULZ (O.). **Über die Entwicklung des Taubencoccids *Eimeria pfeifferi* (Labbé 1896).** [The Development of *E. pfeifferi*—Coccidium of the Pigeon.]—*Arch. f. Protist.* 1925. June. Vol. 51. No. 3. pp. 479-494.
- NOLLER (W.) & RUPPERT (H.). **Zur Kenntnis der verbreitung des Taubenkoccids *Eimeria pfeifferi*.** [The Distribution of *Eimeria pfeifferi* of the Pigeon.]—*Berlin. Tierarzt. Wochensh.* 1925. Apr. 24. Vol. 41. No. 17. pp. 257-258.
- PANISSET (L.) & VERGE (J.). **Presence de Spirochètes chez les chiens atteints de gastro-enterite hémorragique.** [The Presence of Spirochaetes in Dogs suffering from Haemorrhagic Gastro-Enteritis.]—*C. R. Acad. Sci.* 1925. Apr. 27. Vol. 180. No. 17. pp. 1296-1297.
[This paper has appeared elsewhere and has been dealt with.]
- PETROCHI (J.) & ZUCCARINI (J. A.). **Sobre la presencia del *Plasmodium danilewskyi* y de *Haemoproteus* sp. en la sangre de los gorriones (*Passer domesticus*) de Buenos Aires.** [The Presence of *Plasmodium danilewskyi* and *Haemoproteus* sp. in *Passer domesticus* in Buenos Aires.]—*Rev. Inst. Bact. Dept. Nac. Hyg.* 1925. Mar. Vol. 4. No. 1. pp. 57-62. With 1 plate and 1 text fig.
- PHISALIX (Mmc.). **Coccidiose intestinale de *Vipera berus* à *Cyclospora babaulti*.** [Intestinal Coccidiosis of a Viper caused by *Cyclospora babaulti*.]—*Bull. Soc. Path. Exot.* 1924. Dec. Vol. 17. No. 10. pp. 868-871. With 14 text figs.
- PHISALIX (Mmc.). ***Cyclospora tropidonoti*, nov. spec., Coccidie intestinale de la couleuvre à Collier.** [*Cyclospora tropidonoti* n. sp., Intestinal Coccidium of Collier's Adder.]—*Bull. Soc. Path. Exot.* 1924. Dec. Vol. 17. No. 10. pp. 871-873. With 8 text figs.

- PHISALIX (Mme. M.). *Coccidium persicum*, nov. sp., parasite des voies biliaires de *Tropidonotus natrix*, var. *persa* Pallas. [*Coccidium persicum* n. sp., in the Bile Ducts of *Tropidonotus natrix*, var. *persa* Pallas.]—*Bull. Soc. Path. Exot.* 1925. Jan. Vol. 18. No. 1. pp. 23-28. With 1 text fig.
- THOMSON (J. G.). A *Giardia* parasitic in a Bursate Nematode living in the *Viscacha*.—*Protozoology*. (A Supplement to the *Jl. of Helminth.*) 1925. May. No. 1. pp. 1-6. With 3 text figs.
- VILLELA (E.) & TORRES (C. Magarinos). Lésions histo-pathologiques dans la paralysie expérimentale à *Schizotrypanum cruzi* chez le chien. Nature des cellules contenant le parasite dans le système nerveux central. [The Histological Changes caused in Dogs infected experimentally with *Schizotrypanum cruzi*. The Nature of the Cells in which the Parasite is found in the Central Nervous System.]—*C. R. Soc. Biol.* 1925. June 19. Vol. 93. No. 21. pp. 133-135.

DISEASES DUE TO METAZOAN PARASITES.

- KRANEVELD (F. C.). *Bijdrage tot de Therapie der Distomatosis in Ned. Indië*. [Contribution to the Therapeutics of Distomatosis in the Dutch Indies.]—*Veeartsenijkundige Mededeeling No. 49. Dept. v. Landbouw, Nijverheid en Handel. Buitenzorg.* 1924. 62 pp.

Fluke infestation occurs very widely in the Dutch East Indies, in cattle, sheep and buffaloes; in buffaloes and native cattle the infestations are usually light, and are only detected after death, but much more serious effects are commonly seen in milch cattle and breeding stock imported from Bengal or Europe.

The author points out that distol must be kept in a dry and cool place, and he emphasizes the importance of correct dosage in relation to body-weight.

His experiments were performed on slaughter stock, so as to be certain of the chance of performing autopsies soon after treatment; the cattle, all Java-Bengal crosses, were oxen of 2-6 years of age and weighing from 165 to 286 kilograms, while the buffaloes were oxen aged from 4 to 9 years, with weights varying from 239 to 319 kilograms.

The author attempted first to estimate the number of flukes present in each animal by counting the eggs passed out in the faeces, as recommended by MAREK. MAREK'S technique was followed, but the firmer consistence of the faeces (as compared with that usually observed in Europe) rendered it necessary to dilute with three times the volume of water, instead of the two volumes recommended.

After preliminary weighing and clinical examination, the animals were kept untreated for 5-8 days, while the faeces were examined daily for eggs. They were then weighed again, and distol was administered on four successive days, usually before the morning feed; Kraneveld advises that the capsules should be greased with a little oil, or kept for a time in lukewarm water.

The examinations of the faeces were continued during the treatment, and for 4-10 days afterwards. The author remarks that the counting of the eggs demands some experience, as *Paramphistomum explanatum* is also very commonly found in cattle in the Dutch Indies, and the eggs of this species may be mistaken for those of *Fasciola hepatica*. He also states that the occurrence of a few eggs in the faeces, for a few days after treatment, does not necessarily indicate the survival of any flukes, as eggs may remain in the gall-bladder for days.

The animals were again weighed (4-14 days after treatment) and then slaughtered; the autopsy was begun within half an hour, and the examination of the liver was very thorough.

The animals treated included 13 cattle and 5 buffaloes, and 1 animal received 2 gms. less than the correct dose; in all cases the correct dose was carefully calculated from the body-weight, and the amounts given varied from 4.5 to 9 gms. (daily, for 4 days).

During the course of treatment, 3 animals showed diarrhoea, 6 exhibited loss of appetite, and 2 developed a high temperature, but these effects were not severe, and soon disappeared. The lesions found in the liver post-mortem allowed the cases to be classified as follows: 7 slight cases, 3 moderate, 6 moderately severe, and 2 severe.

All but 4 of the animals showed dead *Fasciolae* in the liver or gall-bladder, the numbers varying from 1 to 21; in 2 cases one partly-degenerated fluke was found, but only one living *Fasciola* was observed, and this was seen in an animal in which no dead or partly destroyed flukes occurred.

For the whole series of animals, the estimated total number of flukes, before treatment, was 1,347; the total number found after treatment was 78, including 75 dead, 2 partly degenerated, and 1 living fluke.

Seven of the animals showed living *Paramphistomum explanatum*, in some cases numerous, and this species appears to be unaffected by distol.

All of the animals gained in weight, but a similar increase was shown by control cattle, and it was attributed to the liberal diet.

The author considers that distol is an efficient remedy against distomatosis, and that, despite its high price, its use is to be recommended in animals of any considerable value; the elimination of even small numbers of flukes is desirable, as the liver infestation is said to influence unfavourably the course of attacks of trypanosomiasis, piroplasmiasis, and anaplasmosis, and to retard complete recovery after such attacks.

He recommends treatment twice a year, at the beginning and at the end of the Western monsoon.

In order to check the accuracy of MAREK'S method of estimating the number of flukes present, he submitted 10 untreated cattle to daily faeces examinations for at least 10 days before slaughter, and compared the estimates with the numbers actually found. The method was found, at least under East Indian conditions, to be quite unreliable; for example, in three cattle calculated each to harbour about 25 flukes, the numbers actually found were 2, 57, and 125 respectively.*

MORISHITA (K.). **On *Fasciola* found in the Dilatation of the Bronchi of Cattle.**—Abstract in *Japan Med. World*. 1925. May 15. Vol. 5. No. 5. p. 129.

“The author obtained a parasite having the form like that of *Fasciola hepatica*, in trachea of cattle. It was found parasitic in that organ and caused dilatation. It occurred not very seldom. By morphological examination it was identified to belong to *Fasciola hepatica*, rather than *Fasciola gigantica*, to which it bore resemblance in some respects.”

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

JOYEUX (Ch.). **Cestodes des poules d'Indochine.** [The Cestodes of Fowls in Indo-China.]—*Ann. Parasit. Hum. et Comp.* 1924. Oct. Vol. 2. No. 4. pp. 314–318. With 3 text figs.

The author has examined a collection of cestodes collected at Hué (Annam). The material was sufficiently well preserved for the diagnosis of the common parasites, but the description of a new species was somewhat difficult.

The following parasites were found :—

Raillictina (Ransomia) echinobothrida,

Raillictina (Ransomia) tetragona,

Hymenolepis carioca,

Cotugnia digonopora,

Hymenolepis bauchei, n. sp.

A detailed description of the last of these is given.

BAER (Jean G.). **Some Cestoda described by Beddard, 1911–1920.**—*Ann. Trop. Med. & Parasit.* 1925. Mar. 31. Vol. 19. No. 1. pp. 1–22. With 15 text figs.

The parasites were found in animals dying at the Zoological Gardens in London, and the specimens examined were those loaned to FUHRMANN, who, owing to pressure of other work, was not able to carry out examinations. They were handed to Baer for scrutiny.

In the author's opinion the following names are synonyms, and must fall. The names which he considers have priority are given :—

Hyracotaenia hyracis Beddard 1912 = *Inermicapsifer capensis* = *I. hyracis* (Rudolphi 1810).

Hyracotaenia procarviae = *Inermicapsifer pagensteckeri* (Setti 1897).

Thysanotaenia gambianum = *Inermicapsifer guineensis* (Graham 1908).

According to SKRJABIN :—

Otidiotaenia eupoditis = *Schistometra conoides* (Bloch 1782).

Descriptions are given of *Anoplotaenia dasyuri* Beddard 1911, *Dasyurotaenia robusta* Beddard 1912, and *Thysanotaenia lemuris* Beddard 1911.

HOBMAIER (M.). **Die Entwicklung von *Ascaris megaloccephala* des Pferdes.** [The Development of *Ascaris megaloccephala* of the Horse.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1925. Vol. 52. No. 2. p. 192–198. With 3 text figs.

The author states that he has been able to follow the migrations of the immature stages of *Ascaris megaloccephala* by feeding mice, guinea-pigs, and rabbits with embryonated eggs.

In all these species the embryo leaves the eggs in the anterior part of the small intestine, and they invade the blood or lymph stream from the caecum.

In the case of mice the embryos have disappeared from the intestine on the day after the infecting meal and are to be found in the liver. At the most only an occasional parasite is to be found in the lungs at this stage. After 2 to 4 days they leave the liver and are more readily found in the lungs. By the 6th day the majority of the larvae have reached the lungs. At the end of a week they are discoverable in the mucus of the larynx, and during the course of the second week they can be seen in the mucous membrane of the stomach. In guinea-pigs

and rabbits the process is similar, but takes a little longer. It is exceptional to be able to trace the migrations as far as the stomach again. The author has only once succeeded in doing so.

The author describes the morphological details of the migrating larvae. The lesions are also dealt with. The passage of the larvae through the intestine and liver as a rule do not cause any obvious symptoms, but a massive invasion of the lungs may actually cause death from suffocation. In such cases there is extensive haemorrhage into the alveoli and small bronchi. The point of penetration of the worms through the bowel wall is marked by a minute haemorrhagic spot. These spots are to be found in the caecum only.

HOBMAIER (M.). Nematodenknötchen innerer Organe, spez. von *Ascaris megalcephala*, beim Pferde. [Nodules due to *Nematodes* in the Internal Organs, and in particular to *Ascaris megalcephala* in the Horse.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1925. May. Vol. 52. No. 3. pp. 273–278. With 1 text fig.

In the course of their migrations the embryos of *Ascaris megalcephala* produce nodules in the liver and lungs of horses. These have usually been thought to have been produced by *Sclerostome larvae*.

GOODEY (T.). *Oesophagostomum longicaudum* n. sp. from the Pig in New Guinea.—*Jl. Helminth.* 1925. Feb. Vol. 3. No. 1. pp. 45–50. With 2 text figs.

Among 114 specimens of *Oesophagostomum* collected from the large intestine of a cross-bred pig at Raboul, 8 were found which differed from the remaining 106, which were the ordinary *Oesophagostomum dentatum* in that they showed long tails and an enlargement of the oesophagus at the anterior end. A detailed description of the parasites is given.

BAYLIS (H. A.). On *Gongylonema* collected in Italy during October, 1924, with some Observations on the Genus.—*Jl. Trop. Med. & Hyg.* 1925. Feb. 2. Vol. 28. No. 3. pp. 71–76.

Worms belonging to the genera *Hepaticola* and *Capillaria* were found in rats and fowls respectively in situations which led to the supposition that they might be *Gongylonema*. Microscopic examination revealed the true nature of the parasites.

G. scutatum was found in sheep, goats, and cattle. Two specimens of *Gongylonema* were found in pigs, but it was found that the pigs examined were fed on cheese factory waste and did not forage for themselves. Baylis is of the opinion that the parasite of the pig cannot be separated from *G. scutatum*, and, further, it is a matter of some doubt as to whether *G. neoplasticum* Fibiger and Ditlevsen should be separated from *G. scutatum*.

BLAIR (K. G.). Some Notes on the Insect Intermediate Hosts of *Gongylonema*.—*Jl. Trop. Med. & Hyg.* 1925. Feb. 2. Vol. 28. No. 3. pp. 76–81. With 7 text figures.

The author briefly reviews the recorded hosts and their habits.

The parasite has been found in the body cavity of many genera of coprophagous beetles, *Ateuchus*, *Chironitis*, *Onthophagus*, *Gymno-*

pleurus, Geotrupes, Aphodius, and Blaps. Under experimental conditions encysted larvae have been found in the meal worm, and in the musculature of different cockroaches, *Blattella germanica*, *Blatta orientalis*, and *Periplaneta americana*.

HALL (M. C.), SHILLINGER (J. E.) & CRAM (E. B.). **A Test of Raw Onions in the Diet as a Control Measure for Worms in Dogs.**—*Jl. Agric. Res.* 1925. Jan. 15. Vol. 30. No. 2. pp. 155–159.

The authors, after accurate experimental tests, come to the conclusion that raw onions in amounts of 2 ounces daily exercise too small an anthelmintic power to be of any value.

BELPEL (M. J.). **L'Habronemosi cutanea degli equini.** [Habronemiasis of the Skin in Equines.]—*La Clin. Vet.* 1925. Mar. Vol. 48. No. 3. pp. 163–175. With 6 text figs.

The author records the occurrence of this disease in Italy. He is of the opinion that the skin lesions are associated with the presence of the worm in the stomach. He does not hold the view that the infection is spread by contact.

HALL (Maurice C.). **The Occurrence of Cuterebrid Larvae in Dogs and Cats, and the Possible Modes of Infection.**—*Jl. Econ. Entomol.* 1925. Apr. Vol. 18. No. 2. pp. 331–334.

Cuterebrids of the genera *Cuterebra*, *Bogeria*, *Rogenhoferia*, and *Atrypoderma* are normally parasitic in Rodentia and Lagomorpha, but evidence is accumulating that their occurrence in carnivora is not so rare as has been thought. The author summarizes the records of cases hitherto published.

Possible methods of infection are the eating of infected rodents and direct oviposition. Prenatal infection must also be borne in mind.

FRISON (Theodore H.). **Intestinal Myiasis and the Common House-Fly (*Musca domestica* Linn.).**—*Jl. Econ. Entomol.* 1925. Apr. Vol. 18. No. 2. pp. 334–335.

A case of intestinal myiasis due to *Musca domestica* in a boy 16 years old is recorded.

In a discussion which followed it was stated that scores of cases of myiasis have been established by examination of larvae at Washington during the last 10 or 12 years.

ROBERTS (J. Isgaer). **On the Bionomics of *Hippobosca equina*.**—*Ann. Trop. Med. & Parasit.* 1925. Mar. 31. Vol. 19. No. 1. pp. 81–90.

The fly has a limited distribution in North Wales, and is restricted to certain valleys in Carnarvonshire and Merionethshire. The distribution is governed by the presence of bracken, which is necessary for pupation, and the amount of sunshine. Horses and cattle are the chief hosts, but dogs are attacked.

Serious consequences may be caused by it frightening animals not accustomed to it. The diminution of horse transport has led to the fly attacking cattle. It was found impossible to keep the fly alive in the laboratory and conduct breeding experiments. It is generally found from May to August.

Decaying humus below bracken is the normal habitat for the deposition of larvae.

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- ANDERSON (Ch.). **Présence de *Bullinus contortus* dans l'oasis de Biskra (Algérie).** [The Presence of *Bullinus contortus* in the Oasis at Biskra (Algeria).]—*Bull. Soc. Path. Exot.* 1925. Mar. Vol. 18. No. 3. pp. 267-268.
- BRUMPT (E.). **Particularités évolutives de l'*Amblyomma agamum*.** [Details of the Evolution of *Amblyomma agamum*.]—*Ann. Parasit. Hum. et Comp.* 1924. Apr. Vol. 2. No. 2. pp. 113-120. With 3 text figs.
- CAMERON (Thomas W. M.). **The Cestode Genus *Mesocostoides* Vaillant.**—*Jl. Helminth.* 1925. Feb. 1. Vol. 3. No. 1. pp. 33-44. With 16 text figs.
- CRAM (E. B.). **A New Nematode, *Cylindropharynx ornata*, from the Zebra, with Keys to the Related Nematode Parasites of the Equidae.**—*Jl. Agric. Res.* 1924. May 17. Vol. 28. No. 7. pp. 661-672. With 8 text figs.
- GOODEY (T.). **Observations on Certain Conditions requisite for Skin Penetration by Infective Larvae of *Strongyloides* and *Ankylostomes*.**—*Jl. Helminth.* 1925. May. Vol. 3. No. 2. pp. 51-62.
- LEWIS (E. Aneurin). **Starlings as Distributors of "Gapes."**—*Jl. Helminth.* 1925. Vol. 3. No. 2. pp. 81-82.
- ORTLEPP (R. J.). **Observations on the Life History of *Triodontophorus tenuicollis*, a Nematode Parasite of the Horse.**—*Jl. Helminth.* 1925. Feb. Vol. 3. No. 1. pp. 1-14. With 9 text figs.
- THAPAR (G. S.). **On the Morphology and Systematic Position of *Echinopharynx*, a new Genus of Bursate Nematode from *Testudo tabulata*.**—*Jl. Helminth.* 1925. Feb. 1. Vol. 3. No. 1. pp. 19-32. With 10 text figs.
- THAPAR (G. S.). **On Some New Members of the Genus *Kiluluma* from the African Rhinoceros.**—*Jl. Helminth.* 1925. May. Vol. 3. No. 2. pp. 63-80. With 32 text figs.
- TURNER (W. Y.). **The Morphology of *Filaria sagitta* v. *Linatow*, 1907, from the Heart of *Tragelaphus sylvaticus* in Nyasaland.**—*Jl. Helminth.* 1925. Feb. Vol. 3. No. 1. pp. 15-18. With 6 text figs.
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BACTERIAL DISEASES.

- SACHELARIÉ (V.). **Etude comparative sur l'immunité conférée par la vaccination anticharbonneuse pratiquée par inoculation dans la peau et par la vaccination pasteurienne classique, chez les bovines.** [Intradermal and Subcutaneous Vaccination of Cattle against Anthrax.]—*Rev. Gen. Méd. Vét.* 1925. May 15. Vol. 34. No. 401. pp. 230-240.

It has been shown by BESREDKA and others that rabbits and guinea-pigs are resistant to infection with anthrax by any path other than the skin. The domesticated animals, on the other hand, are susceptible to infection by all paths. This is a point of considerable importance.

While guinea-pigs are susceptible to infection practically only by way of the skin, they can be immunized with certainty by the same path. The serum of such guinea-pigs has no protective power, and the conclusion is drawn by BESREDKA that the immunity possessed by such vaccinated guinea-pigs is due to the local immunization of the

skin and the natural power of resistance possessed by the other organs. On the other hand, the immunity conferred upon cattle and other large animals by the usual methods is one involving all the tissues, and this rests upon the production of antibodies, the existence of which in the serum is demonstrable.

The author briefly reviews the experiments of BROCC-ROUSSEU and URBAIN, MAZUCCHI, and VELU regarding immunization via the intradermal route. These authors have, however, in testing their animals, given the test doses by the same path. This may merely test the local immunity conferred upon the skin. The important point to determine is whether the immunity acquired is general.

Quite recently intradermal vaccination has been practised on a vast scale in the Levant army, it having been found necessary to abandon the Pasteur method and sero-vaccination. In all, 10,000 animals were treated, and it will be necessary to wait a year before the results can be evaluated. It must suffice for the present to say that the experiment was carried out in an infected area under the best possible conditions.

The author's experiments have been designed to provide answers to the following questions:—

1. The comparative resistance of cattle immunized intradermally and subcutaneously with Pasteur vaccines to experimental and natural infection.

2. The protective powers of the sera of such animals.

3. What conclusions may be drawn regarding the method of vaccination to be employed in a country where infection is likely to be heavy and the organism very virulent.

For his experiments Sachelarie had available 9 heifers of approximately the same age and size. Five of these were vaccinated intradermally with first and second vaccines at an interval of 8 days. The remaining 4 were vaccinated subcutaneously by the Pasteur method.

For the inoculations the anal fold was selected, for the reasons that it does not require shaving, it is convenient, and it can readily be kept steady while the injections are made, and comparisons are easily made.

In animals vaccinated intradermally a local reaction occurs in the form of a small slightly painful swelling which persists for several days. There is also a slight oscillation of temperature. This reaction is more distinct than that shown by animals inoculated subcutaneously. A month after the vaccinations were completed test inoculations were begun.

In the first test two of each of the batches and two control heifers were inoculated intradermally with a virulent strain of anthrax of Roumanian origin. The following day the animals vaccinated intradermally showed no symptoms of any kind. In those vaccinated subcutaneously there was a rise of temperature to 39.5° C. and a painful oedematous swelling at the seat of inoculation. The control animals were seriously ill, and during the next few days they showed temperatures exceeding 41° C., and there was pronounced and painful swelling of the fold of skin. These symptoms persisted for three or four days, and then recovery took place. The animals lost condition very markedly.

From this experiment it would appear that intradermal inoculation afforded the greater amount of protection.

In the second test one heifer of each batch was inoculated, the

intradermal path being again selected, but 0.5 cc. of culture was used, instead of 0.25 cc. used in the first test. No control was inoculated. Again, the animal inoculated intradermally gave no reaction, while that inoculated subcutaneously showed a painful swelling and a rise of temperature.

In the third test, two vaccinated animals, one from each batch, and an unvaccinated control. These animals were fed with oats mixed with powdered glass and a quantity of sporulating anthrax culture. The test was therefore a very severe one. The control animal died of anthrax, but neither of the vaccinated animals showed the least sign of ill-health.

Fourth test. A heifer vaccinated intradermally was fed as in the previous test, but the amount of sporulating culture added was very much greater. The test resulted in a rise of temperature to a maximum of 40.6° C., and there was great prostration. Recovery followed, but there can be no doubt that this would not have taken place had the animal not been vaccinated.

The serum of this animal, taken on the day of the test, protected a guineapig against a fatal dose of anthrax in an amount of 2 cc.

It appears to be clear then that intradermal vaccination produces both local and general immunity.

Tests were carried out with the sera of all the heifers on guineapigs, and it was found that while doses of 1 cc. failed to confer immunity against the second vaccine, 1½ and 2 cc. conferred immunity. The sera of heifers after vaccination only and before test inoculations were found to be protective for guineapigs, and therefore it appears to be certain that intradermal vaccination establishes general immunity.

MONOD (T.) & VELU. **Intradermovaccination en un temps contre le charbon bacteridien.** [Single Intradermal Vaccination against Anthrax.]—*Rec. Méd. Vét.* 1925. Feb. Vol. 101. No. 4. pp. 67-73.

During 1924, 40,000 single doses of sporulated vaccine were used in Morocco, and of these nearly half have been administered intradermally. In some districts the vaccine has been employed although no cases of anthrax were reported. In others it has been used after the use of protective serum which was employed for the control of outbreaks. In other places it has been used as a prophylactic and as a means of checking the disease after it had appeared.

Objection has been raised to the technique of injecting into the anal folds on the score of risk from kicks, and the skin behind the shoulder has been suggested as an alternative, but it must be pointed out that this seat of injection is open to the very serious objection that if the vaccine is by chance implanted through the skin serious results are likely to follow. Intradermic vaccination is not followed by any reaction.

Only in one case was the intradermal vaccination followed by ill effects. One veterinary surgeon reported loss of appetite, dullness and depression, followed by the appearance of piroplasmiasis in some cattle and sheep. The appearance of the latter is not a matter for surprise, as it has been recorded on many occasions, but it is difficult to explain the general symptoms since the animals upon which the vaccine tests were carried out tolerated 1,000 doses without any reaction of this kind.

Serious losses were reported by one owner (7 out of 35), but the diagnosis was made by the owner and was based on splenic enlargement. The authors insist upon the difficulty of making a definite diagnosis in this way in a country where piroplasmiasis exists, and where this disease is a greater danger than anthrax for cross-bred animals.

In testing the immunity two sheep which were in poor condition and which had been vaccinated intradermally eight months previously were injected with 1,000 m.l.d. of the Moroccan strain of anthrax. One died of anthrax and one of shock. It is pointed out that the test was immensely more severe than natural infection.

VELU (H.) & BIGOT (A.). **Vaccination du cheval contre le charbon bacteridien per intradermovaccination en un temps.** [The Protection of Horses against Anthrax by a Single Intradermal Vaccination.]—*Rec. Méd. Vét.* 1925. Jan. 30. Vol. 101. No. 2. pp. 40-49.

The authors have vaccinated experimentally 59 animals (horses and mules). They have used a sporulated vaccine which was of slightly lower virulence than that used in Morocco for the protection of oxen, sheep and pigs. The dose used was 0.25 cc. injected at one place.

After some experience the injection of the vaccine into the skin beneath the tail or the skin of the ear was abandoned, the former because restraint of the animals was difficult, and the latter because of the production of a painful swelling.

Finally, the skin of the neck was selected. If by accident the vaccine is introduced subcutaneously the only results are that there is a delay in the establishment of immunity and there is a more or less extensive local reaction. The authors give details of each animal treated in a tabular statement. Of the 59 animals treated, 38 showed no reaction. There was no general reaction in any case save one, and in this animal wasting was observed. Four animals showed elevations of temperature.

Test inoculations were carried out from 5 to 28 days after the vaccination, and these were given subcutaneously. Forty-eight animals showed no reaction. Of the remaining 11, 8 developed a slight temporary local swelling and the others a more persistent swelling, which disappeared slowly. One of these died of anthrax on the fourth day. In this particular case the whole of the vaccine was not introduced into the skin. The authors believe that the animal would have resisted natural infection.

WIGOTTSCHIKOFF (G.). **Die Hautvakzination gegen Milzbrand.** [Skin Vaccination against Anthrax.]—*Zeitsch. f. Immunitätsforsch.* 1925. Feb. 16. Vol. 42. No. 2. pp. 105-112.

Five guineapigs were treated by applying ZENKOVSKY'S vaccine to a shaved area of skin with a tampon. The vaccine contained vegetative forms only.

No protection was conferred.

The author thought that possibly the immunization was not complete because of the impossibility of making certain that the full dose of vaccine was used. He therefore treated five further guineapigs by injecting 0.1 cc. of the first and second ZENKOVSKY'S vaccines intradermally. One dose of the first was given and four doses of the second.

The latter were 0.1, 0.1, 0.2, and 0.3 cc. respectively, and were given at weekly intervals. Subcutaneous injection of 0.1 cc. of virus proved fatal.

A second series of experiments was carried out with rabbits. Ten were used, but in only two was a degree of resistance to infection found.

In further experiments it was found to be possible to infect rabbits without involving the skin in the operation. The insusceptibility of the internal organs is only relative, and dependent upon the dose of infective material used.

CORDIER (G.). Essais de cuti-vaccinations contre la fièvre charbonneuse. Résultats comparatifs de différentes méthodes. [Cuti-Vaccination against Anthrax.]—*C.R. Soc. Biol.* 1925. May 15. Vol. 92. No. 16. pp. 1309-1311.

Guineapigs had first and second anthrax vaccines applied to shaved areas of skin for 24 hours each at an interval of 12 days. When tested 24 days after the second vaccine by virulent culture placed on the skin for 24 hours, two-thirds of the animals succumbed. The actual numbers are not given. Sixteen days later the survivors received one-tenth cc. of the same virulent culture. All died.

In the second series of tests the vaccines were applied with friction for 5 minutes. The intervals were the same as in the first tests. When tested with virulent material, also applied with friction, three-fifths of the animals died. A second test 16 days later by the subcutaneous path failed to infect any of the survivors.

Intradermo inoculations.—The doses were 0.1 cc. of vaccines injected intradermally at an interval of 12 days. Intradermal test inoculations carried out later caused death in 12 out of 14. A second test killed 1 of the 2 survivors.

Three sheep were vaccinated by friction, and when tested with virulent culture applied in the same way one died. The two survivors failed to become infected by a second test inoculation.

Fifteen sheep were vaccinated intradermally. Fourteen of these survived a test inoculation, and one of these survivors died after a second test inoculation.

Three calves were protected by intradermal inoculation, and two of these showed only a rise of temperature when subjected to a test inoculation.

Two sheep were vaccinated by injection into bone marrow. Both survived intradermic and subcutaneous test inoculations.

A similar result followed vaccination into the testicular substance, care being taken to avoid contamination of the tunics of the organ.

In many cases fixation tests were carried out after the second vaccines, but no positive results were obtained.

NICOLAS (Eug.). Intradermo-vaccination, contre le charbon bactérien de 8,912 chevaux et mulets de l'armée du Levant. [Intradermo Vaccination against Anthrax of 8,912 Horses and Mules of the Levant Army.]—*C.R. Soc. Biol.* 1925. Mar. 13. Vol. 92. No. 9. pp. 693-694.

The technique was as follows: The animals were first injected in three places 5 centimetres apart on the side of the neck with 0.25 cc. of first vaccine (Pasteur). They were rested on the following day.

From the third to the sixth day they did their normal work. On the seventh day the second (Pasteur) vaccine was given in the same manner on the opposite side of the neck. After a day's rest they were put to work again.

No ill-effects followed the first vaccine. In 22 per cent. there was a certain amount of swelling after the second vaccine was given. This appeared in from 2 to 53 days after the operation, but usually during the second week. These swellings were in most cases reabsorbed without treatment or after a dose of anti-anthrax serum. In four cases swellings occurred in parts of the body remote from the seat of inoculation, and two of these animals died.

A year later four cases of anthrax had occurred among the vaccinated animals, and two of these terminated fatally.

During the period 1919-1923, when subcutaneous injections of serum were given, and only in infected places, the mortality averaged 0.81 per cent. per annum.

In 1924, when the intradermo-vaccination was used, the mortality was 0.045 per cent.

SANARELLI (G.). **Sur la pathogénie du charbon dit "Interne" ou "Spontané."** [The Pathogenesis of so-called "Internal" or "Spontaneous" Anthrax.]—*Ann. Inst. Pasteur.* 1925. Mar. Vol. 39. No. 3. pp. 209-297.

This long paper is divided into sections dealing with the following points: (1) A review of the opinions at present held regarding the pathogenesis of "internal" anthrax; (2) The impossibility of reproducing experimentally the so-called "intestinal anthrax mycosis"; (3) the behaviour of anthrax bacilli in the alimentary tract; (4) the non-existence of the condition termed "intestinal anthrax mycosis"; (5) the manner in which anthrax spores behave in the lungs of animals; (6) the manner in which intestinal anthrax develops in animals infected with spores; (7) the production of the lesions in internal anthrax.

It is an opinion generally held that the so-called intestinal anthrax is due to the germination of spores, which have escaped the action of the gastric juice, in the intestine, and that the serious lesions are due to direct invasion of these parts by the bacilli.

So far all experiments designed to reproduce "natural anthrax" by experimental means have failed to yield convincing results.

Sanarelli's experiments, which are described in this paper, and which have been carried out with newly born and adult guineapigs and rabbits, indicate that it is almost impossible to induce infection in this way even with enormous doses. The bacilli are promptly destroyed by the gastric juice and by the intestinal secretions. In the great majority of cases similar results follow the administration of spores by the mouth. In some of these cases, however, death from anthrax occurred, and in these animals there were usually local lesions indicating that the infection had actually taken place by inoculation. There were, however, some cases in which no evidence of such localized infection was found.

The administration of spores by the mouth showed that they are not destroyed by the gastric juice, and, further, that they are incapable of germinating in the intestine. The intestinal secretions exercise anti-bacterial powers particularly when fresh, but even when old, or after subjection to heat, they inhibit multiplication.

The introduction of large quantities (100,000) of spores into the respiratory tract is followed by infection, but smaller doses, such as are capable of being dealt with by the local defences, fail to cause the disease. The spores are transported by the blood to various organs and remain there without producing any effect, and by degrees they are digested. In cases of this kind fatal infection can be caused by injecting some substance which will cause the formation of necrotic foci, or will disturb the physico-chemical relationships of the cell colloids. Substances which have been found capable of producing these effects are arsenic, quinine, lactic acid, sodium nucleinate, glucose, peptone, blood, milk, distilled water, and living and dead cultures of colon bacilli.

Pulmonary anthrax can be produced in this way, the chemical substance being injected into the air passages either immediately after, or some days after the injection of the spores. The exposure of animals that are "carriers" of spores, to adverse conditions, such as incubation at body temperature on a number of occasions, leads to reduction of cell resistance and infection. A similar result may be obtained by keeping such rabbits short of water (*i.e.*, feeding them with food which is deficient in water). Such a diet is fatal to normal rabbits in about 6 weeks, but "carrier" rabbits die in a week.

The lesions of the alimentary canal found in anthrax are not those of local infection, but result from blood invasion.

CORDIER (G.). Sur la teneur en glucose du sang des animaux charbonneux. Action de l'insuline et du sérum glucosé dans l'évolution de l'infection charbonneuse. [The Glucose Content of the Blood of Animals infected with Anthrax. The Effects of Insulin and Serum containing Glucose upon the Development of Anthrax.] *C.R. Soc. Biol.* 1925. May 15. Vol. 92. No. 16. pp. 1307-1308.

The amount of glucose in the blood of animals affected with anthrax is so variable that no accelerating or retarding action can be ascribed to insulin or glucose serum in the evolution of the disease.

BASSET (J.). Réceptivité du cobaye et du lapin au virus du charbon bactérien. [The Susceptibility of the Guinea-pig and the Rabbit to Anthrax.]—*C.R. Soc. Biol.* 1925. June 5. Vol. 92. No. 19. pp. 1513-1515.

The author is of the opinion that BESREDKA'S view regarding the susceptibility of the skin to anthrax, to the exclusion of other tissues, is too sweeping. He cites a few experiments designed to show that it is the subcutaneous tissue which is the most susceptible to infection. In his opinion the epidermis is really the only tissue which belongs to the skin proper. This has a low degree of susceptibility to anthrax.

BASSET (J.). Pouvoir pathogène des spores pures de la bactérie de Davaine. [The Pathogenicity of Pure Spores of Davaine's Bacillus.]—*C.R. Soc. Biol.* 1925. June 5. Vol. 92. No. 19. pp. 1515-1517.

A brief description is given of inoculation experiments designed to show that the spores of the bacillus of anthrax are less pathogenic than the vegetative elements.

BASSET (J.). **Spores pures de la bactérie de Davaine dans les tissus lésés. Associations microbiennes.** [Pure Spores of the Anthrax Bacillus in Damaged Tissues. Bacterial Associations.]—*C.R. Soc. Biol.* 1925. June 5. Vol. 92. No. 19. pp. 1517-1519.

While the injection of anthrax spores in a state of purity is not necessarily fatal, the admixture of lactic acid renders a non-pathogenic dose pathogenic. The facts, according to the author, run parallel with those regarding *B. chauvaci*.

LECLAINCHE (E.) & VALLÉE (H.). **Sur la vaccination contre le charbon symptomatique.** [Vaccination against Blackquarter.]—*C.R. Soc. Biol.* 1925. May 15. Vol. 92. No. 16. pp. 1273-1276.

The authors claim that the addition of 2 to 4 per 1,000 of "formol" to cultures kept at 38° C. yields sterile antigens which are far more active than filtered cultures.

Young cultures to which "formol" has been added become avirulent and non-toxic. Thus, one obtains a vaccine which resembles the non-toxic diphtheria vaccine.

Whole cultures so treated may be injected subcutaneously into guineapigs and bovines in doses of 0.5 to 5 cc. without any effect other than a slight œdema. When tested at intervals of 10 to 30 days these animals withstand several lethal doses of the same culture in its virulent state.

Experiments on a large scale are under way, and from these it is hoped to obtain information regarding the duration of the immunity.

WAGENER (K.). **Die Diagnose des Rauschbrandes.** [The Diagnosis of Blackquarter.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1925. April 1. Vol. 52. No. 2. pp. 73-179.

In this paper the author deals at length with the following points in connection with Blackquarter: Epidemiology, the animals susceptible to infection, symptoms, pathological anatomy, bacteriology, nomenclature, and the importance of diagnosis. The section dealing with the bacteriology of the disease is further divided into sections dealing with the morphology of the organism, experimental inoculations, serum diagnosis, and culture experiments.

The paper contains four text figures and concludes with a very extensive list of references.

ZANOLLI (C.) & SORDELLI (A.). **Identidad del Carbunco sintomático y de "La Mancha."** [The Identity of Blackquarter with "La Mancha."]—*Revist. Med. Vet.* 1925 [Dec. 1824-Mar. 1925]. Vol. 7. Nos. 5 & 6. pp. 372-380.

1. The age of the animals attacked does not furnish any evidence that the two diseases are distinct.
2. The morphological and cultural characters of the causal organisms of the two diseases are identical.
3. The lesions produced in both guineapigs and sheep by inoculation with the two organisms are the same.
4. The organisms cannot be distinguished by serological tests or by neutralization of toxin tests.

SMITH (Theobald). **Pneumonia associated with *Bacillus abortus* (Bang) in Fetuses and New-born Calves.**—*Jl. Exp. Med.* 1925. May 1. Vol. 41. No. 5. pp. 639–647. With 2 plates.

Pneumonia of varying extent due to *B. abortus* may be present in calves. In some cases the pneumonia is established early, in others the pneumonia is found in calves which have survived for a few hours only, and in calves which have survived for a week or more.

The bacillus has been isolated directly or via the guineapig, or in both ways from many cases.

BEVAN (L. E. W.). **Infectious Abortion of Cattle. Notes on Agglutination.**—*Veter. Jl.* 1925. Mar. Vol. 81. No. 3. pp. 110–126.

Experiments with “devitalised” vaccines for the purpose of immunization have led to inconclusive results.

DUNCAN (J. T.). **The Rôle of the Domestic Cow in the Epidemiology of Undulant Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.*—1924. Nov. 20 & Dec. 11. Vol. 18. Nos. 5 & 6. pp. 318–327.

In this paper the author records a case of undulant fever in an Englishman from Rhodesia which was apparently caused by *B. abortus*. This view was supported by agglutination tests and by absorption tests. Culturally the organism also tended to resemble *B. abortus* more closely than *B. melitensis*.

GERLACH (F.) & MICHALKA (J.). **Über die häemorrhagische Septikämie der Schafe.** [Haemorrhagic Septicæmia in Sheep].—*Zeitschr. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1925. Feb. 3. Vol. 27. No. 4. pp. 276–287.

The authors record what they believe to be the first cases of hæmorrhagic septicæmia in sheep in Austria.

Only a few cases were observed. The principal lesions were sero-fibrinous pleurisy and broncho-pneumonia with necrosis. As was to be expected, a mixture of bacteria was found in the exudate and in the lung tissue, but a bipolar organism was found in a state of apparent purity in the bronchial glands.

The organism was pathogenic for mice and rabbits, but not for guineapigs. Intratracheal injection into a sheep produced dullness, a nasal discharge, and bronchial râles. A second intratracheal injection given ten days later caused the reappearance of symptoms. At the postmortem examination two abscesses were found at approximately the seats of injection, it being apparent that the entire doses had not been introduced into the trachea. The blood, lungs, bronchial glands, etc., were sterile, but a bipolar organism was cultivated from the abscesses in the neck. The organism was pathogenic for mice, and one of two pigeons inoculated died. The other pigeon and a fowl, although they showed evidence of illness, recovered. Subcutaneous inoculation of a lamb caused visible illness. There was a rise of temperature and acceleration of pulse and respiration, marked catarrh of the nasal mucous membrane, and muscular spasms. Death took place in 36 hours. At the postmortem there was sero-hæmorrhagic

infiltration at the seat of inoculation, nasal catarrh, congestion of the meninges of the brain, petechiae on the pleura, epicardium and in the kidneys.

An antiserum was prepared from a horse, and by the use of this, coupled with thorough disinfection, deaths among the sheep were stopped.

NIIMI (D.). **Correlations between Haemorrhagic Septicaemia Organisms.** *Jl. Jap. Soc. Vet. Sci.* 1924. Dec. Vol. 3. No. 4. pp. 309-310. [Author's English abstract.]

The author has been unable to distinguish between *B. bubalisepticus*, *B. suisiepticus*, *B. avisepticus*, and *B. bovisiepticus* by morphological, cultural, or serological tests, nor has he been able to show any differences in their pathogenicity.

CAROUGEAU. **Lymphangite ulcéreuse à Madagascar.** [Ulcerative Lymphangitis in Madagascar].—*Rev. Gen. Méd. Vét.* 1925. Jan. 15. Vol. 34. No. 397. pp. 8-9.

In this brief note the author states that no confusion has been made between ulcerative lymphangitis and bursati in Madagascar. The latter disease, so far as he knows, does not exist there, but he has known of the existence of ulcerative lymphangitis in the Island for nearly twenty years. He has differentiated the disease from sporotrichosis and from epizootic lymphangitis. The latter disease is not now known in Madagascar; no cases have been seen since the importation of mules from Algeria was stopped.

A cure can be effected provided intervention is early. The best results have been obtained by intravenous injection of arsenobenzol or novarsenobenzol. Three or four injections, each of 3 grammes, are given at intervals of eight days. Secondly, favourable results have followed the subcutaneous injection of 50 to 60 cc. of blood taken from the animal itself every four or five days. Intravenous injections of 1-2 cc. of oil of turpentine every four days have been found useful.

All external treatments suitable to such cases must be applied at the same time.

EMOTO (O.) & NIIMI (D.). **Infectious Pneumonia in Sheep.**—*Jl. Jap. Soc. Vet. Sci.* 1924. Dec. Vol. 3. No. 4. pp. 345-346. [Author's English Abstract.]

Infectious pneumonia has been the cause of heavy losses among sheep every summer. At the postmortem examinations severe infestations with worms were found in the stomach and intestines. There was catarrhal pneumonia associated with pleurisy.

From the diseased lungs *Bacillus pyogenes*, *B. avisepticus*, a small Gram-positive bacillus, *Micrococcus catarrhalis*, a streptococcus, and a staphylococcus were isolated. The first three of these were considered to be of the greatest importance on account of their frequent occurrence, their virulence for lambs and laboratory animals and the serological reactions given with the serum of diseased lambs.

A mixed vaccine was prepared and used on the infected farm. Vermifuges were prescribed at the same time. The losses were reduced to one-tenth the number of previous years.

LIGNIÈRES (J.). **Sur la classification du microbe de la typhose aviaire.** [The Classification of Fowl Typhoid.]—*Bull. Acad. Méd.* 1925. May 5. Vol. 93. No. 18. pp. 500-505.

Lignières has had the opportunity of comparing the organism isolated in the Argentine (*Salmonella avium*) with *B. sanguinarium*—the cause of fowl typhoid in France—and concludes that they are identical.

SABELLA (A.). **Involutionsformen des *Bacillus erysipelatos suis*.** [Involution Forms of the Bacillus of Swine Erysipelas.]—*Centralbl. f. Bakt.* I. Abt. Orig. 1925. May 1. Vol. 94. No. 7-8. pp. 411-416. With 3 text figs.

The presence of Saponin in culture media used for the cultivation of the swine erysipelas bacillus leads to the production of involution forms. Bacilli so cultivated differ morphologically, culturally, and serologically from the original form, and these new characters may be impressed upon them.

TEPPAZ (L.). **Tuberculoses animales en A. O. F.** [Tuberculosis of Animals in French West Africa.]—*Rev. Méd. de Angola.* 1923. Aug. (No. especial consagrado ao 1^o Congresso de Med. Trop. da Africa Ocidental. Vol. 5.) No. 4. pp. 219-220.

Tuberculosis is rare among animals in French West Africa, but it is not correct to state, as has been done, that it does not occur.

The author summarizes briefly the reports previously published regarding the existence of the disease.

Teppaz has found 6 cases in three years at an abattoir killing 20 to 30 bovines daily.

During 1923, although every suspicious lesion was subjected to biological examination, only a single positive result was obtained. Zebus must be considered as resistant to infection with tuberculosis.

Pigs appear to be resistant also. In all, 6 cases have been recorded, but the type of bacillus responsible has not been ascertained. No cases have been recorded in cats or dogs.

MYCOTIC DISEASES.

MICHELON. **Un cas d'abcès pulmonaire déterminé par des Cryptococques.** [A Pulmonary Abscess due to Cryptococci.]—*Rec. Méd. Vét.* 1925. Feb. 15. Vol. 101. No. 3. pp. 71-72.

The horse was under treatment for epizootic lymphangitis from July 11th to September 13th, 1924. It showed four abscesses on the lower lip, and abscess formation in the sublingual glands. A mallein test yielded a negative result. Under treatment the lesions cleared up. About a month later the horse was slaughtered on account of a fracture of the humerus. At the postmortem a small abscess was found in the apex of the right lung. The glands were enlarged but otherwise normal in appearance. On section a small quantity of yellowish white pus escaped. Close examination shewed that in reality there were three

or four abscesses close together. Microscopic examination revealed the presence of cryptococci in a state of purity. A minute abscess was discovered in one of the bronchial glands, and in this cryptococci were found.

The other organs were apparently normal.

GRONOW (A.). **Kultur- und Infektionsversuche mit dem *Cryptococcus farciminosus*.** [Cultural and Infection Experiments with the *Cryptococcus farciminosus*.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. Dec. 30. Vol. 51. No. 6. pp. 601-615.

The greater part of this paper is occupied by a general survey of the state of knowledge regarding epizootic lymphangitis.

The organism was cultivated in two liquid media containing ox and horse serum respectively.

The medium had the following composition:—Ox serum 70, beef broth 30, grape sugar 2, and glycerin 2. It is not stated at what temperature the cultures were incubated. Growth began to appear in about a fortnight, on the surface of the medium and as a sediment. In the course of three weeks the surface was covered with a bluish-white growth. A horse inoculated cutaneously with culture developed an abscess at the seat of inoculation. Reference is made to cultures obtained on an agar medium, but the composition of this is not specified. Growth from solid cultures was also used for the inoculation of this horse at another part of the body. An abscess developed. Mycelial and yeast forms were found in the pus. No infection followed intraperitoneal inoculation.

Attempts to obtain evidence of infection by the complement fixation test using various extracts as antigen failed.

KÄMPER. **Die Lymphangitis epizootica des Pferdes.** [Epizootic Lymphangitis.]—*Arch. f. Wissenschaft. u. Prakt. Tierheilk.* 1924. Dec. 30. Vol. 51. No. 6. pp. 616-641.

This paper contains an account of the various methods of treatment which have been tried by the writer.

Seventy-five animals have been under his observation. Of these 19 died or were killed. Of the 56 which recovered 30 recovered without treatment. Eighteen were cured by operation, and one by curetting. Seven, or 37 per cent., of the animals treated by medicinal means recovered.

The author's observations lead him to think that the cryptococcus may persist for months in encapsuled abscesses. Outside the body they may retain their vitality for 6 months.

BIGOT (A.) & VELU (H.). **Isolement rapide de *Cryptococcus mirandei* en culture pure.** [The Rapid Isolation of *Cryptococcus mirandei*.]—*Bull. Soc. Path. Exot.* 1925. Feb. 11. Vol. 18. No. 2. pp. 127-129.

The methods used have been based upon those devised by PIETRE and DE SOUZA for soil investigations, and by BAROTTE and Velu for the cultivation of the cryptococcus of RIVOLTA. The principle of the method is the use of media acidified with citric acid to the extent of 5 per mille.

A fragment of a tumour from a donkey's eye placed on Sabouraud's agar acidified in this method and incubated at 32° C. appears swollen after 24 hours, acquires a creamy white tint, and is surrounded by a greyish margin.

A subculture on ordinary or acidified Sabouraud yields an abundant pure culture in 24 hours.

The acidified medium was found to prevent the multiplication of accidental organisms.

No growth was obtained in acidified peptone broth, and subcultures on Sabouraud's agar after 24 or 48 hours also failed to grow. Acidified peptone broth appears therefore to have a sterilizing action.

JEAUME (G.) & DEKESTER (M.). Isolement de l'agent pathogène de la Blastomycose des voies lacrymales. [The Isolation of the Cause of Blastomycosis of the Lachrymal Tract.]—*Bull. Soc. Path. Exot.* 1925. Feb. 11. Vol. 18. No. 2. pp. 125-127. With 8 text figs.

Cultures of the organism can be obtained upon Sabouraud's medium and on dung agar, and on many of the ordinary media. The optimum temperature appears to be about 30° C., and at this temperature visible growth is obtained within 24 hours. On agar media the organism forms a continuous glistening layer which is readily detached. As cultures become older they turn brown, become dry and wrinkled. In peptone broth there is first formed a flocculent deposit at the bottom, then a ring of growth forms round the surface of the medium, and this finally becomes covered with a surface growth.

The organism possesses great vitality, and subcultures can be obtained from tubes which have been left in the laboratory without special precautions for a year or more. The organism appears as a rounded or oval body which may be drawn out at one end, and may or may not show a refractile granule.

Multiplication in broth is by budding, and actual chains may be formed. Some of the organisms become elongated, but true filaments have not been observed.

On agar the cells rapidly increase in volume and may measure 7-8 μ . The wall becomes thickened and the refractile granules increase in number.

On carrot multiplication comes to a stop rapidly.

On two occasions the authors have been able to produce lesions in donkeys experimentally with cultures. The organism is provisionally placed in the genus *Cryptococcus*.

DISEASES DUE TO FILTERABLE VIRUSES.

REPETTO (R.). Quelques cas de rage canine au Bas-Congo. [Canine Rabies in the Lower Congo.]—*Rev. Méd. de Angola.* 1923. Aug. (No. especial consagrado ao 1° Congresso de Med. Trop. da Africa Occidental. Vol. 5.) No. 4. pp. 113-114.

An outbreak of what appeared to be rabies occurred at Mayumbe in June, 1922. Diagnosis was based upon clinical evidence, as means were not available for biological or histological examinations. It appeared to be probable that the outbreak was an extension from that which had occurred earlier at Brazzaville.

In October cases occurred at Boma. In these cases detailed examinations were made. Typical Negri bodies were discovered in the brains of two cases.

Animals inoculated subdurally from the first case died, probably because the material used was putrid, on the following day. Two rabbits inoculated subdurally from the second case also died on the day following the operation. Two guineapigs and two rats inoculated subcutaneously survived. Two dogs inoculated with brain tissue kept in glycerin for 13 days also survived.

A specimen of fixed virus from the Antirabic Institute at Sassari was used for the inoculation of two dogs subdurally, and to guineapigs and two rats subcutaneously. None of these became infected. This virus had been obtained from Europe 2 months previously and was considered to be exceedingly virulent.

REMLINGER (P.). **Vaccination du chien et du chat contre la rage au moyen du virus-éther.** [The Vaccination of Dogs and Cats against Rabies by means of Virus treated with Ether.]—*C.R. Soc. Biol.* 1925. May 8. Vol. 92. No. 15. pp. 1195–1196.

The experiments have been carried out with the brains of rabbits, the spinal cords of which are used for human protective inoculations. The brains are immersed in ether for 25, 20, and 15 hours. They are then emulsified with 50 cc. of sterile salt solution and filtered through muslin. The injections are made subcutaneously every day or every other day. A whole brain is used at each injection for a dog, and half for a cat. It is not held that either the periods of immersion or the doses are definitive.

Brains may be kept in glycerin until they are required, and may be then immersed in ether, and etherized brains may be placed in glycerin for transmission to places where they are required.

Further experiments are under way in which the brains of rabid dogs are being tested as vaccine in this way, and a further account of the results is promised.

GUYON (M.). **Curieux effets de la fièvre aphteuse chez des brebis.** [Curious Effects of Foot and Mouth Disease in Sheep.]—*Rec. Méd. Vét.* 1925. Feb. 15. Vol. 101. No. 3. pp. 73–74.

The author records the occurrence of lactation in ewe lambs which had not been served as a result of mild attacks of foot and mouth disease.

MAGALHAES (O. de). **Typhose aviaire.** [Avian Typhoid.]—*C.R. Soc. Biol.* 1925. June 12. Vol. 92. No. 20. p. 31.

The author states that in parts of Brazil he has observed a disease resembling fowl cholera which is due to a bacillus almost identical with *B. sanguinarium*. Once out of 150 experiments he has infected a fowl with virulent liquid passed through a Berkefeld filter. This, he states, must be confirmed.

Vaccination on a large scale (12,000) has completely cleared up endemic centres of infection.

GRANOUILLET (M.). **Les abcès de fixation dans la peste du buffle.** [Fixation Abscesses in the treatment of Cattle Plague in Buffaloes.]—*Rev. Vét.* 1925. May. Vol. 77. No. 3. pp. 295-297.

The author has found that the injection of 10 to 15 cc. of oil of turpentine into the subcutaneous tissues of the brisket is of value for the treatment of cattle plague in buffaloes.

SCHEIN (H.) & JACOTOT (H.). **La Séro-infection : vaccination préventive contre la peste bovine.** [The Serum-Simultaneous Inoculation against Cattle Plague.]—*Arch. Inst. Pasteur d'Indochine.* 1925. Apr. No. 1. pp. 48-56.

The authors discuss the three factors concerned in the serum-simultaneous inoculation of cattle against cattle plague. They conclude that the part played by variation in the strength of the serum is slight. The virulence of the virus is of more importance, but the most important factor is the general condition of the animal, and, in conjunction with this, the hygienic conditions under which the animals are kept.

CURASSON (G.). **Introduction de la Blue Tongue en Afrique Occidentale Française.** [The Introduction of Blue Tongue into French West Africa.]—*Bull. Soc. Path. Exot.* 1925. Feb. 11. Vol. 18. No. 2. pp. 215-218.

The author gives the history of the introduction of Blue Tongue into Senegal, which occurred towards the end of 1923.

The disease was introduced in merinos imported from South Africa. On arrival they were divided into three lots to be sent to different destinations. After the initial cases the disease died out in two districts where there were no mosquitoes, but persisted in the third where mosquitoes abounded.

ONO (S.). **A Study of Contagious Pleuro-Pneumonia in Imported Cattle.**—*Jl. Jap. Soc. Vet. Sci.* 1925. Mar. Vol. 4. No. 1. pp. 45-48. [Author's English abstract.]

Contagious bovine pleuro-pneumonia first appeared in Japan in September, 1924, when three cases were detected at the Yokohama Quarantine Station among 42 Mongolian cattle imported from Dairen, China.

KIMURA (T.), FUKUSHIMA (T.), & FUJII (T.). **Pathologische anatomie von Lungenseuche (Pleuropneumonia bovis contagiosa) der Rinder in Chosen.** [The Morbid Anatomy of Contagious Bovine Pleuro-Pneumonia in Korea.]—*Sei-i-Kwai Med. Jl.* 1925. Feb. Vol. 44. No. 1. p. 16. [German Abstract of Japanese original article.]

The authors describe the results of their examination of specimens from nine cases of pleuro-pneumonia, obtained during an outbreak in 1922. There appears to be nothing new in the paper.

MISCELLANEOUS.

JOHNSON (E. L.). **Relation of Sheep to Climate.**—*Jl. Agric. Res.* 1924. Nov. 15. Vol. 29. No. 10. pp. 491-500. With 18 charts.

The author adduces reasons, based upon records, why climate must be taken into consideration in the selection and development of various breeds of sheep.

The important periods are the rutting season, period of pregnancy, and of lambing, during which climatic conditions should be favourable.

Sheep thrive best in areas where summers are cool, winters mild, and where the rainfall is sufficient to produce good grazing. The areas of dense sheep population fulfil these conditions.

MARSH (C. D.). **Stock-Poisoning Plants of the Range.**—*U.S.A. Dept. Agric. Dept. Bull.* No. 1245. 1924. Dec. 22. 36 pp. With numerous figs. & plates.

While figures are not available, it is estimated that poisonous plants cause a loss of from 3-5 per cent. of range animals, and it is probable that in some States the figure is much higher. In Wyoming sheep farmers estimate their loss at over 14 per cent. The Bulletin under review has been published with a view to assist stock owners to minimize their losses. Extensive investigations and experiments have been and are being carried out, and definite results have been obtained. To make the publication more valuable to owners many of the illustrations are given in colour. The plants dealt with are as follows:—Liliaceae, Fagaceae, Chenopodiaceae, Ranunculaceae, Rosaceae, Leguminosae, Rhamnaceae, Umbelliferae, Ericaceae, Asclepiadaceae, Compositae, Ferns.

DONATIEN (A.). **Les Maladies microbiennes des animaux domestiques in Algérie.** [The Diseases of Animals in Algeria.]—*Rev. Gen. Méd. Vét.* 1925. Feb. 15. Vol. 4. No. 398. pp. 65-77.

This paper is a summary of existing knowledge regarding the diseases of live stock in Algeria. It is divided into four sections, which deal respectively with (1) diseases, the nature of the virus of which is still unknown; (2) bacterial diseases; (3) diseases due to filterable viruses; (4) protozoal diseases.

ADLER (S.). **A Disease of Fowls in Palestine characterised by Leucocyte Inclusions.**—*Ann. Trop. Med. & Parasit.* 1925. Mar. 31. Vol. 19. No 1. pp. 127-135. With 17 text figs.

The disease produced shows some resemblance to Spirochaetosis clinically, but is not amenable to treatment with atoxyl or neo-salvarsan. It is of economic importance as it attacks imported breeds and cross-bred poultry. Native fowls are not observed to be attacked. The symptoms are dullness and inappetence, followed by a rise of temperature and diarrhoea. Death takes place in 7 to 14 days.

The inclusions found in the leucocytes were of the following varieties:

- (1) Minute granules of chromatin surrounded by a vacuole.
- (2) Small regular rings of chromatin.
- (3) Spherical solid masses of chromatin.
- (4) Irregular bacilliform masses of chromatin.
- (5) Clusters of minute granules of chromatin not lying in vacuoles.

Similar inclusions were noticed in the interior of the nuclei of infected cells. The granules were readily distinguished from the ordinary leucocyte granules of the fowl's blood. With Romanovsky they stained like the nuclei of malaria parasites, but more brilliantly. The inclusions present varied very largely in number in different cells.

The percentage of infected cells was as high as 18, and in cells in which the number of inclusions was very large the nucleus had practically disappeared.

On postmortem affected fowls showed the following lesions:—The liver was enlarged and softened, and showed areas of fatty degeneration. There were areas of necrosis in the kidneys.

The evidence obtained by the examination of the blood of apparently normal native birds indicated that these acted as carriers.

MACFIE has expressed the opinion that the inclusions are similar to those described by him as occurring in diseased fowls in the Gold Coast and Nigeria.

Atoxyl, neo-salvarsan, and bismuth sodium tartrate were without curative effects. The disease can be transmitted by blood inoculation.

Experiments failed to provide conclusive evidence regarding the possible transmission of the disease by *Argas persicus*.

LATHBURY (E. B.). **A Case of Snake Bite in a Dog treated with Antivenine Serum.**—*Jl. Royal Army Med. Corps.* 1925. Apr. Vol. 44. No. 4. pp. 290–291.

The dog was bitten by a "pitless" Russells viper. A dose of 15 cc. of anti-venom serum was injected into each flank. There was considerable swelling around the bite, which was on the eyebrow, and subsequently some difficulty in swallowing. For some days the dog could take little or no nourishment and lost a great deal of flesh. Eventually recovery occurred.

WRIGHT (T. W. W.) & TULL (T. C.). **A Preliminary Report of an Investigation of a Condition known as "Dry Coat" in Horses.**—*Veter. Jl.* 1925. May. Vol. 81. No. 5. pp. 235–240.

This condition has been seen in race horses and polo ponies in Penang during the last few years. It occurs in animals imported from Australia.

The clinical aspect of the disease is as follows:—There is a steady decrease in the amount of sweating shown by affected animals after severe exercise, until there is practically no evidence of perspiration at all.

In a few cases animals severely affected have continued to race, but such horses are difficult to keep in condition owing to their capricious appetites. One animal which had had "dry coat" for a year collapsed and died immediately after a race.

Such cases are, however, exceptional. As a rule, with the first appearance of "dry coat" exercise produces dyspnoea which may last for several hours. There is general dullness and laziness. The temperature is high, blood pressure is greatly increased, and the pulse rapid. No oedema has been observed, but there is a diminution in the amount of urine passed. As the case progresses, the animal can scarcely walk, the hair falls out, there is constant fever, and the urine contains albumen and casts.

Opportunity offered to make a complete examination of one mare which was known to have had a "dry coat" for over a year. All attempts at treatment had failed.

The stomach contained numerous specimens of a small worm, probably *Habronema microstoma*. There was an abscess about the size of a pigeon's egg with thick fibrous walls containing worms, probably *Habronema muscae*.

The caecum and colon were heavily infested with small worms which were not particularly identified. The kidneys were enlarged, the enlargement mainly involving the cortex. Microscopically, the smallest vessels were found to be reduced in lumen. Bowman's capsule was thickened. The glomeruli were shrunken, and there was a distinct space between these two structures. The epithelium of the tubes was swollen and granular. The tubules contained hyalin casts. The heart was hypertrophied and weighed a little under 9 lb. The valves showed no gross changes, and there was no pericarditis.

Sections of the aorta showed that the interior was thickened; there was a reduction in the amount of elastic tissue, but the muscular coat appeared to be normal. The liver was enlarged and fatty, and on section many small necrotic foci were found. There was no cirrhosis.

The spleen was normal. The lungs were emphysematous, but there was no evidence of bronchitis.

Sections of a piece of skin that was devoid of hair showed the following changes. There was moderate thickening of the epidermis, and an almost complete absence of elastic fibres in the chorium. The hair follicles were shrunken. No normal sweat glands could be recognized. Those seen were atrophied to a considerable extent and partially replaced by fibrous tissue.

In view of these findings it was decided to make cultures from the blood of future cases.

It is stated that from each of four cases the same organism has been isolated and autogenous vaccines prepared. No description of the organism is given, but further information is promised.

Details are given of the four cases treated with the vaccines, and definite improvement is reported in each case.

WITJENS (J. C.), VAN LEEUWEN (J. F. H. L.) & VAN DER HOEK (J.).
Influenza equorum.—*Ned. Ind. Bladen v. Diergencesk.* 1925.
Apr. Vol. 37.

In August a disease appeared amongst the horses at the artillery depôt at Tjimahi, and within a few days a series of cases appeared.

Negative blood examinations allowed surra, anthrax and piroplasmosis to be eliminated. Pernicious anaemia was suggested by the extravasations in the conjunctivae, but against this were the very rapid spread and inflammation of the subcutis, tendons and tendon-sheaths, as well as the absence of lesions in the bone-marrow and the characters of the blood.

It is to be expected that the disease should be introduced from Australia, from which horses are imported every year, and the authors mention several past outbreaks of disease that were probably outbreaks of influenza.

In their description of the disease the authors point out that diagnosis may at first be difficult, as many cases fail to show characteristic symptoms. They lay emphasis on the character of the

symptoms shown by the eyes and neighbouring structures, and on the swelling of the extremities, especially over tendon-sheaths. The course was generally favourable, and little loss of condition was noted. The temperature fell suddenly after about a week of fever, and 3 weeks' convalescence was needed.

They failed to check the outbreak by methods of isolation and disinfection, and they decided therefore to get it over quickly by artificial infection of the healthy, as was done in Holland by BEMELMANS.

Blood was taken aseptically from affected horses, defibrinated and diluted with 3 vols. of normal saline; it was injected subcutaneously, in the neck, in doses of 20 cc.

The following injections were performed:—

GROUP I.—*Infection with diluted blood taken from a naturally-contracted case—*

A. 10 horses, of which 9 reacted.

B. 31 horses, of which 30 reacted.

GROUP II.—*Infection with diluted blood taken from an artificially infected horse (injected from a natural case)—*

A. 44 horses, of which all reacted.

B. 20 horses, all of which reacted; in this case the virus was used after preservation at room temperature for 24 hours.

C. 20 horses, of which all reacted; virus kept at room temperature for 48 hours.

GROUP III.—*Infection with blood from one of the horses of GROUP II (i.e., "passage-virus")—*

41 horses, of which all reacted.

In the course of these inoculations it was seen that the older animals suffered more severely—higher temperatures and more affected clinically.

It appeared that thoroughbreds (i.e., officers' chargers) were less severely attacked.

Only one horse died—a 16 years old Australian gelding. The two horses which failed to react were re-injected, and one then showed a slight reaction; the other was unaffected and probably had a natural resistance.

In 104 horses out of 125 the incubation period was 40 hours; the horses in Group I are omitted from this, as they had been in contact with natural cases.

Altogether 166 horses were injected; the incubation period was 40 hours in 104 cases, as stated above, and it varied from 1 to 15 days. The temperature reached a maximum between 40° and 41° C. in 64 per cent. of cases, and attained 41° C. or over in 29 per cent.

The duration of the fever was from 2 days to as much as 16 or 20 days, averaging about 8 days.

At the dépôt there were 98 natural cases; 2 died and one horse had to be destroyed. A careful comparison of these figures, and of the intensity of the temperature reactions and symptoms, showed that the artificial infections were certainly not more severe than the natural cases.

This agrees with the results of BEMELMANS, but not with the views of HUTYRA and MAREK (1922). Moreover, HUTYRA and MAREK state that horses may again become sick one or two weeks after recovery from an infection; but the authors reinjected a few horses after recovery from artificial infection and failed to cause any further signs of disease. They note also that many horses were in contact with natural cases long after their own recovery from artificial infection, but none showed any further illness. A little later there was an

outbreak amongst the horses of another unit, and, as isolation again failed to check it, artificial infection was again resorted to. There were 34 natural cases, and 106 were artificially infected; one horse failed to react, 2 died and one had to be killed on account of posterior paraplegia.

No horses were moved from this garrison within 2 months of the recovery of the last-occurring case, and rigorous disinfection was carried out.*

PREUSS (O. K.). **Osteoporose.**—*Ned. Indische Bladen v. Diergeneesk. en Dierenteelt.* 1925. Apr. Vol. 37. No. 2. pp. 178-181.

The author records three cases of osteoporosis occurring in the same livery stables at Soerabaya—one case in September, 1923, and two in February, 1924.

In the first case the horse, which had been imported from Australia as a racehorse 5 years previously, had not been worked for some months prior to the day of the appearance of symptoms. On that day it was ridden, and at the walk and trot seemed to be fatigued, but when galloped it broke down immediately. The rider then found that both fore- and one hind-limb appeared to be seriously injured, and within an hour the other hind-limb also became affected.

The writer found that the forelimbs had given way, so that the fetlocks came to the ground, and the soles of the feet were almost vertical; the hind feet rested on the heels and bulbs, and the soles made an angle of about 45° with the ground. One hind leg was continually kicking and the hoof, which was bleeding, was seen to dangle.

The horse was destroyed, and on postmortem it was found that in both the forelegs all the lower attachments of the sesamoid ligaments (lig. sesamoidea obliqua, cruciata, et rectum) had been torn away from the sesamoid bones; a few small pieces of bone were still attached to the ends. In both hind legs the flexors were separated from the os pedis, and here again the ends of the tendons showed bone-splinters, the size of a grain of sand, still attached. There were infiltrations with blood in the subcutis in one foreleg, and in one hind hoof the sensitive and horny laminae were separated by blood.

The idea that the cause was mechanical, the writer's first impression, was abandoned, and he took all the evidence to indicate a case of osteoporosis.

In the second case the horse, a small Javan, 10 years of age, was said by the owner to have rheumatism. The gait was peculiar, the horse moving very carefully and taking short steps; and after a little trotting it began to stumble. No abnormalities of the bones could be detected, and the muscles were not sensitive to pressure. The author prescribed pot. iodide and special diet, and some improvement in condition occurred, but the animal died a month later.

The third case was seen by LENSIREK, who diagnosed osteoporosis, and had the horse shot. No clinical description is given, on account of LENSIREK's illness and absence, but he sent specimens to MÜLLER for pathological examination. MÜLLER found:—Tendon of deep flexor, especially distal part and fibres of attachment, lacerated and torn loose from os pedis. The articular cartilage showed light yellow linear irregularities. The ligamentum transversum and tendinous attachments of the superficial flexor showed no abnormality.

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

Coronary bone—externally on volar surface—linear greyish areas. Microscopically MÜLLER found:—At the ridges of the articular cartilage, the uppermost layers of the cartilage (nearest joint cavity) had separated in the form of wavy strings. At junction of cartilage and bone a cavity was pushed into cartilage. The long lamellae were surrounded by a layer of osteoid tissue.

The lacerated tendon still bore at its insertion-ends a layer of bone, which, moreover, lacked the typical structure of compacta. Numerous bone canaliculi with vessels grew in the direction of the tendon, and between these vessels were found small spherical lime concretions and some infiltration with lymphocytes.*

Moussu (R.). **L'intoxication par les graines de *Cassia occidentalis* L. est due à une Toxalbumine.** [Intoxication by the Seeds of *Cassia occidentalis* L. is due to a Toxalbumen.]—*C.R. Soc. Biol.* 1925. Mar. 27. Vol. 92. No. 11. pp. 862-863.

ERRATA.

Vol. 13, No. 1, p. 1, last line of summary of VAN DER ELST's paper, and in title of WALRAVENS' paper, *Trypanosoma rodhain* should read *Trypanosoma rodhaini*.

Vol. 13, No. 1, p. 6, 14th line from bottom, the name of the first author of the paper on *Eimeria utinensis* should read SELAN (U.) not LELAU (U.).

* Summarized by Dr. W. H. Andrews, M.R.C.V.S.

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[No. 4.

DISEASES DUE TO PROTOZOAN PARASITES.

KLIGLER (I. J.) & WEITZMAN (I.). **Experimental Study of Trypanosomiasis in Palestine.**—*Ann. Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 437-458.

The authors give an account of their investigation of an outbreak of trypanosomiasis among mules on a farm in Northern Palestine. In September 1922 an English mare and a native mule became ill and examination showed that trypanosomes were present in their blood. About three months later, in January 1923, four further mules fell sick. The mules had all been on the farm for two or three years, but the mare had been purchased about four months previously.

One male and one female mule were obtained for investigation. At the time of their receipt trypanosomes could not be detected in the blood, but inoculation of dogs established their presence. The period of incubation was seven days.

The effect of subcutaneous injections of .05 gramme of arecolin was tried on both the mules. The drug caused salivation, defaecation and urination very promptly and after a delay of an hour trypanosomes were found to be present in the blood by microscopic examination.

Further inoculations into dogs, rabbits, and guineapigs showed that the average period of incubation was about a week. Since the original inoculations the trypanosome has been carried on in guineapigs and rabbits.

In experimental animals there were remissions when trypanosomes could not be found in the blood, and parasites were always more scantily present in the blood of rabbits than in guineapigs. This was particularly noticeable just before death.

The duration of illness in mules was not determined, but it was more than six months. Rabbits died in 4 to 8 weeks and guineapigs, in the earlier passages, in 4 to 6 weeks, but later the period of illness extended to 3 months or more. In mules the general symptoms of trypanosomiasis were observed, but there was also occasionally mild haemoglobinuria. In dogs there were clinical symptoms indicating severe illness. In guineapigs, on the other hand, there was not even loss of appetite, even when the blood was swarming with trypanosomes. In rabbits and in dogs keratitis developed. In all animals the blood showed during the course of the infection the changes associated with anaemia.

From a study of the morphology of the trypanosome and from a consideration of the results obtained in experimental animals the authors come to the conclusion that the trypanosome belonged to the *T. evansi* group.

Experiments with Bayer "205" on guineapigs and rabbits showed that a dose of 0.1 g. per kilogram always effected what appeared to be a complete cure. The drug was given intraperitoneally in a 5 or 10 per cent. solution at various stages of infection and always with the same result. These doses, however, not infrequently produced toxic effects. Experimentally it was found that the medicinal dose for guineapigs is one-fifth to one-eighth the toxic dose, but that smaller doses may be more toxic for guineapigs infected with trypanosomes than for healthy guineapigs.

Pathological changes directly attributable to the drug were; extensive degeneration of the kidney epithelium, congestion of the renal vessels, deposition of brown pigments in the spleen, small areas of necrosis in the liver.

The drug is capable of exercising a prophylactic power, but its injection during the period of incubation does not prevent the disease from developing. Experiments in which the trypanocidal action of the drug was tested in various dilutions indicated that its sterilizing power *in vitro* is inferior to that possessed by it *in vivo*.

Guineapigs and rabbits which had been cured were subjected to re-infection experiments, and were found to possess an enhanced resistance for 3 or 4 months or more. The period depended upon the dose of the drug to some extent. No evidence could be obtained by experimental means of the existence of any trypanocidal antibody in the sera of recovered animals.

During infection marked changes were observed in the leucocyte formula. There is a marked leucopaenia, but after treatment there is a sharp rise in the total leucocyte count with an increase in the large mononuclears. This condition persists for some time in cured animals.

It was found possible to produce relapses at will by the injection of oil (olive or cod liver oil). Intraperitoneal injections of sterile oil were followed within 24 or 48 hours by relapses. The dose given did not appear to affect the immediate results of the injections, but there seemed to be some connexion between the dose and the persistence of the relapse. The injection of oil in some cases caused a breakdown of resistance. Further, in some cases a breakdown of resistance was produced in an apparently cured animal by injections of oil.

DUKE (H. Lyndhurst). **Polymorphic Trypanosomes of the *T. brucei* Group recovered from the Mwanza Sleeping Sickness Area.**—*Ann. Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 415-435.

This paper deals with three strains of trypanosomes of the *T. brucei* group isolated through monkeys, two from human beings and one from wild fly (*G. saynnerioni*). There is also a review of the data obtained from the experimental study of directly-transmitted strains. The three strains were apparently alike in morphology, and they behaved essentially in the same way in laboratory animals. In monkeys the period of illness was about 10 weeks, and in guineapigs about 9 weeks.

Posterior nuclear forms could always be found, but as the strains were passed from animal to animal they appeared to become rarer. The strain which was kept under observation for the longest period lost its power of development in the tsetse, but it is not certain whether the two processes are independent.

The author compares the data obtained with those obtained from a study of the "direct transmission strain" and the "antelope strain", which were isolated respectively from wild *G. palpalis* in January 1920, and a Sitatunga antelope in September of the same year.

These three strains when first isolated were readily transmissible cyclically by laboratory bred *G. palpalis*.

The condensed histories of the strains are as follows:—

Direct transmission strain.—Was still transmissible cyclically after 11 direct passages covering 16 months. About the 18th passage (at 23 months) there was a sudden increase of virulence. After a total of 34 passages covering a period of 30 months, cyclical development in the tsetse was no longer possible. The exact period at which this loss of power occurred was not determined.

Antelope strain.—After 24 direct passages (22 months) the parasite was unable to invade the salivary glands although there was still a heavy gut infection. After 20 further direct passages (10 months) the power to develop in the tsetse had disappeared.

This strain also showed an increase in virulence about the 17th direct passage.

The Mwanza Strain.—This strain after 8 passages (11 months) had almost lost the power of cyclical development. The possibility is suggested that this more rapid loss of power of development in the fly was due to the parasite having been subjected to a number of direct passages from man to man in the fly belt before reaching the individual from which it was isolated.

The author discusses the significance of the facts obtained in his experiments and concludes that in the present state of knowledge we may suppose that under certain circumstances *T. brucei* can establish itself in man, using him as an adventitious host and causing fatal disease, a feature of which is heavy infestation of the peripheral blood. The parasite thus stands an excellent chance of being transmitted mechanically to fresh human hosts, and of maintaining intact those qualities, whatever they may be, which originally determined its establishment in man.

POINCLOUX (P.). **Le mercure et l'arsenic, inhalés en vapeurs, agissent dans la syphilis et le nagana.** [The Actions of Mercury and Arsenic Vapours on Syphilis and Nagana.]—*Compt. Rend. Soc. Biol.* 1925. July 24. Vol. 93. No. 26. pp. 487-489.

The subjection of rabbits infected with syphilis to the vaporization of 0.2 g. of mercury heated to 350° C. daily effected a cure in 3 days.

Mice inoculated intraperitoneally with nagana were subjected to the vaporization of 0.04 g. of mercury daily. Either the infection did not develop or recovery took place. When arsenic was used in a similar way for the treatment of syphilis it was found that an effective dose (treatment) was toxic and smaller doses did not effect a cure.

Vaporized arsenic anhydride was found to have a definite curative effect upon mice infected with nagana.

VAN SACEGHEM (R.). **Contribution à l'étude du 309 Fourneau dans les trypanosomiases animales.** [309 Fourneau in the Treatment of Animal Trypanosomiasis].—*Bull. Soc. Path. Exot.* 1925. June 10. Vol. 18. No. 6. pp. 453-457.

Van Saceghem has carried out a small number of experiments with "309 Fourneau" on cattle infected with *T. cazalboni* var. *vivax* and *T. congolense pecorum*. The drug was given by intravenous injection in 25 per cent. solution.

Details of four animals infected with each parasite are given. The doses ranged from 3 to 10 grammes (2-4 g. per kilog.), and trypanosomes were cleared from the circulation for about a week only. One animal which was given the drug at the rate of 4 g. per kilog. died 6 days later. The author attributes this death to the drug.

KLIGLER (I. J.) & WEITZMAN (I.). **The Mode of Action of Bayer "205" on Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1925. July 16. Vol. 19. No. 2. pp. 235-241.

After referring to the peculiarities of the drug as regards its action *in vitro* and *in vivo*, and outlining the different views that have been expressed regarding the probable mode of action, the authors point out that the exact mode of action is of more than theoretical importance because estimates of the value of the drug *in vivo* cannot be based upon *in vitro* experiments.

The object of the tests was to ascertain whether there is any relationship between the *in vivo* and *in vitro* effects.

The first experiments were designed to furnish information as to whether exposure to the drug affected the virulence of trypanosomes.

Suspension of trypanosomes in serum were exposed to varying dilutions of the drug for different periods, the trypanosomes being used subsequently for inoculation of rabbits. *T. evansi* was used. The suspensions were kept at 25° C. It was found that three hours' exposure to 1 per cent. destroyed the virulence of the organisms, 0.5 per cent. was variable in action, 0.25 per cent. did not completely destroy virulence but the period of incubation was prolonged.

In the second experiment the conditions were the same save that the exposure was for 24 hours. The dilution of 0.25 per cent. rendered the parasites non-infective.

In the third experiment the conditions of the first were repeated, but smaller doses of trypanosomes were injected into the test animals. All the mixtures were non-infective.

In a further series of experiments dilutions of 1 in 800 and 1 in 1,600 were used for 24 hours. The latter dilution was found to destroy virulence, although the trypanosomes injected showed active movement.

It would appear, therefore, that there is a direct action, and that the curative and prophylactic effects are due to the concentration of the drug in the body and its slow elimination.

Previous experiments showed that in rabbits and guineapigs a dose of 0.1 gm. per kilog. cured all animals, 0.05 g. gave about 80 per cent. of cures, and 0.005 g. was not effective.

This relationship of dose to effect is also illustrated by an experiment in which inoculated rabbits were given doses smaller than the therapeutic dose. 0.005 gm. per kilo. failed to prevent infection, while 0.05 prevented the development of the disease.

Experiment indicated that there is a relationship between dose and period of protection obtained. .05 gm. protected a rabbit when inoculated with trypanosomes 35 days later, but the protection was lost when another inoculation was given after 3 months. 0.1 gm. protected against inoculation one month later, but a second inoculation after a further period of a month caused infection. The period of incubation in this case was, however, longer.

These experiments indicate the necessity of maintaining a degree of concentration of the drug. This was further shown in an experiment in which it was found that the minimal therapeutic dose is the same as the minimal protective dose. The differences observed with regard to the action of the drug in different hosts is probably due to differences in the rate of elimination.

BRUMPT (E.). **Recherches morphologiques et expérimentales sur le *Trichomonas felis* da Cunha et Muniz, 1922, parasite du chat et du chien.** [Morphological and Experimental Studies of *Trichomonas felis* da Cunha & Muniz, 1922, Parasitic in the Cat and Dog.]—*Ann. Parasit. Hum. et Comp.* 1925. July. Vol. 3. No. 3. pp. 239–251. With 3 text figs.

The author has detected the existence of the parasite in young cats in Paris. Hitherto, it had not been noted elsewhere than in Brazil. It occurs mainly in the large intestine, but may be found in the stomach and small intestine.

Cultures are readily obtained by the Boeck and Drbohlav method. Young and adult cats can readily be infected by ingestion, either with faeces or with cultures.

CÉSARI. **La leishmaniose canine en France.** [Canine Leishmaniasis in France.]—*Rec. Méd. Vét.* 1925. Apr. 30. Vol. 101. No. 8. pp. 177–179.

Césari has been able to detect *Leishmania* in the marrow of bones of two dogs. The dogs were encountered by ROZIER in his practice at Grasse (Maritime Alps).

During life the dogs showed anaemia and skin lesions and at the post-mortem pronounced splenomegaly was found.

NICOLLE (Charles) & ANDERSON (Charles). **L'immunité dans le Kala Azar expérimental du chien avec quelques données sur l'évolution de la maladie chez cet animal. Immunité naturelle et immunité par première atteinte naturelle.** [Immunity in Dogs experimentally infected with Kala Azar, and some Facts regarding the Evolution of the Disease in that Species.]—*Arch. Inst. Pasteur Tunis.* 1925. July. Vol. 14. No. 3. pp. 278–287.

The authors draw attention to the fact that some of the earlier workers did not consider the possibility of dogs acquiring immunity to kala azar as a result of a previous attack contracted naturally. A further point which appears to have escaped notice is the possibility of dogs possessing a high degree of natural immunity.

It is further insisted that in experimental infections a large dose of virus must be used or a light temporary infection is likely to be

produced. For the certain detection of infection in the living animal bone marrow, preferably from the tibia, or liver pulp must be examined.

As a result of their experiments the authors find that a dog which had made a complete recovery from an experimental infection is immune to infection with doses of virus which will certainly infect fresh dogs. It appears to be probable that natural attacks confer a similar immunity but this has not been established. In any case, it is desirable to use very young dogs for experimental purposes even in countries like Tunis, where the natural disease is rare, to avoid the possibility of using an immune animal.

There is no evidence to show that dogs may possess a natural immunity to infection.

In carrying on the virus in dogs it is best to inoculate four or five animals at a time, and select that showing the most severe infection for carrying on. The most suitable time for obtaining virus for fresh inoculations is at about two and a-half to three months.

NICOLLE (Charles) & ANDERSON (Charles). **Recherches expérimentales sur le mode de transmission du kala azar.** [Experiments regarding the Transmission of Kala Azar.]—*Arch. Inst. Pasteur Tunis.* 1925. July. Vol. 14. No. 3. pp. 264-277.

The experiments which the authors detail fail to provide a solution to the question of the manner in which kala azar is transmitted. Bugs were used, but no evidence was obtained that they can carry the infection from dog to dog.

PÉRARD (Ch.). **Recherches sur les coccidies et les coccidioses du lapin.** [The Coccidia and Coccidioses of the Rabbit.]—*Ann. Inst. Pasteur.* 1925. June. Vol. 39. No. 6. pp. 505-542.

In the experiments recorded in this paper the author has studied the biology of the oocysts with a view to formulating some plan for controlling infection among rabbits. He finds that non-segmented oocysts can be kept in the living condition at 0°-2° C. Bacterial contaminations delay sporulation, and finally lead to the death of oocysts. Oocysts which have sporulated may remain viable for more than a year if kept moist and between 0° and 38° C. The majority of chemical disinfectants are not destructive to coccidia, but rather favour their survival by destroying bacteria. Complete desiccation is fatal to oocysts, and temperatures above 40° C. are also destructive to them. Freezing is also fatal as a rule. Sporulated parasites are more resistant to external influences than the non-sporulated.

PÉRARD (Ch.). **La prophylaxie des coccidioses.** [Prophylaxis against Coccidial Infections.]—*Rev. Gen. Méd. Vét.* 1925. Aug. 15. Vol. 34. No. 404. pp. 421-428.

The facts upon which prophylactic measures can be based are as follows :—

1. Coccidia are specific for their hosts.
2. Apart from epidemics, the infestations are maintained by recovered animals.
3. The minimum period for which excreted oocysts are not infective is 30 hours at 25° C.

4. Between temperatures of -2° C. and 38° C. coccidia maintain their vitality in moist surroundings for periods up to a year or more.

5. Oxygen is necessary for the process of sporulation. Fermentation, and particularly ammoniacal fermentation in dung heaps, hinders or prevents sporulation, and finally proves fatal.

6. The majority of chemical disinfectants are without action on oocysts, but actually favour their development by sterilizing the medium in which they are.

7. On the other hand, heat, cold and desiccation are fatal to the parasites.

8. Non-sporulated oocysts are more readily destroyed by these agents than sporulated parasites.

RAU (A. N.). **Haemogregarina canis.**—*Veter. Jl.* 1925. June. Vol. 81. No. 1. pp. 293-307. With 2 plates.

The author records three cases of natural infection in dogs with *Haemogregarina canis* in Madras. Examination of blood smears from pariah dogs and well-cared-for animals indicated that the infection is far more common in the former than in the latter. A description of the parasite as it occurs in the peripheral blood is given. The host cells are usually polymorphonuclear leucocytes, and the parasite appears to be encysted in the cytoplasm. In hanging drop preparations the organisms may sometimes be observed during the process of emergence from their host cells. The free parasites are vermicule-like. Schizogony occurs in the bone marrow, spleen, and liver, and schizonts acquire an envelope which is resistant to the penetration of stains. The individual merozoites resemble the vermicules, but are smaller.

The writer states that he is able to confirm CHRISTOPHERS' observations regarding the development of the parasite in *R. sanguineus*. This he has done, using ticks from naturally-infected dogs and laboratory-bred ticks fed upon experimentally-infected dogs.

The parasite causes a subacute febrile disease, the temperature ranging from 98° to 106° F., and there is marked and rapid emaciation.

Treatment with trypanblue, salvarsan, and tartar emetic have not effected a cure.

GILBERT (S. J.). **Treatment of Acute Theileria (Egyptian Fever) by Inoculation with "Immune" Blood.**—*Jl. Comp. Path. & Therap.* 1925. June. Vol. 38. Pt. 2. pp. 91-93.

A Jersey bull imported from England into Palestine in August, 1924, showed evidence of infection with Theileria on March 18th, 1925. As previous experience showed that medicinal treatment was valueless it was decided to subject the animal to inoculations with blood from a native cow bred in a tick-infested area. During the period March 21st to 30th the animal was given nine doses of blood. The first four doses were 750 cc., and the remaining five 500 cc. The larger doses were given partly intravenously and partly subcutaneously, and the smaller doses intravenously. There was an almost immediate fall of temperature to about normal. It was noted that on the day when the injection of blood was missed the temperature rose to 104.4

again. Parasites were present in large numbers on the day before injections began, and on the first day of injection, but subsequently none were found. From the 8th to the 12th days the bull's blood showed very marked evidence of anaemia.

MROWKA (F.). **Das Texasfieber in Peru.** [Texas Fever in Peru.]—Reprinted from *Zeitschr. f. Veterinärk. 1925. May. No. 5.* With 6 figs. and 31 charts.

The author describes the occurrence of redwater and anaplasmosis in Peru, and he is of the opinion that the two diseases are not in reality separate entities.

FRANÇA (C.). **Notes parasitologiques sur l'Angola.** [Notes on Parasites in Angola.]—*Ann. Parasit. Hum. et Comp. 1925. July. Vol. 3. No. 3. pp. 255-262.* With 3 text figs.

The author describes trypanosomes and Haemogregarines found in *Bufo regularis*.

MROWKA (F.). **Die Entwicklung der Sarkosporidien und ihre Beziehung zu Lamkrankheit der Haustiere in Peru.** [The Development of Sarcosporidia and their Connection with Lamziekte of the Domesticated Animals in Peru.]—Reprinted from *Zeitsch. f. Veterinärk. 1925. June. No. 6.*

The author describes a disease of the domesticated animals which he believes to be identical with the Lamziekte of South Africa. It attacks lambs, ewes, calves of both sexes, and cows, and occasionally filly foals.

As a result of microscopic examination of tissues from affected animals he arrives at the conclusions that the condition is caused by sarcosporidia and that sarcosporidia are not in reality protozoa. "They owe their autochthonous origin from muscular tissue with nuclear characters to the irritation caused by an as yet unrecognized cause, which is localized in the muscular tissue and causes a slight disturbance of the circulation of the fat. An unknown factor causes so sudden a development of gram-positive elements in the blood and muscular tissue that severe disturbances of nutrition and function are brought about in the latter and the symptoms recognized as those of Lamziekte or Renguera are produced."

TORRES (S.). **Toxoplasmas dos Animaes.** [Toxoplasmosis in Animals.]—*Boletim da Soc. Brasil. Med. Vet. 1924. July. Vol. 1. No. 7. pp. 251-264.*

This paper is a summary and contains nothing new.

GILBERT (S. J.). **A Note on the Occurrence of Bovine Spirochaetosis in Palestine.**—*Jl. Comp. Path. & Therap. 1925. June. Vol. 38. Pt. 2. pp. 94-95.*

The first case occurred naturally in a Damascus cow imported from Beyrouth. Spirochaetes were found which appeared to be identical with *S. theileri*.

A Jersey bull was inoculated with half a litre of blood on February 17th. No spirochaetes appeared in the blood up to the 31st March, when the bull contracted Egyptian fever. This infection was treated by injections of blood from a native cow (*see above*) between March 21st and 31st. On April 6th spirochaetes were found in the blood, but these had disappeared by April 8th.

ALVAREZ (R. G.). **Contribución a la histología patológica de la Sarcosporidiosis muscular del cerdo.** [The Pathological Histology of Sarcosporidiosis.]—*Revist. Hig. y Sanid. Pcaur.* 1925. July. Vol. 15. No. 7. pp. 387-394. With 4 text figs.

BRUG (S. L.), DEN HEYER (J. K.) & HAGA (J.). **Toxoplasmose du lapin aux Indes Orientales Néerlandaises.** [Toxoplasmosis of the Rabbit in the Dutch East Indies.]—*Ann. Parasit. Hum. et Comp.* 1925. July. Vol. 3. No. 3. pp. 232-238. With 6 plates.

MARTIN (M. A.). **L'entérite coccidienne du chien et du chat.** [Coccidiosis in the Cat and Dog.]—*Rev. Vét.* 1925. Sept. Vol. 77. No. 9. pp. 537-548. With 2 text figs.

DISEASES DUE TO METAZOAN PARASITES.

BELPEL (J.). **De l'habronemose cutanée des Equides.** [Cutaneous Habronemiasis of Equines.]—*Rev. Vét.* 1925. Jan. Vol. 77. No. 1. pp. 5-24. With 4 text figs.

In one case the author obtained good results by the application of an ointment containing novarsenobenzol locally, and by intravenous injections of the same drug. On four successive days doses of 1.5, 2, 2, and 2.5 g. were given, and after an interval of 8 days further doses of 2, 2.5, 2.5, and 3 g.

NEWSTEAD (R.) & POTTS (W. H.). **Some Characteristics of the First Stage Larva of *Dermatobia hominis* Gmelin.**—*Ann. Trop. Med. & Parasit.* 1925. July 16. Vol. 19. No. 2. pp. 247-260. With 2 plates.

This fly is responsible for serious losses mainly on account of damage done to hides in Central and South America. The larvae are able to penetrate unbroken skin and cause warbles similar to those seen in Europe. According to DA MATTA the percentage of hides damaged ranges from 5 to 70 per cent.

The fly differs from all other members of its class in that it does not lay its eggs direct on the animal's body, but on the bodies of other insects, chiefly mosquitoes. The larva appears to emerge from the egg when the mosquito alights on a warm-blooded animal for a feed. There is evidence to show that if the larva cannot emerge entirely while the mosquito is feeding, it withdraws again into the egg and awaits another opportunity.

The authors give a summary of the life-history of the fly.

The larvae of the fly have been found in cattle, dogs, pigs, goats, turkeys, and, rarely, mules. It is doubtful whether they occur in sheep, donkeys, and horses. They have also been found in monkeys, jaguar, tapir, coati, agouti, deer (rarely), squirrels, and birds.

The deposition of the eggs upon other flies and upon mosquitoes has been observed and the larvae obtained have been reared to the adult stage in dogs. The whole process from the laying of eggs to emergence of the adult requires 120–141 days.

The authors give a list of insects which have been found bearing batches of eggs in various parts of South America.

For the detailed description of the first stage larva the original article should be consulted.

STEPHENS (J. W. W.). **The Golubacser Fly.**—*Ann. Trop. Med. & Parasit.* 1925. July 16. Vol. 19. No. 2. pp. 262–263.

Stephens quotes an interesting reference to *Simulium columbascense* Köll, taken from the "Romance of Natural History," by P. H. GOSSE, F.R.S., Second Ed. 1861, p. 111, showing that the severe attacks of these flies have been observed many years ago.

ROUBAUD (E.). **Nouveaux diptères piqueurs de l'est africain.** [New Blood-Sucking Diptera from East Africa.]—*Bull. Soc. Path. Exot.* 1925. June 10. Vol. 18. No. 6. pp. 465–469. With 2 text figs.

The species described are *Hipposca camelopardalis* n. sp., which appears to be specific for the giraffe and *Stomoxys rhodainica*, which is closely allied to *St. inornata* Grünb., but differs from that in details of general coloration. The specimens upon which the descriptions are based were collected by RODHAIN during the operations in East Africa, 1915–1916.

ROUBAUD (E.). **Une nouvelle espèce de puce-chique pénétrante, parasite des rats en Chine : *Dermatophilus lagrangei* n. sp.** [A New Species of Jigger, parasitic in Rats in China.]—*Bull. Soc. Path. Exot.* 1925. May 13. Vol. 18. No. 5. pp. 399–405. With 6 figs. on 1 plate & 6 text figs.

The principal features of the parasite as seen in the mature female are as follows:—Eyes absent; abdomen oval and drawn out posteriorly into a cylindrical manubrium. Cephalic region masked laterally by two symmetrical pairs of ampulla-like protuberances developed from the anterior parts of the abdomen.

The parasite invades the ears exclusively.

CHARRIER (H.). **Ixodes de la région de Tanger.** [The Ixodes of Tangier.]—*Bull. Soc. Path. Exot.* 1925. June 10. Vol. 18. No. 6. pp. 469–470.

The Ticks encountered in Tangier are—

Rhipicephalus :

R. sanguineus (dog and ox).

R. bursa (ox and horse).

Boophilus (Margaropus) :

B. annulatus var. *calcaratus* (ox).

Hyalomma :

H. aegyptium (ox and horse).

STILES (C. W.) & ORLEMAN (M.). **The Cestode Genus *Hydatigera* Lamarck, 1816, Species *Reditaenia* Sambon, 1924.**—*Jl. Trop. Med. & Hyg.* 1925. July 1. Vol. 28. No. 13. pp. 249-250.

The authors invite attention to the alteration proposed by SAMBON to prevent, if possible, the use of the generic term *Reditaenia*, as it would appear to be certain that it would have to be changed again. If the new taxonomic unit proposed is accepted as of either generic or subgeneric value the correct name would be *Hydatigera* with *Reditaenia* as a synonym.

SOUTHWELL (T.). **On a New Cestode from Nigeria.**—*Ann. Trop. Med. & Parasit.* 1925. July 16. Vol. 19. No. 2. pp. 243-246. With 4 text figs.

The author figures and describes *Lateriporus fuhrmanni* n. sp. from a "large grey eagle". The parasite differs from the other species of the genus mainly in the size of the hooks.

WARE (F.). **Some Parasitic Infections of Comparative Interest.**—*Jl. Comp. Path. & Therap.* 1925. June. Vol. 38. Pt. 2. pp. 89-91.

Ware has examined material forwarded to him by the Superintendent, Government Ophthalmic Hospital, Madras, and has found *Cysticercus cellulosae* (three times) and what appeared to be a sterile hydatid of *Echinococcus granulosus* in tissues from various parts of the eye in human beings.

GOODEY (T.). **Skin Penetration by the Infective Larvae of *Dochmoides stenocephala*.**—*Jl. Helminth.* 1925. Aug. Vol. 3. No. 3-4. pp. 173-176.

Using the cork raft method the author found that ensheathed larvae were capable of penetrating skin without first escaping from their sheaths.

MASSINO (B.). **Ein neuer Nematode des Hundes : *Rictularia cahirensis* Jägerskiöld 1909.** [A New Nematode of the Dog: *Rictularia cahirensis* Jägerskiöld 1909.]—*Berlin. Tierarzt Woch.* 1925. Jan. 30. Vol. 41. No. 5. pp. 67-69.

The author records the occurrence of this parasite in dogs in Bokhara.

CHAPIN (E. A.). **New Nematodes from North American Mammals.**—*Jl. Agric. Res.* 1925. April 1. Vol. 30. No. 7. pp. 677-681. With 4 text figs.

The author describes the following:

From the bison, *Dictyocaulus hadweni*, n. sp., *Ostertagia bisonis*, n. sp. and from the beaver, *Trevassosius americanus*, n. sp., *Castrostrongylus*, n. gen. *Castrostrongylus castoris*, n. sp.

TAYLOR (E. L.). **Notes on Some Nematodes in the Museum of the Liverpool School of Tropical Medicine.**—*Ann. Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 601–618. With 18 text figs.

The author describes *Porrocaecum crocodili*, *Ampliccaecum africanum*, *Strongyluris brevicaudata*, *Africana africana*, *Oxyuris praeputialis*, and *Tricuris discolor*.

LEDOUX (M.). **Sur un cas de spirocercose canine.** [A Case of Canine Spirocercosis.]—*Rev. Vét.* 1925. March. Vol. 77. No. 3. pp. 155–157.

A fox terrier showed progressive wasting, frequent cough, practically constant vomiting after the ingestion of solids, but there was no elevation of temperature, and the animal was quite lively.

Ordinary treatment for gastritis was without effect—in fact, there was steady progress of the symptoms. At the postmortem examination the oesophagus was found in its thoracic portion to be extremely dilated, and at the point of penetration of the diaphragm there was a cyst with a thick fibrous wall which almost occluded the lumen. In the left sac of the stomach there was a second cyst about the size of a small nut. These cysts contained 8 and 6 worms respectively.

The aorta was thickened and sclerosed. At the original of the iliac arteries there was a group of nodules about the size of lentils.

WARE (Frank). **Two Uncommon Nematode Parasites of Cattle.**—*Jl. Comp. Path. & Therap.* 1925. June 30. Vol. 38. No. 2. pp. 83–89. With 2 text figs.

The writer describes *Agriostomum vryburgi* and *Syngamus laryngeus* emending the previously published accounts in certain particulars.

SCHWARTZ (Benjamin). **Internal Metazoan Parasites collected from Ruminants in the Philippine Islands.**—*Philippine Jl. Sci.* 1925. Apr. Vol. 26. No. 4. pp. 521–533. With 2 plates.

This paper contains a brief summary of the parasites found in cattle, Indian cattle, carabao, Indian buffalo, sheep and goats in the Philippine Islands.

No new species are described.

BRU (M. P.). **L'hémithorax par Spirocercose aortique chez le chien.** [Haemithorax resulting from Infestation of the Aorta by Spirocercia in the Dog.]—*Rev. Vét.* 1925. Jan. Vol. 77. No. 1. pp. 26–32.

DESCAZEUX (M. J.). **Sur la présence au Chili de l'*Ornithodoros mcgnini*.** [The Occurrence of *Ornithodoros mcgnini* in Chili.]—*Bull. Soc. Path. Exot.* 1925. May 13. Vol. 18. No. 5. pp. 408–409.

HOBMAIER (M.). **Die Entwicklungsgeschichte und die pathologische Bedeutung von *Physocephalus sexalatus* (*Spiroptera sexalata*, Molin).** [The Cycle of Development and the Pathological Importance of *Physocephalus sexalatus* (*Spiroptera sexalata*, Molin).]—*Münch. Tierärztl. Woch.* 1925. Vol. 76. No. 17–20. With 5 text figs.

IHLE (J. E. W.). **Verzeichnis der Cyclostomum-Arten der Equiden, mit Bemerkungen über einzelne Spezies.** [A Catalogue of the Cyclostomes of the Equidae.]—*Centralbl. f. Bakt.* 1. Abt. Orig. 1925. June 8. Vol. 95. No. 2/4. pp. 227–236. With 4 text figs.

- LARROUSSE (F.). **Contribution à l'étude des tiques de l'Annam; description de deux espèces nouvelles du genre *Haemaphysalis*: *H. obesa* n. sp., et *H. lagrangei* n. sp.** [Two new species of Ticks from Annam, *Haemaphysalis obesa* and *H. lagrangei*.]—*Ann. Parasit. Hum. et Comp.* 1925. July. Vol. 3. No. 3. pp. 301-305. With 3 text figs.
- NEVEU-LEMAIRE (M.). **Description d'un strongle nouveau du Rhinocéros Africain *Quilonia parva* n. sp.** [A new Strongyle of the African Rhinoceros, *Quilonia parva* n. sp.]—*Ann. Parasit. Hum. et Comp.* 1925. July. Vol. 3. No. 3. pp. 290-291. With 6 text figs.
- NÖLLER. **Bemerkungen zu der vorstehenden Arbeit von Dr. M. Zunker:** "*Echinostoma columbae* n. sp. ein neuer Parasit der Haustaube. [Observations on the foregoing paper by Zunker.]—*Berlin. Tierärztl. Woch.* 1925. July 31. Vol. 41. No. 31. pp. 384-385.
- SAMBON (L. W.). **Gongylonema.**—*Jl. Trop. Med. & Hyg.* 1925. Sept. 1. Vol. 28. No. 17. pp. 313-316. With 2 text figs.
- SOUTHWELL (T.). **On a Collection of Linguatulids in the Liverpool School of Tropical Medicine.**—*Ann. Trop. Med. & Parasit.* 1924. Dec. 30. Vol. 18. No. 4. pp. 515-531.
- SOUTHWELL (T.) & MACFIE (J. W. S.). **On a Collection of Acanthocephala in the Liverpool School of Tropical Medicine.**—*Ann. Trop. Med. & Parasit.* 1925. July 16. Vol. 19. No. 2. pp. 141-184.
- SPREHN (C.). **Ein Beitrag zur Dochmiasis der Rinder.** [Dochmiasis in the Ox.]—*Berlin. Tierärztl. Woch.* 1925. July 31. Vol. 41. No. 31. pp. 485-486. With 3 text figs.
- WOODLAND (W. N. F.). ***Tetracampos* Wedl 1861 as a Genus of the Bothriocephalidae.**—*Ann. Trop. Med. & Parasit.* 1925. July 16. Vol. 19. No. 2. pp. 185-189.
- ZUNKER (M.). ***Echinostoma columbae* n.sp. Ein neuer Parasit der Haustaube.** [*Echinostoma columbae* n.sp. A New Parasite of the Pigeon.]—*Berlin. Tierärztl. Woch.* 1925. July 31. Vol. 41. No. 31. pp. 483-484. With 2 text figs.

BACTERIAL DISEASES.

- WARWICK (B. L.), GILDOW (E.M.) & HADLEY (F. B.). **The Use of Rabbits in the Study of Infectious Abortion.**—*Jl. Infect. Dis.* 1925. July. Vol. 37. No. 1. pp. 62-67.

The authors think that rabbits are more suitable than guineapigs for studying certain problems in connexion with infectious abortion. They have found that while infection rarely occurs by direct contact, the rabbit develops a wider range of lesions than the guineapig as the result of intraperitoneal inoculation.

They have set themselves to find answers to the following questions: Will a virulent strain produce abortion in rabbits, and can the organism be recovered from the foetuses? What is the period of incubation? How early and how late in pregnancy can abortion be produced?

Of 14 does inoculated during pregnancy, all but 1 produced dead foetuses, and usually before the end of the normal period of gestation. Two litters which were carried to full term were not completely developed. In most cases the period of incubation was from 7 to 11 days. Cultures were obtained from foetuses of every litter of does inoculated between the 14th and the 24th day of pregnancy.

In one case an inoculated doe produced a normal litter. But cultures were obtained from the foetuses.

The experiments were carried out with a strain of organism of porcine origin.

BOSWORTH (T. J.) & GLOVER (R. E.). **Contagious Abortion in Ewes.**—*Vet. J.* 1925. July. Vol. 81. No. 7. pp. 319-334.

During the last two years seven outbreaks of abortion among ewes have come under the notice of the writers.

In all cases the main facts of the outbreaks were substantially the same. Abortions may begin six weeks before full time, and continue throughout the season. As a rule, premonitory symptoms are slight or absent. Depression, stiffness of gait, and a blood-tinged vaginal discharge are the symptoms seen.

Postmortem examination of a ewe shows oedema of the uterus, which contains a clear straw-coloured liquid. The cotyledons are swollen, and their crypts contain yellowish-white pus.

The subcutaneous tissue of the foetuses is infiltrated with blood-tinged gelatinous oedema. The serous cavities contain a similar exudate, and the tissues are generally moist and pale in colour.

From ewes and foetuses in different outbreaks there has been isolated an organism having the following characters: A gram-negative pleomorphic bacillus, which in young cultures appears to be oval, but in older cultures definite bacilli and even short filaments are found. It is a facultative anaerobe.

On agar minute transparent colonies form within 18 hours, and these increase in size until by the 48th hour they measure about 3 mm. These colonies are round, translucent and raised. Turbidity is produced in broth with subsequent sedimentation. Growth is more abundant in glucose broth and a few bubbles are formed. In glucose agar shake cultures the medium is disrupted by gas formation. There is no growth on potato. Gelatin is slowly liquefied. Glucose, maltose, laevulose, and mannite are fermented. There is no change in litmus milk after 10 days.

The organism will remain alive in liver broth at room temperature for 16 months without losing virulence for mice. Exposure to 56° C. for 30 minutes is not fatal, nor is an exposure to 60° C. for 15 minutes. 58° C. for half-an-hour is fatal.

Normal sheep serum may possess feeble agglutinating powers (1 in 25 only), but the sera of ewes that have aborted cause agglutination in dilutions ranging from 1 in 50 to 1 in 1,000. Small doses of culture are fatal to mice in 3 to 8 days. There is enlargement of the spleen and, if the inoculation is intraperitoneal, the formation of a diphtheritic deposit. Unless large doses (1-2 cc.) of culture are used the organism produces only a large local abscess in rabbits and guineapigs. Two lambs were inoculated subcutaneously with culture. One was killed when comatose on the 4th day, and the other died on the 4th day. A swelling at the seat of inoculation, enlargement of the spleen, diffuse enteritis, and a peritoneal exudate were the lesions found. The organism was recovered from the local lesion, heart blood, and spleen.

In a preliminary experiment with ewes, 5 pregnant animals were inoculated. Two aborted, but the organism was not recovered.

An agglutination test of the flock was negative, but the inoculated animals showed a high titre. The inoculated ewes were mixed with the rest of the flock. After three months the in-contact animals had developed agglutinin. These ewes were tested at intervals, and it was found that the titre gradually declined, but that there was a sharp rise about the time of the next parturition.

Subsequently, six ewes in which the agglutination titre had fallen nearly to zero were fed on five occasions at intervals of a week with

broth culture. Two aborted dead lambs from which the organism was recovered, one gave birth at full term and the organism was recovered from the vaginal discharge, one lambed normally, and two were barren.

At the lambing season of 1925 there were 12 ewes which had not been infected artificially, but which had been in contact. Eleven of these lambed normally and one aborted four days before full term. The organism was not recovered. At the time of lambing three ewes showed agglutination titres of 1 in 100 or more, six of 1 in 50, and the remainder were negative.

The six ewes experimentally infected in 1924 were served in December of that year. One did not become pregnant, one died three weeks prior to lambing of fatty infiltration of the liver; the organism was not recovered; one aborted and the organism was recovered from both uterus and lambs, and three lambed normally. The organism was isolated from the uterus of one of these three immediately after lambing.

The paper concludes with an appendix of the details of experiments with ewes.

MERLE (M.). **L'avortement contagieux des juments.** [Contagious Equine Abortion.]—*Rev. Gen. Méd. Vét.* 1925. Sept. 15. Vol. 34. No. 405. pp. 485-490.

In Finistère, in some years, from one-third to two-thirds of the foals are lost. The symptoms usually are dullness, loss of appetite, slight attacks of colic, oedema of the mammae, filling of the hind legs and a more or less purulent discharge from the vagina. There is a difference of opinion as to whether there is any dystokia when abortion occurs. The foetal liquids are usually turbid and sometimes blackish in colour.

Portions of the afterbirth are frequently retained and the placenta shows brownish areas the tissues of which are friable. The foetus is generally born dead, but when the abortion occurs at nearly full term it may survive for a day or two. When the foetus has been slipped the mares frequently show symptoms of severe illness associated with purulent metritis. The mortality among infected mares, however, does not exceed 2 or 3 per cent. The majority of abortions occur between the 6th and 9th month, but the act may be delayed until nearly full term is reached.

Epidemics appear to vary in severity from year to year, and it appears to be certain that abortion does not occur in the same mare two years running.

The etiology of the disease has not been established.

JORGENSEN (G. E.). **Some Studies of *Pasteurella bovisseptica*.**—*Cornell Vet.* 1925. July. Vol. 15. No. 3. pp. 295-302.

The author finds as a result of bacteriological examination of swabs taken from the nasal cavities of 250 cattle that about 15 per cent. of these were carriers of *B. bovissepticus*. In circumstances likely to lower the animal's resistance infection is likely to take place. The three types of bacillus described by JONES were encountered together with a fourth which differed from the other three in that it fermented dulcitate, grew more luxuriantly, was highly virulent, and was not agglutinated by the antisera of the other three types.

In infection experiments one cow was made to inhale a vapourized culture. This was followed by acute congestion of the lungs and a mild carpal arthritis. After recovery a broth culture was administered per os. There was no ill effect. No effect followed an intravenous inoculation with 50 cc. of broth culture. The agglutination titre, which was negative at first, steadily mounted during the experiments.

A second cow which was given culture per os was subjected to fatigue and cold. Fatal haemorrhagic septicaemia developed.

GUEVEDO (J. M.). **El Carbunclo sintomatico argentino.** [Argentine Blackquarter.]—*Revist. Med. Vet.* 1925. Apr.–May. Vol. 8. No. 1. pp. 9–12.

The author questions whether ZANOLLI and SORDELLI are correct in expressing the view that the disease known as la Mancha in the Argentine is identical with blackquarter.

BASSET (J.). **Infection latente dans le charbon symptomatique.** [Latent Infection in Blackquarter.]—*Compt. Rend. Soc. Biol.* 1925. June 26. Vol. 93. No. 22. pp. 170–171.

The expression "latent infection" covers different conditions, which must be carefully distinguished. The author classifies these as follows:

1. Reservoirs of the virus. In this case it is the ground.
2. The period of incubation. This is practically absent in blackquarter since symptoms appear within 8 hours of the introduction of a sufficient quantity of infective material.
3. The condition of latent infection properly so-called. This is characterized by the existence of a discrete infection for the recognition of which special technique is required.

In the author's experiments with guineapigs inoculated with a very small dose of culture no trace of the organisms could be found at the seat of inoculation after the lapse of three weeks. He further found that such an infection is not aggravated by the introduction of an immunizing dose of toxin.

4. Chronic carriers. A guineapig which was inoculated and developed a lesion recovered. This animal was placed in conditions to reduce its resistance, and the inoculated region was injured three weeks after recovery, but no recrudescence of the lesion appeared. When killed 6 weeks after inoculation bacilli and spores were found in the lymphatic gland nearest the seat of inoculation.

5. Healthy carriers. Inoculation experiments carried out with spores showed that spores may persist in the tissues of animals without setting up the disease for periods of 12 days or more. The disease may be induced in such animals by injury, by hydroxylamine, or toxin at the seat of inoculation. The disease does not develop if the toxin is injected at a place removed from that into which the spores were introduced.

Spores in a state of purity confer no immunity, and a dose of serum does not lead to the destruction of spores in healthy carriers.

BASSET (J.). **Atténuation de *B. chauvaiei*. Anatoxine symptomatique.** [Attenuation of *B. chauvaiei*. Anatoxin.]—*Compt. Rend. Soc. Biol.* 1925. June 26. Vol. 93. No. 22. pp. 172–173.

The author states that he has been able to confirm the results reported by KITASATO (1889) and KITT (1893) that prolonged incubation at

37° C. causes a loss of virulence in cultures of *B. chauvæi*, and that such cultures may be used as vaccines. Four subcultivations in liver broth at intervals of 6 weeks produced the result that doses of 0.5 cc. caused only a temporary oedema while the original culture in doses of $\frac{1}{16}$ cc. was fatal in 60 per cent. of guineapigs in 20 to 36 hours. Guineapigs inoculated with such attenuated cultures acquired a solid immunity. The morphology of such organisms was changed. Even in young cultures only a minority of the organisms are gram positive, and cultures that are a fortnight old contain no gram positive organisms at all. Spores are very rarely found.

Experiments in which such cultures were used for guineapig inoculation after heating showed that the spores themselves were attenuated. The author states that the toxin can be converted into an anatoxin by the addition of 0.5 per cent. formalin and incubation at 38° to 40° for 30 days.

BASSET (J.). Immunisation des bovidés par la toxine symptomatique.

[The Immunization of Cattle against Blackquarter by means of Toxine.]—*Compt. Rend. Soc. Biol.* 1925. June 26. Vol. 93. No. 22. pp. 168-170.

The toxicity of filtrates from serum liver broth cultures of *B. chauvæi* undergoes little or no change, when they are kept in sealed vessels, in periods ranging from 2 to 4 months.

Doses of 5 cc. of such filtrates conferred a high degree of immunity upon guineapigs, enabling them to resist doses of $\frac{1}{8}$ and $\frac{1}{4}$ cc. of virus. This virus, in doses of $\frac{1}{16}$ cc., proved fatal to 10 out of 15 guineapigs in 20 hours to 3 days, and in doses of $\frac{1}{8}$ cc. to 13 out of 15 in 17 to 24 hours. Two doses of toxin given at an interval of 15 days enabled them to resist doses of 0.5 to 3 cc. of virus.

In experiments with cattle the author found that the lethal dose of virus for a bovine of 15 months to 2 years of age was about 0.25 cc. of virus, or twice the lethal dose for the guineapig. In his immunization experiments three groups of animals under three years of age were used. Each animal was given a subcutaneous injection of toxin which had been preserved with the exclusion of air for periods ranging from three weeks to 2 months. The injections caused a slight temporary rise of temperature and the formation of a plaque of oedema which disappeared in about a week. From 12 to 16 days later they were given 0.25 cc. of virus. The controls died in 2 days, but the protected animals showed no disturbance of health of any kind.

In an experiment to test the effect of the injection of toxin into an animal that was in a condition of latent infection, 12 guineapigs were inoculated subcutaneously on the neck with 1 cc. of "pure spores," and on the following day with 5 cc. of filtrate subcutaneously in the thigh. None became infected. Two bovines were inoculated subcutaneously with $\frac{1}{16}$ cc. of culture. A marked local lesion developed, but it was soon apparent that recovery would take place. The injection of 10 cc. of toxin on the 4th day led to no aggravation of symptoms.

A bovine was inoculated simultaneously on the two sides of the body with 10 cc. of toxin and 0.25 cc. of "2nd Pasteur vaccine."* A control received vaccine alone. On the fourth day after the injection of virus there was extensive oedema and an elevation of temperature.

* It would appear from the context that this was anthrax vaccine.—Ed.

The toxin did not lead to any aggravation of the symptoms. The animal which received the vaccine and toxin subsequently withstood a lethal dose of *B. chauvæi*.

It remains to be shown how long the immunity lasts.

LECLAINCHE & VALLÉE. **L'immunisation contre le charbon symptomatique.** [Immunization against Blackquarter.]—*Rev. Gén. Méd. Vét.* 1925. June 15. Vol. 34. No. 402. pp. 293-301.

This paper is a review of the methods that have been used for immunization against blackleg. It is divided into three sections, dealing respectively with immunization by (a) vaccines, (b) toxins, (c) sera.

ZELLER (H.). **Die Schutzimpfung gegen Rauschbrand mit Rauschbrand Kulturfiltraten.** [Protective Inoculation against Blackquarter by means of Filtrates.]—*Berlin. Tierärztl. Woch.* 1925. June. Vol. 41. No. 25. pp. 385-387.

The author gives details of protective inoculations carried out during 1924. The cultures used for the preparation of the filtrate were derived from three strains isolated locally. The growths were made in litre flasks containing peptone liver broth with the addition of fragments of liver tissue. The flasks were incubated for three weeks under aerobic conditions, tested for purity, mixed and filtered in succession through wire gauze, paper, asbestos, and Berkefeld candles.

The toxicity of the filtrate was tested by inoculating 1 ox, 2 sheep, 2 rabbits and 18 guineapigs. The ox, which was about 18 months old, was given 100 cc., injected subcutaneously in two places. There was a slight temporary swelling at the seat of inoculation, but there was no rise of temperature, loss of appetite or disturbance of health. The sheep were given 25 and 50 cc. respectively on the inner side of the hind leg. A swelling resulted and the animals were lame for a few days. One of the sheep showed a slight temporary rise of temperature. One rabbit was given 20 cc. subcutaneously and the other the same dose intraperitoneally. Neither showed any disturbance of health.

Seven of the guineapigs were given doses ranging from 1 to 20 cc. subcutaneously, and 5 similar doses intraperitoneally. None died. As doses of 10 cc. or more were likely to produce severe muscular spasms, an alcoholic precipitate was prepared as described by Foth, and this was dissolved in boiled water and injected in doses corresponding to 15, 20, 25, 50, 75 and 100 cc. of filtrate. The two guineapigs which received 75 and 100 cc. equivalent doses died of blackquarter in 24 to 48 hours. The remainder showed only a temporary swelling at the seat of inoculation. Blackquarter bacilli could not be detected culturally in the material used for the inoculations. The 12 guineapigs which had received filtrate subcutaneously in doses up to 20 cc. were injected after the lapse of a month with a dose of freshly isolated culture which proved fatal to 2 controls in 20 and 26 hours. One, which had received 3 cc. of filtrate intraperitoneally, died.

In a second test 16 guineapigs received filtrate, the doses were 1, 2, 3½, and 5 cc., and four guineapigs were injected with each. In

this case two months were allowed to elapse before the test inoculation. The controls died within 48 hours, but all the protected animals survived.

The filtrate thus tested was carbolized to the extent of 0.5 per cent., and distributed for use. The dose used was 5 cc. for cattle irrespective of size and age, and 2,917 doses were used. In no case did untoward results follow the injection, but in a few cases slight transitory swellings were reported. The injections were carried out during April, and up to December, 1924, only four animals had died showing symptoms of blackquarter. In three of these cases the author made bacteriological examinations.

The first case occurred five days after the protective inoculation and presumably before immunity could have been established. There was no evidence that the infection resulted from the inoculation with filtrate.

The second and third cases occurred in calves three months old on the same premises a month after injection of filtrate.

Tests applied to material from Case 2 showed that it was not a case of true blackquarter, the organism isolated belonging to the para-blackquarter group. No specimens were sent for examination from Case 3.

Case 4, in a four-months-old calf, occurred during the fourth month after injection. From this case blackquarter bacilli and para-blackquarter bacilli were isolated.

Uninoculated animals were left on premises where the filtrate was used and four cases of blackquarter were reported among these by the veterinary surgeons. In none of these cases was material sent for bacteriological examination.

The question arose as to whether an attempt should be made to prepare a filtrate which would protect against both blackquarter and para-blackquarter infections. Experiments with guineapigs indicated that while it is a simple matter to protect these against true blackquarter it was found difficult or impossible to protect them against para-blackquarter by means of filtrate. Details of these tests are not given by the author.

PANTON (P. N.) & BENIANS (T. H. C.). **The Influence of the Site of Inoculation upon the Infectivity of Anthrax Bacilli and Pneumococci for Laboratory Animals.**—*Brit. Jl. Exp. Path.* 1925. Aug. Vol. 6. No. 4. pp. 146-157.

The authors' original aim was to attempt to establish BESREDKA'S view that a dose of anthrax bacilli which is fatal by intradermal inoculation is not fatal when injected subcutaneously. Subsequently the work was extended to a comparison of the infectivity of the anthrax bacillus by intradermal and subcutaneous inoculation, and the infectivity of the pneumococcus for mice and rabbits when introduced by the same paths.

Great difficulty was experienced in achieving subcutaneous inoculation without soiling the skin, and the following techniques were employed in attempts to obviate this.

In two instances BESREDKA'S technique was employed. A variety of capsules, including capillary glass tubes, were tried but none was quite satisfactory. The use of a double needle with the further modifi-

cation that soft paraffin was forced through the outer one to leave a trail of the substance along the needle track and so imprison the bacilli, was found to be unsatisfactory. Lastly a cannula about 1½ inches long was passed into the subcutaneous tissue secured by stitches and sealed with a stilette. After a few days a long hollow needle was passed through the cannula and the injection made. The stilette was then replaced. Deductions could be drawn from the animals which survived.

The virulence of the anthrax cultures used was frequently ascertained by animal inoculation.

In preliminary experiments it was shown (a) that rabbits were susceptible to anthrax by scarification; (b) that dead bacilli applied to scarifications produced no immunity; (c) that Pasteur vaccines applied by scarification established immunity. In an experiment in which an attempt was made to employ BESREDKA's technique both animals died of anthrax.

An attempt was made to throw light upon the question of the possible soiling of the skin in the process of subcutaneous inoculation by drawing a broth culture through a needle and then without wiping it passing the needle through the skin of three guineapigs and into the marginal vein of a rabbit's ear. Eight animals were treated in this way and only one died. This would appear to indicate that soiling of the skin cannot be responsible for infection which invariably follows subcutaneous inoculation.

Twenty-six rabbits were used in capsule experiments and only one sustained injury from the liberated bacilli. This animal had an accidental cutaneous lesion of the foot.

The authors draw attention to possible fallacies in all capsule experiments.

(1) Deterioration of the culture in the capsule while it is under the skin during the period necessary for the healing of the skin wound. The longer the capsule remains in position the greater the deterioration. "The capsule is lying in an inflamed area, and one might presume, in the case of the rabbit, that the bacteria are exposed to a temperature of approximately 42° C."

(2) The capsule itself has become encapsuled in dense fibrous tissue.

(3) With most types of capsule it is impossible to ascertain what proportion of the dose is expressed. In the case of glass capsules minute fragments may injure the skin.

The occurrence of deterioration in the capsules was established by implanting them under the skin of rabbits and removing them again and examining their contents microscopically, culturally, and by inoculation. Evidence was, however, obtained that in some cases the virulence of the organisms in the capsules was to some extent maintained. Hard and fast conclusions cannot be drawn from capsule experiments, but as a result of a considerable number of experiments the authors are inclined to think that rabbits will tolerate a larger dose of anthrax bacilli placed under the skin than in it.

In cannula experiments, of eight rabbits inoculated four died and four survived. In these cases .25 to .5 cc. of virulent culture were introduced into the subcutis. This is regarded as evidence that the subcutis is relatively insusceptible to anthrax.

Some of the rabbits in which capsules had been implanted were used again for similar tests, and finally, along with others in which capsules had been placed once only, were tested by subcutaneous inoculation

with a large dose of virulent culture. Of 19 so treated 16 died as a result of the test inoculation.

The history of one of the survivors was as follows :—

Rabbit 34A ...	May 5th ...	Capsule expressed.
	June 6th ...	$\frac{1}{2}$ cc. of contents of buried capsule given subcutaneously.
	Aug. 1st ...	$\frac{1}{2}$ cc. virulent anthrax transcutaneously.
	Aug. 11th ...	Inoculated with anthrax by scarification. Slight local reaction.
	Aug. 19th ...	$\frac{1}{2}$ cc. of virulent anthrax transcutaneously.
	Aug. 25th ...	Death from generalized anthrax.

The other two had similar histories. From these three animals the authors conclude that a solid immunity both to dermal and transcutaneous injection followed the subcutaneous administration of the bacilli, but that at a period of about 10 days subsequent to the dermal inoculation immunity was lost. "It is possible that these animals were first immunized subcutaneously and subsequently re-sensitized cutaneously, but at present the evidence only justifies the statement that the lethal dose was effective after dermal inoculation, and we do not know what part, if any, this dermal inoculation played. The four rabbits which survived cannula inoculation were given lethal doses transcutaneously at intervals ranging from 9 days to 10 weeks afterwards. Three died in about the same period as controls and the fourth died on the 12th day. There was no local oedema, but very occasional bacilli were present in the heart blood.

BROcq-ROUSSEU & URBAIN (Ach.). **Cuti-vaccination et cuti-immunité anticharbonneuse chez le cobaye.** [Cuti-Vaccination and Cuti-Immunity of the Guinea-pig against Anthrax.]—*Compt. Rend. Soc. Biol.* 1925. July 10. Vol. 93. No. 24. pp. 333-335.

The authors record in this paper the results of experiments designed to test the resistance of guinea-pigs immunized against anthrax by the cutaneous path to intracerebral inoculation, and they come to the conclusion that the immunity conferred by cuti-vaccination is sufficiently strong to permit the vaccinated guinea-pigs to resist intracerebral inoculation with several fatal doses of virus.

SCHOENFELD (A. F.) & CARPENTER (C. M.). **Mixed Infection in Guinea-Pigs with *Bacterium abortum* and *Mycobacterium tuberculosis*.**—*Jl. Infect. Dis.* 1925. July. Vol. 37. No. 1. pp. 68-74.

In the course of experiments in which guinea-pigs have been inoculated with materials suspected of containing the abortion bacillus it has occasionally happened that tuberculosis has been produced, although there was no reason for supposing that the material used for inoculation contained tubercle bacilli. The lesions produced by the two organisms resemble each other both macroscopically and microscopically. It therefore appeared to be of importance to ascertain whether specific agglutinins would be developed for the bacillus of abortion in cases of mixed infection. A series of groups of guinea-pigs were inoculated with the two organisms simultaneously, and one after the other, and also with extracts of the lesions produced by the organisms. The inoculations did not interfere with the development of agglutinins in any instance.

DESCOMBEY (P.). **Vaccination du cheval par l'anatoxine tétanique.**
[The Vaccination of Horses by Tetanus Anatoxin.]—*Ann. Inst. Pasteur.* 1925. June. Vol. 39. No. 6. pp. 485-504.

Tetanus toxin may be rendered non-toxic by the addition of formalin in the proportion of 2 per 1,000, the mixture being incubated at body temperature. The toxic power is gradually lost until after about 20 days. Doses of 10 cc. may be injected into guineapigs without producing any immediate or delayed reaction. A decrease in the amount of formalin added leads to a slower destruction of toxic power and *vice versa*, but too great quantities of formalin are to be avoided because of their reducing the antigenic power of the anatoxin.

The anatoxin produced by formalization of the toxin has considerable immunizing powers. A dose of 0.1 cc. of anatoxin is sufficient to protect a guineapig against 10 lethal doses of toxin after an interval of 16 days. Twenty lethal doses will cause local tetanus, but no fatal result. Anatoxin is capable of producing flocculation with anti-tetanic serum, and it appears to be established that anatoxins which give flocculation with anti-tetanic sera in short periods are more actively antigenic than those which require a longer time for flocculation. Flocculation is therefore an index of antigenic power. Anatoxin can be preserved at room temperature, or in an ice chest for months without deterioration.

Experiments have been carried out with anatoxin on horses as follows:—

Two horses were given 20, 20, and 30 cc. of anatoxin at intervals of a week, and after a further interval of the same duration they received 2 cc. of tetanus toxin. This toxin was that in general use for immunization purposes at the Pasteur Institute and the dose given represented several dozen fatal doses for an unprotected horse.

Five horses received two doses of 20 cc. of anatoxin at a week's interval, followed by a dose of 1 cc. of toxin. In one case the interval was a week and in the other four a fortnight after the second dose.

Three horses were given 15 and 20 cc. at a week's interval followed by a dose of 1 cc. a week later. None showed any symptoms whatsoever and they were subsequently given progressively increasing doses of toxin for hyperimmunization.

With a view to testing the immunity conferred by anatoxin in a manner resembling natural infection, splinters of wood were soaked in sporulating cultures, then heated in a water bath to 80° C. for half an hour, and then immersed in a mixture of cultures of staphylococci, bacillus pyocyaneus, and Friedlander's bacillus. Such splinters always set up fatal infections in guineapigs. In the experiments with horses these splinters were planted deeply in the muscles of the neck by passing them through a bleeding cannula and thrusting them deep into the muscles. Two horses were treated in this way, and in the case of 4 others the splinters were saturated with a solution of a salt of quinine.

Horse 1 was given two doses of 20 cc. of anatoxin at a fortnight's interval, and No. 2 was given two doses of 10 cc. at the same interval. Ten days later the infected splinters were inserted into the muscles. A control horse, uninjected with anatoxin, had a splinter inserted at the same time. The control developed tetanus a fortnight later and died. The protected animals showed no symptoms.

Horse No. 3 received doses of anatoxin as No. 2. Nos. 4 and 5 received a single dose of 10 cc., and No. 6 a single dose of 20 cc. From

4 to 4½ months later the infected splinters saturated with quinine were inserted. A control was used. The control died of tetanus on the 15th day after 2 days' illness. Horse No. 5 died on the 17th day after 3 days' illness. No. 6 developed symptoms on the 14th day and died 15 days later. Nos. 3 and 4 developed no symptoms.

The methods employed in the foregoing experiments excluded the possibility of ascertaining certain important points regarding the immunity conferred by anatoxin since animals which died under test inoculation were lost, and in those which survived the immunity was reinforced by the test inoculation.

Steps were therefore taken to ascertain whether the injection of anatoxin caused the production of antibodies in the serum. Experiments with guineapigs showed that animals immunized with 0.1 cc. of anatoxin furnished a serum two months later, 0.5 cc. of which completely neutralized *in vitro* two lethal doses of toxin. In experiments with horses serum was obtained from Nos. 3, 4, 5, and 6 mentioned above prior to the insertion of the infected splinters. These sera were titrated against toxin by means of guineapig inoculation with mixtures of serum and toxin, and the existence of antitoxin in the sera of the horses was established. The results were parallel with the infected splinter tests. They showed that double inoculation with anatoxin was more effective than single inoculation. The experiments also showed that this method of testing immunity was superior to others.

With a view to the determination of the amount of anatoxin necessary for the production of antitoxin a number of horses were injected with doses ranging from 15 to 5 cc. Six horses received one injection only, but three were given two doses of 5 cc. at three weeks' interval.

When the sera of these animals were tested those which had received two doses of 5 cc. were found to contain larger amounts of antitoxin than the sera of any of the animals which had one dose only. These results of course only apply to the particular anatoxin used, and it is reasonable to suppose that had the anatoxin been prepared from a more toxic sample of toxin smaller doses might prove protective.

The author has not been able to reduce the period required for the production of antitoxin in the serum to less than 15 days, although large doses (up to 300 cc.) of anatoxin have been injected. The antitoxin is produced slowly and it increases in amount for some weeks after its appearance in the serum can be detected.

Sufficient time has not yet elapsed to allow any opinion being formed regarding the duration of immunity produced by anatoxin, but the facts so far ascertained indicate that it persists for several months.

Brocq-Rousseu & Urbain. La Vaccination contre la toxine du Bacille de Preisz-Nocard. [Vaccination against the Toxin of the Preisz-Nocard Bacillus.]—*Compt. Rend. Soc. Biol.* 1925. July 24. Vol. 93. No. 26. pp. 486-487.

The Preisz-Nocard bacillus was grown in Martin's broth for 10 days and the culture was then filtered through a Chamberland L3 filter. One cubic centimetre of such a toxin injected subcutaneously killed a guineapig in 36 hours.

Such toxin had formalin added to it in the proportion of 3 per 1,000, and was incubated. After 4 days the toxin failed to kill a guineapig

in a dose of 5 cc., while non-formolized toxin incubated for the same period proved fatal in a dose of 4 cc. After incubation for 8 days the non-formolized toxin became non-toxic.

With a view to the investigation of the antigenic values of formolized and non-formolized toxin, the mixtures were incubated for a month, but it was found that formolized toxin was not superior to heated toxin and that both were only feebly antigenic.

NARAYANAN (R. S.). A Case of Tuberculosis in an Elephant.—*Jl. Comp. Path. & Therap.* 1925. June. Vol. 38. Pt. 2. pp. 96-97.

A female elephant about 70 years of age was noticed to be losing condition in March 1923. The appetite was capricious, the urine cloudy, and the faeces were softer than normal and often coated with mucus.

Death took place just a year later. Prior to this there had been marked emaciation, foetid diarrhoea with an admixture of blood, and oedema of dependent parts.

At the post-mortem examination the liver and spleen were found to be enlarged. The mucous membrane of the large intestine was thickened and dark red in colour. On the wall of the large bowel there were three lesions as large as a fist and containing greyish-white matter. Both lungs were involved and showed caseo-calcareous lesions.

Examination of specimens by EDWARDS showed that the lung lesions were tuberculous. The intestinal lesion was apparently due to parasitic invasion.

GREEN (R. G.). Distemper in the Silver Fox (*Culpes vulpes*).—*Proc. Soc. Exp. Biol. & Med.* 1925. May. Vol. 22. pp. 546-548.

The author has obtained a bacillus belonging to the Salmonella group from silver foxes dying with symptoms of distemper. To get rid of the large number of contaminants encountered in natural cases, materials obtained from diseased animals were passed through others in series, and from the last of these cultures were obtained and the disease was carried on by culture inoculations in series also.

The lesions mainly involved the liver, which was congested, and the intestine, which showed ulceration. Catarrh of the air passages and pneumonia were not encountered in the experimental infections. The heart blood and the central nervous system proved infective.

DISEASES DUE TO FILTERABLE VIRUSES.

WRIGHT (L. H.). Further Investigations of Infectious Equine Anaemia in Nevada.—*Jl. Agric. Res.* 1925. Apr. 1. Vol. 30. No. 7. pp. 683-691. With 12 charts in text.

The author is of the opinion that the presence or absence of eosinophilia is not a reliable guide for the differential diagnosis of infectious anaemia and strongylosis. The only definite means of diagnosis is the reproduction of the disease in an experimental animal, but a blood count and a temperature curve may assist very materially.

The filtrability of the virus is confirmed.

NÖLLER (W.) & DOBBERSTEIN (J.). **Zur Frage der histologischen Diagnose der ansteckenden Blutarmut der Pferde.** [The Histological Diagnosis of Infectious Anaemia of Equines.]—*Berlin. Tierärztl. Woch.* 1925. July 24. Vol. 41. No. 30. pp. 465–472.

The authors classify their findings into six groups which are characterized as follows :—

Group 1.—The endothelial cells of the reticulum in the liver are neither swollen nor increased in number. They contain little or no haemosiderin.

Group 2.—The endothelial cells of the reticulum of the liver are enlarged and often slightly increased in numbers. They contain a variable amount of haemosiderin. Lymphoid cells as well as endothelial cells may be found in the capillaries. Glisson's tissue often shows an increase in the lymphocyte-like cells. The spleen as a rule contains a normal amount of blood and haemosiderin, but cases occur in which there may be an abnormally small or an abnormally large amount of haemosiderin in the spleen. Very frequently large numbers of eosinophile cells were found round the periphery of the follicles.

Group 3.—The endothelial cells are obviously enlarged and are present in increased numbers. They almost invariably contain large amounts of haemosiderin. The affected capillaries appear as solid strings of cells. The spleen frequently contains an excess of haemosiderin.

Group 4.—The endothelial cells show a tendency to collect into masses. These masses sometimes contain an admixture of lymphocytes. There is a marked excess of haemosiderin. The spleen shows a marked reduction in its blood- and haemosiderin-content. The aggregation of eosinophiles round the follicles is very inconspicuous. There is a marked multiplication of the lymphocyte elements in the spleen.

Group 5.—The capillaries become distended with endothelial cells and the masses produced present the appearance of small tumours. In the spleen the follicles are not distinct as a result of the multiplication of the lymphoid cells. Eosinophile cells are practically absent.

Group 6.—Is characterized by the more or less complete destruction of the centres of the liver lobules, the place of the liver cells being taken by endothelial cells containing large amounts of haemosiderin. In the spleen only traces of haemosiderin are found, and there is increased multiplication of lymphocytes.

The lesions found in Groups 1 and 2 do not definitely indicate the existence of infectious anaemia. The lesions of Group 3 indicate its probable existence, while in Groups 4, 5 and 6 are included cases in which the diagnosis is practically certain.

As the result of their examination of 700 cases in which the existence of the disease was suspected, the following conclusions have been arrived at :—

In 37 per cent. of cases the histological examination indicated that the disease was "probably" or "very probably" present.

The histological changes are the more pronounced according as the animal has had febrile attacks during the weeks preceding death or slaughter. Where fever has not occurred, changes are inconspicuous.

The lesions observed are not absolutely specific, as they occur in such diseases as piroplasmosis and dourine, and are probably to be found in all diseases in which phagocytosis of red corpuscles occurs.

The histological examination is in fact only one part of the general examination, including the history of the case and the post-mortem findings, upon which it is at the moment possible to base a diagnosis of infectious anaemia.

ABE (T.). **Über das Virus der Maul- und Klauenseuche.** [The Virus of Foot-and-Mouth Disease.]—*Zeitschr. f. Infektionskr. parasit. Krankh. u. Hyg. d. Haust.* 1925. June 30. Vol. 28. No. 2. pp. 111-129.

The author has studied the effect of various physical and chemical influences upon the virus of foot-and-mouth disease.

The lymph in the vesicles on the feet of infected guineapigs reaches its maximum virulence in 24 hours, maintains that maximum for a further 24 hours and then declines.

The virus can be precipitated along with albumen by 70 to 75 per cent. alcohol. The dried precipitated virus maintains its virulence for 2-3 days, and in glycerin for 10 days.

Dried virus which has become avirulent is useless for immunization. The virus is not sedimented by centrifuging at 2,000 revolutions. It is absorbed by kaolin, and still better by animal charcoal.

Berkefeld filters allow the virus to pass, but the proportion of the virus passing is dependent upon the pressure. Haen's membrane filters hold varying proportions of the virus back.

The inoculation of rabbits causes the production of antibodies in the serum.

WEISCHER, STAPENHORST & BÜRMAN. **Der Dortmunder Impfapparat für Maul- und Klauenseuche.** [The Dortmund Apparatus for Injection of Foot-and-Mouth Disease Serum.]—*Berlin. Tierärzt. Woch.* 1925. Sept. 18. Vol. 41. No. 38. pp. 613-614. With 1 text fig.

The authors describe a special form of container to which a pump supplied with a rubber tube and cannula can be fixed.

VAN HEELSBERGEN (T.). **Die Impfung gegen Diphtherie und Geflügelpocken mit "Antidiphtherin."** [Inoculation against Fowl Diphtheria and Fowl Pox with "Antidiphtherin."]—*Schweiz. Arch. f. Tierheilk.* 1925. July 15. Vol. 67. No. 13. pp. 333-338.

There is now a considerable amount of evidence to show that fowl diphtheria and fowl pox are caused by one and the same virus.

Both give fully virulent virus, and viruses modified in various ways have been employed for immunizing purposes.

The author states that he has been able to obtain an unmodified virus which confers immunity by intradermal inoculation with the production of a local reaction only. No details are given.

FRANÇA (C.). **Pathologie comparée de la rage.** [The Comparative Pathology of Rabies.]—*Arch. Inst. Pasteur Tunis.* 1925. July. Vol. 14. No. 3. pp. 309-324.

In this paper the author publishes a summary of his observations in connexion with rabies in a number of different species.

One of his main objects has been to ascertain which is the most important and the most constant of the various alterations found in the histology of certain parts of the nervous system. A further aim has been to establish the nature of the cells found in certain of these nerve lesions. For example, a leucotoxic serum was found to produce great changes in the cells which are sometimes found within the capsules of the ganglion cells, and it was further found that the use of such a serum produced a great improvement in the general condition of the animal. The author's investigations have included man, carnivora, rodents, and the hedgehog.

In the human subject it has been found that the cerebro-spinal fluid is virulent, and in one case the virus contained in that liquid was proved by experimental inoculation to be fixed virus. Summaries are given of the author's findings regarding lesions in the nervous systems in the wolf, fox, marten, weasel, badger, mice and rats, porcupine, and hedgehog.

He finds that rabies is the most constant in its symptoms and lesions in man and the carnivora. The typical lesions are generally all present, but they are most marked in the Canidae.

In rodents lesions of the ganglia are usually absent, and in insectivores the lesions are very inconstant.

As a result of the histological examination of all the material available the author concludes that the most constant lesion is the hypertrophy of the neuro-fibrils, and following this he found the perivascular infiltrations the most common. The lesions of Nelis and van Gehuchten, which are so typical of rabies in man and carnivora, are not found in the rodents and hedgehog.

He is unable to express any opinion as to the constancy or otherwise of Negri bodies as they have not been searched for in all the material.

GALEGO (A.). **Beitrag zur histologischen Diagnose der Tollwut.**
[The Histological Diagnosis of Rabies.]—*Zeitsch. f. Infektionskrankh. parasit. Krankh. u. Hyg. d. Haust.* 1925. June 30.
Vol. 28. No. 2. pp. 95–98.

In this paper the author describes a method for staining Negri bodies in sections which he claims is rapid, simple and effective:—

Small pieces of Ammon's horn are fixed by boiling in 10 per cent. formalin for 1 to 5 minutes.

Frozen sections are cut. The sections are placed for $\frac{1}{2}$ to 1 minute in

Distilled water	...	...	...	...	10 cc.
Nitric acid	...	...	...	...	1 drop.
Liq. ferri perchlor.	...	...	...	...	1 drop.

Without washing, the sections are transferred to

Distilled water	...	...	...	...	10 cc.
Carbol Fuchsin	...	...	...	...	15 drops.
Acetic Acid	...	...	...	...	1 drop.

Rinse in water, and transfer for 5 minutes to

Distilled water	...	...	...	...	10 cc.
Formalin	...	...	...	...	11 drops.
Nitric Acid	...	...	...	...	1 drop.
Liquor ferri perchlor.	...	...	...	...	1 drop.

Rinse in water and stain for 1 minute in

1 per cent. watery solution of Indigo-carmin	1 part.
Saturated watery solution of Picric Acid	2 parts.

The specimen is then dehydrated and clarified and mounted in Canada balsam.

The cell nuclei are violet, the protoplasm light green, the body of the Negri bodies is dark green and the inner bodies are pale violet or unstained.

SCHOENING (H. W.). **Studies on the Single-Injection Method of Vaccination as a Prophylactic against Rabies in Dogs.**—*Jl. Agric. Research.* 1925. Mar. 1. Vol. 30. No. 5. pp. 431-439.

As a result of experiments carried out with single vaccines prepared at the Laboratory of the Bureau of Animal Industry, supplied by commercial houses, and prepared according to the technique of UMEMO and DOI, the author came to the conclusion that there appears to be more than one strain of street rabies in the United States.

STOCKMAN (S.). **A Review of Some Problems of Foot-and-Mouth Disease.**—*Proc. Roy. Soc. Med.* (Section of Comp. Med.). 1925. Aug. Vol. 18. No. 10. pp. 31-39.

MYCOTIC DISEASES.

LANGERON (M.), CAUCHEMEZ (L.) & ALLEAUX (V.). **Cultures de massues obtenues dans trois cas d'actinobacilliose bovine.** [Cultures containing Clubs from Three Cases of Bovine Actinobacillosis.]—*Ann. Parasit. Hum. et Comp.* 1925. July. Vol. 3. No. 3. pp. 225-231. With 4 text figs.

The literature shows that the development of clubs in artificial cultures of the Actinobacillus is an exceptional result, but it appears to be associated with the presence of substances derived from the body (blood, serum, etc.). From a case of actinobacillosis of the peritoneum, the animal also showing lesions of the tongue, cultures were made on Sabouraud's medium and incubated at 26° C. Colonies appeared in about a fortnight, and developed very slowly. At first they were yellowish, but they gradually changed to brown, and then chocolate. Microscopic examination showed that they were a mass of clubs.

Subcultures on other media kept at 26° C. succeeded. Martin's agar, carrot, and ordinary agar were all used. On potato growth was very slow. No cultures were obtained in liquid media. Stab cultures in agar failed, and no growth was obtained at 37° C.

After 4 or 5 subcultivations the development of clubs ceased and the "cultures were invaded" by a gram-negative diplococcus.

In a second case of actinobacillosis of the tongue cultures with numerous clubs were obtained on media containing glucose by the 4th day. Subcultures were obtained on peptone agar, but not on ascites agar, carrot or potato. The structure of the colonies was examined in preparations of entire colonies in lacto-phenol, in sections of colonies fixed in Bouin and embedded in paraffin. The best stain for sections was found to be Curtis' method (Safranin-picro-black-naphthol). The authors view the clubs as living protoplasmic structures which are capable of budding, but the view that their formation is in some way connected with the opposition of the tissues cannot be maintained.

The organism which gave rise to these cultures differs in certain particulars from that described by LIGNIÈRES and SPITZ. It does not grow at all at 37° C. It is aerobic, it will grow on potato which has not been rendered alkaline, and it grows on carrot which is essentially

an acid medium. In view of the findings of other investigators it appears to be justifiable to conclude that there is more than one type of actinobacillosis.

GILMAN (H. L.) & BIRCH (R. R.). **A Mould Associated with Abortion in Cattle.**—*Cornell Vet.* 1925. Apr. Vol. 15. No. 2. pp. 81–89. With 2 plates.

The authors report the recovery of a mould of the genus *Mucor* from the foetuses which were aborted in one herd. The three abortions were spread over a period of three years. Experimental inoculations of five pregnant cows with cultures of the mould led to placental infection without abortion in one, and placental infection with abortion in another. The mould was recovered in a state of purity from both. The remaining three animals yielded negative results. The herd gave negative results to agglutination tests with the abortion bacillus. The mould and the lesions produced were practically identical with those described by SMITH in 1920.

Y. MARTIN (C. A.). **Contribucion al estudio de la linfangitis epizootica.** [Epizootic Lymphangitis.]—*Revist. Hig. y Sanidad Pecuarias.* 1925. May-June. Vol. 15. No. 5-6. pp. 291–301.

MISCELLANEOUS.

GEISERT (E.). **Zur Therapie der Bornaschen Krankheit, erfolglos Behandlung mit Hexamethylen-tetramin. Urotropin.** [Urotropin used without success in the Treatment of Borna Disease.]—*Berlin. Tierärztl. Woch.* 1925. Sept. 4. Vol. 41. No. 36. p. 586.

The author has used the drug on five cases, in doses varying from 20 to 140 gm., but without success.

HIESINGER (F.). **Zur Spirochätenfrage bei der Stuttgarter Hundeseuche.** [Spirochaetes and Stuttgart Disease.]—*Berlin. Tierärztl. Woch.* 1925. July 31. Vol. 41. No. 31. pp. 381–383. With 2 text figs.

The author has investigated 20 cases of Stuttgart disease and in one case only, in which putrefaction had already set in, were spirochaetes found in the kidney. Transmission to the rabbit failed.

In no case were the structures described by LUKES as spirochaetes found in the kidneys.

In 3 out of 13 control dogs LUKES' spirochaetes were found in the kidneys. In one case, in addition to putrefactive bacteria and LUKES' spirochaetes, undoubted spirochaetes were found in Levaditi preparations.

LEGER (A.). **Mode de préparation simplifié d'un éosinate de méthylène.** [A Simple Method of preparing Eosinate of Methylene.]—*Bull. Soc. Path. Exot.* 1925. June 10. Vol. 18. No. 6. pp. 464–465.

Working in Annam the author has devised a simple method of preparing an eosinate of methylene blue with dyes of French origin

(R.A.L.) which is said to give very good, selective and intense staining with blood corpuscles and blood parasites.

Grind in a mortar 1 part of eosin extra R.A.L. with 2 parts of methylene blue R.A.L.

To 1 gramme of the mixture add 2 cc. of neutral glycerin and thoroughly grind. Add 100 cc. of absolute methyl alcohol. Shake and filter.

Ten or twelve drops of this stain are placed on a dry but unfixed film and allowed to act for one or two minutes. Add an equal amount of distilled or tap water and allow the mixture to act for 5-10 minutes.

Wash and dry.

ELLIOT (H. B.). The Veterinary History of the Island of Hawaii.—
Vet. Jl. 1925. July. Vol. 81. No. 7. pp. 335-346.

After dealing briefly with the early history of the islands, climate, and animal population (the figures for the latter are admittedly inaccurate), the writer proceeds to deal with animal diseases.

It is stated that all the contagious diseases now present in the Islands have been imported from the continent of America.

The diseases affecting equines are glanders, influenza, cerebro-spinal meningitis, epizootic lymphangitis, tetanus, osteoporosis, parasitic infestations, and diseases of the digestive tract.

The first of these, which alone for a time took heavy toll, is now thought to have been eradicated. Mention is made of the occurrence of what appears to have been a mild form of glanders in indigenous animals, a form which did not spread to mules by contact, and it is stated that ONISSIMENKO, working on the Island of Maui, believes that he has discovered in a district that was severely infected with glanders many years ago an attenuated type of bacillus.

Under influenza are included nasal catarrh, strangles, and contagious pneumonia. The detention of animals for three weeks' quarantine and sanitary measures in general have greatly reduced losses from these diseases during recent years. NORGAARD originally believed that epizootic lymphangitis was existent in the island, but Elliot has not seen a typical case. Tetanus occasionally occurs, but the percentage of recoveries is unexpectedly high.

Osteoporosis was for years a very serious matter in the wet districts, but it has not been known for many years now, the decline in the number of cases beginning in 1904. It is difficult to offer a sound hypothesis for this, but it would seem to be associated with improved dietary. This is supported by the fact that the disease abruptly disappeared from a stable previously ravaged by it when bran feeding was stopped.

Cerebro-spinal meningitis is occasionally seen in Hawaii, but is of more common occurrence in other islands of the group. Summer sores are of frequent occurrence. At one time there were large numbers of animals to which the term "blower" was applied. They were so-called because after return from work they would stand for hours, with food untouched, blowing heavily. Such animals were usually in good condition, had staring coats, and never sweated at work. The most dangerous period was when the winter coat was being acquired. "Blowers" working at such times often died from pul-

monary congestion. The universal adoption of the practice of periodical clipping has eliminated this source of loss.

Tuberculosis exists among the cattle on the Island. In 1906 a certificate was required prior to shipment, but this was found to be ineffective for stopping the importation of infected animals. A period of quarantine and retest are necessary.

In 1910, a test of the dairy cattle on the Island of Oahu showed 23.49 per cent. reactors. An initial test on the island of Hawaii in 1914 eliminated 7.7 of diseased animals. The subcutaneous test is impracticable, and the intrapalpebral test is employed.

Various methods of compensation have been put into force in connection with compulsory slaughter, but complete eradication has not been achieved. The percentages for Oahu and Hawaii last year were 3.4 and 1.3 respectively. In Honolulu Abattoir tuberculous lesions are found in about 4 per cent. of beef cattle and 2 per cent. of pigs.

With the importation of pure bred animals for improving breeds there was introduced contagious abortion. This disease was first referred to in reports in 1920, and it is stated now that all the pure-bred and many of the grade herds on Kauai, Oahu, and Maui are infected. In Hawaii it is known to exist in one isolated herd only.

In the past confusion has arisen between haemorrhagic septicaemia and blackquarter, but apparently both diseases exist, and are almost every year responsible for sudden outbreaks with a high mortality. It is said that cases of blackquarter occur in cattle of all ages, and that death occurs without any development of a muscle lesion. At altitudes of 3,000–4,000 feet a form of haematuria associated with ulceration of the bladder occurs. This in other parts of the north-western Pacific region is attributed to an excess of oxalic acid in certain plants.

The smaller domesticated animals are said to be largely free from disease.

SEDDON (H. R.) & CARNE (H. R.). *Marsdenia rostrata*: **A Vine Poisonous to Stock.**—*Dept. of Agric. New South Wales Vet. Res. Rep.* No. 1. 1925. Apr. pp. 34–43.

Reports having been received that fatalities had occurred both in cattle and pigs which were possibly due to the ingestion of this plant, experiments were undertaken to test its toxicity.

In experiments it was found that the plant was toxic for cattle, sheep and pigs. Cattle and sheep would not eat the plant either alone or when mixed with other foods, but pigs would do so as a mixture. It appears to be probable that the milky latex which the plant contains renders it unpalatable. Pigs would take a watery extract when mixed with a considerable amount of milk. The experiments performed appear to indicate that the toxic principle acts upon the nervous system.

In pigs symptoms appear within an hour or two of drinking extract. These are unsteadiness of gait, loss of equilibrium, inability to stand, acceleration of pulse and respirations, vomiting, dilatation of the pupils, and, just prior to death, coma. Death usually supervenes within two or three hours after drinking the extract.

Cattle and sheep which were drenched with extract did not show symptoms for some hours. When they appeared they closely resembled those seen in pigs, and death occurred in 24 to 48 hours.

In one sheep, which developed symptoms of intoxication, recovery occurred, and was complete by the third day.

In pigs post-mortem examination revealed the following lesions. The blood was dark and uncoagulated. The stomach and intestines showed diffuse or patchy submucous haemorrhages. These were most marked in the stomach, ileum, and caecum. There was no blood in the lumen of the bowel.

In one case a post-mortem was made on a 16-months-old calf, and the lesions found were similar to those seen in the pigs. The post-mortem examinations of the fatal intoxications in sheep revealed similar lesions.

The leaves of the plants were found to be toxic, whether fresh or dried, but other parts of the plant have not been tested.

The minimum toxic doses have not been ascertained, but the following produced toxic effects. In weaned pigs a cold watery extract of sources of green leaves, in sheep extract of 6 ounces of green leaves, and 2-year-old cattle extract of 1½ lb.

The toxic principle has not as yet been isolated, but preliminary tests have revealed the presence of an alkaloid.

SEDDON (H. R.) & CARNE (H. R.). **Poisoning of Stock by *Solanum sturtianum*.**—*Dept. of Agric. New South Wales Vet. Res. Rep.* No. 1. 1925. Apr. pp. 28-33.

It would appear that the toxic properties of this plant have not as yet been investigated, although experiments have been conducted with *S. esuriale*. Brief details are given of three occasions when heavy mortalities occurred among sheep and cattle passing through country where the plant is plentiful. It is said that cattle grazing continuously in the neighbourhood of Broken Hill, where the plant is abundant, are not affected, but mortalities occur among fresh stock and among travelling stock.

A stock of ripe berries were obtained for experiment from Broken Hill and these were identified as the fruit of *Solanum sturtianum*.

In the first experiment it was found that the sheep would not eat the berries, a watery extract was therefore made from 1 lb. of berries, and the extract made up to 1 litre. A drench of water followed the administration of the extract. Within 4 hours six motions had been passed, these becoming progressively more diarrhoeic. The diarrhoea continued and there was laboured respiration and frothing at the mouth. The diarrhoea continued, and death occurred at 47 hours. At the post-mortem severe gastro-enteritis was found.

The experiment was repeated on a heifer with a total of 1½ lb. of berries extracted with 8 litres of water. Diarrhoea was again produced and this persisted for three days, when the animal was killed.

In a third experiment another heifer ate a quantity of berries (about 3 lb.) minced up with chaff and bran. Diarrhoea began in about 36 hours and death took place at the 72nd hour.

At the post-mortem severe gastro-enteritis and peritonitis were found.

The toxic principle has not been identified up to the present.

SEDDON (H. R.). *Stachys arvensis*: A Cause of Staggers or Shivers in Sheep.—*Dept. Agric. New South Wales Vet. Res. Rep.* No. 1. 1925. Apr. pp. 14–27.

Proof has already been furnished by DODD and HENRY that *Malva parviflora* and *Lamium amplexicaule* are both capable of producing the disease in sheep. Seddon now brings evidence to incriminate *Stachys arvensis*, previous tests having been inconclusive.

In the first experiments three sheep were given 30 lb. of freshly-cut plant daily, and they were tested by driving, along with control sheep. The first drive was on the 12th day. Evidence was obtained that, 12 days feeding may be sufficient to provoke symptoms, and that whether staggering develops or not, driving such sheep may prove fatal.

A further sheep fed later did not develop symptoms even up to 5 weeks. It is suggested that the different age of the plant may have accounted for this difference in result.

In the second experiment the cut plant was transported 73 miles before being fed to the sheep.

Definite symptoms of lagging behind and falling were seen in the fed ewes and lambs beginning on the 8th day after feeding. None of the control sheep showed symptoms.

It was found by experiment that substitution of good diet for the weed lead to prompt recovery. The minimum amount of plants necessary to produce symptoms in lambs was about 6 lb., and in sheep about 11 lb., each fed during a period of 4½ days.

The substance responsible for the symptoms is excreted in the ewe's milk, as was shown by an experiment. The ewe which ate from 1 to 6 lbs. daily first showed symptoms when driven on the 12th day. Both ewe and lamb showed staggering and frequent urination, another symptom of the intoxication, on the 24th day.

BAKER (A. H.). A Useful Preservative for Whole Blood.—*Brit. Jl. Exp. Path.* 1925. Aug. Vol. 6. No. 4. pp. 201–202.

After a number of tests with other substances it was found that boric acid in the proportion of 1/100 to 1/500 was suitable for the preservation of samples of fowls blood collected for agglutination tests with *B. pullorum*. Tubes of 2.5 cc. capacity were sent out with 0.1 cc. of 5 per cent. solution of boric acid in saline. If the tube was filled with blood the dilution of the boric acid was 1/500.

Serum separation was good; no haemolysis occurred until the 4th day or later. No cloudiness due to contamination was visible till the 6th day, and the agglutination titre remained constant.

In a postscript the author states that it is probable that a similarly simple method has been used elsewhere, but that he has not been able to find any reference to it. The use of boric acid in saline for the preservation of blood has already been recommended by BEVAN [see this *Bulletin*, 1916, Vol. 4, No. 1, p. 40].

HAGAN (W. A.). Bracken Poisoning in Cattle.—*Cornell. Vet.* 1925. July. Vol. 15. No. 3. pp. 326–332.

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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 (L. E. W.). **The Trypanosomiasis 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.

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. morsilians*.

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 CO₂ 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.) & OYARZABAI (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 trypanosomiasés animales.** [Bismuthoidol in the Treatment of Trypanosomiasis of Animals.]—*C.R. Soc. Biol.* 1925. Oct. 30. Vol. 93. No. 30. pp. 1046–1049.

Bismuthoidol 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. cazalhoui* 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 kilogram 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.

DROS (R. I.). **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. Tierärztl. 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, 33½ per cent. failed to become infected. The same percentage of those treated with tartar emetic escaped 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 Algérie. [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 Piroplasmiose 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 intracorporal 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. Guinea-pigs, 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 intraperitoneal 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 arsenophenyglycine 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.), & RASTEGAWEA (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 (L. 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 Argentina.** [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:—

N
15 di-sodium phosphate—88 parts.

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 μ by 6.5-7.5 μ . 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 Spirochètoses 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. gallinarum 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.

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.

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 neuveu-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 3-3.86 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.* 1. 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*; *Chrysomya albiceps*, and *Chrysomya 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 carcasses is, therefore, of the utmost importance.

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

The means adopted for the disposal of carcasses 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 carcasses 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 carcasses are simply thrown into the trough, the flies are attracted in enormous numbers, and very soon the carcass is a mass of maggots. These reduce the carcass 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 carcasses two tins nearly full of maggots were collected. After these had been killed they were thrown out on the veldt, where they dried up.

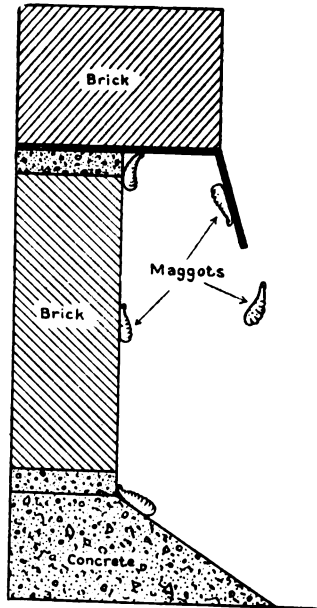
The suggestion is put forward that it may be possible to preserve the maggots for poultry food.

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.

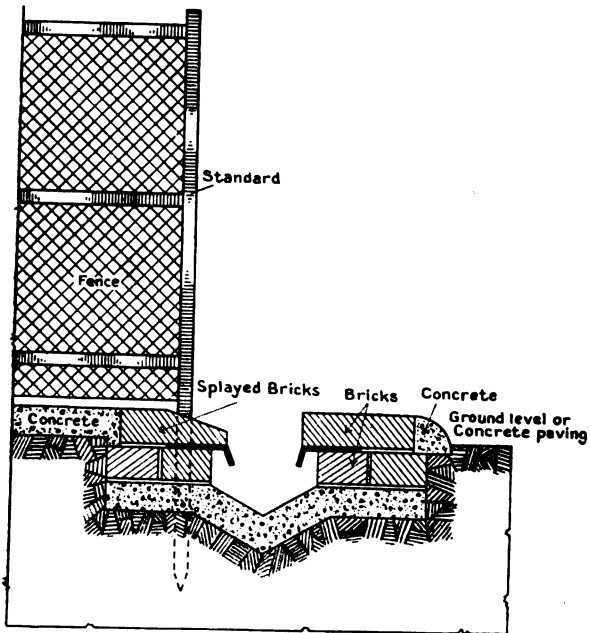
An essential part of the device described in this paper is an overhanging lip round which maggots cannot pass; temperature, however, also plays an important part in fly control. Larvae prefer a temperature of about 90° F. At 115° F. they die and at lower temperatures (108° F.) if the material in which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



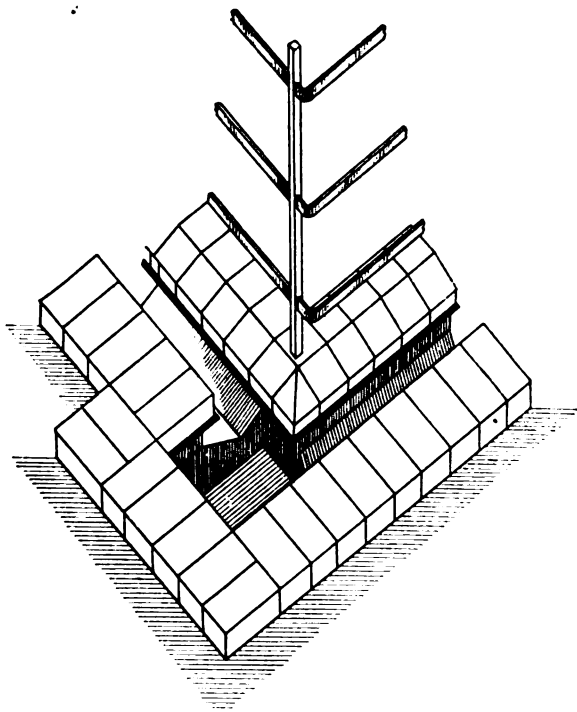
Maggot falling back into the Trench.



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.

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.

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 $\frac{1}{20}$ 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 intraperitoneally 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 conférée aux animaux vaccinés contre le charbon bactérien par la méthode 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.

SACHELARIÉ (V.). **Étude 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. paratolulinus*. 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 parobotulinus 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 (L. 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 colostrum 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 colostrum 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 Zeisler 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 Einschlusskörperchen 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. Tierärztl. 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 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 FROSCHE 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, where 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 discrete 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.

NIKOLAJEWA (E.). Antiwutimpfung mittels Karbolvaccine 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. Tierärztl. Wochenschr.* 1925. Nov. 13. Vol. 41. No. 46. pp. 751-752.

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 μ . 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 carried 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 μ in diameter and 1-5 μ 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 PFELER-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 an advantage over the usual methods of treatment.

One subject of investigation "Lymphatic Disease," which occurs in trek animals in Sumatra, in which both sexes are affected, and it appears as an acute affection of the joints—ulnar, tarsal, carpal, etc.—with severe lameness. In many cases cows abort, and castration of males seems to favour 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.

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.

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL VETERINARY BULLETIN.

VOL. 14.]

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[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.]

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 trypanosomiasés animales avec le 205 Bayer (Naganol).** [The Treatment of Animal Trypanosomiasés 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 trypanosomioses animales.** [Preliminary Note on the Action of Tryparsamide in Animal Trypanosomiasis.]—*Ann. Soc. Belge Méd. 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 Tierärztl. 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:—

<i>Acute.</i>	<i>Sub-acute.</i>	<i>Chronic.</i>
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 toxæmia; 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. $\frac{1}{2}$ 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 theileriose 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 à 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 μ long by 1.5 to 2 μ 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 μ by 0.5 to 0.75 μ . 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 μ . The merozoites have one rounded end and one pointed, and range from 4–10 μ in length by 1 to 2.5 μ 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 ...	{ <i>Isospora rara</i> .
	{ <i>Diplospora avium</i> .
Oval Sporocysts ...	{ <i>Lucetina rivoltai</i> .
	{ <i>Hyaloklossia lieberkühni</i> .

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 36μ 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 Protozoaires" 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 frequency 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 leishmaniosi 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 spirochètose 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.

BOSSÉLUT (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 μ 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.

PHISALIX (M.). *Cyclospora viperac*, 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 viperac* infects also *Coluber esculapii* and *Coelopeltis monspassulana*.]—*Bull. Soc. Path. Exot.* 1925. Nov. 11. Vol. 18. No. 9. pp. 707-709.

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 0 to 31.4 „
at different seasons.
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 (P) 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 μ thick. They appeared to be oviparous as well as ovoviviparous. The blood contained larvae measuring 160-190 μ by 3.3 μ .

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. rattii* 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 $\frac{1}{2}$ 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 $1\frac{1}{4}$ 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 its 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 :—

<i>Xenopsylla cheopis</i>	...	...	...	60 per cent.
<i>Ctenopsylla musculi</i>	...	...	...	25 per cent.
<i>Sarcopsylla (Echidnophaga) gallinacea</i>				15 per cent.

SÉGUY (E.) **Étude 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.

- 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.
- HOEPLI (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 Ruillietina, Ransomia, et Johnstonia.** [The Nomenclature of the Genera of Cestodes *Ruillietina*, *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), Ornithodoros gurneyi, Ixodes arvicolae and Haemaphysalis mjobergi.**—*Ibid.* pp. 55-58. With 3 text figs.

BACTERIAL DISEASES.

VALLÉE (H.) & RINJARD (P.). **Études sur l'entérite paratuberculeuse des bovidés.** [John'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 John'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. chauvæi* 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 toxins. 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 inmunizante de los cultivos de *Bacillus chauwoei* 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. chauwoei* 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 infrequency 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 pasteurilla 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 or visible organism.

They have cultivated the organism in a proportion of cases, serum, and have produced arthritis 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 μ in length. Longer spirochaete-like forms measuring up to 15 μ 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 STAUB (A.), satisfactory results.

[Four Years of ... are less susceptible to infection than goats. *Ann. Inst. Pasteur*. 1925. Dec. ... leads to the formation within a week of a small local lesion. ... 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 accroître 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.

INOUE (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). **Immunisierungsverfahren gegen Tollwut.** [Immunization against Rabies.]—*Berlin. Tierärztl. 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 Pekinese. 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. Tierärztl. 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. Tierärztl. 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 3½ 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 μ 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 μ 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 vaccino-therapy 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 vaccinothérapie de l'étude Anatomopathologiques des lésions (à propos des Blastomycoses).—*Maroc Médical*. 1925. Feb. 15. No. 38.

This paper is an abbreviated form of the above.

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 poly-stachya*, 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 blue adheres to the sides of the vessel. The liquid is thrown away and the vessel is placed in an incubator. 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. Grüber	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.

LOWE (H. T.). **A Veterinary Survey of the Bukoba District, Tanganyika Territory.**
— *Vet. Jl.* 1925. Dec. Vol. 81. No. 12. pp. 592-608.

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 $1\frac{1}{2}$ 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.

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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 intravenously. 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*.

MEISSLER (H.) & BERGE (R.). **Die trypanozide Kraft des Arsenobenzol-Präparates "Albert 102."** [The Trypanocidal Properties of "Albert 102."]—*Deut. Tierärztl. 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 ascertaining 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.

VAN SACEGHEM (René). **L'action du tryparsamide dans les trypanosomiasés 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. cazalbouti* 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 Sienna (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 *Ileocyathis 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 μ by 9-14.4 μ .

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. falci-formis* 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 im 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 Babesielliosis 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 hematológico e urológico da Anaplasmosse 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.

DESCAZEUX (J.). **Spirochètose 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 μ 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.

BERGE (R.). **Ein Fall von Hühnerspirochètose in Deutschland.** [A Case of Spirochaetosis of the Fowl in Germany.]—*Deut. Tierärztl. Woch.* 1926. March 6th. Vol. 34. No. 10. pp. 169-172. With 1 text fig.

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. hainesi*, *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 μ , and a maximum thickness of 2 μ . [Measurements are as in original.]

The larvae measured 10 to 12 μ by 2 to 3 μ , the eggs 8 to 9 μ by 4 to 5 μ . 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-Ouélé.** [A Centre of *Glossina* of the *Morsitans* Group in Lower Ouélé.]—*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 remembered 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.

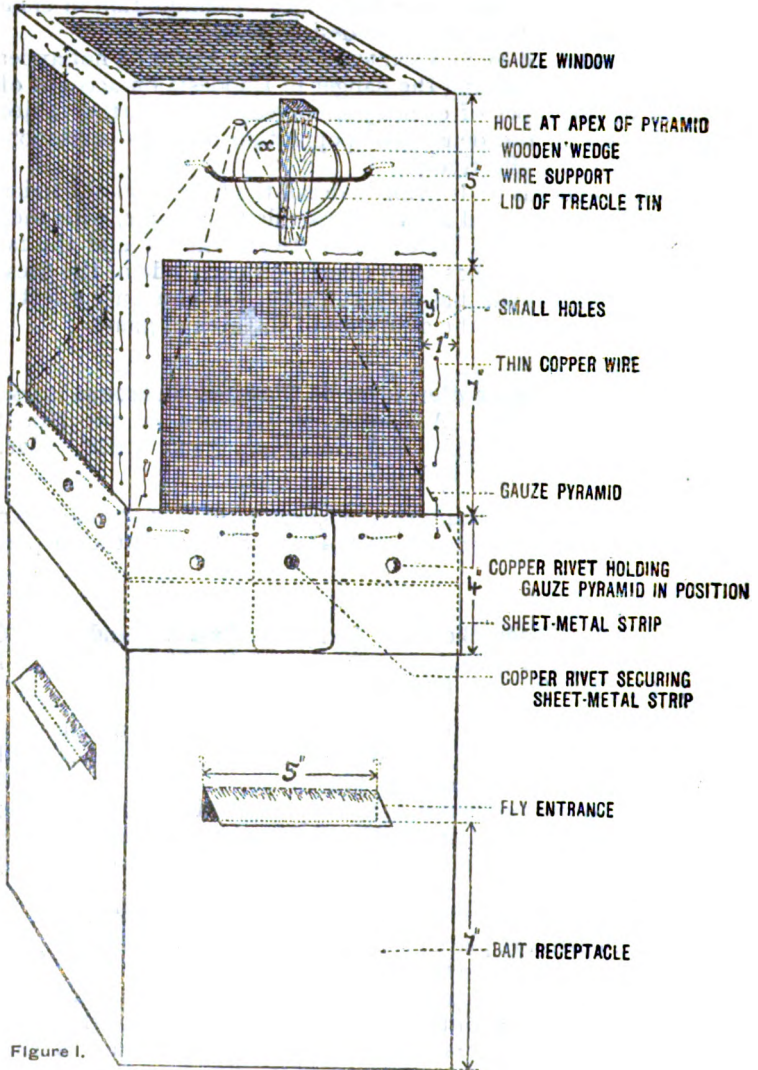
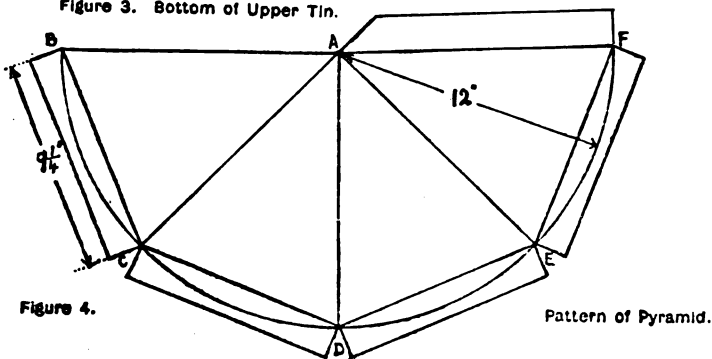
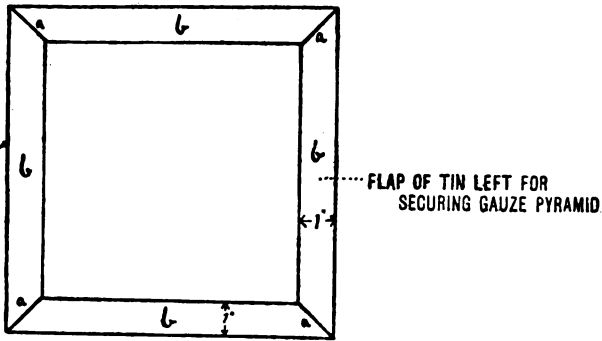
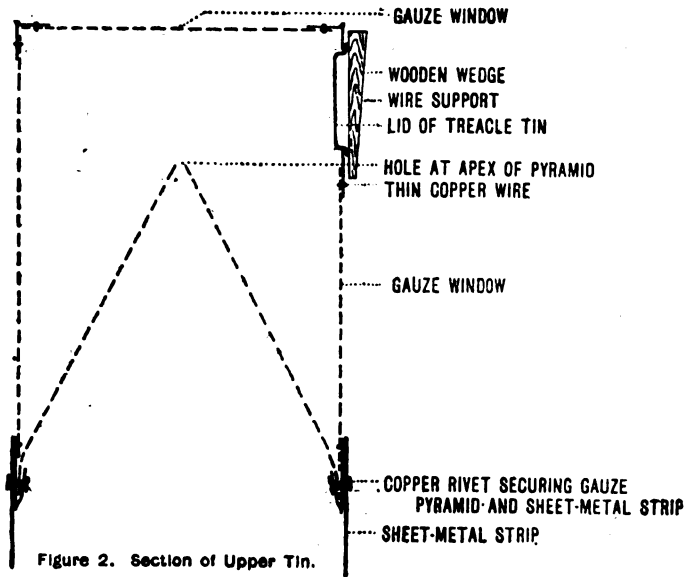


Figure 1.

[Reproduced from *Jl. Dept. Agric. Union of S. Africa.* 1926. Vol. 12. No. 2.]



[Reproduced from *Jl. Dept. Agric. Union of S. Africa.* 1926. Vol. 12. No. 2.]

DROUIN (V. F.). **Prevention et Traitement de l'hypodermose du Bœuf.** [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 kilogram, 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 $\frac{1}{4}$ 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.

- 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. Tierarz. 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.

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 CO₂ 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 CO₂ requirements.

The origin and sources of the strains growing with less dependence on CO₂ (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 antiocharbonneuse 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 bactérien 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 bactérien 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 piroplasmiasis.

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 anti-carbunclosa. 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 carcasses 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.

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 (B. 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 vibriion 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 vibriion 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 vibriion septique is readily distinguished from the bacillus of blackquarter by this means.

KLARIN (E.). **Om kastning genom Spirillinfektion.** [Vibriionic 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 Dermatitis 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 staphylococcal 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 additionnées 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.

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 inoculated 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 Lebensfähigkeit des Maul- und Klauenseuchevirus in Ather.** [The Vitality of the Virus of Foot-and-Mouth Disease in Ether.]—*Deut. Tierärztl. 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 formalized 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. Tierärztl. 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 carbolyzed 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 tissue.

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 Occidentale Française.** [Rinderpest in French West Africa.]—*Bull. Comité d'Études Hist. et Scientif. de l'Afrique Occidentale 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. Tierärztl. 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 food-stuffs 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 BROCOU-ROUSSEU on a paper submitted by Teppaz for the Doctorate.

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.

MYCOTIC DISEASES.

ARROYO Y MARTIN (C.). **Contribución al estudio de la linfangitis epizootica.** [Epizootic Lymphangitis.]—*Revista Zoolécnica.* 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 histopatología de la linfangitis epizootica.** [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.

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. Tierärztl. 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.

HADLEY (F. B.). **Sweet Clover Poisoning of Cattle.**—*Vet. Med.* 1926. May. Vol. 21. No. 5. pp. 213-214.

MALFROY (M.). **L'élevage 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.

REITTERER (Ed.). **Structure de la défense d'éléphant.** [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. Tierärztl. Woch.* 1926. Mar. 12. Vol. 42. No. 11. pp. 170-171.

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.

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 wolfhounds.

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.

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TROPICAL VETERINARY BULLETIN.

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[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.

CONTIS (Georg). **Beitrag zur Hundepiroplasmose in Griechenland.** [Canine Piroplasmosis in Greece.]—*Berlin. Tierärztl. 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.

SERGEANT (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 2.7μ by 1.6μ .

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.		Test animal.	Result.
			After.	For.		
1 ...	<i>T. rubidus</i> 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 ...	<i>T. striatus</i> 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 ...	<i>Stomoxys</i> 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 piroplasmiasis 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. cazalbovi* (*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 trypanosomiasés animales.** [Bismuthoidol in Treatment of Animal Trypanosomiasés.]—*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 $\frac{1}{4}$ 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 on 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 papatasi*.**—*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. papatasi*.

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. Tierärztl. 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 spirochètose 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. crociduræ*—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.*

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.

* 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. oligarthus* 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.). **Strongylien der Pferde in Deutschland.** [Strongyles of Equines in Germany.]—*Deut. Tierärztl. 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 portage 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 P** [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* (Vibrien septique) is non-pathogenic. *C. chauvoei* does not produce a soluble exotoxin.

C. chauvoei ferments glucose, lactose and sucrose under favourable conditions, but vibrien 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 Vibrien Septique of Pasteur.]—*Deut. Tierärz. 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 vibrien 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 vibrien 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 vibrien 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 vibrien 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 Schafranschbrand.** [Blackquarter of the Ox and Sheep. Comparative Investigations.]—*Deut. Tierärztl. 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 Ranschbrand 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 guineapigs.

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, dulcitol, 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. Guinea-pigs 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 guinea-pigs, death occurring in about a month. Rabbits are not susceptible to the toxin. On two occasions pregnant guinea-pigs 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. Tierärztl. 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 Veterinærvidskrift* 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. Tierärztl. 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 spermatocidal 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.

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.

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.

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.

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 contagé. [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, Malmö 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 contagé 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. Tierärztl. 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 Ginschen Einschulskörperchen 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 Schlusswort 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. Tierärztl. 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 intraperitoneal 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.

Intra-rectal 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). **Ricerche 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 intraveineuse.** [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 given 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 ovalus*)**. **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. **Enpoisonnements dus à des végétaux, 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. Tierärzt. 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. Tierärztl. Woch.* 1926. June. 25. Vol. 42. No. 26. pp. 425-427.

* Summarized by Dr. W. H. Andrews.

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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.) & WOŹEKHOWSKY (A. M.). La résistance des érythrocytes au cours de la babesiellose bovine. [**The Resistance of the Red Blood Corpuscles in Bovine Babesiosis.**]—*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.

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 Babesiosis 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 (Babesiosis, 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 than 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 & PEYAVIN, with NGUYÊN-VAN-DÈN, 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 hindmost 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 identify 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 trypanosan. 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 Guinea-pigs with Mal de Caderas.**—*Compt. Rend. Soc. Biol.* 1926. Sept. 21. Vol. 95. No. 27. p. 828.]

Series of guinea-pigs 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 guinea-pigs 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. Tierärztl. 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 $1\frac{1}{2}$ 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 $\frac{1}{2}$ 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 $\frac{1}{2}$ to $\frac{3}{4}$ of a dram in 5 ounces of distilled water.

LEVADITI (C.), NICOLAU (S.) & GALLOWAY (I.) Essais de prophylaxie des trypanosomiasés 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" ($\frac{1}{4}$ 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 Trypanosomen. [**The Pathogeny of Trypanosomiasis explained upon the basis of Trypanosome Sugar Phenomena.**]—*Berlin. Tierärztl. 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*. Guinea-pigs and mice were inoculated from it, but in only one mouse did infection occur. *Amblyomma cajennense* 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 complementary 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 syphilitic 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 hydnocarbate, 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.

SERGEANT (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 papatasi***].—*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. papatasi*, 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 papatasi* 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 konijnencoccidiose. [**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 $\frac{1}{4}$ per cent. solution per kilogramme. This dose given three days in succession produced no evidence of nephritis.

YAKIMOFF (W. L.), GALOUZO (J. G.) & RASTEGAIIEFF (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 Ekaterinoslav 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.

HANSCHHELL (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 Espiroquetas 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.

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 Trypanosomiasis 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.). **Hémogregarines 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 danilewskyi* 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 microfilariae 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.

BISHOPP (J. 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.

HOEPLI (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. Tierärztl. 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. Tierärztl. 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.

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 bactériidies 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 Guinea-pigs 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 guinea-pigs 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 guinea-pigs were inoculated intravenously, intraperitoneally, 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 guinea-pigs 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 Guinea-pigs 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 guinea-pig the reverse is the case.

Strains of fowl cholera bacilli and Paratyphoid B bacilli isolated from natural cases of guinea-pig 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 bactérien 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 months 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 bactérien. [**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'évolution 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.

IZUKA (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 Carbunco Sintomático y de "La Mancha."** [**The Identity of Blackleg with "La Mancha."**]*—Revist. Inst. Bact. Dept. Nac. Hvg.* 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. Tierärztl. 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.

FROHÖSE (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, dulcitol, 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. Tierärztl. 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 formalized 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 formalized whole culture.

BALAZET (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.

BALAZET (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 flocculation. [**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 $3\frac{1}{2}$ 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 différenciation 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.

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. Veter. 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. Tierärztl. Woch.* 1926. Aug. 21. Vol. 34. No. 34. pp. 603-606.

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 dermatropic 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.) & STYLIANOPOULOU (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 STYLIANOPOULO, 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.

DA SILVA (E. P.). Apparition précoce de substances rabcides 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.

— Persistence de substances rabcides 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. Tierärztl. Woch.* 1926. Nov. 19. Vol. 42. No. 47. pp. 801-802.

MYCOTIC DISEASES.

NAINSOUTA (R.). Action spécifique 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. Tierärz. 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 epizootica 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 μ in length, 2-4 μ 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.*

MISCELLANEOUS.

SULDEY (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.

* 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.) & MUSO (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.
- MUSO (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.
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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.

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[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 lipid 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.

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 trypanosomiasés 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 carcasses 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 trypanosomiasis 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 trypanosomiasis 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 cazalbovi*. 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 cazalbouri*) 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 arséniques 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.). *Ricerca 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 papatasi*.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 713-716.

In parallel tests with *P. argentipes* and *P. papatasi* 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 papatasi* 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 papatasi* 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. papatasi*. 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 intracorpuseular 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.

SERGEANT (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 piroplasmids 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 trypanbleu 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 trypanbleu 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 Babesiosis 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 tryptaflavin 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.

DESCHIEENS (R.). *Chilomastix* sp. observé chez le chimpanzé (*Anthropithecus 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 fig.

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.), RASTAGAIIEFF (E. F.), MIZKEWITSCH (W. J.) & TOLSTOFF (A. N.). Ueber die Darmkokzidiose der Schafe in Russland. [**Intestinal Coccidiosis of the Sheep in Russia.**]—*Berlin. Tierärztl. 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 μ by 44–90 μ . 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 spirochètose 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 caeaux. [**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.

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.

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. *Cyclophyllidae*), with n. sp. *F. transvaalensis*, and *P. acanthocirrosa* n. sp. of *Paranoplocephala*. *Inermicapsifer aberratus* n. sp. *Dipylidium fuhrmanni* n. sp. *Hymenolepis macrosclidarum* 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 swinderemianus*, *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 cercariae 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 Lebergelheilmittel für Rinder. [T.53 Merck, a New Drug for the Treatment of Fluke Disease in Cattle.]—*Berlin. Tierärztl. 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 μ long by 8 to 12 μ 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 vomiting. 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 disinfectant 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.

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 Hydatida.]—*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 *G. 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 Elisabethville 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.

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 Schafranschbrandfrage. [**Black-leg in Sheep.**]*—Deut. Tierärztl. 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 infection. 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 formalization. Small doses only are sufficient to confer immunity.

CLAVERIE (J.). Au sujet du charbon bactérien 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 bactéries 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 hyper-immunized 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 Guinea-pigs.**—*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 litre 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.

PRIEBRAM (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 Bakterienkulturen. [**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.

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.

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 piroplasmiasis 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. Tierärz. 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 carcasses 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.

KUNIKE (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. Tierärztl. 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. Tierärztl. 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.

MEISSNER (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 conditions. 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.

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.

MYCOTIC DISEASES.

LAJOS (T. V.). La fórmula leucocitaria en la linfangitis epizootica. [**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 epizootica. [**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.

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 premonitory 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 vomiting 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 vomiting 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*, *Ornithodoros megnini*, *Ornithodoros 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.

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DISEASES DUE TO PROTOZOAN PARASITES.

SERGEANT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les piroplasmoses bovines. La "fièvre de la côte orientale" et la theilériose 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 intracorpuseular 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 $2\frac{1}{2}$ 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

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 carcasses 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 intracorpuseular 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-corpuseular 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 carcasses 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.). **Spécificité 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 infestation 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 *Isoospora* 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. Tierärztl. 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 taniola 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 (P). 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 24.17μ in length by 1.35μ in breadth, the latter excluding the undulating membrane. There was a free flagellum, which is included in the above measurement of length, about 9μ long. These measurements are less than those given by JOLYET and DE NABIAS ($30-36\mu$) and ASHWORTH and others (28.4μ).

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 *Spilopsyllus 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 *Schizotrypanum 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 kinetocore 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 μ in length, by 4 μ 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 toxicity 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.

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.

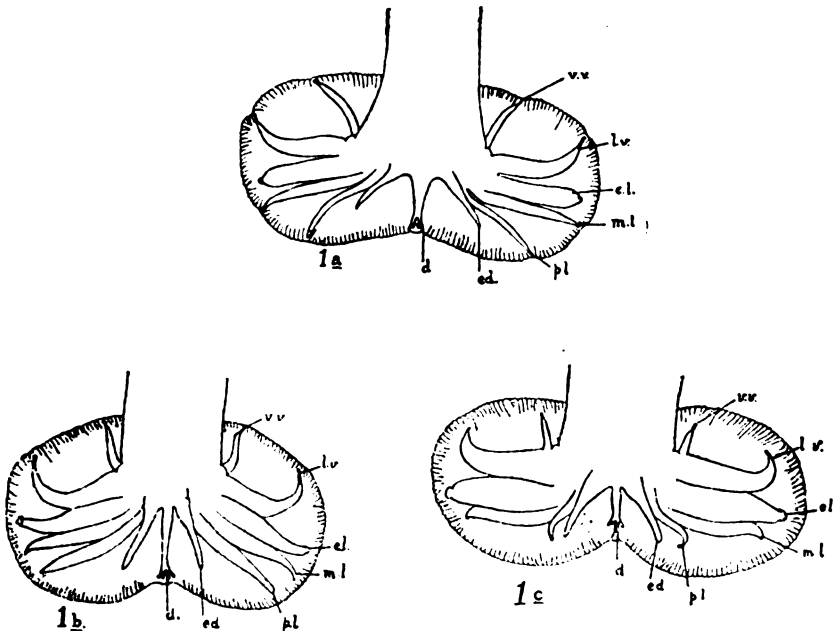
QUIROGA (S. S.) & SCASSO (R.). Epidemia de Enteritis coccidiana en los pollitos. [Epidemic of Enteritis due to *Coccidia* in Fowls.]—*Revist. Zootech.* 1927. Feb. 15. Vol. 14. No. 161. pp. 35-40.

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*.

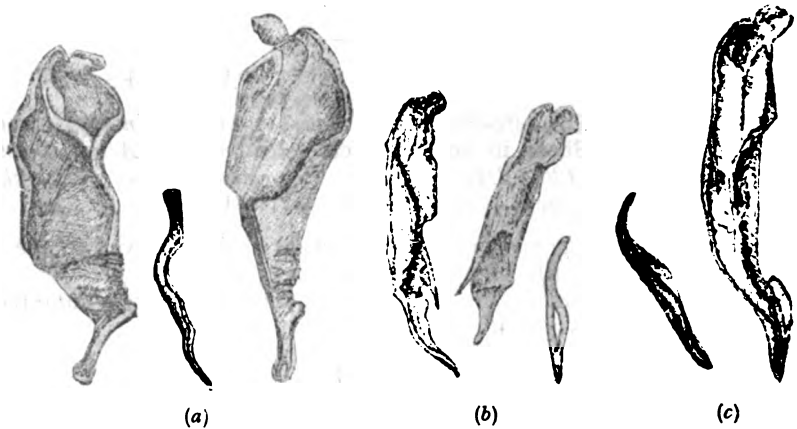
[Reproduced from 11th and 12th Reports of Director of Veterinary Education & Research, Union of South Africa.]

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. falcuatus* 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 μ 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 Microfilarie 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. *hidachiensis*.
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.). Über die Behandlung der Leberegelkrankheit der Schafe. [**The Treatment of Fluke Disease in Sheep.**]—*Deut. Tierärztl. Wochenschr.* 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. Tierärztl. Wochens.* 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.

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 mansonii* (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.

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. Tierärztl. 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 $\frac{1}{2}$ 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 $\frac{1}{4}$ 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.

STOLYGO (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 kilogram. 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 kilogram. 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 kilogram.

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 saccharose. 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 phtalein.

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 2μ – 3μ in length by 0.5μ 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.

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 infrequency, *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 glands 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.

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.). Schutzzimpfungsversuche gegen die Tollwut bei Hunden. [**Protective Inoculation of Dogs against Rabies.**]—*Arch. 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 manifestations 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 Lungen-seucheerregers 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 colonics 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 lipid 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 Guinea-pigs.—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 RÜHLE 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.—KUH 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 carcasses 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, piroplasmiasis, 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.), 1½ lb. 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 carcasses, 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 Lungen-seuche 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.

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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 brunipes* 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 guinea-pigs failed. Direct transmission from horse to horse (with 25 flies) was successful. With an interval of half-an-hour transmission from horse to guinea-pig failed.

With *H. irrorata* two experiments were carried out. An infected dog and guinea-pigs 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 guinea-pigs.

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.

With progressively smaller doses of "Germanin" the effects were progressively less marked, until at 0.0001 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 trypanosomiasis 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 cerebrospinal 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.). Rinderbabesiellöse in Bessarabien und ihre erfolgreiche Behandlung mit Hexamethylentetramin. [**The Successful Treatment of Bovine Babesiosis with Hexamethylenetetramine in Bessarabia.**]—*Berlin. Tierärztl. 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-PÉTRASCHESKY (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 piroplasmiasis. 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.) & RASTEGAIIEFF (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 debliccki*.

No piroplasmas were found in 16 dogs, but there was one case of leucocytozoon 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. papatasi*. Nine experiments with *L. tropica* which had developed from 2 to 7 days in *P. papatasi* 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 papatasi*.**—*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. papatasi 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. papatasi*. *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 infrequency 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.

GRANOUILLET & THU. Sur une forme kystique anormale et rare due 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. Vét.* 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 130μ 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.

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.). Über die Oxyuris des Schafes und der Ziege. [**The Oxyuris of the Sheep and Goat.**]—*Deut. Tierarzt. Woch.* 1927. July 9. Vol. 35. No. 28. pp. 455–456. With 1 text fig.

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. Tierärztl. 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 médical. [**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 nouveau-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 bactérien 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 Black quarter.**]—*Berlin. Tierärztl. 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 vibriion 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 enteritidis.

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 debris of a carcass, and found that material from the same carcass 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 Modifikation 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. suispestifer* the relationship of the types was 5 to 1. Occasionally both forms of flagella may be found in a single organism.

VAN HEELSBERGER (T.). Een Geval van echte "Gasbrand" (*Bac. phlegmonis emphysematosae* E. Fränkel) bij het 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. Tierärztl. 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.

DISEASES DUE TO FILTERABLE VIRUSES.

SCHERN (K.). Postinfektionelle Immunisierungsversuche sowie Immunisierungsversuche in Verdachtsfällen gegen Tollwut unter den Bedingungen der Praxis. [**Post-Inflectional Immunization and Immunization in Suspected Cases of Rabies under the Conditions of Practice.**]—*Berlin. Tierärztl. 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. Tierärztl. 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 (Méthode 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.

KIJI (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 8½ lb.)

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 chevreux au Maroc. [**Contagious Pseudo-Ecthyma 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-ecthyma 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. Miegerville 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 undoubtedly 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 Fibrosa (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.

DELOIRME (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. vincentii*. 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 Reagents 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.

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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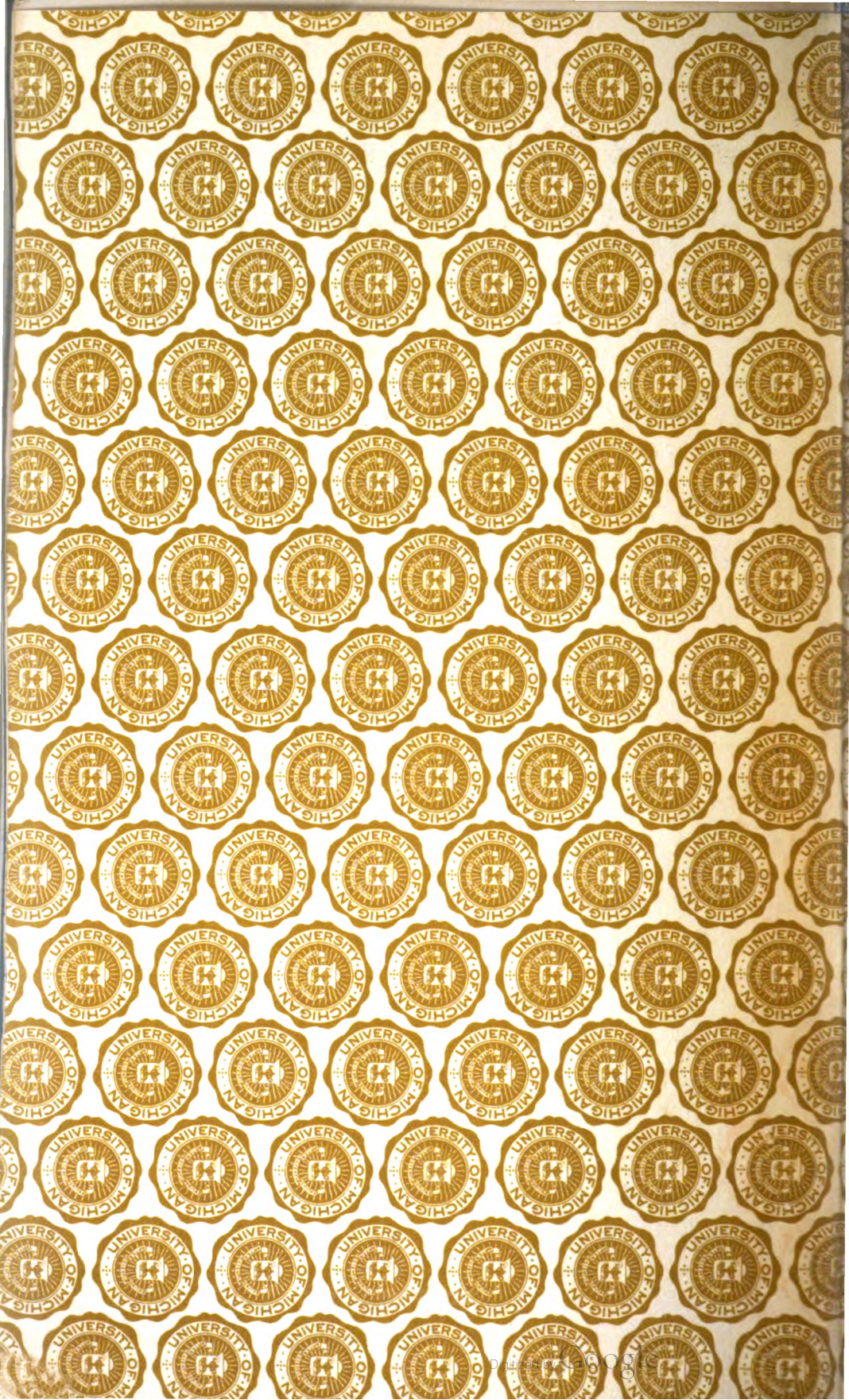
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